



Junos[®] OS

ATM Interfaces Configuration Guide

Release
12.3



Published: 2012-12-05

Juniper Networks, Inc.
1194 North Mathilda Avenue
Sunnyvale, California 94089
USA
408-745-2000
www.juniper.net

This product includes the Envoy SNMP Engine, developed by Epilogue Technology, an Integrated Systems Company. Copyright © 1986-1997, Epilogue Technology Corporation. All rights reserved. This program and its documentation were developed at private expense, and no part of them is in the public domain.

This product includes memory allocation software developed by Mark Moraes, copyright © 1988, 1989, 1993, University of Toronto.

This product includes FreeBSD software developed by the University of California, Berkeley, and its contributors. All of the documentation and software included in the 4.4BSD and 4.4BSD-Lite Releases is copyrighted by the Regents of the University of California. Copyright © 1979, 1980, 1983, 1986, 1988, 1989, 1991, 1992, 1993, 1994. The Regents of the University of California. All rights reserved.

GateD software copyright © 1995, the Regents of the University. All rights reserved. Gate Daemon was originated and developed through release 3.0 by Cornell University and its collaborators. Gated is based on Kirton's EGP, UC Berkeley's routing daemon (routed), and DCN's HELLO routing protocol. Development of Gated has been supported in part by the National Science Foundation. Portions of the GateD software copyright © 1988, Regents of the University of California. All rights reserved. Portions of the GateD software copyright © 1991, D. L. S. Associates.

This product includes software developed by Maker Communications, Inc., copyright © 1996, 1997, Maker Communications, Inc.

Juniper Networks, Junos, Steel-Belted Radius, NetScreen, and ScreenOS are registered trademarks of Juniper Networks, Inc. in the United States and other countries. The Juniper Networks Logo, the Junos logo, and JunosE are trademarks of Juniper Networks, Inc. All other trademarks, service marks, registered trademarks, or registered service marks are the property of their respective owners.

Juniper Networks assumes no responsibility for any inaccuracies in this document. Juniper Networks reserves the right to change, modify, transfer, or otherwise revise this publication without notice.

Products made or sold by Juniper Networks or components thereof might be covered by one or more of the following patents that are owned by or licensed to Juniper Networks: U.S. Patent Nos. 5,473,599, 5,905,725, 5,909,440, 6,192,051, 6,333,650, 6,359,479, 6,406,312, 6,429,706, 6,459,579, 6,493,347, 6,538,518, 6,538,899, 6,552,918, 6,567,902, 6,578,186, and 6,590,785.

Junos® OS ATM Interfaces Configuration Guide
Release 12.3
Copyright © 2012, Juniper Networks, Inc.
All rights reserved.

Revision History
December 2012—R1 Junos OS 12.3

The information in this document is current as of the date on the title page.

YEAR 2000 NOTICE

Juniper Networks hardware and software products are Year 2000 compliant. Junos OS has no known time-related limitations through the year 2038. However, the NTP application is known to have some difficulty in the year 2036.

END USER LICENSE AGREEMENT

The Juniper Networks product that is the subject of this technical documentation consists of (or is intended for use with) Juniper Networks software. Use of such software is subject to the terms and conditions of the End User License Agreement ("EULA") posted at <http://www.juniper.net/support/eula.html>. By downloading, installing or using such software, you agree to the terms and conditions of that EULA.

Abbreviated Table of Contents

	About This Guide	xv
Part 1	ATM Interfaces Configuration Statements Overview	
Chapter 1	ATM Interfaces Configuration Statements and Hierarchy	3
Part 2	Configuring ATM Interfaces	
Chapter 2	Configuring ATM Interfaces	27
Chapter 3	Configuring ATM-over-ADSL Interfaces	109
Chapter 4	Configuring ATM-over-SHDSL Interfaces	115
Part 3	ATM Interfaces Configuration Statements	
Chapter 5	Summary of ATM Interfaces Configuration Statements	125
Part 4	ATM Interfaces Troubleshooting	
Chapter 6	Troubleshooting ATM Interfaces	219
Part 5	Index	
	Index	277
	Index of Statements and Commands	283

Table of Contents

	About This Guide	xv
	Documentation and Release Notes	xv
	Supported Routing Platforms	xv
	Using the Examples in This Manual	xvi
	Merging a Full Example	xvi
	Merging a Snippet	xvii
	Documentation Conventions	xvii
	Documentation Feedback	xix
	Requesting Technical Support	xix
	Self-Help Online Tools and Resources	xix
	Opening a Case with JTAC	xx
Part 1	ATM Interfaces Configuration Statements Overview	
Chapter 1	ATM Interfaces Configuration Statements and Hierarchy	3
	[edit interfaces] Hierarchy Level	3
	[edit logical-systems] Hierarchy Level	19
Part 2	Configuring ATM Interfaces	
Chapter 2	Configuring ATM Interfaces	27
	ATM Interfaces Overview	28
	ATM1 Physical and Logical Configuration Statement Hierarchies	30
	ATM2 IQ Physical and Logical Configuration Statement Hierarchies	32
	Supported Features on ATM1 and ATM2 IQ Interfaces	34
	Configuring Communication with Directly Attached ATM Switches and Routers	39
	Example: Configuring Communication with Directly Attached ATM Switches and Routers	39
	Enabling ILMI for Cell Relay	40
	Example: Enabling ILMI for Cell Relay	41
	Enabling Passive Monitoring on ATM Interfaces	41
	Removing MPLS Labels from Incoming Packets	42
	Configuring the ATM PIC Type	43
	Example: Configuring the ATM PIC Type	44
	Configuring ATM Cell-Relay Promiscuous Mode	45
	Examples: Configuring ATM Cell-Relay Promiscuous Mode	46
	Configuring the Maximum Number of ATM1 VCs on a VP	48

Configuring Layer 2 Circuit Transport Mode	49
Examples: Configuring IQ Layer 2 Circuit Transport Mode	52
Layer 2 Circuit Transport Mode on ATM MICs Overview	57
Configuring Layer 2 Circuit Transport Mode on ATM MICs	57
Example: Configuring Layer 2 Circuit Transport Mode on ATM MICs	58
Configuring Layer 2 Circuit Cell-Relay Promiscuous Mode	61
Example: Configuring Layer 2 Circuit Cell-Relay Promiscuous Mode	61
Configuring Layer 2 Circuit Trunk Mode Scheduling	62
Example: Configuring Layer 2 Circuit Trunk Mode Scheduling	63
Configuring CoS Queues in Layer 2 Circuit Trunk Mode	64
Example: Configuring CoS Queues in Layer 2 Circuit Trunk Mode	66
Configuring the Layer 2 Circuit Cell-Relay Cell Maximum	67
Class-Based Cell Bundling	67
Configuring the OAM F4 Cell Flows	68
Defining Virtual Path Tunnels	69
Configuring a Point-to-Point ATM1 or ATM2 IQ Connection	70
Configuring a Point-to-Multipoint ATM1 or ATM2 IQ Connection	70
Configuring a Multicast-Capable ATM1 or ATM2 IQ Connection	71
Configuring Inverse ATM1 or ATM2 ARP	72
Defining the ATM Traffic-Shaping Profile	72
Configuring ATM CBR	73
Configuring ATM2 IQ Real-Time VBR	74
Configuring ATM VBR	74
Specifying ATM1 Shaping Values	75
Example: Specifying ATM1 Shaping Values	77
Specifying ATM2 IQ Shaping Values	78
Configuring the ATM1 Queue Length	78
Configuring the ATM2 IQ EPD Threshold	79
Example: Configuring the ATM2 IQ EPD Threshold	80
Configuring Two EPD Thresholds per Queue	81
Configuring the ATM2 IQ Transmission Weight	81
Defining the ATM OAM F5 Loopback Cell Period	82
Configuring the ATM OAM F5 Loopback Cell Threshold	82
Configuring ATM Interface Encapsulation	83
Configuring an ATM1 Cell-Relay Circuit	85
Example: Configuring an ATM1 Cell-Relay Circuit	85
Configuring PPP over ATM2 Encapsulation	87
Example: Configuring PPP over ATM2 IQ Encapsulation	88
Configuring E3 and T3 Parameters on ATM Interfaces	90
Configuring SONET/SDH Parameters on ATM Interfaces	91
Configuring ATM2 IQ VC Tunnel CoS Components	92
Configuring Linear RED Profiles	93
Configuring an ATM Scheduler Map	94
Enabling Eight Queues on ATM2 IQ Interfaces	95
Example: Enabling Eight Queues on T Series, M120, and M320 Routers	96
Configuring VC CoS Mode	101
Enabling the PLP Setting to Be Copied to the CLP Bit	101
Configuring ATM CoS on the Logical Interface	102

	Example: Configuring ATM2 IQ VC Tunnel CoS Components	102
	Configuring ATM Scheduler on Ethernet VPLS over a Bridged ATM Interface . . .	103
	Example: Configuring ATM1 Interfaces	104
	Example: Configuring ATM2 IQ Interfaces	106
	Example: Configuring ATM Scheduler Map on Ethernet VPLS over Bridged ATM Interfaces	107
Chapter 3	Configuring ATM-over-ADSL Interfaces	109
	ATM-over-ADSL Overview	109
	Configuring Physical ATM Interfaces and Logical Interface Properties for ADSL	110
	Configuring the ATM-over-ADSL Virtual Path Identifier	111
	Configuring the ATM-over-ADSL Physical Interface Operating Mode	111
	Configuring the ATM-over-ADSL Physical Interface Encapsulation Type	112
	Configuring the ATM-over-ADSL Logical Interface Encapsulation Type	112
	Configuring the ATM-over-ADSL Protocol Family	114
	Configuring the ATM-over-ADSL Virtual Channel Identifier	114
Chapter 4	Configuring ATM-over-SHDSL Interfaces	115
	ATM-over-SHDSL Overview	115
	Configuring ATM Mode for SHDSL Overview	116
	Configuring ATM Mode on the PIM	117
	Configuring SHDSL Operating Mode on an ATM Physical Interface	118
	Configuring Encapsulation on the ATM Physical Interface	119
	Configuring Logical Interface Properties	119
	Example: Configuring an ATM-over-SHDSL Interface	120
	Verifying an ATM-over-SHDSL Interface Configuration	121
Part 3	ATM Interfaces Configuration Statements	
Chapter 5	Summary of ATM Interfaces Configuration Statements	125
	advertise-interval	125
	allow-any-vci	126
	annex	126
	aps	127
	atm-encapsulation	128
	atm-options	129
	atm-scheduler-map	130
	authentication-key	131
	buildout (E3 or T3 over ATM Interfaces)	131
	bytes	132
	cbit-parity	133
	cbr	134
	cell-bundle-size	135
	current	135
	down-count	136
	dsl-options	137

e3-options	138
encapsulation	139
encapsulation (Logical Interface)	140
encapsulation (Physical Interface)	144
epd-threshold	149
epd-threshold (Logical Interface)	149
epd-threshold (Physical Interface)	150
family	151
fast-aps-switch	155
force	156
forwarding-class (ATM2 IQ Scheduler Maps)	156
framing (E1, E3, and T1 Interfaces)	157
high-plp-max-threshold	158
high-plp-threshold	158
hold-time	159
hold-time (APS)	159
hold-time (SONET/SDH Defect Triggers)	160
ilmi	161
inverse-arp	162
line-rate	163
linear-red-profile	164
linear-red-profiles	165
lockout	165
loopback (ADSL, DS0, E1/E3, SONET/SDH, SHDSL, and T1/T3)	166
low-plp-max-threshold	167
low-plp-threshold	168
maximum-vcs	169
mpls (Interfaces)	170
multicast-vci	171
multipoint-destination	172
neighbor (Automatic Protection Switching for SONET/SDH)	173
oam-liveness	174
oam-period	175
operating-mode	176
paired-group	177
passive-monitor-mode	178
payload-scrambler	179
pic-type	180
plp-to-clp	180
plp1	181
pop-all-labels	182
priority (Schedulers)	183
promiscuous-mode	183
protect-circuit	184
queue-depth	184
queue-length	185
receive-options-packets	185
receive-ttl-exceeded	186
request	186

required-depth	187
revert-time (Interfaces)	188
rfc-2615	188
rtvbr	189
scheduler-maps	190
shaping	191
shdsl-options	192
snext	193
snr-margin	194
source	195
t3-options	196
transmit-weight	197
transmit-weight (ATM2 IQ CoS Forwarding Class)	197
transmit-weight (ATM2 IQ Virtual Circuit)	198
trigger	199
trunk-bandwidth	200
trunk-id	201
unit	202
up-count	208
use-null-cw	209
vbr	210
vc-cos-mode	211
vci	212
vpi	213
vpi (ATM CCC Cell-Relay Promiscuous Mode)	213
vpi (Define Virtual Path)	214
vpi (Logical Interface and Interworking)	215
working-circuit	215
z0-increment	216

Part 4

ATM Interfaces Troubleshooting

Chapter 6

Troubleshooting ATM Interfaces	219
Investigating Interface Steps and Commands	219
Investigating Interface Steps and Commands Overview	219
Monitoring Interfaces	219
Performing a Loopback Test on an Interface	220
Locating Interface Alarms	222
Determining ATM Interface Type	222
Checklist for Determining ATM Interface Type	222
Determining the ATM Interface Type and Configuration	224
Determining the ATM Interface Type	224
Identifying the ATM Interface Type	225
Verifying the ATM Configuration	226
Verifying the Configuration of an ATM1 Interface	226
Verifying the Configuration of an ATM2 IQ Interface	227

Verifying the Configuration of an ATM MIC Interface	228
Examples of Incorrect Configurations of ATM Options	229
Verifying the Configuration of the VCI on an ATM1 Interface	229
Verifying the Configuration of the VCI on an ATM2 IQ Interface	230
Verifying the Configuration of Promiscuous Mode on an ATM2 IQ Interface	231
Monitoring ATM Interfaces	233
Checklist for Monitoring ATM Interfaces	233
Monitoring ATM Interfaces	234
Monitoring ATM1 Interfaces	235
Displaying the Status of a Specific ATM1 Interface	235
Displaying Extensive Status Information for a Specific ATM1 Interface	235
Monitoring Statistics for an ATM1 Interface	237
Monitoring ATM2 IQ Interfaces	239
Displaying the Status of a Specific ATM2 IQ Interface	239
Displaying Extensive Information for a Specific ATM2 Interface	241
Monitoring Statistics for an ATM2 Interface	246
Monitoring ATM MIC Interfaces	247
Displaying the Status of a Specific ATM MIC Interface	247
Displaying Extensive Information for a Specific ATM MIC Interface	249
Monitoring Traffic and Error Statistics for an ATM MIC Interface	252
Using Loopback Testing for ATM Interfaces	254
Checklist for Using Loopback Testing for ATM Interfaces	254
Diagnosing a Suspected Hardware Problem with an ATM1 or ATM2 IQ Interface	255
Creating a Loopback	255
Creating a Physical Loopback	256
Configuring a Local Loopback	256
Setting Clocking to Internal	257
Verifying That the ATM Interface Is Up	257
Clearing ATM Interface Statistics	260
Pinging the ATM Interface	260
Checking for ATM Interface Error Statistics	261
Diagnosing a Suspected Circuit Problem	264
Creating a Loop from the Router to the Network	264
Creating a Loop to the Router from Various Points in the Network	265
Locating ATM Alarms and Errors	266
List of Common ATM Alarms and Error	266
Displaying ATM1 and ATM2 Alarms and Errors	266

Part 5

Index

Index	277
Index of Statements and Commands	283

List of Figures

Part 2	Configuring ATM Interfaces	
Chapter 2	Configuring ATM Interfaces	27
	Figure 1: Layer 2 Circuit Trunk Topology	53
	Figure 2: Example Topology for Router with Eight Queues	96
Part 4	ATM Interfaces Troubleshooting	
Chapter 6	Troubleshooting ATM Interfaces	219
	Figure 3: Local Loopback	256
	Figure 4: Loop from the Router to the Network	265

List of Tables

	About This Guide	xv
	Table 1: Notice Icons	xvii
	Table 2: Text and Syntax Conventions	xviii
Part 2	Configuring ATM Interfaces	
Chapter 2	Configuring ATM Interfaces	27
	Table 3: ATM1 and ATM2 IQ Supported Features	34
	Table 4: ILMI Support by Encapsulation Type	40
	Table 5: Shaping Rate Range by Interface Type	74
	Table 6: ATM1 Traffic-Shaping Rates	76
	Table 7: EPD Threshold Range by Interface Type	80
	Table 8: ATM Logical Interface Encapsulation Types	84
Chapter 3	Configuring ATM-over-ADSL Interfaces	109
	Table 9: ATM-over-ADSL Operational Modes	111
	Table 10: ATM-over-ADSL Encapsulation Types	113
Part 4	ATM Interfaces Troubleshooting	
Chapter 6	Troubleshooting ATM Interfaces	219
	Table 11: Commands Used to Monitor Interfaces	220
	Table 12: Commands Used to Perform Loopback Testing on Interfaces	221
	Table 13: Checklist for Determining ATM Interface Type	223
	Table 14: show chassis hardware Output Fields	226
	Table 15: Checklist for Monitoring ATM Interfaces	233
	Table 16: Status of ATM Interfaces	234
	Table 17: show interfaces terse Output Fields	248
	Table 18: Checklist for Using Loopback Testing for ATM Interfaces	254
	Table 19: Problems and Solutions for a Physical Link That Is Down	259
	Table 20: List of Common ATM Alarms and Error	266
	Table 21: ATM Interface Input and Output Errors	270
	Table 22: ATM Active Alarms and Defects	272

About This Guide

This preface provides the following guidelines for using the *Junos[®] OS ATM Interfaces Configuration Guide*:

- [Documentation and Release Notes on page xv](#)
- [Supported Routing Platforms on page xv](#)
- [Using the Examples in This Manual on page xvi](#)
- [Documentation Conventions on page xvii](#)
- [Documentation Feedback on page xix](#)
- [Requesting Technical Support on page xix](#)

Documentation and Release Notes

To obtain the most current version of all Juniper Networks[®] technical documentation, see the product documentation page on the Juniper Networks website at <http://www.juniper.net/techpubs/>.

If the information in the latest release notes differs from the information in the documentation, follow the product Release Notes.

Juniper Networks Books publishes books by Juniper Networks engineers and subject matter experts. These books go beyond the technical documentation to explore the nuances of network architecture, deployment, and administration. The current list can be viewed at <http://www.juniper.net/books>.

Supported Routing Platforms

For the features described in this manual, the Junos OS currently supports the following routing platforms:

- J Series
- M Series
- MX Series
- T Series
- ACX Series
- PTX Series

Using the Examples in This Manual

If you want to use the examples in this manual, you can use the **load merge** or the **load merge relative** command. These commands cause the software to merge the incoming configuration into the current candidate configuration. The example does not become active until you commit the candidate configuration.

If the example configuration contains the top level of the hierarchy (or multiple hierarchies), the example is a *full example*. In this case, use the **load merge** command.

If the example configuration does not start at the top level of the hierarchy, the example is a *snippet*. In this case, use the **load merge relative** command. These procedures are described in the following sections.

Merging a Full Example

To merge a full example, follow these steps:

1. From the HTML or PDF version of the manual, copy a configuration example into a text file, save the file with a name, and copy the file to a directory on your routing platform.

For example, copy the following configuration to a file and name the file **ex-script.conf**. Copy the **ex-script.conf** file to the **/var/tmp** directory on your routing platform.

```
system {
  scripts {
    commit {
      file ex-script.xml;
    }
  }
}
interfaces {
  fxp0 {
    disable;
    unit 0 {
      family inet {
        address 10.0.0.1/24;
      }
    }
  }
}
```

2. Merge the contents of the file into your routing platform configuration by issuing the **load merge** configuration mode command:

```
[edit]
user@host# load merge /var/tmp/ex-script.conf
load complete
```


Merging a Snippet

To merge a snippet, follow these steps:

1. From the HTML or PDF version of the manual, copy a configuration snippet into a text file, save the file with a name, and copy the file to a directory on your routing platform.

For example, copy the following snippet to a file and name the file **ex-script-snippet.conf**. Copy the **ex-script-snippet.conf** file to the **/var/tmp** directory on your routing platform.

```
commit {
  file ex-script-snippet.xml; }
```

2. Move to the hierarchy level that is relevant for this snippet by issuing the following configuration mode command:

```
[edit]
user@host# edit system scripts
[edit system scripts]
```

3. Merge the contents of the file into your routing platform configuration by issuing the **load merge relative** configuration mode command:

```
[edit system scripts]
user@host# load merge relative /var/tmp/ex-script-snippet.conf
load complete
```

For more information about the **load** command, see the CLI User Guide.

Documentation Conventions

Table 1 on page xvii defines notice icons used in this guide.

Table 1: Notice Icons




Icon	Meaning	Description
	Informational note	Indicates important features or instructions.
	Caution	Indicates a situation that might result in loss of data or hardware damage.
	Warning	Alerts you to the risk of personal injury or death.
	Laser warning	Alerts you to the risk of personal injury from a laser.

Table 2 on page xviii defines the text and syntax conventions used in this guide.

Table 2: Text and Syntax Conventions

Convention	Description	Examples
Bold text like this	Represents text that you type.	To enter configuration mode, type the configure command: user@host> configure
Fixed-width text like this	Represents output that appears on the terminal screen.	user@host> show chassis alarms No alarms currently active
<i>Italic text like this</i>	<ul style="list-style-type: none"> Introduces or emphasizes important new terms. Identifies book names. Identifies RFC and Internet draft titles. 	<ul style="list-style-type: none"> A policy <i>term</i> is a named structure that defines match conditions and actions. <i>Junos OS System Basics Configuration Guide</i> RFC 1997, <i>BGP Communities Attribute</i>
<i>Italic text like this</i>	Represents variables (options for which you substitute a value) in commands or configuration statements.	Configure the machine's domain name: [edit] root@# set system domain-name <i>domain-name</i>
Text like this	Represents names of configuration statements, commands, files, and directories; configuration hierarchy levels; or labels on routing platform components.	<ul style="list-style-type: none"> To configure a stub area, include the stub statement at the [edit protocols ospf area area-id] hierarchy level. The console port is labeled CONSOLE.
< > (angle brackets)	Enclose optional keywords or variables.	stub <default-metric <i>metric</i> >;
(pipe symbol)	Indicates a choice between the mutually exclusive keywords or variables on either side of the symbol. The set of choices is often enclosed in parentheses for clarity.	broadcast multicast (<i>string1</i> <i>string2</i> <i>string3</i>)
# (pound sign)	Indicates a comment specified on the same line as the configuration statement to which it applies.	rsvp { # Required for dynamic MPLS only
[] (square brackets)	Enclose a variable for which you can substitute one or more values.	community name members [<i>community-ids</i>]
Indentation and braces ({ })	Identify a level in the configuration hierarchy.	[edit] routing-options { static { route default { nexthop <i>address</i> ; retain; } } }
;(semicolon)	Identifies a leaf statement at a configuration hierarchy level.	

J-Web GUI Conventions

Table 2: Text and Syntax Conventions (*continued*)

Convention	Description	Examples
Bold text like this	Represents J-Web graphical user interface (GUI) items you click or select.	<ul style="list-style-type: none"> In the Logical Interfaces box, select All Interfaces. To cancel the configuration, click Cancel.
> (bold right angle bracket)	Separates levels in a hierarchy of J-Web selections.	In the configuration editor hierarchy, select Protocols>Ospf .

Documentation Feedback

We encourage you to provide feedback, comments, and suggestions so that we can improve the documentation. You can send your comments to techpubs-comments@juniper.net, or fill out the documentation feedback form at <https://www.juniper.net/cgi-bin/docbugreport/>. If you are using e-mail, be sure to include the following information with your comments:

- Document or topic name
- URL or page number
- Software release version (if applicable)

Requesting Technical Support

Technical product support is available through the Juniper Networks Technical Assistance Center (JTAC). If you are a customer with an active J-Care or JNASC support contract, or are covered under warranty, and need postsales technical support, you can access our tools and resources online or open a case with JTAC.

- JTAC policies—For a complete understanding of our JTAC procedures and policies, review the JTAC User Guide located at <http://www.juniper.net/us/en/local/pdf/resource-guides/7100059-en.pdf>.
- Product warranties—For product warranty information, visit <http://www.juniper.net/support/warranty/>.
- JTAC Hours of Operation —The JTAC centers have resources available 24 hours a day, 7 days a week, 365 days a year.

Self-Help Online Tools and Resources

For quick and easy problem resolution, Juniper Networks has designed an online self-service portal called the Customer Support Center (CSC) that provides you with the following features:

- Find CSC offerings: <http://www.juniper.net/customers/support/>
- Find product documentation: <http://www.juniper.net/techpubs/>

- Find solutions and answer questions using our Knowledge Base: <http://kb.juniper.net/>
- Download the latest versions of software and review release notes:
<http://www.juniper.net/customers/csc/software/>
- Search technical bulletins for relevant hardware and software notifications:
<https://www.juniper.net/alerts/>
- Join and participate in the Juniper Networks Community Forum:
<http://www.juniper.net/company/communities/>
- Open a case online in the CSC Case Management tool: <http://www.juniper.net/cm/>

To verify service entitlement by product serial number, use our Serial Number Entitlement (SNE) Tool: <https://tools.juniper.net/SerialNumberEntitlementSearch/>

Opening a Case with JTAC

You can open a case with JTAC on the Web or by telephone.

- Use the Case Management tool in the CSC at <http://www.juniper.net/cm/>.
- Call 1-888-314-JTAC (1-888-314-5822 toll-free in the USA, Canada, and Mexico).

For international or direct-dial options in countries without toll-free numbers, visit us at <http://www.juniper.net/support/requesting-support.html>

PART 1

ATM Interfaces Configuration Statements Overview

- [ATM Interfaces Configuration Statements and Hierarchy on page 3](#)

CHAPTER 1

ATM Interfaces Configuration Statements and Hierarchy

The following network interfaces hierarchy listings show the complete configuration statement hierarchy for the indicated hierarchy levels, listing all possible configuration statements within the indicated hierarchy levels, and showing their level in the configuration hierarchy. When you are configuring the Junos OS, your current hierarchy level is shown in the banner on the line preceding the **user@host#** prompt.

This section contains the following topics:

- [\[edit interfaces\] Hierarchy Level on page 3](#)
- [\[edit logical-systems\] Hierarchy Level on page 19](#)

[\[edit interfaces\] Hierarchy Level](#)

The statements at the **[edit interfaces *interface-name* unit *logical-unit-number*]** hierarchy level can also be configured at the **[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]** hierarchy level.



NOTE: The accounting-profile statement is an exception to this rule. The accounting-profile statement can be configured at the **[edit interfaces *interface-name* unit *logical-unit-number*]** hierarchy level, but it cannot be configured at the **[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]** hierarchy level.

```
interfaces {
  traceoptions {
    file filename <files number> <match regular-expression> <size size> <world-readable |
      no-world-readable> ;
    flag flag <disable>;
  }
  interface-name {
    accounting-profile name;
    aggregated-ether-options {
      (flow-control | no-flow-control);
      lacp {
        (active | passive);
      }
    }
  }
}
```

```

    link-protection {
        disable;
        (revertive | non-revertive);
        periodic interval;
        system-priority priority;
    }
    link-protection;
    link-speed speed;
    (loopback | no-loopback);
    mc-ae {
        chassis-id chassis-id;
        mc-ae-id mc-ae-id;
        mode (active-active | active-standby);
        redundancy-group group-id;
        status-control (active | standby);
    }
    minimum-links number;
    source-address-filter {
        mac-address;
    }
    (source-filtering | no-source-filtering);
}
aggregated-sonet-options {
    link-speed speed | mixed;
    minimum-links number;
}
atm-options {
    cell-bundle-size cells;
    ilmi;
    linear-red-profiles profile-name {
        high-plp-max-threshold percent;
        low-plp-max-threshold percent;
        queue-depth cells high-plp-threshold percent low-plp-threshold percent;
    }
    mpls {
        pop-all-labels {
            required-depth number;
        }
    }
    pic-type (atm1 | atm2);
    plp-to-clp;
    promiscuous-mode {
        vpi vpi-identifier;
    }
    scheduler-maps map-name {
        forwarding-class class-name {
            epd-threshold cells plp1 cells;
            linear-red-profile profile-name;
            priority (high | low);
            transmit-weight (cells number | percent number);
        }
        vc-cos-mode (alternate | strict);
    }
    use-null-cw;
    vpi vpi-identifier {
        maximum-vcs maximum-vcs;
    }
}

```



```

oam-liveness {
    down-count cells;
    up-count cells;
}
oam-period (seconds | disable);
shaping {
    (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate
    burst length);
    queue-length number;
}
}
clocking clock-source;
data-input (system | interface interface-name);
dce;
serial-options {
    clock-rate rate;
    clocking-mode (dce | internal | loop);
    control-polarity (negative | positive);
    cts-polarity (negative | positive);
    dcd-polarity (negative | positive);
    dce-options {
        control-signal (assert | de-assert | normal);
        cts (ignore | normal | require);
        dcd (ignore | normal | require);
        dsr (ignore | normal | require);
        dtr signal-handling-option;
        ignore-all;
        indication (ignore | normal | require);
        rts (assert | de-assert | normal);
        tm (ignore | normal | require);
    }
    dsr-polarity (negative | positive);
    dte-options {
        control-signal (assert | de-assert | normal);
        cts (ignore | normal | require);
        dcd (ignore | normal | require);
        dsr (ignore | normal | require);
        dtr signal-handling-option;
        ignore-all;
        indication (ignore | normal | require);
        rts (assert | de-assert | normal);
        tm (ignore | normal | require);
    }
    dtr-circuit (balanced | unbalanced);
    dtr-polarity (negative | positive);
    encoding (nrz | nrzi);
    indication-polarity (negative | positive);
    line-protocol protocol;
    loopback mode;
    rts-polarity (negative | positive);
    tm-polarity (negative | positive);
    transmit-clock invert;
}
description text;
dialer-options {

```

```

    pool pool-name <priority priority>;
  }
  disable;
  ds0-options {
    bert-algorithm algorithm;
    bert-error-rate rate;
    bert-period seconds;
    byte-encoding (nx56 | nx64);
    fcs (16 | 32);
    idle-cycle-flag (flags | ones);
    invert-data;
    loopback payload;
    start-end-flag (filler | shared);
  }
  e1-options {
    bert-error-rate rate;
    bert-period seconds;
    fcs (16 | 32);
    framing (g704 | g704-no-crc4 | unframed);
    idle-cycle-flag (flags | ones);
    invert-data;
    loopback (local | remote);
    start-end-flag (filler | shared);
    timeslots time-slot-range;
  }
  e3-options {
    atm-encapsulation (direct | plcp);
    bert-algorithm algorithm;
    bert-error-rate rate;
    bert-period seconds;
    framing feet;
    compatibility-mode (digital-link | kentrox | larscom) <subrate value>;
    fcs (16 | 32);
    framing (g.751 | g.832);
    idle-cycle-flag (filler | shared);
    invert-data;
    loopback (local | remote);
    (payload-scrambler | no-payload-scrambler);
    start-end-flag (filler | shared);
    (unframed | no-unframed);
  }
  encapsulation type;
  es-options {
    backup-interface es-fpc/pic/port;
  }
  fastether-options {
    802.3ad aex;
    (flow-control | no-flow-control);
    ignore-l3-incompletes;
    ingress-rate-limit rate;
    (loopback | no-loopback);
    mpls {
      pop-all-labels {
        required-depth number;
      }
    }
  }
}

```



```
ima-group-options {
  differential-delay number;
  frame-length (32 | 64 | 128 | 256);
  frame-synchronization {
    alpha number;
    beta number;
    gamma number;
  }
  minimum-links number;
  symmetry (symmetrical-config-and-operation |
    symmetrical-config-asymmetrical-operation);
  test-procedure {
    ima-test-start;
    ima-test-stop;
    interface name;
    pattern number;
    period number;
  }
  transmit-clock (common | independent);
  version (1.0 | 1.1);
}
ima-link-options group-id group-id;
interface-set interface-set-name {
  interface ethernet-interface-name {
    (unit unit-number | vlan-tags-outer vlan-tag);
  }
  interface interface-name {
    (unit unit-number);
  }
}
}
isdn-options {
  bchannel-allocation (ascending | descending);
  calling-number number;
  pool pool-name <priority priority>;
  spid1 spid-string;
  spid2 spid-string;
  static-tei-val value;
  switch-type (att5e | etsi | ni1 | ntdms100 | ntt);
  t310 seconds;
  tei-option (first-call | power-up);
}
keepalives <down-count number> <interval seconds> <up-count number>;
link-mode mode;
lmi {
  lmi-type (ansi | itu | c-lmi);
  n391dte number;
  n392dce number;
  n392dte number;
  n393dce number;
  n393dte number;
  t391dte seconds;
  t392dce seconds;
}
lsq-failure-options {
  no-termination-request;
  [ trigger-link-failure interface-name ];
```

```

}
mac mac-address;
mlfr-uni-nni-bundle-options {
    acknowledge-retries number;
    acknowledge-timer milliseconds;
    action-red-differential-delay (disable-tx | remove-link);
    drop-timeout milliseconds;
    fragment-threshold bytes;
    cisco-interoperability send-lip-remove-link-for-link-reject;
    hello-timer milliseconds;
    link-layer-overhead percent;
    lmi-type (ansi | itu | c-lmi);
    minimum-links number;
    mrru bytes;
    n391 number;
    n392 number;
    n393 number;
    red-differential-delay milliseconds;
    t391 seconds;
    t392 seconds;
    yellow-differential-delay milliseconds;
}
modem-options {
    dialin (console | routable);
    init-command-string initialization-command-string;
}
mtu bytes;
multi-chassis-protection {
    peer a.b.c.d {
        interface interface-name;
    }
}
multiservice-options {
    (core-dump | no-core-dump);
    (syslog | no-syslog);
}
native-vlan-id number;
no-gratuitous-arp-request;
no-keepalives;
no-partition {
    interface-type type;
}
no-vpivci-swapping;
otn-options {
    fec (efec | gfec | none);
    (laser-enable | no-laser-enable);
    (line-loopback | no-line-loopback);
    pass-thru;
    rate (fixed-stuff-bytes | no-fixed-stuff-bytes | pass-thru);
    transmit-payload-type number;
    trigger (oc-lof | oc-lom | oc-los | oc-wavelength-lock | odu-ais | odu-bbe-th | odu-bdi
        | odu-es-th | odu-lck | odu-oci | odu-sd | odu-ses-th | odu-ttim | odu-uas-th |
        opu-ptm | otu-ais | otu-bbe-th | otu-bdi | otu-es-th | otu-fec-deg | otu-fec-exe |
        otu-iae | otu-sd | otu-ses-th | otu-ttim | otu-uas-th);
    tti;
}

```

```
optics-options {
  wavelength nm;
  alarm alarm-name {
    (syslog | link-down);
  }
  warning warning-name {
    (syslog | link-down);
  }
}
partition partition-number oc-slice oc-slice-range interface-type type;
timeslots time-slot-range;
passive-monitor-mode;
per-unit-scheduler;
ppp-options {
  chap {
    access-profile name;
    default-chap-secret name;
    local-name name;
    passive;
  }
  compression {
    acfc;
    pfc;
  }
  dynamic-profile profile-name;
  no-termination-request;
  pap {
    access-profile name;
    local-name name;
    local-password password;
    compression;
  }
}
psn-vcip psn-vci-identifier;
psn-vpip psn-vpi-identifier;
receive-bucket {
  overflow (discard | tag);
  rate percentage;
  threshold bytes;
}
redundancy-options {
  priority sp-fpc/pic/port;
  secondary sp-fpc/pic/port;
  hot-standby;
}
satop-options {
  payload-size n;
}
schedulers number;
serial-options {
  clock-rate rate;
  clocking-mode (dce | internal | loop);
  control-polarity (negative | positive);
  cts-polarity (negative | positive);
  dcd-polarity (negative | positive);
  dce-options {
```

```

control-signal (assert | de-assert | normal);
cts (ignore | normal | require);
dcd (ignore | normal | require);
dsr (ignore | normal | require);
dtr signal-handling-option;
ignore-all;
indication (ignore | normal | require);
rts (assert | de-assert | normal);
tm (ignore | normal | require);
}
dsr-polarity (negative | positive);
dte-options {
    control-signal (assert | de-assert | normal);
    cts (ignore | normal | require);
    dcd (ignore | normal | require);
    dsr (ignore | normal | require);
    dtr signal-handling-option;
    ignore-all;
    indication (ignore | normal | require);
    rts (assert | de-assert | normal);
    tm (ignore | normal | require);
}
dtr-circuit (balanced | unbalanced);
dtr-polarity (negative | positive);
encoding (nrz | nrzi);
indication-polarity (negative | positive);
line-protocol protocol;
loopback mode;
rts-polarity (negative | positive);
tm-polarity (negative | positive);
transmit-clock invert;
}
services-options {
    inactivity-timeout seconds;
    open-timeout seconds;
    session-limit {
        maximum number;
        rate new-sessions-per-second;
    }
    syslog {
        host hostname {
            facility-override facility-name;
            log-prefix prefix-number;
            services priority-level;
        }
    }
}
shdsl-options {
    annex (annex-a | annex-b);
    line-rate line-rate;
    loopback (local | remote);
    snr-margin {
        current margin;
        snext margin;
    }
}

```

```

sonet-options {
  aggregate asx;
  aps {
    advertise-interval milliseconds;
    annex-b;
    authentication-key key;
    fast-aps-switch;
    force;
    hold-time milliseconds;
    lockout;
    neighbor address;
    paired-group group-name;
    preserve-interface;
    protect-circuit group-name;
    request;
    revert-time seconds;
    switching-mode (bidirectional | unidirectional);
    working-circuit group-name;
  }
  bytes {
    c2 value;
    e1-quiet value;
    f1 value;
    f2 value;
    s1 value;
    z3 value;
    z4 value;
  }
  fcs (16 | 32);
  loopback (local | remote);
  mpls {
    pop-all-labels {
      required-depth number;
    }
  }
  path-trace trace-string;
  (payload-scrambler | no-payload-scrambler);
  rfc-2615;
  trigger {
    defect ignore;
    hold-time up milliseconds down milliseconds;
  }
  vtmapping (itu-t | klm);
  (z0-increment | no-z0-increment);
}
speed (10m | 100m | 1g | oc3 | oc12 | oc48);
stacked-vlan-tagging;
switch-options {
  switch-port port-number {
    (auto-negotiation | no-auto-negotiation);
    speed (10m | 100m | 1g);
    link-mode (full-duplex | half-duplex);
  }
}
}
t1-options {
  bert-algorithm algorithm;
}

```



```

bert-error-rate rate;
bert-period seconds;
buildout value;
byte-encoding (nx56 | nx64);
crc-major-alarm-threshold (1e-3 | 5e-4 | 1e-4 | 5e-5 | 1e-5);
crc-minor-alarm-threshold (1e-3 | 5e-4 | 1e-4 | 5e-5 | 1e-5 | 5e-6 | 1e-6);
fcs (16 | 32);
framing (esf | sf);
idle-cycle-flag (flags | ones);
invert-data;
line-encoding (ami | b8zs);
loopback (local | payload | remote);
remote-loopback-respond;
start-end-flag (filler | shared);
timeslots time-slot-range;
}
t3-options {
  atm-encapsulation (direct | plcp);
  bert-algorithm algorithm;
  bert-error-rate rate;
  bert-period seconds;
  buildout feet;
  (cbit-parity | no-cbit-parity);
  compatibility-mode (adtran | digital-link | kentrox | larscom | verilink) <subrate
    value>;
  fcs (16 | 32);
  (feac-loop-respond | no-feac-loop-respond);
  idle-cycle-flag value;
  (long-buildout | no-long-buildout);
  (loop-timing | no-loop-timing);
  loopback (local | payload | remote);
  (mac | no-mac);
  (payload-scrambler | no-payload-scrambler);
  start-end-flag (filler | shared);
}
traceoptions {
  flag flag <flag-modifier> <disable>;
}
transmit-bucket {
  overflow discard;
  rate percentage;
  threshold bytes;
}
(traps | no-traps);
unidirectional;
vlan-tagging;
vlan-vci-tagging;
unit logical-unit-number {
  accept-source-mac {
    mac-address mac-address {
      policer {
        input cos-policer-name;
        output cos-policer-name;
      }
    }
  }
}
}

```

```

accounting-profile name;
advisory-options {
    downstream-rate rate;
    upstream-rate rate;
}
allow-any-vci;
atm-scheduler-map (map-name | default);
backup-options {
    interface interface-name;
}
bandwidth rate;
cell-bundle-size cells;
clear-dont-fragment-bit;
compression {
    rtp {
        f-max-period number;
        maximum-contexts number <force>;
        queues [ queue-numbers ];
        port {
            minimum port-number;
            maximum port-number;
        }
    }
}
compression-device interface-name;
copy-tos-to-outer-ip-header;
demux-destination family;
demux-source family;
demux-options {
    underlying-interface interface-name;
}
description text;
interface {
    l2tp-interface-id name;
    (dedicated | shared);
}
dialer-options {
    activation-delay seconds;
    callback;
    callback-wait-period time;
    deactivation-delay seconds;
    dial-string [ dial-string-numbers ];
    idle-timeout seconds;
    incoming-map {
        caller (caller-id | accept-all);
        initial-route-check seconds;
        load-interval seconds;
        load-threshold percent;
        pool pool-name;
        redial-delay time;
        watch-list {
            [ routes ];
        }
    }
}
disable;

```

```

disable-mlppp-inner-ppp-pfc;
dlci dlci-identifier;
drop-timeout milliseconds;
dynamic-call-admission-control {
    activation-priority priority;
    bearer-bandwidth-limit kilobits-per-second;
}
encapsulation type;
epd-threshold cells plp1 cells;
fragment-threshold bytes;
inner-vlan-id-range start start-id end end-id;
input-vlan-map {
    (pop | pop-pop | pop-swap | push | push-push | swap | swap-push | swap-swap);
    inner-tag-protocol-id tpid;
    inner-vlan-id number;
    tag-protocol-id tpid;
    vlan-id number;
}
interleave-fragments;
inverse-arp;
layer2-policer {
    input-policer policer-name;
    input-three-color policer-name;
    output-policer policer-name;
    output-three-color policer-name;
}
link-layer-overhead percent;
minimum-links number;
mrru bytes;
multicast-dlci dlci-identifier;
multicast-vci vpi-identifier.vci-identifier;
multilink-max-classes number;
multipoint;
oam-liveness {
    down-count cells;
    up-count cells;
}
oam-period (seconds | disable);
output-vlan-map {
    (pop | pop-pop | pop-swap | push | push-push | swap | swap-push | swap-swap);
    inner-tag-protocol-id tpid;
    inner-vlan-id number;
    tag-protocol-id tpid;
    vlan-id number;
}
passive-monitor-mode;
peer-unit unit-number;
plp-to-clp;
point-to-point;
ppp-options {
    chap {
        access-profile name;
        default-chap-secret name;
        local-name name;
        passive;
    }
}

```

```

compression {
  acfc;
  pfc;
  pap;
  default-pap-password password;
  local-name name;
  local-password password;
  passive;
}
dynamic-profile profile-name;
lcp-max-conf-req number;
lcp-restart-timer milliseconds;
loopback-clear-timer seconds;
ncp-max-conf-req number;
ncp-restart-timer milliseconds;
}
pppoe-options {
  access-concentrator name;
  auto-reconnect seconds;
  (client | server);
  service-name name;
  underlying-interface interface-name;
}
proxy-arp;
service-domain (inside | outside);
shaping {
  (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate
   burst length);
  queue-length number;
}
short-sequence;
transmit-weight number;
(traps | no-traps);
trunk-bandwidth rate;
trunk-id number;
tunnel {
  backup-destination address;
  destination address;
  key number;
  routing-instance {
    destination routing-instance-name;
  }
  source source-address;
  ttl number;
}
vci vpi-identifier.vci-identifier;
vci-range start start-vci end end-vci;
vpi vpi-identifier;
vlan-id number;
vlan-id-list [vlan-id vlan-id-vlan-id];
vlan-id-range number-number;
vlan-tags inner tpid.vlan-id outer tpid.vlan-id;
vlan-tags-outer tpid.vlan-id inner-list [vlan-id vlan-id-vlan-id];
family family {
  accounting {
    destination-class-usage;
  }
}

```

```

    source-class-usage {
        direction;
    }
}
access-concentrator name;
address address {
    destination address;
}
bundle ml-fpc/pic/port | ls-fpc/pic/port;
duplicate-protection;
dynamic-profile profile-name;
filter {
    group filter-group-number;
    input filter-name;
    input-list {
        [ filter-names ];
        output filter-name;
    }
    output-list {
        [ filter-names ];
    }
}
ipsec-sa sa-name;
keep-address-and-control;
max-sessions number;
max-sessions-vs-a-ignore;
mtu bytes;
multicast-only;
negotiate-address;
no-redirects;
policer {
    arp policer-template-name;
    input policer-template-name;
    output policer-template-name;
}
primary;
proxy inet-address address;
receive-options-packets;
receive-ttl-exceeded;
remote (inet-address address | mac-address address);
rpf-check {
    fail-filter filter-name;
    mode loose;
}
sampling {
    direction;
}
service {
    input {
        service-set service-set-name <service-filter filter-name>;
        post-service-filter filter-name;
    }
    output {
        service-set service-set-names <service-filter filter-name>;
    }
}
}

```

```

service-name-table table-name;
short-cycle-protection <lockout-time-min minimum-seconds lockout-time-max
    maximum-seconds>;
targeted-broadcast {
    forward-and-send-to-re;
    forward-only;
}
(translate-discard-eligible | no-translate-discard-eligible);
(translate-fecn-and-becn | no-translate-fecn-and-becn);
translate-plp-control-word-de;
unnumbered-address interface-name <destination address destination-profile
    profile-name | preferred-source-address address>;
address address {
    arp ip-address (mac | multicast-mac) mac-address <publish>;
    broadcast address;
    destination address;
    destination-profile name;
    eui-64;
    multipoint-destination address (dlci dlci-identifier | vci vci-identifier);
    multipoint-destination address {
        epd-threshold cells plp1 cells;
        inverse-arp;
        oam-liveness {
            up-count cells;
            down-count cells;
        }
        oam-period (seconds | disable);
        shaping {
            (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained
                rate burst length);
            queue-length number;
        }
        vci vpi-identifier.vci-identifier;
    }
    preferred;
    primary;
    (vrp-group | vrrp-inet6-group) group-number {
        (accept-data | no-accept-data);
        advertise-interval seconds;
        authentication-type authentication;
        authentication-key key;
        fast-interval milliseconds;
        (preempt | no-preempt) {
            hold-time seconds;
        }
    }
    priority-number number;
    track {
        priority-cost seconds;
        priority-hold-time interface-name {
            bandwidth-threshold bits-per-second {
                priority;
            }
            interface priority;
        }
    }
    route ip-address/mask routing-instance instance-name priority-cost cost;
}

```

```

        virtual-address [ addresses ];
    }
}
}
}
}

```

Related Documentation

- [Junos OS Hierarchy and RFC Reference](#)
- [Junos® OS Ethernet Interfaces](#)
- [Junos® OS Network Interfaces](#)

[\[edit logical-systems\] Hierarchy Level](#)

The following lists the statements that can be configured at the **[edit logical-systems]** hierarchy level that are also documented in this manual. For more information about logical systems, see the Junos OS Routing Protocols Configuration Guide.

```

logical-systems logical-system-name {
  interfaces interface-name {
    unit logical-unit-number {
      accept-source-mac {
        mac-address mac-address {
          policer {
            input cos-policer-name;
            output cos-policer-name;
          }
        }
      }
    }
    allow-any-vci;
    atm-scheduler-map (map-name | default);
    bandwidth rate;
    backup-options {
      interface interface-name;
    }
    cell-bundle-size cells;
    clear-dont-fragment-bit;
    compression {
      rtp {
        f-max-period number;
        port {
          minimum port-number;
          maximum port-number;
        }
        queues [ queue-numbers ];
      }
    }
    compression-device interface-name;
    description text;
    interface {
      l2tp-interface-id name;
      (dedicated | shared);
    }
  }
}

```

```
dialer-options {
  activation-delay seconds;
  deactivation-delay seconds;
  dial-string [ dial-string-numbers ];
  idle-timeout seconds;
  initial-route-check seconds;
  load-threshold number;
  pool pool;
  remote-name remote-callers;
  watch-list {
    [ routes ];
  }
}
disable;
dlci dlci-identifier;
drop-timeout milliseconds;
dynamic-call-admission-control {
  activation-priority priority;
  bearer-bandwidth-limit kilobits-per-second;
}
encapsulation type;
epd-threshold cells plp1 cells;
fragment-threshold bytes;
input-vlan-map {
  inner-tag-protocol-id;
  inner-vlan-id;
  (pop | pop-pop | pop-swap | push | push-push | swap | swap-push | swap-swap);
  tag-protocol-id tpid;
  vlan-id number;
}
interleave-fragments;
inverse-arp;
layer2-policer {
  input-policer policer-name;
  input-three-color policer-name;
  output-policer policer-name;
  output-three-color policer-name;
}
link-layer-overhead percent;
minimum-links number;
mrru bytes;
multicast-dlci dlci-identifier;
multicast-vci vpi-identifier.vci-identifier;
multilink-max-classes number;
multipoint;
oam-liveness {
  up-count cells;
  down-count cells;
}
oam-period (seconds | disable);
output-vlan-map {
  inner-tag-protocol-id;
  inner-vlan-id;
  (pop | pop-pop | pop-swap | push | push-push | swap | swap-swap);
  tag-protocol-id tpid;
  vlan-id number;
```



```

}
passive-monitor-mode;
peer-unit unit-number;
plp-to-clp;
point-to-point;
ppp-options {
  chap {
    access-profile name;
    default-chap-secret name;
    local-name name;
    passive;
  }
  compression {
    acfc;
    pfc;
  }
}
dynamic-profile profile-name;
pap {
  default-pap-password password;
  local-name name;
  local-password password;
  passive;
}
}
proxy-arp;
service-domain (inside | outside);
shaping {
  (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate
  burst length);
  queue-length number;
}
short-sequence;
transmit-weight number;
(traps | no-traps);
trunk-bandwidth rate;
trunk-id number;
tunnel {
  backup-destination address;
  destination address;
  key number;
  routing-instance {
    destination routing-instance-name;
  }
  source source-address;
  ttl number;
}
vci vpi-identifier.vci-identifier;
vlan-id number;
vlan-id-list [vlan-id vlan-id-vlan-id]
vlan-tags inner tpid.vlan-id outer tpid.vlan-id;
vlan-tags outer tpid.vlan-id inner-list [vlan-id vlan-id-vlan-id]
vpi vpi-identifier;
family family {
  accounting {
    destination-class-usage;

```

```

    source-class-usage {
        direction;
    }
}
bundle interface-name;
filter {
    group filter-group-number;
    input filter-name;
    input-list {
        [ filter-names ];
    }
    output filter-name;
    output-list {
        [ filter-names ];
    }
}
ipsec-sa sa-name;
keep-address-and-control;
mtu bytes;
multicast-only;
no-redirects;
policer {
    arp policer-template-name;
    input policer-template-name;
    output policer-template-name;
}
primary;
proxy inet-address address;
receive-options-packets;
receive-ttl-exceeded;
remote (inet-address address | mac-address address);
rpf-check <fail-filter filter-name> {
    <mode loose>;
}
sampling {
    direction;
}
service {
    input {
        service-set service-set-name <service-filter filter-name>;
        post-service-filter filter-name;
    }
    output {
        service-set service-set-name <service-filter filter-name>;
    }
}
(translate-discard-eligible | no-translate-discard-eligible);
(translate-fecn-and-becn | no-translate-fecn-and-becn);
unnumbered-address interface-name destination address destination-profile
profile-name;
address address {
    arp ip-address (mac | multicast-mac) mac-address <publish>;
    broadcast address;
    destination address;
    destination-profile name;
    eui-64;
}

```

```

multipoint-destination address (dlci dlci-identifier | vci vci-identifier);
multipoint-destination address {
  epd-threshold cells plp1 cells;
  inverse-arp;
  oam-liveness {
    up-count cells;
    down-count cells;
  }
  oam-period (seconds | disable);
  shaping {
    (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained
    rate burst length);
    queue-length number;
  }
  vci vpi-identifier.vci-identifier;
}
preferred;
primary;
(vrrp-group | vrrp-inet6-group) group-number {
  (accept-data | no-accept-data);
  advertise-interval seconds;
  authentication-type authentication;
  authentication-key key;
  fast-interval milliseconds;
  (preempt | no-preempt) {
    hold-time seconds;
  }
  priority-number number;
  track {
    priority-cost seconds;
    priority-hold-time interface-name {
      interface priority;
      bandwidth-threshold bits-per-second {
        priority;
      }
    }
  }
  route ip-address/mask routing-instance instance-name priority-cost cost;
}
}
virtual-address [ addresses ];
}
}
}
}
}

```

Related Documentation

- [Junos OS Hierarchy and RFC Reference](#)
- [Junos® OS Ethernet Interfaces](#)
- [Junos® OS Network Interfaces](#)

PART 2

Configuring ATM Interfaces

- [Configuring ATM Interfaces on page 27](#)
- [Configuring ATM-over-ADSL Interfaces on page 109](#)
- [Configuring ATM-over-SHDSL Interfaces on page 115](#)

CHAPTER 2

Configuring ATM Interfaces

- [ATM Interfaces Overview on page 28](#)
- [ATM1 Physical and Logical Configuration Statement Hierarchies on page 30](#)
- [ATM2 IQ Physical and Logical Configuration Statement Hierarchies on page 32](#)
- [Supported Features on ATM1 and ATM2 IQ Interfaces on page 34](#)
- [Configuring Communication with Directly Attached ATM Switches and Routers on page 39](#)
- [Enabling ILMI for Cell Relay on page 40](#)
- [Enabling Passive Monitoring on ATM Interfaces on page 41](#)
- [Removing MPLS Labels from Incoming Packets on page 42](#)
- [Configuring the ATM PIC Type on page 43](#)
- [Configuring ATM Cell-Relay Promiscuous Mode on page 45](#)
- [Configuring the Maximum Number of ATM1 VCs on a VP on page 48](#)
- [Configuring Layer 2 Circuit Transport Mode on page 49](#)
- [Layer 2 Circuit Transport Mode on ATM MICs Overview on page 57](#)
- [Configuring Layer 2 Circuit Transport Mode on ATM MICs on page 57](#)
- [Example: Configuring Layer 2 Circuit Transport Mode on ATM MICs on page 58](#)
- [Configuring Layer 2 Circuit Cell-Relay Promiscuous Mode on page 61](#)
- [Configuring Layer 2 Circuit Trunk Mode Scheduling on page 62](#)
- [Configuring CoS Queues in Layer 2 Circuit Trunk Mode on page 64](#)
- [Configuring the Layer 2 Circuit Cell-Relay Cell Maximum on page 67](#)
- [Configuring the OAM F4 Cell Flows on page 68](#)
- [Defining Virtual Path Tunnels on page 69](#)
- [Configuring a Point-to-Point ATM1 or ATM2 IQ Connection on page 70](#)
- [Configuring a Point-to-Multipoint ATM1 or ATM2 IQ Connection on page 70](#)
- [Configuring a Multicast-Capable ATM1 or ATM2 IQ Connection on page 71](#)
- [Configuring Inverse ATM1 or ATM2 ARP on page 72](#)
- [Defining the ATM Traffic-Shaping Profile on page 72](#)
- [Configuring the ATM1 Queue Length on page 78](#)

- [Configuring the ATM2 IQ EPD Threshold on page 79](#)
- [Configuring Two EPD Thresholds per Queue on page 81](#)
- [Configuring the ATM2 IQ Transmission Weight on page 81](#)
- [Defining the ATM OAM F5 Loopback Cell Period on page 82](#)
- [Configuring the ATM OAM F5 Loopback Cell Threshold on page 82](#)
- [Configuring ATM Interface Encapsulation on page 83](#)
- [Configuring an ATM1 Cell-Relay Circuit on page 85](#)
- [Configuring PPP over ATM2 Encapsulation on page 87](#)
- [Configuring E3 and T3 Parameters on ATM Interfaces on page 90](#)
- [Configuring SONET/SDH Parameters on ATM Interfaces on page 91](#)
- [Configuring ATM2 IQ VC Tunnel CoS Components on page 92](#)
- [Configuring ATM Scheduler on Ethernet VPLS over a Bridged ATM Interface on page 103](#)
- [Example: Configuring ATM1 Interfaces on page 104](#)
- [Example: Configuring ATM2 IQ Interfaces on page 106](#)
- [Example: Configuring ATM Scheduler Map on Ethernet VPLS over Bridged ATM Interfaces on page 107](#)

ATM Interfaces Overview

Asynchronous Transfer Mode (ATM) is a network protocol designed to facilitate the simultaneous handling of various types of traffic streams (voice, data, and video) at very high speeds over the same physical connection. By always using 53-byte cells, ATM simplifies the design of hardware, enabling it to quickly determine the destination address of each cell. This allows simple switching of network traffic at much higher speeds than are easily accomplished using protocols with variable sizes of transfer units, such as Frame Relay and Transmission Control Protocol/Internet Protocol (TCP/IP).

Although ATM was designed to operate without the requirement of any other networking protocol, other protocols are frequently segmented and encapsulated across multiple, smaller ATM cells. This makes ATM a transport mechanism for preexisting technologies such as Frame Relay and the TCP/IP family of protocols.

ATM relies on the concepts of virtual paths and virtual circuits. A virtual path, represented by a specific virtual path identifier (VPI), establishes a route between two devices in a network. Each VPI can contain multiple virtual circuits, each represented by a virtual circuit identifier (VCI).

VPIs and VCIs are local to the router, which means that only the two devices connected by the VCI or VPI need know the details of the connection. In a typical ATM network, user data might traverse multiple connections, using many different VPI and VCI connections. Each end device, just like each device in the network, needs to know only the VCI and VPI information for the path to the next device.



NOTE: The ATM three-bit payload type identifier (PTI) field is not supported.

With ATM2 intelligent queuing (IQ) interfaces, you can configure virtual path (VP) shaping and Operation, Administration, and Management (OAM) F4 cell flows.

**Related
Documentation**

- [ATM1 Physical and Logical Configuration Statement Hierarchies on page 30](#)
- [ATM2 IQ Physical and Logical Configuration Statement Hierarchies on page 32](#)
- [Supported Features on ATM1 and ATM2 IQ Interfaces on page 34](#)
- [Configuring Communication with Directly Attached ATM Switches and Routers on page 39](#)
- [Enabling ILMI for Cell Relay on page 40](#)
- [Configuring Communication with Directly Attached ATM Switches and Routers on page 39](#)
- [Enabling ILMI for Cell Relay on page 40](#)
- [Enabling Passive Monitoring on ATM Interfaces on page 41](#)
- [Removing MPLS Labels from Incoming Packets on page 42](#)
- [Configuring the ATM PIC Type on page 43](#)
- [Configuring ATM Cell-Relay Promiscuous Mode on page 45](#)
- [Configuring the Maximum Number of ATM1 VCs on a VP on page 48](#)
- [Configuring Layer 2 Circuit Transport Mode on page 49](#)
- [Configuring Layer 2 Circuit Cell-Relay Promiscuous Mode on page 61](#)
- [Configuring Layer 2 Circuit Trunk Mode Scheduling on page 62](#)
- [Configuring CoS Queues in Layer 2 Circuit Trunk Mode on page 64](#)
- [Configuring the Layer 2 Circuit Cell-Relay Cell Maximum on page 67](#)
- [Configuring the OAM F4 Cell Flows on page 68](#)
- [Defining Virtual Path Tunnels on page 69](#)
- [Configuring a Point-to-Point ATM1 or ATM2 IQ Connection on page 70](#)
- [Configuring a Point-to-Multipoint ATM1 or ATM2 IQ Connection on page 70](#)
- [Configuring a Multicast-Capable ATM1 or ATM2 IQ Connection on page 71](#)
- [Configuring Inverse ATM1 or ATM2 ARP on page 72](#)
- [Defining the ATM Traffic-Shaping Profile on page 72](#)
- [Configuring the ATM1 Queue Length on page 78](#)
- [Configuring the ATM2 IQ EPD Threshold on page 79](#)
- [Configuring Two EPD Thresholds per Queue on page 81](#)
- [Configuring the ATM2 IQ Transmission Weight on page 81](#)
- [Defining the ATM OAM F5 Loopback Cell Period on page 82](#)
- [Configuring the ATM OAM F5 Loopback Cell Threshold on page 82](#)

- [Configuring ATM Interface Encapsulation on page 83](#)
- [Configuring an ATM1 Cell-Relay Circuit on page 85](#)
- [Configuring PPP over ATM2 Encapsulation on page 87](#)
- [Configuring E3 and T3 Parameters on ATM Interfaces on page 90](#)
- [Configuring SONET/SDH Parameters on ATM Interfaces on page 91](#)
- [Configuring ATM2 IQ VC Tunnel CoS Components on page 92](#)
- [Example: Configuring ATM1 Interfaces on page 104](#)
- [Example: Configuring ATM2 IQ Interfaces on page 106](#)

ATM1 Physical and Logical Configuration Statement Hierarchies

To configure ATM1 physical interface properties, include the **atm-options**, **e3-options**, **t3-options**, and **sonet-options** statements at the **[edit interfaces at-*fpc/pic/port*]** hierarchy level:

ATM1 Physical Configuration Hierarchy	<pre>[edit interfaces at-<i>fpc/pic/port</i>] atm-options { ilmi; mpls { pop-all-labels { required-depth <i>number</i>; } } pic-type atm1; promiscuous-mode { vpi <i>vpi-identifier</i>; } vpi <i>vpi-identifier</i> { maximum-vcs <i>maximum-vcs</i>; } } e3-options { atm-encapsulation (direct plcp); buildout <i>feet</i>; framing (g.751 g.832); loopback (local remote); (payload-scrambler no-payload-scrambler); } encapsulation (atm-ccc-cell-relay atm-pvc ethernet-over-atm); sonet-options { aps { advertise-interval <i>milliseconds</i>; authentication-key <i>key</i>; force; hold-time <i>milliseconds</i>; lockout; neighbor <i>address</i>; paired-group <i>group-name</i>; protect-circuit <i>group-name</i>;</pre>
---	--

```

    request;
    revert-time seconds;
    working-circuit group-name;
}
bytes {
    e1-quiet value;
    f1 value;
    f2 value;
    s1 value;
    z3 value;
    z4 value;
}
loopback (local | remote);
(payload-scrambler | no-payload-scrambler);
rfc-2615;
trigger {
    defect ignore {
        hold-time up milliseconds down milliseconds;
    }
}
(z0-increment | no-z0-increment);
}
t3-options {
    atm-encapsulation (direct | plcp);
    buildout feet;
    (cbit-parity | no-cbit-parity);
    loopback (local | payload | remote);
    (payload-scrambler | no-payload-scrambler);
}

```

To configure ATM1 logical interface properties, include the following statements:

ATM1 Logical Configuration Hierarchy

```

allow-any-vci;
multicast-vci vpi-identifier.vci-identifier;
oam-liveness {
    up-count cells;
    down-count cells;
}
oam-period (disable | seconds);
shaping {
    (cbr rate | vbr peak rate sustained rate burst length);
    queue-length number;
}
vci vpi-identifier.vci-identifier;
vpi vpi-identifier;
family inet {
    address address {
        multipoint-destination address {
            inverse-arp;
            oam-liveness {
                up-count cells;
                down-count cells;
            }
            oam-period (disable | seconds);
            shaping {
                (cbr rate | vbr peak rate sustained rate burst length);
            }
        }
    }
}

```

```

        queue-length number;
    }
    vci vpi-identifier.vci-identifier;
}
}
}

```

You can include these statements at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number*]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]

ATM2 IQ Physical and Logical Configuration Statement Hierarchies

To configure ATM2 IQ physical interface properties, include the **atm-options** and **sonet-options** statements at the [edit interfaces *at-fpc/pic/port*] hierarchy level:

ATM2 IQ Physical Configuration Hierarchy

```

[edit interfaces at-fpc/pic/port]
atm-options {
  cell-bundle-size cells;
  ilmi;
  linear-red-profiles profile-name {
    high-plp-max-threshold percent;
    low-plp-max-threshold percent;
    queue-depth cells high-plp-threshold percent low-plp-threshold percent;
  }
  mpls {
    pop-all-labels {
      required-depth number;
    }
  }
  pic-type atm2;
  plp-to-clp;
  promiscuous-mode {
    vpi vpi-identifier;
  }
  scheduler-maps map-name {
    forwarding-class class-name {
      epd-threshold cells plp1 cells;
      linear-red-profile profile-name;
      priority (high | low);
      transmit-weight (cells number | percent number);
    }
    vc-cos-mode (alternate | strict);
  }
  vpi vpi-identifier {
    oam-liveness {
      up-count;
      down-count;
    }
    oam-period (disable | seconds);
    shaping {

```

```

        (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate
         burst length);
    }
}
sonet-options {
    aps {
        advertise-interval milliseconds;
        authentication-key key;
        force;
        hold-time milliseconds;
        logout;
        neighbor address;
        paired-group group-name;
        protect-circuit group-name;
        request;
        revert-time seconds;
        working-circuit group-name;
    }
    bytes {
        e1-quiet value;
        f1 value;
        f2 value;
        s1 value;
        z3 value;
        z4 value;
    }
    loopback (local | remote);
    (payload-scrambler | no-payload-scrambler);
    rfc-2615;
    trigger {
        defect ignore {
            hold-time up milliseconds down milliseconds;
        }
    }
    (z0-increment | no-z0-increment);
}

```

To configure ATM2 IQ logical interface properties, include the following statements:

ATM2 IQ Logical Configuration Hierarchy	<pre> allow-any-vci; atm-scheduler-map (map-name default); cell-bundle-size cells; epd-threshold cells; multicast-vci vpi-identifier.vci-identifier; oam-liveness { up-count cells; down-count cells; } oam-period (disable seconds); plp-to-clp; shaping { (cbr rate rtvbr peak rate sustained rate burst length vbr peak rate sustained rate burst length); } transmit-weight number; </pre>
--	--

```

trunk-id number;
vci vpi-identifier.vci-identifier;
vpi vpi-identifier;
family inet address address {
    multipoint-destination address;
    epd-threshold cells;
    inverse-arp;
    oam-liveness {
        up-count cells;
        down-count cells;
    }
    oam-period (disable | seconds);
    shaping {
        (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate burst
        length);
    }
    transmit-weight number;
    vci vpi-identifier.vci-identifier;
}

```

You can include these statements at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number*]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]

Supported Features on ATM1 and ATM2 IQ Interfaces

Table 3 on page 34 lists the supported features on ATM1 and ATM2 IQ interfaces.

Table 3: ATM1 and ATM2 IQ Supported Features

Item	ATM1	ATM2 IQ	Comments
Encapsulation and Transport Modes			
ATM Adaptation Layer 5 (AAL5) circuit cross-connect (CCC)	Supported	Supported	For ATM1 and ATM2 IQ Physical Interface Cards (PICs), you can configure any combination of AAL5 CCC, nonpromiscuous cell relay, and AAL5 permanent virtual connections (PVCs) on the same PIC at the same time. See “Configuring ATM Interface Encapsulation” on page 83.
Cell-relay accumulation mode: The incoming cells (1 to 8) are packaged into a single packet and forwarded to the label-switched path (LSP).	Supported	Not supported	Cell-relay accumulation mode is per PIC, not per port. If you configure accumulation mode, the entire ATM1 PIC uses the configured mode. See “Configuring ATM Interface Encapsulation” on page 83.

Table 3: ATM1 and ATM2 IQ Supported Features (*continued*)

Item	ATM1	ATM2 IQ	Comments
Cell-relay promiscuous port mode: All cells from 0 through 65,535 of all VPIs (0 through 255) are sent to or received from an LSP.	Supported	Supported	For promiscuous mode, you must configure the port with atm-ccc-cell-relay encapsulation. For ATM2 IQ multiport PICs, you can configure one or more ports in port promiscuous mode, and the other ports with any ATM encapsulation.
Cell-relay promiscuous VPI mode: All cells in the VCI range 0 through 65,535 of a single VPI are sent to or received from an LSP.	Supported	Supported	For ATM2 IQ PICs, you can configure one or more logical interfaces in VPI promiscuous mode, and the other logical interfaces with any ATM encapsulation. For ATM1 PICs, if you configure one port in port mode, all ports on the PIC operate in port mode. Likewise if you configure one logical interface in VPI mode, all logical interfaces on the PIC operate in VPI mode. See "Configuring ATM Cell-Relay Promiscuous Mode" on page 45.
Cell-relay VP shaping	Supported	Supported	For ATM2 PICs, you can configure ATM CC cell relay promiscuous mode. VP promiscuous mode allows incoming traffic on all VCIs under the VPI to be bundled and directed to an LSP. Port promiscuous mode allows all traffic coming in on the entire VPI/VCI range to be forwarded to an LSP. In both modes, traffic shaping is not permitted. The ATM2 PIC supports traffic shaping in VP promiscuous mode and cell relay VC mode.
Cell-relay VCI mode: All cells in a VCI are sent to or received from an LSP.	Supported	Supported	For ATM1 PICs, nonpromiscuous cell-relay VCI, VPI, and port modes are supported on the same PIC with ATM AAL5 PVCs or ATM AAL5 CCC.
Cell-relay VPI mode: All cells in the VCI range (0 through <i>maximum-vcs</i>) of a single VPI are sent to or received from an LSP.	Supported	Not supported	For ATM2 IQ PICs, nonpromiscuous cell-relay VCI mode is supported on the same PIC with ATM AAL5 PVCs or ATM AAL5 CCC. See "Configuring ATM Interface Encapsulation" on page 83.
Cell-relay port mode: All cells in the VCI range (0 through <i>maximum-vcs</i>) of all VPIs (0 through 255) are sent to or received from an LSP.	Supported	Not supported	For ATM1 PICs, port mode is supported on the same PIC with ATM AAL5 PVCs or ATM AAL5 CCC. See "Configuring ATM Interface Encapsulation" on page 83.
Ethernet over ATM encapsulation: Allows ATM interfaces to connect to devices that support only bridged-mode protocol data units (PDUs).	Supported	Supported	See "Configuring ATM Interface Encapsulation" on page 83.

Table 3: ATM1 and ATM2 IQ Supported Features (*continued*)

Item	ATM1	ATM2 IQ	Comments
Layer 2 circuit cell-relay, Layer 2 circuit AAL5, and Layer 2 circuit trunk transport modes: Allow you to send ATM cells or AAL5 PDUs between ATM2 IQ interfaces across a Layer 2 circuit-enabled network. Layer 2 circuits are designed to transport Layer 2 frames between provider edge (PE) routers across a Label Distribution Protocol (LDP)-signaled Multiprotocol Label Switching (MPLS) backbone.	Not supported	Supported	<p>Transport mode is per PIC, not per port. If you configure Layer 2 circuit cell-relay, Layer 2 circuit AAL5, or Layer 2 circuit trunk transport mode, the entire ATM2 IQ PIC uses the configured transport mode.</p> <p>Layer 2 circuit cell-relay mode supports both VP- and port-promiscuous modes.</p> <p>See “Configuring Layer 2 Circuit Transport Mode” on page 49.</p>
Layer 2 VPN cell relay and Layer 2 VPN AAL5: Allow you to carry ATM cells or AAL5 PDUs over an MPLS backbone.	Supported	Supported	See the Junos OS VPNs Configuration Guide.
Point-to-Point Protocol (PPP) over ATM encapsulation: Associates a PPP link with an ATM AAL5 PVC.	Not supported	Supported	<p>For ATM2 IQ interfaces, the Junos OS supports three PPP over ATM encapsulation types:</p> <ul style="list-style-type: none"> • atm-ppp-llc—PPP over AAL5 logical link control (LLC). • atm-ppp-vc-mux—PPP over AAL5 multiplex. • atm-mlppp-llc—Multilink PPP over AAL5 LLC. Requires a Link Services or Voice Services PIC. <p>See “Configuring PPP over ATM2 Encapsulation” on page 87.</p>
Other ATM Attributes			
EPD (early packet discard) threshold: Limits the queue size in ATM cells of a particular VC or forwarding class configured over a VC when using VC tunnel class of service (CoS). When the first ATM cell of a new packet is received, the VC's queue depth is checked against the EPD threshold. If the VC's queue depth exceeds the EPD threshold, the first and all subsequent ATM cells in the packet are discarded.	Not supported	Supported	<p>If you are using VC tunnel CoS, the EPD threshold configured at the logical unit level has no effect. You should configure each forwarding class for congestion management using either an individual EPD threshold (in other words, tail drop) or weighted random early detection (WRED) profile.</p> <p>See “Configuring the ATM2 IQ EPD Threshold” on page 79 and “Configuring ATM2 IQ VC Tunnel CoS Components” on page 92.</p>
OAM F4 cell flows: Identify and report virtual path connection (VPC) defects and failures.	Not supported	Supported	See “Configuring the OAM F4 Cell Flows” on page 68 .

Table 3: ATM1 and ATM2 IQ Supported Features (*continued*)

Item	ATM1	ATM2 IQ	Comments
OAM F5 loopback cell responses	Supported	Supported	<p>For ATM1 interfaces, when an OAM F5 loopback request is received, the response cell is sent by the PIC. The request and response cells are not counted in the VC, logical interface, or physical interface statistics.</p> <p>For ATM2 IQ interfaces, when an OAM F5 loopback request is received, the response is sent by the Routing Engine. The OAM, VC, logical interface, and physical interface statistics are incremented.</p> <p>See “Defining the ATM OAM F5 Loopback Cell Period” on page 82 and “Configuring the ATM OAM F5 Loopback Cell Threshold” on page 82.</p>
Passive monitoring mode	Supported	Supported	See “Enabling Passive Monitoring on ATM Interfaces” on page 41 .
PIC type	Supported	Supported	<p>For ATM1 interfaces, you can include the pic-type atm1 statement.</p> <p>For ATM2 IQ interfaces, you can include the pic-type atm2 statement.</p> <p>See “Configuring the ATM PIC Type” on page 43.</p>
Ping	Supported	Supported	<p>For ATM1 and ATM2 IQ interfaces, when you issue the ATM ping command, you must include a logical unit number in the interface name, as shown in the following example:</p> <p>ping atm interface at-1/0/0.5 vci 0.123 count 3</p> <p>The logical unit number is 5 on physical interface at-1/0/0.</p> <p>See the Junos OS Operational Mode Commands.</p>
Queue length: Limits the queue size in packets of a particular VC.	Supported	Not supported	See “Configuring the ATM1 Queue Length” on page 78 .
Real-time variable bit rate (VBR): Supports VBR data traffic with average and peak traffic parameters.	Not supported	Supported	<p>Compared to non-real-time VBR, real-time VBR data is serviced at a higher priority. Real-time VBR is suitable for carrying packetized video and audio.</p> <p>See “Configuring ATM2 IQ Real-Time VBR” on page 74.</p>

Table 3: ATM1 and ATM2 IQ Supported Features (*continued*)

Item	ATM1	ATM2 IQ	Comments
Shaping rates: Peak and sustained rates of traffic.	Supported	Supported	<p>For ATM1 OC3 interfaces, the rate can be from 33 kilobits per second (Kbps) through 135.6 megabits per second (Mbps); for ATM1 OC12 interfaces, the rate can be from 33 Kbps through 276 Mbps.</p> <p>For ATM2 IQ OC3 interfaces, the rate can be from 33 Kbps through 135,600,000 bits per second (bps). For ATM2 IQ OC12 interfaces, the rate can be from 33 Kbps through 271,273,396 bps (up to 50 percent of the line rate).</p> <p>For ATM2 IQ OC48 interfaces, the rate can be from 33 Kbps through 2,170,107,168 bits per second (bps).</p> <p>For ATM2 IQ DS3 and E3 interfaces, the rate can be from 33 Kbps to the maximum rate. The maximum rate varies depending on the ATM encapsulation and framing you configure:</p> <ul style="list-style-type: none"> • For DS3 interfaces with direct ATM encapsulation, the maximum rate is 40,038,968 bps. • For DS3 interfaces with Physical Layer Convergence Protocol (PLCP) ATM encapsulation, the maximum rate is 36,864,000 bps. • For E3 interfaces with g.751 framing and direct ATM encapsulation, the maximum rate is 30,801,509 bps. • For E3 interfaces with g.751 framing PLCP ATM encapsulation, the maximum rate is 27,648,000 bps. • For E3 interfaces with g.832 framing, the maximum rate is 30,720,000 bps. <p>See “Defining the ATM Traffic-Shaping Profile” on page 72.</p>
VC tunnel CoS: Allows VCs to be opened as VC tunnels.	Not supported	Supported	<p>On M Series routers (except the M320 and M120 routers), a VC tunnel can support four CoS queues. On the M320, M120, and T Series routers, a VC tunnel can support eight CoS queues. Within the VC tunnel, the class-based weighted fair queuing algorithm is used to schedule packet transmission from each queue. You can configure the queue admission policies, such as EPD or WRED, to control the queue size during congestion.</p> <p>See “Configuring ATM2 IQ VC Tunnel CoS Components” on page 92.</p>

Table 3: ATM1 and ATM2 IQ Supported Features (*continued*)

Item	ATM1	ATM2 IQ	Comments
VCI management	Supported	Supported	<p>For ATM1 interfaces, you must specify the maximum number of VCIs by including the maximum-vcs statement in the configuration. This restricts VCIs to the range 0 through <i>maximum-vcs</i>. See “Configuring the Maximum Number of ATM1 VCs on a VP” on page 48.</p> <p>For ATM2 interfaces, you must not include the maximum-vcs statement in the configuration. All ATM2 IQ interfaces support VCI numbers from 0 through 65,535. The total number of VCIs that you can open on an ATM2 IQ port depends on two factors:</p> <ul style="list-style-type: none"> • Number of tunnels • Sparseness of VCI numbers (the more sparse, the fewer VCIs supported) <p>For ATM1 and ATM2 IQ interfaces with promiscuous mode, the allowable maximum number of VCIs is 65,535.</p>
VCI statistics	Supported	Supported	<p>For ATM1 interfaces, multipoint VCI statistics are collected from indirect sources.</p> <p>For ATM2 IQ interfaces, multipoint VCI statistics are collected directly from the PIC.</p> <p>For ATM1 and ATM2 IQ interfaces, point-to-point VCI statistics are the same as logical interface statistics.</p>

Configuring Communication with Directly Attached ATM Switches and Routers

For ATM1 and ATM2 IQ interfaces, you can configure communication with directly attached ATM switches and routers to enable querying of the IP addresses and switch port numbers. You query the switch or router by entering the following **show** command:

```
user@host> show ilmi interface interface-name
```

The router uses VC 0.16 to communicate with the ATM switch or router.

To configure communication between the router and its directly attached ATM switches and routers, include the **ilmi** statement at the **[edit interfaces *interface-name* atm-options]** hierarchy level:

```
[edit interfaces interface-name atm-options]
ilmi;
```

Example: Configuring Communication with Directly Attached ATM Switches and Routers

Enable an interface to communicate directly with an ATM switch or router:

```
[edit interfaces]
at-0/1/0 {
  atm-options {
    vpi 0;
    ilmi;
```

```

    }
    unit 0 {
        vci 0.120;
        family inet {
            address 10.33.33.1/30;
        }
    }
}

```

Enabling ILMI for Cell Relay

The Junos OS supports standard AAL5 and three Layer 2 circuit transport modes: Layer 2 circuit AAL5, Layer 2 circuit cell-relay, and Layer 2 circuit trunk transport mode.

Integrated local management interface (ILMI) is supported on standard AAL5 interfaces, regardless of encapsulation. To enable ILMI on interfaces with cell-relay encapsulation, you must configure an ATM2 IQ PIC to use Layer 2 circuit trunk transport mode. ILMI is not supported with cell-relay encapsulation when the ATM2 IQ PIC is configured with Layer 2 AAL5 or Layer 2 circuit cell-relay transport mode, as shown in [Table 4 on page 40](#).

Layer 2 circuit cell-relay trunk mode is not supported on ATM OC48 PICs.

Table 4: ILMI Support by Encapsulation Type

Encapsulation Type	ILMI Support
Standard AAL5, with any encapsulation type	Yes
Layer 2 circuit AAL5 mode	No
Layer 2 circuit cell-relay mode	No
Layer 2 circuit trunk mode	Yes

For more information about Layer 2 circuit transport modes, see [“Configuring Layer 2 Circuit Transport Mode” on page 49](#).

To configure ILMI on an interface with cell-relay encapsulation, include the following statements:

```

[edit chassis fpc slot-number pic pic-number]
atm-l2circuit-mode trunk trunk;
[edit interfaces at-fpc/pic/port]
encapsulation atm-ccc-cell-relay;
atm-options {
    ilmi;
    pic-type atm2;
}
unit logical-unit-number {
    trunk-id number;
}

```

For more information about ILMI, see [“Configuring Communication with Directly Attached ATM Switches and Routers”](#) on page 39.

Example: Enabling ILMI for Cell Relay

On an ATM2 IQ PIC with Layer 2 circuit trunk transport mode, enable ILMI on an interface with cell-relay encapsulation:

```
[edit chassis]
fpc 0 {
  pic 1 {
    atm-l2circuit-mode trunk uni;
  }
}
[edit interfaces]
at-0/0/0 {
  encapsulation atm-ccc-cell-relay;
  atm-options {
    pic-type atm2;
    ilmi;
  }
}
```

Enabling Passive Monitoring on ATM Interfaces

The Monitoring Services I and Monitoring Services II PICs are designed to enable IP services. If you have a Monitoring Services PIC and an ATM PIC installed in an M Series, MX Series, or T Series router, you can monitor IPv4 and IPv6 traffic from another router.

On ATM interfaces, you enable packet flow monitoring by including the **passive-monitor-mode** statement at the **[edit interfaces at-fpc/pic/port]** hierarchy level:

```
[edit interfaces at-fpc/pic/port]
passive-monitor-mode;
```

If you include the **passive-monitor-mode** statement in the configuration, the ATM interface is always up, and the interface does not receive or transmit incoming control packets, such as OAM cell and ILMI.

On monitoring services interfaces, you enable packet flow monitoring by including the **family** statement at the **[edit interfaces mo-fpc/pic/port unit logical-unit-number]** hierarchy level, specifying the **inet** option:

```
[edit interfaces mo-fpc/pic/port unit logical-unit-number]
family inet;
```

For conformity with cflowd record structure, you must include the **receive-options-packets** and **receive-ttl-exceeded** statements at the **[edit interfaces mo-fpc/pic/port unit logical-unit-number family inet]** hierarchy level:

```
[edit interfaces mo-fpc/pic/port unit logical-unit-number family inet]
receive-options-packets;
receive-ttl-exceeded;
```

For the monitoring services interface, you can configure multiservice physical interface properties. For more information, see *Configuring Multiservice Physical Interface Properties* and the Junos Services Interfaces Configuration Release 11.2.

Removing MPLS Labels from Incoming Packets

The Junos OS can forward only IPv4 packets to a Monitoring Services PIC. IPv4 packets with MPLS labels cannot be forwarded to a Monitoring Services PIC. By default, if packets with MPLS labels are forwarded to the Monitoring Services PIC, they are discarded. To monitor packets with MPLS labels, you must remove the MPLS labels as the packets arrive on the interface.

You can remove up to two MPLS labels from an incoming packet by including the **pop-all-labels** statement at the `[edit interfaces interface-name atm-options mpls]` hierarchy level:

```
[edit interfaces interface-name atm-options mpls]
pop-all-labels {
  required-depth number;
}
```



NOTE: On T Series devices, the **pop-all-labels** command can remove up to five MPLS labels from incoming packets.

By default, the **pop-all-labels** statement takes effect for incoming packets with one or two labels. You can specify the number of MPLS labels an incoming packet must have for the **pop-all-labels** statement to take effect by including the **required-depth** statement at the `[edit interfaces interface-name atm-options mpls pop-all-labels]` hierarchy level:

```
[edit interfaces interface-name atm-options mpls pop-all-labels]
required-depth number;
```

The required depth can be 1, 2, or [1 2]. If you include the **required-depth 1** statement, the **pop-all-labels** statement takes effect for incoming packets with one label only. If you include the **required-depth 2** statement, the **pop-all-labels** statement takes effect for incoming packets with two labels only. If you include the **required-depth [1 2]** statement, the **pop-all-labels** statement takes effect for incoming packets with one or two labels. A required depth of [1 2] is equivalent to the default behavior of the **pop-all-labels** statement.

When you remove MPLS labels from incoming packets, note the following:

- The **pop-all-labels** statement has no effect on IP packets with three or more MPLS labels.
- When you enable MPLS label removal, you must configure all ports on a PIC with the same label popping mode and required depth.
- You use the **pop-all-labels** statement to enable passive monitoring applications, not active monitoring.

- You cannot apply MPLS filters or accounting to the MPLS labels because the labels are removed as soon as the packet arrives on the interface.
- The following ATM encapsulation types are not supported on interfaces with MPLS label removal:
 - atm-ccc-cell-relay
 - atm-ccc-vc-mux
 - atm-mlppp-llc
 - atm-tcc-snap
 - atm-tcc-vc-mux
 - ether-over-atm-llc
 - ether-vpls-over-atm-llc

**Related
Documentation**

- [atm-options on page 129](#)
- [mpls on page 170](#)
- [pop-all-labels on page 182](#)
- [required-depth on page 187](#)

Configuring the ATM PIC Type

For ATM1 and ATM2 IQ interfaces, the Junos OS does not determine from the interface name **at-*fpc/pic/port*** whether your router has an ATM1 or ATM2 IQ PIC installed. You can configure the PIC type as ATM1 or ATM2 IQ by including the **pic-type** statement at the **[edit interfaces *interface-name* atm-options]** hierarchy level:

```
[edit interfaces interface-name atm-options]
  pic-type (atm1 | atm2);
```

On MX Series routers with ATM MICs with SFP, you do not have to configure the PIC type because Junos OS automatically configures the PIC type as ATM MIC.



NOTE: This topic uses the term PIC for ATM MICs where the reference is to a CLI or Junos OS entity.

The following guidelines apply to configuring the ATM PIC type:

- If you include the **pic-type** statement in the configuration, and you include other statements at the **[edit interfaces *interface-name* atm-options]** hierarchy level that do not match the configured PIC type, the configuration does not commit. For example, you cannot commit a configuration that includes the **pic-type atm2** statement and the **maximum-vcs** statement.
- If you do not include the **pic-type** statement and you do include the **maximum-vcs** statement in the configuration, Junos OS assumes you are configuring an ATM1 interface, and sets the PIC type option accordingly. If you do not include the **maximum-vcs** statement in the configuration, Junos OS assumes you are configuring an ATM2 IQ interface, and sets the PIC type option accordingly.
- On MX Series routers with ATM MICs with SFP, Junos OS automatically sets the PIC type to ATM MIC.
- If you include the **promiscuous-mode** statement in the configuration of an ATM2 interface, you must also include the **pic-type atm2** statement.

Example: Configuring the ATM PIC Type

Configure the PIC type on an ATM1 and an ATM2 interface.



NOTE: On MX Series routers with ATM MICs with SFP, Junos OS automatically sets the PIC type to ATM MIC.

On an ATM1 Interface

```
[edit interfaces]
at-1/0/0 {
  atm-options {
    pic-type atm1;
    vpi 0 maximum-vcs 256;
    vpi 1 maximum-vcs 512;
  }
  ...
}
```

On an ATM2 IQ Interface

```
[edit interfaces]
at-1/1/0 {
  atm-options {
    pic-type atm2;
    vpi 0;
    vpi 2 {
      oam-period 6;
    }
  }
  ...
}
```

On an ATM MIC Interface

```
[edit interfaces]
at-1/1/0 {
  atm-options {
```



```

    vpi 7;
  }
  ...
}

```

Configuring ATM Cell-Relay Promiscuous Mode

For ATM1 and ATM2 IQ with **atm-ccc-cell-relay** encapsulation, you can map all incoming cells from either an interface port or a virtual path (VP) to a single LSP without restricting the VCI number. Promiscuous mode allows you to map traffic from all 65,535 VCIs to a single LSP, or from all 256 VPIs to a single LSP.

To map incoming traffic from a port or VC to an LSP, include the **promiscuous-mode** statement at the **[edit interfaces *interface-name* atm-options]** hierarchy level:

```

[edit interfaces interface-name]
atm-options {
  promiscuous-mode {
    vpi vpi-identifier;
  }
}

```

You can include multiple **vpi** statements in the configuration.

To enable all VCIs in a VPI to open in ATM CCC cell-relay mode, you must also map the logical interface to a VPI by including the **vpi** statement in the logical interface configuration:

```

vpi vpi-identifier;

```

You can include this statement at the following hierarchy levels:

- **[edit interfaces *interface-name* unit *logical-unit-number*]**
- **[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]**

Also, note the following:

- For promiscuous mode, you must configure the port with **atm-ccc-cell-relay** encapsulation.
- For ATM1 PICs and ATM2 IQ PICs, changing modes between promiscuous and nonpromiscuous causes all physical interfaces to be deleted and re-added.
- For ATM1 PICs, and ATM2 IQ PICs, when you configure promiscuous mode, you cannot configure VCIs.
- For ATM1 PICs, if you configure one port in port mode, all ports on the PIC operate in port mode. Likewise if you configure one logical interface in VPI mode, all logical interfaces on the PIC must operate in VPI mode.
- For ATM2 IQ PICs, you can configure one or more logical interfaces in VPI promiscuous mode, and the other logical interfaces with any ATM encapsulation.

- For ATM2 IQ PICs, when you configure promiscuous mode, you must also include the **pic-type atm2** statement. For more information, see [“Configuring the ATM PIC Type” on page 43](#).
- For ATM2 IQ multiport PICs, you can configure one or more ports in port promiscuous mode, and the other ports with any ATM encapsulation.
- For interfaces that are configured for cell-relay promiscuous virtual path identifier (VPI) mode, the **show interfaces** command output does not show OAM F4 cell statistics.

Examples: Configuring ATM Cell-Relay Promiscuous Mode

This section includes the following examples:

Configuring Port-Promiscuous Mode

```
[edit interfaces]
at-0/2/1 {
  encapsulation atm-ccc-cell-relay; # at the physical interface level only
  atm-options {
    pic-type atm2;
    promiscuous-mode;
  }
  unit 0 {
    allow-any-vci;
  }
}
```

Configuring VP-Promiscuous Mode

```
[edit interfaces]
at-0/2/0 {
  atm-options {
    pic-type atm2;
    promiscuous-mode {
      vpi 0;
      vpi 1;
    }
    vpi 2;
    vpi 3;
  }
  unit 0 {
    encapsulation atm-ccc-cell-relay; # at the logical interface level only
    vpi 0;
  }
  unit 1 {
    encapsulation atm-ccc-cell-relay;
    vpi 1;
  }
  unit 2 {
    encapsulation atm-snap;
    vci 2.100;
  }
  unit 3 {
    encapsulation atm-vc-mux;
    vci 3.100;
  }
}
```

To map incoming traffic from a port to an LSP, include the **allow-any-vci** statement at the **[edit interfaces *interface-name* unit 0]** hierarchy level. When you include the **allow-any-vci** statement, you cannot configure other logical interfaces in the same physical interface. Next, you must map **unit 0** to an LSP using the CCC connection.

Mapping Incoming Traffic from a Port to an LSP

```
[edit interfaces at-1/2/0]
encapsulation atm-ccc-cell-relay;
atm-options {
  promiscuous-mode;
}
unit 0 {
  allow-any-vci;
}
```

Mapping Unit 0 to an LSP

```
protocols {
  connections {
    remote-interface-switch router-a-router-c {
      interface at-1/2/0.0;
    }
    lsp-switch router-a-router-c {
      transmit-lsp lsp1
      receive-lsp lsp2;
    }
  }
}
```

To map a VPI to an LSP, you must define the allowed VPIs. You can configure one or more logical interfaces, each mapped to a different VPI. You can then route traffic from each of these interfaces to different LSPs.

Mapping a VPI to an LSP

```
[edit interfaces at-1/1/0]
encapsulation atm-ccc-cell-relay;
atm-options {
  pic-type atm1;
  promiscuous-mode {
    vpi 10;
    vpi 20;
  }
}
unit 0 {
  encapsulation atm-ccc-cell-relay;
  vpi 10;
}
unit 1 {
  encapsulation atm-ccc-cell-relay;
  vpi 20;
}
[edit interfaces at-3/1/0]
encapsulation atm-ccc-cell-relay;
atm-options {
  pic-type atm2;
  promiscuous-mode {
    vpi 10;
    vpi 20;
  }
}
```

```
unit 0 {
    encapsulation atm-ccc-cell-relay;
    vpi 10;
}
unit 1 {
    encapsulation atm-ccc-cell-relay;
    vpi 20;
}
[edit protocols]
mpls {
    connections {
        interface-switch router-a-router-c {
            interface at-1/1/0.0;
            interface at-3/1/0.0;
        }
        interface-switch router-a-router-d {
            interface at-1/1/0.1;
            interface at-3/1/0.1;
        }
    }
}
```

Configuring the Maximum Number of ATM1 VCs on a VP

For ATM1 interfaces, you must configure the maximum number of virtual circuits (VCs) allowed on a virtual path (VP) so that sufficient memory on the ATM1 PIC can be allocated for each VC.

To configure the highest-numbered VCs on a VP, include the **maximum-vcs** and **vpi** statements at the **[edit interfaces *interface-name* atm-options]** hierarchy level:

```
[edit interfaces interface-name atm-options]
vpi vpi-identifier {
    maximum-vcs maximum-vcs;
}
```

The VP identifier can be a value from 0 through 255. For most interfaces, you can define a maximum of 4090 VCs per interface, and some interfaces have higher limits. Promiscuous mode removes these limits. For more information, see [“Configuring ATM Cell-Relay Promiscuous Mode” on page 45](#).

All VPIs that you configure in the **atm-options** statement are stored in a single table. If you modify the VPIs—for example, by editing them in configuration mode or by issuing a **load override** command—all VCs on the interface are closed and then reopened, resulting in a temporary loss of connectivity for all the VCs on the interface.

You can also include some of the statements in the **sonet-options** statement to set SONET/SDH parameters on ATM interfaces, as described in [“Configuring SONET/SDH Parameters on ATM Interfaces” on page 91](#).

Configuring Layer 2 Circuit Transport Mode

On ATM2 IQ interfaces only, you can configure Layer 2 circuit cell-relay, Layer 2 circuit AAL5, or Layer 2 circuit trunk transport mode.

Layer 2 circuit cell-relay and Layer 2 circuit AAL5 are defined in Internet draft draft-martini-l2circuit-encap-mpls-07.txt, *Encapsulation Methods for Transport of Layer 2 Frames Over IP and MPLS Networks* (expires December 2004).

Layer 2 circuit cell-relay and Layer 2 circuit AAL5 transport modes allow you to send ATM cells between ATM2 IQ interfaces across a Layer 2 circuit-enabled network. Layer 2 circuits are designed to transport Layer 2 frames between PE routers across an LDP-signaled MPLS backbone. You use Layer 2 circuit AAL5 transport mode to send AAL5 segmentation and reassembly protocol data units (SAR-PDUs) over the Layer 2 circuit.

A trunk is a collection of ATM VPs. Layer 2 circuit trunk transport mode allows you to send ATM cells over MPLS trunking.

By default, ATM2 IQ PICs are in standard AAL5 transport mode. Standard AAL5 allows multiple applications to tunnel the protocol data units of their Layer 2 protocols over an ATM virtual circuit. Encapsulation of these Layer 2 protocol data units allows a number of these emulated virtual circuits to be carried in a single tunnel. Protocol data units are segmented at one end of the tunnel and reassembled at the other end. The ingress router reassembles the protocol data units received from the incoming VC and transports each PDU as a single packet.

In contrast, Layer 2 circuit cell-relay and Layer 2 circuit AAL5 transport modes accept a stream of ATM cells, convert these to an encapsulated Layer 2 format, then tunnel them over an MPLS or IP backbone, where a similarly configured router segments these packets back into a stream of ATM cells, to be forwarded to the virtual circuit configured for the far-end router.

In Layer 2 circuit cell-relay transport mode, ATM cells are bundled together and transported in packet form to the far-end router, where they are segmented back into individual ATM cells and forwarded to the ATM virtual circuit configured for the far-end router.



NOTE: When you configure the `cell-bundle-size` statement at the `[edit interfaces at -fpc/pic/port atm-options]` hierarchy level is 1 and the `atm-ccc-cell-relay` trunk statement is included at the `[edit interfaces interface-name encapsulation]` hierarchy level, ATM cells are not bundled. Each ATM cell is forwarded as a single MPLS packet.

The uses for the four transport modes are defined as follows:

- To tunnel IP packets over an ATM backbone, use the default standard AAL5 transport mode.
- To tunnel a stream of AAL5-encoded ATM SAR-PDUs over an MPLS or IP backbone, use Layer 2 circuit AAL5 transport mode.
- To tunnel a stream of ATM cells over an MPLS or IP backbone, use Layer 2 circuit cell-relay transport mode.
- To transport ATM cells over an MPLS core network that is implemented between other vendors' switches or routers, use Layer 2 circuit trunk transport mode.



NOTE: You can transport AAL5-encoded traffic with Layer 2 circuit cell-relay transport mode, because Layer 2 circuit cell-relay transport mode ignores the encoding of the cell data presented to the ingress interface.

When you configure AAL5 mode Layer 2 circuits, the control word carries cell loss priority (CLP) information by default.

The Layer 2 circuit trunk transport mode is not supported on the ATM2 IQ OC48c/STM16 PIC.

To configure Layer 2 circuit AAL5, Layer 2 circuit cell-relay, or Layer 2 circuit trunk mode, you must perform the following tasks:

1. Identify the interface as an ATM2 IQ interface by including the **pic-type atm2** statement at the **[edit interfaces at-fpc/pic/port atm-options]** hierarchy level:

```
[edit interfaces at-fpc/pic/port atm-options]
pic-type atm2;
```

2. Include the **atm-l2circuit-mode** statement at the **[edit chassis fpc slot-number pic pic-number]** hierarchy level, specifying **aal5**, **cell**, or **trunk**:

```
[edit chassis fpc slot-number pic pic-number]
atm-l2circuit-mode (aal5 | cell | trunk trunk );
```

By default, the trunk mode uses user-to-network interface (UNI) mode. The trunk option can be UNI or network-to-network interface (NNI). For more information about UNI and NNI, see the Junos OS VPNs Configuration Guide and the Junos OS Feature Guides.

Transport mode is per PIC, not per port. If you do not include the **atm-l2circuit-mode** statement in the configuration, the ATM2 IQ PIC uses standard AAL5 transport mode. If you configure Layer 2 circuit cell-relay, Layer 2 circuit AAL5 transport mode, or Layer 2 circuit trunk mode, the entire ATM2 PIC uses the configured transport mode.

3. For Layer 2 circuit trunk mode only, you must also configure a trunk identification number by including the **trunk-id** statement:

```
trunk-id number;
```

You can include this statement at the following hierarchy levels:

- **[edit interfaces *interface-name* unit *logical-unit-number*]**
- **[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]**

The trunk identification number can be from 0 through 31; each trunk on an interface must have a unique trunk ID. When you associate a trunk ID number with a logical interface, you are in effect specifying the interfaces that are allowed to send ATM traffic over an LSP. For UNI mode, the trunk ID range is from 0 through 7. For NNI mode, the trunk ID range is from 0 through 31. Trunk IDs on connecting trunks do not need to be the same.

For information about proportional bandwidth sharing in trunk mode, see [“Configuring Layer 2 Circuit Trunk Mode Scheduling” on page 62](#).

4. For Layer 2 circuit AAL5 mode, configure logical interface encapsulation by including the **encapsulation** statement, specifying the **atm-ccc-vc-mux** encapsulation type:

```
encapsulation atm-ccc-vc-mux;
```

You can include this statement at the following hierarchy levels:

- **[edit interfaces *interface-name* unit *logical-unit-number*]**
- **[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]**

5. For Layer 2 circuit cell-relay and Layer 2 circuit trunk modes, configure physical interface encapsulation by including the **encapsulation** statement at the **[edit interfaces *interface-name*]** hierarchy level, specifying the **atm-ccc-cell-relay** encapsulation type:

```
[edit interfaces interface-name]  
encapsulation atm-ccc-cell-relay;
```

You can also include the **encapsulation atm-ccc-cell-relay** statement at the **[edit interface *interface-name* unit *logical-unit-number*]** hierarchy level. When you use the configuration given in the preceding steps,, keep the following points in mind:

- This configuration interoperates between Juniper routers running Junos OS Release 8.2 or earlier.
- This configuration does not interoperate with other network equipment, including a Juniper router running Junos OS Release 8.3 or later.
- For a Juniper router running Junos OS Release 8.3 or later to interoperate with another Juniper router running Junos OS Release 8.2 or earlier, include the **use-null-cw** statement at the **[edit interfaces *interface-name* atm-options]** hierarchy level on the router running Junos OS Release 8.3 or later.
- The **use-null-cw** statement inserts (for sending traffic) or strips (for receiving traffic) an extra null control word in the MPLS packet.
- The **use-null-cw** statement is not supported on a router running Junos OS Release 8.2 or earlier.

For more information about Layer 2 circuits, see the Junos OS VPNs Configuration Guide and the Junos OS Routing Protocols Configuration Guide. For a comprehensive example, see the Junos OS Feature Guides.

Examples: Configuring IQ Layer 2 Circuit Transport Mode

Configure Layer 2 circuit AAL5 transport mode and cell-relay transport mode.

Configuring Layer 2 Circuit AAL5 Transport Mode

```
[edit chassis]
fpc 0 {
  pic 1 {
    atm-l2circuit-mode aal5;
  }
}
[edit interfaces]
at-0/1/0 {
  atm-options {
    pic-type atm2;
    vpi 0;
  }
  unit 0 {
    encapsulation atm-ccc-vc-mux;
    point-to-point;
    vci 0.32;
  }
}
```

Configuring Layer 2 Circuit Cell-Relay Transport Mode

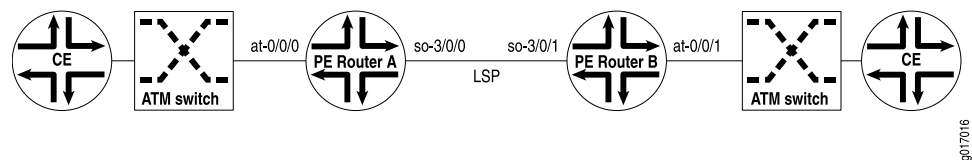
```
[edit chassis]
fpc 0 {
  pic 1 {
    atm-l2circuit-mode cell;
  }
}
[edit interfaces]
at-0/1/0 {
  encapsulation atm-ccc-cell-relay;
  atm-options {
    pic-type atm2;
    vpi 0;
  }
  unit 0 {
    encapsulation atm-ccc-cell-relay;
    point-to-point;
    vci 0.32;
  }
}
```


Configuring Layer 2 Circuit Trunk Transport Mode

In [Figure 1 on page 53](#), Router A is a local PE router. Router B is a remote PE router. Both Juniper Networks routers have Layer 2 circuit cell-relay capability. You configure an ATM physical interface on Router A in Layer 2 circuit trunk mode and specify trunks that are allowed to send traffic over the LSP. As a cell is received on this interface, it is classified using the CoS bits in the cell header, and encapsulated as a labeled packet. It is then queued on one of the outgoing queues according to its classification and sent over the LSP to Router B. At Router B, the packet label is removed and the raw cell is put on one of the queues of the ATM interface and forwarded to the second ATM switch. To carry the CoS information and CLP of the cell over the network, the CoS and CLP bits are copied into the EXP bits of the MPLS label. This CoS information is used to select the output queues. Using EPD profiles, the CLP is used to determine whether the cell should be dropped.

For more information about ATM CoS capability, see [“Configuring ATM2 IQ VC Tunnel CoS Components” on page 92](#).

Figure 1: Layer 2 Circuit Trunk Topology



```
On Router A    [edit chassis]
                fpc 0 {
                  pic 1 {
                    atm-l2circuit-mode trunk uni;
                  }
                }
                [edit interfaces]
                at-0/0/0 {
                  encapsulation atm-ccc-cell-relay;
                  atm-options {
                    pic-type atm2;
                    ilmi;
                  }
                  unit 0 {
                    trunk-id 0;
                    epd-threshold 10240;
                  }
                  unit 1 {
                    trunk-id 1;
                    epd-threshold 10240;
                  }
                  unit 2 {
                    trunk-id 2;
                    epd-threshold 10240;
                  }
                  unit 3 {
                    trunk-id 3;
                    epd-threshold 10240;
                  }
                  unit 4 {
                    trunk-id 4;
                    epd-threshold 10240;
                  }
                }
```

```
    }
    unit 5 {
        trunk-id 5;
        epd-threshold 10240;
    }
    unit 6 {
        trunk-id 6;
        epd-threshold 10240;
    }
    unit 7 {
        trunk-id 7;
        epd-threshold 10240;
    }
}
so-3/0/0 {
    mtu 9192;
    unit 0 {
        family inet {
            address 10.0.1.1/24;
        }
        family mpls;
    }
}
lo0 {
    unit 0 {
        family inet {
            address 172.16.0.1/32;
            address 10.255.245.1/32;
        }
    }
}
[edit protocols]
rsvp {
    interface all;
}
mpls {
    interface all;
}
ldp {
    interface all;
}
ospf {
    traffic-engineering;
    reference-bandwidth 4g;
    area 0.0.0.0 {
        interface all;
        interface fxp0.0 {
            disable;
        }
    }
}
l2circuit {
    neighbor 10.255.245.2 {
        interface at-0/1/0.0 {
            virtual-circuit-id 100;
        }
    }
}
```

```

interface at-0/1/0.1 {
    virtual-circuit-id 101;
}
interface at-0/1/0.2 {
    virtual-circuit-id 102;
}
interface at-0/1/0.3 {
    virtual-circuit-id 103;
}
interface at-0/1/0.4 {
    virtual-circuit-id 104;
}
interface at-0/1/0.5 {
    virtual-circuit-id 105;
}
interface at-0/1/0.6 {
    virtual-circuit-id 106;
}
interface at-0/1/0.7 {
    virtual-circuit-id 107;
}
}
}

```

On Router B

```

[edit chassis]
fpc 0 {
    pic 1 {
        atm-l2circuit-mode trunk uni;
    }
}
[edit interfaces]
at-0/0/1 {
    encapsulation atm-ccc-cell-relay;
    atm-options {
        pic-type atm2;
    }
    unit 0 {
        trunk-id 0;
        epd-threshold 10240;
    }
    unit 1 {
        trunk-id 1;
        epd-threshold 10240;
    }
    unit 2 {
        trunk-id 2;
        epd-threshold 10240;
    }
    unit 3 {
        trunk-id 3;
        epd-threshold 10240;
    }
    unit 4 {
        trunk-id 4;
        epd-threshold 10240;
    }
}

```

```
    unit 5 {
      trunk-id 5;
      epd-threshold 10240;
    }
    unit 6 {
      trunk-id 6;
      epd-threshold 10240;
    }
    unit 7 {
      trunk-id 7;
      epd-threshold 10240;
    }
  }
so-3/0/1 {
  mtu 9192;
  unit 0 {
    family inet {
      address 10.0.1.2/24;
    }
    family mpls;
  }
}
lo0 {
  unit 0 {
    family inet {
      address 172.16.0.1/32;
      address 10.255.245.2/32;
    }
  }
}
[edit protocols]
rsvp {
  interface all;
}
mpls {
  interface all;
}
ldp {
  interface all;
}
ospf {
  traffic-engineering;
  reference-bandwidth 4g;
  area 0.0.0.0 {
    interface all;
    interface fxp0.0 {
      disable;
    }
  }
}
l2circuit {
  neighbor 10.255.245.1 {
    interface at-0/1/0.0 {
      virtual-circuit-id 100;
    }
    interface at-0/1/0.1 {
```

```

        virtual-circuit-id 101;
    }
    interface at-0/1/0.2 {
        virtual-circuit-id 102;
    }
    interface at-0/1/0.3 {
        virtual-circuit-id 103;
    }
    interface at-0/1/0.4 {
        virtual-circuit-id 104;
    }
    interface at-0/1/0.5 {
        virtual-circuit-id 105;
    }
    interface at-0/1/0.6 {
        virtual-circuit-id 106;
    }
    interface at-0/1/0.7 {
        virtual-circuit-id 107;
    }
}
}

```

Layer 2 Circuit Transport Mode on ATM MICs Overview

On MX Series routers with ATM MICs, you can configure Layer 2 circuit cell relay or Layer 2 circuit ATM Adaptation Layer 5 (AAL5). Layer 2 circuit cell relay and Layer 2 circuit AAL5 are defined in *Encapsulation Methods for Transport of Asynchronous Transfer Mode (ATM) Over MPLS Networks* (RFC 4717). Layer 2 circuit cell-relay and Layer 2 circuit AAL5 transport modes allow you to send ATM cells between ATM interfaces across a Layer 2 circuit-enabled network. Layer 2 circuits are designed to transport Layer 2 frames between provider edge (PE) routers across an MPLS backbone.

Layer 2 circuit cell-relay and Layer 2 circuit AAL5 transport modes accept a stream of ATM cells, convert these to an encapsulated Layer 2 format, and then tunnel them over an MPLS or IP backbone, where a similarly configured router segments these packets back into a stream of ATM cells, to be forwarded to the virtual circuit configured for the far-end router. In Layer 2 circuit cell-relay transport mode, ATM cells are bundled together and transported in packet form to the far-end router, where they are segmented back into individual ATM cells and forwarded to the ATM virtual circuit configured for the far-end router. You use Layer 2 circuit AAL5 transport mode to send AAL5 segmentation and reassembly protocol data units (SAR-PDUs) over the Layer 2 circuit.

- Related Documentation**
- [Configuring Layer 2 Circuit Transport Mode on ATM MICs on page 57](#)
 - [Example: Configuring Layer 2 Circuit Transport Mode on ATM MICs on page 58](#)

Configuring Layer 2 Circuit Transport Mode on ATM MICs

To configure Layer 2 circuit AAL5 or Layer 2 circuit cell relay, perform the following tasks:

- For Layer 2 circuit AAL5 mode, configure logical interface encapsulation by including the **encapsulation** statement, specifying the **atm-ccc-vc-mux** encapsulation type:

```
encapsulation atm-ccc-vc-mux;
```

You can include this statement at the following hierarchy levels:

- **[edit interfaces *interface-name* unit *logical-unit-number*]**
- **[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]**
- For Layer 2 circuit cell-relay mode, configure physical interface encapsulation by including the **encapsulation** statement at the **[edit interfaces *interface-name*]** hierarchy level, specifying the **atm-ccc-cell-relay** encapsulation type:

```
[edit interfaces interface-name]  
encapsulation atm-ccc-cell-relay;
```

You can also include the **encapsulation atm-ccc-cell-relay** statement at the **[edit interface *interface-name* unit *logical-unit-number*]** hierarchy level.

When you use the configuration given in the preceding steps, keep the following points in mind:

- The chassis-level configuration for **atm-l2-circuit-mode** is not available for ATM MICs.
- The absence of the chassis-level configuration for **atm-l2-circuit-mode** does not indicate null control word.

For more information about Layer 2 circuits, see the Junos OS VPNs Configuration Guide and the Junos OS Routing Protocols Configuration Guide. For a comprehensive example, see the Junos OS Feature Guides.

Related Documentation

- [Layer 2 Circuit Transport Mode on ATM MICs Overview on page 57](#)
- [Example: Configuring Layer 2 Circuit Transport Mode on ATM MICs on page 58](#)

Example: Configuring Layer 2 Circuit Transport Mode on ATM MICs

This example shows how to configure Layer 2 circuit transport mode on ATM MICs.

- [Requirements on page 58](#)
- [Overview on page 59](#)
- [Configuration on page 59](#)

Requirements

This example uses the following hardware and software components:

- Junos OS Release 12.1 or later for MX Series routers
- A single MX Series router with an ATM MIC with SFP

Overview

This example provides information about configuring the Layer 2 circuit transport mode on MX Series routers with ATM MICs with SFP. You can configure the Layer 2 circuit cell-relay or Layer 2 circuit AAL5 transport mode. Layer 2 circuit cell-relay and Layer 2 circuit AAL5 transport modes allow you to send ATM cells between ATM interfaces across a Layer 2 circuit-enabled network. Layer 2 circuits are designed to transport Layer 2 frames between provider edge (PE) routers across an MPLS backbone. In Layer 2 circuit cell-relay transport mode, ATM cells are bundled together and transported in packet form to the far-end router, where they are segmented back into individual ATM cells and forwarded to the ATM virtual circuit configured for the far-end router. You use Layer 2 circuit AAL5 transport mode to send AAL5 segmentation and reassembly protocol data units (SAR-PDUs) over the Layer 2 circuit.

Configuration

To configure Layer 2 circuit transport mode, perform these tasks:

- [Configuring Layer 2 Circuit AAL5 Transport Mode on page 59](#)
- [Configuring Layer 2 Circuit Cell-Relay Transport Mode on page 60](#)

Configuring Layer 2 Circuit AAL5 Transport Mode

CLI Quick Configuration

To quickly configure interface-level Layer 2 circuit AAL5 transport mode, copy and paste the following commands into the CLI:

```
[edit]
set interface at-0/2/2 atm-options vpi 9
set interface at-0/2/2 unit 0 encaps atm-ccc-vc-mux
set interface at-0/2/2 unit 0 vci 9.99
```

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the CLI User Guide.

Step-by-Step Procedure

To configure Layer 2 circuit AAL5 transport mode on the ATM MIC with SFP, perform the following tasks:

1. In configuration mode, go to the **[edit interfaces]** hierarchy level and set the interface as **at-0/2/2**.

```
[edit]
user@host# edit interfaces at-0/2/2
```

2. Set the ATM virtual path identifier (VPI) to 9, by including the **vpi 9** statement.

```
[edit interfaces at-0/2/2]
user@host# set vpi 9
```

3. Configure unit 0 and the physical interface encapsulation.

```
[edit interfaces at-0/2/2]
user@host# edit unit 0
[edit interfaces at-0/2/2 unit 0]
user@host# set encapsulation atm-ccc-vc-mux
```

4. Specify the ATM virtual circuit identifier (VCI) as 9.9.

```
[edit interfaces at-0/2/2 unit 0]
user@host#set vci 9.9
```

Results To view the configuration of AAL5 transport mode:

```
[edit]
user@host# show
[edit interfaces]
  at-0/1/0 {
    atm-options {
      vpi 9;
    }
    unit 0 {
      encapsulation atm-ccc-vc-mux;
      vci 9.9;
    }
  }
```

Configuring Layer 2 Circuit Cell-Relay Transport Mode

CLI Quick Configuration To quickly configure interface-level Layer 2 circuit cell-relay transport mode, copy and paste the following commands into the CLI:

```
[edit]
set interface at-0/2/2 atm-options vpi 10
set interface at-0/2/2 unit 0 encaps atm-ccc-cell-relay
set interface at-0/2/2 unit 0 vci 10.100
```

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the CLI User Guide.

Step-by-Step Procedure To configure Layer 2 circuit cell-relay transport mode on the ATM MIC with SFP, perform the following tasks:

1. In configuration mode, go to the **[edit interfaces]** hierarchy level and set the interface as **at-0/2/2**.

```
[edit]
user@host# edit interfaces at-0/2/2
```

2. Set the ATM virtual path identifier (VPI) to 10, by including the **vpi 10** statement.

```
[edit interfaces at-0/2/2]
user@host# set vpi 10
```

3. Configure unit 0 and the physical interface encapsulation.

```
[edit interfaces at-0/2/2]
user@host# edit unit 0
[edit interfaces at-0/2/2]
user@host# set encapsulation atm-ccc-cell-relay
```

4. Specify the ATM virtual circuit identifier (VCI) as 10.100.


```
[edit interfaces at-0/2/2 unit 0]
user@host#set vci 10.100
```

Results To view the configuration of cell-relay transport mode:

```
[edit]
user@host# show
[edit interfaces]
  at-0/1/0 {
    atm-options {
      vpi 10;
    }
    unit 0 {
      encapsulation atm-ccc-cell-relay;
      vci 10.100;
    }
  }
```

Related Documentation

- [Configuring Layer 2 Circuit Transport Mode on ATM MICs on page 57](#)

Configuring Layer 2 Circuit Cell-Relay Promiscuous Mode

By default, all incoming cells are mapped from a single virtual circuit (VC) to an external LSP. For ATM interfaces with Layer 2 circuit cell-relay transport mode and **atm-ccc-cell-relay** encapsulation, you can configure promiscuous mode. Promiscuous mode allows you to map all incoming cells from either an interface port or a virtual path (VP) to a single LSP without restricting the VCI number. You can map traffic from all 65,535 VCIs to a single LSP, or from all 256 VPIs to a single LSP. For promiscuous-mode configuration guidelines, see “[Configuring ATM Cell-Relay Promiscuous Mode](#)” on page 45.

Example: Configuring Layer 2 Circuit Cell-Relay Promiscuous Mode

Configure Layer 2 circuit cell-relay VP- and port-promiscuous mode:

VP-Promiscuous Mode

```
[edit interfaces]
at-0/1/0 {
  encapsulation atm-ccc-cell-relay;
  atm-options {
    pic-type atm2;
    cell-bundle-size 4;
    promiscuous-mode {
      vpi 0;
    }
  }
  unit 0 {
    encapsulation atm-ccc-cell-relay;
    point-to-point;
    vci 0.32;
  }
}
```

Port-Promiscuous Mode

```
[edit interfaces]
at-0/1/0 {
  encapsulation atm-ccc-cell-relay;
  atm-options {
    pic-type atm2;
    promiscuous-mode;
  }
  unit 0 {
    allow-any-vci;
  }
}
```

Configure Layer 2 circuit cell-relay VP-promiscuous and port-promiscuous modes on ATM MICs:

VP-Promiscuous Mode

```
[edit interfaces]
at-0/1/0 {
  atm-options {
    promiscuous-mode {
      vpi 1;
    }
  }
  unit 0 {
    encapsulation atm-ccc-cell-relay;
    vpi 1;
  }
}
```

Port-Promiscuous Mode

```
[edit interfaces]
at-0/1/0 {
  encapsulation atm-ccc-cell-relay;
  atm-options {
    promiscuous-mode;
  }
  unit 0 {
    allow-any-vci;
  }
}
```

Configuring Layer 2 Circuit Trunk Mode Scheduling

For ATM2 IQ interfaces configured to use Layer 2 circuit trunk mode, you can share a scheduler among 32 trunks on an ATM port. A weighted round robin scheduling algorithm ensures each trunk receives a proportional share of the bandwidth when all trunks are active, and redistributes bandwidth that would have otherwise been reserved by an inactive trunk, thus minimizing the latency on each trunk. For general information about Layer 2 circuit trunk mode, see [“Configuring Layer 2 Circuit Transport Mode” on page 49](#). For general information about ATM CoS scheduling, see [“Configuring ATM2 IQ VC Tunnel CoS Components” on page 92](#).

Each trunk is associated with a trunk bandwidth. The trunk bandwidth is the maximum bandwidth used each time a trunk is serviced. We recommend configuring trunk

bandwidths so that the ratio between the minimum and maximum bandwidths does not exceed 1:500.

To minimize latency, the Junos OS does not shape the trunks. As cells are received, they are immediately transmitted.

To configure trunk bandwidth, include the **trunk-bandwidth** statement:

```
trunk-bandwidth rate;
```

You can include this statement at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number*]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]

The trunk bandwidth can be from 1,000,000 through 542,526,792 bps. You can specify the rate in bits per second or cells per second (cps). You can specify a bits-per-second value either as a complete decimal number or as a decimal number followed by the abbreviation **k** (1000), **m** (1,000,000), or **g** (1,000,000,000). You can specify a cells-per-second value by entering a decimal number followed by the abbreviation **c**; values expressed in cells per second are converted to bits per second by means of the formula 1 cps = 384 bps.

The Junos OS rounds off the configured value. Therefore, we recommend that you configure a minimum trunk bandwidth of **1m**. From **1m**, configure values in increments of **500k**.

Example: Configuring Layer 2 Circuit Trunk Mode Scheduling

Configure two logical interfaces to use Layer 2 circuit trunk mode, ATM CoS scheduling, and proportional bandwidth sharing:

```
[edit interface]
at-1/1/0 {
  encapsulation atm-ccc-cell-relay;
  atm-options {
    pic-type atm2;
    ilmi;
    scheduler-maps {
      trunk-map {
        vc-cos-mode strict;
        forwarding-class cbr-class {
          priority high;
          transmit-weight percent 40;
          epd-threshold 100;
        }
        forwarding-class rtvbr-class {
          priority low;
          transmit-weight percent 30;
          epd-threshold 100;
        }
        forwarding-class nrtvbr-class {
          priority low;
        }
      }
    }
  }
}
```

```

        transmit-weight percent 20;
        epd-threshold 100;
    }
    forwarding-classubr-class {
        priority low;
        transmit-weight percent 10;
        epd-threshold 100;
    }
}
}
}
unit 0 {
    encapsulation atm-ccc-cell-relay;
    trunk-id 1;
    trunk-bandwidth 10m;
    atm-scheduler-map trunk-map;
    family ccc {
        filter {
            output atm-trunk-01;
        }
    }
}
unit 1 {
    encapsulation atm-ccc-cell-relay;
    trunk-id 3;
    trunk-bandwidth 30m;
    atm-scheduler-map trunk-map;
}
}

```

Configuring CoS Queues in Layer 2 Circuit Trunk Mode

On ATM2 IQ interfaces, you can configure ATM CoS scheduling for AAL5 mode and Layer 2 circuit trunk mode. For general information about ATM CoS, see [“Configuring ATM2 IQ VC Tunnel CoS Components” on page 92](#).

When you configure CoS scheduling in Layer 2 circuit trunk mode, the trunk is defined on the logical interface, and four CoS queues are opened in the trunk. For each CoS queue, you specify a priority and a transmit weight. CoS queues are serviced using a weighted round robin (WRR) algorithm. One queue is serviced with strictly high priority and the remaining queues are serviced with the WRR.

For Layer 2 circuit trunk mode, only strict mode is supported. Alternate mode is not supported.

To configure CoS queues in Layer 2 circuit trunk mode, perform the following tasks:

1. Include the **encapsulation atm-ccc-cell-relay** statement at the **[edit interfaces at-fpc/pic/port]** hierarchy level:

```

[edit interfaces at-fpc/pic/port]
encapsulation (atm-ccc-cell-relay | ether-vpls-over-atm-llc);

```

2. Include the **scheduler-maps** statement at the **[edit interfaces at-fpc/pic/port atm-options]** hierarchy level:

```
[edit interfaces at-fpc/pic/port atm-options]
scheduler-maps map-name {
  forwarding-class (class-name | assured-forwarding | best-effort |
    expedited-forwarding | network-control);
  vc-cos-mode strict;
}
```

3. Include the **atm-scheduler-map**, **trunk-bandwidth**, and **trunk-id** statements at the **[edit interfaces at-fpc/pic/port unit logical-unit-number]** hierarchy level:

```
[edit interfaces at-fpc/pic/port unit logical-unit-number]
atm-scheduler-map (map-name | default);
trunk-bandwidth rate;
trunk-id number;
```

For information about ATM scheduler maps, see [“Configuring an ATM Scheduler Map” on page 94](#).

For information about trunk identification numbers, see [“Configuring Layer 2 Circuit Transport Mode” on page 49](#). For information about trunk bandwidths, see [“Configuring Layer 2 Circuit Trunk Mode Scheduling” on page 62](#).

Strict mode CoS queue priority works as follows:

- **Scheduling**—One queue has strictly high priority and is always serviced before the remaining queues are serviced by a weighted round robin. This means the packets in a **high** priority queue are sent first until the queue is empty. Then **low** priority queues send packets until their weight quota becomes zero or negative.
- **Latency**—Each trunk is associated with a trunk bandwidth. The trunk bandwidth is the maximum bandwidth used each time a trunk is serviced. In the scheduling process, each trunk is serviced in a WRR. The maximum latency for any trunk to begin transmitting is equal to the sum of the weights of all previously queued trunks. Trunks without data do not affect output scheduling. As long as all the trunks have data, the exact weight proportions are maintained. If a trunk runs out of data during its turn, it is no longer included in the WRR. When the trunk gets more data, the trunk is placed at the end of the queue. For more information, see [“Configuring Layer 2 Circuit Trunk Mode Scheduling” on page 62](#).

Within a single trunk, the maximum latency of a **high** priority queue is the time it takes to transmit one ATM cell. The latency of a **low** priority queue is the sum of **high** priority queue burst time and the transmission time of the remaining **low** priority queues' weight.

- **Bandwidth distribution**—Trunks are serviced in a WRR based on the trunk bandwidth.

Within a single trunk, the **high** priority queue consumes the bandwidth first regardless of its weight. The remaining bandwidth is distributed to the **low** priority queues in proportion to their weights.

Consider the following example:

- You configure a trunk with weights of 10 percent, 20 percent, 30 percent, and 40 percent for queues 0, 1, 2, and 3, respectively.

- You configure queue 0 to be a high priority queue.
- Queue 0 does not have cells to transmit.

In this scenario, queues 1, 2 and 3 receive 2/9, 3/9, and 4/9 of the bandwidth, respectively.



NOTE: Constant bit rate (CBR) traffic always enters the strictly high priority queue.

For more information about strict and alternate modes, see [“Configuring VC CoS Mode” on page 101](#).

For general information about Layer 2 circuit trunk mode, see [“Configuring Layer 2 Circuit Transport Mode” on page 49](#).

For interfaces configured in trunk mode, you can also configure dual EPD thresholds depending on packet loss priorities (PLPs). For more information, see [“Configuring Two EPD Thresholds per Queue” on page 81](#).

Example: Configuring CoS Queues in Layer 2 Circuit Trunk Mode

Configure a scheduler map and trunk bandwidth:

```
[edit interfaces]
at-6/1/0 {
  encapsulation atm-ccc-cell-relay;
  atm-options {
    pic-type atm2;
    scheduler-maps {
      cos0 {
        vc-cos-mode strict;
        forwarding-class cbr-class {
          priority high;
          transmit-weight percent 10;
        }
        forwarding-class rtvbr-class {
          priority low;
          transmit-weight percent 20;
        }
        forwarding-class nrtvbr-class {
          priority low;
          transmit-weight percent 30;
        }
        forwarding-class ubr-class {
          priority low;
          transmit-weight percent 40;
        }
      }
    }
  }
  unit 0 {
    trunk-id 0;
    trunk-bandwidth 10m;
  }
}
```

```

        atm-scheduler-map cos0;
    }
}

```

Configuring the Layer 2 Circuit Cell-Relay Cell Maximum

By default, each frame contains one cell. For ATM interfaces with Layer 2 circuit cell-relay transport mode configured, you can configure the maximum number of ATM cells per frame on the physical or logical interface. To set the maximum number of cells per frame, include the **cell-bundle-size** statement:

```
cell-bundle-size cells;
```

You can include this statement at the following hierarchy levels:

- [edit interfaces *interface-name* atm-options]
- [edit interfaces *interface-name* unit *logical-unit-number*]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]

The cell bundle size can be from 1 through 176.

After 125 microseconds, cell bundling times out. This means that after 125 microseconds if the frame does not contain the configured value, the frame is transmitted anyway.

If you include the **cell-bundle-size** statement at the [edit interfaces *interface-name* atm-options] hierarchy level, then the configured value becomes the default for all the logical interface units configured for that physical interface. If you include the **cell-bundle-size** statement for a logical interface, the logical interface configuration overrides the value configured at the physical interface level.

The transmit rates you configure on the routers at each end of the connection must be the same value.

Class-Based Cell Bundling

For Layer 2 circuit trunk mode only, cell bundling is enhanced by a set of CoS and traffic shaping rules, as follows:

- CBR and real-time variable bit rate (RTVBR) cells are not bundled. They are always sent as single-cell packets.
- Cells with the same CLP bits are bundled together. This means all the cells in a bundle contain the same CLP value.
- Cells with the same CoS bits are bundled together. This means all the cells in a bundle belong to the same class of service.
- As alluded to in the previous rules, several triggers cause early packet transmission, meaning that the packet is transmitted before the number of cells received is equal to the value configured with the **cell-bundle-size** statement. These triggers are as follows:

- The next cell is of type CBR or RTVBR.
- The next cell has a different CLP bit.
- The next cell has different CoS bits.
- The 125-microsecond timer expires.

CoS-based cell bundling optimizes the release of a bundle by sending out the cell that triggers early packet transmission as a single-cell packet. This means that when a cell triggers early packet transmission, that cell is not bundled. Consequently, certain input data patterns might cause primarily single-cell packets to be transmitted. For example, say the output interface receives a steady pattern of two cells from a non-RTVBR queue, followed by two cells from a UBR queue. In this case, all transmitted packets contain a single cell because the first cell triggers a transition and is transmitted by itself. The second cell is also transmitted by itself because the third cell triggers another transition, and so on. This effect might not be dramatic with a mix of traffic; it is most evident with steady traffic patterns, as generated by ATM test equipment programmed to emit regular sequences of CoS queue transitions.

Configuring the OAM F4 Cell Flows

For ATM2 IQ interfaces, the F4 flow cell is used for management of the VP level. If your router is equipped with an ATM2 IQ PIC, you can configure OAM F4 cell flows to identify and report VPC defects and failures. The Junos OS supports three types of OAM F4 cells in end-to-end F4 flows:

- Virtual Path Alarm Indication Signal (VP-AIS)
- Virtual Path Remote Defect Indication (VP-RDI)
- Virtual Path Loopback

The Junos OS does not support segment F4 flows, VPC continuity check, or VP performance management functions.

On each VP, you can configure an interval during which to transmit loopback cells by including the **oam-period** statement at the **[edit interfaces *interface-name* atm-options vpi *vpi-identifier*]** hierarchy level:

```
[edit interfaces interface-name atm-options vpi vpi-identifier]  
oam-period (disable | seconds);
```

When you add a VPI at the **atm-options** hierarchy, an end-to-end F4 VCI is automatically opened to send and receive OAM F4, VP-AIS, and VP-RDI cells. If you enable OAM by including the **oam-period** statement in the configuration, the router sends and receives OAM F4 loopback cells.

If the physical ATM interface is configured with encapsulation type **atm-ccc-cell-relay**, then F4 VCIs are not created, and F4 OAM processing is not performed for the VPIs configured on that interface.

To modify OAM liveness values on a VP, include the **oam-liveness** statement at the **[edit interfaces *interface-name* atm-options vpi *vpi-identifier*]** hierarchy level:

```
[edit interfaces interface-name atm-options vpi vpi-identifier]
oam-liveness {
  up-count cells;
  down-count cells;
}
```

up-count is the minimum number of consecutive OAM F4 loopback cells received on a VPI before it is declared up.

down-count is the minimum number of consecutive OAM F4 loopback cells lost before a VPI is declared down.

When a VP-AIS or VP-RDI cell is received, the VPI is marked down. When a VP-AIS cell is received on a VPI, a VP-RDI is generated and transmitted on the same VPI. When an OAM F4 loopback request cell is received, the router sends a loopback reply cell, even if the **oam-period** statement is not included in the configuration of the VPI.

When a VPI is marked down because the VPI receives VP-AIS, VP-RDI, VC-AIS, or VC-RDI cells, or because the VPI does not receive down-count consecutive OAM F4 loopback replies, all the VCs that belong to the VPI are marked down. When a VPI is marked up, all the VCs that belong to the VPI are marked up. The status of logical interfaces is also changed when the status of the last VCI on that interface is changed.

For a configuration example, see [“Example: Configuring ATM2 IQ Interfaces” on page 106](#).



NOTE: For interfaces that are configured for cell-relay promiscuous virtual path identifier (VPI) mode, the **show interfaces** command output does not show (OAM) F4 cell statistics.

Defining Virtual Path Tunnels

For ATM2 IQ interfaces, you can configure shaping on a VPI. When you do this, the VPI is called a VP tunnel. If your router is equipped with an ATM2 IQ PIC, you can configure VP tunnels and a weight for each VC. Each VC is serviced in WRR mode. When VCs have data to send, they send the number of cells equal to their weight before passing control to the next active VC. This allows proportional bandwidth sharing between multiple VCs within a rate-shaped VP tunnel. VP tunnels are not supported on point-to-multipoint interfaces.

If you change or delete VP tunnel traffic shaping, all logical interfaces on a VP are deleted and re-added.

All VPIs you configure on logical interfaces must also be configured on the physical interface, at the **[edit interfaces *interface-name* atm-options]** hierarchy level.

When you configure a VPI without shaping parameters, the VPI is a regular VPI; no shaping is attached. VCs that belong to non-shaped VPIs can have VCI shaping.

For point-to-point interfaces, include the **shaping** statement at the **[edit interfaces *interface-name* atm-options vpi *vpi-identifier*]** hierarchy level:

```
[edit interfaces interface-name atm-options vpi vpi-identifier]  
shaping {  
  (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate burst length);  
  queue-length number;  
}
```

For **cbr**, **vbr**, and **burst** statement usage guidelines, see “Defining the ATM Traffic-Shaping Profile” on page 72. For information about ATM2 IQ shaping values, see “Specifying ATM2 IQ Shaping Values” on page 78.

Configuring a Point-to-Point ATM1 or ATM2 IQ Connection

When you use ATM encapsulation on an interface, you must map each logical interface to a VCI. You can optionally map logical interfaces to a VPI.

For ATM1 and ATM2 IQ interfaces, you can configure a VCI and a VPI on a point-to-point ATM interface by including the **vci** statement:

```
vci vpi-identifier.vci-identifier;
```

You can include this statement at the following hierarchy levels:

- **[edit interfaces *interface-name* unit *logical-unit-number*]**
- **[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]**

For each VCI, configure the VCI and VPI identifiers. The default VPI identifier is 0. For ATM1 interfaces, the VCI identifier cannot exceed the highest-numbered VC configured for the interface with the **vpi** statement, as described in “Configuring the Maximum Number of ATM1 VCs on a VP” on page 48.

VCIs 0 through 31 are reserved for specific ATM values designated by the ATM Forum.

ATM2 IQ interfaces support only one invalid VC counter for all ports. The invalid VC counter is recorded at port 0 only.

When you are configuring point-to-point connections, the maximum transmission unit (MTU) sizes on both sides of the connections must be the same.

Configuring a Point-to-Multipoint ATM1 or ATM2 IQ Connection

An ATM interface can be a point-to-point interface or a point-to-multipoint (also called a multipoint non-broadcast multiaccess [NBMA]) connection.

For ATM1 and ATM2 IQ interfaces, you can configure an NBMA ATM connection by including the following statements:

```
multipoint;  
family inet {
```

```

address ip-address {
  multipoint-destination address {
    epd-threshold cells;
    inverse-arp;
    oam-liveness {
      up-count cells;
      down-count cells;
    }
    oam-period (disable | seconds);
    shaping {
      (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate
      burst length);
      queue-length number;
    }
    vci vpi-identifier.vci-identifier;
  }
}

```

ip-address is the interface's address. The address must include the destination prefix (for example, /24).

You can include this statement at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number*]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]

For each destination, include one **multipoint-destination** statement. *address* is the address of the remote side of the connection, and *vci-identifier* and *vpi-identifier* are the VCI and optional VPI identifiers for the connection.

When you configure point-to-multipoint connections, all interfaces in the subnet must use the same MTU size.

Configuring a Multicast-Capable ATM1 or ATM2 IQ Connection

For ATM1 and ATM2 IQ interfaces, you can configure a multicast-capable connection. By default, ATM connections assume unicast traffic. If your ATM switch performs multicast replication, you can configure the connection to support multicast traffic by including the **multicast-vci** statement:

```

multicast-vci vpi-identifier.vci-identifier;

```

You can include this statement at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number*]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]

vci-identifier and *vpi-identifier* are the VCI and VPI identifiers, which define the ATM VCI over which the switch is expecting to receive multicast packets for replication.

You can configure multicast support only on point-to-multipoint ATM connections.

Configuring Inverse ATM1 or ATM2 ARP

For ATM1 and ATM2 IQ interfaces, you can configure inverse ATM Address Resolution Protocol (ARP), as described in RFC 2225, *Classical IP and ARP over ATM*. When inverse ATM ARP is enabled, the router responds to received inverse ATM ARP requests by providing IP address information to the requesting ATM device.

The router does not initiate inverse ATM ARP requests.

By default, inverse ATM ARP is disabled. To configure a VC to respond to inverse ATM ARP requests, include the **inverse-arp** statement:

```
inverse-arp;
```

For a list of hierarchy levels at which you can include this statement, see [inverse-arp](#).

You must configure ATM LLC subnetwork attachment point (SNAP) encapsulation on the logical interface to support inverse ARP. No other ATM encapsulation types are allowed. For more information, see [“Configuring ATM Interface Encapsulation” on page 83](#).

Defining the ATM Traffic-Shaping Profile

When you use an ATM encapsulation on ATM1 and ATM2 IQ interfaces, you can define bandwidth utilization, which consists of either a constant rate or a peak cell rate, with sustained cell rate and burst tolerance.

These values are used in the ATM generic cell-rate algorithm, which is a leaky bucket algorithm that defines the short-term burst rate for ATM cells, the maximum number of cells that can be included in a burst, and the long-term sustained ATM cell traffic rate.

If your router is equipped with an ATM2 IQ PIC, each VC can have independent shaping parameters. For more information, see [“Defining Virtual Path Tunnels” on page 69](#).



NOTE: When the DS3 or E3 port parameters are not identical on all ports of a multiport ATM DS3 or E3 PIC, the ATM PIC driver might not always use the minimum port shaping rate (of all the ports on a multiport ATM DS3 or E3 PIC) selected for cell transmission shaping. The PIC's shaping rate is always updated to conform to the last port setting updated by the PIC software driver, rather than use the minimum port (shaping) rate. There is no syslog message to inform the user of the shaping rate decision applied by the software driver.

By default, the bandwidth utilization is unlimited; that is, unspecified bit rate (UBR) is used. Also, by default, buffer usage by VCs is unregulated.

To define limits to bandwidth utilization, include the **shaping** statement:

```
shaping {
```

```
(cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate burst length);
queue-length number;
}
```

For a list of hierarchy levels at which you can include this statement, see [shaping](#).

The **rtvbr** statement is supported on ATM2 IQ PICs only. The **queue-length** statement is supported on ATM1 PICs only.

To configure VP tunnels on ATM2 IQ interfaces, include the **shaping** statement at the **[edit interfaces *interface-name* atm-options vpi *vpi-identifier*]** hierarchy level:

```
[edit interfaces interface-name atm-options vpi vpi-identifier]
shaping {
  (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate burst length);
}
```

When configuring ATM traffic shaping, you can do the following:

- [Configuring ATM CBR on page 73](#)
- [Configuring ATM2 IQ Real-Time VBR on page 74](#)
- [Configuring ATM VBR on page 74](#)
- [Specifying ATM1 Shaping Values on page 75](#)
- [Specifying ATM2 IQ Shaping Values on page 78](#)

Configuring ATM CBR

For traffic that does not require the ability to periodically burst to a higher rate, you can specify a constant bit rate (CBR).

To specify a CBR on ATM1 and ATM2 IQ interfaces, include the **cbr** statement:

```
cbr rate;
```

For a list of hierarchy levels at which you can include this statement, see [cbr](#). On J Series routers, ATM CBR shaping is not supported.

For ATM1 OC3 interfaces, the rate can be from 33 Kbps through 135.6 Mbps; for ATM1 OC12 interfaces, the rate can be from 33 Kbps through 276 Mbps.

For ATM2 IQ OC3 and OC12 interfaces, the rate can be from 33 Kbps through 542,526,792 bps.

For ATM2 IQ OC48 interfaces, the rate can be from 33 Kbps through 2,170,107,168 bps.

For ATM2 IQ DS3 and E3 interfaces, the rate can be from 33 Kbps to the maximum rate. The maximum rate varies depending on the ATM encapsulation and framing you configure, as shown in [Table 5 on page 74](#).

Table 5: Shaping Rate Range by Interface Type

Interface Type	Maximum Rate
DS3 with direct ATM encapsulation	40,038,968 bps
DS3 with PLCP ATM encapsulation	36,864,000 bps
E3 with g.751 framing and direct ATM encapsulation	30,801,509 bps
E3 with g.751 framing PLCP ATM encapsulation	27,648,000 bps
E3 with g.832 framing	30,720,000 bps

Configuring ATM2 IQ Real-Time VBR

By default, ATM interfaces use UBR; that is, bandwidth utilization is unlimited. For ATM2 IQ interfaces only, you can configure RTVBR, which supports variable bit rate data traffic with average and peak traffic parameters. Compared to non-real-time VBR, RTVBR data is serviced at a higher priority with a relatively small sustainable cell rate (SCR) limit to minimize the delay. Real-time VBR is suitable for carrying packetized video and audio.

To configure RTVBR, include the **rtvbr** statement:

```
rtvbr peak rate sustained rate burst length;
```

For a list of hierarchy levels at which you can include this statement, see [rtvbr](#).

When configuring RTVBR, you can define the following shaping properties:

- Peak rate—Top rate at which traffic can burst.
- Sustained rate—Normal traffic rate averaged over time.
- Burst length—Maximum number of cells that a burst of traffic can contain. It can be a value from 1 through 4000 cells.

The peak and sustained rates can be from 33 Kbps through 542,526,792 bps.

Configuring ATM VBR

By default, ATM interfaces use UBR; that is, bandwidth utilization is unlimited. For ATM1 and ATM2 IQ interfaces, you can configure non-real-time VBR, which supports variable bit rate data traffic with average and peak traffic parameters. Compared to RTVBR, non-real-time VBR is scheduled with a lower priority and with a larger SCR limit, allowing it to recover bandwidth if it falls behind. Non-real-time VBR is suitable for packet data transfers.

To define VBR on ATM1 and ATM2 IQ interfaces, include the **vbr** statement:

```
vbr peak rate sustained rate burst length;
```

For a list of hierarchy levels at which you can include this statement, see [vbr](#).

When configuring VBR, you can define the following shaping properties:

- Peak rate—Top rate at which traffic can burst.
- Sustained rate—Normal traffic rate averaged over time.
- Burst length—Maximum number of cells that a burst of traffic can contain. It can be a value from 1 through 4000 cells.

Specifying ATM1 Shaping Values

For ATM1 interfaces, you can specify the rates in bits per second or cells per second. For OC3c interfaces, the highest rate is 135,631,698 bps (353,207.55 cps), which corresponds to 100 percent of the available line rate. For OC12c interfaces, the highest rate is 271,263,396 bps (706,415.09 cps), which corresponds to 50 percent of the available line rate. [Table 6 on page 76](#) lists some of the other rates you can specify. If you specify a rate that is not listed, it is rounded to the nearest rate.

The exact number of values differs between OC12c and OC3c interfaces. OC12c interfaces have about four times as many value increments as OC3c interfaces.

For OC12c rates between 1/2 of the line rate and 1/128 of the line rate, there are 128 steps between each 1/*n* value. This means that there is 128 steps between the 1/2 and 1/3 line rate values, and another 128 steps between 1/3 and 1/4 and so on. For rates smaller than 1/127, there are (16,384 minus 127) or 16,257 values. The reason for this is that fractional shaping is ignored at rates below 1/127. This results in a total of about 32,384 distinct rates for OC12c. When *n* is larger than or equal to 127, the steps are 1/*n*.

For OC3c, the starting point is full line rate, the fraction/integer breakpoint is about 1/31, and there is a maximum of 4096 scheduler slots for use after 1/31 of line rate, producing about 8032 total distinct rates. When *n* is larger than or equal to 31, the steps are 1/*n*.

For ATM1 interfaces, the following formula can be used to predict the actual shaping rate:

- OC3 shaping settings between 135,631,698 bps (OC3 ATM cell line rate) and 4,375,216 bps (1/31 of OC3 ATM cell line rate).
- OC12 shaping settings between 271,263,396 bps (half OC12 ATM cell line rate – the highest rate supported) and 4,271,864 bps (1/127 of OC12 ATM cell line rate).

$$\text{actual-rate} = (128 * \text{line-rate}) / (\text{trunc} ((128 * \text{line-rate}) / \text{desired-rate}))$$

line-rate is the maximum available rate on the interface (in bits per second) after factoring out the overhead for SONET/SDH and ATM (per-cell) overheads. For OC3c interfaces, the line rate is calculated as follows:

$$\text{line-rate} = 155,520,000 \text{ bps} \times (26/27) \times (48/53) = 135,631,698.1 \text{ bps}$$

For OC12c interfaces, the line rate is calculated as follows:

$$\text{line-rate} = 622,080,000 \text{ bps} \times (26/27) \times (48/53) = 542,526,792.45 \text{ bps}$$

desired-rate is the rate you enter in the **vbr** statement, in bits per second.

The **trunc** operator indicates that all digits to the right of the decimal point should be dropped.

For shaping settings smaller than 1/31 of OC3 ATM cell line rate (4,375,216 bps) and 1/127 of OC12 ATM cell line rate (4,271,864 bps), you can predict the actual shaping rate using the following formula:

$$\text{actual-rate} = (1 / (\text{trunc}(\text{line-rate} / \text{desired-rate}) + 1)) * \text{line-rate}$$

For example, for OC12 interfaces, the actual rates for shaping below 4,271,864 bps are calculated as follows:

1 / 127 * 542,526,792.45 bps = 4,271,864 bps (11124 cells/second)
 1 / 128 * 542,526,792.45 bps = 4,238,490 bps (11038 cells/second)
 1 / 129 * 542,526,792.45 bps = 4,205,634 bps (10952 cells/second)
 ...

Buffers are shared among all VCs, and by default, there is no limit to the buffer size for a VC. If a VC is particularly slow, it might use all the buffer resources.

Table 6 on page 76 shows ATM1 traffic-shaping rates.

Table 6: ATM1 Traffic-Shaping Rates

Interface Type	Line Rate (bps)	Line Rate (cps)	Percentage of Total Line Rate
OC3			
	135,600,000	353,125	100.00
	134,542,320	350,370.66	99.22
	133,511,760	347,686.88	98.46
	132,494,760	345,038.44	97.71
	131,491,320	342,425.31	96.97
	130,501,440	339,847.5	96.24
	129,525,120	337,305	95.52
	128,562,360	334,797.81	94.81
	127,626,720	332,361.25	94.12
	126,691,080	329,924.69	93.43
OC12			
	271,263,396	706,415.09	50.00
	270,207,897	703,666.40	49.81

Table 6: ATM1 Traffic-Shaping Rates (*continued*)

Interface Type	Line Rate (bps)	Line Rate (cps)	Percentage of Total Line Rate
	269,160,579	700,939.01	49.61
	268,121,349	698,232.68	49.42
	267,090,113	695,547.17	49.23
	266,066,779	692,882.24	49.04
	265,051,257	690,237.65	48.85
	264,043,458	687,613.17	48.67
	263,043,293	685,008.58	48.48
	262,050,677	682,423.64	48.30

Example: Specifying ATM1 Shaping Values

Determine the actual rate in ATM1 interfaces when the desired rate is 80 percent of the maximum rate:

- OC3c:

$$135,600,000 \text{ bps} * 0.8 = 108,480,000 \text{ bps}$$

Because 108,480,000 bps is greater than 1/31 of OC3 ATM cell line rate:

$$\text{actual-rate} = (128 * 135,600,000.1) / (\text{trunc} ((128 * 135,600,000.1) / 108,480,000))$$

$$\text{actual-rate} = 17,356,800,013 / (\text{trunc} (17,356,800,013 / 108,480,000))$$

$$\text{actual-rate} = 17,356,800,013 / 160$$

$$\text{actual-rate} = 108,480,000 \text{ bps}$$

- OC12c:

$$271,263,396 \text{ bps} * 0.8 = 217,010,716.8 \text{ bps}$$

Because 217,010,716.8 bps is greater than 1/127 of OC12 ATM cell line rate:

$$\text{actual-rate} = (128 * 542,526,792.45) / (\text{trunc} ((128 * 542,526,792.45) / 217,010,716.8))$$

$$\text{actual-rate} = 69,443,429,434 / (\text{trunc} (69,443,429,434 / 217,010,716.8))$$

$$\text{actual-rate} = 69,443,429,434 / 320$$

$$\text{actual-rate} = 217,010,717 \text{ bps}$$

Determine the actual rate in ATM1 interfaces when the desired rate is 3,000,000 bps:

- OC3c:

Because 3,000,000 bps is smaller than 1/31 of OC3 ATM cell line rate:

$$\text{actual-rate} = (1 / (\text{trunc} (\text{line-rate} / \text{desired-rate}) + 1)) * \text{line-rate}$$

$$\text{actual-rate} = (1 / (\text{trunc} (135,631,698 / 3,000,000) + 1)) * 135,631,698$$

$$\text{actual-rate} = (1 / (45 + 1)) * 135,631,698$$

$actual-rate = (1 / 46) * 135,631,698$
 $actual-rate = 2,948,515 \text{ bps}$

- OC12c:

Because 3,000,000 bps is smaller than 1/127 of OC12 ATM cell line rate:

$actual-rate = (1 / (trunc (line-rate / desired-rate) + 1)) * line-rate$
 $actual-rate = (1 / (trunc (542,526,792 / 3,000,000) + 1)) * 542,526,792$
 $actual-rate = (1 / (180 + 1)) * 542,526,792$
 $actual-rate = (1 / 181) * 542,526,792$
 $actual-rate = 2,997,386 \text{ bps}$

Specifying ATM2 IQ Shaping Values

For ATM2 IQ OC3c interfaces, the maximum available rate is 100 percent of line rate, or 135,600,000 bps. For ATM2 IQ OC12c interfaces, the maximum available rate is 50 percent of line rate, or 271,273,396 bps. You can specify the rates in bits per second or cells per second. Fractional shaping is accurate within 0.5 percent of the desired rate.

Configuring the ATM1 Queue Length

ATM1 PICs contain a transmit buffer pool of 16,382 buffers, which are shared by all the PVCs that you configure on the PIC. Even multiple-port ATM PICs have a single buffer pool shared by all the ports.

By default, the ATM1 PIC allows PVCs to consume all the buffers they require. If the sustained traffic rate for a PVC exceeds its shaped rate, buffers are consumed. Eventually, all buffers on the PIC are consumed, and the other PVCs are underserved. This results in head-of-line blocking.

For each PVC, you prevent this situation by configuring the queue length of the PVC. The queue length is a limit on the number of transmit packets that can be queued. Packets that exceed the limit are dropped.

To limit the queue size of a PVC, include the **queue-length** statement:

queue-length *number*;

For a list of hierarchy levels at which you can include this statement, see [queue-length](#).

The length can be from 1 through 16,383 packets. The default is 16,383 packets. You should include the **queue-length** statement in the configuration of all the PVCs that you configure on an ATM1 PIC. The **queue-length** statement performs two functions:

- It prevents head-of-line blocking because it limits the number of packets and therefore buffers that can be consumed by each configured PVC.
- It sets the maximum lifetime that can be sustained by packets over the PVC when traffic has oversubscribed the configured shaping contract.

The total value of all the queue lengths must not exceed the total number of packets that can be held in the buffer space available on the PIC. The total number of packets the buffers can hold depends on the size of the physical interface MTU, including all

encapsulation overhead. You can use the following formula to calculate the total number of packets the buffer space can hold:

$$16,382 / (\text{Round Up} (\text{MTU} / 480))$$

For example, assuming default MTU settings for all ATM1 interfaces on a PIC, the total number of packets that can be held is:

$$16,382 / (\text{Round Up} (4482 / 480)) = 1638 \text{ packets}$$

Thus, you can configure up to 1638 for the combined queue length of all the PVCs on an ATM1 PIC that uses default MTU settings for all interfaces.

If you set a queue length to a very low value, small bursts in packets transiting the PVC might not be buffered.

The maximum lifetime that packets can sustain while transiting a PVC depends on the shaping rate you configure for the PVC, the setting for the **queue-length** statement, and the physical interface MTU. You can use the following formula to calculate the maximum lifetime that packets can sustain while transiting a PVC:

$$(\text{PVC queue-length in packets} \times \text{MTU}) / (\text{PVC shaping in bps} / 8)$$

For example, if you configure a PVC on an ATM1 interface with the default MTU, a CBR shaping rate of 3,840,000 bps (10,000 cps), and a queue length of 25 packets. The maximum lifetime is:

$$(25 \times 4482) / (3,840,000 / 8) = 233 \text{ ms}$$

This is the worst-case lifetime assuming all packets in the queue are MTU sized, and the traffic using the PVC is oversubscribing its configured shaping contract.

In general, we recommend that you use a maximum lifetime under 500 ms.

If you add or change the queue-length setting on the VC, the logical interface associated with the VC is deleted and re-added.

Configuring the ATM2 IQ EPD Threshold

The EPD threshold is a limit on the number of transmit cells that can be queued. Cells that exceed the limit are discarded. When a beginning of packet (BOP) cell is received, the VC's queue depth is checked against the EPD threshold. If the VC's queue depth exceeds the EPD threshold, the BOP cell and all subsequent cells in the packet are discarded. This prevents a single queue from draining all the buffers on the PIC.

By default, for UBR the EPD threshold is approximately 1 percent of the available cell buffers. If shaping is enabled, the default EPD threshold is proportional to the shaping rate according to the following formula:

$$\text{default epd-threshold} = \text{number of buffers} \times \text{shaping rate} / \text{line rate}$$

By default, the software estimates how much buffer space is needed for each PVC. However, you can configure the per-VC buffer space. In general, ATM PVCs need larger buffers for data traffic and smaller buffers for time-sensitive applications. Unnecessarily deep buffers might cause excessive delays on congested PVCs. Overly shallow buffers

might cause premature random early detection (RED) or tail packet drops in bursty conditions.

The minimum EPD threshold value is 48 cells. If the default EPD threshold formula results in an EPD threshold of less than 48 cells, the result will be ignored, and the minimum value of 48 cells will be used.

To set the EPD threshold of a PVC, include the **epd-threshold** statement:

```
epd-threshold cells;
```

For a list of hierarchy levels at which you can include this statement, see [epd-threshold](#).

The allowable range for EPD threshold varies by interface type, as shown in [Table 7](#) on page 80.

Table 7: EPD Threshold Range by Interface Type

Interface Type	EPD Range
1-port OC48	48 through 425,984 cells
1-port and 2-port OC12	48 through 425,984 cells
2-port OC3, DS3, and E3	48 through 212,992 cells
4-port DS3 and E3	48 through 106,496 cells

You should include the **epd-threshold** statement in the configuration of all the PVCs that you configure on an ATM2 IQ PIC. The **epd-threshold** statement performs two functions:

- It prevents head-of-line blocking because it limits the number of packets and therefore buffers that can be consumed by each configured PVC.
- It sets the maximum lifetime that can be sustained by packets over the PVC when traffic has oversubscribed the configured shaping contract.

If you add or change the EPD threshold on the VC, the logical interface associated with the VC is deleted and re-added.

On ATM2 IQ DS3 and E3 interfaces, you might be able to enter an EPD threshold or shaping parameter that exceeds the maximum threshold for these interfaces. If the configuration commits, the physical interface might indicate that it is up, but the logical interface fails. As a workaround, configure shaping parameters and EPD thresholds that do not exceed the bandwidth of the interface.

For information about configuring dual EPD thresholds on interfaces configured to use Layer 2 circuit trunk mode, see [“Configuring Two EPD Thresholds per Queue”](#) on page 81.

Example: Configuring the ATM2 IQ EPD Threshold

Configure the EPD threshold for a point-to-point ATM2 interface and a point-to-multipoint ATM2 interface.

On a Point-to-Point ATM2 Interface	<pre>[edit interfaces at-1/0/0] unit 0 { vci 0.123; epd-threshold 1300; ... }</pre>
On a Point-to-Multipoint ATM2 Interface	<pre>[edit interfaces at-1/0/1] unit 0 { multipoint; family inet address 10.0.12.12/24 { multipoint-destination 10.0.12.14 vci 0.123 epd-threshold 1300; ... } }</pre>

Configuring Two EPD Thresholds per Queue

For ATM2 IQ interfaces configured to use Layer 2 circuit trunk mode, you can set two EPD thresholds that depend on the PLPs of the packets. When you set a threshold with the **epd-threshold** statement, it applies to packets that have a PLP of 0. When you set a threshold with the **plp1** statement, it applies to packets that have a PLP of 1. If you include the **plp1** statement in the configuration, you must also include the **epd-threshold** statement.

To configure two EPD thresholds, include the **epd-threshold** and **plp1** statements:

```
epd-threshold cells plp1 cells;
```

You can include these statements at the following hierarchy levels:

- [edit interfaces *interface-name* atm-options scheduler-maps *map-name* forwarding-class *class-name*]
- [edit interfaces *interface-name* unit *logical-unit-number*]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]

The value you set with the **epd-threshold** statement (for PLP0) should be equal to or greater than the value you set with the **plp1** statement. EPD threshold ranges vary by interface type. See [Table 7 on page 80](#).

For general information about EPD thresholds, see “[Configuring the ATM2 IQ EPD Threshold](#)” on page 79.

Configuring the ATM2 IQ Transmission Weight

For ATM2 IQ interfaces configured with VPI shaping, you can control the number of cells a VCI can send each time the VCI has a turn to transmit by including the **transmit-weight** statement:

```
transmit-weight cells;
```

You can include this statement at the following hierarchy levels:

- **[edit interfaces *interface-name* unit *logical-unit-number*]**
- **[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]**

VPI traffic shaping is not supported on point-to-multipoint interfaces.

The number of cells can be from 1 through 32,000. For a configuration example, see [“Example: Configuring ATM2 IQ Interfaces” on page 106](#).

Defining the ATM OAM F5 Loopback Cell Period

For ATM1 and ATM2 IQ interfaces with an ATM encapsulation, you can configure the OAM F5 loopback cell period on virtual circuits. This is the interval at which OAM F5 loopback cells are transmitted.

By default, no OAM F5 loopback cells are sent. To send OAM F5 loopback cells, include the **oam-period** statement:

```
oam-period (disable | seconds);
```

For a list of hierarchy levels at which you can include this statement, see [oam-period](#).

The period can be from 1 through 900 seconds. You can also choose the **disable** option to disable the OAM loopback cell transmit feature.

OAM VC-AIS and VC-RDI defect indication cells are used for identifying and reporting VC defects end-to-end. When a physical link or interface failure occurs, intermediate nodes insert OAM AIS cells into all the downstream VCs affected by the failure. Upon receiving an AIS cell on a VC, the router marks the logical interface down and sends an RDI cell on the same VC to notify the remote end of the error status. When an RDI cell is received on a VC, the router sets the logical interface status to down. When no AIS or RDI cells are received for 3 seconds, the router sets the logical interface status to up. You do not need to configure anything to enable defect indication.

Configuring the ATM OAM F5 Loopback Cell Threshold

For ATM1 and ATM2 IQ interfaces with an ATM encapsulation, you can configure the OAM F5 loopback cell threshold on VCs. This is the minimum number of consecutive OAM F5 loopback cells received before a VC is declared up, or the minimum number of consecutive OAM F5 loopback cells lost before a VC is declared down.

By default, when five consecutive OAM F5 loopback cells are received, the VC is considered to be up, and when five consecutive cells are lost, the VC is considered to be down. To modify these values, include the **oam-liveness** statement:

```
oam-liveness {  
  up-count cells;  
  down-count cells;  
}
```

For a list of hierarchy levels at which you can include this statement, see [oam-liveness](#).

The cell count can be a value from 1 through 255.

Configuring ATM Interface Encapsulation

To configure ATM encapsulation on a physical interface, include the **encapsulation** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]  
encapsulation (atm-ccc-cell-relay | atm-pvc | ethernet-over-atm);
```

For ATM interfaces, the physical interface encapsulation can be one of the following:

- ATM cell-relay—This encapsulation connects two remote virtual circuits or ATM physical interfaces with an LSP. Traffic on the circuit is ATM cells.
- ATM PVC—ATM PVC encapsulation is defined in RFC 2684, *Multiprotocol Encapsulation over ATM Adaptation Layer 5*.
- Ethernet over ATM—As defined in RFC 1483 (the previous version of RFC 2684), this encapsulation type allows ATM interfaces to connect to devices that support only bridged-mode protocol data units (BPDUs). The Junos OS does not completely support bridging, but accepts BPDU packets as a default gateway. If you use the router as an edge device, then the router acts as a default gateway. It accepts Ethernet LLC/SNAP frames with IP or ARP in the payload, and drops the rest. For packets destined to the Ethernet LAN, a route lookup is done using the destination IP address. If the route lookup yields a full address match, the packet is encapsulated with an LLC/SNAP and media access control (MAC) header, and the packet is forwarded to the ATM interface.

Generally, you configure an interface's encapsulation at the **[edit interfaces *interface-name*]** hierarchy level. However, for ATM encapsulations, you can also configure the encapsulation type that is used inside the ATM cell itself. To do this, include the **encapsulation** statement:

```
encapsulation (atm-ccc-cell-relay | atm-ccc-vc-mux | atm-cisco-nlpid | atm-mlppp-llc |  
atm-nlpid | atm-ppp-llc | atm-ppp-vc-mux | atm-snap | atm-tcc-snap | atm-vc-mux |  
atm-tcc-vc-mux | ether-over-atm-llc | ether-vpls-over-atm-llc);
```

You can include this statement at the following hierarchy levels:

- **[edit interfaces *interface-name* unit *logical-unit-number*]**
- **[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]**

Table 8 on page 84 shows the logical interface encapsulation types for ATM interfaces.

Table 8: ATM Logical Interface Encapsulation Types

Encapsulation Types	Comments
ATM CCC cell relay	<p>This encapsulation type connects two remote virtual circuits or ATM physical interfaces with an LSP.</p> <p>This encapsulation type carries traffic in ATM cells.</p> <p>When you use this encapsulation type, you can configure the ccc family only.</p>
ATM CCC VC multiplex	<p>This encapsulation type is for CCC circuits.</p> <p>When you use this encapsulation type, you can configure the ccc family only.</p>
ATM network layer protocol identifier (NLPID)	When you use this encapsulation type, you can configure the inet family only.
ATM SNAP	
ATM SNAP encapsulation on translational cross-connect (TCC) circuits	When you use this encapsulation type, you can configure the tcc family only.
ATM VC multiplex	When you use this encapsulation type, you can configure the inet family only.
ATM VC multiplex on TCC circuits	When you use this encapsulation type, you can configure the tcc family only.
Cell-relay accumulation mode (CAM)	<p>In this mode, the incoming 1 to 8 cells are packaged into a single packet and forwarded to the LSP. To configure CAM, include the atm-cell-relay-accumulation statement at the [edit chassis fpc slot-number pic pic-number] hierarchy level.</p> <p>This encapsulation type is for ATM1 interfaces only.</p> <p>For more information about CAM, see the Junos OS System Basics Configuration Guide.</p>
Cisco ATM NLPID	When you use this encapsulation type, you can configure the inet family only.
Ethernet over ATM	<p>This encapsulation type is for interfaces that carry IPv4 traffic.</p> <p>When you use this encapsulation type, you cannot configure point-to-multipoint interfaces.</p>
Ethernet VPLS over ATM	<p>This encapsulation type enables a VPLS instance to support bridging between Ethernet interfaces and ATM interfaces, as described in RFC 2684.</p> <p>Use this encapsulation type to support IEEE 802.1p classification binding on ATM VCs.</p> <p>This encapsulation type is for ATM2 IQ interfaces only.</p> <p>When you use this encapsulation type, you cannot configure point-to-multipoint interfaces.</p>
Multilink PPP over AAL5 LLC	<p>This encapsulation type is for ATM2 IQ interfaces only.</p> <p>When you use this encapsulation type, your router must be equipped with a Link Services or Voice Services PIC.</p>

Table 8: ATM Logical Interface Encapsulation Types (*continued*)

Encapsulation Types	Comments
PPP over AAL5 LLC	This encapsulation type is for ATM2 IQ interfaces only. When you use this encapsulation type, you cannot configure point-to-multipoint interfaces.
PPP over AAL5 multiplex	This encapsulation type is for ATM2 IQ interfaces only. When you use this encapsulation type, you cannot configure point-to-multipoint interfaces.

Configuring an ATM1 Cell-Relay Circuit

For ATM1 interfaces, you can create an ATM cell-relay circuit by configuring an entire ATM physical device or an individual VC. When you configure an entire device, only cell-relay encapsulation is allowed on the logical interfaces; for ATM1 PICs, you use the **atm-options** statement to control the number and location of VCs. The configuration of allowed VCs on both ingress and egress ATM interfaces should be the same. For most interfaces, you can define a maximum of 4090 VCs per interface. The highest-numbered VC value you can configure is 4089. Promiscuous mode removes these limits. For more information, see [“Configuring ATM Cell-Relay Promiscuous Mode” on page 45](#).

For ATM1 interfaces, if you are dedicating the entire device to a cell-relay circuit, include the **allow-any-vci** statement in the configuration of **unit 0**:

```
allow-any-vci;
```

You can include this statement at the following hierarchy levels:

- **[edit interfaces *interface-name* unit 0]**
- **[edit logical-systems *logical-system-name* interfaces *interface-name* unit 0]**

Once you include this statement, you cannot configure other logical interfaces in the same physical interface.



NOTE: When you use ATM CCC cell-relay encapsulation, you must configure the logical encapsulation as **atm-ccc-cell-relay**. You cannot mix different logical encapsulation types on an interface that you have configured with ATM CCC cell-relay physical encapsulation.

Example: Configuring an ATM1 Cell-Relay Circuit

Configure an ATM1 cell-relay circuit:

```
[edit interfaces at-1/2/0]
encapsulation atm-ccc-cell-relay;
atm-options {
  pic-type atm1;
```

	<pre>vpi 0 maximum-vcs 256; } unit 0 { point-to-point; encapsulation atm-ccc-cell-relay; allow-any-vci; }</pre>
Configuring an Individual VC on a Logical Interface	<pre>[edit interfaces at-1/1/0] encapsulation atm-ccc-cell-relay; atm-options { pic-type atm1; vpi 0 maximum-vcs 256; } unit 120 { encapsulation atm-ccc-cell-relay; vci 0.120; }</pre>
Configuring Nonpromiscuous Port Mode	<pre>[edit interfaces at-0/0/1] encapsulation atm-ccc-cell-relay; atm-options { pic-type atm1; vpi 0 { maximum-vcs 100; } vpi 1 { maximum-vcs 300; } vpi 4 { maximum-vcs 200; } } unit 0 { encapsulation atm-ccc-cell-relay; allow-any-vci; }</pre>
Configuring Nonpromiscuous VPI Mode	<pre>[edit interfaces at-0/0/1] encapsulation atm-ccc-cell-relay; atm-options { pic-type atm1; vpi 0 { maximum-vcs 100; } } unit 0 { encapsulation atm-ccc-cell-relay; vpi 0; }</pre>
Configuring Nonpromiscuous VCI Mode	<pre>[edit interfaces at-0/0/1] encapsulation atm-ccc-cell-relay; atm-options { pic-type atm1; vpi 0 {</pre>

```

        maximum-vcs 100;
    }
}
unit 0 {
    encapsulation atm-ccc-cell-relay;
    vci 0.50
}

```

**Related
Documentation**

- [allow-any-vci on page 126](#)
- [atm-options on page 129](#)
- [atm-encapsulation on page 128](#)
- [encapsulation \(Logical Interface\) on page 140](#)
- [encapsulation \(Physical Interface\) on page 144](#)
- [unit on page 202](#)

Configuring PPP over ATM2 Encapsulation

For ATM2 IQ interfaces, you can configure PPP over AAL5 encapsulation, as described in RFC 2364, *PPP over AAL5*. PPP over ATM encapsulation associates a PPP link with an ATM AAL5 PVC.

The Junos OS supports three PPP over ATM encapsulation types:

- **atm-ppp-llc**—PPP over AAL5 LLC.
- **atm-ppp-vc-mux**—PPP over ATM AAL5 multiplex.
- **atm-mlppp-llc**—Multilink PPP over ATM AAL5 LLC. For this encapsulation type, your router must be equipped with a Link Services or Voice Services PIC. MLPPP over ATM encapsulation is not supported on ATM2 IQ OC48 interfaces.

To enable PPP over ATM encapsulation, include the **encapsulation** statement, specifying the **atm-mlppp-llc**, **atm-ppp-llc**, or **atm-ppp-vc-mux** encapsulation type:

```
encapsulation (atm-mlppp-llc | atm-ppp-llc | atm-ppp-vc-mux);
```

You can include this statement at the following hierarchy levels:

- **[edit interfaces *interface-name* unit *logical-unit-number*]**
- **[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]**

When you configure PPP over ATM encapsulation, you can enable PPP Challenge Handshake Authentication Protocol (CHAP) and keepalives on the logical interface. For more information about PPP CHAP and keepalives, see [Configuring the PPP Challenge Handshake Authentication Protocol](#) and [Configuring Keepalives](#).



NOTE: When you use PPP over ATM encapsulation, we recommend that you not include the `oam-period` statement in the configuration. Instead, we recommend that you enable keepalives to detect connection failures.

Example: Configuring PPP over ATM2 IQ Encapsulation

Configure three logical interfaces with PPP over ATM encapsulation:

```
[edit interfaces]
at-0/1/0 {
  atm-options {
    pic-type atm2;
    vpi 0;
    vpi 2;
  }
  unit 0 {
    encapsulation atm-ppp-llc;
    ppp-options {
      chap {
        access-profile pe-B-ppp-clients;
        local-name "pe-A-at-0/1/0";
      }
    }
    keepalives interval 5 up-count 6 down-count 4;
    vci 0.120;
    family inet address 192.168.13.13/30;
  }
  unit 1 {
    encapsulation atm-ppp-vc-mux;
    vci 2.120;
    keepalives interval 6 up-count 6 down-count 4;
    family inet address 192.168.14.13/30;
  }
  unit 2 {
    encapsulation atm-ppp-vc-mux;
    ppp-options {
      chap {
        passive;
        access-profile pe-A-ppp-clients;
        local-name "pe-A-at-0/1/0";
      }
    }
    keepalives interval 5 up-count 6 down-count 4;
    vci 2.121;
    family inet address 192.168.15.13/30;
  }
}
```

Configuring Multilink PPP over ATM2 IQ Encapsulation

```
[edit interfaces]
at-0/0/0 {
  atm-options {
    pic-type atm2;
    vpi 10;
  }
}
```

```

unit 0 {
    encapsulation atm-mlppp-llc;
    ppp-options {
        chap {
            access-profile pe-B-ppp-clients;
            local-name "pe-A-at-0/0/0";
        }
    }
    keepalive interval 5 up-count 6 down-count 4;
    vci 10.120;
    family mlppp {
        bundle ls-0/3/0.0;
    }
}
}
at-0/0/1 {
    atm-options {
        pic-type atm2;
        vpi 11;
    }
    unit 1 {
        encapsulation atm-mlppp-llc;
        ppp-options {
            chap {
                access-profile pe-B-ppp-clients;
                local-name "pe-A-at-0/0/0";
            }
        }
        keepalive interval 5 up-count 6 down-count 4;
        vci 11.120;
        family mlppp {
            bundle ls-0/3/0.0;
        }
    }
}
}
at-1/2/3 {
    atm-options {
        pic-type atm2;
        vpi 12;
    }
    unit 2 {
        encapsulation atm-mlppp-llc;
        ppp-options {
            chap {
                access-profile pe-B-ppp-clients;
                local-name "pe-A-at-0/0/0";
            }
        }
        keepalive interval 5 up-count 6 down-count 4;
        vci 12.120;
        family mlppp {
            bundle ls-0/3/0.0;
        }
    }
}
}
...

```

```
ls-0/3/0 {
  encapsulation multilink-ppp;
  interleave-fragments;
  keepalive;
  unit 0 {
    mrru 4500;
    short-sequence;
    fragment-threshold 16320;
    drop-timeout 2000;
    encapsulation multilink-ppp;
    interleave-fragments;
    minimum-links 8;
    family inet {
      address 10.10.0.1/32 {
        destination 10.10.0.2;
      }
    }
    family iso;
    family inet6 {
      address 8090::0:1/128 {
        destination 8090::0:2;
      }
    }
  }
  ...
}
```

Configuring E3 and T3 Parameters on ATM Interfaces

For ATM1 and ATM2 IQ interfaces, you can configure ATM E3 and T3 interfaces by including the following statements at the `[edit interfaces at-fpc/pic/port]` hierarchy level:

```
[edit interfaces at-fpc/pic/port]
e3-options {
  atm-encapsulation (direct | plcp);
  buildout feet;
  framing (g.751 | g.832);
  loopback (local | remote);
  (payload-scrambler | no-payload-scrambler);
}
t3-options {
  atm-encapsulation (direct | plcp);
  buildout feet;
  (cbit-parity | no-cbit-parity);
  loopback (local | payload | remote);
  (payload-scrambler | no-payload-scrambler);
}
```

The following options and default values differ from those described in E3 Interfaces Overview and T3 Interfaces Overview:

- **atm-encapsulation**—PLCP is the default value. The E3 **line-format** option **g.832** supports the **direct** ATM-encapsulation option only.
- **buildout**—The default value is 10 feet. The number of feet can be any integer value. The range is from 0 through 450 feet (about 137 meters).
- **cbit-parity**—The default option is to enable cbit parity.
- **framing**—There is no default option for E3 interfaces; T3 interfaces use the **cbit-parity** statement in place of the **framing** statement.
- **loopback**—By default, loopback is disabled.
- **payload-scrambler**—The default option is to enable payload scrambling.

In addition, the ATM E3 and T3 PICs support the **clocking** statement at the interface level, as do the SONET/SDH PICs. For more information about E3- and T3-specific parameters, see E3 Interfaces Overview and T3 Interfaces Overview.



NOTE: You must configure all the ports on an ATM E3 or T3 PIC with the same framing and encapsulation. Otherwise, the system will set all the ports on the PIC to the slowest framing and encapsulating configuration. For ATM T3, this is PLCP. For ATM E3, this is G.751 PLCP.

Configuring SONET/SDH Parameters on ATM Interfaces

When configuring ATM1 and ATM2 IQ SONET/SDH interfaces, you can also include the following statements in the **sonet-options** statement to set SONET/SDH parameters on ATM interfaces:

```
[edit interfaces at-fpc/pic/port]
sonet-options {
  aps {
    advertise-interval milliseconds;
    authentication-key key;
    force;
    hold-time milliseconds;
    lockout;
    neighbor address;
    paired-group group-name;
    protect-circuit group-name;
    request;
    revert-time seconds;
    working-circuit group-name;
  }
  bytes {
    e1-quiet value;
    f1 value;
    f2 value;
    s1 value;
    z3 value;
    z4 value;
  }
}
```

```

loopback (local | remote);
(payload-scrambler | no-payload-scrambler);
rfc-2615;
trigger {
    defect ignore {
        hold-time up milliseconds down milliseconds;
    }
}
(z0-increment | no-z0-increment);
}

```

For information about configuring specific SONET/SDH statements, see SONET/SDH Interfaces Overview.

Configuring ATM2 IQ VC Tunnel CoS Components

The ATM2 IQ interface allows multiple IP queues into each VC. On M Series routers (except the M320 and M120 router), a VC tunnel can support four CoS queues. On the M320, M120, and T Series routers for all ATM2 IQ PICs except the OC48 PIC, a VC tunnel can support eight CoS queues. Within a VC tunnel, the WRR algorithm schedules the cell transmission of each queue. You can configure the queue admission policies, such as EPD or WRED, to control the queue size during congestion.

For information about CoS components that apply generally to all interfaces, see the Junos OS Class of Service Configuration Guide.

To configure ATM2 IQ VC tunnel CoS components, include the following statements at the **[edit interfaces at-fpc/pic/port]** hierarchy level:

```

[edit chassis fpc slot-number pic pic-number]
max-queues-per-interface number;
[edit interfaces at-fpc/pic/port]
atm-options {
    linear-red-profiles profile-name {
        high-plp-max-threshold percent;
        low-plp-max-threshold percent;
        queue-depth cells high-plp-threshold percent low-plp-threshold percent;
    }
    plp-to-clp;
    scheduler-maps map-name {
        forwarding-class class-name {
            epd-threshold cells plp1 cells;
            linear-red-profile profile-name;
            priority (high | low);
            transmit-weight (cells number | percent number);
        }
        vc-cos-mode (alternate | strict);
    }
}
unit 0 {
    atm-scheduler-map (map-name | default);
    family family {
        address address {
            destination address;
        }
    }
}

```



```

}
plp-to-clp;
shaping {
  (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate burst
  length);
}
vci vpi-identifier.vci-identifier;
}

```

This section contains the following topics:

- [Configuring Linear RED Profiles on page 93](#)
- [Configuring an ATM Scheduler Map on page 94](#)
- [Enabling Eight Queues on ATM2 IQ Interfaces on page 95](#)
- [Configuring VC CoS Mode on page 101](#)
- [Enabling the PLP Setting to Be Copied to the CLP Bit on page 101](#)
- [Configuring ATM CoS on the Logical Interface on page 102](#)
- [Example: Configuring ATM2 IQ VC Tunnel CoS Components on page 102](#)

Configuring Linear RED Profiles

Linear RED profiles define CoS virtual circuit drop profiles. You can configure up to 32 linear RED profiles per port. When a packet arrives, RED checks the queue fill level. If the fill level corresponds to a nonzero drop probability, the RED algorithm determines whether to drop the arriving packet.

To configure linear RED profiles, include the **linear-red-profiles** statement at the **[edit interfaces at-fpc/pic/port atm-options]** hierarchy level:

```

[edit interfaces at-fpc/pic/port atm-options]
linear-red-profiles profile-name {
  high-plp-max-threshold percent;
  low-plp-max-threshold percent;
  queue-depth cells high-plp-threshold percent low-plp-threshold percent;
}

```

The **queue-depth**, **high-plp-threshold**, and **low-plp-threshold** statements are mandatory.

You can define the following options for each RED profile:

- **high-plp-max-threshold**—Define the drop profile fill-level for the high PLP CoS VC. When the fill level exceeds the defined percentage, all packets with high PLP are dropped.
- **low-plp-max-threshold**—Define the drop profile fill-level for the low PLP CoS VC. When the fill level exceeds the defined percentage, all packets with low PLP are dropped.
- **queue-depth**—Define maximum queue depth in the CoS VC drop profile. Packets are always dropped beyond the defined maximum. The range you can configure is from 1 through 64,000 cells.

- **high-plp-threshold**—Define CoS VC drop profile fill-level percentage when linear RED is applied to cells with high PLP. When the fill level exceeds the defined percentage, packets with high PLP are randomly dropped by RED.
- **low-plp-threshold**—Define CoS VC drop profile fill-level percentage when linear RED is applied to cells with low PLP. When the fill level exceeds the defined percentage, packets with low PLP are randomly dropped by RED.

Configuring an ATM Scheduler Map

To define a scheduler map, you associate it with a forwarding class. Each class is associated with a specific queue, as follows:

- **best-effort**—Queue 0
- **expedited-forwarding**—Queue 1
- **assured-forwarding**—Queue 2
- **network-control**—Queue 3



NOTE: For M320, M120, and T Series routers only, you can configure more than four forwarding classes and queues. For more information, see [“Enabling Eight Queues on ATM2 IQ Interfaces” on page 95](#).

When you configure an ATM scheduler map, the Junos OS creates these CoS queues for a VC. The Junos OS prefixes each packet delivered to the VC with the next-hop rewrite data associated with each queue.

To configure an ATM scheduler map, include the **scheduler-maps** statement at the **[edit interfaces at-*fpc/pic/port* atm-options]** hierarchy level:

```
edit interfaces at-fpc/pic/port atm-options]
scheduler-maps map-name {
  forwarding-class class-name {
    epd-threshold cells plp1 cells;
    linear-red-profile profile-name;
    priority (high | low);
    transmit-weight (cells number | percent number);
  }
}
```

You can define the following options for each forwarding class:

- **epd-threshold** or **linear-red-profile**—An EPD threshold provides a queue of cells that can be stored with tail drop. When a BOP cell is received, the VC’s queue depth is checked against the EPD threshold. If the VC’s queue depth exceeds the EPD threshold, the BOP cell and all subsequent cells in the packet are discarded.

A linear RED profile defines the number of cells using the **queue-depth** statement within the RED profile. (You configure the **queue-depth** statement at the **[edit interfaces at-*fpc/pic/port* atm-options linear-red-profiles *profile-name*]** hierarchy level.)

By default, if you include the **scheduler-maps** statement at the **[edit interfaces at-fpc/pic/port atm-options]** hierarchy level, the interface uses an EPD threshold that is determined by the Junos OS based on the available bandwidth and other parameters. You can override the default EPD threshold by setting an EPD threshold or a linear RED profile.

- **priority**—By default, queue 0 is high-priority, and the remaining queues are low-priority. You can configure high or low queuing priority for each queue.
- **transmit-weight**—By default, the transmit weight is 95 percent for queue 0, and 5 percent for queue 3. You can configure the transmission weight in number of cells or percentage. Each CoS queue is serviced in WRR mode. When CoS queues have data to send, they send the number of cells equal to their weight before passing control to the next active CoS queue. This allows proportional bandwidth sharing between multiple CoS queues within a rate-shaped VC tunnel. A CoS queue can send from 1 through 32,000 cells or from 5 through 100 percent of queued traffic before passing control to the next active CoS queue within a VC tunnel.

The AAL5 protocol prohibits cells from being interleaved on a VC; therefore, a complete packet is always sent. If a CoS queue sends more cells than its assigned weight because of the packet boundary, the deficit is carried over to the next time the queue is scheduled to transmit. If the queue is empty after the cells are sent, the deficit is waived, and the queue's assigned weight is reset.



NOTE: If you include the **scheduler-maps** statement at the **[edit interfaces at-fpc/pic/port atm-options]** hierarchy level, the **epd-threshold** statement at the **[edit interfaces interface-name unit logical-unit-number]** or **[edit interfaces interface-name unit logical-unit-number address address family family multipoint-destination address]** hierarchy level has no effect because either the default EPD threshold, the EPD threshold setting in the forwarding class, or the linear RED profile takes effect instead.

For more information about forwarding classes, see the Junos OS Class of Service Configuration Guide.

Enabling Eight Queues on ATM2 IQ Interfaces

By default, ATM2 IQ PICs on T Series, M120, and M320 routers are restricted to a maximum of four egress queues per interface. You can enable eight egress queues on ATM2 IQ interfaces by including the **max-queues-per-interface** statement at the **[edit chassis fpc slot-number pic pic-number]** hierarchy level:

```
[edit chassis fpc slot-number pic pic-number]
max-queues-per-interface number;
```

The numerical value can be 4 or 8.

If you include the **max-queues-per-interface** statement, all ports on the ATM2 IQ PIC use the configured mode.

When you include the **max-queues-per-interface** statement and commit the configuration, all physical interfaces on the ATM2 IQ PIC are deleted and re-added. Also, the PIC is taken offline and then brought back online immediately. You do not need to manually take the PIC offline and online. You should change modes between four queues and eight queues, or vice versa, only when there is no active traffic going to the ATM2 IQ PIC.

To configure up to eight queues on the ATM2 IQ interface, you must also include the statements described in [“Configuring ATM2 IQ VC Tunnel CoS Components” on page 92](#).

For general information about configuring up to eight forwarding classes and queues on PICs other than ATM2 IQ PICs, see the Junos OS Class of Service Configuration Guide.



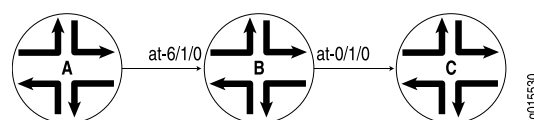
NOTE: When you are considering enabling eight queues on an ATM2 IQ interface, you should note the following:

- ATM2 IQ interfaces using Layer 2 circuit trunk transport mode support only four CoS queues.
- ATM2 IQ OC48 interfaces support only four CoS queues.
- ATM2 IQ interfaces with MLPPP encapsulation support only four CoS queues.
- You can configure only four RED profiles for the eight queues. Thus, queue 0 and queue 4 share a single RED profile, as do queue 1 and queue 5, queue 2 and queue 6, and queue 3 and queue 7. There is no restriction on EPD threshold per queue.
- The default chassis scheduler allocates resources for queue 0 through queue 3, with 25 percent of the bandwidth allocated to each queue. When you configure the chassis to use more than four queues, you must configure and apply a custom chassis scheduler to override the default. To apply a custom chassis scheduler, include the `scheduler-map-chassis` statement at the `[edit class-of-service interfaces at-fpc/pic/*]` hierarchy level. For more information about configuring and applying a custom chassis scheduler, see the Junos OS Class of Service Configuration Guide.

Example: Enabling Eight Queues on T Series, M120, and M320 Routers

In [Figure 2 on page 96](#), Router A generates IP packets with different IP precedence settings. Router B is an M320, M120, or T Series router with two ATM2 IQ interfaces. On Router B, interface **at-6/1/0** receives traffic from Router A, while interface **at-0/1/0** sends traffic to Router C. This example shows the CoS configuration for Router B.

Figure 2: Example Topology for Router with Eight Queues



On Router B:

```
[edit chassis]
fpc 0 {
  pic 1 {
    max-queues-per-interface 8;
  }
}
fpc 6 {
  pic 1 {
    max-queues-per-interface 8;
  }
}
[edit interfaces]
at-0/1/0 {
  atm-options {
    linear-red-profiles {
      red_1 queue-depth 1k high-plp-threshold 50 low-plp-threshold 80;
      red_2 queue-depth 2k high-plp-threshold 40 low-plp-threshold 70;
      red_3 queue-depth 3k high-plp-threshold 30 low-plp-threshold 60;
      red_4 queue-depth 4k high-plp-threshold 20 low-plp-threshold 50;
    }
    scheduler-maps {
      sch_red {
        vc-cos-mode strict;
        forwarding-class fc_q0 {
          priority high;
          transmit-weight percent 5;
          linear-red-profile red_1;
        }
        forwarding-class fc_q1 {
          priority low;
          transmit-weight percent 10;
          linear-red-profile red_2;
        }
        forwarding-class fc_q2 {
          priority low;
          transmit-weight percent 15;
          linear-red-profile red_3;
        }
        forwarding-class fc_q3 {
          priority low;
          transmit-weight percent 20;
          linear-red-profile red_4;
        }
        forwarding-class fc_q4 {
          priority low;
          transmit-weight percent 5;
          linear-red-profile red_1;
        }
        forwarding-class fc_q5 {
          priority low;
          transmit-weight percent 10;
          linear-red-profile red_2;
        }
        forwarding-class fc_q6 {
          priority low;
          transmit-weight percent 15;
        }
      }
    }
  }
}
```

```
        linear-red-profile red_3;
    }
    forwarding-class fc_q7 {
        priority low;
        transmit-weight percent 20;
        linear-red-profile red_4;
    }
}
sch_epd {
    vc-cos-mode alternate;
    forwarding-class fc_q0 {
        priority high;
        transmit-weight percent 5;
        epd-threshold 1024;
    }
    forwarding-class fc_q1 {
        priority low;
        transmit-weight percent 10;
        epd-threshold 2048;
    }
    forwarding-class fc_q2 {
        priority low;
        transmit-weight percent 15;
        epd-threshold 3072;
    }
    forwarding-class fc_q3 {
        priority low;
        transmit-weight percent 20;
        epd-threshold 4096;
    }
    forwarding-class fc_q4 {
        priority low;
        transmit-weight percent 5;
        epd-threshold 2048;
    }
    forwarding-class fc_q5 {
        priority low;
        transmit-weight percent 10;
        epd-threshold 3072;
    }
    forwarding-class fc_q6 {
        priority low;
        transmit-weight percent 15;
        epd-threshold 4096;
    }
    forwarding-class fc_q7 {
        priority low;
        transmit-weight percent 20;
        epd-threshold 5120;
    }
}
}
}
atm-options {
    vpi 0;
}
```

```

unit 0 {
  vci 0.100;
  shaping {
    cbr 1920000;
  }
  atm-scheduler-map sch_red;
  family inet {
    address 172.16.0.1/24;
  }
}
unit 1 {
  vci 0.101;
  shaping {
    vbr peak 1m sustained 384k burst 256;
  }
  atm-scheduler-map sch_epd;
  family inet {
    address 172.16.1.1/24;
  }
}
}
at-6/1/0 {
  atm-options {
    vpi 0;
  }
  unit 0 {
    vci 0.100;
    family inet {
      address 10.10.0.1/24;
    }
  }
  unit 1 {
    vci 0.101;
    family inet {
      address 10.10.1.1/24;
    }
  }
}
[edit class-of-service]
classifiers {
  inet-precedence inet_classifier {
    forwarding-class fc_q0 {
      loss-priority low code-points 000;
    }
    forwarding-class fc_q1 {
      loss-priority low code-points 001;
    }
    forwarding-class fc_q2 {
      loss-priority low code-points 010;
    }
    forwarding-class fc_q3 {
      loss-priority low code-points 011;
    }
    forwarding-class fc_q4 {
      loss-priority low code-points 100;
    }
  }
}

```

```
forwarding-class fc_q5 {
    loss-priority low code-points 101;
}
forwarding-class fc_q6 {
    loss-priority low code-points 110;
}
forwarding-class fc_q7 {
    loss-priority low code-points 111;
}
}
forwarding-classes {
    queue 0 fc_q0;
    queue 1 fc_q1;
    queue 2 fc_q2;
    queue 3 fc_q3;
    queue 4 fc_q4;
    queue 5 fc_q5;
    queue 6 fc_q6;
    queue 7 fc_q7;
}
interfaces {
    at-6/1/0 {
        unit * {
            classifiers {
                inet-precedence inet_classifier;
            }
        }
    }
}
}
[edit routing-options]
static {
    route 10.10.20.2/32 {
        next-hop at-0/1/0.0;
        retain;
        no-readvertise;
    }
    route 10.10.1.2/32 {
        next-hop at-0/1/0.1;
        retain;
        no-readvertise;
    }
}
}
```


Verifying the Configuration To see the results of this configuration, you can issue the following operational mode commands:

- `show interfaces at-0/1/0 extensive`
- `show interfaces queue at-0/1/0`
- `show class-of-service forwarding-class`

Configuring VC CoS Mode

VC CoS mode defines the CoS queue scheduling priority. By default, the VC CoS mode is alternate. When it is a queue's turn to transmit, the queue transmits up to its weight in cells as specified by the `transmit-weight` statement at the `[edit interfaces at-fpc/pic/port atm-options scheduler-maps map-name forwarding-class class-name]` hierarchy level. The number of cells transmitted can be slightly over the configured or default transmit weight, because the transmission always ends at a packet boundary.

To configure the VC CoS mode, include the `vc-cos-mode` statement at the `[edit interfaces at-fpc/pic/port atm-options scheduler-maps]` hierarchy level:

```
edit interfaces at-fpc/pic/port atm-options scheduler-maps]
vc-cos-mode (alternate | strict);
```

Two modes of CoS scheduling priority are supported:

- **alternate**—Assign **high** priority to one queue. The scheduling of the queues alternates between the **high** priority queue and the remaining queues. Every other scheduled packet is from the **high** priority queue.
- **strict**—Assign strictly **high** priority to one queue. A queue with strictly **high** priority is always scheduled before the remaining queues. The remaining queues are scheduled in round-robin fashion.

Enabling the PLP Setting to Be Copied to the CLP Bit

For a PE router with customer edge (CE)-facing, egress, ATM2 IQ interfaces configured with standard AAL5 encapsulation, you can enable the PLP setting to be copied into the CLP bit.



NOTE: This configuration setting is not applicable to Layer 2 circuit encapsulations because the control word captures and preserves CLP information. For more information about Layer 2 circuit encapsulations, see [“Configuring Layer 2 Circuit Transport Mode” on page 49](#).

By default, at egress ATM2 IQ interfaces configured with standard AAL5 encapsulation, the PLP information is not copied to the CLP bit. This means the PLP information is not carried beyond the egress interface onto the CE router.

You can enable the PLP information to be copied into the CLP bit by including the `plp-to-clp` statement:

```
plp-to-clp;
```

You can include this statement at the following hierarchy levels:

- [edit interfaces *interface-name* atm-options]
- [edit interfaces *interface-name* unit *logical-unit-number*]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]

Configuring ATM CoS on the Logical Interface

To apply the ATM scheduler map to a logical interface, include the **atm-scheduler-map** statement:

```
atm-scheduler-map (map-name | default);
```

For ATM CoS to take effect, you must configure the VCI and VPI identifiers and traffic shaping on each VC by including the following statements:

```
vci vpi-identifier.vci-identifier;  
shaping {  
  (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate burst length);  
}
```

You can include these statements at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number*]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]

For more information, see “Configuring a Point-to-Point ATM1 or ATM2 IQ Connection” on page 70 and “Defining the ATM Traffic-Shaping Profile” on page 72.

You can also apply a scheduler map to the chassis traffic that feeds the ATM interfaces. For more information, see the Junos OS Class of Service Configuration Guide.

Example: Configuring ATM2 IQ VC Tunnel CoS Components

Configure ATM2 IQ VC tunnel CoS components:

```
[edit interfaces]  
at-1/2/0 {  
  atm-options {  
    vpi 0;  
    linear-red-profiles red-profile-1 {  
      queue-depth 35000 high-plp-threshold 75 low-plp-threshold 25;  
    }  
    scheduler-maps map-1 {  
      vc-cos-mode strict;  
      forwarding-class best-effort {  
        priority low;  
        transmit-weight percent 25;  
        linear-red-profile red-profile-1;  
      }  
    }  
  }  
}
```

```

    }
  }
}
unit 0 {
  vci 0.128;
  shaping {
    vbr peak 20m sustained 10m burst 20;
  }
  atm-scheduler-map map-1;
  family inet {
    address 192.168.0.100/32 {
      destination 192.168.0.101;
    }
  }
}
}
}

```

**Related
Documentation**

- [Configuring a Point-to-Point ATM1 or ATM2 IQ Connection on page 70](#)
- [Defining the ATM Traffic-Shaping Profile on page 72](#)
- [atm-scheduler-map on page 130](#)
- [vci on page 212](#)

Configuring ATM Scheduler on Ethernet VPLS over a Bridged ATM Interface

On M7i routers, M10i routers with Enhanced III FPCs, and M320 routers with Enhanced III FPCs, you can attach scheduler maps under ATM logical interfaces configured with Ethernet VPLS over ATM (bridging) encapsulation.

The following configuration tasks are required:

- Define the **scheduler-maps** statement at the **[edit interfaces at-fpc/pic/port atm-options]** hierarchy level, as follows:

```

[edit interfaces at-fpc/pic/port atm-options]
  scheduler-maps map-name {
    forwarding-class (class-name | assured-forwarding | best-effort
    expedited-forwarding | network-control);
    vc-cos-mode strict;
  }

```

- Include the encapsulation **ether-vpls-over-atm-llc** statement at the **[edit interfaces at-fpc/pic/port unit logical-unit-number]** hierarchy level, as follows:

```

[edit interfaces at-fpc/pic/port unit logical-unit-number]
  encapsulation ether-vpls-over-atm-llc;

```

- Include the **atm-scheduler-map** at the **[edit interfaces at-fpc/pic/port unit logical-unit-number]** hierarchy level, as follows.

```

[edit interfaces at-fpc/pic/port unit logical-unit-number]
  atm-scheduler-map (map-name | default);

```

The scheduler map configured on the ATM device can be checked by using the PFE command **show atm slot number vpc** on the FPC console

- Related Documentation**
- [encapsulation \(Physical Interface\) on page 144](#)
 - [Example: Configuring ATM Scheduler Map on Ethernet VPLS over Bridged ATM Interfaces on page 107](#)

Example: Configuring ATM1 Interfaces

The following configuration is sufficient to get an ATM1 OC3 or OC12 interface up and running. By default, ATM interfaces use ATM PVC encapsulation.

<p>Complex Configuration Example</p>	<pre> [edit interfaces] at-fpc/pic/port { atm-options { vpi <i>vpi-identifier</i> maximum-vcs <i>maximum-vcs-value</i>; unit 0 { # one unit per VC vci <i>vpi-identifier.vci-identifier</i>; family inet { address <i>local-address</i> { destination <i>address</i>; } } } unit 1 { # second VC ... } } } </pre>
	<pre> [edit interfaces] at-0/0/0 { encapsulation atm-pvc; atm-options { vpi 0 maximum-vcs 1200; } unit 2 { encapsulation atm-snap; inverse-arp; vci 0.80; family inet { mtu 1500; address 192.168.0.3/32 { destination 192.168.0.1; } } } unit 3 { encapsulation atm-snap; vci 0.32; oam-period 60; family inet { mtu 1500; address 192.168.4.3/32 { destination 192.168.4.2; } } } } </pre>

```

    }
  }
}
at-0/2/0 {
  encapsulation atm-pvc;
  atm-options {
    vpi 0 maximum-vcs 1200;
  }
  unit 2 {
    encapsulation atm-snap;
    inverse-arp;
    vci 0.82;
    family inet {
      mtu 1500;
      address 192.168.5.3/32 {
        destination 192.168.5.2;
      }
    }
  }
}
at-0/3/0 {
  encapsulation atm-pvc;
  atm-options {
    vpi 0 maximum-vcs 1200;
  }
  unit 140 {
    encapsulation atm-snap;
    multipoint;
    family inet {
      address 192.168.7.4/24 {
        multipoint-destination 192.168.7.5;
        vci 0.100;
        inverse-arp;
      }
    }
  }
}
at-7/3/0 {
  encapsulation atm-pvc;
  atm-options {
    vpi 0 maximum-vcs 1200;
  }
  unit 0 {
    encapsulation atm-snap;
    vci 0.32;
    family inet {
      address 192.168.12.3/32 {
        destination 192.168.12.2;
      }
    }
  }
}
}

```

Example: Configuring ATM2 IQ Interfaces

Configure VP tunnel-shaping and OAM F4 on an ATM2 IQ interface:

```
interfaces {
  at-5/2/0 {
    atm-options {
      vpi 0 {
        shaping {
          vbr peak 10m sustained 6m burst 12;
        }
        oam-period 10;
        oam-liveness {
          up-count 6;
          down-count 5;
        }
      }
    }
    vpi 4 {
      shaping {
        vbr peak 7m sustained 4m burst 24;
      }
    }
    vpi 5 {
      oam-period 10;
      oam-liveness {
        up-count 6;
        down-count 5;
      }
    }
    vpi 6;
  }
  unit 0 {
    vci 0.128;
    transmit-weight 20;
    family inet {
      address 192.168.9.225/32 {
        destination 192.168.9.224;
      }
    }
  }
  unit 1 {
    vci 0.129;
    transmit-weight 30;
    family inet {
      address 192.168.9.226/32 {
        destination 192.168.9.227;
      }
    }
  }
  unit 2 {
    vci 5.123;
    shaping {
      vbr peak 60m sustained 4m burst 24;
    }
  }
}
```

```

        family inet {
            address 192.168.9.227/32 {
                destination 192.168.9.230;
            }
        }
    }
}

```

Example: Configuring ATM Scheduler Map on Ethernet VPLS over Bridged ATM Interfaces

This example describes sending packets between routers with ATM2 IQ interfaces using Ethernet VPLS over ATM encapsulation.

```

interfaces {
    at-1/2/3 {
        atm-options {
            vpi 0;
            scheduler-maps {
                cos-vpls {
                    forwarding-class assured-forwarding {
                        priority low;
                        transmit-weight percent 10;
                    }
                    forwarding-class best-effort {
                        priority low;
                        transmit-weight percent 20;
                    }
                    forwarding-class expedited-forwarding {
                        priority low;
                        transmit-weight percent 30;
                    }
                    forwarding-class network-control {
                        priority high;
                        transmit-weight percent 40;
                    }
                }
            }
        }
        unit 0 {
            encapsulation ether-vpls-over-atm-llc;
            vci 0.100;
            family vpls;
        }
        atm-scheduler-map cos-vpls;
    }
}

```

For a proper routing setup, a routing-instance for the VPLS must be setup as well:

```

routing-instance {
    cos-test-v1 {
        instance-type vpls;
        interface at-1/2/3.0;
        route-distinguisher 10.10.10.1;
        vrf-target target:11111:1;
        protocols {

```

```
    vpls {  
      site-range 10;  
      site cos-test-v1-site1 {  
        site-identifier 1;  
      }  
    }  
  }  
}
```

- Related Documentation**
- [encapsulation \(Physical Interface\) on page 144](#)
 - [Configuring ATM Scheduler on Ethernet VPLS over a Bridged ATM Interface on page 103](#)

CHAPTER 3

Configuring ATM-over-ADSL Interfaces

- [ATM-over-ADSL Overview on page 109](#)
- [Configuring Physical ATM Interfaces and Logical Interface Properties for ADSL on page 110](#)
- [Configuring the ATM-over-ADSL Virtual Path Identifier on page 111](#)
- [Configuring the ATM-over-ADSL Physical Interface Operating Mode on page 111](#)
- [Configuring the ATM-over-ADSL Physical Interface Encapsulation Type on page 112](#)
- [Configuring the ATM-over-ADSL Logical Interface Encapsulation Type on page 112](#)
- [Configuring the ATM-over-ADSL Protocol Family on page 114](#)
- [Configuring the ATM-over-ADSL Virtual Channel Identifier on page 114](#)

ATM-over-ADSL Overview

J4300 and J6300 Services Routers with asymmetrical DSL (ADSL) Annex A or Annex B PIMs can use an ATM interface to send network traffic through a point-to-point connection to a DSLAM. ATM-over-ADSL interfaces are not supported on J2300 Services Routers.



NOTE: You can configure J4300 and J6300 Services Routers with ADSL PIMs for connections through DSL only, not for direct ATM connections.

You configure the underlying ADSL as an ATM interface with an interface name of **at-pim/0/port**. Multiple encapsulation types are supported on both the physical and logical ATM-over-ADSL interface.

You can configure Point-to-Point Protocol over Ethernet (PPPoE) over ATM to connect through DSL lines. For PPPoE on an ATM-over-ADSL interface, you must configure encapsulation on both the physical and logical interfaces. To configure encapsulation on an ATM-over-ADSL physical interface, use Ethernet over ATM encapsulation. To configure encapsulation on an ATM-over-ADSL logical interface, use the PPPoE over AAL5 LLC encapsulation. LLC encapsulation allows a single ATM virtual connection to transport multiple protocols.



NOTE: PPPoE encapsulation is not supported on an M120 router with ATM2 PICs.

When you configure a point-to-point encapsulation such as PPP on a physical interface, the physical interface can have only one logical interface (only one **unit** statement) associated with it.

For more information about configuring PPPoE, see [Configuring PPPoE](#).

Related Documentation

- [Configuring the ATM-over-ADSL Virtual Path Identifier on page 111](#)
- [Configuring the ATM-over-ADSL Physical Interface Operating Mode on page 111](#)
- [Configuring the ATM-over-ADSL Physical Interface Encapsulation Type on page 112](#)
- [Configuring the ATM-over-ADSL Logical Interface Encapsulation Type on page 112](#)
- [Configuring the ATM-over-ADSL Protocol Family on page 114](#)
- [Configuring the ATM-over-ADSL Virtual Channel Identifier on page 114](#)

Configuring Physical ATM Interfaces and Logical Interface Properties for ADSL

To configure physical ATM interfaces for ADSL, include the **vpi 0** statement at the **[edit interfaces at-pim/0/port atm-options]** hierarchy level, the **operating-mode** statement at the **[edit interfaces at-pim/0/port dsl-options]** hierarchy level, and the **encapsulation** statement at the **[edit interfaces at-pim/0/port]** hierarchy level:

```
[edit interfaces at-pim/0/port]
atm-options {
  vpi 0;
}
dsl-options {
  operating-mode mode;
}
encapsulation (atm-pvc | ethernet-over-atm);
```

Configure logical interface properties by including the **encapsulation** statement, **family** statement, and **vci** statement:

```
unit logical-unit-number {
  encapsulation (atm-vc-mux | atm-nlpd | atm-cisco-nlpd | atm-snap | atm-ppp-vc-mux |
    atm-ppp-llc | ether-over-atm-llc | ppp-over-ether-over-atm-llc);
  family inet {
    vci vpi-identifier.vci-identifier;
  }
}
```

You can include these statements at the following hierarchy levels:

- **[edit interfaces *interface-name* unit *logical-unit-number*]**
- **[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]**

Related Documentation

- [Configuring the ATM-over-ADSL Virtual Path Identifier on page 111](#)
- [Configuring the ATM-over-ADSL Physical Interface Operating Mode on page 111](#)
- [Configuring the ATM-over-ADSL Physical Interface Encapsulation Type on page 112](#)
- [Configuring the ATM-over-ADSL Logical Interface Encapsulation Type on page 112](#)
- [Configuring the ATM-over-ADSL Protocol Family on page 114](#)
- [Configuring the ATM-over-ADSL Virtual Channel Identifier on page 114](#)

Configuring the ATM-over-ADSL Virtual Path Identifier

Set the ATM virtual path identifier (VPI) to 0 (zero) by including the **vpi 0** statement at the **[edit interfaces at-pim/0/port atm-options]** hierarchy level:

```
[edit interfaces at-pim/0/port atm-options]
vpi 0;
```

Configuring the ATM-over-ADSL Physical Interface Operating Mode

Configure the ADSL operating mode on the physical ATM interface by including the **operating-mode** statement at the **[edit interfaces at-pim/0/port dsl-options]** hierarchy level:

```
[edit interfaces at-pim/0/port dsl-options]
operating-mode (adsl2plus | ansi-dmt | auto | etsi | itu-annexb-non-ur2 | itu-annexb-ur2 |
itu-dmt | itu-dmt-bis);
```

By default, the mode is **auto**, which means the ADSL line autonegotiates the setting to match the setting of the DSLAM located at the central office.

[Table 9 on page 111](#) shows the Annex A PIM and Annex B PIM operational modes for ATM-over-ADSL interfaces.

Table 9: ATM-over-ADSL Operational Modes

Encapsulation Types	Comments
Annex A PIMs	
adsl2plus	Set the ADSL line to train in the ITU G.992.5 mode.
ansi-dmt	Set the ADSL line to train in the ANSI T1.413 Issue 2 mode.
auto	Set the ADSL line to autonegotiate the setting to match the setting of the DSLAM located at the central office. The ADSL line trains in the ANSI T1.413 Issue 2 (ansi-dmt) or ITU G.992.1 (itu-dmt) mode.
itu-dmt	Set the ADSL line to train in the ITU G.992.1 mode.
itu-dmt-bis	Set the ADSL line to train in the ITU G.992.3 mode.

Table 9: ATM-over-ADSL Operational Modes (*continued*)

Encapsulation Types	Comments
itu-lite	Set the ADSL line to train in the G.992.2 mode.
itu-lite-bis	Set the ADSL line to train in the G.992.4 mode.
Annex B PIMs	
adsl2plus	Set the ADSL line to train in the ITU G.992.5 mode.
auto	Set the ADSL line after autonegotiating the setting to match the setting of the DSLAM located at the central office.
etsi	Set the ADSL line to train in the ETSI TS 101 388 V1.3.1 mode.
itu-dmt	Set the ADSL line to train in the ITU G.992.1 mode.
itu-dmt-bis	Set the ADSL line to train in the ITU G.992.3 mode.
itu-annexb-ur2	Set the ADSL line to train in the ITU G.992.1 Deutsche Telekom UR-2 mode.
itu-annexb-non-ur2	Set the ADSL line to train in the ITU G.992.1 non-UR-2 mode.
itu-dmt	Set the ADSL line to train in the ITU G.992.1 mode.

Configuring the ATM-over-ADSL Physical Interface Encapsulation Type

Configure the physical interface encapsulation type by including the **encapsulation** statement at the **[edit interfaces at-pim/O/port]** hierarchy level:

```
[edit interfaces at-pim/O/port]
encapsulation type;
```

Table 10 on page 113 shows the physical interface encapsulation types for ATM-over-ADSL interfaces.

Configuring the ATM-over-ADSL Logical Interface Encapsulation Type

Configure the logical interface encapsulation type by including the **encapsulation** statement:

```
[edit interfaces at-pim/O/port unit logical-unit-number]
encapsulation type;
```

You can include this statement at the following hierarchy levels:

```
[edit interfaces interface-name unit logical-unit-number]
```

[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]

Table 10 on page 113 shows the logical interface encapsulation types for ATM-over-ADSL interfaces.

Table 10: ATM-over-ADSL Encapsulation Types

Encapsulation Types	Comments
Physical Interface	
ether-over-atm	Ethernet over ATM encapsulation. Use this type of encapsulation for interfaces that carry IPv4 traffic.
atm-pvc	ATM permanent virtual circuits (PVCs).
Logical Interface	
atm-vc-mux	Use ATM VC multiplex encapsulation. You can only configure the inet family when you use this type of encapsulation.
atm-nlpd	Use ATM network layer protocol ID (NLPD) encapsulation. You can only configure the inet family when you use this type of encapsulation.
atm-cisco-nlpd	Use Cisco NLPD encapsulation. You can only configure the inet family when you use this type of encapsulation.
atm-snap	Use ATM subnetwork attachment point (SNAP) encapsulation.
atm-ppp-vc-mux	Use PPP over ATM AAL5 multiplex encapsulation.
atm-ppp-llc	Use ATM PPP over AAL5 logical link control (LLC) encapsulation.
ether-over-atm-llc	Use Ethernet over LLC encapsulation for interfaces that carry IPv4 traffic. You cannot configure multipoint interfaces if you use this type of encapsulation.
ppp-over-ether-over-atm-llc	Use PPP over Ethernet over ATM LLC encapsulation. You cannot configure the interface address when you use this encapsulation type. Instead, you configure the interface address on the PPP interface.

Configuring the ATM-over-ADSL Protocol Family

Configure the protocol family type by including the **family** statement:

```
[edit interfaces at-pim/0/port unit logical-unit-number]  
family family;
```

You can include this statement at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number*]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]

Configuring the ATM-over-ADSL Virtual Channel Identifier

Configure the virtual channel identifier (VCI) type and value by including the **vci** statement:

```
[edit interfaces at-pim/0/port unit logical-unit-number]  
vci vpi-identifier.vci-identifier;
```

You can include this statement at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number*]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]

CHAPTER 4

Configuring ATM-over-SHDSL Interfaces

- [ATM-over-SHDSL Overview on page 115](#)
- [Configuring ATM Mode for SHDSL Overview on page 116](#)
- [Configuring ATM Mode on the PIM on page 117](#)
- [Configuring SHDSL Operating Mode on an ATM Physical Interface on page 118](#)
- [Configuring Encapsulation on the ATM Physical Interface on page 119](#)
- [Configuring Logical Interface Properties on page 119](#)
- [Example: Configuring an ATM-over-SHDSL Interface on page 120](#)
- [Verifying an ATM-over-SHDSL Interface Configuration on page 121](#)

ATM-over-SHDSL Overview

The symmetric high-speed digital subscriber line (SHDSL) Physical Interface Module (PIM) is available for J Series Services Routers. The PIM supports multi-rate, high-speed, symmetrical digital subscriber line technology for data transfer between a single customer premises equipment (CPE) subscriber and a central office (CO). Unlike ADSL, which was designed for delivering more bandwidth downstream than upstream, SHDSL is symmetrical and delivers a bandwidth of 2.3 Mbps in both directions. The SHDSL PIM has 2 ports and supports ATM-over-SHDSL mode only.

SHDSL is defined in the following specifications from the ITU and the Internet Engineering Task Force (IETF):

- ITU G.991.2, *Single-pair High-speed Digital Subscriber Line (SHDSL) Transceiver*
- ITU G.994.1, *Handshake Procedures for Digital Subscriber Line (DSL) Transceivers*
- ITU G.997.1, *Physical Layer Management for Digital Subscriber Line (DSL) Transceivers*
- RFC 3276, *Definitions of Managed Objects for High Bit-Rate DSL - 2nd generation (HDSL2) and Single-Pair High-Speed Digital Subscriber Line (SHDSL) Lines*

J Series routers with SHDSL Annex A or Annex B PIMs act as a primary WAN link. They use an ATM interface to send network traffic through a point-to-point connection to a DSL-access multiplexer (DSLAM). You can configure Point-to-Point Protocol over Ethernet (PPPoE) over ATM to connect through DSL lines. For more information about configuring PPPoE, see [Configuring PPPoE](#).

ATM-over-SHDSL interfaces are not supported on J2300 Services Routers.



NOTE: You can configure J Series routers with SHDSL PIMs for connections through SHDSL only, not for direct ATM connections.

Related Documentation

- [Configuring ATM Mode for SHDSL Overview on page 116](#)
- [Configuring ATM Mode on the PIM on page 117](#)
- [Configuring SHDSL Operating Mode on an ATM Physical Interface on page 118](#)
- [Configuring Encapsulation on the ATM Physical Interface on page 119](#)
- [Configuring Logical Interface Properties on page 119](#)
- [Example: Configuring an ATM-over-SHDSL Interface on page 120](#)
- [Verifying an ATM-over-SHDSL Interface Configuration on page 121](#)

Configuring ATM Mode for SHDSL Overview

To configure the ATM mode for SHDSL, include the **pic-mode** statement at the **[edit chassis fpc *fpc-number* pic 0 shdsl]** hierarchy level:

```
[edit chassis]
fpc fpc-number {
  pic 0 {
    shdsl {
      pic-mode (1-port-atm | 2-port-atm);
    }
  }
}
```

For more information about configuring the ATM mode, see the Junos OS System Basics Configuration Guide and the *Junos OS Interfaces and Routing Configuration Guide*.

To configure SHDSL operating mode on the physical ATM interface and set the encapsulation, include the **shdsl-options** statement and the **encapsulation** statement at the **[edit interfaces at-*pim*/0/*port*]** hierarchy level:

```
[edit interfaces at-pim/0/port]
shdsl-options {
  annex (annex-a | annex-b);
  line-rate line-rate;
  loopback (local remote);
  snr-margin {
    current margin;
    snext margin;
  }
  encapsulation (atm-pvc | ethernet-over-atm)
}
```

To configure ATM virtual path identifier (VPI) options for the interface, include the **vpi** statement at the **[edit interfaces *interface-name* atm-options]** hierarchy level:


```
[edit interfaces interface-name]
atm-options {
  vpi vpi-identifier {
    maximum-vcs maximum-vcs;
    oam-liveness {
      up-count cells;
      down-count cells;
    }
    oam-period (disable | seconds);
  }
}
```

For more information about configuring ATM VPI options, see [“Configuring the Maximum Number of ATM1 VCs on a VP” on page 48](#).

To configure logical interface properties, include the **encapsulation** statement, **family** statement, and **vci** statement:

```
unit logical-unit-number {
  encapsulation type;
  family inet {
    vci vpi-identifier.vci-identifier;
  }
}
```

You can include these statements at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number*]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]

Related Documentation

- [ATM-over-SHDSL Overview on page 115](#)
- [Configuring ATM Mode on the PIM on page 117](#)
- [Configuring SHDSL Operating Mode on an ATM Physical Interface on page 118](#)
- [Configuring Encapsulation on the ATM Physical Interface on page 119](#)
- [Configuring Logical Interface Properties on page 119](#)
- [Example: Configuring an ATM-over-SHDSL Interface on page 120](#)
- [Verifying an ATM-over-SHDSL Interface Configuration on page 121](#)

Configuring ATM Mode on the PIM

The J Series routers with an SHDSL PIM installed support the 2-port, two-wire mode (Annex A or Annex B). You can configure only one mode on each 2-port SHDSL PIM.



NOTE: G.SHDSL interfaces on a J Series router only support 2-port, two-wire mode. This is enabled by default. The 1-port, 4-wire mode is not supported.

The two-wire mode supports autodetection of the line rate or fixed line rate and network speeds from 192 Kbps to 2.3 Kbps in 64-Kbps increments.

For information about configuring Annex A or Annex B, see [“Configuring SHDSL Operating Mode on an ATM Physical Interface” on page 118](#).

To configure the ATM mode for SHDSL, include the **pic-mode** statement at the **[edit chassis fpc *fpc-number* pic 0 shdsl]** hierarchy level:

```
[edit chassis]
fpc fpc-number {
  pic 0 {
    shdsl {
      pic-mode (1-port-atm | 2-port-atm);
    }
  }
}
```

The default is 2-wire (two-port ATM) mode. To set the default explicitly, specify the **2-port-atm** option. For 4-wire (single-port ATM) mode, specify the **1-port-atm** option.

For more information about configuring the **pic-mode** statement, see the Junos OS System Basics Configuration Guide. For information about configuring the ATM mode, see the *Junos OS Interfaces and Routing Configuration Guide*.

Configuring SHDSL Operating Mode on an ATM Physical Interface

To configure the SHDSL operating mode on the physical ATM interface, include the **shdsl-options** statement at the **[edit interfaces at-*pim*/0/*port*]** hierarchy level:

```
[edit interfaces at-pim/0/port]
shdsl-options {
  annex (annex-a | annex-b);
  line-rate line-rate;
  loopback (local | remote);
  snr-margin {
    current margin;
    snext margin;
  }
}
```

Configure the following SHDSL options:

- **annex**—The type of annex:
 - **annex-a**—Use for North American SHDSL network implementations.
 - **annex-b**—Use for European SHDSL network implementations.
- **line-rate**—The SHDSL line rate. The default for 2-wire mode is auto. The default for 4-wire mode is 4608 Kbps.
- **loopback**—A loopback connection, **local** or **remote**.
 - **local**—Use to troubleshoot physical PIC errors. A local loopback loops packets, including both data and timing information, back on the local router's PIM.

- **remote**—Use to troubleshoot physical circuit problems between the local router and the remote router. A remote loopback loops packets, including both data and timing information, back on the remote router's PIC.
- **snr-margin**— The SHDSL signal-to-noise ratio (SNR) margin, **current** or **snext**. The SNR margin is the difference between the desired SNR and the actual SNR.
- **current**—Current SNR is the difference between desired SNR and the actual SNR. When configured, the line trains at higher than current noise margin plus SNR threshold.
- **snext**—Self-near-end crosstalk (SNEXT) SNR margin line trains the line at higher than SNEXT threshold.

Configuring Encapsulation on the ATM Physical Interface

To configure the type of encapsulation for the physical ATM interface, include the **encapsulation** statement at the **[edit interfaces at-pim /O/port]** hierarchy level:

```
[edit interfaces at-pim/O/port]
encapsulation (atm-pvc | ether-over-atm);
```

Configure one of the following:

- **atm-pvc**—ATM permanent virtual circuits (PVCs), used for PPP over ATM over SHDSL interfaces. This is the default encapsulation.
- **ether-over-atm**—Ethernet over ATM encapsulation. For interfaces that carry IPv4 traffic, use this type of encapsulation.

Configuring Logical Interface Properties

To configure logical interface properties, include the **encapsulation** statement, **family** statement, and **vci** statement:

```
unit logical-unit-number {
  encapsulation type;
  family inet {
    vci vpi-identifier.vci-identifier;
  }
}
```

You can include these statements at the following hierarchy levels:

- **[edit interfaces interface-name unit logical-unit-number]**
- **[edit logical-systems logical-system-name interfaces interface-name unit logical-unit-number]**

To configure the logical link-layer encapsulation type, include the **encapsulation** statement.

ATM-over-SHDSL interfaces that use **inet** (IP) protocols support the following encapsulations on the logical interface:

- **atm-vc-mux**—Use ATM VC multiplex encapsulation. You can only configure the **inet** family when you use this type of encapsulation.
- **atm-nlpd**—Use ATM network layer protocol ID (NLPD) encapsulation. You can only configure the **inet** family when you use this type of encapsulation.
- **atm-cisco-nlpd**—Use Cisco NLPD encapsulation. You can only configure the **inet** family when you use this type of encapsulation.

ATM-over-SHDSL for PPP over ATM interfaces support the following encapsulations on the logical interface:

- **atm-ppp-llc**—Use ATM PPP over AAL5 logical link control (LLC) encapsulation.
- **atm-ppp-vc-mux**—Use PPP over ATM AAL5 multiplex encapsulation.

ATM-over-SHDSL interfaces also support the following encapsulations on the logical interface:

- **atm-snap**—Use ATM subnetwork attachment point (SNAP) encapsulation.
- **atm-mlppp-llc**—For ATM2 IQ interfaces only, use Multilink PPP (MLPPP) over AAL5 LLC. For this encapsulation type, your router must be equipped with a Link Services or Voice Services PIC. MLPPP over ATM encapsulation is not supported on ATM2 IQ OC48 interfaces.
- **ppp-over-ether-over-atm-llc**—Use PPP over Ethernet over ATM LLC encapsulation. When you use this encapsulation type, you cannot configure the interface address. Instead, you configure the interface address on the PPP interface.
- **family**—The family protocol type.
- **vci**—The virtual channel identifier (VCI) type and value.
- **vci-identifier**—ATM virtual circuit identifier. Unless you configure the interface to use promiscuous mode, this value cannot exceed the largest numbered VC configured for the interface with the **maximum-vcs** option of the **vpi** statement. Specify a VCI identifier from 0 through 4089 or 0 through 65,535 with promiscuous mode. VCIs from 0 through 31 are reserved.
- **vpi-identifier**—ATM virtual path identifier. Specify a VPI from 0 through 255. The default is 0.

**Related
Documentation**

- [unit on page 202](#)
- [encapsulation on page 140](#)
- [family on page 151](#)
- [vci on page 212](#)

Example: Configuring an ATM-over-SHDSL Interface

The following example illustrates an ATM-over-SHDSL interface configuration.

Configuration for the ATM Mode on the PIM	<pre>[edit chassis] fpc 6 { pic 0 { shdsl { pic-mode 2-port-atm; } } }</pre>
Configuration for the SHDSL Operating Mode on the Physical ATM Interface	<pre>[edit interfaces at-6/0/0/0] shdsl-options { annex annex-b; line-rate 192; loopback local; snr-margin { current 1; snext 2; } }</pre>
Configuration for the Encapsulation on the Physical ATM Interface	<pre>[edit interfaces at-6/0/0/0] encapsulation ethernet-over-atm;</pre>
Configuration for the Logical Interface	<pre>[edit interfaces at-6/0/0/0 unit 3] encapsulation atm-nlpid; family inet { vci 25; }</pre>

Verifying an ATM-over-SHDSL Interface Configuration

To verify an ATM-over-SHDSL interface configuration, you can issue the following operational mode command:

```
user@host> show interfaces at-pim/0/port extensive
```


PART 3

ATM Interfaces Configuration Statements

- [Summary of ATM Interfaces Configuration Statements on page 125](#)

CHAPTER 5

Summary of ATM Interfaces Configuration Statements

The following descriptions explain each of the interface configuration statements. The statements are organized alphabetically.

advertise-interval

Syntax	<code>advertise-interval <i>milliseconds</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options aps]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Modify the Automatic Protection Switching (APS) interval at which the protect and working routers send packets to their neighbors to advertise that they are operational. A router considers its neighbor to be operational for a period, called the hold time, that is, by default, three times the advertisement interval.
Options	<i>milliseconds</i> —Interval between advertisement packets. Range: 1 through 65,534 milliseconds Default: 1000 milliseconds
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring APS Timers

allow-any-vci

Syntax	allow-any-vci;
Hierarchy Level	[edit interfaces <i>interface-name</i> unit 0], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit 0]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access routers.
Description	Dedicate entire ATM device to ATM cell relay circuit.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring an ATM1 Cell-Relay Circuit on page 85

annex

Syntax	annex (annex-a annex-b);
Hierarchy Level	[edit interfaces <i>interface-name</i> shdsl-options], [edit interfaces <i>interface-name</i> sonet-options aps], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> shdsl-options]
Release Information	Statement introduced in Junos OS Release 7.4.
Description	For J Series Services Routers only, configure the type of SHDSL annex. For M320 and M120 routers only, for Multiplex Section Protection (MSP) switching on SDH interfaces, set annex-b . You must also configure the working protection circuit under the [edit interfaces <i>so-fpc/pic/port</i> sonet-options aps] hierarchy level.
Default	annex-b
Options	annex-a —Use for North American SHDSL network implementations. annex-b —Use for European SHDSL network implementations.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• ATM-over-SHDSL Overview on page 115

aps

Syntax	<pre>aps { advertise-interval <i>milliseconds</i>; annex-b authentication-key <i>key</i>; (break-before-make no-break-before-make); fast-aps-switch; force; hold-time <i>milliseconds</i>; lockout; neighbor <i>address</i>; paired-group <i>group-name</i>; preserve-interface; protect-circuit <i>group-name</i>; request; revert-time <i>seconds</i>; switching-mode (bidirectional unidirectional); working-circuit <i>group-name</i>; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>Configure Automatic Protection Switching (APS) on the router.</p> <p>For DS3 channels on a channelized OC12 interface, configure APS on channel 0 only. If you configure APS on channels 1 through 11, it is ignored.</p> <p>The statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Automatic Protection Switching and Multiplex Section Protection Overview

atm-encapsulation

Syntax	atm-encapsulation (direct plcp);
Hierarchy Level	[edit interfaces at- <i>fpc/pic/port</i> e3-options], [edit interfaces at- <i>fpc/pic/port</i> t3-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure encapsulation for E3 and T3 traffic over ATM interfaces.
Default	Physical Layer Convergence Protocol (PLCP) encapsulation is the default for T3 traffic and for E3 traffic using G.751 framing.
Options	direct —Use direct encapsulation. G.832 framing on E3 interfaces requires direct encapsulation. plcp —Use PLCP encapsulation.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring E3 and T3 Parameters on ATM Interfaces on page 90• encapsulation (Physical Interface) on page 144

atm-options

```
Syntax  atm-options {
        cell-bundle-size cells;
        ilmi;
        linear-red-profiles profile-name {
            high-plp-max-threshold percent;
            low-plp-max-threshold percent;
            queue-depth cells high-plp-threshold percent low-plp-threshold percent;
        }
        mpls {
            pop-all-labels {
                required-depth number;
            }
        }
        pic-type (atm1 | atm2);
        plp-to-clp;
        promiscuous-mode {
            vpi vpi-identifier;
        }
        scheduler-maps map-name {
            forwarding-class class-name {
                epd-threshold cells plp1 cells;
                linear-red-profile profile-name;
                priority (high | low);
                transmit-weight (cells number | percent number);
            }
            vc-cos-mode (alternate | strict);
        }
        use-null-cw;
        vpi vpi-identifier {
            maximum-vcs maximum-vcs;
            oam-liveness {
                up-count cells;
                down-count cells;
            }
            oam-period (disable | seconds);
            shaping {
                (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate burst
                length);
                queue-length number;
            }
        }
    }
```

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description Configure ATM-specific physical interface properties.

The statements are explained separately.



NOTE: Certain options apply only to specific platforms.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Interface Encapsulations Overview
- [multipoint-destination on page 172](#)
- [shaping on page 191](#)
- [vci on page 212](#)

atm-scheduler-map

Syntax atm-scheduler-map (*map-name* | default);

Hierarchy Level [edit interfaces *interface-name* [unit logical-unit-number](#)],
[edit logical-systems *logical-system-name* interfaces *interface-name* [unit logical-unit-number](#)]

Release Information Statement introduced before Junos OS Release 7.4.

Description Associate a scheduler map with a virtual circuit on a logical interface.

Options *map-name*—Name of scheduler map that you define at the [edit interfaces *interface-name* [atm-options scheduler-maps](#)] hierarchy level.

default—The default scheduler mapping.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- [Configuring ATM2 IQ VC Tunnel CoS Components on page 92](#)
- [scheduler-maps on page 190](#)

authentication-key

Syntax	<code>authentication-key key;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options aps]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure the Automatic Protection Switching (APS) authentication key (password).
Options	key —Authentication password. It can be 1 through 8 characters long. Configure the same key for both the working and protect routers.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring Basic Automatic Protect Switching For information about the authentication-key statement at the [edit interfaces <i>interface-name</i> unit <i>unit-number</i> family inet address <i>address</i> (vrrp-group vrrp-inet6-group) <i>group-number</i>] or [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>unit-number</i> family (inet inet6) address <i>address</i> (vrrp-group vrrp-inet6-group) <i>group-number</i>] hierarchy level, see the Junos OS High Availability Configuration Guide.

buildout (E3 or T3 over ATM Interfaces)

Syntax	<code>buildout feet;</code>
Hierarchy Level	[edit interfaces at- <i>fpc/pic/port</i> e3-options], [edit interfaces at- <i>fpc/pic/port</i> t3-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For E3 and T3 traffic over ATM interfaces, set the buildout value.
Options	feet —The buildout value in feet. Range: 0 through 450 feet (137 meters) Default: 10 feet (3 meters)
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring E3 and T3 Parameters on ATM Interfaces on page 90

bytes

Syntax	<pre>bytes { c2 <i>value</i>; e1-quiet <i>value</i>; f1 <i>value</i>; f2 <i>value</i>; s1 <i>value</i>; z3 <i>value</i>; z4 <i>value</i>; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Set values in some SONET/SDH header bytes.
Options	<p>c2 <i>value</i>—Path signal label SONET/SDH overhead byte. SONET/SDH frames use the C2 byte to indicate the contents of the payload inside the frame. SONET/SDH interfaces use the C2 byte to indicate whether the payload is scrambled.</p> <p>Range: 0 through 255</p> <p>Default: 0xCF</p> <p>e1-quiet <i>value</i>—Default idle byte sent on the orderwire SONET/SDH overhead bytes. The router does not support the orderwire channel, and hence sends this byte continuously.</p> <p>Range: 0 through 255</p> <p>Default: 0x7F</p> <p>f1 <i>value</i>, f2 <i>value</i>, z3 <i>value</i>, z4 <i>value</i>—SONET/SDH overhead bytes.</p> <p>Range: 0 through 255</p> <p>Default: 0x00</p> <p>s1 <i>value</i>—Synchronization message SONET overhead byte. This byte is normally controlled as a side effect of the system reference clock configuration and the state of the external clock coming from an interface if the system reference clocks have been configured to use an external reference.</p> <p>Range: 0 through 255</p> <p>Default: 0xCC</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring SONET/SDH Header Byte Valuesno-concatenate

cbit-parity

Syntax	(cbit-parity no-cbit-parity);
Hierarchy Level	[edit interfaces <i>interface-name</i> t3-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For T3 interfaces only, enable or disable C-bit parity mode, which controls the type of framing that is present on the transmitted T3 signal. When C-bit parity mode is enabled, the C-bit positions are used for the far-end block error (FEBE), far-end alarm and control (FEAC), terminal data link, path parity, and mode indicator bits, as defined in ANSI T1.107a-1989. For ATM and ATM2 IQ2 and IQ2-E interfaces, M23 framing is used when the no-cbit-parity statement is included. For all other interfaces, M13 framing is used when the no-cbit-parity statement is included.
Default	C-bit parity mode is enabled.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring E3 and T3 Parameters on ATM Interfaces on page 90 • Disabling T3 C-Bit Parity Mode

cbr

Syntax	<code>cbr rate;</code>
Hierarchy Level	[edit interfaces at- <i>fpc/pic/port</i> atm-options vpi <i>vpi-identifier</i> shaping], [edit interfaces at- <i>fpc/pic/port</i> unit <i>logical-unit-number</i> address <i>address</i> family <i>family</i> multipoint-destination <i>address</i> shaping], [edit interfaces at- <i>fpc/pic/ port</i> unit <i>logical-unit-number</i> shaping], [edit logical-systems <i>logical-system-name</i> interfaces at- <i>fpc/pic/port</i> unit <i>logical-unit-number</i> address <i>address</i> family <i>family</i> multipoint-destination <i>address</i> shaping], [edit logical-systems <i>logical-system-name</i> interfaces at- <i>fpc/pic/port</i> unit <i>logical-unit-number</i> shaping]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM encapsulation only, define a constant bit rate bandwidth utilization in the traffic-shaping profile.
Default	Unspecified bit rate (UBR); that is, bandwidth utilization is unlimited.
Options	rate —Peak rate, in bits per second (bps) or cells per second (cps). You can specify a value in bits per second either as a complete decimal number or as a decimal number followed by the abbreviation k (1000), m (1,000,000), or g (1,000,000,000). You can also specify a value in cells per second by entering a decimal number followed by the abbreviation c ; values expressed in cells per second are converted to bits per second by means of the formula 1 cps = 384 bps. For ATM1 and ATM2 OC3 interfaces, the maximum available rate is 100 percent of <i>line-rate</i> , or 135,600,000 bps. For ATM1 OC12 interfaces, the maximum available rate is 50 percent of <i>line-rate</i> , or 271,263,396 bps. For ATM2 IQ interfaces, the maximum available rate is 542,526,792 bps.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Defining the ATM Traffic-Shaping Profile on page 72 • rtvbr on page 189 • shaping on page 191 • vbr on page 210

cell-bundle-size

Syntax	<code>cell-bundle-size <i>cells</i>;</code>
Hierarchy Level	[edit interfaces <i>at-fpc/pic/port</i> atm-options], [edit interfaces <i>at-fpc/pic/port</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>at-fpc/pic/port</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM2 IQ interfaces using ATM Layer 2 circuit cell-relay transport mode only, configure the maximum number of ATM cells per frame.
Options	<i>cells</i> —Maximum number of cells. Default: 1 cell Range: 1 through 176 cells
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring the Layer 2 Circuit Cell-Relay Cell Maximum on page 67

current

Syntax	<code>current <i>margin</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> shdsl-options snr-margin], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> shdsl-options snr-margin]
Release Information	Statement introduced in Junos OS Release 7.4.
Description	For J Series Services Routers only, configure the current target signal-to-noise ratio (SNR) margin to be used when training the SHDSL line. The current margin is the difference between desired SNR and the actual SNR. When configured, the line trains at higher than the current margin plus SNR threshold.
Options	<i>margin</i> —Desired current SNR margin. Specify either disabled or a value from 0 dB through 10 dB. Default: 0 dB
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • ATM-over-SHDSL Overview on page 115

down-count

Syntax	<code>down-count <i>cells</i>;</code>
Hierarchy Level	<code>[edit interfaces <i>interface-name</i> atm-options vpi <i>vpi-identifier</i> oam-liveness]</code> , <code>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> oam-liveness]</code> , <code>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i> address <i>address</i> multipoint-destination <i>address</i> oam-liveness]</code> , <code>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> oam-liveness]</code> , <code>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i> address <i>address</i> multipoint-destination <i>address</i> oam-liveness]</code>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For ATM encapsulation only, configure Operation, Administration, and Maintenance (OAM) F5 loopback cell count thresholds. This feature is not supported on ATM-over-SHDSL interfaces.</p> <p>For ATM2 IQ PICs only, configure OAM F4 loopback cell count thresholds at the <code>[edit interfaces <i>interface-name</i> atm-options vpi <i>vpi-identifier</i>]</code> hierarchy level.</p>
Options	<p>cells—Minimum number of consecutive OAM F4 or F5 loopback cells lost before a VC is declared down.</p> <p>Range: 1 through 255</p> <p>Default: 5 cells</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Configuring the ATM OAM F5 Loopback Cell Threshold on page 82

dsl-options

Syntax	<pre>dsl-options { loopback local; operating-mode mode; }</pre>
Hierarchy Level	[edit interfaces at- <i>fpc/pic/port</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For J Series Services Routers only, modify the properties of the digital subscriber line for an ATM interface.</p> <p>The statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• ATM-over-ADSL Overview on page 109• <i>Junos OS Interfaces and Routing Configuration Guide</i>

e3-options

Syntax e3-options {
 [atm-encapsulation](#) (direct | plcp);
 bert-algorithm *algorithm*;
 bert-error-rate *rate*;
 bert-period *seconds*;
 [buildout](#) *feet*;
 compatibility-mode (digital-link | kentrox | larscom) <subrate *value*>;
 fcs (16 | 32);
 [framing](#) (g.751 | g.832);
 idle-cycle-flag *value*;
 invert-data;
 [loopback](#) (local | remote);
 ([payload-scrambler](#) | no-[payload-scrambler](#));
 start-end-flag *value*;
 (unframed | no-unframed);
 }

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure E3-specific physical interface properties.

For ATM1 interfaces, you can configure a subset of E3 options statements.

The statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
 interface-control—To add this statement to the configuration.

Related Documentation

- E3 Interfaces Overview
- T3 Interfaces Overview
- [atm-options on page 129](#)

encapsulation

See the following sections:

- [encapsulation \(Logical Interface\) on page 140](#)
- [encapsulation \(Physical Interface\) on page 144](#)

encapsulation (Logical Interface)

Syntax	<code>encapsulation (atm-ccc-cell-relay atm-ccc-vc-mux atm-cisco-nlpid atm-mlppp-llc atm-nlpid atm-ppp-llc atm-ppp-vc-mux atm-snap atm-tcc-snap atm-tcc-vc-mux atm-vc-mux ether-over-atm-llc ether-vpls-over-atm-llc ether-vpls-over-fr ether-vpls-over-ppp ethernet ethernet-vpls ethernet-vpls-fr frame-relay-ccc frame-relay-ether-type frame-relay-ether-type-tcc frame-relay-ppp frame-relay-tcc gre-fragmentation multilink-frame-relay-end-to-end multilink-ppp ppp-over-ether ppp-over-ether-over-atm-llc vlan-bridge vlan-ccc vlan-vci-ccc vlan-tcc vlan-vpls);</code>
Hierarchy Level	<code>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>],</code> <code>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>],</code> <code>[edit interfaces rlsq <i>number</i> unit <i>logical-unit-number</i>]</code>
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 12.1 for PTX Series Packet Transport Switches (vlan-ccc and vlan-tcc options only). Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers. Only the atm-ccc-cell-relay and atm-ccc-vc-mux options are supported on ACX Series routers.
Description	Configure a logical link-layer encapsulation type.
Options	atm-ccc-cell-relay —Use ATM cell-relay encapsulation. atm-ccc-vc-mux —Use ATM virtual circuit (VC) multiplex encapsulation on CCC circuits. When you use this encapsulation type, you can configure the ccc family only. atm-cisco-nlpid —Use Cisco ATM network layer protocol identifier (NLPID) encapsulation. When you use this encapsulation type, you can configure the inet family only. atm-mlppp-llc —For ATM2 IQ interfaces only, use Multilink Point-to-Point (MLPPP) over AAL5 LLC. For this encapsulation type, your router must be equipped with a Link Services or Voice Services PIC. MLPPP over ATM encapsulation is not supported on ATM2 IQ OC48 interfaces. atm-nlpid —Use ATM NLPID encapsulation. When you use this encapsulation type, you can configure the inet family only. atm-ppp-llc —(ATM2 IQ interfaces and MX Series routers with MPC/MIC interfaces using the ATM MIC with SFP only) Use PPP over AAL5 LLC encapsulation. atm-ppp-vc-mux —(ATM2 IQ interfaces and MX Series routers with MPC/MIC interfaces using the ATM MIC with SFP only) Use PPP over ATM AAL5 multiplex encapsulation. atm-snap —(All interfaces including MX Series routers with MPC/MIC interfaces using the ATM MIC with SFP) Use ATM subnetwork attachment point (SNAP) encapsulation. atm-tcc-snap —Use ATM SNAP encapsulation on translational cross-connect (TCC) circuits.

atm-tcc-vc-mux—Use ATM VC multiplex encapsulation on TCC circuits. When you use this encapsulation type, you can configure the **tcc** family only.

atm-vc-mux—(All interfaces including MX Series routers with MPC/MIC interfaces using the ATM MIC with SFP) Use ATM VC multiplex encapsulation. When you use this encapsulation type, you can configure the **inet** family only.

ether-over-atm-llc—(All IP interfaces including MX Series routers with MPC/MIC interfaces using the ATM MIC with SFP) For interfaces that carry IP traffic, use Ethernet over ATM LLC encapsulation. When you use this encapsulation type, you cannot configure multipoint interfaces.

ether-vpls-over-atm-llc—For ATM2 IQ interfaces only, use the Ethernet virtual private LAN service (VPLS) over ATM LLC encapsulation to bridge Ethernet interfaces and ATM interfaces over a VPLS routing instance (as described in RFC 2684, *Multiprotocol Encapsulation over ATM Adaptation Layer 5*). Packets from the ATM interfaces are converted to standard ENET2/802.3 encapsulated Ethernet frames with the frame check sequence (FCS) field removed.

ether-vpls-over-fr—For E1, T1, E3, T3, and SONET interfaces only, use the Ethernet virtual private LAN service (VPLS) over Frame Relay encapsulation to support Bridged Ethernet over Frame Relay encapsulated TDM interfaces for VPLS applications, per RFC 2427, *Multiprotocol Interconnect over Frame Relay*.



NOTE: The SONET/SDH OC3/STM1 (Multi-Rate) MIC with SFP, the Channelized SONET/SDH OC3/STM1 (Multi-Rate) MIC with SFP, and the DS3/E3 MIC do not support Ethernet over Frame Relay encapsulation.

ether-vpls-over-ppp—For E1, T1, E3, T3, and SONET interfaces only, use the Ethernet virtual private LAN service (VPLS) over Point-to-Point Protocol (PPP) encapsulation to support Bridged Ethernet over PPP-encapsulated TDM interfaces for VPLS applications.

ethernet—Use Ethernet II encapsulation (as described in RFC 894, *A Standard for the Transmission of IP Datagrams over Ethernet Networks*).

ethernet-vpls—Use Ethernet VPLS encapsulation on Ethernet interfaces that have VPLS enabled and that must accept packets carrying standard Tag Protocol ID (TPID) values.



NOTE: The built-in Gigabit Ethernet PIC on an M7i router does not support extended VLAN VPLS encapsulation.

ethernet-vpls-fr—Use in a VPLS setup when a CE device is connected to a PE device over a time-division multiplexing (TDM) link. This encapsulation type enables the PE device to terminate the outer layer 2 Frame Relay connection, use the 802.1p bits inside the inner Ethernet header to classify the packets, look at the MAC address from the Ethernet header, and use the MAC address to forward the packet into a given VPLS instance.

frame-relay-ccc—Use Frame Relay encapsulation on CCC circuits. When you use this encapsulation type, you can configure the **ccc** family only.

frame-relay-ether-type—Use Frame Relay ether type encapsulation for compatibility with Cisco Frame Relay. The physical interface must be configured with flexible-frame-relay encapsulation.

frame-relay-ether-type-tcc—Use Frame Relay ether type TCC for Cisco-compatible Frame Relay on TCC circuits to connect different media. The physical interface must be configured with flexible-frame-relay encapsulation.

frame-relay-ppp—Use PPP over Frame Relay circuits. When you use this encapsulation type, you can configure the **ppp** family only. J Series routers do not support frame-relay-ppp encapsulation.

frame-relay-tcc—Use Frame Relay encapsulation on TCC circuits for connecting different media. When you use this encapsulation type, you can configure the **tcc** family only.

gre-fragmentation—For adaptive services interfaces only, use GRE fragmentation encapsulation to enable fragmentation of IPv4 packets in GRE tunnels. This encapsulation clears the do not fragment (DF) bit in the packet header. If the packet's size exceeds the tunnel's maximum transmission unit (MTU) value, the packet is fragmented before encapsulation.

multilink-frame-relay-end-to-end—Use MLFR FRF.15 encapsulation. This encapsulation is used only on multilink, link services, and voice services interfaces and their constituent T1 or E1 interfaces, and is supported on LSQ and redundant LSQ interfaces.

multilink-ppp—Use MLPPP encapsulation. This encapsulation is used only on multilink, link services, and voice services interfaces and their constituent T1 or E1 interfaces.

ppp-over-ether—For underlying Ethernet interfaces on J Series routers, use PPP over Ethernet encapsulation. When you use this encapsulation type, you cannot configure the interface address. Instead, configure the interface address on the PPP interface. You also use PPP over Ethernet encapsulation to configure an underlying Ethernet interface for a dynamic PPPoE logical interface on M120 and M320 routers with Intelligent Queuing 2 (IQ2) PICs, and on MX Series routers with MPCs.

ppp-over-ether-over-atm-llc—(J Series routers and MX Series routers with MPCs using the ATM MIC with SFP only) For underlying ATM interfaces, use PPP over Ethernet over ATM LLC encapsulation. When you use this encapsulation type, you cannot configure the interface address. Instead, configure the interface address on the PPP interface.

vlan-bridge—Use Ethernet VLAN bridge encapsulation on Ethernet interfaces that have IEEE 802.1Q tagging, flexible-ethernet-services, and bridging enabled and that must accept packets carrying TPID 0x8100 or a user-defined TPID.

vlan-ccc—Use Ethernet virtual LAN (VLAN) encapsulation on CCC circuits. When you use this encapsulation type, you can configure the **ccc** family only.

vlan-vci-ccc—Use ATM-to-Ethernet interworking encapsulation on CCC circuits. When you use this encapsulation type, you can configure the **ccc** family only.

vlan-tcc—Use Ethernet VLAN encapsulation on TCC circuits. When you use this encapsulation type, you can configure the **tcc** family only.

vlan-vpls—Use Ethernet VLAN encapsulation on VPLS circuits.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring Layer 2 Switching Cross-Connects Using CCC
- Configuring the Encapsulation for Layer 2 Switching TCCs
- Configuring Interface Encapsulation on Logical Interfaces
- Configuring MPLS LSP Tunnel Cross-Connects Using CCC
- Circuit and Translational Cross-Connects Overview
- Identifying the Access Concentrator
- [Configuring ATM Interface Encapsulation on page 83](#)
- Configuring VLAN Encapsulation
- Configuring Extended VLAN Encapsulation
- Configuring ISDN Logical Interface Properties
- Configuring ATM-to-Ethernet Interworking
- Configuring Interface Encapsulation on PTX Series Packet Transport Switches
- Configuring CCC Encapsulation for Layer 2 VPNs
- Configuring TCC Encapsulation for Layer 2 VPNs and Layer 2 Circuits
- Configuring ATM for Subscriber Access
- Junos Services Interfaces Configuration Release 11.2
- CoS on ATM IMA Pseudowire Interfaces Overview
- Configuring Policing on an ATM IMA Pseudowire

encapsulation (Physical Interface)

Syntax	<code>encapsulation (atm-ccc-cell-relay atm-pvc cisco-hdlc cisco-hdlc-ccc cisco-hdlc-tcc ethernet-bridge ethernet-ccc ethernet-over-atm ethernet-tcc ethernet-vpls ethernet-vpls-fr ether-vpls-over-atm-llc ethernet-vpls-ppp extended-frame-relay-ccc extended-frame-relay-ether-type-tcc extended-frame-relay-tcc extended-vlan-bridge extended-vlan-ccc extended-vlan-tcc extended-vlan-vpls flexible-ethernet-services flexible-frame-relay frame-relay frame-relay-ccc frame-relay-ether-type frame-relay-ether-type-tcc frame-relay-port-ccc frame-relay-tcc generic-services multilink-frame-relay-uni-nni ppp ppp-ccc ppp-tcc vlan-ccc vlan-vci-ccc vlan-vpls);</code>
Hierarchy Level	<code>[edit interfaces <i>interface-name</i>],</code> <code>[edit interfaces rlsq <i>number:number</i>]</code>
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 11.1 for EX Series switches. Statement introduced in Junos OS Release 12.1 for PTX Series Packet Transport Switches (flexible-ethernet-services , ethernet-ccc , and ethernet-tcc options only).
Description	Specify the physical link-layer encapsulation type. Not all encapsulation types are supported on the switches. See the switch CLI.
Default	ppp —Use serial PPP encapsulation.
Options	atm-ccc-cell-relay —Use ATM cell-relay encapsulation. atm-pvc —Use ATM PVC encapsulation. cisco-hdlc —Use Cisco-compatible High-Level Data Link Control (HDLC) framing. cisco-hdlc-ccc —Use Cisco-compatible HDLC framing on CCC circuits. cisco-hdlc-tcc —Use Cisco-compatible HDLC framing on TCC circuits for connecting different media. ethernet-bridge —Use Ethernet bridge encapsulation on Ethernet interfaces that have bridging enabled and that must accept all packets. ethernet-ccc —Use Ethernet CCC encapsulation on Ethernet interfaces that must accept packets carrying standard Tag Protocol ID (TPID) values. For 8-port, 12-port, and 48-port Fast Ethernet PICs, CCC is not supported. ethernet-over-atm —For interfaces that carry IPv4 traffic, use Ethernet over ATM encapsulation. When you use this encapsulation type, you cannot configure multipoint interfaces. As defined in RFC 2684, <i>Multiprotocol Encapsulation over ATM Adaptation Layer 5</i> , this encapsulation type allows ATM interfaces to connect to devices that support only bridge protocol data units (BPDUs). Junos OS does not completely support bridging, but accepts BPDU packets as a default gateway. If you use the router as an edge device, then the router acts as a default gateway. It accepts Ethernet LLC/SNAP frames with IP or ARP in the payload, and drops the rest. For packets destined to the Ethernet LAN, a route lookup is done using the destination

IP address. If the route lookup yields a full address match, the packet is encapsulated with an LLC/SNAP and MAC header, and the packet is forwarded to the ATM interface.

ethernet-tcc—For interfaces that carry IPv4 traffic, use Ethernet TCC encapsulation on interfaces that must accept packets carrying standard TPID values. For 8-port, 12-port, and 48-port Fast Ethernet PICs, TCC is not supported.

ethernet-vpls—Use Ethernet VPLS encapsulation on Ethernet interfaces that have VPLS enabled and that must accept packets carrying standard TPID values. On M Series routers, except the M320 router, the 4-port Fast Ethernet TX PIC and the 1-port, 2-port, and 4-port, 4-slot Gigabit Ethernet PICs can use the Ethernet VPLS encapsulation type.

ethernet-vpls-fr—Use in a VPLS setup when a CE device is connected to a PE device over a time division multiplexing (TDM) link. This encapsulation type enables the PE device to terminate the outer layer 2 Frame Relay connection, use the 802.1p bits inside the inner Ethernet header to classify the packets, look at the MAC address from the Ethernet header, and use the MAC address to forward the packet into a given VPLS instance.

ethernet-vpls-ppp—Use in a VPLS setup when a CE device is connected to a PE device over a time division multiplexing (TDM) link. This encapsulation type enables the PE device to terminate the outer layer 2 PPP connection, use the 802.1p bits inside the inner Ethernet header to classify the packets, look at the MAC address from the Ethernet header, and use it to forward the packet into a given VPLS instance.

ether-vpls-over-atm-llc—For ATM intelligent queuing (IQ) interfaces only, use the Ethernet virtual private LAN service (VPLS) over ATM LLC encapsulation to bridge Ethernet interfaces and ATM interfaces over a VPLS routing instance (as described in RFC 2684, *Multiprotocol Encapsulation over ATM Adaptation Layer 5*). Packets from the ATM interfaces are converted to standard ENET2/802.3 encapsulated Ethernet frames with the frame check sequence (FCS) field removed.

extended-frame-relay-ccc—Use Frame Relay encapsulation on CCC circuits. This encapsulation type allows you to dedicate DLCIs 1 through 1022 to CCC.

extended-frame-relay-ether-type-tcc—Use extended Frame Relay ether type TCC for Cisco-compatible Frame Relay for DLCIs 1 through 1022. This encapsulation type is used for circuits with different media on either side of the connection.

extended-frame-relay-tcc—Use Frame Relay encapsulation on TCC circuits to connect different media. This encapsulation type allows you to dedicate DLCIs 1 through 1022 to TCC.

extended-vlan-bridge—Use extended VLAN bridge encapsulation on Ethernet interfaces that have IEEE 802.1Q VLAN tagging and bridging enabled and that must accept packets carrying TPID 0x8100 or a user-defined TPID.

extended-vlan-ccc—Use extended VLAN encapsulation on CCC circuits with Gigabit Ethernet and 4-port Fast Ethernet interfaces that must accept packets carrying 802.1Q values. For 8-port, 12-port, and 48-port Fast Ethernet PICs, extended VLAN CCC is not supported. For 4-port Gigabit Ethernet PICs, extended VLAN CCC is not supported.

extended-vlan-tcc—For interfaces that carry IPv4 traffic, use extended VLAN encapsulation on TCC circuits with Gigabit Ethernet interfaces on which you want to use 802.1Q tagging. For 4-port Gigabit Ethernet PICs, extended VLAN TCC is not supported.

extended-vlan-vpls—Use extended VLAN VPLS encapsulation on Ethernet interfaces that have VLAN 802.1Q tagging and VPLS enabled and that must accept packets carrying TPIDs 0x8100, 0x9100, and 0x9901. On M Series routers, except the M320 router, the 4-port Fast Ethernet TX PIC and the 1-port, 2-port, and 4-port, 4-slot Gigabit Ethernet PICs can use the Ethernet VPLS encapsulation type.



NOTE: The built-in Gigabit Ethernet PIC on an M7i router does not support extended VLAN VPLS encapsulation.

flexible-ethernet-services—For Gigabit Ethernet IQ interfaces and Gigabit Ethernet PICs with small form-factor pluggable transceivers (SFPs) (except the 10-port Gigabit Ethernet PIC and the built-in Gigabit Ethernet port on the M7i router), use flexible Ethernet services encapsulation when you want to configure multiple per-unit Ethernet encapsulations. Aggregated Ethernet bundles can use this encapsulation type. This encapsulation type allows you to configure any combination of route, TCC, CCC, Layer 2 virtual private networks (VPNs), and VPLS encapsulations on a single physical port. If you configure flexible Ethernet services encapsulation on the physical interface, VLAN IDs from 1 through 511 are no longer reserved for normal VLANs.

flexible-frame-relay—For IQ interfaces only, use flexible Frame Relay encapsulation when you want to configure multiple per-unit Frame Relay encapsulations. This encapsulation type allows you to configure any combination of TCC, CCC, and standard Frame Relay encapsulations on a single physical port. Also, each logical interface can have any DLCI value from 1 through 1022.

frame-relay—Use Frame Relay encapsulation.

frame-relay-ccc—Use Frame Relay encapsulation on CCC circuits.

frame-relay-ether-type—Use Frame Relay ether type encapsulation for compatibility with the Cisco Frame Relay.

frame-relay-ether-type-tcc—Use Frame Relay ether type TCC for Cisco-compatible Frame Relay on TCC circuits to connect different media.

frame-relay-port-ccc—Use Frame Relay port CCC encapsulation to transparently carry all the DLCIs between two customer edge (CE) routers without explicitly configuring each DLCI on the two provider edge (PE) routers with Frame Relay transport. When you use this encapsulation type, you can configure the **ccc** family only.

frame-relay-tcc—Use Frame Relay encapsulation on TCC circuits to connect different media.

generic-services—Use generic services encapsulation for services with a hierarchical scheduler.

multilink-frame-relay-uni-nni—Use MLFR UNI NNI encapsulation. This encapsulation is used on link services, voice services interfaces functioning as FRF.16 bundles, and their constituent T1 or E1 interfaces, and is supported on LSQ and redundant LSQ interfaces.

ppp—Use serial PPP encapsulation.

ppp-ccc—Use serial PPP encapsulation on CCC circuits. When you use this encapsulation type, you can configure the **ccc** family only.

ppp-tcc—Use serial PPP encapsulation on TCC circuits for connecting different media. When you use this encapsulation type, you can configure the **tcc** family only.

vlan-ccc—Use Ethernet VLAN encapsulation on CCC circuits.

vlan-vci-ccc—Use ATM-to-Ethernet interworking encapsulation on CCC circuits. When you use this encapsulation type, you can configure the **ccc** family only. All logical interfaces configured on the Ethernet interface must also have the encapsulation type set to **vlan-vci-ccc**.

vlan-vpls—Use VLAN VPLS encapsulation on Ethernet interfaces with VLAN tagging and VPLS enabled. Interfaces with VLAN VPLS encapsulation accept packets carrying standard TPID values only. On M Series routers, except the M320 router, the 4-port Fast Ethernet TX PIC and the 1-port, 2-port, and 4-port, 4-slot Gigabit Ethernet PICs can use the Ethernet VPLS encapsulation type.



NOTE: Label-switched interfaces (LSIs) do not support VLAN VPLS encapsulation. Therefore, you can only use VLAN VPLS encapsulation on a PE-router-to-CE-router interface and not a core-facing interface.

Required Privilege Level	interface —To view this statement in the configuration. interface-control —To add this statement to the configuration.
---------------------------------	---

**Related
Documentation**

- Configuring Interface Encapsulation on Physical Interfaces
- Configuring CCC Encapsulation for Layer 2 VPNs
- Configuring Layer 2 Switching Cross-Connects Using CCC
- Configuring TCC Encapsulation for Layer 2 VPNs and Layer 2 Circuits
- [Configuring ATM Interface Encapsulation on page 83](#)
- Configuring ATM-to-Ethernet Interworking
- Configuring VLAN Encapsulation
- Configuring Extended VLAN Encapsulation
- Configuring Encapsulation for Layer 2 Wholesale VLAN Interfaces
- Configuring Interfaces for Layer 2 Circuits
- Configuring Interface Encapsulation on PTX Series Packet Transport Switches
- Configuring an MPLS-Based Layer 2 VPN (CLI Procedure)
- Configuring MPLS LSP Tunnel Cross-Connects Using CCC
- Configuring TCC
- Configuring VPLS Interface Encapsulation
- Configuring Interfaces for VPLS Routing
- Defining the Encapsulation for Switching Cross-Connects
- Understanding Encapsulation on an Interface

epd-threshold

See the following sections:

- [epd-threshold \(Logical Interface\) on page 149](#)
- [epd-threshold \(Physical Interface\) on page 150](#)

epd-threshold (Logical Interface)

Syntax	<code>epd-threshold cells plp1 cells;</code>
Hierarchy Level	<p>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> address <i>address</i> family <i>family</i> multipoint-destination <i>address</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> address <i>address</i> family <i>family</i> multipoint-destination <i>address</i>]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 11.1 for the QFX Series.</p>
Description	<p>For ATM2 IQ interfaces only, define the early packet discard (EPD) threshold on a VC. The EPD threshold is a limit on the number of transmit packets that can be queued. Packets that exceed the limit are discarded. For interfaces configured in trunk mode, you can also configure dual EPD thresholds depending on the packet loss priorities (PLPs).</p>
Default	<p>Approximately 1 percent of the available cell buffers. If shaping is enabled, the default EPD threshold is proportional to the shaping rate according to the following formula:</p> $\text{default epd-threshold} = \text{number of buffers} * \text{shaping rate} / \text{line rate}$ <p>The minimum EPD threshold value is 48 cells. If the default EPD threshold formula results in an EPD threshold of less than 48 cells, the result will be ignored, and the minimum value of 48 cells will be used.</p>
Options	<p>cells—Maximum number of cells.</p> <p>Range: For 1-port and 2-port OC12 interfaces, 48 through 425,984 cells</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring the ATM2 IQ EPD Threshold on page 79 • Configuring Two EPD Thresholds per Queue on page 81

epd-threshold (Physical Interface)

Syntax	<code>epd-threshold cells plp1 cells;</code>
Hierarchy Level	[edit interfaces at- <i>fpc/pic/port</i> atm-options scheduler-maps <i>map-name</i> forwarding-class <i>class-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM2 IQ interfaces only, define the EPD threshold on a VC. The EPD threshold is a limit on the number of transmit packets that can be queued. Packets that exceed the limit are discarded.
Default	If you do not include either the epd-threshold or the linear-red-profile statement in the forwarding class configuration, the Junos OS uses an EPD threshold based on the available bandwidth and other parameters.
Options	cells —Maximum number of cells. Range: For 1-port and 2-port OC12 interfaces, 48 through 425,984 cells. For 1-port OC48 interfaces, 48 through 425,984 cells. For 2-port OC3, DS3, and E3 interfaces, 48 through 212,992 cells. For 4-port DS3 and E3 interfaces, 48 through 106,496 cells. The plp1 statement is explained separately.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring an ATM Scheduler Map on page 94• linear-red-profile on page 164

family

```

Syntax  family family {
        accounting {
            destination-class-usage;
            source-class-usage {
                (input | output | input output);
            }
        }
        access-concentrator name;
        address address {
            ... the address subhierarchy appears after the main [edit interfaces interface-name unit
                logical-unit-number family family-name] hierarchy ...
        }
        bridge-domain-type (bvlan | svlan);
        bundle interface-name;
        core-facing;
        demux-destination {
            destination-prefix;
        }
        demux-source {
            source-prefix;
        }
        duplicate-protection;
        dynamic-profile profile-name;
        filter {
            group filter-group-number;
            input filter-name;
            input-list [ filter-names ];
            output filter-name;
            output-list [ filter-names ];
        }
        interface-mode (access | trunk);
        ipsec-sa sa-name;
        isid-list all-service-groups;
        keep-address-and-control;
        mac-validate (loose | strict);
        max-sessions number;
        max-sessions-vsa-ignore;
        mtu bytes;
        multicast-only;
        negotiate-address;
        no-redirects;
        policer {
            arp policer-template-name;
            input policer-template-name;
            output policer-template-name;
        }
        primary;
        protocols [inet iso mpls];
        proxy inet-address address;
        receive-options-packets;
        receive-ttl-exceeded;
        remote (inet-address address | mac-address address);

```

```

rpf-check {
    fail-filter filter-name
    mode loose;
}
sampling {
    input;
    output;
}
service {
    input {
        post-service-filter filter-name;
        service-set service-set-name <service-filter filter-name>;
    }
    output {
        service-set service-set-name <service-filter filter-name>;
    }
}
service-name-table table-name
short-cycle-protection <lockout-time-min minimum-seconds lockout-time-max
    maximum-seconds>;
(translate-discard-eligible | no-translate-discard-eligible);
(translate-fecn-and-becn | no-translate-fecn-and-becn);
translate-plp-control-word-de;
unnumbered-address interface-name destination address destination-profile profile-name;
vlan-id number;
vlan-id-list [number number-number];
address address {
    arp ip-address (mac | multicast-mac) mac-address <publish>;
    broadcast address;
    destination address;
    destination-profile name;
    eui-64;
    master-only;
    multipoint-destination address dlc dlci-identifier;
    multipoint-destination address {
        epd-threshold cells;
        inverse-arp;
        oam-liveness {
            up-count cells;
            down-count cells;
        }
        oam-period (disable | seconds);
        shaping {
            (cbr rate | rtvbr burst length peak rate sustained rate | vbr burst length peak rate
                sustained rate);
            queue-length number;
        }
        vci vpi-identifier.vci-identifier;
    }
    preferred;
    primary;
    vrrp-group group-id {
        (accept-data | no-accept-data);
        advertise-interval seconds;
        authentication-key key;
        authentication-type authentication;
    }
}

```

```

fast-interval milliseconds;
(preempt | no-preempt) {
    hold-time seconds;
}
priority number;
track {
    interface interface-name {
        bandwidth-threshold bits-per-second priority-cost priority;
        priority-cost priority;
    }
    priority-hold-time seconds;
    route prefix routing-instance instance-name priority-cost priority;
}
}
virtual-address [ addresses ];
}
virtual-link-local-address ipv6-address;
}
}

```

Hierarchy Level [edit interfaces *interface-name* *unit* *logical-unit-number*],
[edit logical-systems *logical-system-name* interfaces *interface-name* *unit* *logical-unit-number*]

Release Information Statement introduced before Junos OS Release 7.4.
Option **max-sessions-vs-a-ignore** introduced in Junos OS Release 11.4.

Description Configure protocol family information for the logical interface.



NOTE: Not all subordinate stanzas are available to every protocol family.

Options *family*—Protocol family:

- **any**—Protocol-independent family used for Layer 2 packet filtering



NOTE: This option is not supported on T4000 Type 5 FPCs.

- **bridge**—(M Series and T Series routers only) Configure only when the physical interface is configured with **ethernet-bridge** type encapsulation or when the logical interface is configured with **vlan-bridge** type encapsulation
- **ccc**—Circuit cross-connect protocol suite
- **inet**—Internet Protocol version 4 suite
- **inet6**—Internet Protocol version 6 suite
- **iso**—International Organization for Standardization Open Systems Interconnection (ISO OSI) protocol suite
- **mlfr-end-to-end**—Multilink Frame Relay FRF.15
- **mlfr-uni-nni**—Multilink Frame Relay FRF.16
- **multilink-ppp**—Multilink Point-to-Point Protocol
- **mpls**—Multiprotocol Label Switching (MPLS)
- **pppoe**—Point-to-Point Protocol over Ethernet
- **tcc**—Translational cross-connect protocol suite
- **tnp**—Trivial Network Protocol
- **vpls**—(M Series and T Series routers only) Virtual private LAN service


The remaining statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
 interface-control—To add this statement to the configuration.

Related Documentation

- Configuring the Protocol Family
- Example: Configuring E-LINE and E-LAN Services for a PBB Network on MX Series Routers
- Junos Services Interfaces Configuration Release 11.2

fast-aps-switch

Syntax	fast-aps-switch;
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options aps]
Release Information	Statement introduced in Junos OS Release 12.1.
Description	(M320 routers with Channelized OC3/STM1 Circuit Emulation PIC with SFP only) Reduce the Automatic Protection Switching (APS) switchover time in Layer 2 circuits.
	<div>  <p>NOTE:</p> <ul style="list-style-type: none"> Configuring this statement reduces the APS switchover time only when the Layer 2 circuit encapsulation type for the interface receiving traffic from a Layer 2 circuit neighbor is SAToP. When the fast-aps-switch statement is configured in revertive APS mode, you must configure an appropriate value for revert time to achieve reduction in APS switchover time. To prevent the logical interfaces in the data path from being shut down, configure appropriate hold-time values on all the interfaces in the data path that support TDM. The fast-aps-switch statement cannot be configured when the APS annex-b option is configured. The interfaces that have the fast-aps-switch statement configured cannot be used in virtual private LAN service (VPLS) environments. </div>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Reducing APS Switchover Time in Layer 2 Circuits


force

Syntax	<code>force (protect working);</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options aps]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Perform a forced switch between the protect and working circuits. This statement is honored only if there are no higher-priority reasons to switch. It can be overridden by a signal failure on the protect circuit, thus causing a switch to the working circuit.
Options	protect —Request the circuit to become the protect circuit. working —Request the circuit to become the working circuit.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring Switching Between the Working and Protect Circuitsrequest on page 186

forwarding-class (ATM2 IQ Scheduler Maps)

Syntax	<pre>forwarding-class <i>class-name</i> { epd-threshold <i>cells plp1 cells</i>; linear-red-profile <i>profile-name</i>; priority (high low); transmit-weight (<i>cells number</i> percent <i>number</i>); }</pre>
Hierarchy Level	[edit interfaces <i>at-fpc/pic/port</i> atm-options scheduler-maps <i>map-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM2 IQ interfaces only, define forwarding class name and option values.
Options	class-name —Name of forwarding class. The statements are explained separately.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring ATM2 IQ VC Tunnel CoS Components on page 92Configuring Scheduler Maps on ATM Interfaces

framing (E1, E3, and T1 Interfaces)

Syntax	framing (g704 g704-no-crc4 g.751 g.832 unframed sf esf);
Hierarchy Level	[edit interfaces ce1- <i>fpc/pic/port</i>], [edit interfaces ct1- <i>fpc/pic/port</i>], [edit interfaces at- <i>fpc/pic/port</i> e3-options], [edit interfaces e1- <i>fpc/pic/port</i> e1-options], [edit interfaces t1- <i>fpc/pic/port</i> t1-options]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.
Description	Configure the framing format.
	<div>  <p>NOTE: When configuring CE1 or CT1 interfaces on 10-port Channelized E1/T1 IQE PICs, the framing statement must be included at the [edit interfaces ce1-<i>fpc/pic/port</i>] or [edit interfaces ct1-<i>fpc/pic/port</i>] hierarchy level as appropriate.</p> </div>
Default	esf for T1 interfaces; g704 for E1 interfaces. There is no default value for E3 over ATM interfaces.
Options	<p>esf—Extended superframe (ESF) mode for T1 interfaces.</p> <p>g704—G.704 framing format for E1 interfaces.</p> <p>g704-no-crc4—G.704 framing with no cyclic redundancy check 4 (CRC4) for E1 interfaces.</p> <p>g.751—G.751 framing format for E3 over ATM interfaces.</p> <p>g.832—G.832 framing format for E3 over ATM interfaces.</p> <p>sf—Superframe (SF) mode for T1 interfaces.</p> <p>unframed—Unframed mode for E1 interfaces.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring E1 Framing Configuring E3 and T3 Parameters on ATM Interfaces on page 90 Configuring T1 Framing

high-plp-max-threshold

Syntax	<code>high-plp-max-threshold <i>percent</i>;</code>
Hierarchy Level	[edit interfaces at- <i>fpc/pic/port</i> atm-options linear-red-profiles <i>profile-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM2 IQ interfaces only, define the drop profile fill-level for the high PLP CoS VC. When the fill level exceeds the defined percentage, all packets are dropped.
Options	<i>percent</i> —Fill-level percentage when linear random early discard (RED) is applied to cells with PLP.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring ATM2 IQ VC Tunnel CoS Components on page 92• low-plp-max-threshold on page 167• low-plp-threshold on page 168• queue-depth on page 184

high-plp-threshold

Syntax	<code>high-plp-threshold <i>percent</i>;</code>
Hierarchy Level	[edit interfaces at- <i>fpc/pic/port</i> atm-options linear-red-profiles <i>profile-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM2 IQ interfaces only, define CoS VC drop profile fill-level percentage when linear RED is applied to cells with high PLP. When the fill level exceeds the defined percentage, packets with high PLP are randomly dropped by RED. This statement is mandatory.
Options	<i>percent</i> —Fill-level percentage when linear RED is applied to cells with PLP.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring ATM2 IQ VC Tunnel CoS Components on page 92• high-plp-max-threshold on page 158• low-plp-max-threshold on page 167• low-plp-threshold on page 168• queue-depth on page 184

hold-time

See the following sections:

- [hold-time \(APS\) on page 159](#)
- [hold-time \(SONET/SDH Defect Triggers\) on page 160](#)



NOTE: For information about the hold-time statement at the [edit interfaces *interface-name* unit *logical-unit-number* **family** (inet | inet6) address *address* (vrrp-group | vrrp-inet6-group) *group-number* preempt] and [edit logical-systems *logical-system-name* interface *interface-name* unit *logical-unit-number* **family** (inet | inet6) address *address* (vrrp-group | vrrp-inet6-group) *group-number* preempt], see the Junos OS High Availability Configuration Guide.

hold-time (APS)

Syntax	hold-time <i>milliseconds</i> ;
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options aps]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Hold-time value to use to determine whether a neighbor APS router is operational.
Options	<i>milliseconds</i> —Hold-time value. Range: 1 through 65,534 milliseconds Default: 3000 milliseconds (3 times the advertisement interval)
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring APS Timers • advertise-interval on page 125

hold-time (SONET/SDH Defect Triggers)

Syntax	hold-time up <i>milliseconds</i> down <i>milliseconds</i> ;
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options trigger defect]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM over SONET/SDH and SONET/SDH interfaces only, apply up and down hold times to SONET/SDH defect triggers. When you apply a down hold time to a defect, the defect must remain present for at least the hold-time period before the interface is marked down. When you apply an up hold time to a defect, the defect must remain absent for at least the hold-time period before the interface is marked up, assuming no other defect is outstanding.



NOTE:

- When up or down hold times are applied to SONET defect triggers of a 10-Gigabit Ethernet WAN-PHY interface, only the defects generated in the WAN Interface Sublayer (WIS) are damped. Therefore, if the hold times are applied to SONET defect triggers only, a 10-Gigabit Ethernet WAN-PHY interface might be marked up or down because of the faults that are generated in other layers, such as the Physical Coding Sublayer (PCS) or Physical Medium Attachment Sublayer (PMA), 10 Gigabit Media Independent Interface (XGMII) Extender Sublayer (XGXS), and Media Access Control (MAC). To damp the interface up or down events of a 10-Gigabit Ethernet WAN-PHY interface, you need to apply up or down hold-times for the interface at the [edit interfaces *interface-name*] hierarchy level.
 - On M Series and T Series platforms with Channelized SONET IQ PICs and Channelized SONET IQE PICs, the SONET defect alarm trigger hold-time statement is not supported.
-

Default If you do not include this statement, when a defect is detected the interface is marked down immediately, and when the defect becomes absent the interface is marked up immediately.

Options **down *milliseconds***—Hold time to wait before the interface is marked down.

Range: 1 through 65,534 milliseconds

Default: No hold time

up *milliseconds*—Hold time to wait before the interface is marked up.

Range: 1 through 65,534 milliseconds

Default: No hold time

Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring SONET/SDH Defect Triggers• hold-time (Physical Interface)

ilmi

Syntax	ilmi;
Hierarchy Level	[edit interfaces at- <i>fpc/pic/port</i> atm-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Enable the router to communicate with directly attached ATM switches and routers. The router uses the VC 0.16 to communicate with the ATM switch or router. Once configured, you can display the IP address and port number of an ATM switch or router using the show interfaces <i>interface-name</i> switch-id command.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Communication with Directly Attached ATM Switches and Routers on page 39• show ilmi• show ilmi statistics

inverse-arp

Syntax	inverse-arp;
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet address <i>address</i> multipoint-destination <i>destination</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet address <i>address</i> multipoint-destination <i>destination</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 11.1 for the QFX Series.
Description	For ATM encapsulation, enable responses to receive inverse ATM ARP requests. For Frame Relay encapsulation, enable responses to receive inverse Frame Relay ARP requests.
Default	Inverse ARP is disabled on all ATM and Frame Relay interfaces.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Inverse ATM1 or ATM2 ARP on page 72• Configuring Inverse Frame Relay ARP

line-rate

Syntax	<code>line-rate <i>line-rate</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> shdsl-options], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> shdsl-options]
Release Information	Statement introduced in Junos OS Release 7.4.
Description	For J Series Services Routers only, configure the SHDSL line rate.
Options	<p><i>line-rate</i>—SHDSL line rate, in Kbps. Possible values are:</p> <p>2-wire (Kbps): 192, 256, 320, 384, 448, 512, 576, 640, 704, 768, 832, 896, 960, 1024, 1088, 1152, 1216, 1280, 1344, 1408, 1472, 1536, 1600, 1664, 1728, 1792, 1856, 1920, 1984, 2048, 2112, 2176, 2240, 2304, auto</p> <p>4-wire (Kbps): 384, 512, 640, 768, 896, 1024, 1152, 1280, 1408, 1536, 1664, 1792, 1920, 2048, 2176, 2304, 2432, 2560, 2688, 2816, 2944, 3072, 3200, 3328, 3456, 3584, 3712, 3840, 3968, 4096, 4224, 4352, 4480, 4608</p> <p>Default: For 2-wire mode, auto; for 4-wire mode, 4608 Kbps</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • ATM-over-SHDSL Overview on page 115

linear-red-profile

Syntax	<code>linear-red-profile <i>profile-name</i>;</code>
Hierarchy Level	[edit interfaces at- <i>fpc/pic/port</i> atm-options scheduler-maps <i>map-name</i> forwarding-class <i>class-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM2 IQ interfaces only, assign a linear RED profile to a specified forwarding class. To define the linear RED profiles, include the linear-red-profiles statement at the [edit interfaces at- <i>fpc/pic/port</i> atm-options] hierarchy level.
Default	If you do not include either the epd-threshold or the linear-red-profile statement in the forwarding class configuration, the Junos OS uses an EPD threshold based on the available bandwidth and other parameters.
Options	<i>profile-name</i> —Name of the linear RED profile.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring an ATM Scheduler Map on page 94• linear-red-profiles on page 165• Configuring Scheduler Maps on ATM Interfaces• epd-threshold

linear-red-profiles

Syntax	linear-red-profiles <i>profile-name</i> { high-plp-threshold <i>percent</i> ; low-plp-threshold <i>percent</i> ; queue-depth <i>cells</i> ; }
Hierarchy Level	[edit interfaces <i>at-fpc/pic/port</i> atm-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM2 IQ interfaces only, define CoS virtual circuit drop profiles for RED. When a packet arrives, RED checks the queue fill level. If the fill level corresponds to a nonzero drop probability, the RED algorithm determines whether to drop the arriving packet.
Options	<i>profile-name</i> —Name of the drop profile. The statements are explained separately.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring ATM2 IQ VC Tunnel CoS Components on page 92 • Configuring Linear RED Profiles on ATM Interfaces

lockout

Syntax	lockout;
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options aps]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure a lockout of protection, forcing the use of the working circuit and locking out the protect circuit regardless of anything else.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring Switching Between the Working and Protect Circuits

loopback (ADSL, DS0, E1/E3, SONET/SDH, SHDSL, and T1/T3)

Syntax	<code>loopback (local payload remote);</code>
Hierarchy Level	<code>[edit interfaces ce1-<i>fpc/pic/port</i>],</code> <code>[edit interfaces ct1-<i>fpc/pic/port</i>],</code> <code>[edit interfaces t1-<i>fpc/pic/port</i>],</code> <code>[edit interfaces <i>interface-name</i> ds0-options],</code> <code>[edit interfaces <i>interface-name</i> dsl-options],</code> <code>[edit interfaces <i>interface-name</i> e1-options],</code> <code>[edit interfaces <i>interface-name</i> e3-options],</code> <code>[edit interfaces <i>interface-name</i> shdsl-options],</code> <code>[edit interfaces <i>interface-name</i> sonet-options],</code> <code>[edit interfaces <i>interface-name</i> t1-options],</code> <code>[edit interfaces <i>interface-name</i> t3-options]</code>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.</p>
Description	Configure a loopback connection. To turn off the loopback capability, remove the loopback statement from the configuration.



NOTE: When configuring CE1 or CT1 interfaces on 10-port Channelized E1/T1 IQE PICs, the **loopback** statement must be included with the **local** or **remote** option at the `[edit interfaces ce1-fpc/pic/port]` or `[edit interfaces ct1-fpc/pic/port]` hierarchy level as appropriate.

When configuring T1 interfaces on 10-port Channelized E1/T1 IQE PICs, the **loopback** statement must be included with the **payload** option at the `[edit interfaces t1-fpc/pic/port]` hierarchy level.



NOTE: When configuring CE1 or CT1 interfaces on the 16-port Channelized E1/T1 MIC (MIC-3D-16CHE1-T1-CE), you must include the **loopback** statement at the `[edit interfaces ce1-fpc/pic/port]` hierarchy level, or `[edit interfaces ct1-fpc/pic/port]`

To configure loopback on channelized IQ and IQE PICs, SONET/SDH level, use the **sonet-options loopback** statement **local** and **remote** options at the controller interface (`coc48`, `cstm16`, `coc12`, `cstm4`, `coc3`, `cstm1`). It is ignored for path-level interfaces `so-fpc/pic/port` or `so-fpc/pic/port:channel`.

Options **local**—Loop packets, including both data and timing information, back on the local router's PIC. NxDS0 IQ interfaces do not support local loopback.

payload—For channelized T3, T1, and NxDSO IQ interfaces only, loop back data only (without clocking information) on the remote router's PIC. With payload loopback, overhead is recalculated. Neither ATM-over-asymmetrical digital subscriber line (ADSL) interfaces nor ATM-over-SHDSL interfaces support payload loopback.

remote—Loop packets, including both data and timing information, back on the remote router's interface card. NxDSO IQ interfaces do not support remote loopback.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- [Configuring E3 and T3 Parameters on ATM Interfaces on page 90](#)
- Configuring E1 Loopback Capability
- Configuring E3 Loopback Capability
- Configuring SONET/SDH Loopback Capability
- [Configuring SHDSL Operating Mode on an ATM Physical Interface on page 118](#)
- Configuring T1 Loopback Capability
- Configuring T3 Loopback Capability
- feac-loop-respond

low-plp-max-threshold

Syntax low-plp-max-threshold *percent*;

Hierarchy Level [edit interfaces at-*fpc/pic/port* [atm-options](#) [linear-red-profiles](#) *profile-name*]

Release Information Statement introduced before Junos OS Release 7.4.

Description For ATM2 IQ interfaces only, define the drop profile fill-level for the low PLP CoS VC. When the fill level exceeds the defined percentage, all packets are dropped.

Options *percent*—Fill-level percentage when linear RED is applied to cells with PLP.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- [Configuring ATM2 IQ VC Tunnel CoS Components on page 92](#)
- [high-plp-max-threshold on page 158](#)
- [low-plp-threshold on page 168](#)
- Configuring Linear RED Profiles on ATM Interfaces
- high-plp-max-threshold
- [queue-depth on page 184](#)

low-plp-threshold

Syntax	<code>low-plp-threshold <i>percent</i>;</code>
Hierarchy Level	[edit interfaces at- <i>fpc/pic/port</i> atm-options linear-red-profiles <i>profile-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM2 IQ interfaces only, define the CoS VC drop profile fill-level percentage when linear RED is applied to cells with low PLP. When the fill level exceeds the defined percentage, packets with low PLP are randomly dropped by RED. This statement is mandatory.
Options	<i>percent</i> —Fill-level percentage when linear RED is applied to cells with low PLP.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring ATM2 IQ VC Tunnel CoS Components on page 92• high-plp-max-threshold on page 158• high-plp-threshold on page 158• Configuring Linear RED Profiles on ATM Interfaces• high-plp-max-threshold• high-plp-threshold• low-plp-max-threshold on page 167• queue-depth on page 184

maximum-vcs

Syntax	<code>maximum-vcs <i>maximum-vcs</i>;</code>
Hierarchy Level	[edit interfaces at- <i>fpc/pic/port</i> atm-options vpi <i>vpi-identifier</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For ATM1 interfaces, configure the maximum number of virtual circuits (VCs) allowed on a virtual path (VP). When configuring ATM1 interfaces on the router, you must include this statement.</p> <p>For a configured virtual path identifier (VPI), valid virtual channel identifier (VCI) numbers are from 0 through (<i>maximum-vcs</i> value – 1). VCI numbers 0 through 31 are reserved by the ATM Forum. It is recommended that you use a VCI number higher than 31 when connecting to an ATM switch.</p>
Options	<p><i>maximum-vcs</i>—Maximum number of VCs on the VP.</p> <p>Range: 1 through 4090</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Configuring the Maximum Number of ATM1 VCs on a VP on page 48• multipoint-destination on page 172• promiscuous-mode on page 183• vci on page 212

mpls (Interfaces)

Syntax	<pre>mpls { pop-all-labels { required-depth <i>number</i>; } }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> atm-options], [edit interfaces <i>interface-name</i> sonet-options], [edit interfaces <i>interface-name</i> fastether-options], [edit interfaces <i>interface-name</i> gigheter-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For passive monitoring on ATM and SONET/SDH interfaces and 10-Gigabit Ethernet interfaces in WAN PHY mode, process incoming IP packets that have MPLS labels.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Removing MPLS Labels from Incoming Packets on page 42• Removing MPLS Labels from Incoming Packet• Junos Services Interfaces Configuration Release 11.2

multicast-vci

Syntax	<code>multicast-vci <i>vpi-identifier.vci-identifier</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM encapsulation only, and for point-to-multipoint ATM logical interfaces only, enable the support of multicast on the interface. You can configure multicast support on the interface if the ATM switch performs multicast replication.
Options	<p><i>vci-identifier</i>—ATM virtual circuit identifier.</p> <p>Range: 0 through 16,384</p> <p><i>vpi-identifier</i>—ATM virtual path identifier.</p> <p>Range: 0 through 255</p> <p>Default: 0</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring a Multicast-Capable ATM1 or ATM2 IQ Connection on page 71 • multipoint-destination on page 172 • vci on page 212

multipoint-destination

Syntax	<pre> multipoint-destination address dlcid dlcid-identifier; multipoint-destination address { epd-threshold cells; inverse-arp; oam-liveness { down-count cells; up-count cells; } oam-period (disable seconds); shaping { (cbr rate rtvbr peak rate sustained rate burst length vbr peak rate sustained rate burst length); queue-length number; } vci vpi-identifier.vci-identifier; } </pre>
Hierarchy Level	<p>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i> address <i>address</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i> address <i>address</i>]</p>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For point-to-multipoint Frame Relay or ATM interfaces only, enable the support of multicast on the interface. You can configure multicast support on the interface if the Frame Relay or ATM switch performs multicast replication.
Options	<p>address—Address of the remote side of the point-to-multipoint connection.</p> <p>dlcid-identifier—For Frame Relay interfaces, the data-link connection identifier. Range: 0 through 0xFFFFFFF (24 bits)</p> <p>vci-identifier—For ATM interfaces, the virtual circuit identifier. Range: 0 through 16,384</p> <p>vpi-identifier—For ATM interfaces, the virtual path identifier. Range: 0 through 255 Default: 0</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring a Point-to-Point ATM1 or ATM2 IQ Connection on page 70 • Configuring a Point-to-Multipoint Frame Relay Connection • dlci • encapsulation (Logical Interface) on page 140

neighbor (Automatic Protection Switching for SONET/SDH)

Syntax	<code>neighbor <i>address</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options aps]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>If you are configuring one router to be the working router and a second to be the protect router, configure the address of the remote interface. You configure this on one or both of the interfaces.</p> <p>The address you specify for the neighbor must never be routed through the interface on which APS is configured, or instability will result. We strongly recommend that you directly connect the working and protect routers and that you configure the interface address of this shared network as the neighbor address.</p>
Options	<i>address</i> —Neighbor's address.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring Basic Automatic Protect Switching

oam-liveness

Syntax	<pre>oam-liveness { down-count cells; up-count cells; }</pre>
Hierarchy Level	<pre>[edit interfaces <i>interface-name</i> atm-options vpi <i>vpi-identifier</i>], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i> address <i>address</i> multipoint-destination <i>address</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i> address <i>address</i> multipoint-destination <i>address</i>]</pre>
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 11.1 for the QFX Series.
Description	<p>For ATM encapsulation only, configure Operation, Administration, and Maintenance (OAM) F5 loopback cell count thresholds. Not supported on ATM-over-SHDSL interfaces.</p> <p>For ATM2 IQ PICs only, configure OAM F4 loopback cell count thresholds at the [edit interfaces <i>interface-name</i> atm-options vpi <i>vpi-identifier</i>] hierarchy level.</p>
Options	<p>down-count cells—Minimum number of consecutive OAM F4 or F5 loopback cells lost before a VC is declared down. Range: 1 through 255 Default: 5 cells</p> <p>up-count cells—Minimum number of consecutive OAM F4 or F5 loopback cells received before a VC is declared up. Range: 1 through 255 Default: 5 cells</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring the ATM OAM F5 Loopback Cell Threshold on page 82

oam-period

Syntax	<code>oam-period (disable seconds);</code>
Hierarchy Level	<p>[edit interfaces <i>interface-name</i> atm-options vpi <i>vpi-identifier</i>], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i> address <i>address</i> multipoint-destination <i>address</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i> address <i>address</i> multipoint-destination <i>address</i>]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 11.1 for the QFX Series.</p>
Description	<p>For ATM encapsulation only, configure the OAM F5 loopback cell period. Not supported on ATM-over-SHDSL interfaces.</p> <p>For ATM2 IQ PICs only, configure the OAM F4 loopback cell period at the [edit interfaces <i>interface-name</i> atm-options vpi <i>vpi-identifier</i>] hierarchy level.</p>
Default	If you omit this statement, OAM F5 loopback cells are not initiated, but the interface still responds if it receives OAM F5 loopback cells.
Options	<p>disable—Disable the OAM loopback cell transmit feature.</p> <p>seconds—OAM loopback cell period.</p> <p>Range: 1 through 900 seconds</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Defining the ATM OAM F5 Loopback Cell Period on page 82

operating-mode

Syntax	<code>operating-mode <i>mode</i>;</code>
Hierarchy Level	[edit interfaces at- <i>fpc/pic/port</i> dsl-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For J Series Services Routers only, modify the operating mode of the digital subscriber line for an ATM interface.
Options	<p><i>mode</i>—Operating mode for ATM-over-ADSL interfaces. The mode can be one of the following:</p> <ul style="list-style-type: none">• <i>adsl2plus</i>—Set the ADSL line to train in the ITU G.992.5 mode.• <i>ansi-dmt</i>—Set the ADSL line to train in the ANSI T1.413 Issue 2 mode.• <i>auto</i>—Set the ADSL line to autonegotiate the setting to match the setting of the DSL access multiplexer (DSLAM) located at the central office. The ADSL line trains in the ANSI T1.413 Issue 2 (<i>ansi-dmt</i>) or ITU G.992.1 (<i>itu-dmt</i>) mode.• <i>etsi</i>—Set the ADSL line to train in the ETSI TS 101 388 V1.3.1 mode.• <i>itu-annexb-ur2</i>—Set the ADSL line to train in the ITU G.992.1 UR-2 mode.• <i>itu-annexb-non-ur2</i>—Set the ADSL line to train in the ITU G.992.1 non-UR-2 mode.• <i>itu-dmt</i>—Set the ADSL line to train in the ITU G.992.1 mode.• <i>itu-dmt-bis</i>—Set the ADSL line to train in the ITU G.992.3 mode. <p>Default: <code>auto</code></p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• ATM-over-ADSL Overview on page 109• <i>Junos OS Interfaces and Routing Configuration Guide</i>


paired-group

Syntax	<code>paired-group <i>group-name</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options aps]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure load sharing between two working protect circuit pairs.
Options	<i>group-name</i> —Circuit's group name, as configured with the protect-circuit or working-circuit statement.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring APS Load Sharingworking-circuit on page 215

passive-monitor-mode

Syntax	<code>passive-monitor-mode;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i>], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>Monitor packet flows from another router. If you include this statement in the configuration, the interface does not send keepalives or alarms, and does not participate actively on the network.</p> <p>This statement is supported on ATM, Ethernet, and SONET/SDH interfaces. For more information, see the <i>Junos OS ATM Interfaces Configuration Guide</i> and <i>Junos OS ATM Interfaces Configuration Guide</i>.</p> <p>For ATM and Ethernet interfaces, you can include this statement on the physical interface only.</p> <p>For SONET/SDH interfaces, you can include this statement on the logical interface only.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Enabling Passive Monitoring on ATM Interfaces on page 41• Passive Monitoring on Ethernet Interfaces Overview• Enabling Passive Monitoring on SONET/SDH Interfaces• multiservice-options• Junos Services Interfaces Configuration Release 11.2

payload-scrambler

Syntax	(payload-scrambler no-payload-scrambler);
Hierarchy Level	[edit interfaces <i>interface-name</i> e3-options], [edit interfaces <i>interface-name</i> sonet-options], [edit interfaces <i>interface-name</i> t3-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>Enable or disable HDLC scrambling on an E3, a SONET/SDH, or a T3 interface. This type of scrambling provides better link stability. Both sides of a connection must either use or not use scrambling.</p> <p>If you commit a T3 interface configuration that has HDLC payload scrambling enabled, the interface must also be configured to be compatible with the channel service unit (CSU) at the remote end of the line.</p> <p>Disable payload scrambling on an E3 interface if Digital Link compatibility mode is used.</p> <p>On a channelized OC12 interface, the sonet payload-scrambler statement is ignored. To configure scrambling on the DS3 channels on the interface, you can include the t3-options payload-scrambler statement in the configuration for each DS3 channel.</p>
	<div>  <p>NOTE: The payload-scrambler statement at the [edit interfaces <i>interface-name</i> e3-options] hierarchy level is not valid for IQE PICs.</p> </div>
Default	Payload scrambling is disabled on all E3 and T3 interfaces; it is enabled by default on E3/T3 over ATM interfaces and on SONET/SDH interfaces.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring E3 and T3 Parameters on ATM Interfaces on page 90 • Configuring E3 HDLC Payload Scrambling • Configuring SONET/SDH HDLC Payload Scrambling • Configuring T3 HDLC Payload Scrambling • Examples: Configuring T3 Interfaces • compatibility-mode

pic-type

Syntax	<code>pic-type (atm1 atm2);</code>
Hierarchy Level	[edit interfaces at- <i>fpc/pic/port</i> atm-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM interfaces, configure the type of ATM PIC installed in your router.
Options	<code>atm1</code> —ATM1 PIC. <code>atm2</code> —ATM2 IQ PIC.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring the ATM PIC Type on page 43

plp-to-clp

Syntax	<code>plp-to-clp;</code>
Hierarchy Level	[edit interfaces at- <i>fpc/pic/port</i> atm-options], [edit interfaces at- <i>fpc/pic/port</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces at- <i>--fpc/pic/port</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM2 IQ interfaces only, enable the PLP setting to be copied to the cell-loss priority (CLP) bit.
Default	If you omit this statement, the Junos OS does not copy the PLP setting to the CLP bit.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Enabling the PLP Setting to Be Copied to the CLP Bit on page 101• Copying the PLP Setting to the CLP Bit on ATM Interfaces

plp1

Syntax	<code>plp1 cells;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> address <i>address</i> family <i>family</i> multipoint-destination <i>address</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> address <i>address</i> family <i>family</i> multipoint-destination <i>address</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 11.1 for QFX Series switches.
Description	For ATM2 IQ interfaces only, define the EPD threshold on a VC. The EPD threshold is a limit on the number of transmit packets that can be queued. Packets that exceed the limit are discarded. This threshold applies to packets that have a PLP of 1.
Default	EPD threshold is unregulated.
Options	cells —Maximum number of cells. Range: For 1-port and 2-port OC12 interfaces, 1 through 425,984 cellsFor 1-port OC48 interfaces, 1 through 425,984 cellsFor 2-port OC3, DS3, and E3 interfaces, 1 through 212,992 cellsFor 4-port DS3 and E3 interfaces, 1 through 106,496 cells
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring Two EPD Thresholds per Queue on page 81 • Configuring an ATM Scheduler Map on page 94 • linear-red-profile on page 164

pop-all-labels

Syntax	<pre>pop-all-labels { required-depth <i>number</i>; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> atm-options mpls], [edit interfaces <i>interface-name</i> sonet-options mpls], [edit interfaces <i>interface-name</i> fastether-options mpls], [edit interfaces <i>interface-name</i> gigether-options mpls]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For passive monitoring on ATM, SONET/SDH, Fast Ethernet, and Gigabit Ethernet interfaces only, removes up to two MPLS labels from incoming IP packets. For passive monitoring on T Series devices, removes up to five MPLS labels from incoming IP packets.</p> <p>This statement has no effect on IP packets with more than two MPLS labels, or IP packets with more than five MPLS labels on T Series devices. Packets with MPLS labels cannot be processed by the Monitoring Services PIC; if packets with MPLS labels are forwarded to the Monitoring Services PIC, they are discarded.</p> <p>The remaining statement is explained separately.</p>
Default	If you omit this statement, the MPLS labels are not removed, and the packet is not processed by the Monitoring Services PIC.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Removing MPLS Labels from Incoming Packets on page 42• Removing MPLS Labels from Incoming Packet• Junos Services Interfaces Configuration Release 11.2

priority (Schedulers)

Syntax	<code>priority (high low);</code>
Hierarchy Level	[edit interfaces <i>at-fpc/pic/port</i> atm-options scheduler-maps <i>map-name</i> forwarding-class class-name]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM2 IQ interfaces only, assign queuing priority to a forwarding class.
Options	<p>low—Forwarding class has low priority.</p> <p>high—Forwarding class has high priority.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring ATM2 IQ VC Tunnel CoS Components on page 92

promiscuous-mode

Syntax	<pre>promiscuous-mode { vpi vpi-identifier; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> atm-options]
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.</p>
Description	For ATM interfaces with atm-ccc-cell-relay encapsulation, map all incoming cells from either an interface port or a VP to a single label-switched path (LSP) without restricting the VCI number. Promiscuous mode allows you to map traffic from all 65,535 VCIs to a single LSP, or from all 256 VPIs to a single LSP.
Options	<p>vpi-identifier—Open this VPI in promiscuous mode.</p> <p>Range: 0 through 255</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring ATM Cell-Relay Promiscuous Mode on page 45 • vpi (ATM CCC Cell-Relay Promiscuous Mode) on page 213

protect-circuit

Syntax	<code>protect-circuit <i>group-name</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options aps]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure the protect router in an APS circuit pair. When the working interface fails, APS brings up the protection circuit and the traffic is moved to the protection circuit.
Options	<i>group-name</i> —Circuit's group name.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring Basic Automatic Protect Switchingworking-circuit on page 215

queue-depth

Syntax	<code>queue-depth <i>cells</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> atm-options linear-red-profiles <i>profile-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM2 IQ interfaces only, define maximum queue depth in the CoS VC drop profile. Packets are always dropped beyond the defined maximum. This statement is mandatory; there is no default configuration.
Default	Buffer usage is unregulated.
Options	<i>cells</i> —Maximum number of cells the queue can contain. Range: 1 through 64,000 cells
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring ATM2 IQ VC Tunnel CoS Components on page 92Configuring Linear RED Profiles on ATM Interfaceshigh-plp-threshold on page 158low-plp-threshold on page 168

queue-length

Syntax	<code>queue-length <i>number</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> address <i>address</i> family <i>family</i> multipoint-destination <i>address</i> shaping], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> shaping], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> address <i>address</i> family <i>family</i> multipoint-destination <i>address</i> shaping], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> shaping]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 11.1 for the QFX Series.
Description	For ATM1 interfaces only, define the maximum queue length in the traffic-shaping profile. For ATM1 PICs, each VC has its own independent shaping parameters.
Default	Buffer usage is unregulated.
Options	<i>number</i> —Maximum number of packets the queue can contain. Range: 1 through 16,383 packets Default: 16,383 packets
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring the ATM1 Queue Length on page 78

receive-options-packets

Syntax	<code>receive-options-packets;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For a Monitoring Services PIC and an ATM or SONET/SDH PIC installed in an M160, M40e, or T Series router, guarantee conformity with cflowd records structure. This statement is required when you enable passive monitoring.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Enabling Passive Monitoring on ATM Interfaces on page 41 • Enabling Passive Monitoring on SONET/SDH Interfaces

receive-ttl-exceeded

Syntax	receive-ttl-exceeded;
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For Monitoring Services PIC and an ATM or SONET/SDH PIC installed in an M160, M40e, or T Series router, guarantee conformity with cflowd records structure. This statement is required when you enable passive monitoring.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Enabling Passive Monitoring on ATM Interfaces on page 41• Enabling Passive Monitoring on SONET/SDH Interfaces

request

Syntax	request (protect working);
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options aps]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Perform a manual switch between the protect and working circuits. This statement is honored only if there are no higher-priority reasons to switch.
Options	protect —Request that the circuit become the protect circuit. working —Request that the circuit become the working circuit.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Switching Between the Working and Protect Circuits• force on page 156

required-depth

Syntax	<code>required-depth <i>number</i>;</code>
Hierarchy Level	<p>[edit interfaces <i>interface-name</i> atm-options mpls pop-all-labels],</p> <p>[edit interfaces <i>interface-name</i> sonet-options mpls pop-all-labels],</p> <p>[edit interfaces <i>interface-name</i> fastether-options mpls pop-all-labels],</p> <p>[edit interfaces <i>interface-name</i> gigether-options mpls pop-all-labels]</p>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For passive monitoring on ATM and SONET/SDH interfaces only, specify the number of MPLS labels an incoming packet must have for the pop-all-labels statement to take effect.</p> <p>If you include the required-depth 1 statement, the pop-all-labels statement takes effect for incoming packets with one label only. If you include the required-depth 2 statement, the pop-all-labels statement takes effect for incoming packets with two labels only.</p>
Options	<p>number—Number of MPLS labels on incoming IP packets.</p> <p>Range: 1 or 2 labels</p> <p>Default: If you omit this statement, the pop-all-labels statement takes effect for incoming packets with one or two labels. The default is equivalent to including the required-depth [1 2] statement.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Removing MPLS Labels from Incoming Packets on page 42 • Removing MPLS Labels from Incoming Packets • Junos Services Interfaces Configuration Release 11.2

revert-time (Interfaces)

Syntax	<code>revert-time <i>seconds</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options aps]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure APS revertive mode.
Default	APS operates in nonrevertive mode.
Options	<i>seconds</i> —Amount of time to wait after the working circuit has again become functional before making the working circuit active again. Range: 1 through 65,535 seconds Default: None (APS operates in nonrevertive mode)
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring Revertive Mode

rfc-2615

Syntax	<code>rfc-2615;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Include this statement to enable features described in RFC 2615, <i>PPP over SONET/SDH</i> .
Default	Settings required by RFC 1619, <i>PPP over SONET/SDH</i> .
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring SONET/SDH RFC 2615 Support

rtvbr

Syntax	<code>rtvbr peak rate sustained rate burst length;</code>
Hierarchy Level	<p>[edit interfaces <i>interface-name</i> atm-options vpi <i>vpi-identifier</i> shaping],</p> <p>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> address <i>address</i> family <i>family</i> multipoint-destination <i>address</i> shaping],</p> <p>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> shaping],</p> <p>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> shaping],</p> <p>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> address <i>address</i> family <i>family</i> multipoint-destination <i>address</i> shaping]</p>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For ATM2 IQ PICs only, define the real-time variable bandwidth utilization in the traffic-shaping profile.</p> <p>When you configure the real-time bandwidth utilization, you must specify all three options (burst, peak, and sustained). You can specify the rate in bits per second either as a complete decimal number or as a decimal number followed by the abbreviation k (1000), m (1,000,000), or g (1,000,000,000). You can also specify the rate in cells per second by entering a decimal number followed by the abbreviation c; values expressed in cells per second are converted to bits per second using the formula 1 cps = 384 bps.</p>
Default	If the rtvbr statement is not included, bandwidth utilization is unlimited.
Options	<p>burst length—Burst length, in cells. If you set the length to 1, the peak traffic rate is used. Range: 1 through 4000 cells</p> <p>peak rate—Peak rate, in bits per second or cells per second. Range: For ATM2 IQ OC3 and OC12 interfaces, 33 Kbps through 542,526,792 bps. For ATM2 IQ OC48 interfaces, 33 Kbps through 2,170,107,168 bps. For ATM2 IQ DS3 and E3 interfaces, 33 Kbps through the maximum rate, which depends on the ATM encapsulation and framing you configure..</p> <p>sustained rate—Sustained rate, in bps or cps. Range: For ATM2 IQ OC3 and OC12 interfaces, 33 Kbps through 542,526,792 bps. For ATM2 IQ OC48 interfaces, 33 Kbps through 2,170,107,168 bps. For ATM2 IQ DS3 and E3 interfaces, from 33 Kbps through the maximum rate, which depends on the ATM encapsulation and framing you configure.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring ATM2 IQ Real-Time VBR on page 74 • Configuring ATM2 IQ Real-Time VBR on page 74 • Applying Scheduler Maps to Logical ATM Interfaces

- [cbr on page 134](#)
- [vbr on page 210](#)

scheduler-maps

Syntax	<pre>scheduler-maps <i>map-name</i> { forwarding-class (<i>class-name</i> assured-forwarding best-effort expedited-forwarding network-control); vc-cos-mode (alternate strict); }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> atm-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM2 IQ interfaces only, define CoS parameters assigned to forwarding classes.
Options	<p><i>map-name</i>—Name of the scheduler map.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Configuring ATM2 IQ VC Tunnel CoS Components on page 92• atm-scheduler-map on page 130• Junos OS Class of Service Configuration Guide

shaping

Syntax	<pre>shaping { (cbr rate rtvbr peak rate sustained rate burst length vbr peak rate sustained rate burst length); queue-length number; }</pre>
Hierarchy Level	<pre>[edit interfaces interface-name atm-options vpi vpi-identifier], [edit interfaces interface-name unit logical-unit-number], [edit interfaces interface-name unit logical-unit-number address address family family multipoint-destination address], [edit logical-systems logical-system-name interfaces interface-name unit logical-unit-number], [edit logical-systems logical-system-name interfaces interface-name unit logical-unit-number address address family family multipoint-destination address]</pre>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For ATM encapsulation only, define the traffic-shaping profile.</p> <p>For Circuit Emulation PICs, specify traffic shaping in the ingress and egress directions.</p> <p>For ATM2 IQ interfaces, changing or deleting VP tunnel traffic shaping causes all logical interfaces on a VP to be deleted and then re-added.</p> <p>VP tunnels are not supported on multipoint interfaces.</p> <p>The statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Defining Virtual Path Tunnels on page 69 • Defining the ATM Traffic-Shaping Profile on page 72 • Configuring ATM QoS or Shaping • Applying Scheduler Maps to Logical ATM Interfaces

shdsl-options

Syntax	<pre>shdsl-options { annex (annex-a annex-b); line-rate <i>line-rate</i>; loopback (local remote payload); snr-margin { current <i>margin</i>; snext <i>margin</i>; } }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i>]
Release Information	Statement introduced in Junos OS Release 7.4.
Description	<p>For J Series Services Routers only, configure symmetric DSL (SHDSL) options.</p> <p>The statements are explained separately.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• ATM-over-SHDSL Overview on page 115

snext

Syntax	<code>snext margin;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> shdsl-options snr-margin], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> shdsl-options snr-margin]
Release Information	Statement introduced in Junos OS Release 7.4.
Description	For J Series Services Routers only, configure self-near-end crosstalk (SNEXT) signal-to-noise ratio (SNR) margin for a SHDSL line. When configured, the line trains at higher than SNEXT threshold. The SNR margin is the difference between the desired SNR and the actual SNR.
Options	margin —Desired SNEXT margin. Possible values are disabled or a margin between –10dB and 10 dB. Default: disabled
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • ATM-over-SHDSL Overview on page 115 • <i>Junos OS Interfaces and Routing Configuration Guide</i>

snr-margin

Syntax	<pre>snr-margin { current margin; snext margin; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> shdsl-options], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> shdsl-options]
Release Information	Statement introduced in Junos OS Release 7.4.
Description	<p>For J Series Services Routers only, configure the SHDSL signal-to-noise ratio (SNR) margin. The SNR margin is the difference between the desired SNR and the actual SNR. Configuring the SNR creates a more stable SHDSL connection by making the line train at a SNR margin higher than the threshold. If any external noise below the threshold is applied to the line, the line remains stable.</p> <p>The statements are explained separately.</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• ATM-over-SHDSL Overview on page 115• <i>Junos OS Interfaces and Routing Configuration Guide</i>

source

Syntax	<code>source <i>source-address</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> tunnel <i>address</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> tunnel <i>address</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Specify the source address of the tunnel.
Default	If you do not specify a source address, the tunnel uses the unit's primary address as the source address of the tunnel.
Options	<i>source-address</i> —Address of the local side of the tunnel. This is the address that is placed in the outer IP header's source field.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • multicast-only • primary (Address on Interface) • Junos Services Interfaces Configuration Release 11.2

t3-options

Syntax t3-options {
 atm-encapsulation (direct | plcp);
 bert-algorithm *algorithm*;
 bert-error-rate *rate*;
 bert-period *seconds*;
 (cbit-parity | no-cbit-parity);
 compatibility-mode (digital-link | kentrox | larscom) <subrate *value*>;
 fcs (16 | 32);
 (feac-loop-respond | no-feac-loop-respond);
 idle-cycle-flag *value*;
 (long-buildout | no-long-buildout);
 (loop-timing | no-loop-timing);
 loopback (local | payload | remote);
 start-end-flag *value*;
 }

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure T3-specific physical interface properties, including the properties of DS3 channels on a channelized OC12 interface. The **long-buildout** statement is not supported for DS3 channels on a channelized OC12 interface.

On T3 interfaces, the default encapsulation is PPP.

For ATM1 interfaces, you can configure a subset of E3 options statements.

The statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
 interface-control—To add this statement to the configuration.

Related Documentation • T3 Interfaces Overview

transmit-weight

See the following sections:

- [transmit-weight \(ATM2 IQ CoS Forwarding Class\) on page 197](#)
- [transmit-weight \(ATM2 IQ Virtual Circuit\) on page 198](#)

transmit-weight (ATM2 IQ CoS Forwarding Class)

Syntax	transmit-weight (cells <i>number</i> percent <i>number</i>);
Hierarchy Level	[edit interfaces <i>interface-name</i> atm-options scheduler-maps <i>map-name</i> forwarding-class <i>class-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM2 IQ interfaces only, assign a transmission weight to a forwarding class.
Default	95 percent for queue 0, 5 percent for queue 3.
Options	percent <i>percent</i> —Transmission weight of the forwarding class as a percentage of the total bandwidth. Range: 5 through 100 cells <i>number</i> —Transmission weight of the forwarding class as a number of cells. Range: 0 through 32,000
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring ATM2 IQ VC Tunnel CoS Components on page 92

transmit-weight (ATM2 IQ Virtual Circuit)

Syntax	<code>transmit-weight <i>number</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For ATM2 IQ PICs only, configure the transmission weight.</p> <p>Each VC is serviced in weighted round robin (WRR) mode. When VCs have data to send, they send the number of cells equal to their weight before passing control to the next active VC. This allows proportional bandwidth sharing between multiple VCs within a rate-shaped VP tunnel. VP tunnels are not supported on multipoint interfaces.</p>
Options	<p><i>number</i>—Number of cells a VC sends before passing control to the next active VC within a VP tunnel.</p> <p>Range: 1 through 32,767</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Configuring the ATM2 IQ Transmission Weight on page 81

trigger

Syntax	<pre>trigger { defect ignore; defect hold-time up <i>milliseconds</i> down <i>milliseconds</i>; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM over SONET/SDH, SONET/SDH interfaces, and 10-Gigabit Ethernet interfaces in WAN PHY mode, configure SONET/SDH defect triggers to be ignored.
Default	If you do not include this statement, all SONET/SDH defect triggers are honored.
Options	<p>defect—Defect to ignore or hold. It can be one of the following:</p> <ul style="list-style-type: none"> • ais-l—Line alarm indication signal • ais-p—Path alarm indication signal • ber-sd—Bit error rate signal degrade • ber-sf—Bit error rate signal fault • locd (ATM only)—Loss of cell delineation • lof—Loss of frame • lol—PHY loss of light • lop-p—Path loss of pointer • los—Loss of signal • pll—PHY phase-locked loop out of lock • plm-p—Path payload (signal) label mismatch • rfi-l—Line remote failure indication • rfi-p—Path remote failure indication • uneq-p—Path unequipped <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring SONET/SDH Defect Triggers

trunk-bandwidth

Syntax	trunk-bandwidth <i>rate</i> ;
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For ATM2 IQ interfaces configured to use Layer 2 circuit trunk mode, configure a scheduler so that unused bandwidth from any inactive trunk is proportionally shared among the active trunks.</p> <p>During congestion, each trunk receives a proportional share of the leftover bandwidth, thus minimizing the latency on each trunk.</p>
Options	<p>rate—Peak rate, in bits per second (bps) or cells per second (cps). You can specify a value in bits per second either as a complete decimal number or as a decimal number followed by the abbreviation k (1000), m (1,000,000), or g (1,000,000,000). You can also specify a value in cells per second by entering a decimal number followed by the abbreviation c; values expressed in cells per second are converted to bits per second by means of the formula 1 cps = 384 bps.</p> <p>Range: 1,000,000 through 542,526,792 bps</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Layer 2 Circuit Trunk Mode Scheduling on page 62

trunk-id

Syntax	<code>trunk-id <i>number</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For ATM2 IQ interfaces with ATM CCC cell-relay encapsulation, configure the trunk identification number.</p> <p>When you associate a trunk ID number with a logical interface, you are in effect specifying the interfaces that are allowed to send ATM traffic over an LSP.</p>
Options	<p>number—A valid trunk identifier.</p> <p>Range: For UNI mode, 0 through 7. For NNI mode, 0 through 31.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Configuring Layer 2 Circuit Transport Mode on page 49

unit

```
Syntax  unit logical-unit-number {
    accept-source-mac {
        mac-address mac-address {
            policer {
                input cos-policer-name;
                output cos-policer-name;
            }
        }
    }
    accounting-profile name;
    advisory-options {
        downstream-rate rate;
        upstream-rate rate;
    }
    allow-any-vci;
    atm-scheduler-map (map-name | default);
    backup-options {
        interface interface-name;
    }
    bandwidth rate;
    cell-bundle-size cells;
    clear-dont-fragment-bit;
    compression {
        rtp {
            maximum-contexts number <force>;
            f-max-period number;
            queues [ queue-numbers ];
            port {
                minimum port-number;
                maximum port-number;
            }
        }
    }
    compression-device interface-name;
    copy-tos-to-outer-ip-header;
    demux-destination family;
    demux-source family;
    demux-options {
        underlying-interface interface-name;
    }
    description text;
    interface {
        l2tp-interface-id name;
        (dedicated | shared);
    }
    dialer-options {
        activation-delay seconds;
        callback;
        callback-wait-period time;
        deactivation-delay seconds;
        dial-string [ dial-string-numbers ];
        idle-timeout seconds;
    }
}
```

```

incoming-map {
  caller caller-id | accept-all;
  initial-route-check seconds;
  load-interval seconds;
  load-threshold percent;
  pool pool-name;
  redial-delay time;
  watch-list {
    [ routes ];
  }
}
}
disable;
disable-mlppp-inner-ppp-pfc;
dlci dlci-identifier;
drop-timeout milliseconds;
dynamic-call-admission-control {
  activation-priority priority;
  bearer-bandwidth-limit kilobits-per-second;
}
encapsulation type;
epd-threshold cells plp1 cells;
family family-name {
  ... the family subhierarchy appears after the main [edit interfaces interface-name unit
    logical-unit-number] hierarchy ...
}
fragment-threshold bytes;
inner-vlan-id-range start start-id end end-id;
input-vlan-map {
  (pop | pop-pop | pop-swap | push | push-push | swap |
  swap-push | swap-swap);
  inner-tag-protocol-id tpid;
  inner-vlan-id number;
  tag-protocol-id tpid;
  vlan-id number;
}
interleave-fragments;
inverse-arp;
layer2-policer {
  input-policer policer-name;
  input-three-color policer-name;
  output-policer policer-name;
  output-three-color policer-name;
}
link-layer-overhead percent;
minimum-links number;
mrru bytes;
multicast-dlci dlci-identifier;
multicast-vci vpi-identifier.vci-identifier;
multilink-max-classes number;
multipoint;
oam-liveness {
  up-count cells;
  down-count cells;
}
oam-period (disable | seconds);

```

```

output-vlan-map {
    (pop | pop-pop | pop-swap | push | push-push | swap |
    swap-push | swap-swap);
    inner-tag-protocol-id tpid;
    inner-vlan-id number;
    tag-protocol-id tpid;
    vlan-id number;
}
passive-monitor-mode;
peer-unit unit-number;
plp-to-clp;
point-to-point;
ppp-options {
    chap {
        access-profile name;
        default-chap-secret name;
        local-name name;
        passive;
    }
    compression {
        acfc;
        pfc;
    }
    dynamic-profile profile-name;
    lcp-restart-timer milliseconds;
    loopback-clear-timer seconds;
    ncp-restart-timer milliseconds;
    pap {
        access-profile name;
        default-pap-password password;
        local-name name;
        local-password password;
        passive;
    }
}
pppoe-options {
    access-concentrator name;
    auto-reconnect seconds;
    (client | server);
    service-name name;
    underlying-interface interface-name;
}
pppoe-underlying-options {
    access-concentrator name;
    dynamic-profile profile-name;
    max-sessions number;
}
proxy-arp;
service-domain (inside | outside);
shaping {
    (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate burst length);
    queue-length number;
}
short-sequence;
targeted-distribution;

```



```

transmit-weight number;
(traps | no-traps);
trunk-bandwidth rate;
trunk-id number;
tunnel {
    backup-destination address;
    destination address;
    key number;
    routing-instance {
        destination routing-instance-name;
    }
    source source-address;
    ttl number;
}
vci vpi-identifier.vci-identifier;
vci-range start start-vci end end-vci;
vpi vpi-identifier;
vlan-id number;
vlan-id-range number-number;
vlan-tags inner tpid.vlan-id outer tpid.vlan-id;
family family {
    accounting {
        destination-class-usage;
        source-class-usage {
            (input | output | input output);
        }
    }
    access-concentrator name;
    address address {
        ... the address subhierarchy appears after the main [edit interfaces interface-name unit
        logical-unit-number family family-name] hierarchy ...
    }
    bridge-domain-type (bvlan | svlan);
    bundle interface-name;
    core-facing;
    demux-destination {
        destination-prefix;
    }
    demux-source {
        source-prefix;
    }
    duplicate-protection;
    dynamic-profile profile-name;
    filter {
        group filter-group-number;
        input filter-name;
        input-list [ filter-names ];
        output filter-name;
        output-list [ filter-names ];
    }
    interface-mode (access | trunk);
    ipsec-sa sa-name;
    isid-list all-service-groups;
    keep-address-and-control;
    mac-validate (loose | strict);
    max-sessions number;

```

```

mtu bytes;
multicast-only;
no-redirects;
policer {
    arp policer-template-name;
    input policer-template-name;
    output policer-template-name;
}
primary;
protocols [inet iso mpls];
proxy inet-address address;
receive-options-packets;
receive-ttl-exceeded;
remote (inet-address address | mac-address address);
rpf-check {
    fail-filter filter-name
    mode loose;
}
sampling {
    input;
    output;
}
service {
    input {
        post-service-filter filter-name;
        service-set service-set-name <service-filter filter-name>;
    }
    output {
        service-set service-set-name <service-filter filter-name>;
    }
}
service-name-table table-name
(translate-discard-eligible | no-translate-discard-eligible);
(translate-fecn-and-becn | no-translate-fecn-and-becn);
translate-plp-control-word-de;
unnumbered-address interface-name destination address destination-profile profile-name;
vlan-id number;
vlan-id-list [number number-number];
address address {
    arp ip-address (mac | multicast-mac) mac-address <publish>;
    broadcast address;
    destination address;
    destination-profile name;
    eui-64;
    master-only;
    multipoint-destination address {
        dlci dlci-identifier;
        epd-threshold cells <plp1 cells>;
        inverse-arp;
        oam-liveness {
            up-count cells;
            down-count cells;
        }
        oam-period (disable | seconds);
        shaping {

```

```

    (cbr rate | rtvbr burst length peak rate sustained rate | vbr burst length peak rate
    sustained rate);
    queue-length number;
}
vci vpi-identifier.vci-identifier;
}
preferred;
primary;
(vrrp-group | vrrp-inet6-group) group-number {
    (accept-data | no-accept-data);
    advertise-interval seconds;
    authentication-type authentication;
    authentication-key key;
    fast-interval milliseconds;
    (preempt | no-preempt) {
        hold-time seconds;
    }
    priority number;
    track {
        interface interface-name {
            bandwidth-threshold bits-per-second priority-cost number;
        }
        priority-hold-time seconds;
        route ip-address/prefix-length routing-instance instance-name priority-cost cost;
    }
    virtual-address [ addresses ];
    virtual-link-local-address ipv6-address;
    vrrp-inherit-from {
        active-interface interface-name;
        active-group group-number;
    }
}
}
}
}

```

Hierarchy Level [edit interfaces *interface-name*],
 [edit logical-systems *logical-system-name* interfaces *interface-name*],
 [edit interfaces interface-set *interface-set-name* interface *interface-name*]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure a logical interface on the physical device. You must configure a logical interface to be able to use the physical device.

Options *logical-unit-number*—Number of the logical unit.

Range: 0 through 1,073,741,823 for demux and PPPoE static interfaces only. 0 through 16,385 for all other static interface types.

The remaining statements are explained separately.


Required Privilege Level interface—To view this statement in the configuration.
 interface-control—To add this statement to the configuration.

- Related Documentation**
- [Configuring Logical Interface Properties on page 119](#)
 - Example: Configuring E-LINE and E-LAN Services for a PBB Network on MX Series Routers
 - Junos Services Interfaces Configuration Release 11.2

up-count

Syntax	<code>up-count <i>cells</i>;</code>
Hierarchy Level	<code>[edit interfaces <i>interface-name</i> atm-options vpi <i>vpi-identifier</i> <i>oam-liveness</i>],</code> <code>[edit interfaces <i>interface-name</i> <i>unit</i> <i>logical-unit-number</i> <i>oam-liveness</i>],</code> <code>[edit interfaces <i>interface-name</i> <i>unit</i> <i>logical-unit-number</i> <i>family</i> <i>family</i> address <i>address</i></code> <code> multipoint-destination <i>address</i> <i>oam-liveness</i>],</code> <code>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> <i>unit</i> <i>logical-unit-number</i></code> <code> <i>oam-liveness</i>],</code> <code>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> <i>unit</i> <i>logical-unit-number</i></code> <code> <i>family</i> <i>family</i> address <i>address</i> multipoint-destination <i>address</i> <i>oam-liveness</i>]</code>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For ATM encapsulation only, configure Operation, Administration, and Maintenance (OAM) F5 loopback cell count thresholds. Not supported on ATM-over-SHDSL interfaces.</p> <p>For ATM2 IQ PICs only, configure OAM F4 loopback cell count thresholds at the <code>[edit interfaces <i>interface-name</i> atm-options vpi <i>vpi-identifier</i>]</code> hierarchy level.</p>
Options	<p>cells—Minimum number of consecutive OAM F4 or F5 loopback cells received before a VC is declared up.</p> <p>Range: 1 through 255</p> <p>Default: 5 cells</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Configuring the ATM OAM F5 Loopback Cell Threshold on page 82

use-null-cw

Syntax	use-null-cw;
Hierarchy Level	[edit interfaces <i>interface-name</i> atm-options]
Release Information	Statement introduced in Junos OS Release 8.3.
Description	Insert (for sending traffic) or strip (for receiving traffic) a null control word in MPLS packets when an MPLS Layer 2 circuit is configured with cell transport mode on a router running Junos OS Release 8.3 or later. When cell relay transport mode is configured, the use-null-cw statement allows interoperability between routers running Junos OS Release 8.2 and earlier and those running Junos OS Release 8.3 and later.
<div>  <p>NOTE: The use-null-cw statement is supported only on routers running Junos OS Release 8.3 or later.</p> </div>	
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring Layer 2 Circuit Transport Mode on page 49

vbr

Syntax	<code>vbr peak <i>rate</i> sustained <i>rate</i> burst <i>length</i>;</code>
Hierarchy Level	<p>[edit interfaces <i>interface-name</i> atm-options vpi <i>vpi-identifier</i> shaping],</p> <p>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> address <i>address</i> family <i>family</i> multipoint-destination <i>address</i> shaping],</p> <p>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> shaping],</p> <p>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> address <i>address</i> family <i>family</i> multipoint-destination <i>address</i> shaping],</p> <p>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> shaping]</p>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For ATM encapsulation only, define the variable bandwidth utilization in the traffic-shaping profile.</p> <p>When you configure the variable bandwidth utilization, you must specify all three options (burst, peak, and sustained). You can specify the rate in bits per second either as a complete decimal number or as a decimal number followed by the abbreviation k (1000), m (1,000,000), or g (1,000,000,000). You can also specify the rate in cells per second by entering a decimal number followed by the abbreviation c; values expressed in cells per second are converted to bits per second by means of the formula 1 cps = 384 bps.</p>
Default	If the vbr statement is not specified, bandwidth utilization is unlimited.
Options	<p>burst <i>length</i>—Burst length, in cells. If you set the length to 1, the peak traffic rate is used. Range: 1 through 4000 cells</p> <p>peak <i>rate</i>—Peak rate, in bits per second or cells per second. Range: For ATM1 interfaces, 33 Kbps through 135.6 Mbps (ATM OC3); 33 Kbps through 276 Mbps (ATM OC12). For ATM2 IQ OC3 and OC12 interfaces, 33 Kbps through 542,526,792 bps. For ATM2 IQ OC48 interfaces, 33 Kbps through 2,170,107,168 bps. For ATM2 IQ DS3 and E3 interfaces, from 33 Kbps through the maximum rate, which depends on the ATM encapsulation and framing you configure.</p> <p>sustained <i>rate</i>—Sustained rate, in bits per second or cells per second. Range: For ATM1 interfaces, 33 Kbps through 135.6 Mbps (ATM OC3); 33 Kbps through 276 Mbps (ATM OC12). For ATM2 IQ OC3 and OC12 interfaces, 33 Kbps through 542,526,792 bps. For ATM2 IQ OC48 interfaces, 33 Kbps through 2,170,107,168 bps. For ATM2 IQ DS3 and E3 interfaces, from 33 Kbps through the maximum rate, which depends on the ATM encapsulation and framing you configure.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring ATM CBR on page 73 • Applying Scheduler Maps to Logical ATM Interfaces

- [cbr on page 134](#)
- [rtvbr on page 189](#)
- [shaping on page 191](#)

vc-cos-mode

Syntax	vc-cos-mode (alternate strict);
Hierarchy Level	[edit interfaces <i>interface-name</i> atm-options scheduler-maps map-name]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For ATM2 IQ interfaces only, specify packet-scheduling priority value for ATM2 IQ VC tunnels.
Options	<p>alternate—VC CoS queue has high priority. The scheduling of the queues alternates between the high-priority queue and the remaining queues, so every other scheduled packet is from the high-priority queue.</p> <p>strict—VC CoS queue has strictly high priority. A queue with strict high priority is always scheduled before the remaining queues. The remaining queues are scheduled in round-robin fashion.</p> <p>Default: alternate</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring ATM2 IQ VC Tunnel CoS Components on page 92• Configuring Scheduler Maps on ATM Interfaces

vci

Syntax	<code>vci vpi-identifier.vci-identifier;</code>
Hierarchy Level	[edit interfaces at- <i>fpc/pic/port</i> unit <i>logical-unit-number</i>], [edit interfaces at- <i>fpc/pic/port</i> unit <i>logical-unit-number</i> family <i>family</i> address <i>address</i> multipoint-destination <i>address</i>], [edit logical-systems <i>logical-system-name</i> interfaces at- <i>fpc/pic/port</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces at- <i>fpc/pic/port</i> unit <i>logical-unit-number</i> family <i>family</i> address <i>address</i> multipoint-destination <i>address</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 11.1 for the QFX Series. Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access routers.
Description	<p>For ATM point-to-point logical interfaces only, configure the virtual circuit identifier (VCI) and virtual path identifier (VPI).</p> <p>To configure a VPI for a point-to-multipoint interface, specify the VPI in the multipoint-destination statement.</p> <p>VCIs 0 through 31 are reserved for specific ATM values designated by the ATM Forum.</p>
Options	<p>vci-identifier—ATM virtual circuit identifier. Unless you configure the interface to use promiscuous mode, this value cannot exceed the highest-numbered VC configured for the interface with the maximum-vcs option of the vpi statement.</p> <p>Range: 0 through 4089 or 0 through 65,535 with promiscuous mode, with VCIs 0 through 31 reserved.</p> <p>vpi-identifier—ATM virtual path identifier.</p> <p>Range: 0 through 255</p> <p>Default: 0</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring a Point-to-Point ATM1 or ATM2 IQ Connection on page 70• Applying Scheduler Maps to Logical ATM Interfaces• multipoint-destination on page 172• promiscuous-mode on page 183• vpi (ATM CCC Cell-Relay Promiscuous Mode) on page 213

vpi

See the following sections:

- [vpi \(ATM CCC Cell-Relay Promiscuous Mode\) on page 213](#)
- [vpi \(Define Virtual Path\) on page 214](#)
- [vpi \(Logical Interface and Interworking\) on page 215](#)

vpi (ATM CCC Cell-Relay Promiscuous Mode)

Syntax	<code>vpi vpi-identifier;</code>
Hierarchy Level	[edit interfaces at- <i>fpc/pic/port</i> atm-options promiscuous-mode]
Release Information	Statement introduced before Junos OS Release 7.4. Junos OS Release 12.2 for the ACX Series Universal Access routers.
Description	For ATM interfaces, allow all VCI in this VPI to open in ATM CCC cell-relay mode. When you include vpi statements at the [edit interfaces <i>interface-name</i> atm-options promiscuous-mode] hierarchy level, the specified VPIs open in promiscuous mode.
Options	vpi-identifier —ATM virtual path identifier. This is one of the VPIs that you define in the vci statement. (For a list of hierarchy levels at which you can include the vci statement, see vci .) Range: 0 through 255
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring ATM Cell-Relay Promiscuous Mode on page 45

vpi (Define Virtual Path)

Syntax `vpi vpi-identifier {
 maximum-vcs maximum-vcs;
 oam-liveness {
 up-count cells;
 down-count cells;
 }
 oam-period (disable | seconds);
 shaping {
 (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate burst
 length);
 queue-length number;
 }
 }`

Hierarchy Level [edit interfaces at-*fpc/pic/port* atm-options]

Release Information Statement introduced before Junos OS Release 7.4.

Description For ATM interfaces, configure the virtual path (VP).



.....
NOTE: Certain options apply only to specific platforms.
.....

Options *vpi-identifier*—ATM virtual path identifier. This is one of the VPIs that you define in the *vci* statement. (For a list of hierarchy levels at which you can include the *vci* statement, see *vci*.)

Range: 0 through 255

The remaining statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
 interface-control—To add this statement to the configuration.

Related Documentation

- [Configuring the Maximum Number of ATM1 VCs on a VP on page 48](#)
- [multipoint-destination on page 172](#)
- [promiscuous-mode on page 183](#)
- [vci on page 212](#)

vpi (Logical Interface and Interworking)

Syntax	<code>vpi virtual-path-identifier;</code>
Hierarchy Level	[edit interfaces at- <i>fpc/pic/port</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces at- <i>fpc/pic/port</i> unit <i>logical-unit-number</i>]
Release Information	Statement introduced in Junos OS Release 9.0. Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access routers.
Description	VPI used in an ATM-to-Ethernet interworking cross-connect.
Options	virtual-path-identifier —VPI to be used. Range: 0 through 255
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring ATM-to-Ethernet InterworkingConfiguring ATM Cell-Relay Promiscuous Mode on page 45

working-circuit

Syntax	<code>working-circuit <i>group-name</i>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options aps]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure the working router in an APS circuit pair.
Options	<i>group-name</i> —Circuit's group name.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring Basic Automatic Protect Switchingprotect-circuit on page 184

z0-increment

Syntax	(z0-increment no-z0-increment);
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure an incremental STM ID rather than a static one.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring an Incrementing STM ID• sonet-options

PART 4

ATM Interfaces Troubleshooting

- [Troubleshooting ATM Interfaces on page 219](#)

CHAPTER 6

Troubleshooting ATM Interfaces

This chapter includes the following information to assist you when troubleshooting ATM interfaces:

- [Investigating Interface Steps and Commands on page 219](#)
- [Determining ATM Interface Type on page 222](#)
- [Monitoring ATM Interfaces on page 233](#)
- [Using Loopback Testing for ATM Interfaces on page 254](#)
- [Locating ATM Alarms and Errors on page 266](#)

Investigating Interface Steps and Commands

This section includes the following information to assist you when troubleshooting ATM interfaces:

- [Investigating Interface Steps and Commands Overview on page 219](#)
- [Monitoring Interfaces on page 219](#)
- [Performing a Loopback Test on an Interface on page 220](#)
- [Locating Interface Alarms on page 222](#)

Investigating Interface Steps and Commands Overview

The “[Monitoring Interfaces](#)” on [page 219](#) section helps you determine the nature of the interface problem. The “[Performing a Loopback Test on an Interface](#)” on [page 220](#) section provides information to help you isolate the source of the problem. The “[Locating Interface Alarms](#)” on [page 222](#) section explains some of the alarms and errors for the media.

Monitoring Interfaces

Problem The following steps are a general outline of how you monitor interfaces to determine the nature of interface problems. For more detailed information on a specific interface, see the corresponding monitor interfaces section.

Solution To monitor interfaces, follow these steps:

1. Display the status of an interface.
2. Display the status of a specific interface.

3. Display extensive status information for a specific interface.
4. Monitor statistics for an interface.

The [Table 11 on page 220](#) lists and describes the operational mode commands you use to monitor interfaces.

Table 11: Commands Used to Monitor Interfaces

CLI Command	Description
show interfaces terse <i>interface-name</i> For example: show interfaces terse t1*	Displays summary information about the named interfaces.
show interfaces <i>interface-name</i> For example: show interfaces t1-x/x/x	Displays static status information about a specific interface.
show interfaces <i>interface-name</i> extensive For example: show interfaces t1-x/x/x extensive	Displays very detailed interface information about a specific interface.
monitor interface <i>interface-name</i> For example: monitor interface t1-x/x/x	Displays real-time statistics about a physical interface, updated every second.

Performing a Loopback Test on an Interface

Problem The following steps are a general outline of how you use loopback testing to isolate the source of the interface problem. For more detailed information on a specific interface, see the corresponding loopback section.

Solution To use loopback testing for interfaces, follow these steps:

1. Diagnose a suspected hardware problem.
 - a. Create a loopback.
 - b. Set clocking to internal. (Not for Fast Ethernet/Gigabit Ethernet or Multichannel DS3 interfaces.)
 - c. Verify that the status of the interface is up.
 - d. Configure a static address resolution protocol table entry. (Fast Ethernet/Gigabit Ethernet interfaces only)
 - e. Clear the interface statistics.
 - f. Force the link layer to stay up.
 - g. Verify the status of the logical interface.

- h. Ping the interface.
 - i. Check for interface error statistics.
2. Diagnose a suspected connection problem.
 - a. Create a loop from the router to the network.
 - b. Create a loop to the router from various points in the network.

The [Table 12 on page 221](#) lists and describes the operational and configuration mode commands you use to perform loopback testing on interfaces (the commands are shown in the order in which you perform them).

Table 12: Commands Used to Perform Loopback Testing on Interfaces

CLI Statement or Command	Interface Type	Description
[edit interfaces <i>interface-name</i> <i>interface- options</i>] set loopback (local remote)	All interfaces	The loopback statement at the hierarchy level configures a loopback on the interface. Packets can be looped on either the local router or the remote channel service unit (CSU). To turn off loopback, remove the loopback statement from the configuration.
show	All interfaces	Verify the configuration before you commit it.
commit	All interfaces	Save the set of changes to the database and cause the changes to take operational effect. Use after you have verified a configuration in all configuration steps.
[edit interfaces <i>interface-name</i>] set clocking internal	T1, T3, ATM, and SONET interfaces	The clocking statement at this hierarchy level configures the clock source of the interface to internal.
show interfaces <i>interface-name</i>	Used for all interfaces	Display static status information about a specific interface.
[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet <i>address address</i>] arp <i>ip-address</i> mac <i>mac-address</i>	Fast Ethernet and Gigabit Ethernet interfaces	The arp statement at this hierarchy level defines mappings between IP and Media Access Control (MAC) addresses.
show arp no-resolve	Fast Ethernet and Gigabit Ethernet interfaces	Display the entries in the ARP table without attempting to determine the hostname that corresponds to the IP address (the no-resolve option).
clear interfaces statistics <i>interface-name</i>	All interfaces	Reset the statistics for an interface to zero.
[edit interfaces <i>interface-name</i>] set encapsulation cisco-hdlc	T1, T3, SONET, and Multichannel DS3 interfaces	The encapsulation statement at this hierarchy level sets the encapsulation to the Cisco High-level Data-Link Control (HDLC) transport protocol on the physical interface.

Table 12: Commands Used to Perform Loopback Testing on Interfaces (*continued*)

CLI Statement or Command	Interface Type	Description
[edit interfaces <i>interface-name</i>] set no-keepalives	T1, T3, SONET, and Multichannel DS3 interfaces	The no-keepalives statement at this level disables the sending of keepalives on the physical interface.
show interfaces <i>interface-name</i> terse	T1, T3, and SONET interfaces	Display summary information about interfaces. (Use to display the status of the logical interfaces for these interfaces.)
ping interface t1- <i>x/x/x</i> <i>local-IP-address</i> bypass-routing count 1000 rapid	All interfaces	<p>Check the reachability of network hosts by sending ICMP ECHO_REQUEST messages to elicit ICMP ECHO_RESPONSE messages from the specified host.</p> <p>Use the bypass-routing option to ping a local system through an interface that has no route through it.</p> <p>The count option sends 1000 ping requests through the system.</p> <p>Type Ctrl+C to interrupt a ping command.</p>
show interfaces <i>interface-name</i> extensive	All interfaces	Display very detailed interface information about a specific interface.

Locating Interface Alarms

Problem Locating alarms and errors for the media can be a simple process.

Solution To locate interface alarms and errors, use the **show interfaces *interface-name* extensive** command and examine the output for active alarms and defects.

Determining ATM Interface Type

- [Checklist for Determining ATM Interface Type on page 222](#)
- [Determining the ATM Interface Type and Configuration on page 224](#)
- [Determining the ATM Interface Type on page 224](#)
- [Identifying the ATM Interface Type on page 225](#)
- [Verifying the ATM Configuration on page 226](#)
- [Examples of Incorrect Configurations of ATM Options on page 229](#)

Checklist for Determining ATM Interface Type

Purpose To determine the type of Asynchronous Transfer Mode (ATM) interface on your router.

Action Table 13 on page 223 provides the links and commands for determining the type of ATM interface on your router.

Table 13: Checklist for Determining ATM Interface Type

Tasks	Command or Action
“Determining the ATM Interface Type and Configuration” on page 224	
1. Determining the ATM Interface Type on page 224	show chassis hardware NOTE: For ATM1 and ATM2 interfaces.
2. Identifying the ATM Interface Type on page 225	show chassis hardware NOTE: For ATM MIC interfaces.
3. Verifying the ATM Configuration on page 226	
a. Verifying the Configuration of an ATM1 Interface on page 226	show configuration interfaces at-<i>fpc/pic/port</i>
b. Verifying the Configuration of an ATM2 IQ Interface on page 227	show configuration interfaces at-<i>fpc/pic/port</i>
c. Verifying the Configuration of an ATM MIC Interface on page 228	show configuration interfaces at-<i>fpc/pic/port</i>
“Examples of Incorrect Configurations of ATM Options” on page 229	
1. Verifying the Configuration of the VCI on an ATM1 Interface on page 229	show configuration interfaces at-<i>fpc/pic/port</i> show interfaces terse at-<i>fpc/pic/port</i> edit edit interfaces <i>interface-name</i> atm-options vpi <i>vpi-identifier</i> maximum-vcs <i>maximum-vcs</i> show commit show configuration interfaces at-<i>fpc/pic/port</i> run show interfaces terse at-<i>fpc/pic/port</i>
2. Verifying the Configuration of the VCI on an ATM2 IQ Interface on page 230	show configuration interfaces at-<i>fpc/pic/port</i> show interfaces terse at-<i>fpc/pic/port</i> edit edit interfaces <i>interface-name</i> atm-options vpi <i>vpi-identifier</i> delete maximum-vcs show commit show configuration interfaces at-<i>fpc/pic/port</i> run show interfaces terse at-<i>fpc/pic/port</i>

Table 13: Checklist for Determining ATM Interface Type (*continued*)

Tasks	Command or Action
3. Verifying the Configuration of Promiscuous Mode on an ATM2 IQ Interface on page 231	<pre> show configuration interfaces at-<i>fpc/pic/port</i> show interfaces terse at-<i>fpc/pic/port</i> edit set interfaces <i>interface-name</i> atm-options pic-type atm 2 show commit show configuration interfaces at-<i>fpc/pic/port</i> run show interfaces terse at-<i>fpc/pic/port</i> </pre>

Determining the ATM Interface Type and Configuration

- Purpose** When you know the type of ATM interface on your router, you can configure it with the correct configuration options.
- For ATM1, ATM2 intelligent queuing (IQ) interfaces, and ATM MIC interfaces, the Junos OS does not determine from the interface name *at-fpc/pic/port* whether your routing platform has an ATM1, ATM2 IQ Physical Interface Card (PIC), or ATM Modular Interface Card (MIC) installed.
- Action** To determine the type of ATM interface on your router and to check your ATM interface configuration, follow these steps:
1. [Determining the ATM Interface Type on page 224](#)
 2. [Verifying the ATM Configuration on page 226](#)

Determining the ATM Interface Type

- Purpose** To determine the type of ATM interface on your router, use the following Junos OS command-line interface (CLI) operational mode command:
- Action** `user@host> show chassis hardware`
- Sample Output**
- ```

user@host> show chassis hardware
Hardware inventory:
Item Version Part number Serial number Description
Chassis 50992 M10
Midplane REV 03 710-001950 HB2090
Power Supply B Rev 04 740-002497 LJ23082 AC
Display REV 04 710-001995 HC5151
Routing Engine 9700000792694801 RE-2.0
FEB REV 06 710-003310 HH0211 E-FEB
FPC 0 E-FPC
PIC 0 REV 06 750-002992 HP2711 4x F/E, 100 BASE-TX
PIC 1 REV 02 750-005718 BE6774 1x OC-12 ATM-II IQ, MM
PIC 3 REV 04 750-002971 HC8106 4x OC-3 SONET, MM
FPC 1 E-FPC
PIC 1 REV 03 750-000612 AA7399 2x OC-3 ATM, MM
PIC 3 REV 02 750-000618 AE2070 4x T3

```

**Meaning** The sample output shows the hardware inventory. The ATM2 IQ interface is in Flexible PIC Concentrator (FPC) slot 0, and PIC slot 1, which translates to **at-fpc/pic/port** or **at-0/1/0**. The ATM1 interface name is **at-1/1/0**.

## Identifying the ATM Interface Type

**Purpose** Display information about the type of ATM interface.

**Action** To determine the type of ATM interface on your router:

**host1#show chassis hardware**

Hardware inventory:

| Item             | Version | Part number | Serial number | Description            |
|------------------|---------|-------------|---------------|------------------------|
| Chassis          |         |             | JN115736EAF   | MX240                  |
| Midplane         | REV 07  | 760-021404  | ABAA5038      | MX240 Backplane        |
| FPM Board        | REV 03  | 760-021392  | ABBA2758      | Front Panel Display    |
| PEM 0            | Rev 01  | 740-022697  | QCS0937C07K   | PS 1.2-1.7kW; 100-240V |
| AC in            |         |             |               |                        |
| PEM 1            | Rev 01  | 740-022697  | QCS0939C04X   | PS 1.2-1.7kW; 100-240V |
| AC in            |         |             |               |                        |
| PEM 2            | Rev 01  | 740-022697  | QCS0937C06B   | PS 1.2-1.7kW; 100-240V |
| AC in            |         |             |               |                        |
| PEM 3            | Rev 01  | 740-022697  | QCS0937C07U   | PS 1.2-1.7kW; 100-240V |
| AC in            |         |             |               |                        |
| Routing Engine 0 | REV 12  | 740-013063  | 9009042291    | RE-S-2000              |
| Routing Engine 1 | REV 12  | 740-013063  | 9009042266    | RE-S-2000              |
| CB 0             | REV 06  | 710-021523  | ABBC1435      | MX SCB                 |
| CB 1             | REV 06  | 710-021523  | ABBC1497      | MX SCB                 |
| FPC 2            | REV 14  | 750-031088  | YH8446        | MPC Type 2 3D Q        |
| CPU              | REV 06  | 711-030884  | YH9612        | MPC PMB 2G             |
| MIC 0            |         |             |               |                        |
| MIC 1            | REV 10  | 750-036132  | ZP7062        | 2x0C12/8x0C3 CC-CE     |
| PIC 2            |         | BUILTIN     | BUILTIN       | 2x0C12/8x0C3 CC-CE     |
| Xcvr 0           |         | NON-JNPR    | 23393-00492   | UNKNOWN                |
| Xcvr 1           |         | NON-JNPR    | 23393-00500   | UNKNOWN                |
| Xcvr 2           |         | NON-JNPR    | 23393-00912   | UNKNOWN                |
| Xcvr 3           | REV 01  | 740-015638  | 22216-00575   | Load SFP               |
| Xcvr 4           | REV 01  | 740-015638  | 24145-00110   | Load SFP               |
| Xcvr 5           | REV 01  | 740-015638  | 24145-00016   | Load SFP               |
| Xcvr 6           | REV 01  | 740-015638  | 24145-00175   | Load SFP               |
| Xcvr 7           |         | NON-JNPR    | 23393-00627   | UNKNOWN                |
| QXM 0            | REV 05  | 711-028408  | YF4681        | MPC QXM                |
| QXM 1            | REV 05  | 711-028408  | YF4817        | MPC QXM                |
| Fan Tray 0       | REV 01  | 710-021113  | XL3645        | MX240 Fan Tray         |

**Meaning** On an MX Series router with an ATM MIC with SFP, the ATM interface is in FPC slot 2 and PIC slot 2, which translates to **at-fpc/pic/port** or **at-2/2/0**.

Table 14 on page 226 lists the **show chassis hardware** command output fields.

Table 14: show chassis hardware Output Fields

| Field Name    | Field Description                                                                                                                                                                                                                                           |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Item          | Information about the backplane, routing engine, power entry modules (PEM), and fan trays. Also displays information about the FPCs and associated PICs and MPCs and associated MICs or DPCs.                                                               |
| Version       | Revision level of the chassis component.                                                                                                                                                                                                                    |
| Part Number   | Part number of the chassis component.                                                                                                                                                                                                                       |
| Serial Number | Serial number of the chassis component. The serial number of the backplane is also the serial number of the router or switch chassis. Use this serial number when you need to contact Juniper Networks Customer Support about the router or switch chassis. |
| Description   | Brief description of the hardware component.                                                                                                                                                                                                                |

## Verifying the ATM Configuration

The supported set of configuration options varies between the ATM1 and ATM2 IQ interfaces. If you configure an ATM1 interface using ATM2 IQ configuration options, the configuration does not commit. The same occurs if you configure an ATM2 IQ interface with ATM1 options. See the *Junos Network Interfaces Configuration Guide* for more information on the options supported for ATM1 and ATM2 IQ interfaces.

1. [Verifying the Configuration of an ATM1 Interface on page 226](#)
2. [Verifying the Configuration of an ATM2 IQ Interface on page 227](#)
3. [Verifying the Configuration of an ATM MIC Interface on page 228](#)

### Verifying the Configuration of an ATM1 Interface

**Purpose** The Junos OS assumes an ATM1 interface configuration if you include the **maximum-vcs** statement without the **pic-type** statement at the **[edit interfaces at-fpc/pic/port atm-options]** hierarchy level,

**Action** To check the configuration of an ATM1 interface, use the following Junos OS CLI operational mode command:

```
user@host> show configuration interfaces at-fpc/pic/port
```

**Sample Output 1**

```
user@host> show configuration interfaces at-0/1/0
atm-options {
 vpi 1 {
 maximum-vcs 1024;
 }
}
unit 100 {
 vci 1.100;
 family inet {
```

```

 address 25.25.25.2/30;
 }
}

```

**Sample Output 2**

```

user@host> show configuration interfaces at-1/0/0
atm-options {
 pic-type atm1;
 vpi 0 maximum-vcs 256;
 vpi 1 maximum-vcs 512;
}

```

**Meaning** The sample output shows the correct configuration of an ATM1 interface. Sample output 1 shows the **maximum-vcs** statement configured on an ATM interface. Because the **pic-type** statement is not included in the configuration, this interface is assumed to be an ATM1 interface. Use the **show chassis hardware** command to verify that the interface is an ATM1. Otherwise this could be the incorrect configuration of an ATM2 IQ interface. Sample output 2 shows the correct configuration of an ATM1 interface with the **pic-type** statement and the **maximum-vcs** statement.

### Verifying the Configuration of an ATM2 IQ Interface

**Purpose** ATM2 IQ interfaces must *not* have the **maximum-vcs** statement included in the configuration.

**Action** To check the configuration on an ATM2 IQ interface, use the following CLI operational mode command:

```

user@host> show configuration interfaces at-fpc/pic/port

```

**Sample Output 1**

```

user@host> show configuration interfaces at-0/1/0
atm-options {
 vpi 1;
}
unit 100 {
 vci 1.100;
 family inet {
 address 25.25.25.1/30;
 }
}

```

**Sample Output 2**

```

user@host> show configuration interfaces at-2/2/0
atm-options {
 pic-type atm2 ;
 vpi 1;
}
unit 100 {
 encapsulation ether-over-atm-llc;
 vci 1.100;
 shaping {
 vbr peak 66k sustained 66k burst 40;
 }
 family inet {
 address 192.168.5.1/24;
 }
}

```

```
}
[...Output truncated...]
```

**Meaning** The sample output shows the correct configuration of an ATM2 IQ interface. The first example shows that the interface **at-0/1/0** has ATM options configured and the logical interface **at-0/1/0.100**. Sample output 2 shows another interface **at-2/2/0** with the PIC type configured.



**NOTE:** The ATM2 IQ interface does *not* have the **maximum-vcs** statement included in the configuration.

---

### Verifying the Configuration of an ATM MIC Interface

---

**Purpose** Verify that the ATM MIC interface is configured correctly. ATM MIC interfaces do *not* have the **maximum-cvs** and **pic-type** statements included in the configuration.

**Action** To check the configuration of the ATM MIC interface:

```
user@host>show configuration interfaces at-2/2/0

atm-options {
 vpi 7;
}
unit 100 {
 encapsulation atm-vc-mux;
 vci 7.100
 family inet {
 address 10.10.10.1/32;{
 destination 10.10.20.1
 }
}
}
```

**Meaning** The sample output shows the correct configuration of an ATM MIC interface. The sample output shows that the interface **at-2/2/0** has ATM options configured.



**NOTE:** The ATM MIC interface does *not* have the **maximum-cvs** statement or the **pic-type** statement included in the configuration.



## Examples of Incorrect Configurations of ATM Options

Even though ATM1 and ATM2 IQ interfaces may be configured with the incorrect options, the configuration may commit but the logical interface may not come up. Here are some examples of incorrectly configured options:

1. [Verifying the Configuration of the VCI on an ATM1 Interface on page 229](#)
2. [Verifying the Configuration of the VCI on an ATM2 IQ Interface on page 230](#)
3. [Verifying the Configuration of Promiscuous Mode on an ATM2 IQ Interface on page 231](#)

### Verifying the Configuration of the VCI on an ATM1 Interface

**Purpose** If your configuration of the virtual channel identifier (VCI) is incorrect, the logical interface is not created.

**Action** To verify that VCI is configured correctly on your ATM1 interface, follow these steps:

1. Verify the configuration with the following Junos OS CLI operational mode command:

```
user@host> show configuration interfaces at-fpc/pic/port
```

For example, the following output shows an *incorrectly* configured ATM1 interface:

```
user@host> show configuration interfaces at-1/2/0
atm-options {
 vpi 1;
} <<< the maximum-vcs statement is missing
unit 100 {
 vci 1.100;
 family inet {
 address 25.25.25.2/30;
 }
}
```

2. Check if the logical interface unit 100 is created with the following command:

```
user@host> show interfaces terse at-fpc/pic/port
```

For example, the following output shows that the link is not created:

```
user@host> show interfaces terse at-1/2/0
Interface Admin Link Proto Local Remote
at-1/2/0 up up
<<< missing logical interface at-1/2/0.100
```

3. Include the **maximum-vcs** statement in the configuration:

```
user@host> edit
user@host# edit interfaces interface-name atm-options vpi vpi-identifier
maximum-vcs maximum-vcs
user@host# show
user@host# commit
```

For example, the following output shows a *correctly* configured ATM1 interface:

```
user@host> show configuration interfaces at-0/1/0
atm-options {
 vpi 1 {
 maximum-vcs 1024;
```

```

 }
}
unit 100 {
 vci 1.100;
 family inet {
 address 25.25.25.2/30;
 }
}

```

1. Check that the logical interface is created with the following command:

```
user@host> run show interfaces terse at-fpc/pic/port
```

For example, the following output shows that the link is created:

```

user@host# run show interfaces terse at-1/2/0
Interface Admin Link Proto Local Remote
at-1/2/0 up up
at-1/2/0.100 up up inet 25.25.25.2/30

```

**Meaning** The steps above show that initially the logical interface **at-1/2/0.100** is not created because the **maximum-vcs** statement is not included in the ATM1 configuration. When that statement is included, the logical interface is created.

### Verifying the Configuration of the VCI on an ATM2 IQ Interface

**Purpose** If your configuration of the VCI is incorrect, the logical interface is not created.

**Action** To check that VCI is configured correctly on your ATM2 IQ interface, follow these steps:

1. Check the configuration with the following Junos OS CLI operational mode command:

```
user@host> show configuration interfaces at-fpc/pic/port
```

For example, the following output shows an *incorrectly* configured ATM2 IQ interface:

```

user@host> show configuration interfaces at-0/1/0
atm-options {
 vpi 1 {
 maximum-vcs 200; <<< incorrectly included
 }
}
unit 100 {
 vci 1.100;
 family inet {
 address 25.25.25.1/30;
 }
}

```

2. Check if the logical interface unit 100 is created with the following command:

```
user@host> show interfaces terse at-fpc/pic/port
```

For example, the following output shows that the link is not created:

```

user@host> show interfaces terse at-0/1/0
Interface Admin Link Proto Local Remote
at-0/1/0 up up
<<< missing logical interface at-0/1/0.100

```

3. Delete the incorrect **maximum-vcs** statement from the configuration:

```
user@host> edit
user@host# edit interfaces interface-name atm-options vpi vpi-identifier
user@host# delete maximum-vcs
user@host# show
user@host# commit
```

For example, the following output shows a *correctly* configured ATM2 IQ interface:

```
user@host> show configuration interfaces at-0/1/0
atm-options {
 vpi 1 {
 }
}
unit 100 {
 vci 1.100;
 family inet {
 address 25.25.25.1/30;
 }
}
```

4. Check that the logical interface is created with the following command:

```
user@host> show interfaces terse at-fpc/pic/port
```

For example, the following output shows that the link is created:

```
user@host> show interfaces terse at-0/1/0
Interface Admin Link Proto Local Remote
at-0/1/0 up up
at-0/1/0.100 up up inet 25.25.25.1/30
```

**Meaning** The steps above show that initially the logical interface **at-0/1/0.100** is not created because the **maximum-vcs** statement is included in the ATM2 IQ configuration. When that statement is deleted, the logical interface is created.

### Verifying the Configuration of Promiscuous Mode on an ATM2 IQ Interface

**Purpose** If your configuration of promiscuous mode is incorrect, the logical interface is not created. ATM2 IQ interfaces must have the **pic-type atm2** statement included if you are including the **promiscuous-mode** statement in the configuration.

**Action** To check that promiscuous mode is configured correctly on your ATM2 IQ interface, follow these steps:

1. Check the configuration with the following Junos OS CLI operational mode command:

```
user@host> show configuration interfaces at-fpc/pic/port
```

For example, the following output shows promiscuous mode *incorrectly* configured on an ATM2 IQ interface:

```
user@host> show configuration interfaces at-1/2/0
encapsulation atm-ccc-cell-relay;
atm-options {
 promiscuous-mode { <<< the pic-type statement is missing
 vpi 1;
 }
}
```

```

}
unit 1 {
 vpi 1;
}

```

2. Check if the logical interface unit 1 is created with the following command:

```
user@host> run show interfaces terse at-fpc/pic/port
```

For example, the following output shows that the link is not created:

```

user@host# run show interfaces terse at-0/1/0
Interface Admin Link Proto Local Remote
at-0/1/0 up up
<<< missing logical interface at-0/1/0.1

```

3. Include the **pic-type** statement in the configuration:

```

user@host> edit
user@host# set interfaces interface-name atm-options pic-type atm2
user@host# show
user@host# commit

```

For example, the following output shows promiscuous mode correctly configured on an ATM2 IQ interface:

```

user@host> show configuration interfaces at-0/1/0
encapsulation atm-ccc-cell-relay;
atm-options {
 pic-type atm2;
 promiscuous-mode {
 vpi 1;
 }
}
unit 1 {
 vpi 1;
}

```

4. Check that the logical interface is created with the following command:

```
user@host> run show interfaces terse at-fpc/pic/port
```

For example, the following output shows that the link is created:

```

user@host# run show interfaces terse at-0/1/0
Interface Admin Link Proto Local Remote
at-0/1/0 up up
at-0/1/0.1 up up ccc

```

**Meaning** The steps above show that initially the logical interface **at-0/1/0.1** is not created because the **pic-type** statement is not included with the **promiscuous-mode** statement in the ATM2 IQ configuration. When that statement is included, the logical interface is created.

#### Related Documentation

- [Investigating Interface Steps and Commands on page 219](#)
- [Monitoring ATM Interfaces on page 233](#)
- [Using Loopback Testing for ATM Interfaces on page 254](#)
- [Locating ATM Alarms and Errors on page 266](#)

## Monitoring ATM Interfaces

- [Checklist for Monitoring ATM Interfaces on page 233](#)
- [Monitoring ATM Interfaces on page 234](#)
- [Monitoring ATM1 Interfaces on page 235](#)
- [Monitoring ATM2 IQ Interfaces on page 239](#)
- [Monitoring ATM MIC Interfaces on page 247](#)

### Checklist for Monitoring ATM Interfaces

**Purpose** To monitor Asynchronous Transfer Mode (ATM) interfaces and begin the process of isolating ATM interface problems when they occur.

**Action** [Table 15 on page 233](#) provides the links and commands for monitoring ATM interfaces.

**Table 15: Checklist for Monitoring ATM Interfaces**

| Tasks                                                                                                | Command or Action                                                                                                |
|------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| <a href="#">“Monitoring ATM Interfaces” on page 234</a>                                              | <code>show interfaces terse at*</code>                                                                           |
| <a href="#">“Monitoring ATM1 Interfaces” on page 235</a>                                             |                                                                                                                  |
| 1. <a href="#">Displaying the Status of a Specific ATM1 Interface on page 235</a>                    | <code>show interfaces at-<i>fpc/pic/port</i></code>                                                              |
| 2. <a href="#">Displaying Extensive Status Information for a Specific ATM1 Interface on page 235</a> | <code>show interfaces at-<i>fpc/pic/port</i> extensive</code>                                                    |
| 3. <a href="#">“Monitoring Statistics for an ATM1 Interface” on page 237</a>                         | <code>monitor interface at-<i>fpc/pic/port</i></code>                                                            |
| <a href="#">“Monitoring ATM2 IQ Interfaces” on page 239</a>                                          |                                                                                                                  |
| 1. <a href="#">Displaying the Status of a Specific ATM2 IQ Interface on page 239</a>                 | <code>show interfaces terse at-<i>fpc/pic/port</i></code><br><code>show interfaces at-<i>fpc/pic/port</i></code> |
| 2. <a href="#">Displaying Extensive Information for a Specific ATM2 Interface on page 241</a>        | <code>show interfaces at-<i>fpc/pic/port</i> extensive</code>                                                    |
| 3. <a href="#">Monitoring Statistics for an ATM2 Interface on page 246</a>                           | <code>monitor interface at-<i>fpc/pic/port</i></code>                                                            |
| <a href="#">“Monitoring ATM MIC Interfaces” on page 247</a>                                          |                                                                                                                  |
| 1. <a href="#">Displaying the Status of a Specific ATM MIC Interface on page 247</a>                 | <code>show interfaces terse at-<i>fpc/pic/port</i></code><br><code>show interfaces at-<i>fpc/pic/port</i></code> |
| 2. <a href="#">Displaying Extensive Information for a Specific ATM MIC Interface on page 249</a>     | <code>show interfaces at-<i>fpc/pic/port</i> extensive</code>                                                    |
| 3. <a href="#">Monitoring Traffic and Error Statistics for an ATM MIC Interface on page 252</a>      | <code>monitor interface at-<i>fpc/pic/port</i></code>                                                            |

## Monitoring ATM Interfaces

**Purpose** By monitoring ATM interfaces, you begin the process of isolating ATM interface problems when they occur. The following command provides the status of all ATM interfaces on the router. See [“Checklist for Determining ATM Interface Type” on page 222](#) for information on how to determine the ATM interface type.

**Action** To display the status of all ATM interfaces, use the following Junos OS command-line interface (CLI) operational mode command:

```
user@host> show interfaces terse at*
```

**Sample Output** The following sample output is for an ATM1 interface:

```
user@host> show interfaces terse at*
Interface Admin Link Proto Local Remote
at-2/0/0 up up
at-2/2/0.100 up up inet 10.16.5.1/24
at-2/2/0.101 up up inet 10.16.250.253/30
at-2/2/0.200 up up inet 20.20.20.1/30
at-2/2/0.300 up up inet 30.30.30.1/30
at-2/2/0.400 up up inet 40.40.40.1/30
at-2/2/0.32767 up up
at-2/0/1 up down
at-2/0/1.10 up down inet 10.10.100.1/30
```

**Meaning** The sample output lists only the ATM interfaces and shows the status of both the physical and logical interfaces. See [Table 16 on page 234](#) for a description of what the output means. You cannot determine from this output whether the interfaces are ATM1 or ATM2 intelligent queuing (IQ). See [“Checklist for Determining ATM Interface Type” on page 222](#) for information on how to determine the ATM interface type.

**Table 16: Status of ATM Interfaces**

| Physical Interface | Logical Interface | Status Description                                                                                                                                                                                                                                                                                                                                                             |
|--------------------|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| at-2/0/0           | at-2/0/0.100      | Both the physical and logical links are up and running on this interface. By default on an ATM interface, if the physical link is up, the logical link is also up. However, for ATM 1 or ATM2 IQ interfaces with an ATM encapsulation and OAM configured for the VC, even if the physical interface is up, the logical link for a VC can be down due to a VC misconfiguration. |
| Admin Up           | Admin Up          |                                                                                                                                                                                                                                                                                                                                                                                |
| Link Up            | Link Up           |                                                                                                                                                                                                                                                                                                                                                                                |
| at-2/0/1           | at-2/0/1.10       | The physical link is down on this interface and therefore the logical interface is down also.                                                                                                                                                                                                                                                                                  |
| Admin Up           | Admin Up          |                                                                                                                                                                                                                                                                                                                                                                                |
| Link Down          | Link Down         |                                                                                                                                                                                                                                                                                                                                                                                |

## Monitoring ATM1 Interfaces

To monitor an ATM1 interface, follow these steps:

1. [Displaying the Status of a Specific ATM1 Interface on page 235](#)
2. [Displaying Extensive Status Information for a Specific ATM1 Interface on page 235](#)
3. [Monitoring Statistics for an ATM1 Interface on page 237](#)

### Displaying the Status of a Specific ATM1 Interface

**Purpose** To display the status of a specific ATM interface, use the following Junos OS CLI operational mode command:

**Action** `user@host> show interfaces at-fpc/pic/port`

**Meaning** The first line of the sample output shows that the physical link is down and therefore the logical link is down also. This means that the interface cannot pass packets.

Further down the sample output, look for active alarms and defects. If there are any, and to further diagnose the problem, see [“Displaying Extensive Status Information for a Specific ATM1 Interface” on page 235](#) to display more extensive information about the ATM interface and the physical interface that is down.

### Displaying Extensive Status Information for a Specific ATM1 Interface

**Purpose** To display extensive status information about a specific interface, use the following Junos OS CLI operational mode command:

**Action** `user@host> show interfaces at-fpc/pic/port extensive`

**Sample Output**

```
user@host> show interfaces at-2/0/1 extensive
Physical interface: at-2/0/1, Enabled, Physical link is Down
 Interface index: 23, SNMP ifIndex: 43, Generation: 22
 Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, SONET mode, Speed:
OC3 , Loopback: None, Payload scrambler: Enabled
 Device flags : Present Running Down
 Link flags : None
 Hold-times : Up 0 ms, Down 0 ms
 Statistics last cleared: 2002-07-29 14:28:14 EDT (00:18:00 ago)
 Traffic statistics:
 Input bytes : 0 0 bps
 Output bytes : 0 0 bps
 Input packets : 0 0 pps
 Output packets : 0 0 pps
 Input errors:
 Errors: 0, Drops: 0, Invalid VCs: 0, Framing errors: 0, Policed discards: 0,
L3 incompletes: 0, L2 channel errors: 0,
 L2 mismatch timeouts: 0
 Output errors:
 Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0
 SONET alarms : LOL, LOS
 SONET defects : LOL, LOF, LOS, SEF, AIS-L, AIS-P, RDI-P, PLM-P
 SONET PHY:
 Seconds Count State
 PLL Lock 0 0 OK
```

```

PHY Light 1079 0 Light Missing
SONET section:
 BIP-B1 0 0
 SEF 1079 0 Defect Active
 LOS 1079 0 Defect Active
 LOF 1079 0 Defect Active
 ES-S 1079
 SES-S 1079
 SEFS-S 1079
SONET line:
 BIP-B2 0 0
 REI-L 0 0
 RDI-L 0 0 OK
 AIS-L 1079 0 Defect Active
 BERR-SF 0 0 OK
 BERR-SD 0 0 OK
 ES-L 1079
 SES-L 1079
 UAS-L 1079
 ES-LFE 0
 SES-LFE 0
 UAS-LFE 0
SONET path:
 BIP-B3 0 0
 REI-P 0 0
 LOP-P 0 0 OK
 AIS-P 1079 0 Defect Active
 RDI-P 1079 0 Defect Active
 UNEQ-P 0 0 OK
 PLM-P 1079 0 Defect Active
 ES-P 1079
 SES-P 1079
 UAS-P 1079
 ES-PFE 1079
 SES-PFE 1079
 UAS-PFE 1079
Received SONET overhead:
 F1 : 0x00, J0 : 0x00, K1 : 0xff, K2 : 0xff
 S1 : 0x00, C2 : 0xff, C2(cmp) : 0x13, F2 : 0x00
 Z3 : 0x00, Z4 : 0x00, S1(cmp) : 0x00, V5 : 0x00
 V5(cmp) : 0x00
Transmitted SONET overhead:
 F1 : 0x00, J0 : 0x01, K1 : 0x00, K2 : 0x00
 S1 : 0x00, C2 : 0x13, F2 : 0x00, Z3 : 0x00
 Z4 : 0x00, V5 : 0x00
ATM status:
 HCS state: Hunt
 LOC : OK
ATM Statistics:
 Uncorrectable HCS errors: 0, Correctable HCS errors: 0, Tx cell FIFO overruns:
0, Rx cell FIFO overruns: 0,
 Rx cell FIFO underruns: 0, Input cell count: 0, Output cell count: 381110991,
Output idle cell count: 18446744069795695321,
 Output VC queue drops: 0, Input no buffers: 0, Input length errors: 0, Input
timeouts: 0, Input invalid VCs: 0,
 Input bad CRCs: 0, Input OAM cell no buffers: 0
PFE configuration:
 Destination slot: 2
 CoS transmit queue

```

|               | Bandwidth | Buffer  | Priority | Limit |
|---------------|-----------|---------|----------|-------|
|               | % bps     | % bytes |          |       |
| 0 best-effort | 0 0       | 0       | low      | none  |



```

1 expedited-forwarding 0 0 0 0 low none
2 assured-forwarding 0 0 0 0 low none
3 network-control 0 0 0 0 low none
Logical interface at-2/0/1.10 (Index 30) (SNMP ifIndex 65) (Generation 29)
Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: ATM-SNAP
Traffic statistics:
Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0
Local statistics:
Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0
Transit statistics:
Input bytes : 0 0 bps
Output bytes : 0 0 bps
Input packets: 0 0 pps
Output packets: 0 0 pps
Protocol inet, MTU: 4470, Flags: None, Generation: 32 Route table: 0
Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
Destination: 192.168.100.0/30, Local: 192.168.100.1, Broadcast:
Unspecified, Generation: 61
VCI 2.100
Flags: Active
Total down time: 0 sec, Last down: Never
ATM per-VC transmit statistics:
Tail queue packet drops: 0
Traffic statistics:
Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets:

```

**Meaning** The sample output is for an OC3 ATM interface and shows the statistics for the SONET media, as well as the **Input** and **Output** ATM errors. Error details include input and output errors, active alarms and defects, and media-specific errors.

If the physical link is down, look at the active alarms and defects for the ATM interface and check the ATM media accordingly. See [“List of Common ATM Alarms and Error”](#) on [page 266](#) for an explanation of ATM alarms.

### Monitoring Statistics for an ATM1 Interface

**Purpose** To monitor statistics for an ATM1 interface, use the following Junos OS CLI operational mode command:

**Action** `user@host> monitor interface at-fpc/pic/port`



**CAUTION:** We recommend that you use this command only for diagnostic purposes. Do not leave it on during normal router operations because real-time monitoring of traffic consumes additional CPU and memory resources.

```

Sample Output user@host> monitor interface at-2/0/0
host Seconds: 68 Time: 13:52:33
 Delay: 0/0/2

Interface: at-2/0/0, Enabled, Link is Up
Encapsulation: ATM-PVC, Speed: OC3
Traffic statistics:
Input bytes: 1528168 (2142968 bps) [1528000]
Output bytes: 1540192 (2165880 bps) [1540000]
Input packets: 1002 (175 pps) [1000]
Output packets: 1002 (175 pps) [1000]
Error statistics:
Input errors: 0 [0]
Input drops: 0 [0]
Input framing errors: 0 [0]
Policed discards: 0 [0]
L3 incompletes: 0 [0]
L2 channel errors: 0 [0]
L2 mismatch timeouts: 0 [0]
Carrier transitions: 0 [0]
Output errors: 0 [0]
Output drops: 0 [0]
Aged packets: 0 [0]
ATM statistics:
Input cell count 33049 [33034]
Input invalid vc 0 [0]
Output cell count 89231368868 [23664462]
Output idle cell count 18446744072746574220 [23631438]
Active alarms : None
Active defects: None
SONET error counts/seconds:
LOS count 0 [0]
LOF count 0 [0]
SEF count 0 [0]
ES-S 0 [0]
SES-S 0 [0]
SONET statistics:
BIP-B1 0 [0]
BIP-B2 0 [0]
REI-L 0 [0]
BIP-B3 0 [0]
REI-P 0 [0]
Received SONET overhead: F1 : 0x00 J0 : 0x00Z
Next='n', Quit='q' or ESC, Freeze='f', Thaw='t', Clear='c', Interface='i'

```

**Meaning** The sample output checks for and displays common interface failures and any increases in framing errors. Information from this command can help you narrow down possible causes of an interface problem.



**NOTE:** If you are accessing the router from the console connection, make sure you set the CLI terminal type using the `set cli terminal` command.

## Monitoring ATM2 IQ Interfaces

To monitor an ATM2 interface, follow these steps:

1. [Displaying the Status of a Specific ATM2 IQ Interface on page 239](#)
2. [Displaying Extensive Information for a Specific ATM2 Interface on page 241](#)
3. [Monitoring Statistics for an ATM2 Interface on page 246](#)

### Displaying the Status of a Specific ATM2 IQ Interface

**Purpose** To display the status of a specific ATM2 IQ interface, use the following Junos OS CLI operational mode commands:

**Action** `user@host> show interfaces terse at-fpc/pic/port`  
`user@host> show interfaces at-fpc/pic/port`

**Sample Output 1**

```
user@host> show interfaces terse at-2/2/0
Interface Admin Link Proto Local Remote
at-2/2/0 up up
at-2/2/0.100 up up inet 10.16.5.1/24
at-2/2/0.101 up up inet 10.16.250.253/30
at-2/2/0.200 up up inet 20.20.20.1/30
at-2/2/0.300 up up inet 30.30.30.1/30
at-2/2/0.400 up up inet 40.40.40.1/30
at-2/2/0.32767 up up
```

**Sample Output 2**

```
user@host> show interfaces at-2/2/0
Physical interface: at-2/2/0, Enabled, Physical link is Up
 Interface index: 138, SNMP ifIndex: 26
 Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, SONET mode, Speed:
OC12, Loopback: None,
 Payload scrambler: Enabled
 Device flags : Present Running
 Link flags : None
 CoS queues : 4 supported
 Current address: 00:90:69:d6:d5:3a
 Last flapped : 2004-05-03 14:32:52 UTC (02:41:35 ago)
 Input rate : 0 bps (0 pps)
 Output rate : 0 bps (0 pps)
 SONET alarms : None
 SONET defects : None
 VPI 1
 Flags: Active
 Total down time: 0 sec, Last down: Never
 Traffic statistics:
 Input packets: 0
 Output packets: 18
 Logical interface at-2/2/0.100 (Index 67) (SNMP ifIndex 36)
 Flags: Point-To-Multipoint SNMP-Traps Encapsulation: Ether-over-ATM-LLC
 Input packets : 0
 Output packets: 7
 Protocol inet, MTU: 1500
 Flags: None
 Addresses, Flags: Is-Preferred Is-Primary
 Destination: 172.16.5.24, Local: 172.16.5.1, Broadcast: 172.16.5.255
 VCI 1.100
 Flags: Active, Shaping, Multicast
```

```
VBR, Peak: 66kbps, Sustained: 66kbps, Burst size: 40
Total down time: 0 sec, Last down: Never
EPD threshold: 0, Transmit weight cells: 0
Input packets : 0
Output packets: 14
Logical interface at-2/2/0.101 (Index 68) (SNMP ifIndex 37)
 Flags: Point-To-Point SNMP-Traps Encapsulation: ATM-SNAP
Input packets : 0
Output packets: 2
 Protocol inet, MTU: 4470
 Flags: None
 Addresses, Flags: Is-Preferred Is-Primary
 Destination: 172.16.250.252/30, Local: 172.16.250.253, Broadcast:
172.16.250.255
 VCI 1.101
 Flags: Active
 Total down time: 0 sec, Last down: Never
 EPD threshold: 0, Transmit weight cells: 0
 Input packets : 0
 Output packets: 2
Logical interface at-2/2/0.200 (Index 69) (SNMP ifIndex 8280)
 Flags: Point-To-Point SNMP-Traps Encapsulation: ATM-SNAP
Input packets : 0
Output packets: 0
 Protocol inet, MTU: 4470
 Flags: None
 Addresses, Flags: Is-Preferred Is-Primary
 Destination: 20.20.20.0/30, Local: 20.20.20.1, Broadcast: 20.20.20.3
 VCI 1.200
 Flags: Active
 Total down time: 0 sec, Last down: Never
 EPD threshold: 0, Transmit weight cells: 0
 Input packets : 0
 Output packets: 0
Logical interface at-2/2/0.300 (Index 70) (SNMP ifIndex 8281)
 Flags: Point-To-Point SNMP-Traps Encapsulation: ATM-SNAP
Input packets : 0
Output packets: 0
 Protocol inet, MTU: 4470
 Flags: None
 Addresses, Flags: Is-Preferred Is-Primary
 Destination: 30.30.30.0/30, Local: 30.30.30.1, Broadcast: 30.30.30.3
 VCI 1.300
 Flags: Active
 Total down time: 0 sec, Last down: Never
 EPD threshold: 0, Transmit weight cells: 0
 Input packets : 0
 Output packets: 0
Logical interface at-2/2/0.400 (Index 72) (SNMP ifIndex 8282)
 Flags: Point-To-Point SNMP-Traps Encapsulation: ATM-SNAP
Input packets : 0
Output packets: 0
 Protocol inet, MTU: 4470
 Flags: None
 Addresses, Flags: Is-Preferred Is-Primary
 Destination: 40.40.40.0/30, Local: 40.40.40.1, Broadcast: 40.40.40.3
 VCI 1.400
 Flags: Active
 Total down time: 0 sec, Last down: Never
 EPD threshold: 0, Transmit weight cells: 0
 Input packets : 0
```

```

Output packets: 0
Logical interface at-2/2/0.32767 (Index 71) (SNMP ifIndex 27)
Flags: Point-To-Multipoint No-Multicast SNMP-Traps Encapsulation: ATM-VCMUX
Input packets : 0
Output packets: 0
VCI 1.4
Flags: Active
Total down time: 0 sec, Last down: Never
EPD threshold: 0, Transmit weight cells: 0
Input packets : 0
Output packets: 0

```

**Meaning** The first line of the sample output shows that the physical link and all logical links are up. This means that the interface can pass packets.

Further down the sample output, look for active alarms and defects. If there are any, and to further diagnose the problem, see [“Displaying Extensive Information for a Specific ATM2 Interface” on page 241](#) to display more extensive information about the ATM interface and the physical interface that is down.

### Displaying Extensive Information for a Specific ATM2 Interface

**Purpose** To display extensive status information about a specific ATM2 interface, use the following Junos OS CLI operational mode command:

**Action** `user@host> show interfaces at-fpc/pic/port extensive`

**Sample Output**

```

user@host> show interfaces at-2/2/0 extensive
Physical interface: at-2/2/0, Enabled, Physical link is Up
Interface index: 138, SNMP ifIndex: 26, Generation: 21
Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, SONET mode, Speed:
OC12, Loopback: None,
Payload scrambler: Enabled
Device flags : Present Running
Link flags : None
CoS queues : 4 supported
Hold-times : Up 0 ms, Down 0 ms
Current address: 00:90:69:d6:d5:3a
Last flapped : 2004-05-03 14:32:52 UTC (02:42:30 ago)
Statistics last cleared: Never
Traffic statistics:
Input bytes : 0 0 bps
Output bytes : 1600 0 bps
Input packets : 0 0 pps
Output packets: 18 0 pps
Input errors:
Errors: 0, Drops: 0, Invalid VCs: 0, Framing errors: 0, Policed discards: 0,
L3 incompletes: 0,
L2 channel errors: 0, L2 mismatch timeouts: 0
Output errors:
Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0
Queue counters: Queued packets Transmitted packets Dropped packets

0 assured-forw 18 18 0
1 expedited-fo 0 0 0
2 best-effort 0 0 0

```

```

3 network-cont 0 0 0

SONET alarms : None
SONET defects : None
SONET PHY:
Seconds Count State
 PLL Lock 0 0 OK
 PHY Light 0 0 OK
SONET section:
 BIP-B1 1 13
 SEF 0 0 OK
 LOS 0 0 OK
 LOF 0 0 OK
 ES-S 1
 SES-S 0
 SEFS-S 0
SONET line:
 BIP-B2 1 196
 REI-L 1 291
 RDI-L 0 0 OK
 AIS-L 0 0 OK
 BERR-SF 0 0 OK
 BERR-SD 0 0 OK
 ES-L 1
 SES-L 0
 UAS-L 0
 ES-LFE 1
 SES-LFE 0
 UAS-LFE 0
SONET path:
 BIP-B3 1 36
 REI-P 1 211
 LOP-P 0 0 OK
 AIS-P 0 0 OK
 RDI-P 0 0 OK
 UNEQ-P 0 0 OK
 PLM-P 0 0 OK
 ES-P 1
 SES-P 0
 UAS-P 0
 ES-PFE 1
 SES-PFE 0
 UAS-PFE 0
Received SONET overhead:
 F1 : 0x00, J0 : 0x00, K1 : 0x00, K2 : 0x00
 S1 : 0x00, C2 : 0x13, C2(cmp) : 0x13, F2 : 0x00
 Z3 : 0x00, Z4 : 0x00, S1(cmp) : 0x00
Transmitted SONET overhead:
 F1 : 0x00, J0 : 0x01, K1 : 0x00, K2 : 0x00
 S1 : 0x00, C2 : 0x13, F2 : 0x00, Z3 : 0x00
 Z4 : 0x00
ATM status:
 HCS state: Sync
 LOC : OK
ATM Statistics:
 Uncorrectable HCS errors: 177, Correctable HCS errors: 3, Tx cell FIFO
overruns: 0,
 Rx cell FIFO overruns: 0, Rx cell FIFO underruns: 0, Input cell count: 4,
 Output cell count: 13785683517, Output idle cell count: 0, Output VC queue
drops: 0,
 Input no buffers: 0, Input length errors: 0, Input timeouts: 0, Input invalid

```

```

VCs: 2,
 Input bad CRCs: 0, Input OAM cell no buffers: 0
Packet Forwarding Engine configuration:
 Destination slot: 2
 VPI 1
 Flags: Active
 Total down time: 0 sec, Last down: Never
 Traffic statistics:
 Input bytes : 0
 Output bytes : 1600
 Input packets: 0
 Output packets: 18
Logical interface at-2/2/0.100 (Index 67) (SNMP ifIndex 36) (Generation 11)
 Flags: Point-To-Multipoint SNMP-Traps Encapsulation: Ether-over-ATM-LLC
 Traffic statistics:
 Input bytes : 0
 Output bytes : 896
 Input packets: 0
 Output packets: 7
 Local statistics:
 Input bytes : 0
 Output bytes : 896
 Input packets: 0
 Output packets: 7
 Transit statistics:
 Input bytes : 0 0 bps
 Output bytes : 0 0 bps
 Input packets: 0 0 pps
 Output packets: 0 0 pps
 Protocol inet, MTU: 1500, Generation: 17, Route table: 0
 Flags: None
 Addresses, Flags: Is-Preferred Is-Primary
 Destination: 172.16.5/24, Local: 172.16.5.1, Broadcast: 172.16.5.255,
 Generation: 16
 VCI 1.100
 Flags: Active, Shaping, Multicast
 VBR, Peak: 66kbps, Sustained: 66kbps, Burst size: 40
 Total down time: 0 sec, Last down: Never
 EPD threshold: 0, Transmit weight cells: 0
 ATM per-VC transmit statistics:
 Tail queue packet drops: 0
 Traffic statistics:
 Input bytes : 0
 Output bytes : 1512
 Input packets: 0
 Output packets: 14
Logical interface at-2/2/0.101 (Index 68) (SNMP ifIndex 37) (Generation 12)
 Flags: Point-To-Point SNMP-Traps Encapsulation: ATM-SNAP
 Traffic statistics:
 Input bytes : 0
 Output bytes : 200
 Input packets: 0
 Output packets: 2
 Local statistics:
 Input bytes : 0
 Output bytes : 200
 Input packets: 0
 Output packets: 2
 Transit statistics:
 Input bytes : 0 0 bps
 Output bytes : 0 0 bps

```

```

Input packets: 0 0 pps
Output packets: 0 0 pps
Protocol inet, MTU: 4470, Generation: 18, Route table: 0
Flags: None
Addresses, Flags: Is-Preferred Is-Primary
Destination: 172.16.250.252/30, Local: 172.16.250.253, Broadcast:
172.16.250.255,
Generation: 18
VCI 1.101
Flags: Active
Total down time: 0 sec, Last down: Never
EPD threshold: 0, Transmit weight cells: 0
ATM per-VC transmit statistics:
Tail queue packet drops: 0
Traffic statistics:
Input bytes : 0
Output bytes : 184
Input packets: 0
Output packets: 2
Logical interface at-2/2/0.200 (Index 69) (SNMP ifIndex 8280) (Generation 13)
Flags: Point-To-Point SNMP-Traps Encapsulation: ATM-SNAP
Traffic statistics:
Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0
Local statistics:
Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0
Transit statistics:
Input bytes : 0 0 bps
Output bytes : 0 0 bps
Input packets: 0 0 pps
Output packets: 0 0 pps
Protocol inet, MTU: 4470, Generation: 19, Route table: 0
Flags: None
Addresses, Flags: Is-Preferred Is-Primary
Destination: 20.20.20.0/30, Local: 20.20.20.1, Broadcast: 20.20.20.3,
Generation: 20
VCI 1.200
Flags: Active
Total down time: 0 sec, Last down: Never
EPD threshold: 0, Transmit weight cells: 0
ATM per-VC transmit statistics:
Tail queue packet drops: 0
Traffic statistics:
Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0
Logical interface at-2/2/0.300 (Index 70) (SNMP ifIndex 8281) (Generation 14)
Flags: Point-To-Point SNMP-Traps Encapsulation: ATM-SNAP
Traffic statistics:
Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0
Local statistics:
Input bytes : 0

```



```

Output bytes : 0
Input packets: 0
Output packets: 0
Transit statistics:
Input bytes : 0 0 bps
Output bytes : 0 0 bps
Input packets: 0 0 pps
Output packets: 0 0 pps
Protocol inet, MTU: 4470, Generation: 20, Route table: 0
Flags: None
Addresses, Flags: Is-Preferred Is-Primary
Destination: 30.30.30.0/30, Local: 30.30.30.1, Broadcast: 30.30.30.3,
Generation: 22
VCI 1.300
Flags: Active
Total down time: 0 sec, Last down: Never
EPD threshold: 0, Transmit weight cells: 0
ATM per-VC transmit statistics:
Tail queue packet drops: 0
Traffic statistics:
Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0
Logical interface at-2/2/0.400 (Index 72) (SNMP ifIndex 8282) (Generation 15)
Flags: Point-To-Point SNMP-Traps Encapsulation: ATM-SNAP
Traffic statistics:
Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0
Local statistics:
Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0
Transit statistics:
Input bytes : 0 0 bps
Output bytes : 0 0 bps
Input packets: 0 0 pps
Output packets: 0 0 pps
Protocol inet, MTU: 4470, Generation: 21, Route table: 0
Flags: None
Addresses, Flags: Is-Preferred Is-Primary
Destination: 40.40.40.0/30, Local: 40.40.40.1, Broadcast: 40.40.40.3,
Generation: 24
VCI 1.400
Flags: Active
Total down time: 0 sec, Last down: Never
EPD threshold: 0, Transmit weight cells: 0
ATM per-VC transmit statistics:
Tail queue packet drops: 0
Traffic statistics:
Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0
Logical interface at-2/2/0.32767 (Index 71) (SNMP ifIndex 27) (Generation 9)
Flags: Point-To-Multipoint No-Multicast SNMP-Traps Encapsulation: ATM-VCMUX
Traffic statistics:
Input bytes : 0

```

```

Output bytes : 0
Input packets: 0
Output packets: 0
Local statistics:
Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0
VCI 1.4
Flags: Active
Total down time: 0 sec, Last down: Never
EPD threshold: 0, Transmit weight cells: 0
ATM per-VC transmit statistics:
Tail queue packet drops: 0
Traffic statistics:
Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0

```

**Meaning** The sample output is for an OC12 ATM interface and shows the statistics for the SONET media, as well as the **Input** and **Output** ATM errors. Error details include input and output errors, active alarms and defects, and media-specific errors.

If the physical link is down, look at the active alarms and defects for the ATM interface and check the ATM media accordingly. See [“List of Common ATM Alarms and Error”](#) on [page 266](#) for an explanation of ATM alarms.

### Monitoring Statistics for an ATM2 Interface

**Purpose** To monitor statistics for an ATM2 interface, use the following Junos OS CLI operational mode command:

**Action** `user@host> monitor interface at-fpc/pic/port`



**CAUTION:** We recommend that you use this command only for diagnostic purposes. Do not leave it on during normal router operations because real-time monitoring of traffic consumes additional CPU and memory resources.

### Sample Output

```

user@host> monitor interface at-2/2/0
host Seconds: 5 Time: 17:16:49
 Delay: 3/0/3

Interface: at-2/2/0, Enabled, Link is Up
Encapsulation: ATM-PVC, Speed: OC12
Traffic statistics:
Input bytes: 0 (0 bps)
Output bytes: 1600 (0 bps)
Input packets: 0 (0 pps)
Output packets: 18 (0 pps)
Error statistics:
Input errors: 0
Input drops: 0
Input framing errors: 0
Policed discards: 0

```

```

L3 incompletes: 0 [0]
L2 channel errors: 0 [0]
L2 mismatch timeouts: 0 [0]
Carrier transitions: 1 [0]
Output errors: 0 [0]
Output drops: 0 [0]
Aged packets: 0 [0]
ATM statistics:
 Input cell count 4 [0]
 Input invalid vc 2 [0]
 Output cell count 13908633088 [8484369]
 Output idle cell count 0 [0]
Active alarms : NoneActive defects: NoneSONET error countsZ [0]

```

**Meaning** The sample output checks for and displays common interface failures and any increases in framing errors. Information from this command can help you narrow down possible causes of an interface problem.



**NOTE:** If you are accessing the router from the console connection, make sure you set the CLI terminal type using the `set cli terminal` command.

## Monitoring ATM MIC Interfaces

To monitor the status of ATM MIC interfaces, perform the following tasks:

- [Displaying the Status of a Specific ATM MIC Interface on page 247](#)
- [Displaying Extensive Information for a Specific ATM MIC Interface on page 249](#)
- [Monitoring Traffic and Error Statistics for an ATM MIC Interface on page 252](#)

### Displaying the Status of a Specific ATM MIC Interface

**Purpose** Display the status of a specific ATM MIC interface.

**Action** To display the summary information about a specific ATM MIC interface:

```
user@host> show interfaces terse at-2/2/0
```

| Interface      | Admin | Link | Proto | Local           | Remote         |
|----------------|-------|------|-------|-----------------|----------------|
| at-2/2/0       |       | up   | up    |                 |                |
| at-2/2/0.100   |       | up   | up    | inet 10.10.10.1 | --> 10.10.20.1 |
| at-2/2/0.32767 |       | up   | up    |                 |                |

To display the status of a specific ATM MIC interface:

```
user@host> show interfaces at-2/2/0
```

**Sample Output**

```

Physical interface: at-2/2/0, Enabled, Physical link is Up
Interface index: 146, SNMP ifIndex: 510
Link-level type: ATM-PVC, MTU: 2048, Clocking: Internal, SONET mode,
Speed: OC3, Loopback: None, Payload scrambler: Enabled
Device flags : Present Running
Link flags : None
CoS queues : 8 supported, 8 maximum usable queues
Schedulers : 0

```

```

Current address: 00:26:88:da:a6:74
Last flapped : 2012-03-07 11:02:11 PST (5w4d 15:45 ago)
Input rate : 0 bps (0 pps)
Output rate : 0 bps (0 pps)
SONET alarms : None
SONET defects : None
 VPI 7
 Flags: Active
 Total down time: 0 sec, Last down: Never
Traffic statistics:
 Input packets: 0
 Output packets: 0

Logical interface at-2/2/0.100 (Index 347) (SNMP ifIndex 518)
 Flags: Point-To-Point SNMP-Traps 0x4000 Encapsulation: ATM-VCMUX
 Input packets : 0
 Output packets: 0
 Protocol inet, MTU: 2040
 Flags: Sendbroadcast-pkt-to-re
 Addresses, Flags: Is-Preferred Is-Primary
 Destination: 10.10.20.1, Local: 10.10.10.1
 VCI 7.100
 Flags: Active
 Total down time: 0 sec, Last down: Never
 Input packets : 0
 Output packets: 0

Logical interface at-2/2/0.32767 (Index 348) (SNMP ifIndex 519)
 Flags: Point-To-Multipoint No-Multicast SNMP-Traps 0x4000
 Encapsulation: ATM-VCMUX
 Input packets : 0
 Output packets: 0
 VCI 7.4
 Flags: Active
 Total down time: 0 sec, Last down: Never
 Input packets : 0
 Output packets: 0

```

**Meaning** The first line of the sample output shows that the physical link and all logical links are up. This means that the interface can pass packets.

Further down the sample output, look for active alarms and defects. If there are any, and to further diagnose the problem, see [“Displaying Extensive Information for a Specific ATM MIC Interface” on page 249](#) to display more extensive information about the ATM interface and the physical interface that is down.

[Table 17 on page 248](#) lists the **show interfaces terse** command output fields.

**Table 17: show interfaces terse Output Fields**

| Field Name | Field Description                                                        |
|------------|--------------------------------------------------------------------------|
| Interface  | Interface name.                                                          |
| Admin      | The administrative status of the interface. Possible values: up or down. |
| Link       | Status of the link. Possible values: up or down.                         |

Table 17: show interfaces terse Output Fields (*continued*)

| Field Name | Field Description                                    |
|------------|------------------------------------------------------|
| Proto      | Protocol family configured on the logical interface. |
| Local      | Local IP address of the logical interface.           |
| Remote     | Remote IP address of the logical interface.          |

For information about the output fields of the **show interfaces** command, see **show interfaces (ATM)**.

### Displaying Extensive Information for a Specific ATM MIC Interface

**Purpose** Display extensive information for a specific ATM MIC interface.

**Action** To display extensive status information about a specific ATM MIC interface:

```
user@host>show interfaces at-2/2/0 extensive
```

```
Physical interface: at-2/2/0, Enabled, Physical link is Up
Interface index: 146, SNMP ifIndex: 510, Generation: 421
Link-level type: ATM-PVC, MTU: 2048, Clocking: Internal, SONET mode,
Speed: OC3, Loopback: None, Payload scrambler: Enabled
Device flags : Present Running
Link flags : None
CoS queues : 8 supported, 8 maximum usable queues
Schedulers : 0
Hold-times : Up 0 ms, Down 0 ms
Current address: 00:26:88:da:a6:74
Last flapped : 2012-03-07 11:02:11 PST (5w4d 15:58 ago)
Statistics last cleared: Never
Traffic statistics:
Input bytes : 0 0 bps
Output bytes : 0 0 bps
Input packets : 0 0 pps
Output packets: 0 0 pps
IPv6 transit statistics:
Input bytes : 0
Output bytes : 0
Input packets : 0
Output packets: 0
Input errors:
Errors: 0, Drops: 0, Invalid VCs: 0, Framing errors: 0, Policed discards: 0,
L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
Resource errors: 0
Output errors:
Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,
Resource errors: 0
Egress queues: 8 supported, 4 in use
Queue counters: Queued packets Transmitted packets Dropped packets
0 best-effort 0 0 0
```

|                |   |   |   |
|----------------|---|---|---|
| 1 expedited-fo | 0 | 0 | 0 |
| 2 assured-forw | 0 | 0 | 0 |
| 3 network-cont | 0 | 0 | 0 |

Queue number:           Mapped forwarding classes

|   |                      |
|---|----------------------|
| 0 | best-effort          |
| 1 | expedited-forwarding |
| 2 | assured-forwarding   |
| 3 | network-control      |

SONET alarms : None

SONET defects : None

SONET PHY:

|           | Seconds | Count | State |
|-----------|---------|-------|-------|
| PLL Lock  | 0       | 0     | OK    |
| PHY Light | 0       | 0     | OK    |

SONET section:

|        |   |    |    |
|--------|---|----|----|
| BIP-B1 | 1 | 29 |    |
| SEF    | 0 | 0  | OK |
| LOS    | 0 | 0  | OK |
| LOF    | 0 | 0  | OK |
| ES-S   | 1 |    |    |
| SES-S  | 0 |    |    |
| SEFS-S | 0 |    |    |

SONET line:

|         |   |    |    |
|---------|---|----|----|
| BIP-B2  | 1 | 75 |    |
| REI-L   | 1 | 36 |    |
| RDI-L   | 0 | 0  | OK |
| AIS-L   | 0 | 0  | OK |
| BERR-SF | 0 | 0  | OK |
| BERR-SD | 0 | 0  | OK |
| ES-L    | 1 |    |    |
| SES-L   | 0 |    |    |
| UAS-L   | 0 |    |    |
| ES-LFE  | 1 |    |    |
| SES-LFE | 0 |    |    |
| UAS-LFE | 0 |    |    |

SONET path:

|         |   |    |    |
|---------|---|----|----|
| BIP-B3  | 1 | 23 |    |
| REI-P   | 1 | 34 |    |
| LOP-P   | 0 | 0  | OK |
| AIS-P   | 0 | 0  | OK |
| RDI-P   | 0 | 0  | OK |
| UNEQ-P  | 0 | 0  | OK |
| PLM-P   | 0 | 0  | OK |
| ES-P    | 1 |    |    |
| SES-P   | 0 |    |    |
| UAS-P   | 0 |    |    |
| ES-PFE  | 1 |    |    |
| SES-PFE | 0 |    |    |
| UAS-PFE | 0 |    |    |

Payload pointer:

|                         |     |
|-------------------------|-----|
| Current pointer         | : 0 |
| Pointer increment count | : 0 |
| Pointer decrement count | : 0 |
| New pointer NDF count   | : 1 |

Received SONET overhead:

|    |            |                 |            |        |
|----|------------|-----------------|------------|--------|
| F1 | : 0x00, J0 | : 0x00, K1      | : 0x00, K2 | : 0x00 |
| S1 | : 0x00, C2 | : 0x13, C2(cmp) | : 0x13, F2 | : 0x00 |
| Z3 | : 0x00, Z4 | : 0x00, S1(cmp) | : 0x00     |        |

Transmitted SONET overhead:

```

F1 : 0x00, J0 : 0x01, K1 : 0x00, K2 : 0x00
S1 : 0x00, C2 : 0x13, F2 : 0x00, Z3 : 0x00
Z4 : 0x00
ATM status:
 HCS state: Sync
 LOC : OK
ATM Statistics:
 Uncorrectable HCS errors: 7, Correctable HCS errors: 0,
 Tx cell FIFO overruns: 0, Rx cell FIFO overruns: 0,
 Rx cell FIFO underruns: 0, Input cell count: 0, Output cell count: 0,
 Output idle cell count: 1210483921034, Output VC queue drops: 0,
 Input no buffers: 0, Input length errors: 0, Input timeouts: 0,
 Input invalid VCs: 0, Input bad CRCs: 0, Input OAM cell no buffers: 0
Packet Forwarding Engine configuration:
 Destination slot: 2
 VPI 7
 Flags: Active
 Total down time: 0 sec, Last down: Never
 Traffic statistics:
 Input bytes : 0
 Output bytes : 0
 Input packets : 0
 Output packets : 0
Logical interface at-2/2/0.100 (Index 347) (SNMP ifIndex 518)
(Generation 660)
 Flags: Point-To-Point SNMP-Traps 0x4000 Encapsulation: ATM-VCMUX
 Traffic statistics:
 Input bytes : 0
 Output bytes : 0
 Input packets : 0
 Output packets : 0
 Local statistics:
 Input bytes : 0
 Output bytes : 0
 Input packets : 0
 Output packets : 0
 Transit statistics:
 Input bytes : 0 0 bps
 Output bytes : 0 0 bps
 Input packets : 0 0 pps
 Output packets : 0 0 pps
 Protocol inet, MTU: 2040, Generation: 457, Route table: 0
 Flags: Sendbcst-pkt-to-re
 Addresses, Flags: Is-Preferred Is-Primary
 Destination: 10.10.20.1, Local: 10.10.10.1, Broadcast: Unspecified,
 Generation: 621
 VCI 7.100
 Flags: Active
 Total down time: 0 sec, Last down: Never
 ATM per-VC transmit statistics:
 Tail queue packet drops: 0
 Traffic statistics:
 Input bytes : 0
 Output bytes : 0
 Input packets : 0
 Output packets : 0
Logical interface at-2/2/0.32767 (Index 348) (SNMP ifIndex 519)
(Generation 661)
 Flags: Point-To-Multipoint No-Multicast SNMP-Traps 0x4000

```

```

Encapsulation: ATM-VCMUX
Traffic statistics:
 Input bytes : 0
 Output bytes : 0
 Input packets: 0
 Output packets: 0
Local statistics:
 Input bytes : 0
 Output bytes : 0
 Input packets: 0
 Output packets: 0
Transit statistics:
 Input bytes : 0 0 bps
 Output bytes : 0 0 bps
 Input packets: 0 0 pps
 Output packets: 0 0 pps
VCI 7.4
 Flags: Active
 Total down time: 0 sec, Last down: Never
 ATM per-VC transmit statistics:
 Tail queue packet drops: 0
 Traffic statistics:
 Input bytes : 0
 Output bytes : 0
 Input packets: 0
 Output packets: 0

```

**Meaning** The sample output is for an OC3 ATM interface and shows the statistics for the SONET media, as well as the **Input** and **Output** ATM errors. Error details include input and output errors, active alarms and defects, and media-specific errors.

If the physical link is down, look at the active alarms and defects for the ATM interface and check the ATM media accordingly. See [“List of Common ATM Alarms and Error” on page 266](#) for an explanation of ATM alarms.

For information about the output fields of the **show interfaces extensive** command, see **show interfaces (ATM)**.

---

### Monitoring Traffic and Error Statistics for an ATM MIC Interface

---

**Purpose** Monitor traffic and error statistics for an ATM MIC interface.

**Action** To display real-time statistics, updated every second, for an ATM MIC interface:



**CAUTION:** We recommend that you use this command only for diagnostic purposes. If you use this command during normal router operations, additional CPU and memory resources are consumed.

---

```
user@host> monitor interface at-2/2/0
```

```
host
```

```
Seconds: 5
```

```
Time: 04:02:22
Delay: 0/0/3
```



```

Interface: at-2/2/0, Enabled, Link is Up
Encapsulation: ATM-PVC, Speed: OC3
Traffic statistics:
 Input bytes: 0 (0 bps)
 Output bytes: 0 (0 bps)
 Input packets: 0 (0 pps)
 Output packets: 0 (0 pps)
Error statistics:
 Input errors: 0
 Input drops: 0
 Input framing errors: 0
 Policed discards: 0
 L3 incompletes: 0
 L2 channel errors: 0
 L2 mismatch timeouts: 0 Carrier transitiz

host Seconds: 5 Time: 04:02:22
 Delay: 1/1/1

Interface: at-2/2/1, Enabled, Link is Up
Encapsulation: ATM-PVC, Speed: OC3
Traffic statistics: Current delta
 Input bytes: 0 (0 bps) [0]
 Output bytes: 0 (0 bps) [0]
 Input packets: 0 (0 pps) [0]
 Output packets: 0 (0 pps) [0]
Error statistics:
 Input errors: 0 [0]
 Input drops: 0 [0]
 Input framing errors: 0 [0]
 Policed discards: 0 [0]
 L3 incompletes: 0 [0]
 L2 channel errors: 0 [0]
 L2 mismatch timeouts: 0 Carrier transitiz [0]

```

**Meaning** The sample output displays common interface failures and any increase in framing errors. Information from this command can help you narrow down possible causes of an interface problem.



**NOTE:** If you are accessing the router from the console connection, make sure you set the CLI terminal type using the `set cli terminal` command.

For information about the output fields of the **monitor interfaces (ATM)** command, see [monitor interface](#).

#### Related Documentation

- [Investigating Interface Steps and Commands on page 219](#)
- [Determining ATM Interface Type on page 222](#)
- [Using Loopback Testing for ATM Interfaces on page 254](#)
- [Locating ATM Alarms and Errors on page 266](#)

## Using Loopback Testing for ATM Interfaces

- [Checklist for Using Loopback Testing for ATM Interfaces on page 254](#)
- [Diagnosing a Suspected Hardware Problem with an ATM1 or ATM2 IQ Interface on page 255](#)
- [Creating a Loopback on page 255](#)
- [Setting Clocking to Internal on page 257](#)
- [Verifying That the ATM Interface Is Up on page 257](#)
- [Clearing ATM Interface Statistics on page 260](#)
- [Pinging the ATM Interface on page 260](#)
- [Checking for ATM Interface Error Statistics on page 261](#)
- [Diagnosing a Suspected Circuit Problem on page 264](#)

### Checklist for Using Loopback Testing for ATM Interfaces

**Purpose** To use loopback testing for ATM interfaces.

**Action** [Table 18 on page 254](#) provides links and commands for using loopback testing for ATM interfaces.

**Table 18: Checklist for Using Loopback Testing for ATM Interfaces**

| Tasks                                                                                                          | Command or Action                                                                                                                                                |
|----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b><a href="#">“Diagnosing a Suspected Hardware Problem with an ATM1 or ATM2 IQ Interface” on page 255</a></b> |                                                                                                                                                                  |
| 1. <a href="#">Creating a Loopback on page 255</a>                                                             |                                                                                                                                                                  |
| a. <a href="#">Creating a Physical Loopback on page 256</a>                                                    | Connect the transmit port to the receive port.                                                                                                                   |
| b. <a href="#">Configuring a Local Loopback on page 256</a>                                                    | <code>[edit interfaces <i>interface-name</i> (sonet-options   t3-options)]</code><br><code>set loopback local</code><br><code>show</code><br><code>commit</code> |
| 2. <a href="#">Setting Clocking to Internal on page 257</a>                                                    | <code>[edit interfaces <i>interface-name</i>]</code><br><code>set clocking internal</code><br><code>show</code><br><code>commit</code>                           |
| 3. <a href="#">Verifying That the ATM Interface Is Up on page 257</a>                                          | <code>show interfaces at-<i>fpc/port/pic</i></code>                                                                                                              |
| 4. <a href="#">Clearing ATM Interface Statistics on page 260</a>                                               | <code>clear interfaces statistics at-<i>fpc/port/pic</i></code>                                                                                                  |
| 5. <a href="#">Pinging the ATM Interface on page 260</a>                                                       | <code>ping interface at-<i>fpc/port/pic</i> local-IP-address</code><br><code>bypass-routing count 1000 rapid</code>                                              |
| 6. <a href="#">Checking for ATM Interface Error Statistics on page 261</a>                                     | <code>show interfaces at-<i>fpc/port/pic</i> extensive</code>                                                                                                    |

**Table 18: Checklist for Using Loopback Testing for ATM Interfaces** (*continued*)

| Tasks                                                                                           | Command or Action                                                                                                       |
|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>“Diagnosing a Suspected Circuit Problem” on page 264</b>                                     |                                                                                                                         |
| 1. <a href="#">Creating a Loop from the Router to the Network on page 264</a>                   | <pre>[edit interfaces <i>interface-name</i> (sonet-options   t3-options)] set loopback remote show commit</pre>         |
| 2. <a href="#">Creating a Loop to the Router from Various Points in the Network on page 265</a> | Perform Steps 2 through 6 from “Diagnosing a Suspected Hardware Problem with an ATM1 or ATM2 IQ Interface” on page 255. |

## Diagnosing a Suspected Hardware Problem with an ATM1 or ATM2 IQ Interface

**Problem** When you suspect a hardware problem, perform the following steps to verify if there is a hardware problem.

**Solution** To diagnose a suspected hardware problem with an ATM1 or ATM2 IQ interface, follow these steps:

1. [Creating a Loopback on page 255](#)
2. [Setting Clocking to Internal on page 257](#)
3. [Verifying That the ATM Interface Is Up on page 257](#)
4. [Clearing ATM Interface Statistics on page 260](#)
5. [Pinging the ATM Interface on page 260](#)
6. [Checking for ATM Interface Error Statistics on page 261](#)

## Creating a Loopback

You can create a physical loopback or configure a local loopback to help diagnose a suspected hardware problem. Creating a physical loopback is recommended because it allows you to test and verify the transmit and receive ports.

If a field engineer is not available to create the physical loopback, you can configure a local loopback for the interface. The local loopback creates a loopback internally in the Physical Interface Card (PIC).

- [Creating a Physical Loopback on page 256](#)
- [Configuring a Local Loopback on page 256](#)

### Creating a Physical Loopback

Create a physical loopback from the transmit port to the receive port.



**NOTE:** Make sure you use single-mode fiber for a single-mode port and multimode fiber for a multimode port for SONET media.

1. To create a physical loopback at the port, connect the transmit port to the receive port using a known good cable.

When you create and test a physical loopback, you are testing the transmit and receive ports of the PIC. This action is recommended if a field engineer is available to create the physical loop as it provides a more complete test of the PIC.

### Configuring a Local Loopback

**Purpose** Because ATM interfaces can be either SONET or T3, you use the **sonet-options** or **t3-options** statements to configure a local loopback. [Figure 3 on page 256](#) illustrates a local loopback configured for an ATM interface.

**Figure 3: Local Loopback**



**Action** To configure a local loopback without physically connecting the transmit port to the receive port, follow these steps:

1. In configuration mode, go to the following hierarchy level:  

```
[edit]
user@host# edit interfaces interface-name (sonet-options | t3-options)
```
2. Configure the loopback:  

```
[edit interfaces interface-name (sonet-options | t3-options)]
user@host# set loopback local
```
3. Verify the configuration:  

```
user@host# show
```

For example:

```
[edit interfaces (t3-1/0/0 t3-options)]
user@host# show
loopback local;
```
4. Commit the change:  

```
user@host# commit
```

For example:

```
[edit interfaces t3-1/0/0 t3-options]
user@host# commit
commit complete
```

**Meaning** When you create a local loopback, you create an internal loop on the interface being tested. A local loopback loops the traffic internally on that PIC. A local loopback tests the interconnection of the PIC but does not test the transmit and receive ports.



**NOTE:** Remember to delete the loopback statement after completing the test.

## Setting Clocking to Internal

**Purpose** Clocking is set to internal because there is no external clock source in a loopback connection.

**Action** To configure clocking to internal, follow these steps:

1. In configuration mode, go to the following hierarchy level:

```
[edit]
user@host# edit interfaces interface-name
```

2. Configure the clocking to internal:

```
user@host# set clocking internal
```

3. Verify the configuration:

```
user@host# show
```

For example:

```
[edit interfaces t3-1/0/0]
user@host# show
clocking internal;
```

4. Commit the change:

```
user@host# commit
```

For example:

```
[edit interfaces t3-1/0/0]
user@host# commit
commit complete
```

**Meaning** The clock source for the interface is set to the internal Stratum 3 clock.

## Verifying That the ATM Interface Is Up

**Purpose** Displaying the status of the ATM interface provides the information you need to determine whether the physical link is up or down.

**Action** To verify that the status of the ATM interface is up, use the following Junos OS CLI operational mode command:

```
user@host> show interfaces at-fpc/pic/port
```

**Sample Output 1** The following sample output is for an OC3 ATM interface:

```
user@host> show interfaces at-2/0/0
Physical interface: at-2/0/0, Enabled, Physical link is Up
 Interface index: 22, SNMP ifIndex: 42
 Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, SONET mode, Speed:
OC3 , Loopback: Local, Payload scrambler: Enabled
 Device flags : Present Running
 Link flags : None
 Input rate : 0 bps (0 pps)
 Output rate : 0 bps (0 pps)
 SONET alarms : None
 SONET defects : None
 Logical interface at-2/0/0.0 (Index 29) (SNMP ifIndex 49)
 Flags: Point-To-Point SNMP-Traps Encapsulation: ATM-SNAP
 Input packets : 0
 Output packets: 0
 Protocol inet, MTU: 4470, Flags: None
 Addresses, Flags: Is-Preferred Is-Primary
 Destination: 192.168.1.0/30, Local: 192.168.1.1
 VCI 1.100
 Flags: Active
 Total down time: 0 sec, Last down: Never
 Traffic statistics:
 Input packets: 0
 Output packets: 0
```

**Sample Output 2** The following sample output is for a T3 ATM interface:

```
user@host> show interfaces at-0/1/0
Physical interface: at-0/1/0, Enabled, Physical link is Up
 Interface index: 90, SNMP ifIndex: 18
 Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, Speed: T3 , Loopback:
None, Payload scrambler: Enabled,
 Mode: C/Bit parity, Line buildout: 10, ATM Encapsulation: PLCP
 Device flags : Present Running
 Link flags : None
 Current address: 00:90:69:0c:c0:1f
 Last flapped : 2002-08-14 16:25:07 UTC (00:00:42 ago)
 Input rate : 0 bps (0 pps)
 Output rate : 0 bps (0 pps)
 Active alarms : None
 Active defects : None
```

**Sample Output 3** The following sample output is for an OC3 ATM interface:

```
user@host> show interfaces at-2/0/1
Physical interface: at-2/0/1, Enabled, Physical link is Down
 Interface index: 23, SNMP ifIndex: 43
 Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, SONET mode, Speed:
OC3 , Loopback: None, Payload scrambler: Enabled
 Device flags : Present Running Down
 Link flags : None
 Input rate : 0 bps (0 pps)
 Output rate : 0 bps (0 pps)
```

```

SONET alarms : LOL, LOS
SONET defects : LOL, LOF, LOS, SEF, AIS-L, AIS-P, RDI-P, PLM-P
Logical interface at-2/0/1.10 (Index 30) (SNMP ifIndex 65)
 Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: ATM-SNAP
Input packets : 0
Output packets: 0
 Protocol inet, MTU: 4470, Flags: None
 Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
 Destination: 192.168.100.0/30, Local: 192.168.100.1
 VCI 2.100
 Flags: Active
 Total down time: 0 sec, Last down: Never
Traffic statistics:
 Input packets: 0
 Output packets: 0

```

**Sample Output 4** The following sample output is for a T3 ATM interface:

```

user@host> show interfaces at-0/1/0
Physical interface: at-0/1/0, Enabled, Physical link is Down
Interface index: 90, SNMP ifIndex: 18
Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, Speed: T3, Loopback:
None, Payload scrambler: Enabled,
Mode: C/Bit parity, Line buildout: 10, ATM Encapsulation: PLCP
Device flags : Present Running Down
Link flags : None
Current address: 00:90:69:0c:c0:1f
Last flapped : 2002-08-09 11:36:15 UTC (5d 04:14 ago)
Input rate : 0 bps (0 pps)
Output rate : 0 bps (0 pps)
Active alarms : PLL, LOF, LOS
Active defects : PLL, LOF, LOS

```

**Meaning** Sample output 1 shows that the physical link is up and there are no SONET alarms or defects.

Sample output 2 shows that the physical link is up and there are no active alarms or defects.

Sample output 3 shows that the physical link, the device flags, and interface flags are down, and that there are SONET alarms and defects. When you see that the physical link is down, there may be a problem with the port.

Sample output 4 shows that the physical link, the device flags, and interface flags are down, and that there are active alarms and defects. When you see that the physical link is down, there may be a problem with the port.

For more information about problem situations and actions to take for a physical link that is down, see [Table 19 on page 259](#).

**Table 19: Problems and Solutions for a Physical Link That Is Down**

| Problem        | Actions                                      |
|----------------|----------------------------------------------|
| Cable mismatch | Verify that the cable connection is correct. |

**Table 19: Problems and Solutions for a Physical Link That Is Down**  
(continued)

| Problem                                                                                                                      | Actions                                                                                  |
|------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| Damaged fiber or coax cable or dirty fiber cable                                                                             | Verify that the cable can successfully loop a known good port of the same type.          |
| Too much or too little optical attenuation (for an OC3 or OC12 ATM interface)                                                | Verify that the attenuation is correct per the PIC optical specification.                |
| The transmit port is not transmitting within the dBm optical range per the specifications (for an OC3 or OC12 ATM interface) | Verify that the Tx power of the optics is within range of the PIC optical specification. |

## Clearing ATM Interface Statistics

**Purpose** You must reset ATM interface statistics before you initiate the ping test. Resetting the statistics provides a clean start so that previous input or output errors and packet statistics do not interfere with the current investigation.

**Action** To clear all statistics for the interface, use the following Junos OS CLI operational mode command:

```
user@host> clear interfaces statistics at-fpc/pic/port
```

**Sample Output**

```
user@host> clear interfaces statistics at-4/0/2
user@host>
```

**Meaning** This command clears the interface statistics counters for interface **at-4/0/2** only.

## Pinging the ATM Interface

**Purpose** After you have put the port in a local loopback, run the ping test using the following Junos OS CLI operational mode command:

**Action** `user@host> ping interface at-fpc/pic/port-IP-address bypass-routing count 1000 rapid`

**Sample Output**

```
user@host> ping interface at-2/0/0.0 192.168.1.1 bypass-routing count 1000 rapid
PING 192.168.1.1 (192.168.1.1): 56 data bytes
!!
!!
!!
!!
!!
!!
!!
!!
!!
!!
!!
!!
!!
!!
!!
!!
--- 192.168.1.1 ping statistics ---
1000 packets transmitted, 1000 packets received, 0% packet loss
round-trip min/avg/max/stddev = 0.423/0.740/26.822/0.829 ms
```



**Meaning** This command sends 1000 ping packets out of the interface to the local IP address. The ping should complete successfully with no packet loss. If there is any persistent packet loss, open a case with the Juniper Networks Technical Assistance Center (JTAC) at [support@juniper.net](mailto:support@juniper.net), or at 1-888-314-JTAC (within the United States) or 1-408-745-9500 (from outside the United States).

## Checking for ATM Interface Error Statistics

**Purpose** Persistent interface error statistics indicate that you need to open a case with JTAC.

**Action** To check the local interface for error statistics, use the following Junos OS CLI operational mode command:

```
user@host> show interfaces at-fpc/pic/port extensive
```

**Sample Output** The following sample output is for an OC3 ATM interface:

```
user@host> show interfaces at-2/0/0 extensive
Physical interface: at-2/0/0, Enabled, Physical link is Up
 Interface index: 22, SNMP ifIndex: 42, Generation: 21
 Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, SONET mode, Speed:
 OC3 , Loopback: None, Payload scrambler: Enabled
 Device flags : Present Running
 Link flags : None
 Hold-times : Up 0 ms, Down 0 ms
 Statistics last cleared: 2002-07-29 14:28:14 EDT (00:00:26 ago)
 Traffic statistics:
 Input bytes : 0 0 bps
 Output bytes : 0 0 bps
 Input packets : 0 0 pps
 Output packets: 0 0 pps
 Input errors:
 Errors: 0, Drops: 0, Invalid VCs: 0, Framing errors: 0, Policed discards: 0,
 L3 incompletes: 0, L2 channel errors: 0,
 L2 mismatch timeouts: 0
 Output errors:
 Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0
 SONET alarms : None
 SONET defects : None
 SONET PHY:
 Seconds Count State
 PLL Lock 0 0 OK
 PHY Light 0 0 OK
 SONET section:
 BIP-B1 0 0
 SEF 0 0 OK
 LOS 0 0 OK
 LOF 0 0 OK
 ES-S 0
 SES-S 0
 SEFS-S 0
 SONET line:
 BIP-B2 0 0
 REI-L 0 0
 RDI-L 0 0 OK
 AIS-L 0 0 OK
 BERR-SF 0 0 OK
 BERR-SD 0 0 OK
 ES-L 0
 SES-L 0
```

```

UAS-L 0
ES-LFE 0
SES-LFE 0
UAS-LFE 0
SONET path:
BIP-B3 0 0
REI-P 0 0
LOP-P 0 0 OK
AIS-P 0 0 OK
RDI-P 0 0 OK
UNEQ-P 0 0 OK
PLM-P 0 0 OK
ES-P 0
SES-P 0
UAS-P 0
ES-PFE 0
SES-PFE 0
UAS-PFE 0
Received SONET overhead:
F1 : 0x00, J0 : 0x00, K1 : 0x00, K2 : 0x00
S1 : 0x00, C2 : 0x13, C2(cmp) : 0x13, F2 : 0x00
Z3 : 0x00, Z4 : 0x00, S1(cmp) : 0x00, V5 : 0x00
V5(cmp) : 0x00
Transmitted SONET overhead:
F1 : 0x00, J0 : 0x01, K1 : 0x00, K2 : 0x00
S1 : 0x00, C2 : 0x13, F2 : 0x00, Z3 : 0x00
Z4 : 0x00, V5 : 0x00
ATM status:
HCS state: Sync
LOC : OK
ATM Statistics:
Uncorrectable HCS errors: 0, Correctable HCS errors: 0, Tx cell FIFO overruns:
0, Rx cell FIFO overruns: 0,
Rx cell FIFO underruns: 0, Input cell count: 0, Output cell count: 8830024,
Output idle cell count: 8830026,
Output VC queue drops: 0, Input no buffers: 0, Input length errors: 0, Input
timeouts: 0, Input invalid VCs: 0,
Input bad CRCs: 0, Input OAM cell no buffers: 0
PFE configuration:
Destination slot: 2
CoS transmit queue Bandwidth Buffer Priority Limit
 % bps % bytes
0 best-effort 0 0 0 0 low none
1 expedited-forwarding 0 0 0 0 low none
2 assured-forwarding 0 0 0 0 low none
3 network-control 0 0 0 0 low none
Logical interface at-2/0/0.0 (Index 29) (SNMP ifIndex 49) (Generation 28)
Flags: Point-To-Point SNMP-Traps Encapsulation: ATM-SNAP
Traffic statistics:
Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0
Local statistics:
Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0
Transit statistics:
Input bytes : 0 0 bps
Output bytes : 0 0 bps

```

```

Input packets: 0 0 pps
Output packets: 0 0 pps
Protocol inet, MTU: 4470, Flags: None, Generation: 31 Route table: 0
 Addresses, Flags: Is-Preferred Is-Primary
 Destination: 192.168.1.0/30, Local: 192.168.1.1, Broadcast: Unspecified,
Generation: 59
 VCI 1.100
 Flags: Active
 Total down time: 0 sec, Last down: Never
 ATM per-VC transmit statistics:
 Tail queue packet drops: 0
 Traffic statistics:
 Input bytes : 0
 Output bytes : 0
 Input packets: 0
 Output packets: 0

```

**Sample Output** The following sample output is for a T3 ATM interface:

```

user@host> show interfaces at-0/1/0 extensive
Physical interface: at-0/1/0, Enabled, Physical link is Up
 Interface index: 90, SNMP ifIndex: 18, Generation: 89
 Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, Speed: T3 , Loopback:
None, Payload scrambler: Enabled,
 Mode: C/Bit parity, Line buildout: 10, ATM Encapsulation: PLCP
 Device flags : Present Running
 Link flags : None
 Hold-times : Up 0 ms, Down 0 ms
 Current address: 00:90:69:0c:c0:1f
 Last flapped : 2002-08-14 16:25:07 UTC (00:00:21 ago)
 Statistics last cleared: 2002-08-14 16:25:26 UTC (00:00:02 ago)
 Traffic statistics:
 Input bytes : 0 0 bps
 Output bytes : 0 0 bps
 Input packets: 0 0 pps
 Output packets: 0 0 pps
 Input errors:
 Errors: 0, Drops: 0, Invalid VCs: 0, Framing errors: 0, Policed discards: 0,
L3 incompletes: 0, L2 channel errors: 0,
 L2 mismatch timeouts: 0
 Output errors:
 Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0
 Active alarms : None
 Active defects : None
 DS3 media:
 Seconds Count State
 PLL Lock 0 0 OK
 Reframing 0 0 OK
 AIS 0 0 OK
 LOF 0 0 OK
 LOS 0 0 OK
 YELLOW 0 0 OK
 EXZ 0 0
 LCV 0 0
 PCV 0 0
 FERR 0 0
 LES 0
 PES 0
 PSES 0
 SEFS 0
 UAS 0
 PLCP defects:
 Seconds Count State

```

```

LOF 0 0
YELLOW 0 0
ATM defects: Seconds Count State
LCD 0 0
ATM status:
HCS state: Sync
LOC : OK
PLCP statistics (errored seconds):
Framing errors : 0(0)
Bit interleaved parity errors: 0(0)
Far end block errors : 0(0)
ATM Statistics:
Uncorrectable HCS errors: 0, Correctable HCS errors: 0, Tx cell FIFO overruns:
0, Rx cell FIFO overruns: 0,
Rx cell FIFO underruns: 0, Input cell count: 0, Output cell count: 96041,
Output idle cell count: 96040,
Output VC queue drops: 0, Input no buffers: 0, Input length errors: 0, Input
timeouts: 0, Input invalid VCs: 0,
Input bad CRCs: 0, Input OAM cell no buffers: 0
Packet Forwarding Engine configuration:
Destination slot: 0
CoS transmit queue Bandwidth Buffer Priority Limit
 % bps % bytes
0 best-effort 95 42499200 95 0 low none
3 network-control 5 2236800 5 0 low none

```

**Meaning** Check for any error statistics that may appear in the output. There should not be any input or output errors. If there are any persistent input or output errors, open a case with the JTAC at [support@juniper.net](mailto:support@juniper.net), or at 1-888-314-JTAC (within the United States) or 1-408-745-9500 (from outside the United States).

## Diagnosing a Suspected Circuit Problem

When you suspect a circuit problem, it is important to work with the transport-layer engineer to resolve the problem. The transport-layer engineer may ask you to create a loop from the router to the network, or the engineer may create a loop to the router from various points in the network.

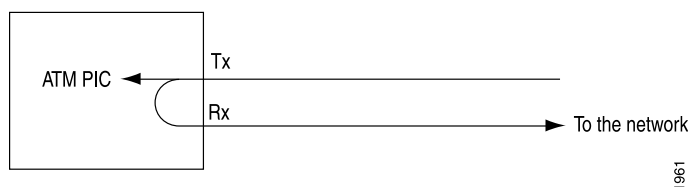
To diagnose a suspected circuit problem, follow these steps:

1. [Creating a Loop from the Router to the Network on page 264](#)
2. [Creating a Loop to the Router from Various Points in the Network on page 265](#)

### Creating a Loop from the Router to the Network

**Purpose** Creating a loop from the router to the network allows the transport-layer engineer to test the router from various points in the network. This helps the engineer isolate where the problem might be located. [Figure 4 on page 265](#) illustrates a loop from a router to the network.

Figure 4: Loop from the Router to the Network



**Action** To create a loop from the router to the network, follow these steps:

1. In configuration mode, go to the following hierarchy level:  

```
[edit]
user@host# edit interfaces interface-name (sonet-options | t3-options)
```
2. Configure the remote loopback:  

```
[edit interfaces interface-name (sonet-options | t3-options)]
user@host# set loopback remote
```
3. Verify the configuration:  

```
user@host# show
```

For example:

```
[edit interfaces t3-1/0/0 t3-options]
user@host# show
loopback remote;
```
4. Commit the change:  

```
user@host# commit
```

For example:

```
[edit interfaces t3-1/0/0 t3-options]
user@host# commit
commit complete
```

### Creating a Loop to the Router from Various Points in the Network

**Purpose** The transport-layer engineer creates a loop to the router from various points in the network. You can then perform tests to verify the connection from the router to that loopback in the network.

**Action** After the transport-layer engineer has created the loop to the router from the network, you must verify the connection from the router to the loopback in the network. Follow Steps 2 through 6 in [“Diagnosing a Suspected Hardware Problem with an ATM1 or ATM2 IQ Interface” on page 255](#). Keep in mind that any problems encountered in the test indicate a problem with the connection from the router to the loopback in the network.

By performing tests to loopbacks at various points in the network, you can isolate the source of the problem.

**Related Documentation**

- [Investigating Interface Steps and Commands on page 219](#)
- [Determining ATM Interface Type on page 222](#)

- [Monitoring ATM Interfaces on page 233](#)
- [Locating ATM Alarms and Errors on page 266](#)

## Locating ATM Alarms and Errors

- [List of Common ATM Alarms and Error on page 266](#)
- [Displaying ATM1 and ATM2 Alarms and Errors on page 266](#)

### List of Common ATM Alarms and Error

**Purpose** To check Asynchronous Transfer Mode (ATM) alarms and errors on both ATM1 and ATM2 IQ interfaces.

**Action** [Table 20 on page 266](#) provides links and commands for checking ATM alarms and errors.

**Table 20: List of Common ATM Alarms and Error**

| Tasks                                                                    | Command or Action                                                                                                                                               |
|--------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#">“Displaying ATM1 and ATM2 Alarms and Errors” on page 266</a> | <b>show interfaces at-<i>fpc/pic/port</i> extensive</b><br><br>See List of Common SONET Alarms and Errors.<br><br>See Checklist of Common T3 Alarms and Errors. |

### Displaying ATM1 and ATM2 Alarms and Errors

**Purpose** The alarms and errors that appear on an ATM1 or an ATM2 IQ interface are identical. ATM alarms and errors are dependent on the ATM interface media. If the ATM interface is an OC3 or OC12 interface media, the media statistics are SONET statistics. If the ATM interface is a T3 interface media, the media statistics are T3 statistics.

For information on determining the type of ATM interface on your router, see [“Checklist for Determining ATM Interface Type” on page 222](#).

**Action** To display ATM alarms and errors, use the following Junos OS command-line interface (CLI) operational mode command:

```
user@host>show interfaces at-fpc/pic/port extensive
```

**Sample Output 1**

```
user@host> show interfaces at-2/0/0 extensive
Physical interface: at-2/0/0, Enabled, Physical link is Up
 Interface index: 22, SNMP ifIndex: 42, Generation: 21
 Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, SONET mode, Speed:
OC3 , Loopback: None, Payload scrambler: Enabled
 Device flags : Present Running
 Link flags : None
 Hold-times : Up 0 ms, Down 0 ms
 Statistics last cleared: 2002-07-29 14:28:14 EDT (00:00:26 ago)
 Traffic statistics:
 Input bytes : 0 0 bps
 Output bytes : 0 0 bps
```

```

Input packets: 0 0 pps
Output packets: 0 0 pps
Input errors:
 Errors: 0, Drops: 0, Invalid VCs: 0, Framing errors: 0, Policed discards: 0,
L3 incompletes: 0, L2 channel errors: 0,
 L2 mismatch timeouts: 0
Output errors:
 Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0
SONET alarms : None
SONET defects : None
SONET PHY:
Seconds Count State
 PLL Lock 0 OK
 PHY Light 0 OK
SONET section:
BIP-B1 0 0
SEF 0 0 OK
LOS 0 0 OK
LOF 0 0 OK
ES-S 0
SES-S 0
SEFS-S 0
SONET line:
BIP-B2 0 0
REI-L 0 0
RDI-L 0 0 OK
AIS-L 0 0 OK
BERR-SF 0 0 OK
BERR-SD 0 0 OK
ES-L 0
SES-L 0
UAS-L 0
ES-LFE 0
SES-LFE 0
UAS-LFE 0
SONET path:
BIP-B3 0 0
REI-P 0 0
LOP-P 0 0 OK
AIS-P 0 0 OK
RDI-P 0 0 OK
UNEQ-P 0 0 OK
PLM-P 0 0 OK
ES-P 0
SES-P 0
UAS-P 0
ES-PFE 0
SES-PFE 0
UAS-PFE 0
Received SONET overhead:
F1 : 0x00, J0 : 0x00, K1 : 0x00, K2 : 0x00
S1 : 0x00, C2 : 0x13, C2(cmp) : 0x13, F2 : 0x00
Z3 : 0x00, Z4 : 0x00, S1(cmp) : 0x00, V5 : 0x00
V5(cmp) : 0x00
Transmitted SONET overhead:
F1 : 0x00, J0 : 0x01, K1 : 0x00, K2 : 0x00
S1 : 0x00, C2 : 0x13, F2 : 0x00, Z3 : 0x00
Z4 : 0x00, V5 : 0x00
ATM status:
 HCS state: Sync
 LOC : OK
ATM Statistics:

```

```

Uncorrectable HCS errors: 0, Correctable HCS errors: 0, Tx cell FIFO overruns:
0, Rx cell FIFO overruns: 0,
Rx cell FIFO underruns: 0, Input cell count: 0, Output cell count: 8830024,
Output idle cell count: 8830026,
Output VC queue drops: 0, Input no buffers: 0, Input length errors: 0, Input
timeouts: 0, Input invalid VCs: 0,
Input bad CRCs: 0, Input OAM cell no buffers: 0
PFE configuration:
Destination slot: 2
CoS transmit queue Bandwidth Buffer Priority Limit
 % bps % bytes
0 best-effort 0 0 0 0 low none
1 expedited-forwarding 0 0 0 0 low none
2 assured-forwarding 0 0 0 0 low none
3 network-control 0 0 0 0 low none
Logical interface at-2/0/0.0 (Index 29) (SNMP ifIndex 49) (Generation 28)
Flags: Point-To-Point SNMP-Traps Encapsulation: ATM-SNAP
Traffic statistics:
Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0
Local statistics:
Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0
Transit statistics:
Input bytes : 0 0 bps
Output bytes : 0 0 bps
Input packets: 0 0 pps
Output packets: 0 0 pps
Protocol inet, MTU: 4470, Flags: None, Generation: 31 Route table: 0
Addresses, Flags: Is-Preferred Is-Primary
Destination: 192.168.1.0/30, Local: 192.168.1.1, Broadcast: Unspecified,
Generation: 59
VCI 1.100
Flags: Active
Total down time: 0 sec, Last down: Never
ATM per-VC transmit statistics:
Tail queue packet drops: 0
Traffic statistics:
Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0

```

**Meaning** Sample output 1 shows the error statistics for an OC3 ATM interface. SONET alarms and errors fall into three different areas of the output: section, line, and path. See List of Common SONET Alarms and Errors for information on SONET alarms.

**Sample Output 2** `user@host> show interfaces at-3/1/0 extensive`

```

Physical interface: at-3/1/0, Enabled, Physical link is Up
Interface index: 57, SNMP ifIndex: 66, Generation: 56
Description: customer
Link-level type: ATM-PVC, MTU: 4482, Clocking: Internal, Speed: T3 , Loopback:
None,
Payload scrambler: Disabled, Mode: C/Bit parity, Line build-out: 10, ATM
Encapsulation: PLCP
Device flags : Present Running

```



```

Link flags : None
Hold-times : Up 0 ms, Down 0 ms
Statistics last cleared: 2002-07-30 15:36:58 UTC (00:00:02 ago)
Traffic statistics:
Input bytes : 270798 1067704 bps
Output bytes : 2260295 8911952 bps
Input packets : 2001 986 pps
Output packets: 2506 1235 pps
Input errors:
Errors: 0, Drops: 0, Invalid VCs: 0, Framing errors: 0, Policed discards: 0,
L3 incompletes: 0,
L2 channel errors: 0, L2 mismatch timeouts: 0
Output errors:
Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0
Active alarms : None
Active defects : None
DS3 media:
Seconds Count State
PLL Lock 0 0 OK
Reframing 0 0 OK
AIS 0 0 OK
LOF 0 0 OK
LOS 0 0 OK
YELLOW 0 0 OK
EXZ 0 0
LCV 0 0
PCV 0 0
FERR 0 0
LES 0
PES 0
PSES 0
SEFS 0
UAS 0
PLCP defects:
Seconds Count State
LOF 0 0
YELLOW 0 0
ATM defects:
Seconds Count State
LCD 0 0
ATM status:
HCS state: Hunt
LOC : OK
PLCP statistics (errored seconds):
Framing errors : 0(0)
Bit interleaved parity errors: 0(0)
Far end block errors : 0(0)
ATM Statistics:
Uncorrectable HCS errors: 0, Correctable HCS errors: 0, Tx cell FIFO overruns:
0,
Rx cell FIFO overruns: 0, Rx cell FIFO underruns: 0, Input cell count: 7716,
Output cell count: 191980, Output idle cell count: 144302, Output VC queue
drops: 0,
Input no buffers: 0, Input length errors: 0, Input timeouts: 0, Input invalid
VCs: 0,
Input bad CRCs: 0, Input OAM cell no buffers: 0
PFE configuration:
Destination slot: 3
CoS transmit queue Bandwidth Buffer Priority Limit
 % bps % bytes
0 best-effort 0 0 0 0 low none
1 expedited-forwarding 0 0 0 0 low none
2 assured-forwarding 0 0 0 0 low none

```

```

3 network-control 0 0 0 0 low none
Logical interface at-3/1/0.0 (Index 25) (SNMP ifIndex 85) (Generation 44)
Flags: Point-To-Point Inverse-ARP SNMP-Traps Encapsulation: ATM-SNAP
Traffic statistics:
 Input bytes : 270798
 Output bytes : 2260295
 Input packets: 2001
 Output packets: 2506
Local statistics:
 Input bytes : 0
 Output bytes : 0
 Input packets: 0
 Output packets: 0
Transit statistics:
 Input bytes : 270798 1067704 bps
 Output bytes : 2260295 8911952 bps
 Input packets: 2001 986 pps
 Output packets: 2506 1235 pps
Protocol inet, MTU: 4470, Flags: None, Generation: 51 Route table: 0
Addresses, Flags: Is-Preferred Is-Primary
Destination: 10.10.65.176/30, Local: 10.10.65.177, Broadcast: Unspecified,
Generation: 88
VCI 0.5
Flags: Active, Inverse-ARP
Total down time: 0 sec, Last down: Never
ATM per-VC transmit statistics:
Tail queue packet drops: 0
Traffic statistics:
 Input bytes : 270798
 Output bytes : 2260295
 Input packets: 2001
 Output packets: 2506

```

### Meaning

Sample output 2 shows the error statistics for a T3 ATM interface. See Checklist of Common T3 Alarms and Errors for information on T3 alarms.

[Table 21 on page 270](#) describes the input and output errors that appear in the extensive output for an ATM interface.

**Table 21: ATM Interface Input and Output Errors**

| Error               | Description                                                             | Reason for Error                                                                                                                                  |
|---------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Input Errors</b> |                                                                         |                                                                                                                                                   |
| <b>Errors</b>       | Sum of the incoming frame aborts and frame check sequence (FCS) errors. |                                                                                                                                                   |
| <b>Drops</b>        | Number of packets dropped by the output queue of the I/O Manager ASIC.  | If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's random early detection (RED) mechanism. |
| <b>Invalid VCs</b>  | Number of cells that arrived for a nonexistent virtual circuit (VC).    |                                                                                                                                                   |

Table 21: ATM Interface Input and Output Errors (*continued*)

| Error                       | Description                                                                                                                                                  | Reason for Error                                                                                                                                                                                                                                                                                                     |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Framing errors</b>       | Sum of ATM Adaptation Layer (AAL5) packets that have FCS errors, AAL5 packets that have reassembly timeout errors, and AAL5 packets that have length errors. |                                                                                                                                                                                                                                                                                                                      |
| <b>Policed discards</b>     | Frames that the incoming packet match code discarded because they were not recognized or of interest.                                                        | Usually, this field reports protocols that the Junos OS does not handle.                                                                                                                                                                                                                                             |
| <b>L3 incompletes</b>       | Number of packets discarded due to the packets failing Layer 3 header checks.                                                                                | Increments when the incoming packet fails Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header would be discarded and this counter would increment.                                                                                               |
| <b>L2 channel errors</b>    | Errors that occurred when the software could not find a valid logical interface for an incoming frame.                                                       | This counter increments when the software cannot find a valid logical interface for an incoming frame.                                                                                                                                                                                                               |
| <b>L2 mismatch timeouts</b> | Count of malformed or short packets.                                                                                                                         | Count of malformed or short packets that cause the incoming packet handler to discard the frame as unreadable.                                                                                                                                                                                                       |
| <b>Output Errors</b>        |                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                      |
| <b>Carrier transitions</b>  | Number of times the interface went from down to up.                                                                                                          | This number should not increment quickly and should increase only when the cable is unplugged, the far-end system is powered down and up, or a similar problem occurs. If it increments quickly (perhaps once every 10 seconds), then the cable, the far-end system, or the Physical Interface Card (PIC) is broken. |
| <b>Errors</b>               | Sum of the outgoing frame aborts and FCS errors.                                                                                                             |                                                                                                                                                                                                                                                                                                                      |
| <b>Drops</b>                | Number of packets dropped by the output queue of the I/O Manager ASIC.                                                                                       | If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism.                                                                                                                                                                                             |
| <b>Aged packets</b>         | Number of packets that remained in shared packet SDRAM for so long that the system automatically purged them.                                                | The value in this field should never increment. If it does, it is most likely a software bug or possibly broken hardware.                                                                                                                                                                                            |

Table 22 on page 272 lists ATM media-specific alarms and defects that can render the interface unable to pass packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router or trigger the red or yellow alarm LED on the craft interface. For complete explanations of most of these alarms and defects, see Chapter 6 in *GR-253, Synchronous Optical Network (SONET) Transport Systems: Common Generic Criteria*.

Table 22: ATM Active Alarms and Defects

| Alarm                | Description                          |
|----------------------|--------------------------------------|
| <b>AIS</b>           | Alarm indication signal              |
| <b>AIS-L</b>         | Alarm indication signal (line)       |
| <b>AIS-P</b>         | Alarm indication signal (path)       |
| <b>BERR</b>          | Bit error rate                       |
| <b>BERR-SD</b>       | Bit error rate defect—signal degrade |
| <b>BERR-SF</b>       | Bit error rate fault—signal fail     |
| <b>EXZ</b>           | Excessive zeros                      |
| <b>FERF</b>          | Far end receive failures             |
| <b>IDLE</b>          | Idle code detected                   |
| <b>LCD</b>           | Loss of cell delineation             |
| <b>LCV</b>           | Line code violation                  |
| <b>LOC</b>           | Loss of cell delineation             |
| <b>LOF</b>           | Loss of frame                        |
| <b>LOL</b>           | Loss of light                        |
| <b>LOP</b>           | Loss of pointer                      |
| <b>LOS</b>           | Loss of signal                       |
| <b>PLL</b>           | Phase-locked loop out of lock        |
| <b>PLCP_LOF</b>      | Loss of PLCP frame alarm             |
| <b>PLCP_YLW PLCP</b> | Alarm at the remote end              |
| <b>PLM-P</b>         | Payload label mismatch               |
| <b>RDI</b>           | Remote defect indication             |
| <b>RDI-L</b>         | Remote defect indication (line)      |
| <b>RDI-P</b>         | Remote defect indication (path)      |
| <b>REI</b>           | Remote error indication              |

Table 22: ATM Active Alarms and Defects (*continued*)

| Alarm | Description                             |
|-------|-----------------------------------------|
| SEF   | Severely errored frame                  |
| UNEQ  | Unequipped                              |
| YLW   | Remote defect indication (yellow alarm) |

**Related Documentation**

- [Investigating Interface Steps and Commands on page 219](#)
- [Determining ATM Interface Type on page 222](#)
- [Monitoring ATM Interfaces on page 233](#)
- [Using Loopback Testing for ATM Interfaces on page 254](#)



## PART 5

# Index

- [Index on page 277](#)
- [Index of Statements and Commands on page 283](#)





# Index

## Symbols

|                                              |       |
|----------------------------------------------|-------|
| #, comments in configuration statements..... | xviii |
| ( ), in syntax descriptions.....             | xviii |
| < >, in syntax descriptions.....             | xviii |
| [ ], in configuration statements.....        | xviii |
| { }, in configuration statements.....        | xviii |
| (pipe), in syntax descriptions.....          | xviii |

## A

|                                       |     |
|---------------------------------------|-----|
| advertise-interval statement.....     | 125 |
| alarms                                |     |
| ATM interfaces, checklist.....        | 266 |
| allow-any-vci statement.....          | 126 |
| annex statement.....                  | 126 |
| usage guidelines.....                 | 118 |
| aps statement.....                    | 127 |
| annex-b.....                          | 126 |
| ATM encapsulation.....                | 27  |
| ATM CCC VC multiplex.....             | 83  |
| ATM cell-relay.....                   | 83  |
| ATM NLPID.....                        | 83  |
| ATM PVC.....                          | 83  |
| ATM SNAP.....                         | 83  |
| ATM TCC SNAP.....                     | 83  |
| ATM TCC SNAP multiplex.....           | 83  |
| ATM VC multiplex.....                 | 83  |
| cell-relay accumulation mode.....     | 83  |
| Cisco ATM NLPID.....                  | 83  |
| Ethernet over ATM.....                | 83  |
| Ethernet VPLS over ATM.....           | 83  |
| Multilink PPP over ATM.....           | 83  |
| PPP over ATM.....                     | 83  |
| PPP over ATM multiplex.....           | 83  |
| See also ATM interfaces               |     |
| ATM interfaces                        |     |
| active alarms and defects, table..... | 273 |
| alarms and errors                     |     |
| checklist.....                        | 266 |
| See SONET interfaces, alarms and      |     |
| errors.....                           | 266 |
| ATM overview.....                     | 27  |

|                                          |          |
|------------------------------------------|----------|
| circuit problems.....                    | 264      |
| clear interfaces statistics command..... | 260      |
| clocking, setting.....                   | 257      |
| communication with ATM switches          |          |
| example configuration.....               | 39       |
| configuring local.....                   | 256      |
| edit interfaces command.....             | 257      |
| edit interfaces sonet-options            |          |
| command.....                             | 256, 265 |
| edit interfaces t3-options               |          |
| command.....                             | 256, 265 |
| error statistics.....                    | 261      |
| extensive status .....                   | 235      |
| ILMI with cell relay                     |          |
| example configuration.....               | 41       |
| input and output errors, table.....      | 270      |
| loopback                                 |          |
| creating physical.....                   | 256      |
| monitor checklist .....                  | 233      |
| physical link                            |          |
| down, table.....                         | 259      |
| status .....                             | 257      |
| PIC type                                 |          |
| example configuration.....               | 44       |
| ping interface command.....              | 260      |
| PPP over ATM encapsulation               |          |
| example configuration.....               | 88       |
| set clocking internal command.....       | 257      |
| set loopback local command.....          | 256      |
| set loopback remote command.....         | 265      |
| show chassis hardware command .....      | 224, 225 |
| show interfaces command.....             | 258      |
| show interfaces extensive                |          |
| command.....                             | 261, 266 |
| show interfaces terse command.....       | 234      |
| statistics                               |          |
| checking errors.....                     | 261      |
| resetting.....                           | 260      |
| status                                   |          |
| description, table .....                 | 234      |
| extensive.....                           | 235      |
| verifying.....                           | 257      |
| virtual circuits                         |          |
| example configuration.....               | 46       |
| virtual paths                            |          |
| example configuration.....               | 46       |
| ATM MIC interfaces                       |          |
| configuration checking .....             | 228      |
| errors.....                              | 252      |

|                                             |     |                                             |       |
|---------------------------------------------|-----|---------------------------------------------|-------|
| Layer 2 circuit AAL5 mode                   |     | ATM2 IQ interfaces.....                     | 230   |
| configuration.....                          | 57  | configuration checking .....                | 227   |
| example configuration.....                  | 58  | early packet discard threshold              |       |
| Layer 2 circuit cell-relay mode             |     | example configuration.....                  | 80    |
| configuration.....                          | 57  | eight forwarding classes                    |       |
| example configuration.....                  | 58  | example configuration.....                  | 96    |
| Layer 2 circuit cell-relay promiscuous mode |     | errors.....                                 | 246   |
| example configuration.....                  | 61  | Layer 2 circuit AAL5 mode                   |       |
| Layer 2 circuit trunk mode                  |     | example configuration.....                  | 52    |
| example configuration.....                  | 58  | Layer 2 circuit cell-relay mode             |       |
| physical link up.....                       | 248 | example configuration.....                  | 52    |
| set cli terminal command.....               | 253 | Layer 2 circuit cell-relay promiscuous mode |       |
| show chassis hardware command.....          | 225 | example configuration.....                  | 61    |
| show configuration interfaces command.....  | 228 | Layer 2 circuit trunk mode                  |       |
| show interfaces extensive command.....      | 249 | example configuration.....                  | 52    |
| status                                      |     | maximum-vcs statement.....                  | 227   |
| extensive.....                              | 249 | monitor checklist .....                     | 233   |
| atm-encapsulation statement.....            | 128 | monitor interface command.....              | 246   |
| atm-options statement.....                  | 129 | physical link up.....                       | 241   |
| ATM-over-ADSL                               |     | promiscuous mode.....                       | 231   |
| encapsulation types.....                    | 112 | set cli terminal command.....               | 247   |
| operational mode.....                       | 111 | show chassis hardware command.....          | 224   |
| ATM-over-SHDSL.....                         | 115 | show configuration interfaces command.....  | 227   |
| atm-scheduler-map statement .....           | 130 | show interfaces command.....                | 239   |
| ATM-to-Ethernet interworking                |     | show interfaces extensive command.....      | 241   |
| virtual path identifier.....                | 215 | show interfaces terse command.....          | 239   |
| ATM1 and ATM2 IQ                            |     | status                                      |       |
| configuration differences.....              | 34  | displaying for specific.....                | 239   |
| ATM1 interfaces.....                        | 229 | extensive.....                              | 241   |
| cell-relay circuit                          |     | authentication-key statement.....           | 131   |
| example configuration.....                  | 85  |                                             |       |
| configuration, checking.....                | 226 | <b>B</b>                                    |       |
| errors .....                                | 237 | braces, in configuration statements.....    | xviii |
| monitor checklist .....                     | 233 | brackets                                    |       |
| monitor interface command.....              | 237 | angle, in syntax descriptions.....          | xviii |
| physical link down.....                     | 235 | square, in configuration statements.....    | xviii |
| pic-type statement.....                     | 227 | buildout statement                          |       |
| set cli terminal command.....               | 238 | E3 or T3 over ATM interfaces.....           | 131   |
| shaping values                              |     | bytes statement.....                        | 132   |
| example calculation.....                    | 77  |                                             |       |
| show chassis hardware command .....         | 224 | <b>C</b>                                    |       |
| show configuration interfaces command.....  | 226 | C-bit parity mode.....                      | 133   |
| show interfaces command.....                | 235 | cables                                      |       |
| show interfaces extensive command.....      | 235 | damaged or dirty.....                       | 260   |
| statistics, monitoring.....                 | 237 | mismatch.....                               | 259   |
| status                                      |     | single-mode fiber.....                      | 256   |
| displaying for specific.....                | 235 | cbit-parity statement.....                  | 133   |
| extensive.....                              | 235 | cbr statement.....                          | 134   |
|                                             |     | cell-bundle-size statement.....             | 135   |

- channelized OC12 interfaces
    - traffic-shaping rates.....73, 75, 80
  - checklist for alarms
    - ATM interfaces.....266
  - checklist for monitoring
    - ATM1 interfaces .....233
    - ATM2 IQ interfaces.....233
  - circuit problems
    - ATM interfaces .....264
  - class of service *See* CoS
  - clear interfaces statistics command
    - ATM interfaces.....260
  - clocking.....257
    - ATM interfaces.....257
  - commands for router management,
    - interfaces.....220, 221
  - comments, in configuration statements.....xviii
  - communication with ATM switches
    - example configuration.....39
  - configuration, interfaces
    - ATM interfaces, incorrect.....229
    - checking
      - ATM MIC interfaces .....228
      - ATM1 interfaces .....226
      - ATM2 IQ interfaces .....227
  - connections, verifying.....265
  - conventions
    - text and syntax.....xvii
  - CoS
    - eight forwarding classes
      - example configuration.....96
  - craft interface, LED alarms.....271
  - curly braces, in configuration statements.....xviii
  - current statement.....135
  - customer support.....xix
    - contacting JTAC.....xix
- D**
- documentation
    - comments on.....xix
  - down-count statement.....136
  - dsl-options statement.....137
    - usage guidelines.....110
- E**
- e3-options statement.....138
  - edit interfaces command.....221
    - ATM interfaces .....257
  - edit interfaces sonet-options command
    - ATM interfaces.....256, 265
  - edit interfaces t3-options command
    - ATM interfaces .....256, 265
  - encapsulation statement.....139
    - logical interfaces.....140
    - physical interface.....144
  - epd-threshold statement.....149
    - logical interface.....149
    - physical interface.....150
    - usage guidelines.....94
  - error statistics
    - ATM interfaces.....261
    - OC3 ATM interfaces.....268
    - T3 ATM interfaces.....270
  - errors
    - ATM MIC interfaces.....252
    - ATM2 IQ interfaces.....246
- F**
- family statement.....151
  - fast-aps-switch statement.....155
  - font conventions.....xvii
  - force statement.....156
  - forwarding-class statement
    - usage guidelines.....94
  - framing statement
    - E1, E3, and T1 interfaces.....157
- H**
- high-plp-max-threshold statement.....158
  - high-plp-threshold statement.....158
  - hold-time statement.....159
    - APS.....159
    - SONET/SDH Defect Triggers.....160
- I**
- icons defined, notice.....xvii
  - ilmi statement.....161
    - usage guidelines.....39
  - ILMI with cell relay
    - encapsulation types supported.....40, 83
    - example configuration.....41
  - interfaces
    - alarms .....222
    - configuration statements.....3, 125
    - investigation process .....222
    - locating alarms.....222
    - loopback test commands, table.....221

|                                                                                       |     |
|---------------------------------------------------------------------------------------|-----|
| monitoring commands, table.....                                                       | 220 |
| monitoring, general steps.....                                                        | 219 |
| troubleshooting ATM interfaces.....                                                   | 219 |
| troubleshooting overview, (monitoring,<br>loopback testing, and locating alarms)..... | 219 |
| inverse-arp statement.....                                                            | 162 |
| investigation process                                                                 |     |
| interfaces.....                                                                       | 222 |

## L

|                                                       |     |
|-------------------------------------------------------|-----|
| Layer 2 circuit cell-relay promiscuous mode           |     |
| ATM MIC interfaces                                    |     |
| example configuration.....                            | 61  |
| ATM2 IQ interfaces                                    |     |
| example configuration.....                            | 61  |
| Layer 2 circuit transport mode                        |     |
| ATM MIC interfaces                                    |     |
| configuration.....                                    | 57  |
| example configuration.....                            | 58  |
| ATM2 IQ interfaces                                    |     |
| example configuration.....                            | 52  |
| line-rate statement.....                              | 163 |
| usage guidelines.....                                 | 118 |
| linear-red-profile statement.....                     | 164 |
| usage guidelines.....                                 | 94  |
| linear-red-profiles statement.....                    | 165 |
| lockout statement.....                                | 165 |
| logical interfaces                                    |     |
| PPP over ATM encapsulation                            |     |
| example configuration.....                            | 88  |
| logical systems                                       |     |
| configuration statements.....                         | 19  |
| loopback statement                                    |     |
| ADSL, DS0, E1/E3, SONET/SDH, SHDSL, and<br>T1/T3..... | 166 |
| loopback, configuring local.....                      | 256 |
| ATM interfaces .....                                  | 256 |
| ATM interfaces, figure .....                          | 256 |
| loopback, creating physical                           |     |
| ATM interfaces .....                                  | 256 |
| low-plp-max-threshold statement.....                  | 167 |
| low-plp-threshold statement.....                      | 168 |

## M

|                            |          |
|----------------------------|----------|
| manuals                    |          |
| comments on.....           | xix      |
| maximum-vcs statement..... | 169, 226 |
| ATM2 IQ interfaces .....   | 227      |

|                                                 |     |
|-------------------------------------------------|-----|
| monitor interface command                       |     |
| ATM1 interface.....                             | 237 |
| ATM2 IQ interfaces.....                         | 246 |
| mpls statement.....                             | 170 |
| multicast-vci statement.....                    | 171 |
| multipoint connections.....                     | 70  |
| <i>See also</i> point-to-multipoint connections |     |
| multipoint-destination statement.....           | 172 |

## N

|                                     |      |
|-------------------------------------|------|
| neighbor statement.....             | 173  |
| network.....                        | 264  |
| no-cbit-parity statement.....       | 133  |
| no-payload-scrambler statement..... | 179  |
| no-z0-increment statement.....      | 216  |
| notice icons defined.....           | xvii |

## O

|                               |            |
|-------------------------------|------------|
| oam-liveness statement.....   | 174        |
| usage guidelines.....         | 68, 82     |
| oam-period statement.....     | 175        |
| usage guidelines.....         | 68         |
| OC12 interfaces               |            |
| traffic-shaping rates.....    | 73, 75, 80 |
| OC3 ATM interface             |            |
| extensive output.....         | 261        |
| status.....                   | 258        |
| OC3 interfaces.....           | 73, 75, 80 |
| operating-mode statement..... | 176        |
| usage guidelines.....         | 111        |
| optical attenuation.....      | 260        |

## P

|                                                               |       |
|---------------------------------------------------------------|-------|
| paired-group statement.....                                   | 177   |
| parentheses, in syntax descriptions.....                      | xviii |
| passive-monitor-mode statement.....                           | 178   |
| payload-scrambler statement.....                              | 179   |
| permanent virtual circuit encapsulation <i>See</i> ATM<br>PVC |       |
| physical interfaces                                           |       |
| C-bit parity mode.....                                        | 133   |
| physical link down                                            |       |
| ATM interfaces, table.....                                    | 259   |
| ATM1 interfaces .....                                         | 235   |
| physical link up                                              |       |
| ATM MIC interfaces .....                                      | 248   |
| ATM2 IQ interfaces .....                                      | 241   |
| physical loopback                                             |       |
| ATM interfaces.....                                           | 256   |

- pic-type statement.....180
  - ATM1 interfaces .....227
- ping interface command
  - ATM interfaces.....260
- plp-to-clp statement.....180
- plp1 statement.....181
  - usage guidelines.....94
- pop-all-labels statement.....182
- PPP over ATM encapsulation
  - example configuration.....88
- priority
  - schedulers.....183
- priority statement
  - usage guidelines
    - ATM scheduler map.....94
- problems
  - ATM interfaces, table.....259
- promiscuous mode, ATM2 IQ interfaces.....231
- promiscuous-mode statement.....183
  - usage guidelines.....45
- protect-circuit statement.....184
- PVC encapsulation See ATM PVC encapsulation
- Q**
- queue-depth statement.....184
- queue-length statement.....185
- R**
- receive-options-packets statement.....185
  - usage guidelines.....41
- receive-ttl-exceeded statement.....186
  - usage guidelines.....41
- red alarm bell.....271
- request statement.....186
- required-depth statement.....187
- revert-time statement.....188
- rfc-2615 statement.....188
- rtvbr statement.....189
- S**
- scheduler-maps statement.....190
- set cli terminal command
  - ATM MIC interfaces .....253
  - ATM1 interfaces .....238
  - ATM2 IQ interfaces .....247
- set clocking internal command
  - ATM interfaces .....257
- set loopback local command
  - ATM interfaces .....256
- set loopback remote command
  - ATM interfaces .....265
- shaping statement.....191
- SHDSL.....115
- shdsl-options statement.....192
  - usage guidelines.....115
- show chassis hardware command.....224, 225
- show configuration interfaces command
  - ATM MIC interfaces .....228
  - ATM1 interfaces .....226, 229
  - ATM2 IQ interfaces .....227, 230
- show interfaces command
  - ATM interfaces.....258
  - ATM1 interfaces .....235
  - ATM2 IQ interfaces .....239
- show interfaces extensive command
  - ATM interfaces.....261, 266
  - ATM MIC interfaces.....249
  - ATM1 interfaces.....235
  - ATM2 IQ interfaces.....241
- show interfaces terse command
  - ATM interfaces.....234
  - ATM1 interfaces .....229
  - ATM2 IQ interfaces .....230, 239
- single-mode fiber cable.....256
- snext statement.....193
  - usage guidelines.....115
- snr-margin statement.....194
  - usage guidelines.....115
- source statement.....195
- statistics
  - ATM interfaces, resetting.....260
  - ATM1 interfaces .....237
  - errors
    - ATM interfaces .....261
- status
  - ATM interfaces.....257
- status description, table
  - ATM interfaces.....234
- status extensive
  - ATM MIC interfaces .....249
  - ATM1 interfaces .....235
  - ATM2 IQ interfaces .....241
- status for specific interface
  - ATM.....235
- support, technical See technical support
- syntax conventions.....xvii

**T**

|                                   |     |
|-----------------------------------|-----|
| T3 ATM interfaces                 |     |
| extensive output.....             | 263 |
| physical link down.....           | 259 |
| physical link up.....             | 258 |
| T3 interfaces                     |     |
| C-bit parity mode.....            | 133 |
| t3-options statement.....         | 196 |
| technical support                 |     |
| contacting JTAC.....              | xix |
| transmit-weight statement.....    | 197 |
| ATM2 IQ CoS Forwarding Class..... | 197 |
| ATM2 IQ Virtual Circuit.....      | 198 |
| usage guidelines.....             | 94  |
| trigger statement.....            | 199 |
| trunk-bandwidth statement.....    | 200 |
| trunk-id statement.....           | 201 |

**U**

|                            |     |
|----------------------------|-----|
| unit statement.....        | 202 |
| up-count statement.....    | 208 |
| use-null-cw statement..... | 209 |

**V**

|                                               |                        |
|-----------------------------------------------|------------------------|
| vbr statement.....                            | 210                    |
| vc-cos-mode statement.....                    | 211                    |
| vci statement.....                            | 212                    |
| VCI, configuration                            |                        |
| ATM1 interfaces.....                          | 229                    |
| ATM2 IQ interfaces.....                       | 230                    |
| VCIs.....                                     | 27                     |
| VCs.....                                      | 46                     |
| virtual channel identifier VCI, configuration | See VCI, configuration |
| virtual channel identifier, configuration     | See VCI, configuration |
| virtual circuits                              | See ATM VCs            |
| virtual paths                                 | See ATM VPs            |
| vpi statement.....                            | 213                    |
| ATM CCC cell-relay promiscuous mode.....      | 213                    |
| Logical Interface and Interworking.....       | 215                    |
| virtual path.....                             | 214                    |
| VPs.....                                      | 27                     |
| VPs.....                                      | 46                     |

**W**

|                                |     |
|--------------------------------|-----|
| working-circuit statement..... | 215 |
|--------------------------------|-----|

**Y**

|                        |     |
|------------------------|-----|
| yellow alarm bell..... | 271 |
|------------------------|-----|

**Z**

|                             |     |
|-----------------------------|-----|
| z0-increment statement..... | 216 |
|-----------------------------|-----|

# Index of Statements and Commands

## A

|                                   |     |
|-----------------------------------|-----|
| advertise-interval statement..... | 125 |
| allow-any-vci statement.....      | 126 |
| annex statement.....              | 126 |
| aps statement.....                | 127 |
| annex-b.....                      | 126 |
| atm-encapsulation statement.....  | 128 |
| atm-options statement.....        | 129 |
| atm-scheduler-map statement ..... | 130 |
| authentication-key statement..... | 131 |

## B

|                                   |     |
|-----------------------------------|-----|
| buildout statement                |     |
| E3 or T3 over ATM interfaces..... | 131 |
| bytes statement.....              | 132 |

## C

|                                 |     |
|---------------------------------|-----|
| cbit-parity statement.....      | 133 |
| cbr statement.....              | 134 |
| cell-bundle-size statement..... | 135 |
| current statement.....          | 135 |

## D

|                            |     |
|----------------------------|-----|
| down-count statement.....  | 136 |
| dsl-options statement..... | 137 |

## E

|                              |     |
|------------------------------|-----|
| e3-options statement.....    | 138 |
| encapsulation statement..... | 139 |
| logical interfaces.....      | 140 |
| physical interface.....      | 144 |
| epd-threshold statement..... | 149 |
| logical interface.....       | 149 |
| physical interface.....      | 150 |

## F

|                       |     |
|-----------------------|-----|
| family statement..... | 151 |
|-----------------------|-----|

|                                |     |
|--------------------------------|-----|
| fast-aps-switch statement..... | 155 |
| force statement.....           | 156 |
| framing statement              |     |
| E1, E3, and T1 interfaces..... | 157 |

## H

|                                       |     |
|---------------------------------------|-----|
| high-plp-max-threshold statement..... | 158 |
| high-plp-threshold statement.....     | 158 |
| hold-time statement.....              | 159 |
| APS.....                              | 159 |
| SONET/SDH Defect Triggers.....        | 160 |

## I

|                            |     |
|----------------------------|-----|
| ilmi statement.....        | 161 |
| inverse-arp statement..... | 162 |

## L

|                                         |     |
|-----------------------------------------|-----|
| line-rate statement.....                | 163 |
| linear-red-profile statement.....       | 164 |
| linear-red-profiles statement.....      | 165 |
| lockout statement.....                  | 165 |
| loopback statement                      |     |
| ADSL, DS0, E1/E3, SONET/SDH, SHDSL, and |     |
| T1/T3.....                              | 166 |
| low-plp-max-threshold statement.....    | 167 |
| low-plp-threshold statement.....        | 168 |

## M

|                                       |          |
|---------------------------------------|----------|
| maximum-vcs statement.....            | 169, 226 |
| mpls statement.....                   | 170      |
| multicast-vci statement.....          | 171      |
| multipoint-destination statement..... | 172      |

## N

|                                     |     |
|-------------------------------------|-----|
| neighbor statement.....             | 173 |
| no-cbit-parity statement.....       | 133 |
| no-payload-scrambler statement..... | 179 |
| no-z0-increment statement.....      | 216 |

## O

|                               |     |
|-------------------------------|-----|
| oam-liveness statement.....   | 174 |
| oam-period statement.....     | 175 |
| operating-mode statement..... | 176 |

## P

|                                     |     |
|-------------------------------------|-----|
| paired-group statement.....         | 177 |
| passive-monitor-mode statement..... | 178 |
| payload-scrambler statement.....    | 179 |
| pic-type statement.....             | 180 |

|                                 |     |
|---------------------------------|-----|
| plp-to-clp statement.....       | 180 |
| plp1 statement.....             | 181 |
| pop-all-labels statement.....   | 182 |
| priority                        |     |
| schedulers.....                 | 183 |
| promiscuous-mode statement..... | 183 |
| protect-circuit statement.....  | 184 |

## Q

|                             |     |
|-----------------------------|-----|
| queue-depth statement.....  | 184 |
| queue-length statement..... | 185 |

## R

|                                        |     |
|----------------------------------------|-----|
| receive-options-packets statement..... | 185 |
| receive-ttl-exceeded statement.....    | 186 |
| request statement.....                 | 186 |
| required-depth statement.....          | 187 |
| revert-time statement.....             | 188 |
| rfc-2615 statement.....                | 188 |
| rtvbr statement.....                   | 189 |

## S

|                               |     |
|-------------------------------|-----|
| scheduler-maps statement..... | 190 |
| shaping statement.....        | 191 |
| shdsl-options statement.....  | 192 |
| snext statement.....          | 193 |
| snr-margin statement.....     | 194 |
| source statement.....         | 195 |

## T

|                                   |     |
|-----------------------------------|-----|
| t3-options statement.....         | 196 |
| transmit-weight statement.....    | 197 |
| ATM2 IQ CoS Forwarding Class..... | 197 |
| ATM2 IQ Virtual Circuit.....      | 198 |
| trigger statement.....            | 199 |
| trunk-bandwidth statement.....    | 200 |
| trunk-id statement.....           | 201 |

## U

|                         |     |
|-------------------------|-----|
| unit statement.....     | 202 |
| up-count statement..... | 208 |

## V

|                            |     |
|----------------------------|-----|
| vbr statement.....         | 210 |
| vc-cos-mode statement..... | 211 |
| vci statement.....         | 212 |

|                                          |     |
|------------------------------------------|-----|
| vpi statement.....                       | 213 |
| ATM CCC cell-relay promiscuous mode..... | 213 |
| Logical Interface and Interworking.....  | 215 |
| virtual path.....                        | 214 |

## W

|                                |     |
|--------------------------------|-----|
| working-circuit statement..... | 215 |
|--------------------------------|-----|

## Z

|                             |     |
|-----------------------------|-----|
| z0-increment statement..... | 216 |
|-----------------------------|-----|