



Junos[®] OS

ATM Interfaces Configuration Guide

Release

11.4



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

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Junos® OS ATM Interfaces Configuration Guide

Release 11.4

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About This Guide

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

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

Junos Documentation and Release Notes

For a list of related Junos documentation, see <http://www.juniper.net/techpubs/software/junos/>.

If the information in the latest release notes differs from the information in the documentation, follow the *Junos 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/>.

Juniper Networks supports a technical book program to publish books by Juniper Networks engineers and subject matter experts with book publishers around the world. These books go beyond the technical documentation to explore the nuances of network architecture, deployment, and administration using the Junos operating system (Junos OS) and Juniper Networks devices. In addition, the Juniper Networks Technical Library, published in conjunction with O'Reilly Media, explores improving network security, reliability, and availability using Junos OS configuration techniques. All the books are for sale at technical bookstores and book outlets around the world. The current list can be viewed at <http://www.juniper.net/books>.

Objectives

This guide provides an overview of the network interfaces features of the Junos OS and describes how to configure these properties on the routing platform.



NOTE: For additional information about the Junos OS—either corrections to or information that might have been omitted from this guide—see the software release notes at <http://www.juniper.net/>.

Audience

This guide is designed for network administrators who are configuring and monitoring a Juniper Networks M Series, MX Series, T Series, EX Series, or J Series router or switch.

To use this guide, you need a broad understanding of networks in general, the Internet in particular, networking principles, and network configuration. You must also be familiar with one or more of the following Internet routing protocols:

- Border Gateway Protocol (BGP)
- Distance Vector Multicast Routing Protocol (DVMRP)
- Intermediate System-to-Intermediate System (IS-IS)
- Internet Control Message Protocol (ICMP) router discovery
- Internet Group Management Protocol (IGMP)
- Multiprotocol Label Switching (MPLS)
- Open Shortest Path First (OSPF)
- Protocol-Independent Multicast (PIM)
- Resource Reservation Protocol (RSVP)
- Routing Information Protocol (RIP)
- Simple Network Management Protocol (SNMP)

Personnel operating the equipment must be trained and competent; must not conduct themselves in a careless, willfully negligent, or hostile manner; and must abide by the instructions provided by the documentation.

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

Using the Indexes

This reference contains two indexes: a complete index that includes topic entries, and an index of statements and commands only.

In the index of statements and commands, an entry refers to a statement summary section only. In the complete index, the entry for a configuration statement or command contains at least two parts:

- The primary entry refers to the statement summary section.
- The secondary entry, *usage guidelines*, refers to the section in a configuration guidelines chapter that describes how to use the statement or command.

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 [Junos OS CLI User Guide](#).

Documentation Conventions

Table 1 on page xix 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 xix 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: <code>user@host> configure</code>
Fixed-width text like this	Represents output that appears on the terminal screen.	<code>user@host> show chassis alarms</code> <code>No alarms currently active</code>
<i>Italic text like this</i>	<ul style="list-style-type: none"> Introduces 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; interface names; 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.	<code>stub <default-metric metric>;</code>

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

Convention	Description	Examples
(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 [community-ids]
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		
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;
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;
}
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;
    }
}
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;
        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 | 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-beecn | no-translate-fecn-and-beecn);
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 | vrpp-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 Configuration Guide*

- [Junos OS Network Interfaces Configuration Guide](#)

[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 Configuration Guide](#)
 - [Junos OS Network Interfaces Configuration Guide](#)

PART 2

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CHAPTER 2

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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](#)
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- [Supported Features on ATM1 and ATM2 IQ Interfaces on page 34](#)
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- [Example: Configuring ATM2 IQ Interfaces on page 100](#)

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-vc <i>maximum-vc</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>; request; revert-time <i>seconds</i>; working-circuit <i>group-name</i>;</pre>
---	--

```

}
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;
    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);
}

```

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

ATM2 IQ Logical Configuration Hierarchy

```

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;
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 77.
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 77.

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 44.
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 77.
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 77.
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 77.

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 48.</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 82.</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 74 and “Configuring ATM2 IQ VC Tunnel CoS Components” on page 86.</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 63 .

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 77 and “Configuring the ATM OAM F5 Loopback Cell Threshold” on page 77.</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 Interfaces Command Reference.</p>
Queue length: Limits the queue size in packets of a particular VC.	Supported	Not supported	See “Configuring the ATM1 Queue Length” on page 73 .
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 68.</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 67.</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 86.</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 47.</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 48](#).

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 OS Services Interfaces Configuration Guide*.

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;
}
```

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 123](#)
- [mpls on page 161](#)
- [pop-all-labels on page 172](#)
- [required-depth on page 177](#)

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);
```

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, the 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, the Junos OS assumes you are configuring an ATM2 IQ interface, and sets the PIC type option accordingly.
- 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.

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;
    }
  }
  ...
}
```

Configuring ATM Cell-Relay Promiscuous Mode

For ATM1 and ATM2 IQ interfaces 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 and ATM2 IQ PICs, changing modes between promiscuous and nonpromiscuous causes all physical interfaces to be deleted and re-added.
- For ATM1 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 44](#).

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 86](#).

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 57](#).

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;
  }
}
```

```

    }
  }

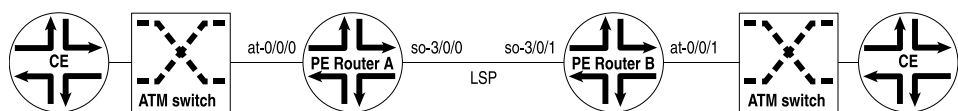
```

Configuring Layer 2 Circuit Trunk Transport Mode

In [Figure 1 on page 52](#), 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 86](#).

Figure 1: Layer 2 Circuit Trunk Topology



g017016

```

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;
    }
}
}
```

Configuring Layer 2 Circuit Cell-Relay Promiscuous Mode

By default, all incoming cells are mapped from a single 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 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 44](#).

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;
  }
}

```

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 48](#). For general information about ATM CoS scheduling, see [“Configuring ATM2 IQ VC Tunnel CoS Components” on page 86](#).

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-class ubr-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 86](#).

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 88](#).

For information about trunk identification numbers, see [“Configuring Layer 2 Circuit Transport Mode” on page 48](#). For information about trunk bandwidths, see [“Configuring Layer 2 Circuit Trunk Mode Scheduling” on page 57](#).

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 57](#).

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 95](#).

For general information about Layer 2 circuit trunk mode, see [“Configuring Layer 2 Circuit Transport Mode” on page 48](#).

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 76](#).

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 VCIs that belong to the VPI are marked down. When a VPI is marked up, all the VCIs 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 100](#).



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. VCIs 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 67](#). For information about ATM2 IQ shaping values, see [“Specifying ATM2 IQ Shaping Values” on page 72](#).

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 47](#).

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 **multipoint-vci** statement:

```
multipoint-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 77](#).

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 64](#).



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 68](#)
- [Configuring ATM2 IQ Real-Time VBR on page 68](#)
- [Configuring ATM VBR on page 69](#)
- [Specifying ATM1 Shaping Values on page 69](#)
- [Specifying ATM2 IQ Shaping Values on page 72](#)

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 68](#).

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 71](#) 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:

$$\begin{aligned} 1 / 127 * 542,526,792.45 \text{ bps} &= 4,271,864 \text{ bps (11124 cells/second)} \\ 1 / 128 * 542,526,792.45 \text{ bps} &= 4,238,490 \text{ bps (11038 cells/second)} \\ 1 / 129 * 542,526,792.45 \text{ bps} &= 4,205,634 \text{ bps (10952 cells/second)} \\ &\dots \end{aligned}$$

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 71](#) 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
	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:

$$\begin{aligned} \text{actual-rate} &= (128 * 135,600,000.1) / (\text{trunc} ((128 * 135,600,000.1) / 108,480,000)) \\ \text{actual-rate} &= 17,356,800,013 / (\text{trunc} (17,356,800,013 / 108,480,000)) \\ \text{actual-rate} &= 17,356,800,013 / 160 \\ \text{actual-rate} &= 108,480,000 \text{ bps} \end{aligned}$$

- 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:

$$\begin{aligned} \text{actual-rate} &= (128 * 542,526,792.45) / (\text{trunc} ((128 * 542,526,792.45) / 217,010,716.8)) \\ \text{actual-rate} &= 69,443,429,434 / (\text{trunc} (69,443,429,434 / 217,010,716.8)) \\ \text{actual-rate} &= 69,443,429,434 / 320 \\ \text{actual-rate} &= 217,010,717 \text{ bps} \end{aligned}$$

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:

$$\begin{aligned} \text{actual-rate} &= (1 / (\text{trunc} (\text{line-rate} / \text{desired-rate}) + 1)) * \text{line-rate} \\ \text{actual-rate} &= (1 / (\text{trunc} (135,631,698 / 3,000,000) + 1)) * 135,631,698 \\ \text{actual-rate} &= (1 / (45 + 1)) * 135,631,698 \\ \text{actual-rate} &= (1 / 46) * 135,631,698 \\ \text{actual-rate} &= 2,948,515 \text{ bps} \end{aligned}$$

- OC12c:

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

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

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:

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

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 75](#).

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 76](#).

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

```
[edit interfaces at-1/0/0]
unit 0 {
  vci 0.123;
  epd-threshold 1300;
  ...
}
```

On a Point-to-Multipoint ATM2 Interface

```
[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;
    ...
  }
}
```

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 75](#).

For general information about EPD thresholds, see “[Configuring the ATM2 IQ EPD Threshold](#)” on page 74.

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 100.

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 78 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	

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

Encapsulation Types	Comments
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>
PPP over AAL5 LLC	<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>
PPP over AAL5 multiplex	<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>

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 44](#).

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;
  vpi 0 maximum-vcs 256;
}
unit 0 {
  point-to-point;
  encapsulation atm-ccc-cell-relay;
  allow-any-vci;
}
```

Configuring an
Individual VC on a
Logical Interface

```
[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;
}

[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;
}

```

Configuring Nonpromiscuous Port Mode

```

[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;
}

```

Configuring Nonpromiscuous VPI Mode

```

[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;
    vci 0.50
}

```

Configuring Nonpromiscuous VCI Mode

- Related Documentation**
- [allow-any-vci on page 120](#)
 - [atm-options on page 123](#)
 - [atm-encapsulation on page 122](#)

- [encapsulation \(Logical Interface\) on page 134](#)
- [encapsulation \(Physical Interface\) on page 138](#)
- [unit on page 192](#)

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;
    }
}

[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;
        }
    }
}

```

Configuring Multilink PPP over ATM2 IQ Encapsulation

```
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 88](#)
- [Configuring an ATM Scheduler Map on page 88](#)
- [Enabling Eight Queues on ATM2 IQ Interfaces on page 90](#)
- [Configuring VC CoS Mode on page 95](#)
- [Enabling the PLP Setting to Be Copied to the CLP Bit on page 96](#)

- [Configuring ATM CoS on the Logical Interface on page 96](#)
- [Example: Configuring ATM2 IQ VC Tunnel CoS Components on page 97](#)

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 90.](#)

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 86](#).

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](#).



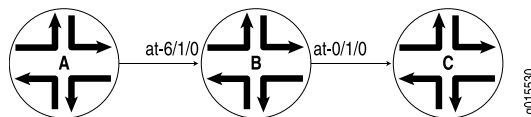
NOTE: When you are considering enabling eight queues on an ATM2 IQ interface, you should note the following:

- 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 Platforms

In [Figure 2 on page 91](#), 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 48](#).

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 64 and “Defining the ATM Traffic-Shaping Profile” on page 67.

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 64](#)
- [Defining the ATM Traffic-Shaping Profile on page 67](#)
- [atm-scheduler-map on page 124](#)
- [vci on page 201](#)

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 138](#)
- [Example: Configuring ATM Scheduler Map on Ethernet VPLS over Bridged ATM Interfaces on page 101](#)

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.

```
[edit interfaces]
at-fpc/pic/port {
  atm-options {
    vpi vpi-identifier maximum-vcs maximum-vcs-value;
    unit 0 { # one unit per VC
      vci vpi-identifier.vci-identifier;
      family inet {
        address local-address {
```


Complex Configuration Example

```

        destination address;
    }
}
unit 1 { # second VC
...
}

[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;
    }
  }
}
}
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 10.10.10.1:1;
    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 138](#)
 - [Configuring ATM Scheduler on Ethernet VPLS over a Bridged ATM Interface on page 98](#)

CHAPTER 3

Configuring ATM-over-ADSL Interfaces

- [ATM-over-ADSL Overview on page 103](#)
- [Configuring Physical ATM Interfaces and Logical Interface Properties for ADSL on page 104](#)
- [Configuring the ATM-over-ADSL Virtual Path Identifier on page 105](#)
- [Configuring the ATM-over-ADSL Physical Interface Operating Mode on page 105](#)
- [Configuring the ATM-over-ADSL Physical Interface Encapsulation Type on page 106](#)
- [Configuring the ATM-over-ADSL Logical Interface Encapsulation Type on page 106](#)
- [Configuring the ATM-over-ADSL Protocol Family on page 107](#)
- [Configuring the ATM-over-ADSL Virtual Channel Identifier on page 108](#)

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 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 105](#)
- [Configuring the ATM-over-ADSL Physical Interface Operating Mode on page 105](#)
- [Configuring the ATM-over-ADSL Physical Interface Encapsulation Type on page 106](#)
- [Configuring the ATM-over-ADSL Logical Interface Encapsulation Type on page 106](#)

- [Configuring the ATM-over-ADSL Protocol Family on page 107](#)
- [Configuring the ATM-over-ADSL Virtual Channel Identifier on page 108](#)

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 105](#) 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.
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	

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

Encapsulation Types	Comments
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*/0/*port*]** hierarchy level:

```
[edit interfaces at-pim/0/port]
  encapsulation type;
```

Table 10 on page 107 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/0/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 107 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/O/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 109](#)
- [Configuring ATM Mode for SHDSL Overview on page 110](#)
- [Configuring ATM Mode on the PIM on page 111](#)
- [Configuring SHDSL Operating Mode on an ATM Physical Interface on page 112](#)
- [Configuring Encapsulation on the ATM Physical Interface on page 113](#)
- [Configuring Logical Interface Properties on page 113](#)
- [Example: Configuring an ATM-over-SHDSL Interface on page 114](#)
- [Verifying an ATM-over-SHDSL Interface Configuration on page 115](#)

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 110](#)
- [Configuring ATM Mode on the PIM on page 111](#)
- [Configuring SHDSL Operating Mode on an ATM Physical Interface on page 112](#)
- [Configuring Encapsulation on the ATM Physical Interface on page 113](#)
- [Configuring Logical Interface Properties on page 113](#)
- [Example: Configuring an ATM-over-SHDSL Interface on page 114](#)
- [Verifying an ATM-over-SHDSL Interface Configuration on page 115](#)

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 47](#).

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 109](#)
- [Configuring ATM Mode on the PIM on page 111](#)
- [Configuring SHDSL Operating Mode on an ATM Physical Interface on page 112](#)
- [Configuring Encapsulation on the ATM Physical Interface on page 113](#)
- [Configuring Logical Interface Properties on page 113](#)
- [Example: Configuring an ATM-over-SHDSL Interface on page 114](#)
- [Verifying an ATM-over-SHDSL Interface Configuration on page 115](#)

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 112.

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 192](#)
- [encapsulation on page 134](#)
- [family on page 144](#)
- [vci on page 201](#)

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 119](#)

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.
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 80

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 109

aps

Syntax

```
aps {
  advertise-interval milliseconds;
  annex-b
  authentication-key key;
  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;
}
```

Hierarchy Level [edit interfaces *interface-name* sonet-options]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure Automatic Protection Switching (APS) on the router.

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.

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

- Configuring APS and MSP

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 85• encapsulation (Physical Interface) on page 138

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.

Description Configure ATM-specific physical interface properties.

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

- Interface Encapsulations Overview
- [multipoint-destination on page 163](#)
- [shaping on page 181](#)
- [vci on page 201](#)

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 86](#)
- [scheduler-maps on page 180](#)

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 APS Support 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 85

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 85 • 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	<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>For ATM1 and ATM2 OC3 interfaces, the maximum available rate is 100 percent of line-rate, or 135,600,000 bps. For ATM1 OC12 interfaces, the maximum available rate is 50 percent of line-rate, or 271,263,396 bps. For ATM2 IQ interfaces, the maximum available rate is 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">• Defining the ATM Traffic-Shaping Profile on page 67• rtvbr on page 179• shaping on page 181• vbr on page 199

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, you can 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 61

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 109

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 77

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 103• <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 123](#)

encapsulation

See the following sections:

- [encapsulation \(Logical Interface\) on page 134](#)
- [encapsulation \(Physical Interface\) on page 138](#)

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 frame-relay-ccc frame-relay-ether-type frame-relay-ether-type-tcc frame-relay-ppp frame-relay-tcc 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 <i>rlsnumber</i> unit <i>logical-unit-number</i>]</code>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Logical link-layer encapsulation type.
Options	<p>atm-ccc-cell-relay—Use ATM cell-relay encapsulation.</p> <p>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.</p> <p>atm-cisco-nlpid—Use Cisco ATM network layer protocol ID (NLPID) encapsulation. When you use this encapsulation type, you can configure the inet family only.</p> <p>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.</p> <p>atm-nlpid—Use ATM NLPID encapsulation. When you use this encapsulation type, you can configure the inet family only.</p> <p>atm-ppp-llc—For ATM2 IQ interfaces only, use PPP over AAL5 LLC encapsulation.</p> <p>atm-ppp-vc-mux—For ATM2 IQ interfaces only, use PPP over ATM AAL5 multiplex encapsulation.</p> <p>atm-snap—Use ATM subnetwork attachment point (SNAP) encapsulation.</p> <p>atm-tcc-snap—Use ATM SNAP encapsulation on translational cross-connect (TCC) circuits.</p> <p>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.</p> <p>atm-vc-mux—Use ATM VC multiplex encapsulation. When you use this encapsulation type, you can configure the inet family only.</p> <p>ether-over-atm-llc—For interfaces that carry IPv4 traffic, use Ethernet over ATM LLC encapsulation. When you use this encapsulation type, you cannot configure multipoint interfaces.</p>

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, as per RFC 2427 (1490).



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.

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-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 unlike media. When you use this encapsulation type, you can configure the **tcc** 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 unlike media. The physical interface must be configured with flexible-frame-relay encapsulation.

multilink-frame-relay-end-to-end—Use MLFR FRF.15 encapsulation. This encapsulation is used only on multilink, link services, 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 Services 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 Series routers with Intelligent Queuing 2 (IQ2) PICs, and on MX Series routers with Trio MPC/MIC interfaces.

ppp-over-ether-over-atm-llc—For underlying ATM interfaces on J Series Services Routers only, 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	interface—To view this statement in the configuration.
Level	interface-control—To add this statement to the configuration.

**Related
Documentation**

- Configuring Interface Encapsulation on Logical Interfaces
- Circuit and Translational Cross-Connects Overview
- Identifying the Access Concentrator
- [Configuring ATM Interface Encapsulation on page 77](#)
- Configuring VLAN Encapsulation
- Configuring Extended VLAN Encapsulation
- Configuring ISDN Logical Interface Properties
- Configuring ATM-to-Ethernet Interworking
- [Junos OS Services Interfaces Configuration Guide](#)

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 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 <i>rlsnumber:number</i>]</code>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Physical link-layer encapsulation type.
Default	PPP encapsulation.
Options	<p>atm-ccc-cell-relay—Use ATM cell-relay encapsulation.</p> <p>atm-pvc—Use ATM PVC encapsulation.</p> <p>cisco-hdlc—Use Cisco-compatible High-Level Data Link Control (HDLC) framing.</p> <p>cisco-hdlc-ccc—Use Cisco-compatible HDLC framing on CCC circuits.</p> <p>cisco-hdlc-tcc—Use Cisco-compatible HDLC framing on TCC circuits for connecting unlike media.</p> <p>ethernet-bridge—Use Ethernet bridge encapsulation on Ethernet interfaces that have bridging enabled and that must accept all packets.</p> <p>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</p> <p>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 1483, <i>Multiprotocol Encapsulation over ATM Adaptation Layer 5</i>, this encapsulation type allows ATM interfaces to connect to devices that support only bridged 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 MAC header, and the packet is forwarded to the ATM interface.</p>

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.

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-tcc—Use Frame Relay encapsulation on TCC circuits to connect unlike 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.



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-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 unlike media.

frame-relay-ether-type—Use Frame Relay ether type encapsulation for compatibility with Cisco Frame Relay.

frame-relay-ether-type-tcc—Use Frame Relay ether type TCC for Cisco-compatible Frame Relay on TCC circuits to connect unlike media.

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 is used for circuits with different media on either side of the connection.

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 unlike 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.

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 Interface Encapsulation on Physical Interfaces• Defining the Encapsulation for Switching Cross-Connects• Configuring ATM Interface Encapsulation on page 77• Configuring VLAN Encapsulation• Configuring ATM-to-Ethernet Interworking• Configuring Extended VLAN Encapsulation• Configuring Encapsulation for Layer 2 Wholesale VLAN Interfaces• Configuring Interfaces for Layer 2 Circuits• Configuring Interfaces for Layer 2 Circuits

epd-threshold

See the following sections:

- [epd-threshold \(Logical Interface\) on page 142](#)
- [epd-threshold \(Physical Interface\) on page 143](#)

epd-threshold (Logical Interface)

Syntax	<code>epd-threshold cells plp1 cells;</code>
Hierarchy Level	<code>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>],</code> <code>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> address <i>address</i> family <i>family</i></code> <code> multipoint-destination <i>address</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 logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i></code> <code> address <i>address</i> family <i>family</i> multipoint-destination <i>address</i>]</code>
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 11.1 for the QFX Series.
Description	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).
Default	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: $\text{default epd-threshold} = \text{number of buffers} * \text{shaping rate} / \text{line rate}$ 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.
Options	cells —Maximum number of cells. Range: For 1-port and 2-port OC12 interfaces, 48 through 425,984 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 ATM2 IQ EPD Threshold on page 74• Configuring Two EPD Thresholds per Queue on page 76

epd-threshold (Physical Interface)

Syntax	<code>epd-threshold cells plp1 cells;</code>
Hierarchy Level	[edit interfaces <i>at-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 88• linear-red-profile on page 155

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 dlci 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 | 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* [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.
See the [Junos OS Configuration Statements and Commands](#) for details about
each protocol family.

.....

Options *family*—Protocol family:

- **any**—Protocol-independent family used for Layer 2 packet filtering
- **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 OS Services Interfaces Configuration Guide](#)


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 176

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	<i>class-name</i> —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 86forwarding-class statement in the <i>Junos OS Class of Service Configuration Guide</i>

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.
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 85 Configuring T1 Framing

high-plp-max-threshold

Syntax	<code>high-plp-max-threshold percent;</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 86• low-plp-max-threshold on page 158• low-plp-threshold on page 159• queue-depth on page 174

high-plp-threshold

Syntax	<code>high-plp-threshold percent;</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 86• high-plp-max-threshold on page 150• low-plp-max-threshold on page 158• low-plp-threshold on page 159• queue-depth on page 174

hold-time

See the following sections:

- [hold-time \(APS\) on page 151](#)
- [hold-time \(SONET/SDH Defect Triggers\) on page 152](#)




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 119

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.
	<div>NOTE: 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.</div>
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	<p>down <i>milliseconds</i>—Hold time to wait before the interface is marked down. Range: 1 through 65,534 milliseconds Default: No hold time</p> <p>up <i>milliseconds</i>—Hold time to wait before the interface is marked up. Range: 1 through 65,534 milliseconds Default: No hold time</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 Defect Hold Times

ilmi

Syntax	ilmi;
Hierarchy Level	[edit interfaces <i>at-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 66 • 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	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 109

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 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 88• linear-red-profiles on page 156


linear-red-profiles

Syntax	<pre>linear-red-profiles <i>profile-name</i> { high-plp-threshold <i>percent</i>; low-plp-threshold <i>percent</i>; queue-depth <i>cells</i>; }</pre>
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	<p><i>profile-name</i>—Name of the drop profile.</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">• Configuring ATM2 IQ VC Tunnel CoS Components on page 86

lockout

Syntax	<pre>lockout;</pre>
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	loopback (local payload remote);
Hierarchy Level	[edit interfaces ce1- <i>fpc/pic/port</i>], [edit interfaces ct1- <i>fpc/pic/port</i>], [edit interfaces t1- <i>fpc/pic/port</i>], [edit interfaces <i>interface-name</i> ds0-options], [edit interfaces <i>interface-name</i> dsl-options], [edit interfaces <i>interface-name</i> e1-options], [edit interfaces <i>interface-name</i> e3-options], [edit interfaces <i>interface-name</i> shdsl-options], [edit interfaces <i>interface-name</i> sonet-options], [edit interfaces <i>interface-name</i> t1-options], [edit interfaces <i>interface-name</i> t3-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure a loopback connection. To turn off the loopback capability, remove the loopback statement from the configuration.
<div>  <p>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-<i>fpc/pic/port</i>] or [edit interfaces ct1-<i>fpc/pic/port</i>] hierarchy level as appropriate.</p> <p>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-<i>fpc/pic/port</i>] hierarchy level.</p> </div>	
<p>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.</p>	
Options	<p>local—Loop packets, including both data and timing information, back on the local router's PIC. NxDS0 IQ interfaces do not support local loopback.</p> <p>payload—For channelized T3, T1, and NxDS0 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.</p> <p>remote—Loop packets, including both data and timing information, back on the remote router's interface card. NxDS0 IQ interfaces do not support remote loopback.</p>
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 85](#)
 - Configuring E1 Loopback Capability
 - Configuring E3 Loopback Capability
 - Configuring Channelized IQ and IQE SONET/SDH Loop Timing
 - [Configuring SHDSL Operating Mode on an ATM Physical Interface on page 112](#)
 - 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 86](#)
 - [high-plp-max-threshold on page 150](#)
 - [low-plp-threshold on page 159](#)
 - [queue-depth on page 174](#)

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 86• high-plp-max-threshold on page 150• high-plp-threshold on page 150• low-plp-max-threshold on page 158• queue-depth on page 174

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 47• multipoint-destination on page 163• promiscuous-mode on page 173• vci on page 201

mpls

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> gige-ether-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 OS Services Interfaces Configuration Guide

multicast-vci

Syntax	<code>multicast-vci vpi-identifier.vci-identifier;</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	vci-identifier —ATM virtual circuit identifier. Range: 0 through 16,384 vpi-identifier —ATM virtual path identifier. Range: 0 through 255 Default: 0
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 Multicast-Capable ATM1 or ATM2 IQ Connection on page 66• multipoint-destination on page 163• vci on page 201

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>], [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 0xFFFFF (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 64 • Configuring a Point-to-Multipoint Frame Relay Connection • dlcid • encapsulation (Logical Interface) on page 134

neighbor

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 APS Support

oam-liveness

Syntax	<pre>oam-liveness { down-count cells; up-count cells; }</pre>
Hierarchy Level	<p>[edit interfaces <i>interface-name</i> atm-options vpi <i>vpi-identifier</i>],</p> <p>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>],</p> <p>[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>],</p> <p>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</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> 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 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.</p> <p>Range: 1 through 255</p> <p>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.</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 77

oam-period

Syntax	<code>oam-period (disable seconds);</code>
Hierarchy Level	[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>]
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 only, configure the OAM F5 loopback cell period. Not supported on ATM-over-SHDLSL interfaces. 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.
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	disable —Disable the OAM loopback cell transmit feature. seconds —OAM loopback cell period. Range: 1 through 900 seconds
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 OAM F5 Loopback Cell Period on page 77

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 103 • <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 Sharing Between Circuit Pairsworking-circuit on page 204

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>For ATM, Ethernet, and SONET/SDH interfaces only, 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>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 41Passive Monitoring on Ethernet Interfaces OverviewEnabling Passive Monitoring on SONET/SDH Interfacesmultiservice-optionsJunos OS Services Interfaces Configuration Guide

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 85 • 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 96

plp1

Syntax	<code>plp1 cells;</code>
Hierarchy Level	<p>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>],</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>],</p> <p>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>],</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>]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 11.1 for QFX Series switches.</p>
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	<p>cells—Maximum number of cells.</p> <p>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</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 Two EPD Thresholds per Queue on page 76 • Configuring an ATM Scheduler Map on page 88 • linear-red-profile on page 155

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 and SONET/SDH interfaces only, removes up to two MPLS labels from incoming IP packets.</p> <p>This statement has no effect on IP packets with more than two MPLS labels. 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 OS Services Interfaces Configuration Guide

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 <i>class-name</i>]
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 86

promiscuous-mode

Syntax	<pre>promiscuous-mode { vpi vpi-identifier; }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i> atm-options]
Release Information	Statement introduced before Junos OS Release 7.4.
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 44 • vpi (ATM CCC Cell-Relay Promiscuous Mode) on page 202

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 APS Supportworking-circuit on page 204

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 86high-plp-threshold on page 150low-plp-threshold on page 159

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 73

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 148

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 OS Services Interfaces Configuration Guide

revert-time

Syntax	<code>revert-time seconds;</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	seconds —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 68 • Configuring ATM2 IQ Real-Time VBR on page 68 • cbr on page 128

- [vbr on page 199](#)

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 86• atm-scheduler-map on page 124• 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	<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, 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 64 • Defining the ATM Traffic-Shaping Profile on page 67 • Configuring ATM QoS or Shaping

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	For J Series Services Routers only, configure symmetric DSL (SHDSL) options. 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">• ATM-over-SHDSL Overview on page 109

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 109 • <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 109• <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 OS Services Interfaces Configuration Guide

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 187](#)
- [transmit-weight \(ATM2 IQ Virtual Circuit\) on page 188](#)

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	<p>percent <i>percent</i>—Transmission weight of the forwarding class as a percentage of the total bandwidth. Range: 5 through 100</p> <p>cells <i>number</i>—Transmission weight of the forwarding class as a number of cells. Range: 0 through 32,000</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 86

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 76

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 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 to Be Ignored

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 57

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 48

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 | 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 {
        dlcidlcid-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 <i>interface-name</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i>], [edit interfaces interface-set <i>interface-set-name</i> interface <i>interface-name</i>]
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	<i>logical-unit-number</i> —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 113](#)
 - [Example: Configuring E-LINE and E-LAN Services for a PBB Network on MX Series Routers](#)
 - [Junos OS Services Interfaces Configuration Guide](#)

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 77

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 68 • cbr on page 128

- [rtvbr on page 179](#)
- [shaping on page 181](#)

vc-cos-mode

Syntax	vc-cos-mode (alternate strict);
Hierarchy Level	[edit interfaces <i>interface-name</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, 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	• Configuring ATM2 IQ VC Tunnel CoS Components on page 86

vci

Syntax	<code>vci vpi-identifier.vci-identifier;</code>
Hierarchy Level	<p>[edit interfaces at-<i>fpc/pic/port</i> unit <i>logical-unit-number</i>],</p> <p>[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>],</p> <p>[edit logical-systems <i>logical-system-name</i> interfaces at-<i>fpc/pic/port</i> unit <i>logical-unit-number</i>],</p> <p>[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>]</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 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	<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 64 • multipoint-destination on page 163 • promiscuous-mode on page 173 • vpi (ATM CCC Cell-Relay Promiscuous Mode) on page 202

vpi

See the following sections:

- [vpi \(ATM CCC Cell-Relay Promiscuous Mode\) on page 202](#)
- [vpi \(Define Virtual Path\) on page 203](#)
- [vpi \(Logical Interface and Interworking\) on page 204](#)

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.
Description	<p>For ATM interfaces, allow all VCIs in this VPI to open in ATM CCC cell-relay mode.</p> <p>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.</p>
Options	<p>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.)</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 44

vpi (Define Virtual Path)

Syntax	<pre> vpi <i>vpi-identifier</i> { maximum-vcs <i>maximum-vcs</i>; oam-liveness { up-count <i>cells</i>; down-count <i>cells</i>; } oam-period (disable <i>seconds</i>); shaping { (<i>cbr</i> <i>rate</i> <i>rtvbr</i> <i>peak rate</i> <i>sustained rate</i> <i>burst length</i> <i>vbr</i> <i>peak rate</i> <i>sustained rate</i> <i>burst length</i>); queue-length <i>number</i>; } } </pre>
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 virtual path (VP).
Options	<p><i>vpi-identifier</i>—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.)</p> <p>Range: 0 through 255</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 the Maximum Number of ATM1 VCs on a VP on page 47 • multipoint-destination on page 163 • promiscuous-mode on page 173 • vci on page 201

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.
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 44

working-circuit

Syntax	<code>working-circuit group-name;</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	group-name —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 APS Supportprotect-circuit on page 174

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 209](#)

CHAPTER 6

Troubleshooting ATM Interfaces

This chapter includes the following information to assist you when troubleshooting ATM interfaces:

- [Investigate Interface Steps and Commands on page 209](#)
- [Determine ATM Interface Type on page 212](#)
- [Monitor ATM Interfaces on page 220](#)
- [Use Loopback Testing for ATM Interfaces on page 235](#)
- [Locate ATM Alarms and Errors on page 247](#)

Investigate Interface Steps and Commands

This section includes the following information to assist you when troubleshooting ATM interfaces:

- [Investigate Interface Steps and Commands Overview on page 209](#)
- [Monitor Interfaces on page 209](#)
- [Perform a Loopback Test on an Interface on page 210](#)
- [Locate Interface Alarms on page 212](#)

Investigate Interface Steps and Commands Overview

The “[Monitor Interfaces](#)” on [page 209](#) section helps you determine the nature of the interface problem. The “[Perform a Loopback Test on an Interface](#)” on [page 210](#) section provides information to help you isolate the source of the problem. The “[Locate Interface Alarms](#)” on [page 212](#) section explains some of the alarms and errors for the media.

Monitor 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 “*Commands Used to Monitor Interfaces*” table 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.

Perform 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 “*Commands Used to Perform Loopback Testing on Interfaces*” table 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 address address] arp ip-address mac mac-address	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.

Locate 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.

Determine ATM Interface Type

- [Checklist for Determining ATM Interface Type on page 212](#)
- [Determine the ATM Interface Type and Configuration on page 213](#)
- [Determine the ATM Interface Type on page 214](#)
- [Check that the ATM Configuration Is Correct on page 214](#)
- [Examples of Incorrect Configurations of ATM Options on page 216](#)

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 213](#) 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
“Determine the ATM Interface Type and Configuration” on page 213	
1. Determine the ATM Interface Type on page 214	<code>show chassis hardware</code>
2. Check that the ATM Configuration Is Correct on page 214	
a. Check the Configuration of an ATM1 Interface on page 214	<code>show configuration interfaces at-fpc/pic/port</code>
b. Check the Configuration of an ATM2 IQ Interface on page 215	<code>show configuration interfaces at-fpc/pic/port</code>
“Examples of Incorrect Configurations of ATM Options” on page 216	
1. Check the Configuration of the VCI on an ATM1 Interface on page 216	<pre> show configuration interfaces at-fpc/pic/port show interfaces terse at-fpc/pic/port 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-fpc/pic/port run show interfaces terse at-fpc/pic/port </pre>
2. Check the Configuration of the VCI on an ATM2 IQ Interface on page 218	<pre> show configuration interfaces at-fpc/pic/port show interfaces terse at-fpc/pic/port edit edit interfaces <i>interface-name</i> atm-options vpi <i>vpi-identifier</i> delete maximum-vcs show commit show configuration interfaces at-fpc/pic/port run show interfaces terse at-fpc/pic/port </pre>
3. Check the Configuration of Promiscuous Mode on an ATM2 IQ Interface on page 219	<pre> show configuration interfaces at-fpc/pic/port show interfaces terse at-fpc/pic/port edit set interfaces <i>interface-name</i> atm-options pic-type atm 2 show commit show configuration interfaces at-fpc/pic/port run show interfaces terse at-fpc/pic/port </pre>

Determine 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 and ATM2 intelligent queuing (IQ) interfaces, the Junos OS does not determine from the interface name `at-fpc/pic/port` whether your routing platform has an ATM1 or ATM2 IQ Physical Interface Card (PIC) installed.

Action To determine the type of ATM interface on your router and to check your ATM interface configuration, follow these steps:

1. [Determine the ATM Interface Type on page 214](#)
2. [Check that the ATM Configuration Is Correct on page 214](#)

Determine 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**.

Check that the ATM Configuration Is Correct

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. [Check the Configuration of an ATM1 Interface on page 214](#)
2. [Check the Configuration of an ATM2 IQ Interface on page 215](#)

Check the Configuration of an ATM1 Interface

Purpose The Junos OS assumes an ATM1 interface configuration if you include the **maximum-vc**s 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.

Check 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.

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. [Check the Configuration of the VCI on an ATM1 Interface on page 216](#)
2. [Check the Configuration of the VCI on an ATM2 IQ Interface on page 218](#)
3. [Check the Configuration of Promiscuous Mode on an ATM2 IQ Interface on page 219](#)

Check 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 check that VCI is configured correctly on your ATM1 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 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.

Check 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.

Check 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**
- [Investigate Interface Steps and Commands on page 209](#)
 - [Monitor ATM Interfaces on page 220](#)
 - [Use Loopback Testing for ATM Interfaces on page 235](#)
 - [Locate ATM Alarms and Errors on page 247](#)

Monitor ATM Interfaces

- [Checklist for Monitoring ATM Interfaces on page 220](#)
- [Monitor ATM Interfaces on page 221](#)
- [Monitor ATM1 Interfaces on page 222](#)
- [Monitor ATM2 IQ Interfaces on page 226](#)

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 14 on page 221](#) provides the links and commands for monitoring ATM interfaces.

Table 14: Checklist for Monitoring ATM Interfaces

Tasks	Command or Action
“Monitor ATM Interfaces” on page 221	<code>show interfaces terse at*</code>
“Monitor ATM1 Interfaces” on page 222	
1. Display the Status of a Specific ATM1 Interface on page 222	<code>show interfaces at-fpc/pic/port</code>
2. Display Extensive Status Information for a Specific ATM1 Interface on page 222	<code>show interfaces at-fpc/pic/port extensive</code>
3. “Monitor Statistics for an ATM1 Interface” on page 225	<code>monitor interface at-fpc/pic/port</code>
“Monitor ATM2 IQ Interfaces” on page 226	
1. Display the Status of a Specific ATM2 IQ Interface on page 226	<code>show interfaces terse at-fpc/pic/port</code> <code>show interfaces at-fpc/pic/port</code>
2. Display Extensive Information for a Specific ATM2 Interface on page 228	<code>show interfaces at-fpc/pic/port extensive</code>
3. Monitor Statistics for an ATM2 Interface on page 234	<code>monitor interface at-fpc/pic/port</code>

Monitor 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 212](#) 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    inet  10.16.5.1/24
at-2/2/0.100   up    up    inet  10.16.250.253/30
at-2/2/0.101   up    up    inet  20.20.20.1/30
at-2/2/0.200   up    up    inet  30.30.30.1/30
at-2/2/0.300   up    up    inet  40.40.40.1/30
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 15 on page 222](#) 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 212](#) for information on how to determine the ATM interface type.

Table 15: 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	

Monitor ATM1 Interfaces

To monitor an ATM1 interface, follow these steps:

1. [Display the Status of a Specific ATM1 Interface on page 222](#)
2. [Display Extensive Status Information for a Specific ATM1 Interface on page 222](#)
3. [Monitor Statistics for an ATM1 Interface on page 225](#)

Display 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 [“Display Extensive Status Information for a Specific ATM1 Interface” on page 222](#) to display more extensive information about the ATM interface and the physical interface that is down.

Display 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      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 247](#) for an explanation of ATM alarms.

Monitor 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.

Monitor ATM2 IQ Interfaces

To monitor an ATM2 interface, follow these steps:

1. [Display the Status of a Specific ATM2 IQ Interface on page 226](#)
2. [Display Extensive Information for a Specific ATM2 Interface on page 228](#)
3. [Monitor Statistics for an ATM2 Interface on page 234](#)

Display 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 [“Display Extensive Information for a Specific ATM2 Interface” on page 228](#) to display more extensive information about the ATM interface and the physical interface that is down.

Display 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 247](#) for an explanation of ATM alarms.

Monitor 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: 0C12
Traffic statistics:
  Input bytes:                      0 (0 bps)                      [0]
  Output bytes:                     1600 (0 bps)                   [0]
  Input packets:                    0 (0 pps)                      [0]
  Output packets:                   18 (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                              [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.

- Related Documentation
- Investigate Interface Steps and Commands on page 209
 - Determine ATM Interface Type on page 212
 - Use Loopback Testing for ATM Interfaces on page 235
 - Locate ATM Alarms and Errors on page 247

Use Loopback Testing for ATM Interfaces

- Checklist for Using Loopback Testing for ATM Interfaces on page 235
- Diagnose a Suspected Hardware Problem with an ATM1 or ATM2 IQ Interface on page 236
- Create a Loopback on page 237
- Set Clocking to Internal on page 238
- Verify That the ATM Interface Is Up on page 239
- Clear ATM Interface Statistics on page 241
- Ping the ATM Interface on page 241
- Check for ATM Interface Error Statistics on page 242
- Diagnose a Suspected Circuit Problem on page 245

Checklist for Using Loopback Testing for ATM Interfaces

- Purpose

To use loopback testing for ATM interfaces.
- Action

Table 16 on page 235 provides links and commands for using loopback testing for ATM interfaces.

Table 16: Checklist for Using Loopback Testing for ATM Interfaces

Tasks	Command or Action
“Diagnose a Suspected Hardware Problem with an ATM1 or ATM2 IQ Interface” on page 236	
1. Create a Loopback on page 237	
a. Create a Physical Loopback on page 237	Connect the transmit port to the receive port.
b. Configure a Local Loopback on page 237	[edit interfaces <i>interface-name</i> (sonet-options t3-options)] set loopback local show commit

Table 16: Checklist for Using Loopback Testing for ATM Interfaces (*continued*)

Tasks	Command or Action
2. Set Clocking to Internal on page 238	<code>[edit interfaces <i>interface-name</i>] set clocking internal show commit</code>
3. Verify That the ATM Interface Is Up on page 239	<code>show interfaces at-<i>fpc/port/pic</i></code>
4. Clear ATM Interface Statistics on page 241	<code>clear interfaces statistics at-<i>fpc/port/pic</i></code>
5. Ping the ATM Interface on page 241	<code>ping interface at-<i>fpc/port/pic</i> <i>local-IP-address</i> bypass-routing count 1000 rapid</code>
6. Check for ATM Interface Error Statistics on page 242	<code>show interfaces at-<i>fpc/port/pic</i> extensive</code>
“Diagnose a Suspected Circuit Problem” on page 245	
1. Create a Loop from the Router to the Network on page 245	<code>[edit interfaces <i>interface-name</i> (sonet-options t3-options)] set loopback remote show commit</code>
2. Create a Loop to the Router from Various Points in the Network on page 246	Perform Steps 2 through 6 from “Diagnose a Suspected Hardware Problem with an ATM1 or ATM2 IQ Interface” on page 236.

Diagnose 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. [Create a Loopback on page 237](#)
2. [Set Clocking to Internal on page 238](#)
3. [Verify That the ATM Interface Is Up on page 239](#)
4. [Clear ATM Interface Statistics on page 241](#)
5. [Ping the ATM Interface on page 241](#)
6. [Check for ATM Interface Error Statistics on page 242](#)

Create 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).

- [Create a Physical Loopback on page 237](#)
- [Configure a Local Loopback on page 237](#)

Create 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.

Configure 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 237](#) 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.

Set 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.

Verify 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 17 on page 241](#).

Table 17: Problems and Solutions for a Physical Link That Is Down

Problem	Actions
Cable mismatch	Verify that the cable connection is correct.
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.

Clear 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.

Ping 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
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
```

```

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--- 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, or at 1-888-314-JTAC (within the United States) or 1-408-745-9500 (from outside the United States).

Check 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, or at 1-888-314-JTAC (within the United States) or 1-408-745-9500 (from outside the United States).

Diagnose 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. [Create a Loop from the Router to the Network on page 245](#)
2. [Create a Loop to the Router from Various Points in the Network on page 246](#)

Create 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 246](#) 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
```

Create 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 [“Diagnose a Suspected Hardware Problem with an ATM1 or ATM2 IQ Interface” on page 236](#). 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**
- [Investigate Interface Steps and Commands on page 209](#)
 - [Determine ATM Interface Type on page 212](#)
 - [Monitor ATM Interfaces on page 220](#)
 - [Locate ATM Alarms and Errors on page 247](#)

Locate ATM Alarms and Errors

- [List of Common ATM Alarms and Error on page 247](#)
- [Display ATM1 and ATM2 Alarms and Errors on page 247](#)

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 18 on page 247](#) provides links and commands for checking ATM alarms and errors.

Table 18: List of Common ATM Alarms and Error

Tasks	Command or Action
“Display ATM1 and ATM2 Alarms and Errors” on page 247	<code>show interfaces at-<i>fpc/pic/port</i> extensive</code> See List of Common SONET Alarms and Errors. See Checklist of Common T3 Alarms and Errors.

Display 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 212](#).
- 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 0 OK
 PHY Light 0 0 OK
SONET section:
Seconds Count
 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:
Seconds Count
 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:
Seconds Count
 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 low none
1 expedited-forwarding 0 0 0 low none
2 assured-forwarding 0 0 0 low none
3 network-control 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 19 on page 251](#) describes the input and output errors that appear in the extensive output for an ATM interface.

**Table 19: 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 19: 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 20 on page 253 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 20: 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 20: ATM Active Alarms and Defects (*continued*)**

| Alarm | Description                             |
|-------|-----------------------------------------|
| SEF   | Severely errored frame                  |
| UNEQ  | Unequipped                              |
| YLW   | Remote defect indication (yellow alarm) |

**Related Documentation**

- [Investigate Interface Steps and Commands on page 209](#)
- [Determine ATM Interface Type on page 212](#)
- [Monitor ATM Interfaces on page 220](#)
- [Use Loopback Testing for ATM Interfaces on page 235](#)

## PART 5

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