



---

Junos<sup>®</sup> OS

# ISDN Interfaces Feature Guide for Routing Devices

Release

14.1



---

Published: 2014-09-26

Juniper Networks, Inc.  
1194 North Mathilda Avenue  
Sunnyvale, California 94089  
USA  
408-745-2000  
[www.juniper.net](http://www.juniper.net)

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

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

*Junos<sup>®</sup> OS ISDN Interfaces Feature Guide for Routing Devices*

14.1

Copyright © 2014, Juniper Networks, Inc.  
All rights reserved.

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

#### YEAR 2000 NOTICE

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

#### END USER LICENSE AGREEMENT

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

# Table of Contents

	About the Documentation . . . . .	xi
	Documentation and Release Notes . . . . .	xi
	Supported Platforms . . . . .	xi
	Using the Examples in This Manual . . . . .	xi
	Merging a Full Example . . . . .	xii
	Merging a Snippet . . . . .	xii
	Documentation Conventions . . . . .	xiii
	Documentation Feedback . . . . .	xv
	Requesting Technical Support . . . . .	xv
	Self-Help Online Tools and Resources . . . . .	xv
	Opening a Case with JTAC . . . . .	xvi
<b>Chapter 1</b>	<b>Overview . . . . .</b>	<b>17</b>
	ISDN Interfaces Overview . . . . .	17
<b>Chapter 2</b>	<b>Configuring ISDN Interfaces . . . . .</b>	<b>19</b>
	Configuring ISDN Services Physical and Logical Interface Properties . . . . .	19
	Configuring ISDN Physical Interface Properties . . . . .	21
	Configuring ISDN Logical Interface Properties . . . . .	22
	Configuring an ISDN Dialer Interface as a Backup Interface . . . . .	25
	Example: Configuring an ISDN Interface as the Backup Interface . . . . .	25
	Applying the Dial-on-Demand Dialer Filter to the Dialer Interfaces . . . . .	27
	Example: Applying the Dialer Filter . . . . .	27
	Configuring Bandwidth on Demand . . . . .	28
	Configuring the Dialer Interface . . . . .	28
	Configuring the ISDN Interface . . . . .	29
	Example: Configuring Bandwidth on Demand . . . . .	30
	Configuring Dial-In and Callback . . . . .	31
	Configuring Dial-In . . . . .	31
	Disabling Dial-In . . . . .	32
	Configuring Callback . . . . .	32
	Example: Configuring Dial-In and Callback . . . . .	32
	Configuring Dialer Watch . . . . .	33
	Configuring the Dialer Interface . . . . .	34
	Configuring the Physical Interface . . . . .	34
	Example: Configuring Dialer Watch . . . . .	34
	Example: Complete ISDN Called-Calling Router Configuration . . . . .	35
	Configuring an ISDN Interface to Screen Incoming Calls . . . . .	38
	Disabling ISDN Processes . . . . .	39

<b>Chapter 3</b>	<b>Troubleshooting ISDN Interfaces</b>	<b>41</b>
	Interface Diagnostics	41
	Configuring Loopback Testing	41
	Interface Diagnostics	43
	Starting and Stopping a BERT Test	47
	Example: Configuring Bit Error Rate Testing	47
<b>Chapter 4</b>	<b>Configuration Statements</b>	<b>49</b>
	[edit interfaces] Hierarchy Level	50
	[edit system processes] Hierarchy Level	66
	access-profile	67
	activation-delay	68
	backup-options	68
	callback	69
	callback-wait-period	70
	caller	71
	calling-number	72
	chap	73
	deactivation-delay	74
	dial-string	74
	dialer	75
	dialer-options	76
	encapsulation (Logical Interface)	77
	encapsulation (Physical Interface)	81
	family	86
	fast-aps-switch	90
	f-max-period	91
	fragment-threshold	91
	idle-timeout	92
	incoming-called-number	92
	incoming-map	93
	initial-route-check	94
	isdn-options	95
	load-interval	96
	load-threshold	97
	mrru	98
	mtu	99
	negotiate-address	101
	pool	102
	ppp-options	103
	redial-delay	104
	spid1	105
	spid2	105
	static-tei-val	106
	switch-type	106
	t310	107
	tei-option	107
	watch-list	108

<b>Chapter 5</b>	<b>Operational Commands . . . . .</b>	<b>109</b>
	clear isdn q921 statistics . . . . .	110
	clear isdn q931 statistics . . . . .	111
	show dialer defaults . . . . .	112
	show dialer interfaces . . . . .	114
	show dialer pools . . . . .	116
	show interfaces (ISDN B-Channel) . . . . .	118
	show interfaces (ISDN BRI) . . . . .	124
	show interfaces (ISDN D-channel) . . . . .	128
	show interfaces (ISDN Dialer) . . . . .	134
	show isdn calls . . . . .	144
	show isdn history . . . . .	145
	show isdn q921 statistics . . . . .	146
	show isdn q931 statistics . . . . .	148
	show isdn status . . . . .	151
<b>Chapter 6</b>	<b>Index . . . . .</b>	<b>153</b>
	Index . . . . .	155



# List of Figures

<b>Chapter 2</b>	<b>Configuring ISDN Interfaces .....</b>	<b>19</b>
	Figure 1: ISDN Backup Topology .....	26
	Figure 2: Dialer Filter Topology .....	27
	Figure 3: Bandwidth-on-Demand Topology .....	30
	Figure 4: Dialer Watch Topology .....	35





# List of Tables

	<b>About the Documentation</b> . . . . .	<b>xi</b>
	Table 1: Notice Icons . . . . .	xiii
	Table 2: Text and Syntax Conventions . . . . .	xiii
<b>Chapter 3</b>	<b>Troubleshooting ISDN Interfaces</b> . . . . .	<b>41</b>
	Table 3: Loopback Modes by Interface Type . . . . .	42
	Table 4: BERT Capabilities by Interface Type . . . . .	46
<b>Chapter 5</b>	<b>Operational Commands</b> . . . . .	<b>109</b>
	Table 5: show dialer defaults Output Fields . . . . .	112
	Table 6: show dialer interfaces Output Fields . . . . .	114
	Table 7: show dialer pools Output Fields . . . . .	116
	Table 8: ISDN B-Channel show interfaces Output Fields . . . . .	118
	Table 9: ISDN BRI show interfaces Output Fields . . . . .	124
	Table 10: ISDN D-Channel show interfaces Output Fields . . . . .	128
	Table 11: ISDN Dialer show interfaces Output Fields . . . . .	134
	Table 12: show isdn calls Output Fields . . . . .	144
	Table 13: show isdn history Output Fields . . . . .	145
	Table 14: show isdn q921 statistics Output Fields . . . . .	146
	Table 15: show isdn q931 Statistics Output Fields . . . . .	149
	Table 16: show isdn status Output Fields . . . . .	151



# About the Documentation

- Documentation and Release Notes on page xi
- Supported Platforms on page xi
- Using the Examples in This Manual on page xi
- Documentation Conventions on page xiii
- Documentation Feedback on page xv
- Requesting Technical Support on page xv

## Documentation and Release Notes

---

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

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

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

## Supported Platforms

---

For the features described in this document, the following platforms are supported:

- J Series

## Using the Examples in This Manual

---

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

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

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

## Merging a Full Example

To merge a full example, follow these steps:

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

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

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

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

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

## Merging a Snippet

To merge a snippet, follow these steps:

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

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

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

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

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

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

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

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

## Documentation Conventions

Table 1 on page xiii 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.
	Tip	Indicates helpful information.
	Best practice	Alerts you to a recommended use or implementation.

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

Table 2: Text and Syntax Conventions

Convention	Description	Examples
<b>Bold text like this</b>	Represents text that you type.	To enter configuration mode, type the <b>configure</b> command:  user@host> <b>configure</b>

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

Convention	Description	Examples
Fixed-width text like this	Represents output that appears on the terminal screen.	user@host> <b>show chassis alarms</b>  No alarms currently active
<i>Italic text like this</i>	<ul style="list-style-type: none"><li>Introduces or emphasizes important new terms.</li><li>Identifies guide names.</li><li>Identifies RFC and Internet draft titles.</li></ul>	<ul style="list-style-type: none"><li>A policy <i>term</i> is a named structure that defines match conditions and actions.</li><li><i>Junos OS CLI User Guide</i></li><li>RFC 1997, <i>BGP Communities Attribute</i></li></ul>
<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@# <b>set system domain-name</b> <i>domain-name</i>
Text like this	Represents names of configuration statements, commands, files, and directories; configuration hierarchy levels; or labels on routing platform components.	<ul style="list-style-type: none"><li>To configure a stub area, include the <b>stub</b> statement at the [edit protocols ospf area area-id] hierarchy level.</li><li>The console port is labeled <b>CONSOLE</b>.</li></ul>
< > (angle brackets)	Encloses optional keywords or variables.	<b>stub &lt;default-metric <i>metric</i>&gt;;</b>
(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.	<b>broadcast   multicast</b>  <b>(<i>string1</i>   <i>string2</i>   <i>string3</i>)</b>
# (pound sign)	Indicates a comment specified on the same line as the configuration statement to which it applies.	<b>rsvp { # Required for dynamic MPLS only</b>
[ ] (square brackets)	Encloses a variable for which you can substitute one or more values.	<b>community name members [</b> <b><i>community-ids</i> ]</b>
Indentation and braces ( { } )	Identifies 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.	
GUI Conventions		
Bold text like this	Represents graphical user interface (GUI) items you click or select.	<ul style="list-style-type: none"><li>In the Logical Interfaces box, select <b>All Interfaces</b>.</li><li>To cancel the configuration, click <b>Cancel</b>.</li></ul>

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

Convention	Description	Examples
> (bold right angle bracket)	Separates levels in a hierarchy of menu selections.	In the configuration editor hierarchy, select <b>Protocols&gt;Ospf</b> .

## Documentation Feedback

We encourage you to provide feedback, comments, and suggestions so that we can improve the documentation. You can provide feedback by using either of the following methods:

- Online feedback rating system—On any page at the Juniper Networks Technical Documentation site at <http://www.juniper.net/techpubs/index.html>, simply click the stars to rate the content, and use the pop-up form to provide us with information about your experience. Alternately, you can use the online feedback form at <https://www.juniper.net/cgi-bin/docbugreport/>.
- E-mail—Send your comments to [techpubs-comments@juniper.net](mailto:techpubs-comments@juniper.net). Include the document or topic name, URL or page number, and software 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 post-sales 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/>
- Search for known bugs: <http://www2.juniper.net/kb/>
- 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:  
<http://kb.juniper.net/InfoCenter/>
- 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, see <http://www.juniper.net/support/requesting-support.html>.



## CHAPTER 1

# Overview

- [ISDN Interfaces Overview on page 17](#)

### ISDN Interfaces Overview

---

ISDN is a set of standards for digital transmission over different media created by the Consultative Committee for International Telegraphy and Telephony (CCITT) and the International Telecommunication Union (ITU). ISDN is a dial-on-demand service that provides fast call setup, low latency, and the ability to carry high-quality voice, data, and video transmissions. ISDN is also a circuit-switched service that can be used on both multipoint and point-to-point connections.

You configure two types of interfaces for ISDN service: a physical interface and a logical interface called the *dialer interface*.

Four types of Physical Interface Modules (PIMs) provide ISDN connectivity on J Series Services Routers:

- 1-port S/T interface supporting ITU-T I.430, ETSI TS 101080, and GR-1089-Core Type III
- 1-port U interface supporting ANSI T.601 and GR-1089-Core
- 4-port S/T interface supporting ITU-T I.430, ETSI TS 101080, and GR-1089-Core Type III as a field-replaceable unit (FRU)
- 4-port U interface supporting ANSI T.601 and GR-1089-Core

For information about installing hardware, see the *J Series Services Routers Hardware Guide*.

For information about installing ISDN service over an ISDN line, contact your telecommunications service provider.

**Related Documentation**

- *Physical Interfaces*



## CHAPTER 2

# Configuring ISDN Interfaces

- [Configuring ISDN Services Physical and Logical Interface Properties on page 19](#)
- [Configuring ISDN Physical Interface Properties on page 21](#)
- [Configuring ISDN Logical Interface Properties on page 22](#)
- [Configuring an ISDN Interface to Screen Incoming Calls on page 38](#)
- [Disabling ISDN Processes on page 39](#)

## Configuring ISDN Services Physical and Logical Interface Properties

---

To configure ISDN services physical interface properties, include the **isdn-options** statement at the **[edit interfaces br-pim/0/port]** hierarchy level:

```
[edit interfaces br-pim/0/port]
isdn-options {
  calling-number number;
  incoming-called-number number <reject>;
  spid1 spid-string;
  spid2 spid-string;
  static-tei-val value;
  switch-type (att5e | etsi | nil | ntdms100 | ntt);
  t310 seconds;
  tei-option (first-call | power-up);
}
dialer-options {
  pool pool-name <priority priority>;
}
```

To configure ISDN services logical interface properties, include the following statements:

```
[edit interfaces dln unit logical-unit-number]
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 ];  
}  
}  
encapsulation [  
    (cisco-hdlc | multilink-ppp | ppp);  
]  
}
```

To configure a primary interface to use an ISDN logical interface as a backup or “failover” interface when the primary connection experiences interruptions in Internet connectivity, include the **backup-options** statement to specify the ISDN interface at the **[edit interfaces interface-name unit logical-unit-number]** hierarchy level:

```
[edit interfaces interface-name unit logical-unit-number]  
backup-options {  
    interface dln.0;  
}
```

You can include these statements at the following hierarchy levels:

- **[edit interfaces]**
- **[edit logical-systems logical-system-name interfaces]**

To configure the Services Router to reject incoming ISDN calls (supported when dial-in is configured), include the **reject-incoming** statement at the **[edit system processes isdn-signaling]** hierarchy level:

```
[edit system processes isdn-signaling]  
reject-incoming;  
}
```

To disable ISDN, include the **disable** statement at the **[edit system processes isdn-signaling]** hierarchy level:

```
[edit system processes isdn-signaling]  
disable;  
}
```

To disable the dial-out on demand process, include the **disable** statement at the **[edit system processes dialer-services]** hierarchy level:

```
[edit system processes dialer-services]  
disable;  
}
```

Related  
Documentation

- [dialer-options on page 76](#)
- [backup-options on page 68](#)

## Configuring ISDN Physical Interface Properties

You specify the physical ISDN interface in the form **br-pim/0/port.pim**. **pim** is the slot in which the PIM is installed. The second number is always 0. **port** is the configured port number.

You specify the B-channel in the form **bc-pim/0/port:n**. **n** is the B-channel ID and can be 1 or 2. You specify the D-channel in the form **dc-pim/0/port:0**.



**NOTE:** The B- and D-channel interfaces do not have any configurable parameters. However, when interface statistics are displayed, B- and D-channel interfaces have statistical values.

To enable ISDN interfaces installed on your Services Router to work properly, you must configure the interface properties. To configure physical interface properties, include the **isdn-options** statement at the **[edit interfaces br-pim/0/port]** hierarchy level:

```
[edit interfaces br-pim/0/port]
isdn-options {
  calling-number number;
  incoming-called-number number <reject>;
  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);
}
dialer-options {
  pool pool-name <priority priority>;
}
```

You can configure the following ISDN options:

- **calling-number**—The calling number included in outgoing calls.
- **incoming-called-number**—Screening of incoming calls. If the incoming number of the incoming call is configured, the call is accepted. If the reject option is specified with the number, the call is rejected. If no numbers are configured, all calls are accepted. See [“Configuring an ISDN Interface to Screen Incoming Calls” on page 38](#).
- **pool**—The dial pool for logical and physical ISDN interfaces. The dial pool allows logical (dialer) and physical (**br-pim/0/port**) interfaces to be bound together dynamically on a per-call basis. On a dialer interface, pool directs the dialer interface to a dial pool. On a **br-pim/0/port** interface, pool defines the pool to which the interface belongs. Specify a priority value from 0 (lowest) to 255 (highest) for the interface.
- **spid1**—The Service Profile Identifier (SPID). **spid-string** is a numeric value. If your service provider requires SPIDs, you cannot place calls until the interface sends a valid, assigned SPID to the service provider when accessing the ISDN connection. A single SPID must be configured as **spid1**.
- **spid2**—A second SPID, used for DMS-100 and NI1switch types.

- **static-tei-val**—A static Terminal Endpoint Identifier (TEI) value. The TEI value represents any ISDN-capable device attached to an ISDN network that is the terminal endpoint. TEIs are used to distinguish between different devices using the same ISDN links. Specify a value from 0 through 63. You cannot configure a TEI value with multiple SPIDs—dynamic TEI assignment is required.



**NOTE:** TEI assignment is usually done dynamically instead of statically using the TEI management protocol. When the TEI management protocol is used, values 64-126 are assigned to terminal endpoints. TEI value 127 is used for group assignment.

- **switch-type**—The ISDN switch type. The following switches are compatible:
  - **att5e**—AT&T 5ESS
  - **etsi**—NET3 for United Kingdom and Europe
  - **ni1**—National ISDN-1
  - **ntdms100**—Northern Telecom DMS-100
  - **ntt**—NTT Group switch for Japan
- **tei-option**—When the Terminal Endpoint Identifier (TEI) negotiates with the ISDN provider. Specify first-call (activation does not occur until the call setup is sent) or power-up (activation occurs when the Services Router is powered on). The default value is power-up.
- **t310**—Q.931-specific timer for T310, in seconds. Specify the number of seconds from 1 through 65536. The default value is 10 seconds.

**Related  
Documentation**

- [Configuring an ISDN Interface to Screen Incoming Calls on page 38](#)
- *Physical Interfaces Properties Statements List*

---

## Configuring ISDN Logical Interface Properties

You configure ISDN services interface properties at the logical unit level.

The dialer interface, **dl*n***, is a logical interface for configuring dialing properties for a backup ISDN connection. The interface can be configured in two modes:

- Multilink mode using **multilink-ppp** encapsulation. This mode is used when the router supports B-channel bundling (two B-channels connected to provide a 128-Kbps connection) and runs Multilink Point-to-Point Protocol (MLPPP). When the dialer interface (**dl*n***) is in multilink mode, the value of ***n*** is from 0 through 149. However, you can only configure one dialer interface with **multilink-ppp** encapsulation. For example, you cannot have both **dl1** and **dl2** as multilink dialers simultaneously. If you need to have multiple multilink dialers, then the values should be **dl*n*.1**, **dl*n*.2**, and so forth.

- Normal mode using **ppp** or **cisco-hdlc** encapsulation. This mode is used when the router is using one B-channel. When the dialer interface (**dl*n***) is in normal mode, the value of **n** is always is from 0 through 149.



**NOTE:** Ensure that the same IP subnet address is not configured on different dialer interfaces. Configuring the same IP subnet address on different dialer interfaces can result in inconsistency in the route and packet loss. Packets may be routed through any of the dialer interfaces that have the same IP subnet address, instead of being routed through the dialer interface to which the ISDN call is connected.

You can configure the following ISDN services logical interface properties:

- [Configuring an ISDN Dialer Interface as a Backup Interface on page 25](#)
- [Applying the Dial-on-Demand Dialer Filter to the Dialer Interfaces on page 27](#)
- [Configuring Bandwidth on Demand on page 28](#)
- [Configuring Dial-In and Callback on page 31](#)
- [Configuring Dialer Watch on page 33](#)

The dialer interface cannot be configured:

- As a backup interface and as a dialer filter simultaneously.
- As a backup interface and as a dialer watch simultaneously.
- As a dialer watch interface and as a dialer filter simultaneously.
- As a backup interface for more than one primary interface.

For specific ISDN configuration information for dial-on-demand routing (DDR) and adding Open Shortest Path First (OSPF) demand circuits to a Services Router, see the *Junos OS Routing Protocols Library for Routing Devices*.

For general information about logical unit properties, see *Configuring Logical Interface Properties*. For general information about **family inet** properties, see *Protocol Family Configuration and Interface Address Statements*.

To configure logical interface properties, include the **encapsulation** statement at the **[edit interfaces *dl*n**]** hierarchy level and the **dialer-options** statement at the **[edit interfaces *dl*n** unit *logical-unit-number*]** hierarchy level:

```
[edit interfaces dln]
encapsulation (cisco-hdlc | multilink-ppp | ppp);
[edit interfaces dln unit logical-unit-number]
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 ];
  }
}

```

You can configure the following options:

- **activation-delay**—ISDN activation delay, in seconds. Specify a number from 1 through 4294967295.
- **callback**—Configure the dialer to terminate the incoming call and call back the originator after the callback wait period.
- **callback-wait-period**—For interfaces configured for ISDN with callback, specify the amount of time the dialer waits before calling back the caller. The default is 5 seconds.
- **caller**—Specify the dialer to accept a specified caller number or accept all incoming calls.
- **deactivation-delay**—ISDN deactivation delay, in seconds. Specify from 1 through 4294967295.
- **encapsulation**—Logical link-layer encapsulation type. For normal mode, specify **cisco-hdlc** for Cisco-compatible High-Level Data Link control (HDLC) or **ppp** for Point-to-Point Protocol. For multilink mode, specify **multilink-ppp**.
- **dial-string**—Phone number to be dialed. Do not include hyphens in number.
- **idle-timeout**—Number of seconds the link is idle before losing connectivity. The default is 120 seconds.
- **incoming-map**—Specify the dialer to accept incoming calls. This statement is required at one end of the ISDN connection.



**CAUTION:** Changing the caller incoming map when a call is connected can create inconsistencies in the route and prevent traffic on a subnet from being transmitted. This is seen when two dialer interfaces are configured and the association of the caller incoming-map from one interface to the other is changed when a call is connected on one of the interfaces. The cause of the inconsistency is that dialer interfaces are pseudo interfaces that are always up, even if not actually connected.

- **initial-route-check**—Allows the router to check whether the primary route is up after the initial startup of the router is complete and the timer expires.



- **load-interval**—Interval used to calculate the average load on the network. By default, the average interface load is calculated every 60 seconds. You can specify an interval from 20 through 180 seconds, configurable in intervals of 10 seconds. For more information about the load interval, see [“Configuring Bandwidth on Demand” on page 28](#).
- **load-threshold**—Bandwidth threshold percentage used for adding interfaces. Another link is added to the multilink bundle when the bandwidth reaches the threshold value you set. Specify a percentage between 0 and 100. When the value is set to 0, all available channels are dialed. The default value is 100.
- **pool**—For logical and physical ISDN interfaces, specify the dial pool. The dial pool allows logical (dialer) and physical (**br-pim/0/port**) interfaces to be bound together dynamically on a per-call basis. On a dialer interface, **pool** directs the dialer interface which dial pool to use. On a **br-pim/0/port** interface, **pool** defines the pool to which the interface belongs.
- **redial-delay**—Specify the delay (in seconds) between two successive calls made by the dialer (for dialout). The default is 3 seconds.
- **watch-list**—IP prefix of one or more routes. The primary route is considered up if there is at least one valid route for any of the addresses in the watch list to an interface other than the backup interface.

Changing the caller incoming map when a call is connected can create inconsistencies in the route and prevent traffic on a subnet from being transmitted. This is seen when two dialer interfaces are configured and the association of the caller incoming-map from one interface to the other is changed when a call is connected on one of the interfaces.

The cause of the inconsistency is that dialer interfaces are pseudo interfaces that are always up, even if not actually connected.

## Configuring an ISDN Dialer Interface as a Backup Interface

Configuring the ISDN interface as a backup interface ensures continuous network connectivity. The Services Router can be configured to fail over to the ISDN interface if the primary connection experiences interruptions in Internet connectivity.

To configure an ISDN interface as the backup interface, include the **backup-options** statement at the **[edit interfaces *interface-name* unit *logical-unit-number*]** hierarchy level:

```
[edit interfaces interface-name unit logical-unit-number]
 backup-options {
   interface dln.0;
 }
```

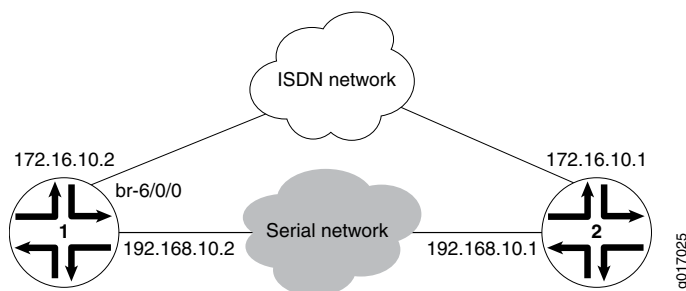
***interface-name*** is the primary interface. The backup interface is specified as ***dln***.

### Example: Configuring an ISDN Interface as the Backup Interface

The following example illustrates a backup configuration using a primary serial interface, two dialer interfaces, and a physical ISDN interface.

See [Figure 1 on page 26](#) for the topology used for this example.

Figure 1: ISDN Backup Topology



Configure dialer interface **d10** as the backup interface on the primary serial interface **t1-4/0/1**:

**Configuration on the  
Primary Serial  
Interface**

```
[edit interfaces]
t1-4/0/1 {
  encapsulation ppp;
  unit 0 {
    backup-options {
      interface d10.0;
    }
    family inet {
      address 192.168.10.2/30;
    }
  }
}
```

**Configuration on the  
Dialer Interface**

```
[edit interfaces]
d10 {
  encapsulation ppp;
  unit 0 {
    dialer-options {
      pool 10;
      dial-string 5552222;
      activation-delay 10;
      deactivation-delay 10;
      incoming-map
        caller 5552222 accept-all
    }
    family inet {
      address 172.16.10.2/32 {
        destination 172.16.10.1;
      }
    }
  }
}
```

**Configuration on the  
Physical ISDN  
Interface**

```
[edit interfaces]
br-6/0/0 {
  isdn-options {
    calling-number 5558888;
    spid1 51255511110101 5551111;
    spid2 51255511120101 5551112;
    switch-type nil;
  }
}
```

```

    t310 70;
  }
  dialer-options {
    pool 10 priority 3;
    pool 2 priority 25;
  }
}

```

## Applying the Dial-on-Demand Dialer Filter to the Dialer Interfaces

Dial-on-demand routing (DDR) links two sites over a public network and provides bandwidth. An ISDN connection allows an ISDN line to be activated only when there is network traffic configured as an “interesting” packet. An interesting packet is defined using the firewall filter feature of the Services Router.

To configure DDR, you configure the dialer interface as a passive static route with a lower priority than dynamic routes. If the dynamic route is lost, and a packet destined for that IP address is received, the dialer interface initiates an ISDN connection and sends the packet over it. When no new packets are sent to the destination, the dialer interface initiates an inactivity timer. The ISDN connection is terminated when the timer expires.

To configure dial-on-demand connectivity, perform the following steps:

1. Define the dialer filter.
2. Configure the firewall rule.
3. Apply the dialer filter to the dialer interface.

To define the filter, include the **dialer-filter interesting-traffic** statement at the **[edit firewall family inet]** hierarchy level.

To configure the firewall rule, include the **term** and **from** statements at the **[edit firewall family inet dialer-filter *filter-name*]** hierarchy level.

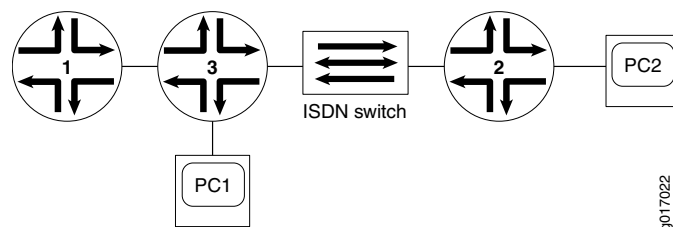
To apply the filter to the dialer interface, include the **filter dialer** statement at the **[edit interfaces *dln* unit *logical-unit-number* family *family*]** hierarchy level.

### Example: Applying the Dialer Filter

The following example illustrates a dialer filter configuration configured at the **[edit firewall family inet]** hierarchy level and applied to a physical interface and a dialer interface.

See [Figure 2 on page 27](#) for the topology used for this example.

Figure 2: Dialer Filter Topology



**Configuration for the  
Dialer Filter**

```
[edit firewall family inet]
dialer-filter interesting-traffic {
  term 1 {
    from {
      destination-address {
        10.2.1.1/30;
      }
    }
    then note;
  }
}
```

**Configuration on the  
Dialer Interface**

```
[edit interfaces]
dl0 {
  encapsulation ppp;
  unit 0 {
    dialer-options {
      pool 1;
      dial-string 350100;
    }
  }
  family inet {
    filter {
      dialer interesting-traffic;
    }
    address 50.2.0.1/24;
  }
}
```

## Configuring Bandwidth on Demand

You can define a bandwidth threshold for network traffic on the Services Router using the dialer interface and ISDN interfaces. Initially, only one ISDN link is active and all packets are sent through this interface. When a predefined bandwidth threshold is reached on this interface, the dialer interface activates another ISDN link and initiates a data connection.

To configure bandwidth on demand, perform the steps in the following sections to configure the dialer interface and the physical ISDN interfaces:

- [Configuring the Dialer Interface on page 28](#)
- [Configuring the ISDN Interface on page 29](#)
- [Example: Configuring Bandwidth on Demand on page 30](#)

---

### Configuring the Dialer Interface

To configure the dialer interface for bandwidth on demand, include the **encapsulation multilink-ppp** statement at the **[edit interfaces dl*n*]** hierarchy level:

```
[edit interfaces]
dln {
  encapsulation multilink-ppp;
}
```

To configure dialer options, include the **dialer-options** statement at the **[edit interfaces dln unit *logical-unit-number*]** hierarchy level:

```
[edit interfaces dln unit logical-unit-number]
dialer-options {
  dial-string dial-string-numbers;
  load-interval seconds;
  load-threshold percent;
  pool pool-name;
}
```

To configure unit properties, include the **unit *logical-unit-number*** statement at the **[edit interfaces dln]** hierarchy level:

```
[edit interfaces dln unit logical-unit-number]
family family {
  mtu bytes;
  negotiate-address;
  filter {
    filter-name;
    fragment-threshold bytes;
    mrru bytes;
    ppp-options {
      chap {
        access-profile name;
      }
    }
  }
}
```

You can configure the following unit properties:

- **family**—Protocol family information for the logical interface. For ***family***, specify **inet** (for Internet Protocol version 4 [IPv4]) suite.
- **filter**—Dialer filter name. The dialer filter applied here is configured at the **[edit firewall family inet]** hierarchy level and also applied to the physical ISDN interface.
- **fragment-threshold**—Maximum size, in bytes, for multilink packet fragments. Any nonzero value must be a multiple of 64 bytes. The value can be between **128** and **16320**. The default is **0** bytes (no fragmentation).
- **mrru**—Maximum received reconstructed unit (MRRU), in bytes. The value can be between **1500** and **4500**. The default is **1500** bytes.
- **negotiate-address**—For interfaces with Point-to-Point Protocol (PPP) encapsulation, enable the interface to be assigned an IP address by the remote end.

### Configuring the ISDN Interface

To configure the ISDN interface for bandwidth on demand, include the **pool** statement at the **[edit interfaces br-pim/0/port dialer-options]** hierarchy level:

```
[edit interfaces br-pim/0/port]
```

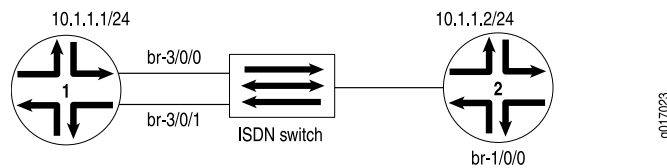
```
dialer-options {
  pool pool-name;
}
```

Each ISDN interface must use the same dialer pool name to participate in the bandwidth-on-demand configuration.

### Example: Configuring Bandwidth on Demand

Figure 3 on page 30 illustrates a bandwidth-on-demand configuration using multiple physical ISDN interfaces.

Figure 3: Bandwidth-on-Demand Topology



#### Configuration for the Dialer Interface

```
[edit interfaces]
dlo {
  encapsulation multilink-ppp;
  unit 0 {
    dialer-options {
      pool 10;
      dial-string 5552222; #Phone number to be dialed
      load-threshold 95; #Dial more ISDN if load exceeds 95% of
        #current capacity
    }
    fragment-threshold 1024; #Allowed only when dialer is in multilink mode
    mrru 1500; #Allowed only when dialer is in multilink mode
    encapsulation multilink-ppp;
    rtp {
      f-max-period 100;
      queues q3;
    }
  }
  family inet {
    negotiate-address;
  }
}
```

#### Configuration for the First Physical ISDN Interface

```
[edit interfaces]
br-3/0/0 {
  isdn-options {
    switch-type nil;
  }
  dialer-options {
    pool 10;
  }
}
```

#### Configuration for the Second Physical ISDN Interface

```
[edit interfaces]
br-3/0/1 {
  isdn-options {
```

```

        switch-type nil;
    }
    dialer-options {
        pool dialer-pool10;
    }
}

```

## Configuring Dial-In and Callback

You can configure dial-in on the dialer interface to permit incoming calls. Using dial-in, all incoming calls on a BRI interface are mapped to a dialer interface based on a caller ID. The incoming call's caller ID is compared against all caller IDs configured on all dialers to find the valid match. Multiple caller IDs can be configured on a dialer interface. The same caller IDs cannot be configured on different dialers.

Instead of accepting incoming calls, you can configure the dialer interface to call back the caller. When callback is configured, the call is rejected, and after a brief delay the caller is called back using the dial-string configured on the dialer interface. Multiple dial-strings cannot be configured on a dialer when callback is configured.

To configure dial-in or callback, perform the steps in the following sections to configure the dialer interface and the physical ISDN interfaces:

- [Configuring Dial-In on page 31](#)
- [Disabling Dial-In on page 32](#)
- [Configuring Callback on page 32](#)
- [Example: Configuring Dial-In and Callback on page 32](#)

### Configuring Dial-In

To configure the dialer interface for dial-in operation, include the **incoming-map** statement with options at the **[edit interfaces dln unit *logical-unit-number* dialer-options]** hierarchy level:

```

[edit interfaces dln unit logical-unit-number]
dialer-options {
    incoming-map {
        caller (caller-id | accept-all);
    }
}

```



**NOTE:** The **incoming-map** statement is mandatory for the router to accept any incoming ISDN calls.

Include the option **accept-all** to accept all incoming calls. You can configure the **accept-all** option for only one of the dialer interfaces associated with an ISDN physical interface. The dialer interface with the **accept-all** option configured will be used only if the incoming call's caller ID does not match against the caller IDs configured on other dialer interfaces.

Include the **caller caller-id** statement to configure the dialer interface to accept calls from a specific caller ID. You can configure a maximum of 15 caller IDs per dialer interface.

The same caller ID cannot be configured on different dialer interfaces. However, you can configure a subset of the caller ID configured on another dialer interface. For example, you can configure the caller IDs 14085551515, 4085551515, and 5551515 on different dialer interfaces.

---

### Disabling Dial-In

When dial-in is configured on the Services Router, incoming ISDN calls are accepted by the Services Router. However, you can configure the Services Router to reject all incoming ISDN calls when dial-in is configured.

To configure the Services Router to reject incoming ISDN calls, include the **reject-incoming** statement at the **[edit system processes isdn-signaling]** hierarchy level:

```
[edit system processes isdn-signaling]
reject-incoming;
```

For more information about disabling dial-in, see the *Junos OS Administration Library for Routing Devices* and the *Junos OS Interfaces and Routing Configuration Guide*.

---

### Configuring Callback

To configure the dialer interface to call back a specific caller, include the **caller caller-id** statement and the **callback** statement at the **[edit interfaces dln unit logical-unit-number dialer-options]** hierarchy level:

```
[edit interfaces dln unit logical-unit-number]
dialer-options {
  incoming-map {
    caller caller-id;
    callback;
    callback-wait-period time;
  }
}
```

Include the optional **callback-wait-period** statement to change the time at which the dialer interface calls back the caller. The default period is 5 seconds.

Before configuring the callback on a dialer interface, ensure that:

- The dialer interface is not configured as a backup for a primary interface.
- The dialer interface does not have a watch list configured.
- Only one dial string is configured for the dialer interface.
- Dial-in is configured on the dialer interface of the remote router that is dialing in.

---

### Example: Configuring Dial-In and Callback

The following illustrates configurations for dial-in and callback operations.



**Configuration to  
Accept All Incoming  
Calls**

```
[edit interfaces]
dlo {
  encapsulation ppp;
  unit 0 {
    dialer-options {
      dial-string 7031231282;
      incoming-map;
      accept-all;
    }
    pool 2;
    family inet {
      address 10.1.1.2;
    }
  }
}
```

**Configuration to  
Accept Calls from a  
Specific Caller ID**

```
[edit interfaces]
dlo {
  encapsulation ppp;
  unit 0 {
    dialer-options {
      incoming-map {
        caller 14082711234;
      }
    }
    pool 1;
    family inet {
      address 10.2.1.1;
    }
  }
}
```

**Configuration to Call  
Back Calls from a  
Specific Caller ID**

```
[edit interfaces]
dlo {
  encapsulation ppp;
  unit 0 {
    dialer-options {
      incoming-map {
        caller 14082711234;
      }
      callback;
      callback-wait-period 2;
    }
    pool 1;
    family inet {
      address 10.2.1.1;
    }
  }
}
```

## Configuring Dialer Watch

Dialer watch is a feature that integrates backup dialing with routing capabilities and provides reliable connectivity without relying on “interesting” packets to trigger outgoing

ISDN connections. With dialer watch, the Services Router monitors the existence of a specified route and if the route fails, the dialer interface initiates the ISDN connection as a backup connection.

To configure dialer watch, perform the steps in the following sections to configure the dialer interface and the physical ISDN interface:

- [Configuring the Dialer Interface on page 34](#)
- [Configuring the Physical Interface on page 34](#)
- [Example: Configuring Dialer Watch on page 34](#)
- [Example: Complete ISDN Called-Calling Router Configuration on page 35](#)

---

### Configuring the Dialer Interface

To configure the dialer interface for dialer watch, include the following statements at the `[edit interfaces dln]` and the `[edit interfaces dln unit logical-unit-number]` hierarchy levels:

```
[edit interfaces]
dln {
  encapsulation (cisco-hdlc | multilink-ppp | ppp);
  hold-time (up | down) milliseconds;
  unit logical-unit-number {
    dialer-options {
      activation-delay seconds;
      deactivation-delay seconds;
      dial-string dial-string-numbers;
      hold-time seconds;
      initial-route-check seconds
      pool pool-name;
      watch-list {
        [ routes ];
      }
      family family {
        ip-address;
      }
    }
  }
}
```

---

### Configuring the Physical Interface

To configure the physical interface for dialer watch, include the `pool` statement at the `[edit interfaces br-pim/O/port dialer-options]` hierarchy level:

```
[edit interfaces br-pim/O/port dialer-options]
pool name;
```

Each physical interface must use the same pool to participate in dialer watch.

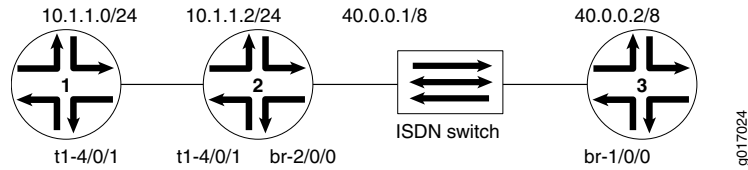
---

### Example: Configuring Dialer Watch

The following example illustrates a dialer watch configuration using one physical interface and one dialer interface.

See [Figure 4 on page 35](#) for the topology used in this example.

**Figure 4: Dialer Watch Topology**



**Configuration for the Physical Interface**

```
[edit interfaces]
br-2/0/0 {
  isdn-options {
    switch-type ntdms100;
  }
  dialer-options {
    pool 1 priority 1;
  }
}
```

**Configuration for the Dialer Interface**

```
[edit interfaces]
dlo {
  unit 0 {
    dialer-options {
      pool 1;
      dial-string 384030;
      watch-list {
        2.2.2.2/24;
        3.3.3.3/24;
      }
    }
  }
  family inet {
    address 40.0.0.1/8;
  }
}
```

**Example: Complete ISDN Called-Calling Router Configuration**

This example configures the calling J Series router (R1) and the calling J Series router (R2). The routers are both directly connected to an ISDN switch.

**Configuration of Calling Router (R1)**

```
[edit]
system {
  login {
    user isdn {
      uid 2000;
      class super-user;
      authentication {
        encrypted-password "$1$IS8Vkg3V$tzySvfBSZhI1vYHSZQ6fM1";
        ## SECRET-DATA
      }
    }
  }
}
services {
  web-management {
```

```
        http;
    }
}

interfaces {
  fe-0/0/0 {
    unit 0 {
      family inet {
        address 192.168.1.1/24;
      }
    }
  }
  br-3/0/0 {
    traceoptions {
      flag q921;
      flag q931;
      file {
        isdn_logg;
      }
    }
    isdn-options {
      switch-type etsi;
      spid1 116;
    }
    dialer-options {
      pool 100;
    }
  }
  dl100 {
    encapsulation ppp;
    unit 0 {
      dialer-options {
        pool 100;
        dial-string 119;
      }
      family inet {
        filter {
          dialer nss;
        }
        address 10.1.1.1/24;
      }
    }
  }
}

firewall {
  family inet {
    dialer-filter nss {
      term 1 {
        from {
          destination-address {
            10.1.1.0/24;
          }
        }
      }
    }
  }
}
```

```

        then note;
    }
}
}

access {
    profile isdn {
        client isdn chap-secret "$9$Lpax7VsYoGUHwsP5F39C"; ## SECRET-DATA
    }
}

Configuration of Called Router (R1) [edit]
system {
    root-authentication {
        encrypted-password "$1$UfcFhjcm$ftfgaLjMgRvFHRt3obrHu."; ## SECRET-DATA
    }
    services {
        web-management {
            http {
                interface [ fe-0/0/0.0 fe-0/0/1.0 ];
            }
        }
    }
    syslog {
        user * {
            any emergency;
        }
        file messages {
            any any;
            authorization info;
        }
        file interactive-commands {
            interactive-commands any;
        }
    }
}

interfaces {
    br-0/0/4 {
        isdn-options {
            switch-type etsi;
            spid1 119;
            tei-option power-up;
        }
        dialer-options {
            pool 100;
        }
    }
    dl100 {
        encapsulation ppp;
        unit 0 {
            dialer-options {
                pool 100;
                dial-string 116;
            }
        }
    }
}

```

```
        incoming-map {
            caller 116;
        }
    }
    family inet {
        filter {
            dialer nss;
        }
        address 10.1.1.2/24;
    }
}

firewall {
    family inet {
        dialer-filter nss {
            term 1 {
                from {
                    address {
                        10.1.1.0/24;
                    }
                }
                then note;
            }
        }
    }
}
```

Related Documentation

- [family on page 86](#)
- [pool on page 102](#)

---

## Configuring an ISDN Interface to Screen Incoming Calls

By default, an ISDN interface is configured to accept all incoming calls. If multiple devices are connected to the same ISDN line, you can configure an ISDN interface to screen incoming calls based on the incoming called number.

You can specify the incoming called numbers that an ISDN interface accepts. You can use the **reject** option to specify a number that the ISDN interface can ignore. The **reject** option is useful when an incoming called number is specified on one device connected to an ISDN line, and you want the incoming called number rejected on a second ISDN device connected to the same ISDN line. For example, if the first ISDN device has the called number 4085321901, you can configure the called number 4085321901 with the **reject** option on the second ISDN device.

When an incoming ISDN call is received, the Services Router matches the incoming called number against the called numbers configured on its ISDN interfaces. If an exact match is not found, or if the called number is configured with the **reject** option, the incoming call is ignored. Each ISDN interface accepts only the calls whose called number are configured on it.

To specify that an incoming called number be rejected by the interface, include the **incoming-called-number** statement with the **reject** option at the **[edit interfaces br-pim/0/port isdn-options]** hierarchy level:

```
[edit interfaces br-pim/0/port isdn-options]  
incoming-called-number number reject;
```

You can configure up to 30 incoming called numbers.

**Related Documentation**

- [incoming-called-number on page 92](#)

---

## Disabling ISDN Processes

You can disable ISDN entirely or disable certain processes at the system process level.

To disable ISDN entirely, include the **disable** statement at the **[edit system processes isdn-signaling]** hierarchy level:

```
[edit system processes isdn-signaling]  
disable;
```

To disable the dial-out on demand process, include the **disable** statement at the **[edit system processes dialer-services]** hierarchy level:

```
[edit system processes dialer-services]  
disable;
```

To disable dial-in and force the Services Router to reject incoming ISDN calls, include the **reject-incoming** statement at the **[edit system processes isdn-signaling]** hierarchy level:

```
[edit system processes isdn-signaling]  
reject-incoming;
```

**Related Documentation**

- [Disabling ISDN Processes \(CLI Procedure\)](#)





## CHAPTER 3

# Troubleshooting ISDN Interfaces

- [Interface Diagnostics on page 41](#)

## Interface Diagnostics

---

You can use two diagnostic tools to test the physical layer connections of interfaces: loopback testing and bit error rate test (BERT) testing. Loopback testing enables you to verify the connectivity of a circuit. BERT testing enables you to identify poor signal quality on a circuit. This section contains the following topics:

- [Configuring Loopback Testing on page 41](#)
- [Interface Diagnostics on page 43](#)

## Configuring Loopback Testing

Loopback testing allows you to verify the connectivity of a circuit. You can configure any of the following interfaces to execute a loopback test: Aggregated Ethernet, Fast Ethernet, Gigabit Ethernet, E1, E3, NxDSO, serial, SONET/SDH, T1, and T3.

The physical path of a network data circuit usually consists of segments interconnected by devices that repeat and regenerate the transmission signal. The transmit path on one device connects to the receive path on the next device. If a circuit fault occurs in the form of a line break or a signal corruption, you can isolate the problem by using a loopback test. Loopback tests allow you to isolate segments of the circuit and test them separately.

To do this, configure a *line loopback* on one of the routers. Instead of transmitting the signal toward the far-end device, the line loopback sends the signal back to the originating router. If the originating router receives back its own data link layer packets, you have verified that the problem is beyond the originating router. Next, configure a line loopback farther away from the local router. If this originating router does not receive its own data link layer packets, you can assume the problem is on one of the segments between the local router and the remote router's interface card. In this case, the next troubleshooting step is to configure a line loopback closer to the local router to find the source of the problem.

There are several types of loopback testing supported by the Junos OS, as follows:

- DCE local—Loops packets back on the local DCE.
- DCE remote—Loops packets back on the remote DCE.

- **Local**—Useful for troubleshooting physical PIC errors. Configuring local loopback on an interface allows transmission of packets to the channel service unit (CSU) and then to the circuit toward the far-end device. The interface receives its own transmission, which includes data and timing information, on the local router's PIC. The data received from the CSU is ignored. To test a local loopback, issue the **show interfaces *interface-name*** command. If PPP keepalives transmitted on the interface are received by the PIC, the **Device Flags** field contains the output **Loop-Detected**.
- **Payload**—Useful for troubleshooting the physical circuit problems between the local router and the remote router. A payload loopback loops data only (without clocking information) on the remote router's PIC. With payload loopback, overhead is recalculated.
- **Remote**—Useful for troubleshooting the 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 interface card. A router at one end of the circuit initiates a remote loopback toward its remote partner. When you configure a remote loopback, the packets received from the physical circuit and CSU are received by the interface. Those packets are then retransmitted by the PIC back toward the CSU and the circuit. This loopback tests all the intermediate transmission segments.

Table 3 on page 42 shows the loopback modes supported on the various interface types.

**Table 3: Loopback Modes by Interface Type**

Interface	Loopback Modes	Usage Guidelines
Aggregated Ethernet, Fast Ethernet, Gigabit Ethernet	Local	<i>Configuring Ethernet Loopback Capability</i>
Circuit Emulation E1	Local and remote	<i>Configuring E1 Loopback Capability</i>
Circuit Emulation T1	Local and remote	<i>Configuring T1 Loopback Capability</i>
E1 and E3	Local and remote	<i>Configuring E1 Loopback Capability and Configuring E3 Loopback Capability</i>
NxDSO	Payload	<i>Configuring Channelized E1 IQ and IQE Interfaces, Configuring T1 and NxDSO Interfaces, Configuring Channelized OC12/STM4 IQ and IQE Interfaces (SONET Mode), Configuring Channelized STM1 IQ and IQE Interfaces, and Configuring Channelized T3 IQ Interfaces</i>
Serial (V.35 and X.21)	Local and remote	<i>Configuring Serial Loopback Capability</i>
Serial (EIA-530)	DCE local, DCE remote, local, and remote	<i>Configuring Serial Loopback Capability</i>
SONET/SDH	Local and remote	<i>Configuring SONET/SDH Loopback Capability</i>

Table 3: Loopback Modes by Interface Type (*continued*)

Interface	Loopback Modes	Usage Guidelines
T1 and T3	Local, payload, and remote	<i>Configuring T1 Loopback Capability</i> and <i>Configuring T3 Loopback Capability</i>  <i>See also Configuring the T1 Remote Loopback Response</i>

To configure loopback testing, include the **loopback** statement:

**loopback mode;**

You can include this statement at the following hierarchy levels:

- [edit interfaces *interface-name* aggregated-ether-options]
- [edit interfaces *interface-name* ds0-options]
- [edit interfaces *interface-name* e1-options]
- [edit interfaces *interface-name* e3-options]
- [edit interfaces *interface-name* fastether-options]
- [edit interfaces *interface-name* gigether-options]
- [edit interfaces *interface-name* serial-options]
- [edit interfaces *interface-name* sonet-options]
- [edit interfaces *interface-name* t1-options]
- [edit interfaces *interface-name* t3-options]

## Interface Diagnostics

BERT allows you to troubleshoot problems by checking the quality of links. You can configure any of the following interfaces to execute a BERT when the interface receives a request to run this test: E1, E3, T1, T3; the channelized DS3, OC3, OC12, and STM1 interfaces; and the channelized DS3 IQ, E1 IQ, and OC12 IQ interfaces.

A BERT test requires a line loop to be in place on either the transmission devices or the far-end router. The local router generates a known bit pattern and sends it out the transmit path. The received pattern is then verified against the sent pattern. The higher the bit error rate of the received pattern, the worse the noise is on the physical circuit. As you move the position of the line loop increasingly downstream toward the far-end router, you can isolate the troubled portion of the link.

To configure BERT, you must configure the duration of the test, the bit pattern to send on the transmit path, and the error rate to monitor when the inbound pattern is received.

To configure the duration of the test, the pattern to send in the bit stream, and the error rate to include in the bit stream, include the **bert-period**, **bert-algorithm**, and **bert-error-rate** statements, respectively, at the [edit interfaces *interface-name* *interface-type*-options] hierarchy level:

```
[edit interfaces interface-name interface-type-options]
bert-algorithm algorithm;
bert-error-rate rate;
bert-period seconds;
```

By default, the BERT period is 10 seconds. You can configure the BERT period to last from 1 through 239 seconds on some PICs and from 1 through 240 seconds on other PICs.

**rate** is the bit error rate. This can be an integer from 0 through 7, which corresponds to a bit error rate from  $10^{-0}$  (1 error per bit) to  $10^{-7}$  (1 error per 10 million bits).

**algorithm** is the pattern to send in the bit stream. For a list of supported algorithms, enter a ? after the **bert-algorithm** statement; for example:

```
[edit interfaces t1-0/0/0 t1-options]
user@host# set bert-algorithm ?
Possible completions:
pseudo-2e11-o152    Pattern is 2^11 - 1 (per 0.152 standard)
pseudo-2e15-o151    Pattern is 2^15 - 1 (per 0.152 standard)
pseudo-2e20-o151    Pattern is 2^20 - 1 (per 0.151 standard)
pseudo-2e20-o153    Pattern is 2^20 - 1 (per 0.153 standard)
...
```

For specific hierarchy information, see the individual interface types.



**NOTE:** The 4-port E1 PIC supports only the following algorithms:

pseudo-2e11-o152	Pattern is $2^{11} - 1$ (per 0.152 standard)
pseudo-2e15-o151	Pattern is $2^{15} - 1$ (per 0.151 standard)
pseudo-2e20-o151	Pattern is $2^{20} - 1$ (per 0.151 standard)
pseudo-2e23-o151	Pattern is $2^{23}$ (per 0.151 standard)

When you issue the help command from the CLI, all BERT algorithm options are displayed, regardless of the PIC type, and no commit check is available. Unsupported patterns for a PIC type can be viewed in system log messages.



**NOTE:** The 12-port T1/E1 Circuit Emulation (CE) PIC supports only the following algorithms:

```
all-ones-repeating    Repeating one bits
all-zeros-repeating   Repeating zero bits
alternating-double-ones-zeros Alternating pairs of ones and zeros
alternating-ones-zeros Alternating ones and zeros
pseudo-2e11-o152     Pattern is 2^11 - 1 (per 0.152 standard)
pseudo-2e15-o151     Pattern is 2^15 - 1 (per 0.151 standard)
pseudo-2e20-o151     Pattern is 2^20 - 1 (per 0.151 standard)
pseudo-2e7            Pattern is 2^7 - 1
pseudo-2e9-o153      Pattern is 2^9 - 1 (per 0.153 standard)
repeating-1-in-4      1 bit in 4 is set
repeating-1-in-8      1 bit in 8 is set
repeating-3-in-24     3 bits in 24 are set
```

When you issue the help command from the CLI, all BERT algorithm options are displayed, regardless of the PIC type, and no commit check is available. Unsupported patterns for a PIC type can be viewed in system log messages.



**NOTE:** The IQE PICs support only the following algorithms:

```
all-ones-repeating    Repeating one bits
all-zeros-repeating   Repeating zero bits
alternating-double-ones-zeros Alternating pairs of ones and zeros
alternating-ones-zeros Alternating ones and zeros
pseudo-2e9-o153       Pattern is 2^9 - 1 (per 0.153 (511 type) standard)
pseudo-2e11-o152      Pattern is 2^11 - 1 (per 0.152 and 0.153 (2047 type)
standards)
pseudo-2e15-o151      Pattern is 2^15 - 1 (per 0.151 standard)
pseudo-2e20-o151      Pattern is 2^20 - 1 (per 0.151 standard)
pseudo-2e20-o153      Pattern is 2^20 - 1 (per 0.153 standard)
pseudo-2e23-o151      Pattern is 2^23 - 1 (per 0.151 standard)
repeating-1-in-4       1 bit in 4 is set
repeating-1-in-8       1 bit in 8 is set
repeating-3-in-24      3 bits in 24 are set
```

When you issue the help command from the CLI, all BERT algorithm options are displayed, regardless of the PIC type, and no commit check is available. Unsupported patterns for a PIC type can be viewed in system log messages.



**NOTE:** BERT is supported on the PDH interfaces of the Channelized SONET/SDH OC3/STM1 (Multi-Rate) MIC with SFP and the DS3/E3 MIC. The following BERT algorithms are supported:

all-ones-repeating	Repeating one bits
all-zeros-repeating	Repeating zero bits
alternating-double-ones-zeros	Alternating pairs of ones and zeros
alternating-ones-zeros	Alternating ones and zeros
repeating-1-in-4	1 bit in 4 is set
repeating-1-in-8	1 bit in 8 is set
repeating-3-in-24	3 bits in 24 are set
pseudo-2e9-o153	Pattern is $2^9 - 1$ (per 0.153 standard)
pseudo-2e11-o152	Pattern is $2^{11} - 1$ (per 0.152 standard)
pseudo-2e15-o151	Pattern is $2^{15} - 1$ (per 0.151 standard)
pseudo-2e20-o151	Pattern is $2^{20} - 1$ (per 0.151 standard)
pseudo-2e20-o153	Pattern is $2^{20} - 1$ (per 0.153 standard)
pseudo-2e23-o151	Pattern is $2^{23} - 1$ (per 0.151 standard)

Table 4 on page 46 shows the BERT capabilities for various interface types.

**Table 4: BERT Capabilities by Interface Type**

Interface	T1 BERT	T3 BERT	Comments
12-port T1/E1 Circuit Emulation	Yes (ports 0–11)		<ul style="list-style-type: none"> <li>Limited algorithms</li> </ul>
4-port Channelized OC3/STM1 Circuit Emulation	Yes (port 0–3)		<ul style="list-style-type: none"> <li>Limited algorithms</li> </ul>
E1 or T1	Yes (port 0–3)	Yes (port 0–3)	<ul style="list-style-type: none"> <li>Single port at a time</li> <li>Limited algorithms</li> </ul>
E3 or T3	Yes (port 0–3)	Yes (port 0–3)	<ul style="list-style-type: none"> <li>Single port at a time</li> </ul>
Channelized OC12	N/A	Yes (channel 0–11)	<ul style="list-style-type: none"> <li>Single channel at a time</li> <li>Limited algorithms</li> <li>No bit count</li> </ul>
Channelized STM1	Yes (channel 0–62)	N/A	<ul style="list-style-type: none"> <li>Multiple channels</li> <li>Only one algorithm</li> <li>No error insert</li> <li>No bit count</li> </ul>
Channelized T3 and Multichannel T3	Yes (channel 0–27)	Yes (port 0–3 on channel 0)	<ul style="list-style-type: none"> <li>Multiple ports and channels</li> <li>Limited algorithms for T1</li> <li>No error insert for T1</li> <li>No bit count for T1</li> </ul>

These limitations do not apply to channelized IQ interfaces. For information about BERT capabilities on channelized IQ interfaces, see *Channelized IQ and IQE Interfaces Properties*.

### Starting and Stopping a BERT Test

Before you can start the BERT test, you must disable the interface. To do this, include the **disable** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]
disable;
```

After you configure the BERT properties and commit the configuration, begin the test by issuing the **test interface *interface-name* *interface-type* bert-start** operational mode command:

```
user@host> test interface interface-name interface-type bert-start
```

The test runs for the duration you specify with the **bert-period** statement. If you wish to terminate the test sooner, issue the **test interface *interface-name* *interface-type* bert-stop** command:

```
user@host> test interface interface-name interface-type bert-stop
```

For example:

```
user@host> test interface t3-1/2/0 t3-bert-start
user@host> test interface t3-1/2/0 t3-bert-stop
```

To view the results of the BERT test, issue the **show interfaces extensive | find BERT** command:

```
user@host> show interfaces interface-name extensive | find BERT
```

For more information about running and evaluating the results of the BERT procedure, see the [CLI Explorer](#).



**NOTE:** To exchange BERT patterns between a local router and a remote router, include the **loopback remote** statement in the interface configuration at the remote end of the link. From the local router, issue the **test interface** command.

### Example: Configuring Bit Error Rate Testing

Configure a BERT test on a T3 interface. In this example, the run duration lasts for 120 seconds. The configured error rate is 0, which corresponds to a bit error rate of  $10^{-0}$  (1 error per bit). The configured bit pattern of **all-ones-repeating** means that every bit the interface sends is a set to a value of 1.

```
[edit interfaces]
t3-1/2/0 {
  t3-options {
    bert algorithm all-ones-repeating;
    bert-error-rate 0;
    bert-period 120;
```

```
}  
}
```



## CHAPTER 4

# Configuration Statements

- [\[edit interfaces\] Hierarchy Level on page 50](#)
- [\[edit system processes\] Hierarchy Level on page 66](#)
- [access-profile on page 67](#)
- [activation-delay on page 68](#)
- [backup-options on page 68](#)
- [callback on page 69](#)
- [callback-wait-period on page 70](#)
- [caller on page 71](#)
- [calling-number on page 72](#)
- [chap on page 73](#)
- [deactivation-delay on page 74](#)
- [dial-string on page 74](#)
- [dialer on page 75](#)
- [dialer-options on page 76](#)
- [encapsulation \(Logical Interface\) on page 77](#)
- [encapsulation \(Physical Interface\) on page 81](#)
- [family on page 86](#)
- [fast-aps-switch on page 90](#)
- [f-max-period on page 91](#)
- [fragment-threshold on page 91](#)
- [idle-timeout on page 92](#)
- [incoming-called-number on page 92](#)
- [incoming-map on page 93](#)
- [initial-route-check on page 94](#)
- [isdn-options on page 95](#)
- [load-interval on page 96](#)
- [load-threshold on page 97](#)
- [mrru on page 98](#)

- [mtu on page 99](#)
- [negotiate-address on page 101](#)
- [pool on page 102](#)
- [ppp-options on page 103](#)
- [redial-delay on page 104](#)
- [spid1 on page 105](#)
- [spid2 on page 105](#)
- [static-tei-val on page 106](#)
- [switch-type on page 106](#)
- [t310 on page 107](#)
- [tei-option on page 107](#)
- [watch-list on page 108](#)

---

## [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);
}
shared-scheduler;
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;  
damping {  
  enable;  
  half-life seconds;  
  max-suppress seconds;  
  reuse number;  
  suppress number;  
}  
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;  
alias alias-name;  
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;
        }
    }
}
source-address-filter {

```

```

    mac-address;
}
(source-filtering | no-source-filtering);
}
flexible-vlan-tagging;
gigether-options {
    802.3ad aex;
    (asynchronous-notification | no-asynchronous-notification);
    (auto-negotiation | no-auto-negotiation) remote-fault <local-interface-online |
        local-interface-offline>;
    auto-reconnect seconds;
    (flow-control | no-flow-control);
    ignore-l3-incompletes;
    (loopback | no-loopback);
    mpls {
        pop-all-labels {
            required-depth number;
        }
    }
    no-auto-mdix;
    source-address-filter {
        mac-address;
    }
    (source-filtering | no-source-filtering);
    ethernet-switch-profile {
        (mac-learn-enable | no-mac-learn-enable);
        tag-protocol-id [ tpid ];
        ethernet-policer-profile {
            input-priority-map {
                ieee802.1p premium [ values ];
            }
            output-priority-map {
                classifier {
                    premium {
                        forwarding-class class-name {
                            loss-priority (high | low);
                        }
                    }
                }
            }
        }
    }
    policer cos-policer-name {
        aggregate {
            bandwidth-limit bps;
            burst-size-limit bytes;
        }
        premium {
            bandwidth-limit bps;
            burst-size-limit bytes;
        }
    }
}
}
}
(gratuitous-arp-reply | no-gratuitous-arp-reply);
hold-time up milliseconds down milliseconds;
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 | nil | ntdms100 | ntt);
    t310 seconds;
    tei-option (first-call | power-up);
}
keepalives <down-count number> <interval seconds> <up-count number>;
link-mode mode;
lmi {
    lmi-type (ansi | itu | c-lmi);
    n391dte number;
    n392dce number;
    n392dte number;
    n393dce number;
    n393dte number;
    t391dte seconds;
    t392dce seconds;
}
lsq-failure-options {
    no-termination-request;
    [ trigger-link-failure interface-name ];
}

```

```

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

```



```

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

```

```

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

```

```

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

```

```

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

```

```

advisory-options {
    downstream-rate rate;
    upstream-rate rate;
}
allow-any-vci;
atm-scheduler-map (map-name | default);
backup-options {
    interface interface-name;
}
bandwidth rate;
cell-bundle-size cells;
clear-dont-fragment-bit;
compression {
    rtp {
        f-max-period number;
        maximum-contexts number <force>;
        queues [ queue-numbers ];
        port {
            minimum port-number;
            maximum port-number;
        }
    }
}
compression-device interface-name;
copy-tos-to-outer-ip-header;
demux-destination family;
demux-source family;
demux-options {
    underlying-interface interface-name;
}
description text;
alias alias-name;
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);
direct-connect;
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;
    disable-arp-policer;
    input policer-template-name;
    output policer-template-name;
}
primary;
proxy inet-address address;
receive-options-packets;
receive-ttl-exceeded;
remote (inet-address address | mac-address address);
rpf-check {
    fail-filter filter-name;
    mode loose;
}
sampling {
    direction;
}
service {
    input {
        service-set service-set-name <service-filter filter-name>;
        post-service-filter filter-name;
    }
    output {
        service-set service-set-names <service-filter filter-name>;
    }
}
```



```

    }
}
service-name-table table-name;
short-cycle-protection <lockout-time-min minimum-seconds lockout-time-max
    maximum-seconds>;
targeted-broadcast {
    forward-and-send-to-re;
    forward-only;
}
(translate-discard-eligible | no-translate-discard-eligible);
(translate-fecn-and-becn | no-translate-fecn-and-becn);
translate-plp-control-word-de;
unnumbered-address interface-name <destination address destination-profile
    profile-name | preferred-source-address address>;
address address {
    arp ip-address (mac | multicast-mac) mac-address <publish>;
    broadcast address;
    destination address;
    destination-profile name;
    eui-64;
    multipoint-destination address (dlci dlci-identifier | vci vci-identifier);
    multipoint-destination address {
        epd-threshold cells plp1 cells;
        inverse-arp;
        oam-liveness {
            up-count cells;
            down-count cells;
        }
        oam-period (seconds | disable);
        shaping {
            (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained
                rate burst length);
            queue-length number;
        }
        vci vpi-identifier.vci-identifier;
    }
    preferred;
    primary;
    (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 {
                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](#)
  - [Ethernet Interfaces Feature Guide for Routing Devices](#)
  - [Junos OS Network Interfaces Library for Routing Devices](#)

---

## [\[edit system processes\] Hierarchy Level](#)

```
dialer-services {  
    disable;  
}  
isdn-signaling {  
    disable;  
    reject-incoming;  
}
```

- Related Documentation**
- [ISDN Configuration Overview](#)
  - [Disabling ISDN Processes on page 39](#)

## access-profile

<b>Syntax</b>	<code>access-profile name;</code>
<b>Hierarchy Level</b>	<p>[edit interfaces <i>interface-name</i> auto-configure vlan-ranges],  [edit interfaces <i>interface-name</i> auto-configure stacked-vlan-ranges],  [edit interfaces <i>interface-name</i> <b>ppp-options</b> chap],  [edit interfaces <i>interface-name</i> <b>ppp-options</b> pap],  [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <b>ppp-options</b> chap],  [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <b>ppp-options</b> pap],  [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <b>ppp-options</b> chap],  [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <b>ppp-options</b> pap]</p>
<b>Release Information</b>	<p>Statement introduced before Junos OS Release 7.4.  Support for PAP added in Junos OS Release 8.3.  Support for VLAN and stacked VLAN ranges added in Junos OS Release 10.0.</p>
<b>Description</b>	<p>For CHAP authentication, the mapping between peer names (or “clients” ) and the secrets associated with their respective links. For PAP authentication, the peer's username and password.</p> <p>For Asynchronous Transfer Mode 2 (ATM2) IQ interfaces only, you can configure a Challenge Handshake Authentication Protocol (CHAP) access profile on the logical interface unit if the logical interface is configured with one of the following PPP over ATM encapsulation types:</p> <ul style="list-style-type: none"> <li>• <b>atm-ppp-llc</b>—PPP over AAL5 logical link control (LLC) encapsulation.</li> <li>• <b>atm-ppp-vc-mux</b>—PPP over AAL5 multiplex encapsulation.</li> </ul> <p>For VLAN and stacked VLAN authentication, the access profile containing the RADIUS accounting and authentication information for the VLAN or stacked VLAN ranges.</p>
<b>Options</b>	<b>name</b> —Name of the access profile.
<b>Required Privilege Level</b>	<p>interface—To view this statement in the configuration.  interface-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <i>Configuring the PPP Challenge Handshake Authentication Protocol</i></li> <li>• <i>Configuring the PPP Password Authentication Protocol</i></li> <li>• <i>default-chap-secret</i></li> <li>• <i>Junos OS Administration Library for Routing Devices</i></li> </ul>

## activation-delay

---


<b>Syntax</b>	<code>activation-delay seconds;</code>
<b>Hierarchy Level</b>	<code>[edit interfaces dln unit logical-unit-number dialer-options]</code>
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	(J Series Services Routers) For ISDN interfaces, configure the ISDN dialer activation delay. Used only for dialer backup and dialer watch cases.
<b>Options</b>	<b>seconds</b> —Interval before the backup interface is activated after the primary interface has gone down. <b>Range:</b> 1 through 4,294,967,295 seconds
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring the Dialer Interface on page 34</a></li><li>• <i>Junos OS Interfaces and Routing Configuration Guide</i></li></ul>

## backup-options

---

<b>Syntax</b>	<pre>backup-options {   interface interface-name; }</pre>
<b>Hierarchy Level</b>	<code>[edit interfaces interface-name unit logical-unit-number]</code> , <code>[edit logical-systems logical-system-name interfaces interface-name unit logical-unit-number]</code>
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	Configure an interface to be used as a backup interface if the primary interface goes down. This is used to support ISDN dial backup operation.  The remaining statement is explained separately.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring an ISDN Dialer Interface as a Backup Interface on page 25</a></li><li>• <i>Junos OS Interfaces and Routing Configuration Guide</i></li></ul>

## callback

<b>Syntax</b>	callback;
<b>Hierarchy Level</b>	[edit interfaces <i>dl n</i> unit <i>logical-unit-number</i> <b>dialer-options incoming-map</b> ], [edit logical-systems <i>logical-system-name</i> interfaces <i>dl n</i> unit <i>logical-unit-number</i> <b>dialer-options incoming-map</b> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 7.5.
<b>Description</b>	On J Series Services Routers with interfaces configured for ISDN, configure the dialer to terminate the incoming call and call back the originator after the callback wait period. The default wait time is 5 seconds. To configure the wait time, include the <b>callback-wait-period</b> statement at the [edit interfaces <i>dl n</i> unit <i>logical-unit-number</i> <b>dialer-options</b> ] hierarchy level.
<div>  <b>NOTE:</b> The <b>incoming-map</b> statement is mandatory for the router to accept any incoming ISDN calls. </div>	
<p>If the <b>callback</b> statement is configured, you cannot use the <b>caller <i>caller-id</i></b> statement at the [edit interfaces <i>dl n</i> unit <i>logical-unit-number</i> <b>dialer-options</b>] hierarchy level.</p>	
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Configuring Dial-In and Callback on page 31</a></li> <li>• <a href="#">Junos OS Interfaces and Routing Configuration Guide</a></li> <li>• <a href="#">callback-wait-period on page 70</a></li> </ul>

## callback-wait-period

---

<b>Syntax</b>	<code>callback-wait-period <i>time</i>;</code>
<b>Hierarchy Level</b>	[edit interfaces <i>dl</i> n unit <i>logical-unit-number</i> <b>dialer-options</b> ], [edit logical-systems <i>logical-system-name</i> interfaces <i>dl</i> n unit <i>logical-unit-number</i> <b>dialer-options</b> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 7.5.
<b>Description</b>	<p>On J Series Services Routers with interfaces configured for ISDN with callback, specify the amount of time the dialer waits before calling back the caller. The default wait time is 5 seconds. The wait time is necessary because, when a call is rejected, the switch waits for up to 4 seconds on point-to-multipoint connections to ensure no other device accepts the call before sending the DISCONNECT message to the originator of the call. However, the default time of 5 seconds may not be sufficient for different switches or may not be needed on point-to-point connections.</p> <p>To configure callback mode, include the <b>callback</b> statement at the [edit interfaces <i>dl</i>n unit <i>logical-unit-number</i> <b>dialer-options</b>] hierarchy level.</p> <p>If the <b>callback</b> statement is configured, you cannot use the <b>caller <i>caller-id</i></b> statement at the [edit interfaces <i>dl</i>n unit <i>logical-unit-number</i> <b>dialer-options</b>] hierarchy level.</p>
<b>Options</b>	<b><i>time</i></b> —Time the dialer waits before calling back the caller.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring Dial-In and Callback on page 31</a></li><li>• <i>Junos OS Interfaces and Routing Configuration Guide</i></li></ul>

## caller

<b>Syntax</b>	<code>caller (caller-id   accept-all);</code>
<b>Hierarchy Level</b>	[edit interfaces <i>dlr</i> unit <i>logical-unit-number</i> <b>dialer-options incoming-map</b> ], [edit logical-systems <i>logical-system-name</i> interfaces <i>dlr</i> unit <i>logical-unit-number</i> <b>dialer-options incoming-map</b> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 7.5.
<b>Description</b>	On J Series Services Routers with interfaces configured for ISDN, specify the dialer to accept a specified caller number or accept all incoming calls.
<b>Options</b>	<p><b>caller-id</b>—Incoming caller number. You can configure multiple caller IDs on a dialer. The caller ID of the incoming call is matched against all caller IDs configured on all dialers. The dialer matching the caller ID is looked at for further processing. Only a precise match is a valid match. For example, the configured caller ID 1-222-333-4444 or 222-333-4444 will match the incoming caller ID 1-222-333-4444.</p> <p>If the incoming caller ID has fewer digits than the number configured, it is not a valid match. Duplicate caller IDs are not allowed on different dialers; however, for example, the numbers 1-408-532-1091, 408-532-1091, and 532-1091 can still be configured on different dialers.</p> <p>Only one B-channel can map to one dialer. If one dialer is already mapped, any other call mapping to the same dialer is rejected (except in the case of a multilink dialer). If no dialer caller is configured on a dialer, that dialer will not accept any calls.</p> <p><b>accept-all</b>—Any incoming call in an associated interface is accepted.</p>
<b>Required Privilege Level</b>	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">ISDN Interfaces Overview on page 17</a></li> <li>• <i>Junos OS Interfaces and Routing Configuration Guide</i></li> </ul>


## calling-number

---

<b>Syntax</b>	<code>calling-number <i>number</i>;</code>
<b>Hierarchy Level</b>	[edit interfaces <i>br-pim</i> /0/ <i>port</i> <a href="#">isdn-options</a> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	On J Series Services Routers with ISDN interfaces, configure the calling number to include in outgoing calls.
<b>Options</b>	<i>number</i> —Calling number.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring ISDN Physical Interface Properties on page 21</a></li><li>• <i>Junos OS Interfaces and Routing Configuration Guide</i></li></ul>



## chap

<b>Syntax</b>	<pre>chap {   access-profile <i>name</i>;   challenge-length minimum <i>minimum-length</i> maximum <i>maximum-length</i>;   default-chap-secret <i>name</i>;   local-name <i>name</i>;   passive; }</pre>
<b>Hierarchy Level</b>	<pre>[edit interfaces <i>interface-name</i> <b>ppp-options</b>], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <b>ppp-options</b>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <b>ppp-options</b>]</pre>
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	<p>Allow each side of a link to challenge its peer, using a “secret” known only to the authenticator and that peer. The secret is not sent over the link.</p> <p>By default, PPP CHAP is disabled. If CHAP is not explicitly enabled, the interface makes no CHAP challenges and denies all incoming CHAP challenges.</p> <p>For ATM2 IQ interfaces only, you can configure CHAP on the logical interface unit if the logical interface is configured with one of the following PPP over ATM encapsulation types:</p> <ul style="list-style-type: none"> <li>• <b>atm-ppp-llc</b>—PPP over AAL5 LLC encapsulation.</li> <li>• <b>atm-ppp-vc-mux</b>—PPP over AAL5 multiplex encapsulation.</li> </ul>
	<p> <b>BEST PRACTICE:</b> On inline service (si) interfaces for L2TP, only the chap statement itself is typically used for subscriber management. We recommend that you leave the subordinate statements at their default values.</p>
	The remaining statements are explained separately.
<b>Required Privilege Level</b>	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <i>Configuring the PPP Challenge Handshake Authentication Protocol</i></li> <li>• <i>Applying PPP Attributes to L2TP LNS Subscribers with a User Group Profile</i></li> <li>• <i>Applying PPP Attributes to L2TP LNS Subscribers Per Inline Service Interface</i></li> </ul>

## deactivation-delay

---

<b>Syntax</b>	<code>deactivation-delay <i>seconds</i>;</code>
<b>Hierarchy Level</b>	[edit interfaces <i>dl</i> unit <i>logical-unit-number</i> <a href="#">dialer-options</a> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	On J Series Services Routers with ISDN interfaces, configure the ISDN deactivation delay. Used only for dialer backup and dialer watch cases.
<b>Options</b>	<b><i>seconds</i></b> —Interval before the backup interface is deactivated after the primary interface has come up. <b>Range:</b> 1 through 4,294,967,295 seconds <b>Default:</b> 0 (zero)
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring ISDN Logical Interface Properties on page 22</a></li><li>• <i>Junos OS Interfaces and Routing Configuration Guide</i></li></ul>

## dial-string

---

<b>Syntax</b>	<code>dial-string [ <i>dial-string-numbers</i> ];</code>
<b>Hierarchy Level</b>	[edit interfaces <i>br-pim</i> /0/ <i>port</i> unit <i>logical-unit-number</i> <a href="#">dialer-options</a> ], [edit logical-systems <i>logical-system-name</i> interfaces <i>br-pim</i> /0/ <i>port</i> unit <i>logical-unit-number</i> <a href="#">dialer-options</a> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	On J Series Services Routers with ISDN interfaces, specify one or more ISDN dial strings used to reach a destination subnetwork.
<b>Options</b>	<b><i>dial-string-numbers</i></b> —One or more strings of numbers to call.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring the Dialer Interface on page 34</a></li></ul>

## dialer

---

<b>Syntax</b>	<code>dialer <i>filter-name</i>;</code>
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i> ], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	Apply a dialer filter to an interface. To create the dialer filter, include the <b>dialer-filter</b> statement at the [edit firewall filter family <i>family</i> ] hierarchy level.
<b>Options</b>	<i>filter-name</i> —Dialer filter name.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Applying the Dial-on-Demand Dialer Filter to the Dialer Interfaces on page 27</a></li> <li>• <i>Junos OS Interfaces and Routing Configuration Guide</i></li> </ul>

## dialer-options

---

<b>Syntax</b>	<pre>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-number   accept-all;     initial-route-check seconds;     load-interval seconds;     load-threshold percent;     pool pool-name;     redial-delay time;     watch-list {       [ routes ];     }   } }</pre>
<b>Hierarchy Level</b>	<pre>[edit interfaces umd0], [edit interfaces dln unit logical-unit-number], [edit logical-systems logical-system-name interfaces dln unit logical-unit-number]</pre>
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	<p>Specify the dialer options for configuring logical interfaces for group and user sessions.</p> <p>The statements are explained separately.</p>
<b>Required Privilege Level</b>	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring ISDN Logical Interface Properties on page 22</a></li><li>• <i>Junos OS Services Interfaces Library for Routing Devices</i></li></ul>

## encapsulation (Logical Interface)

<b>Syntax</b>	encapsulation (atm-ccc-cell-relay   atm-ccc-vc-mux   atm-cisco-nlpid   atm-mlppp-llc   atm-nlpid   atm-ppp-llc   atm-ppp-vc-mux   atm-snap   atm-tcc-snap   atm-tcc-vc-mux   atm-vc-mux   ether-over-atm-llc   ether-vpls-over-atm-llc   ether-vpls-over-fr   ether-vpls-over-ppp   ethernet   ethernet-ccc   ethernet-vpls   ethernet-vpls-fr   frame-relay-ccc   frame-relay-ether-type   frame-relay-ether-type-tcc   frame-relay-ppp   frame-relay-tcc   gre-fragmentation   multilink-frame-relay-end-to-end   multilink-ppp   ppp-over-ether   ppp-over-ether-over-atm-llc   vlan-bridge   vlan-ccc   vlan-vci-ccc   vlan-tcc   vlan-vpls);
<b>Hierarchy Level</b>	[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> ], [edit interfaces rlsq <i>number</i> unit <i>logical-unit-number</i> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 12.1X48 for PTX Series Packet Transport Routers ( <b>ethernet</b> , <b>vlan-ccc</b> , and <b>vlan-tcc</b> options only). Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers. Only the <b>atm-ccc-cell-relay</b> and <b>atm-ccc-vc-mux</b> options are supported on ACX Series routers.
<b>Description</b>	Configure a logical link-layer encapsulation type.
<b>Options</b>	<p><b>atm-ccc-cell-relay</b>—Use ATM cell-relay encapsulation.</p> <p><b>atm-ccc-vc-mux</b>—Use ATM virtual circuit (VC) multiplex encapsulation on CCC circuits. When you use this encapsulation type, you can configure the <b>ccc</b> family only.</p> <p><b>atm-cisco-nlpid</b>—Use Cisco ATM network layer protocol identifier (NLPID) encapsulation. When you use this encapsulation type, you can configure the <b>inet</b> family only.</p> <p><b>atm-mlppp-llc</b>—For ATM2 IQ interfaces only, use Multilink Point-to-Point (MLPPP) over AAL5 LLC. For this encapsulation type, your router must be equipped with a Link Services or Voice Services PIC. MLPPP over ATM encapsulation is not supported on ATM2 IQ OC48 interfaces.</p> <p><b>atm-nlpid</b>—Use ATM NLPID encapsulation. When you use this encapsulation type, you can configure the <b>inet</b> family only.</p> <p><b>atm-ppp-llc</b>—(ATM2 IQ interfaces and MX Series routers with MPC/MIC interfaces using the ATM MIC with SFP only) Use PPP over AAL5 LLC encapsulation.</p> <p><b>atm-ppp-vc-mux</b>—(ATM2 IQ interfaces and MX Series routers with MPC/MIC interfaces using the ATM MIC with SFP only) Use PPP over ATM AAL5 multiplex encapsulation.</p> <p><b>atm-snap</b>—(All interfaces including MX Series routers with MPC/MIC interfaces using the ATM MIC with SFP) Use ATM subnetwork attachment point (SNAP) encapsulation.</p> <p><b>atm-tcc-snap</b>—Use ATM SNAP encapsulation on translational cross-connect (TCC) circuits.</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.

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

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

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

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



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

---

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

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

**ethernet-ccc**—Use Ethernet CCC encapsulation on Ethernet interfaces.

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



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

---

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

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

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

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

**frame-relay-ppp**—Use PPP over Frame Relay circuits. When you use this encapsulation type, you can configure the **ppp** family only.

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

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

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

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

**ppp-over-ether**—You use PPP over Ethernet encapsulation to configure an underlying Ethernet interface for a dynamic PPPoE logical interface on M120 and M320 routers with Intelligent Queuing 2 (IQ2) PICs, and on MX Series routers with MPCs.

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

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

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

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

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

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

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

**Related Documentation**

- *Configuring Layer 2 Switching Cross-Connects Using CCC*
- *Configuring the Encapsulation for Layer 2 Switching TCCs*
- *Configuring Interface Encapsulation on Logical Interfaces*
- *Configuring MPLS LSP Tunnel Cross-Connects Using CCC*
- *Circuit and Translational Cross-Connects Overview*
- *Identifying the Access Concentrator*
- *Configuring ATM Interface Encapsulation*
- *Configuring VLAN Encapsulation*
- *Configuring Extended VLAN Encapsulation*
- *Configuring ATM-to-Ethernet Interworking*
- *Configuring Interface Encapsulation on PTX Series Packet Transport Routers*
- *Configuring CCC Encapsulation for Layer 2 VPNs*
- *Configuring TCC Encapsulation for Layer 2 VPNs and Layer 2 Circuits*
- *Configuring ATM for Subscriber Access*
- *CoS on ATM IMA Pseudowire Interfaces Overview*
- *Configuring Policing on an ATM IMA Pseudowire*



## encapsulation (Physical Interface)

<b>Syntax</b>	encapsulation (atm-ccc-cell-relay   atm-pvc   cisco-hdlc   cisco-hdlc-ccc   cisco-hdlc-tcc   ethernet-bridge   ethernet-ccc   ethernet-over-atm   ethernet-tcc   ethernet-vpls   ethernet-vpls-fr   ether-vpls-over-atm-llc   ethernet-vpls-ppp   extended-frame-relay-ccc   extended-frame-relay-ether-type-tcc   extended-frame-relay-tcc   extended-vlan-bridge   extended-vlan-ccc   extended-vlan-tcc   extended-vlan-vpls   flexible-ethernet-services   flexible-frame-relay   frame-relay   frame-relay-ccc   frame-relay-ether-type   frame-relay-ether-type-tcc   frame-relay-port-ccc   frame-relay-tcc   generic-services   multilink-frame-relay-uni-nni   ppp   ppp-ccc   ppp-tcc   vlan-ccc   vlan-vci-ccc   vlan-vpls);
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> ], [edit interfaces rlsq <i>number:number</i> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 11.1 for EX Series switches. Statement introduced in Junos OS Release 12.1X48 for PTX Series Packet Transport Routers ( <b>flexible-ethernet-services</b> , <b>ethernet-ccc</b> , and <b>ethernet-tcc</b> options only).
<b>Description</b>	Specify the physical link-layer encapsulation type. Not all encapsulation types are supported on the switches. See the switch CLI.
<b>Default</b>	<b>ppp</b> —Use serial PPP encapsulation.
<b>Options</b>	<p><b>atm-ccc-cell-relay</b>—Use ATM cell-relay encapsulation.</p> <p><b>atm-pvc</b>—Use ATM PVC encapsulation.</p> <p><b>cisco-hdlc</b>—Use Cisco-compatible High-Level Data Link Control (HDLC) framing.</p> <p><b>cisco-hdlc-ccc</b>—Use Cisco-compatible HDLC framing on CCC circuits.</p> <p><b>cisco-hdlc-tcc</b>—Use Cisco-compatible HDLC framing on TCC circuits for connecting different media.</p> <p><b>ethernet-bridge</b>—Use Ethernet bridge encapsulation on Ethernet interfaces that have bridging enabled and that must accept all packets.</p> <p><b>ethernet-ccc</b>—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><b>ethernet-over-atm</b>—For interfaces that carry IPv4 traffic, use Ethernet over ATM encapsulation. When you use this encapsulation type, you cannot configure multipoint interfaces. As defined in RFC 2684, <i>Multiprotocol Encapsulation over ATM Adaptation Layer 5</i>, this encapsulation type allows ATM interfaces to connect to devices that support only bridge protocol data units (BPDUs). Junos OS does not completely support bridging, but accepts BPDU packets as a default gateway. If you use the router as an edge device, then the router acts as a default gateway. It accepts Ethernet LLC/SNAP frames with IP or ARP in the payload, and drops the rest. For packets destined to the Ethernet LAN, a route lookup is done using the destination</p>

IP address. If the route lookup yields a full address match, the packet is encapsulated with an LLC/SNAP and MAC header, and the packet is forwarded to the ATM interface.

**ethernet-tcc**—For interfaces that carry IPv4 traffic, use Ethernet TCC encapsulation on interfaces that must accept packets carrying standard TPID values. For 8-port, 12-port, and 48-port Fast Ethernet PICs, TCC is not supported.

**ethernet-vpls**—Use Ethernet VPLS encapsulation on Ethernet interfaces that have VPLS enabled and that must accept packets carrying standard TPID values. On M Series routers, except the M320 router, the 4-port Fast Ethernet TX PIC and the 1-port, 2-port, and 4-port, 4-slot Gigabit Ethernet PICs can use the Ethernet VPLS encapsulation type.

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

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

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

**extended-frame-relay-ccc**—Use Frame Relay encapsulation on CCC circuits. This encapsulation type allows you to dedicate DLCIs 1 through 1022 to CCC.

**extended-frame-relay-ether-type-tcc**—Use extended Frame Relay ether type TCC for Cisco-compatible Frame Relay for DLCIs 1 through 1022. This encapsulation type is used for circuits with different media on either side of the connection.

**extended-frame-relay-tcc**—Use Frame Relay encapsulation on TCC circuits to connect different media. This encapsulation type allows you to dedicate DLCIs 1 through 1022 to TCC.

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

**extended-vlan-ccc**—Use extended VLAN encapsulation on CCC circuits with Gigabit Ethernet and 4-port Fast Ethernet interfaces that must accept packets carrying 802.1Q values. For 8-port, 12-port, and 48-port Fast Ethernet PICs, extended VLAN CCC is not supported. For 4-port Gigabit Ethernet PICs, extended VLAN CCC is not supported.

**extended-vlan-tcc**—For interfaces that carry IPv4 traffic, use extended VLAN encapsulation on TCC circuits with Gigabit Ethernet interfaces on which you want to use 802.1Q tagging. For 4-port Gigabit Ethernet PICs, extended VLAN TCC is not supported.

**extended-vlan-vpls**—Use extended VLAN VPLS encapsulation on Ethernet interfaces that have VLAN 802.1Q tagging and VPLS enabled and that must accept packets carrying TPIDs 0x8100, 0x9100, and 0x9901. On M Series routers, except the M320 router, the 4-port Fast Ethernet TX PIC and the 1-port, 2-port, and 4-port, 4-slot Gigabit Ethernet PICs can use the Ethernet VPLS encapsulation type.



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

**flexible-ethernet-services**—For Gigabit Ethernet IQ interfaces and Gigabit Ethernet PICs with small form-factor pluggable transceivers (SFPs) (except the 10-port Gigabit Ethernet PIC and the built-in Gigabit Ethernet port on the M7i router), use flexible Ethernet services encapsulation when you want to configure multiple per-unit Ethernet encapsulations. Aggregated Ethernet bundles can use this encapsulation type. This encapsulation type allows you to configure any combination of route, TCC, CCC, Layer 2 virtual private networks (VPNs), and VPLS encapsulations on a single physical port. If you configure flexible Ethernet services encapsulation on the physical interface, VLAN IDs from 1 through 511 are no longer reserved for normal VLANs.

**flexible-frame-relay**—For IQ interfaces only, use flexible Frame Relay encapsulation when you want to configure multiple per-unit Frame Relay encapsulations. This encapsulation type allows you to configure any combination of TCC, CCC, and standard Frame Relay encapsulations on a single physical port. Also, each logical interface can have any DLCI value from 1 through 1022.

**frame-relay**—Use Frame Relay encapsulation.

**frame-relay-ccc**—Use Frame Relay encapsulation on CCC circuits.

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

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

**frame-relay-port-ccc**—Use Frame Relay port CCC encapsulation to transparently carry all the DLCIs between two customer edge (CE) routers without explicitly configuring each DLCI on the two provider edge (PE) routers with Frame Relay transport. When you use this encapsulation type, you can configure the **ccc** family only.

**frame-relay-tcc**—Use Frame Relay encapsulation on TCC circuits to connect different media.

**generic-services**—Use generic services encapsulation for services with a hierarchical scheduler.

**multilink-frame-relay-uni-nni**—Use MLFR UNI NNI encapsulation. This encapsulation is used on link services, voice services interfaces functioning as FRF.16 bundles, and their constituent T1 or E1 interfaces, and is supported on LSQ and redundant LSQ interfaces.

**ppp**—Use serial PPP encapsulation.

**ppp-ccc**—Use serial PPP encapsulation on CCC circuits. When you use this encapsulation type, you can configure the **ccc** family only.

**ppp-tcc**—Use serial PPP encapsulation on TCC circuits for connecting different media. When you use this encapsulation type, you can configure the **tcc** family only.

**vlan-ccc**—Use Ethernet VLAN encapsulation on CCC circuits.

**vlan-vci-ccc**—Use ATM-to-Ethernet interworking encapsulation on CCC circuits. When you use this encapsulation type, you can configure the **ccc** family only. All logical interfaces configured on the Ethernet interface must also have the encapsulation type set to **vlan-vci-ccc**.

**vlan-vpls**—Use VLAN VPLS encapsulation on Ethernet interfaces with VLAN tagging and VPLS enabled. Interfaces with VLAN VPLS encapsulation accept packets carrying standard TPID values only. On M Series routers, except the M320 router, the 4-port Fast Ethernet TX PIC and the 1-port, 2-port, and 4-port, 4-slot Gigabit Ethernet PICs can use the Ethernet VPLS encapsulation type.



NOTE:

- Label-switched interfaces (LSIs) do not support VLAN VPLS encapsulation. Therefore, you can only use VLAN VPLS encapsulation on a PE-router-to-CE-router interface and not a core-facing interface.
  - Starting with Junos OS release 13.3, a commit error occurs when you configure **vlan-vpls** encapsulation on a physical interface and configure **family inet** on one of the logical units. Previously, it was possible to commit this invalid configuration.
- 

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

**Related  
Documentation**

- *Configuring Interface Encapsulation on Physical Interfaces*
- *Configuring CCC Encapsulation for Layer 2 VPNs*
- *Configuring Layer 2 Switching Cross-Connects Using CCC*
- *Configuring TCC Encapsulation for Layer 2 VPNs and Layer 2 Circuits*
- *Configuring ATM Interface Encapsulation*
- *Configuring ATM-to-Ethernet Interworking*
- *Configuring VLAN Encapsulation*
- *Configuring Extended VLAN Encapsulation*
- *Configuring Encapsulation for Layer 2 Wholesale VLAN Interfaces*
- *Configuring Interfaces for Layer 2 Circuits*
- *Configuring Interface Encapsulation on PTX Series Packet Transport Routers*
- *Configuring an MPLS-Based Layer 2 VPN (CLI Procedure)*
- *Configuring MPLS LSP Tunnel Cross-Connects Using CCC*
- *Configuring TCC*
- *Configuring VPLS Interface Encapsulation*
- *Configuring Interfaces for VPLS Routing*
- *Defining the Encapsulation for Switching Cross-Connects*
- *Configuring Q-in-Q Tunneling (CLI Procedure)*

## 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 ...
        }
        bundle interface-name;
        core-facing;
        demux-destination {
            destination-prefix;
        }
        demux-source {
            source-prefix;
        }
        direct-connect;
        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;
        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 group-id {
        (accept-data | no-accept-data);
        advertise-interval seconds;
        authentication-key key;
        authentication-type authentication;
        fast-interval milliseconds;
    }
}

```

```
(preempt | no-preempt) {  
    hold-time seconds;  
}  
priority number;  
track {  
    interface interface-name {  
        bandwidth-threshold bits-per-second priority-cost priority;  
        priority-cost priority;  
    }  
    priority-hold-time seconds;  
    route prefix routing-instance instance-name priority-cost priority;  
}  
}  
virtual-address [ addresses ];  
}  
virtual-link-local-address ipv6-address;  
}
```

Hierarchy Level	[edit interfaces <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. Option <b>max-sessions-vs-a-ignore</b> introduced in Junos OS Release 11.4.
Description	Configure protocol family information for the logical interface.



**NOTE:** Not all subordinate stanzas are available to every protocol family.

---



**Options** *family*—Protocol family:

- **any**—Protocol-independent family used for Layer 2 packet filtering



**NOTE:** This option is not supported on T4000 Type 5 FPCs.

- **bridge**—(M Series and T Series routers only) Configure only when the physical interface is configured with **ethernet-bridge** type encapsulation or when the logical interface is configured with **vlan-bridge** type encapsulation
- **ethernet-switching**—(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*

## fast-aps-switch

---

<b>Syntax</b>	fast-aps-switch;
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> sonet-options aps]
<b>Release Information</b>	Statement introduced in Junos OS Release 12.1.
<b>Description</b>	(M320 routers with Channelized OC3/STM1 Circuit Emulation PIC with SFP only and EX Series switches) Reduce the Automatic Protection Switching (APS) switchover time in Layer 2 circuits.

**NOTE:**

- Configuring this statement reduces the APS switchover time only when the Layer 2 circuit encapsulation type for the interface receiving traffic from a Layer 2 circuit neighbor is SAToP.
  - When the fast-aps-switch statement is configured in revertive APS mode, you must configure an appropriate value for revert time to achieve reduction in APS switchover time.
  - To prevent the logical interfaces in the data path from being shut down, configure appropriate hold-time values on all the interfaces in the data path that support TDM.
  - The fast-aps-switch statement cannot be configured when the APS annex-b option is configured.
  - The interfaces that have the fast-aps-switch statement configured cannot be used in virtual private LAN service (VPLS) environments.
- 

<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Reducing APS Switchover Time in Layer 2 Circuits</i></li></ul>

## f-max-period

<b>Syntax</b>	f-max-period <i>number</i> ;
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> rtp]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	For all adaptive services interfaces and for ISDN interfaces on J Series Services Routers. Specify the maximum number of compressed packets allowed between the transmission of full headers in a compressed Real-Time Transport Protocol (RTP) traffic stream.
<b>Options</b>	<i>number</i> —Maximum number of packets. The value can be from 1 through 65535.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Configuring Bandwidth on Demand on page 28</a></li> <li>• <i>Junos OS Services Interfaces Library for Routing Devices</i></li> </ul>

## fragment-threshold

<b>Syntax</b>	fragment-threshold <i>bytes</i> ;
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> mlfr-uni-nni-bundle-options], [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> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	For multilink, link services, and voice services interfaces, and for J Series Services Routers ISDN interfaces, set the fragmentation threshold.
<b>Options</b>	<i>bytes</i> —Maximum size, in bytes, for multilink packet fragments. Any nonzero value must be a multiple of 64 bytes. <b>Range:</b> 128 through 16,320 bytes <b>Default:</b> 0 bytes (no fragmentation)
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Configuring ISDN Logical Interface Properties on page 22</a></li> <li>• <i>Junos OS Services Interfaces Library for Routing Devices</i></li> </ul>

## idle-timeout

---

<b>Syntax</b>	<code>idle-timeout seconds;</code>
<b>Hierarchy Level</b>	<code>[edit interfaces dln unit <i>logical-unit-number</i> dialer-options]</code>
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	On J Series Services Routers with ISDN interfaces, configure the number of seconds the link is idle before losing connectivity.
<b>Options</b>	<b>seconds</b> —Time for which the connection can remain idle. For interfaces configured to use a filter for traffic, the idle timeout is based on traffic. <b>Range:</b> 1 through 429497295 <b>Default:</b> 120 seconds
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring ISDN Logical Interface Properties on page 22</a></li><li>• <i>Junos OS Interfaces and Routing Configuration Guide</i></li></ul>

## incoming-called-number

---

<b>Syntax</b>	<code>incoming-called-number number &lt;reject&gt;;</code>
<b>Hierarchy Level</b>	<code>[edit interfaces br-pim/0/port isdn-options]</code>
<b>Release Information</b>	Statement introduced on Junos OS Release 7.5.
<b>Description</b>	On J Series Services Routers with interfaces configured for ISDN, screen incoming calls. If the incoming number is configured, the call is accepted. If the reject option is specified with the number, the call is rejected. If no numbers are configured, all calls are accepted.
<b>Options</b>	<b>number</b> —(Optional) Incoming caller number. Multiple numbers can be configured, up to a maximum of 30 entries. Only a precise match is a valid match. For example, the configured caller number 1-222-333-4444 or 222-333-4444 will match the incoming caller number 1-222-333-4444.  <b>reject</b> —(Optional) Rejects the incoming number.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring an ISDN Interface to Screen Incoming Calls on page 38</a></li><li>• <i>Junos OS Services Interfaces Library for Routing Devices</i></li></ul>

## incoming-map

---

<b>Syntax</b>	incoming-map { <code>caller caller-number</code>   accept-all; }
<b>Hierarchy Level</b>	[edit interfaces <i>dl</i> n unit <i>logical-unit-number</i> <code>dialer-options</code> ], [edit logical-systems <i>logical-system-name</i> interfaces <i>dl</i> n unit <i>logical-unit-number</i> <code>dialer-options</code> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 7.5.
<b>Description</b>	On J Series Services Routers with interfaces configured for ISDN, specify the dialer to accept incoming calls.  The statements are explained separately.



**NOTE:** The `incoming-map` statement is mandatory for the router to accept any incoming ISDN calls.

<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Configuring Dial-In and Callback on page 31</a></li> <li>• <i>Junos OS Interfaces and Routing Configuration Guide</i></li> </ul>

## initial-route-check

---

<b>Syntax</b>	<code>initial-route-check seconds;</code>
<b>Hierarchy Level</b>	[edit interfaces <i>dl</i> unit <i>logical-unit-number</i> <a href="#">dialer-options</a> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	On J Series Services Routers with ISDN interfaces, allows the router to check whether the primary route is up after the initial startup of the router is complete and the timer expires.
<b>Options</b>	<b>seconds</b> —How long to wait to check if the primary interface is up after the router comes up. <b>Range:</b> 1 through 300 seconds <b>Default:</b> 120 seconds
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">ISDN Interfaces Overview on page 17</a></li><li>• <i>Junos OS Interfaces and Routing Configuration Guide</i></li></ul>

## isdn-options

<b>Syntax</b>	<pre> isdn-options {     bchannel-allocation (ascending   descending);     calling-number <i>number</i>;     incoming-called-number <i>number</i> &lt;reject&gt;;     spid1 <i>spid-string</i>;     spid2 <i>spid-string</i>;     static-tei-val <i>value</i>;     switch-type (att5e   etsi   nil   ntdms100   ntt);     t310 <i>seconds</i>;     tei-option (first-call   power-up); } </pre>
<b>Hierarchy Level</b>	<pre> [edit interfaces br-<i>pim</i>/0/<i>port</i>], [edit interfaces ct1-<i>pim</i>/0/<i>port</i>], [edit interfaces ce1-<i>pim</i>/0/<i>port</i>] </pre>
<b>Release Information</b>	<p>Statement introduced before Junos OS Release 7.4.</p> <p><b>bchannel-allocation</b> option added in Junos OS Release 8.3.</p>
<b>Description</b>	<p>For J Series Services Routers only. Specify the ISDN options for configuring ISDN interfaces for group and user sessions.</p> <p>The statements are explained separately.</p>
<b>Required Privilege Level</b>	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Configuring ISDN Physical Interface Properties on page 21</a></li> <li>• <i>Allocating B-Channels for Dialout</i></li> <li>• <i>Junos OS Interfaces and Routing Configuration Guide</i></li> </ul>

## load-interval

---

<b>Syntax</b>	<code>load-interval seconds;</code>
<b>Hierarchy Level</b>	[edit interfaces <i>dl</i> n unit <i>logical-unit-number</i> <a href="#">dialer-options</a> ], [edit logical-systems <i>logical-system-name</i> interfaces <i>dl</i> n unit <i>logical-unit-number</i> <a href="#">dialer-options</a> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	On J Series Services Routers with ISDN logical interfaces, specify the interval used to calculate the average load on the network. By default, the average interface load is calculated every 60 seconds.
<b>Options</b>	<b>seconds</b> —Number of seconds at which the average load calculation is triggered. <b>Range:</b> 20 through 180, in 10-second intervals <b>Default:</b> 60 seconds
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring ISDN Logical Interface Properties on page 22</a></li><li>• <i>Junos OS Interfaces and Routing Configuration Guide</i></li></ul>



## load-threshold

<b>Syntax</b>	<code>load-threshold <i>percent</i>;</code>
<b>Hierarchy Level</b>	[edit interfaces <i>dlr</i> unit <i>logical-unit-number</i> <a href="#">dialer-options</a> ], [edit logical-systems <i>logical-system-name</i> interfaces <i>dlr</i> unit <i>logical-unit-number</i> <a href="#">dialer-options</a> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	On J Series Services Routers with ISDN logical interfaces, specify the bandwidth threshold percentage used for adding interfaces. Another link is added to the multilink bundle when the load reaches the threshold value you set. Specify a percentage between 0 and 100.
<b>Options</b>	<p><b><i>percent</i></b>—Bandwidth threshold percentage used for adding interfaces. When set to 0, all available channels are dialed.</p> <p><b>Range:</b> 0 through 100 seconds</p> <p><b>Default:</b> 100 seconds</p>
<b>Required Privilege Level</b>	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Configuring Bandwidth on Demand on page 28</a></li> <li>• <i>Junos OS Interfaces and Routing Configuration Guide</i></li> </ul>

## mrru

---

<b>Syntax</b>	<code>mrru bytes;</code>
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> mlfr-uni-nni-bundle-options], [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> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	For multilink, link services, voice services, and J Series Services Routers ISDN interfaces only, set the maximum received reconstructed unit (MRRU). The MRRU is similar to the MTU, but is specific to multilink interfaces.
<b>Options</b>	<b>bytes</b> —MRRU size. <b>Range:</b> 1500 through 4500 bytes <b>Default:</b> 1500 bytes
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring the Dialer Interface on page 28</a></li><li>• <a href="#">mtu on page 99</a></li><li>• <i>Junos OS Services Interfaces Library for Routing Devices</i></li></ul>

## mtu

<b>Syntax</b>	<code>mtu bytes;</code>
<b>Hierarchy Level</b>	<p>[edit interfaces <i>interface-name</i>],</p> <p>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <b>family</b> <i>family</i>],</p> <p>[edit interfaces <i>interface-range name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <b>family</b> <i>family</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols l2circuit local-switching interface <i>interface-name</i> backup-neighbor <i>address</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols l2circuit neighbor <i>address</i> interface <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols l2circuit neighbor <i>address</i> interface <i>interface-name</i> backup-neighbor <i>address</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols l2vpn interface <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols vpls],</p> <p>[edit protocols l2circuit local-switching interface <i>interface-name</i> backup-neighbor <i>address</i>],</p> <p>[edit protocols l2circuit neighbor <i>address</i> interface <i>interface-name</i>],</p> <p>[edit protocols l2circuit neighbor <i>address</i> interface <i>interface-name</i> backup-neighbor <i>address</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols l2vpn interface <i>interface-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols l2vpn site <i>site-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols vpls]</p>
<b>Release Information</b>	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Support for Layer 2 VPNs and VPLS introduced in Junos OS Release 10.4.</p> <p>Statement introduced in Junos OS Release 12.1X48 for PTX Series Packet Transport Routers.</p> <p>Statement introduced in Junos OS Release 12.2 for ACX Series Universal Access Routers.</p> <p>Support at the [set interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <b>family</b> <i>ccc</i>] hierarchy level introduced in Junos OS Release 12.3R3 for MX Series routers.</p>
<b>Description</b>	<p>Specify the maximum transmission unit (MTU) size for the media or protocol. The default MTU size depends on the device type. Changing the media MTU or protocol MTU causes an interface to be deleted and added again.</p> <p>To route jumbo data packets on an integrated routing and bridging (IRB) interface or routed VLAN interface (RVI) on EX Series switches, you must configure the jumbo MTU size on the member physical interfaces of the VLAN that you have associated with the IRB interface or RVI, as well as on the IRB interface or RVI itself (the interface named <i>irb</i> or <i>vlan</i>, respectively).</p>



**CAUTION:** For EX Series switches, setting or deleting the jumbo MTU size on an IRB interface or RVI while the switch is transmitting packets might cause packets to be dropped.



---

**NOTE:**

The MTU for an IRB interface is calculated by removing the Ethernet header overhead [6(DMAC)+6(SMAC)+2(EtherType)]. Because, the MTU is the lower value of the MTU configured on the IRB interface and the MTU configured on the IRB's associated bridge domain IFDs or IFLs, the IRB MTU is calculated as follows:

- In case of Layer 2 IFL configured with the `flexible-vlan-tagging` statement, the IRB MTU is calculated by including 8 bytes overhead (SVLAN+CVLAN).
  - In case of Layer 2 IFL configured with the `vlan-tagging` statement, the IRB MTU is calculated by including a single VLAN 4 bytes overhead.
- 



---

**NOTE:**

- If a packet whose size is larger than the configured MTU size is received on the receiving interface, the packet is eventually dropped. The value considered for MRU (maximum receive unit) size is also the same as the MTU size configured on that interface.
  - Not all devices allow you to set an MTU value, and some devices have restrictions on the range of allowable MTU values. You cannot configure an MTU for management Ethernet interfaces (fxp0, em0, or me0) or for loopback, multilink, and multicast tunnel devices.
  - On ACX Series routers, you can configure the protocol MTU by including the `mtu` statement at the [edit interfaces *interface-name* unit *logical-unit-number* family inet] or [edit interfaces *interface-name* unit *logical-unit-number* family inet6] hierarchy level.
    - If you configure the protocol MTU at any of these hierarchy levels, the configured value is applied to all families that are configured on the logical interface.
    - If you are configuring the protocol MTU for both inet and inet6 families on the same logical interface, you must configure the same value for both the families. It is not recommended to configure different MTU size values for inet and inet6 families that are configured on the same logical interface.
- 

For more information about configuring MTU for specific interfaces and router or switch combinations, see *Configuring the Media MTU*.

<b>Options</b>	<p><b>bytes</b>—MTU size.</p> <p><b>Range:</b> 256 through 9192 bytes, 256 through 9216 (EX Series switch interfaces), 256 through 9500 bytes (Junos OS 12.1X48R2 for PTX Series routers)</p> <p><b>Default:</b> 1500 bytes (INET, INET6, and ISO families), 1448 bytes (MPLS), 1514 bytes (EX Series switch interfaces)</p>
<b>Required Privilege Level</b>	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <i>Configuring Gigabit Ethernet Interfaces (CLI Procedure)</i></li> <li>• <i>Configuring the Media MTU</i></li> <li>• <i>Configuring the MTU for Layer 2 Interfaces</i></li> <li>• <i>Setting the Protocol MTU</i></li> </ul>

## negotiate-address

<b>Syntax</b>	negotiate-address;
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <b>family</b> inet], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <b>family</b> inet]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	For interfaces with PPP encapsulation, enable the interface to be assigned an IP address by the remote end.
<b>Required Privilege Level</b>	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <i>Configuring IPCP Options</i></li> <li>• <i>address</i></li> <li>• <i>unnumbered-address (PPP)</i></li> <li>• <i>Junos OS Administration Library for Routing Devices</i></li> </ul>

## pool

---

Syntax	<code>pool <i>pool-name</i> &lt;priority <i>priority</i>&gt;;</code>
Hierarchy Level	[edit interfaces <i>br-pim/0/port</i> <a href="#">dialer-options</a> ], [edit interfaces <i>umd0</i> <a href="#">dialer-options</a> ], [edit interfaces <i>dlm</i> unit <i>logical-unit-number</i> <a href="#">dialer-options</a> ], [edit logical-systems <i>logical-system-name</i> interfaces <i>dlm</i> unit <i>logical-unit-number</i> <a href="#">dialer-options</a> ]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	On J Series Services Routers, for logical and physical ISDN interfaces, specify the dial pool. The dial pool allows logical (dialer) and physical ( <b><i>br-pim/0/port</i></b> ) interfaces to be bound together dynamically on a per-call basis. On a dialer interface, <b>pool</b> directs the dialer interface which dial pool to use. On <b><i>br-pim/0/port</i></b> interface, <b>pool</b> defines the pool to which the interface belongs.
Options	<b><i>pool-name</i></b> —Pool identifier.  <b><i>priority priority</i></b> —(Physical <b><i>br-pim/0/port</i></b> interfaces only) Specify a priority value of 0 (lowest) to 255 (highest) for the interface within the pool.
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"><li>• <a href="#">Configuring ISDN Physical Interface Properties on page 21</a></li><li>• <i>Junos OS Interfaces and Routing Configuration Guide</i></li></ul>

## ppp-options

**Syntax**

```
ppp-options {
  authentication [ authentication-protocols ];
  chap {
    access-profile name;
    challenge-length minimum minimum-length maximum maximum-length;
    default-chap-secret name;
    local-name name;
    passive;
  }
  compression {
    acfc;
    pfc;
  }
  dynamic-profile profile-name;
  initiate-ncp (ip | ipv6 | dual-stack-passive)
  lcp-max-conf-req number
  lcp-restart-timer milliseconds;
  loopback-clear-timer seconds;
  ncp-max-conf-req number
  ncp-restart-timer milliseconds;
  on-demand-ip-address
  pap {
    access-profile name;
    default-pap-password password;
    local-name name;
    local-password password;
    passive;
  }
}
```

**Hierarchy Level** [edit interfaces *interface-name*],  
[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** On interfaces with PPP encapsulation, configure PPP-specific interface properties.

For ATM2 IQ interfaces only, you can configure CHAP on the logical interface unit if the logical interface is configured with one of the following PPP over ATM encapsulation types:

- **atm-ppp-llc**—PPP over AAL5 LLC encapsulation.
- **atm-ppp-vc-mux**—PPP over AAL5 multiplex encapsulation.



**BEST PRACTICE:** On inline service (si) interfaces for L2TP, only the chap and pap statements are typically used for subscriber management. We recommend that you leave the other statements subordinate to

**ppp-options**—including those subordinate to **chap** and **pap**—at their default values.

.....  
The remaining statements are explained separately.

<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Configuring the PPP Challenge Handshake Authentication Protocol</i></li><li>• <i>Applying PPP Attributes to L2TP LNS Subscribers Per Inline Service Interface</i></li></ul>

---

## redial-delay

<b>Syntax</b>	<code>redial-delay time;</code>
<b>Hierarchy Level</b>	[edit interfaces <i>dl</i> n unit <i>logical-unit-number</i> <b>dialer-options</b> ], [edit logical-systems <i>logical-system-name</i> interfaces <i>dl</i> n unit <i>logical-unit-number</i> <b>dialer-options</b> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 7.5.
<b>Description</b>	<p>On J Series Services Routers with interfaces configured for ISDN with dialout, specify the delay (in seconds) between two successive calls made by the dialer. To configure callback mode, include the <b>callback</b> statement at the [edit interfaces <i>dl</i>n unit <i>logical-unit-number</i> <b>dialer-options</b>] hierarchy level.</p> <p>If the <b>callback</b> statement is configured, you cannot use the <b>caller caller-id</b> statement at the [edit interfaces <i>dl</i>n unit <i>logical-unit-number</i> <b>dialer-options</b>] hierarchy level.</p>
<b>Options</b>	<p><b>time</b>—Delay (in seconds) between two successive calls.</p> <p><b>Range:</b> 2 through 255 seconds</p> <p><b>Default:</b> 3 seconds</p>
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">ISDN Interfaces Overview on page 17</a></li><li>• <i>Junos OS Interfaces and Routing Configuration Guide</i></li></ul>



## spid1

---

<b>Syntax</b>	<code>spid1 <i>spid1-string</i>;</code>
<b>Hierarchy Level</b>	[edit interfaces <i>br-pim</i> /0/ <i>port isdn-options</i> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	Configure the Service Profile Identifier (SPID).
<b>Options</b>	<i>spid1-string</i> —Numeric SPID.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Configuring ISDN Physical Interface Properties on page 21</a></li> <li>• <i>Junos OS Interfaces and Routing Configuration Guide</i></li> </ul>

## spid2

---

<b>Syntax</b>	<code>spid2 <i>spid2-string</i>;</code>
<b>Hierarchy Level</b>	[edit interfaces <i>br-pim</i> /0/ <i>port isdn-options</i> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	Configure an additional SPID.
<b>Options</b>	<i>spid2-string</i> —Numeric SPID.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Configuring ISDN Physical Interface Properties on page 21</a></li> <li>• <i>J Series Services Router Configuration Guide</i></li> </ul>

## static-tei-val

---

<b>Syntax</b>	<code>static-tei-val value;</code>
<b>Hierarchy Level</b>	[edit interfaces <i>br-pim</i> /0/port <a href="#">isdn-options</a> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	For J Series Services Routers only. Statically configure the Terminal Endpoint Identifier (TEI) value. The TEI value represents any ISDN-capable device attached to an ISDN network that is the terminal endpoint. TEIs are used to distinguish between several different devices using the same ISDN links.
<b>Options</b>	<b>value</b> —Value between 0 through 63.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring ISDN Physical Interface Properties on page 21</a></li><li>• <i>Junos OS Interfaces and Routing Configuration Guide</i></li></ul>

## switch-type

---

<b>Syntax</b>	<code>switch-type (att5e   etsi   ni1   ntdms-100)</code>
<b>Hierarchy Level</b>	[edit interfaces <i>br-pim</i> /0/port <a href="#">isdn-options</a> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	For J Series Services Routers only. Configure the ISDN variant supported.
<b>Options</b>	<b>att5e</b> —AT&T switch variant.  <b>etsi</b> —European Telecommunications Standards Institute switch variant.  <b>ni1</b> —National ISDN 1 switch variant.  <b>ntdms-100</b> —Northern Telecom DMS-100.  <b>ntt</b> —NTT Group switch for Japan.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">ISDN Interfaces Overview on page 17</a></li><li>• <i>Junos OS Interfaces and Routing Configuration Guide</i></li></ul>

## t310

<b>Syntax</b>	t310-value <i>seconds</i> ;
<b>Hierarchy Level</b>	[edit interfaces <i>br-pim/0/port isdn-options</i> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	For ISDN interfaces, configure the Q.931-specific timer for T310, in seconds. The Q.931 protocol is involved in the setup and termination of connections.
<b>Options</b>	<p><b>seconds</b>—Timer value, in seconds.</p> <p><b>Range:</b> 1 through 65,536 seconds</p> <p><b>Default:</b> 10 seconds</p>
<b>Required Privilege Level</b>	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Configuring ISDN Physical Interface Properties on page 21</a></li> <li>• <i>Junos OS Interfaces and Routing Configuration Guide</i></li> </ul>

## tei-option

<b>Syntax</b>	tei-option (first-call   power-up);
<b>Hierarchy Level</b>	[edit interfaces <i>br-pim/0/port isdn-options</i> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	For ISDN interfaces, configure when the Terminal Endpoint Identifier (TEI) negotiates with the ISDN provider.
<b>Options</b>	<p><b>first-call</b>—Activation does not occur until the call setup is sent.</p> <p><b>power-up</b>—Activation occurs when the Services Router is powered on.</p> <p><b>Default:</b> power-up</p>
<b>Required Privilege Level</b>	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Configuring ISDN Physical Interface Properties on page 21</a></li> <li>• <i>Junos OS Interfaces and Routing Configuration Guide</i></li> </ul>

## watch-list

---

<b>Syntax</b>	<code>watch-list {     [ <i>routes</i> ]; }</code>
<b>Hierarchy Level</b>	[edit interfaces <i>dl</i> unit <i>logical-unit-number</i> <b>dialer-options</b> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	On J Series Services Routers with ISDN interfaces, configure an ISDN list of routes to watch. Used only for dialer watch.
<b>Options</b>	<b>routes</b> —IP prefix of a route. Specify one or more. The primary interface is considered up if there is at least one valid route for any of the addresses in the watch list to an interface other than the backup interface.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring Dialer Watch on page 33</a></li><li>• <i>Junos OS Interfaces and Routing Configuration Guide</i></li></ul>

## CHAPTER 5

# Operational Commands

- clear isdn q921 statistics
- clear isdn q931 statistics
- show dialer defaults
- show dialer interfaces
- show dialer pools
- show interfaces (ISDN B-Channel)
- show interfaces (ISDN BRI)
- show interfaces (ISDN D-channel)
- show interfaces (ISDN Dialer)
- show isdn calls
- show isdn history
- show isdn q921 statistics
- show isdn q931 statistics
- show isdn status

## clear isdn q921 statistics

---

<b>Syntax</b>	clear isdn q921 statistics <br-pim/0/port>
<b>Release Information</b>	Command introduced before Junos OS Release 7.4.
<b>Description</b>	(J Series routers only) Clear ISDN Layer 2 statistics based on the Q.921 standard.
<b>Options</b>	<b>none</b> —Clear ISDN Q.921 statistics for all Basic Rate Interface (BRI) interfaces. <b>br-pim/0/port</b> —(Optional) Clear ISDN Q.921 statistics for the specified BRI interface only.
<b>Required Privilege Level</b>	view
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">show isdn q921 statistics on page 146</a></li></ul>
<b>List of Sample Output</b>	<a href="#">clear isdn q921 statistics on page 110</a>
<b>Output Fields</b>	When you enter this command, you are provided feedback on the status of your request.

## Sample Output

### clear isdn q921 statistics

```
user@host> clear isdn q921 statistics
```

## clear isdn q931 statistics

---

<b>Syntax</b>	clear isdn q931 statistics <br-pim/0/port>
<b>Release Information</b>	Command introduced before Junos OS Release 7.4.
<b>Description</b>	(J Series routers only) Clear ISDN Layer 3 statistics based on the Q.931 standard.
<b>Options</b>	<b>none</b> —Clear ISDN Q.931 statistics for all Basic Rate Interface (BRI) interfaces. <b>br-pim/0/port</b> —(Optional) Clear ISDN Q.931 statistics for the specified BRI interface only.
<b>Required Privilege Level</b>	view
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">show isdn q931 statistics on page 148</a></li></ul>
<b>List of Sample Output</b>	<a href="#">clear isdn q931 statistics on page 111</a>
<b>Output Fields</b>	When you enter this command, you are provided feedback on the status of your request.

## Sample Output

### clear isdn q931 statistics

```
user@host> clear isdn q931 statistics
```

## show dialer defaults

<b>Syntax</b>	show dialer defaults
<b>Release Information</b>	Command introduced before Junos OS Release 7.4.
<b>Description</b>	(J Series routers only) Display ISDN services default software values.
<b>Options</b>	This command has no options.
<b>Required Privilege Level</b>	view
<b>List of Sample Output</b>	<a href="#">show dialer defaults on page 113</a>
<b>Output Fields</b>	<a href="#">Table 5 on page 112</a> lists the output fields for the <b>show dialer defaults</b> command. Output fields are listed in the approximate order in which they appear.

**Table 5: show dialer defaults Output Fields**

Field Name	Field Description
Idle timeout	Length of time (in seconds) that a connection can be idle before disconnecting.
Activation delay	Length of time (in seconds) to wait before enabling the interface after the primary interface has failed.
Deactivation delay	Length of time (in seconds) to wait before disabling the interface after the primary interface is operational.
Dialer watch initial route check time	Length of time (in seconds) before a route is checked for status.
Dialer pool priority	Priority of the dialer interface.
Dialer load threshold	Bandwidth threshold percentage used for adding interfaces. Another link is added to the multilink bundle when the bandwidth reaches the threshold value you set. The range of values is 0 through 100. When the value is set to 0, all available channels are dialed. The default value is 100.
Dialer load interval	Interval used to calculate the average load on the network. The range of values, in seconds, is 20 through 180, configurable in intervals of 10 seconds. The default value is 60.
Dialer redial delay	Delay, in seconds, between two successive calls made by the dialer (for dialout). The default value is 3 seconds.
Dialer callback wait period	For interfaces configured for ISDN with callback, the amount of time the dialer waits before calling back the caller. The default value is 5 seconds.



## Sample Output

### show dialer defaults

```
user@host> show dialer defaults
Dialer services related defaults :
  Idle timeout: 120 seconds
  Activation delay: 0 seconds
  Deactivation delay: 0 seconds
  Dialer watch initial route check time: 120 seconds
  Dialer pool priority: 0 seconds
  Dialer load threshold: 100%
  Dialer load interval: 60 seconds
  Dialer redial delay: 3 seconds
  Dialer callback wait period : 5 seconds
```

## show dialer interfaces

<b>Syntax</b>	<code>show dialer interfaces</code> <code>&lt;brief   detail&gt;</code> <code>&lt;dlnumber&gt;</code>
<b>Release Information</b>	Command introduced before Junos OS Release 7.4.
<b>Description</b>	(J Series routers only) Display ISDN dialer interface information.
<b>Options</b>	<p><b>none</b>—(Same as detail) Display detailed information about all ISDN dialer interfaces.</p> <p><b>brief   detail</b>—(Optional) Display the specified level of output.</p> <p><b>dlnumber</b>—(Optional) Display information about the specified dialer interface only.</p>
<b>Required Privilege Level</b>	view
<b>List of Sample Output</b>	<a href="#">show dialer interfaces on page 115</a> <a href="#">show dialer interfaces brief on page 115</a> <a href="#">show dialer interfaces detail on page 115</a>
<b>Output Fields</b>	Table 6 on page 114 lists the output fields for the <b>show dialer interfaces</b> command. Output fields are listed in the approximate order in which they appear.

Table 6: show dialer interfaces Output Fields

Field Name	Field Description	Level of Output
<i>Interface-name</i>	Dialer interface name.	All levels
<b>State</b>	State of the interface: <b>Active</b> or <b>Inactive</b>	All levels
<b>Dial pool</b>	Dial pool name.	All levels
<b>Dial strings</b>	Dialing number for the ISDN connection.	<b>detail none</b>
<b>Subordinate interfaces</b>	Associated B-channel or USB modem interface name and SNMP index number.	All levels
<b>Activation delay</b>	Length of time (in seconds) to wait before enabling the interface after the primary interface has failed.	<b>detail none</b>
<b>Deactivation delay</b>	Length of time (in seconds) to wait before disabling the interface after the primary interface is operational.	<b>detail none</b>
<b>Initial route check delay</b>	Wait period (in seconds) for the software to check if the primary interface is up after the router comes up. The range is from 1 through 300 seconds. The default is 120 seconds.	<b>detail none</b>

Table 6: show dialer interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Redial delay</b>	(Available on interfaces configured for ISDN dial-out.) Delay, in seconds, between two successive calls made. The range is from <b>2</b> to <b>255</b> . The default value is <b>3</b> .	<b>detail none</b>
<b>Callback wait period</b>	Time, in seconds, that the dialer waits before it calls back the caller ID. The default value is <b>5</b> .	<b>detail none</b>
<b>Load threshold</b>	Bandwidth threshold percentage used for adding interfaces. Another link is added to the multilink bundle when the load reaches the threshold value you set. The range of values is from <b>0</b> to <b>100</b> . The default value is <b>100</b> .	<b>detail none</b>
<b>Load interval</b>	Interval used to calculate the average load on the network. By default, the average interface load is calculated every 60 seconds.	<b>detail none</b>

## Sample Output

### show dialer interfaces

```

user@host> show dialer interfaces
d10.0
  State: Active
  Dial Pool: 10
  Dial strings: 5551212
  Subordinate interfaces: bc-4/0/0:1 (Index 151)
  Activation delay: 0, Deactivation delay: 0
  Initial route check delay: 120
  Redial delay: 3
  Callback wait period: 5
  Load threshold: 0, Load interval: 60

```

### show dialer interfaces brief

```

user@host> show dialer interfaces brief
d10.0
  State: Active
  Dial Pool: 10
  Subordinate interfaces: bc-4/0/0:1

```

### show dialer interfaces detail

The output for the **show dialer interfaces detail** command is identical to that for the **show dialer interfaces** command. For sample output, see [show dialer interfaces on page 115](#).

## show dialer pools

<b>Syntax</b>	show dialer pools <brief   detail> <pool-name>
<b>Release Information</b>	Command introduced before Junos OS Release 7.4.
<b>Description</b>	(J Series routers only) Display dialer pool information. The dialer pool provides a group of dialing options for ISDN interfaces.
<b>Options</b>	<p><b>none</b>—(Same as detail) Display detailed information about all ISDN dialer pools.</p> <p><b>brief   detail</b>—(Optional) Display the specified level of output.</p> <p><b>pool-name</b>—(Optional) Display information about the specified dialer pool only.</p>
<b>Required Privilege Level</b>	view
<b>List of Sample Output</b>	<a href="#">show dialer pools on page 117</a> <a href="#">show dialer pools brief on page 117</a> <a href="#">show dialer pools detail on page 117</a>
<b>Output Fields</b>	Table 7 on page 116 lists the output fields for the <b>show dialer pools</b> command. Output fields are listed in the approximate order in which they appear.

Table 7: show dialer pools Output Fields

Field Name	Field Description	Level of Output
<b>Pool</b>	Name of the dialer pool.	All levels
<b>Dialer Interfaces</b>		
<b>Name</b>	Name of configured dialer interfaces.	All levels
<b>State</b>	Status of the dialer interface: <b>Active</b> or <b>Inactive</b>	All levels
<b>Subordinate Interfaces</b>		
<b>Name</b>	Name of each physical ISDN interface configured as part of the dialer interface.	All levels
<b>Flags</b>	Status of the physical B-channel interface.	All levels
<b>Priority</b>	Priority of the interface.	All levels

## Sample Output

### show dialer pools

```
user@host> show dialer pools
Pool: 10
Dialer interfaces:   Name      State
                    d10.0    Active
Subordinate interfaces: Name      Flags      Priority
                    bc-4/0/0:1  Active     0
                    bc-4/0/0:2  Inactive   0
```

### show dialer pools brief

```
user@host> show dialer pools brief
Pool      Dialer interface      Subordinate interface
Name      State                  Name      Flags      Priority
10        d10.0 Active                bc-4/0/0:1 Active     0
                    bc-4/0/0:2 Inactive   0
```

### show dialer pools detail

The output for the **show dialer pools detail** command is identical to that for the **show dialer pools** command.

## show interfaces (ISDN B-Channel)

<b>Syntax</b>	<pre>show interfaces bc-pim/0/port:channel &lt;brief   detail   extensive   terse&gt; &lt;descriptions&gt; &lt;media&gt; &lt;snmp-index snmp-index&gt; &lt;statistics&gt;</pre>
<b>Release Information</b>	Command introduced before Junos OS Release 7.4.
<b>Description</b>	(J Series routers only) Display information about the specified ISDN B-channel interface.
<b>Options</b>	<p><b>bc-pim/0/port:channel</b>—Display standard information about the specified ISDN B-channel interface.</p> <p><b>brief   detail   extensive   terse</b>—(Optional) Display the specified level of output.</p> <p><b>descriptions</b>—(Optional) Display the interface description string.</p> <p><b>media</b>—(Optional) Display media-specific information.</p> <p><b>snmp-index snmp-index</b>—(Optional) Display information for the specified SNMP index of the interface.</p> <p><b>statistics</b>—(Optional) Display static interface statistics.</p>
<b>Additional Information</b>	There are no user-configurable fields on B-channel interfaces.
<b>Required Privilege Level</b>	view
<b>List of Sample Output</b>	<a href="#">show interfaces (ISDN B-Channel) on page 121</a> <a href="#">show interfaces brief (ISDN B-Channel) on page 122</a> <a href="#">show interfaces detail (ISDN B-Channel) on page 122</a> <a href="#">show interfaces extensive (ISDN B-Channel) on page 122</a>
<b>Output Fields</b>	<a href="#">Table 8 on page 118</a> lists the output fields for the <b>show interfaces</b> (ISDN B-channel) command. Output fields are listed in the approximate order in which they appear.

**Table 8: ISDN B-Channel show interfaces Output Fields**

Field Name	Field Description	Level of Output
<b>Physical Interface</b>	Name of the physical interface type.	All levels
<b>Enabled</b>	State of the interface. Possible values are described in the “Enabled Fiel” section under <i>Common Output Fields Description</i> .	All levels
<b>Interface index</b>	Physical interface's index number, which reflects its initialization sequence.	<b>detail extensive none</b>
<b>SNMP ifIndex</b>	SNMP index number for the physical interface.	<b>detail extensive none</b>

Table 8: ISDN B-Channel show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Generation</b>	Unique number for use by Juniper Networks technical support only.	<b>detail extensive</b>
<b>Type</b>	Type of interface.	All levels
<b>Link-level type</b>	Encapsulation used on the physical interface.	All levels
<b>MTU</b>	Maximum transmission unit (MTU)—Size of the largest packet to be transmitted.	All levels
<b>Clocking</b>	Reference clock source of the interface.	All levels
<b>Speed</b>	Network speed on the interface.	All levels
<b>Parent</b>	Name and interface index of the interface to which a particular child interface belongs. <b>None</b> indicates that this is the top level.	<b>detail extensive none</b>
<b>Device flags</b>	Information about the physical device. Possible values are described in the “Device Flags” section under <i>Common Output Fields Description</i> .	All levels
<b>Interface flags</b>	Information about the interface. Possible values are described in the “Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
<b>Link type</b>	Data transmission type.	<b>detail extensive none</b>
<b>Link flags</b>	Information about the link. Possible values are described in the “Link Flags” section under <i>Common Output Fields Description</i> .	<b>detail extensive</b>
<b>Physical info</b>	Information about the physical interface.	<b>detail extensive</b>
<b>Hold-times</b>	Current interface hold-time up and hold-time down. Value is in milliseconds.	<b>detail extensive</b>
<b>Current address</b>	Configured media access control (MAC) address.	<b>detail extensive</b>
<b>Hardware address</b>	MAC address of the hardware.	<b>detail extensive</b>
<b>Alternate link address</b>	Backup address of the link.	<b>detail extensive</b>
<b>CoS queues</b>	Number of class-of-service (CoS) queues configured.	<b>detail extensive none</b>
<b>Last flapped</b>	Date, time, and length of time since the interface changed its status from down to up.	<b>detail extensive none</b>
<b>Input rate</b>	Input rate in bits per second (bps) and packets per second (pps).	none specified
<b>Output rate</b>	Output rate in bps and pps.	none specified
<b>Statistics last cleared</b>	Time when the interface statistics were last set to zero.	<b>detail extensive</b>

Table 8: ISDN B-Channel show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Traffic statistics</b>	<p>Number and rate of bytes and packets received and transmitted on the logical and physical interface.</p> <ul style="list-style-type: none"> <li>• <b>Input bytes</b>—Number of bytes received on the interface.</li> <li>• <b>Output bytes</b>—Number of bytes transmitted on the interface.</li> <li>• <b>Input packets</b>—Number of packets received on the interface.</li> <li>• <b>Output packets</b>—Number of packets transmitted on the interface.</li> </ul>	<b>detail extensive</b>
<b>Input errors</b>	<ul style="list-style-type: none"> <li>• <b>Errors</b>—Input errors on the interface.</li> <li>• <b>Drops</b>—Number of packets dropped by the output queue of the I/O Manager ASIC.</li> <li>• <b>Framing errors</b>—Number of packets received with an invalid frame checksum (FCS).</li> <li>• <b>Runts</b>—Frames received smaller than the runt threshold.</li> <li>• <b>Giants</b>—Frames received larger than the giant threshold.</li> <li>• <b>Policed discards</b>—Frames that the incoming packet match code discarded because they were not recognized or were not of interest. Usually, this field reports protocols that the Junos OS does not support.</li> <li>• <b>Resource errors</b>—Sum of transmit drops.</li> </ul>	<b>extensive</b>
<b>Output errors</b>	<ul style="list-style-type: none"> <li>• <b>Carrier transitions</b>—Number of times the interface has gone from <b>down</b> to <b>up</b>. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly, possibly once every 10 seconds, the cable, the remote system, or the interface is malfunctioning.</li> <li>• <b>Errors</b>—Sum of outgoing frame aborts and FCS errors.</li> <li>• <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 dropped by the ASIC RED mechanism.</li> <li>• <b>MTU errors</b>—Number of packets larger than the MTU threshold.</li> <li>• <b>Resource errors</b>—Sum of transmit drops.</li> </ul>	<b>extensive</b>
<b>Queue counters</b>	<p>CoS queue number and its associated user-configured forwarding class name.</p> <ul style="list-style-type: none"> <li>• <b>Queued packets</b>—Number of queued packets.</li> <li>• <b>Transmitted packets</b>—Number of transmitted packets.</li> <li>• <b>Dropped packets</b>—Number of packets dropped by the ASIC's RED mechanism.</li> </ul>	<b>detail extensive</b>
<b>Packet Forwarding Engine configuration</b>	<p>Information about the configuration of the Packet Forwarding Engine:</p> <ul style="list-style-type: none"> <li>• <b>Destination slot</b>—FPC slot number.</li> <li>• <b>PLP byte</b>—Packet Level Protocol byte.</li> </ul>	<b>extensive</b>



Table 8: ISDN B-Channel show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>CoS information</b>	Information about the CoS queue for the physical interface. <ul style="list-style-type: none"> <li>• <b>CoS transmit queue</b>—Queue number and its associated user-configured forwarding class name.</li> <li>• <b>Bandwidth %</b>—Percentage of bandwidth allocated to the queue.</li> <li>• <b>Bandwidth bps</b>—Bandwidth allocated to the queue (in bps).</li> <li>• <b>Buffer %</b>—Percentage of buffer space allocated to the queue.</li> <li>• <b>Buffer usec</b>—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time.</li> <li>• <b>Priority</b>—Queue priority: <b>low</b> or <b>high</b>.</li> <li>• <b>Limit</b>—Displayed if rate limiting is configured for the queue. Possible values are <b>none</b> and <b>exact</b>. If <b>exact</b> is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If <b>none</b> is configured, the queue transmits beyond the configured bandwidth if bandwidth is available.</li> </ul>	<b>extensive</b>
<b>Logical Interface</b>		
<b>Logical interface</b>	Name of the logical interface.	All levels
<b>Index</b>	Index number of the logical interface (which reflects its initialization sequence).	<b>detail extensive none</b>
<b>SNMP ifIndex</b>	SNMP interface index number for the logical interface.	<b>detail extensive none</b>
<b>Generation</b>	Unique number for use by Juniper Networks technical support only.	<b>detail extensive</b>
<b>Flags</b>	Information about the logical interface. Possible values are described in the “Logical Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
<b>Encapsulation</b>	Encapsulation on the logical interface.	All levels

## Sample Output

### show interfaces (ISDN B-Channel)

```

user@host> show interfaces bc-4/0/0:1
Physical interface: bc-4/0/0:1, Enabled, Physical link is Up
  Interface index: 151, SNMP ifIndex: 75
  Type: Serial, Link-level type: 57, MTU: 4092, Clocking: Internal,
  Speed: 64kbps,
  Parent: br-4/0/0 Interface index 129
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Link type      : Full-Duplex
  Link flags     : None
  CoS queues     : 8 supported, 8 maximum usable queues
  Last flapped   : 2006-06-13 19:50:38 PDT (14:39:03 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)

```

Logical interface bc-4/0/0:1.0 (Index 74) (SNMP ifIndex 79)  
 Flags: Point-To-Point SNMP-Traps Encapsulation: 64

#### show interfaces brief (ISDN B-Channel)

```
user@host> show interfaces bc-4/0/0:1 brief
Physical interface: bc-4/0/0:1, Enabled, Physical link is Up
  Type: Serial, Link-level type: 57, MTU: 4092, Clocking: Internal,
  Speed: 64kbps
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000

Logical interface bc-4/0/0:1.0
  Flags: Point-To-Point SNMP-Traps Encapsulation: 64
```

#### show interfaces detail (ISDN B-Channel)

```
user@host> show interfaces bc-4/0/0:1 detail
Physical interface: bc-4/0/0:1, Enabled, Physical link is Up
  Interface index: 151, SNMP ifIndex: 75, Generation: 152
  Type: Serial, Link-level type: 57, MTU: 4092, Clocking: Internal,
  Speed: 64kbps,
  Parent: br-4/0/0 Interface index 129
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Link type      : Full-Duplex
  Link flags     : None
  Physical info  : Unspecified
  Hold-times    : Up 0 ms, Down 0 ms
  Current address: Unspecified, Hardware address: Unspecified
  Alternate link address: Unspecified
  CoS queues    : 8 supported, 8 maximum usable queues
  Last flapped  : 2006-06-13 19:50:38 PDT (14:39:06 ago)
  Statistics last cleared: Never
Traffic statistics:
  Input bytes   :          4096          0 bps
  Output bytes  :        128423         96 bps
  Input packets :           0          0 pps
  Output packets:         9801         0 pps
Egress queues: 8 supported, 8 in use
Queue counters:      Queued packets  Transmitted packets    Dropped packets

  0 best-effort          13             13             0
  1 expedited-fo          0             0             0
  2 assured-forw          0             0             0
  3 network-cont       9788           9788             0

Logical interface bc-4/0/0:1.0 (Index 74) (SNMP ifIndex 79) (Generation 140)
  Flags: Point-To-Point SNMP-Traps Encapsulation: 64
```

#### show interfaces extensive (ISDN B-Channel)

```
user@host> show interfaces bc-4/0/0:1 extensive
Physical interface: bc-4/0/0:1, Enabled, Physical link is Up
  Interface index: 151, SNMP ifIndex: 75, Generation: 152
  Type: Serial, Link-level type: 57, MTU: 4092, Clocking: Internal,
  Speed: 64kbps,
```

```

Parent: br-4/0/0 Interface index 129
Device flags   : Present Running
Interface flags: SNMP-Traps Internal: 0x4000
Link type      : Full-Duplex
Link flags     : None
Physical info  : Unspecified
Hold-times     : Up 0 ms, Down 0 ms
Current address: Unspecified, Hardware address: Unspecified
Alternate link address: Unspecified
CoS queues     : 8 supported, 8 maximum usable queues
Last flapped   : 2006-06-13 19:50:38 PDT (14:39:12 ago)
Statistics last cleared: Never
Traffic statistics:
Input bytes   :           4096           0 bps
Output bytes  :          128423           0 bps
Input packets :              0           0 pps
Output packets:            9801           0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Runt: 0, Giants: 0,
  Policed discards: 0, Resource errors: 0
Output errors:
  Carrier transitions: 4, Errors: 0, Drops: 0, MTU errors: 0,
  Resource errors: 0
Egress queues: 8 supported, 8 in use
Queue counters:      Queued packets  Transmitted packets      Dropped packets

  0 best-effort           13             13             0
  1 expedited-fo           0             0             0
  2 assured-forw           0             0             0
  3 network-cont        9788            9788             0

Packet Forwarding Engine configuration:
  Destination slot: 4, PLP byte: 1 (0x00)
CoS information:
  CoS transmit queue      Bandwidth      Buffer  Priority  Limit
                           %      bps      %      usec
  0 best-effort           95      60800  95       0        low  none
  3 network-control        5       3200   5        0        low  none
Logical interface bc-4/0/0:1.0 (Index 74) (SNMP ifIndex 79) (Generation 140)
  Flags: Point-To-Point SNMP-Traps Encapsulation: 64

```

## show interfaces (ISDN BRI)

<b>Syntax</b>	<pre>show interfaces br-pim/0/port &lt;brief   detail   extensive   terse&gt; &lt;descriptions&gt; &lt;media&gt; &lt;snmp-index snmp-index&gt; &lt;statistics&gt;</pre>
<b>Release Information</b>	Command introduced before Junos OS Release 7.4.
<b>Description</b>	(J Series routers only) Display status information about the specified ISDN Basic Rate Interface (BRI) interface.
<b>Options</b>	<p><b>br-pim/0/port</b>—Display standard information about the specified ISDN BRI interface.</p> <p><b>brief   detail   extensive   terse</b>—(Optional) Display the specified level of output.</p> <p><b>descriptions</b>—(Optional) Display the interface description string.</p> <p><b>media</b>—(Optional) Display media-specific information.</p> <p><b>snmp-index snmp-index</b>—(Optional) Display information for the specified SNMP index of the interface.</p> <p><b>statistics</b>—(Optional) Display static interface statistics.</p>
<b>Required Privilege Level</b>	view
<b>List of Sample Output</b>	<a href="#">show interfaces (ISDN BRI) on page 126</a> <a href="#">show interfaces brief (ISDN BRI) on page 127</a> <a href="#">show interfaces detail (ISDN BRI) on page 127</a> <a href="#">show interfaces extensive (ISDN BRI) on page 127</a>
<b>Output Fields</b>	Table 9 on page 124 lists the output fields for the <b>show interfaces (ISDN BRI)</b> command. Output fields are listed in the approximate order in which they appear.

Table 9: ISDN BRI show interfaces Output Fields

Field Name	Field Description	Level of Output
<b>Physical Interface</b>	Name of the physical interface type.	All levels
<b>Enabled</b>	State of the interface. Possible values are described in the “Enabled Field” section under <i>Common Output Fields Description</i> .	All levels
<b>Interface index</b>	Physical interface index number that reflects its initialization sequence.	<b>detail extensive none</b>
<b>SNMP ifIndex</b>	SNMP index number for the physical interface.	<b>detail extensive none</b>
<b>Generation</b>	Unique number for use by Juniper Networks technical support only.	<b>detail extensive</b>

Table 9: ISDN BRI show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Type</b>	Type of interface.	All levels
<b>Link-level type</b>	Encapsulation type used on the physical interface.	All levels
<b>MTU</b>	Maximum transmission unit (MTU)—Size of the largest packet to be transmitted.	All levels
<b>Clocking</b>	Reference clock source of the interface.	All levels
<b>Speed</b>	Network speed on the interface.	All levels
<b>Parent</b>	Name and interface index of the interface to which a particular child interface belongs. <b>None</b> indicates that this is the top level.	<b>detail extensive none</b>
<b>Device flags</b>	Information about the physical device. Possible values are described in the “Device Flags” section under <i>Common Output Fields Description</i> .	All levels
<b>Interface flags</b>	Information about the interface. Possible values are described in the “Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
<b>Link type</b>	Data transmission type.	<b>detail extensive none</b>
<b>Link flags</b>	Information about the link. Possible values are described in the “Link Flags” section under <i>Common Output Fields Description</i> .	<b>detail extensive none</b>
<b>Physical info</b>	Information about the physical interface.	<b>detail extensive none</b>
<b>Hold-times</b>	Current interface hold-time up and hold-time down. Value is in milliseconds.	<b>detail extensive</b>
<b>Current address</b>	Configured MAC address.	<b>detail extensive</b>
<b>Hardware address</b>	Media access control (MAC) address of the interface.	<b>detail extensive</b>
<b>Alternate link address</b>	Backup link address.	<b>detail extensive</b>
<b>Last flapped</b>	Date, time, and length of time since the interface changed its status from down to up.	<b>detail extensive none</b>
<b>Input rate</b>	Input rate in bits per second (bps) and packets per second (pps).	none specified
<b>Output rate</b>	Output rate in bps and pps.	none specified
<b>Statistics last cleared</b>	Time when the statistics for the interface were last set to zero.	<b>detail extensive</b>

Table 9: ISDN BRI show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Traffic statistics</b>	<p>Number and rate of bytes and packets received and transmitted on the logical and physical interface.</p> <ul style="list-style-type: none"> <li><b>Input bytes</b>—Number of bytes received on the interface.</li> <li><b>Output bytes</b>—Number of bytes transmitted on the interface.</li> <li><b>Input packets</b>—Number of packets received on the interface.</li> <li><b>Output packets</b>—Number of packets transmitted on the interface.</li> </ul>	<b>detail extensive</b>
<b>Input errors</b>	<ul style="list-style-type: none"> <li><b>Errors</b>—Input errors on the interface.</li> <li><b>Drops</b>—Number of packets dropped by the output queue of the I/O Manager ASIC.</li> <li><b>Framing errors</b>—Number of packets received with an invalid frame checksum (FCS).</li> <li><b>Runts</b>—Frames received smaller than the runt threshold.</li> <li><b>Giants</b>—Frames received larger than the giant threshold.</li> <li><b>Policed discards</b>—Frames that the incoming packet match code discarded because they were not recognized or were not of interest. Usually, this field reports protocols that the Junos OS does not support.</li> <li><b>Resource errors</b>—Sum of transmit drops.</li> </ul>	<b>extensive</b>
<b>Output errors</b>	<ul style="list-style-type: none"> <li><b>Carrier transitions</b>—Number of times the interface has gone from <b>down</b> to <b>up</b>. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly, possibly once every 10 seconds, the cable, the remote system, or the interface is malfunctioning.</li> <li><b>Errors</b>—Sum of outgoing frame aborts and FCS errors.</li> <li><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 dropped by the ASIC RED mechanism.</li> <li><b>MTU errors</b>—Number of packets larger than the MTU threshold.</li> <li><b>Resource errors</b>—Sum of transmit drops.</li> </ul>	<b>extensive</b>

## Sample Output

### show interfaces (ISDN BRI)

```

user@host> show interfaces br-4/0/0
Physical interface: br-4/0/0, Enabled, Physical link is Up
  Interface index: 129, SNMP ifIndex: 59
  Type: BRI, Link-level type: Controller, MTU: 4092, Clocking: 1,
  Speed: 128kbps, Parent: None
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link type      : Full-Duplex
  Link flags     : None
  Physical info  : S/T
  Last flapped   : 2006-06-13 19:50:38 PDT (15:18:26 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)

```

**show interfaces brief (ISDN BRI)**

```

user@host> show interfaces brief br-4/0/0
Physical interface: br-4/0/0, Enabled, Physical link is Up
  Type: BRI, Link-level type: Controller, MTU: 4092, Clocking: 1, Speed: 128kbps

Device flags      : Present Running
Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000

```

**show interfaces detail (ISDN BRI)**

```

user@host> show interfaces br-4/0/0 detail
Physical interface: br-4/0/0, Enabled, Physical link is Up
  Interface index: 129, SNMP ifIndex: 59, Generation: 130
  Type: BRI, Link-level type: Controller, MTU: 4092, Clocking: 1,
  Speed: 128kbps, Parent: None
  Device flags      : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link type         : Full-Duplex
  Link flags        : None
  Physical info     : S/T
  Hold-times        : Up 0 ms, Down 0 ms
  Last flapped      : 2006-06-13 19:50:38 PDT (15:18:32 ago)
  Statistics last cleared: Never
  Traffic statistics:
    Input bytes      :                0                0 bps
    Output bytes     :                0                0 bps
    Input packets    :                0                0 pps
    Output packets   :                0                0 pps

```

**show interfaces extensive (ISDN BRI)**

```

user@host> show interfaces br-4/0/0 extensive
Physical interface: br-4/0/0, Enabled, Physical link is Up
  Interface index: 129, SNMP ifIndex: 59, Generation: 130
  Type: BRI, Link-level type: Controller, MTU: 4092, Clocking: 1,
  Speed: 128kbps, Parent: None
  Device flags      : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link type         : Full-Duplex  Link flags      : None
  Physical info     : S/T
  Hold-times        : Up 0 ms, Down 0 ms
  Last flapped      : 2006-06-13 19:50:38 PDT (15:18:38 ago)
  Statistics last cleared: Never
  Traffic statistics:
    Input bytes      :                0                0 bps
    Output bytes     :                0                0 bps
    Input packets    :                0                0 pps
    Output packets   :                0                0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
    Policed discards: 0, Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, MTU errors: 0,
    Resource errors: 0

```

## show interfaces (ISDN D-channel)

<b>Syntax</b>	<pre>show interfaces dc-pim/0/port:0 &lt;brief   detail   extensive   terse&gt; &lt;descriptions&gt; &lt;media&gt; &lt;snmp-index <i>snmp-index</i>&gt; &lt;statistics&gt;</pre>
<b>Release Information</b>	Command introduced before Junos OS Release 7.4.
<b>Description</b>	(J Series routers only) Display information about the specified ISDN D-channel interface.
<b>Options</b>	<p><b>dc-pim/0/port:0</b>—Display standard information about the specified ISDN D-channel interface.</p> <p><b>brief   detail   extensive   terse</b>—(Optional) Display the specified level of output.</p> <p><b>descriptions</b>—(Optional) Display the interface description string.</p> <p><b>media</b>—(Optional) Display media-specific information.</p> <p><b>snmp-index <i>snmp-index</i></b>—(Optional) Display information for the specified SNMP index of the interface.</p> <p><b>statistics</b>—(Optional) Display static interface statistics.</p>
<b>Additional Information</b>	There are no user-configurable features on D-channel interfaces.
<b>Required Privilege Level</b>	view
<b>List of Sample Output</b>	<a href="#">show interfaces (ISDN D-Channel) on page 131</a> <a href="#">show interfaces brief (ISDN D-Channel) on page 131</a> <a href="#">show interfaces detail (ISDN D-Channel) on page 132</a> <a href="#">show interfaces extensive (ISDN D-Channel) on page 132</a>
<b>Output Fields</b>	<a href="#">Table 10 on page 128</a> lists the output fields for the <b>show interfaces</b> (ISDN D-channel) command. Output fields are listed in the approximate order in which they appear.

Table 10: ISDN D-Channel show interfaces Output Fields

Field Name	Field Description	Level of Output
<b>Physical Interface</b>		
<b>Physical Interface</b>	Name of the physical interface type.	All levels
<b>Enabled</b>	State of the interface. Possible values are described in the “Enabled Field” section under <i>Common Output Fields Description</i> .	All levels
<b>Interface index</b>	Physical interface index number that reflects its initialization sequence.	<b>detail extensive none</b>



Table 10: ISDN D-Channel show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>SNMP ifIndex</b>	SNMP index number for the physical interface.	<b>detail extensive none</b>
<b>Generation</b>	Unique number for use by Juniper Networks technical support only.	<b>detail extensive</b>
<b>Type</b>	Type of interface.	All levels
<b>Link-level type</b>	Encapsulation type used on the physical interface.	All levels
<b>MTU</b>	Maximum transmission unit—Size of the largest packet to be transmitted.	All levels
<b>Clocking</b>	Reference clock source of the interface.	All levels
<b>Speed</b>	Network speed on the interface.	All levels
<b>Parent</b>	Name and interface index of the interface to which a particular child interface belongs. None indicates that this is the top level.	<b>detail extensive none</b>
<b>Device flags</b>	Information about the physical device. Possible values are described in the “Device Flags” section under <i>Common Output Fields Description</i> .	All levels
<b>Interface flags</b>	Information about the interface. Possible values are described in the “Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
<b>Link type</b>	Type of data transmission.	<b>detail extensive none</b>
<b>Link flags</b>	Information about the link. Possible values are described in the “Link Flags” section under <i>Common Output Fields Description</i> .	<b>detail extensive none</b>
<b>Physical info</b>	Information about the physical interface.	<b>detail extensive</b>
<b>Hold-times</b>	Current interface hold-time up and hold-time down. Value is in milliseconds.	<b>detail extensive</b>
<b>Current address</b>	Configured MAC address.	<b>detail extensive</b>
<b>Hardware address</b>	MAC address of the hardware.	<b>detail extensive</b>
<b>Alternate link address</b>	Backup address for the link.	<b>detail extensive</b>
<b>Last flapped</b>	Date, time, and length of time since the interface changed its status from down to up.	<b>detail extensive none</b>
<b>Input rate</b>	Input rate in bits per second (bps) and packets per second (pps).	none specified
<b>Output rate</b>	Output rate in bps and pps.	none specified
<b>Statistics last cleared</b>	Time when the statistics for the interface were last set to zero.	<b>detail extensive</b>

Table 10: ISDN D-Channel show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Traffic statistics</b>	Number and rate of bytes and packets received and transmitted on the physical interface. <ul style="list-style-type: none"> <li><b>Input bytes</b>—Number of bytes received on the interface.</li> <li><b>Output bytes</b>—Number of bytes transmitted on the interface.</li> <li><b>Input packets</b>—Number of packets received on the interface.</li> <li><b>Output packets</b>—Number of packets transmitted on the interface.</li> </ul>	<b>detail extensive</b>
<b>Input errors</b>	<ul style="list-style-type: none"> <li><b>Errors</b>—Input errors on the interface.</li> <li><b>Drops</b>—Number of packets dropped by the output queue of the I/O Manager ASIC.</li> <li><b>Framing errors</b>—Number of packets received with an invalid frame checksum (FCS).</li> <li><b>Runts</b>—Frames received smaller than the runt threshold.</li> <li><b>Giants</b>—Frames received larger than the giant threshold.</li> <li><b>Policed Discards</b>—Frames that the incoming packet match code discarded because they were not recognized or were not of interest. Usually, this field reports protocols that Junos does not support.</li> <li><b>Resource errors</b>—Sum of transmit drops.</li> </ul>	<b>extensive</b>
<b>Output errors</b>	<ul style="list-style-type: none"> <li><b>Carrier transitions</b> —Number of times the interface has gone from <b>down</b> to <b>up</b>. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly, possibly once every 10 seconds, the cable, the remote system, or the interface is malfunctioning.</li> <li><b>Errors</b>—Sum of outgoing frame aborts and FCS errors.</li> <li><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 dropped by the ASIC Red mechanism.</li> <li><b>MTU errors</b>—Number of packets larger than the MTU threshold.</li> <li><b>Resource errors</b>—Sum of transmit drops.</li> </ul>	<b>extensive</b>
<b>ISDN Alarms</b>	ISDN alarms.	All levels
<b>ISDN Media</b>	<ul style="list-style-type: none"> <li><b>LOF</b>—Loss of frame</li> <li><b>LOS</b>—Loss of signal</li> </ul>	<b>extensive</b>
<b>Logical Interface</b>		
<b>Logical interface</b>	Name of the logical interface.	All levels
<b>Index</b>	Index number of the logical interface (which reflects its initialization sequence).	<b>detail extensive none</b>
<b>SNMP ifIndex</b>	SNMP interface index number for the logical interface.	<b>detail extensive none</b>
<b>Generation</b>	Unique number for use by Juniper Networks technical support only.	<b>detail extensive</b>
<b>Flags</b>	Information about the logical interface. Possible values are described in the "Logical Interface Flags" section under <i>Common Output Fields Description</i> .	All levels

Table 10: ISDN D-Channel show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Encapsulation</b>	Encapsulation on the logical interface.	All levels
<b>Input packets</b>	Number of packets received on the logical interface.	None specified
<b>Output packets</b>	Number of packets transmitted on the logical interface.	None specified
<b>Traffic statistics</b>	<p>Total number of bytes and packets received and transmitted on the logical interface. These statistics are the sum of the local and transit statistics. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.</p> <ul style="list-style-type: none"> <li>• <b>Input bytes</b>—Number of bytes received on the interface.</li> <li>• <b>Output bytes</b>—Number of bytes transmitted on the interface.</li> <li>• <b>Input packets</b>—Number of packets received on the logical interface.</li> <li>• <b>Output packets</b>—Number of packets transmitted on the logical interface</li> </ul>	<b>detail extensive</b>
<b>Local statistics</b>	Statistics for traffic received from and transmitted to the Routing Engine. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.	<b>detail extensive</b>

## Sample Output

### show interfaces (ISDN D-Channel)

```

user@host> show interfaces dc-4/0/0
Physical interface: dc-4/0/0, Enabled, Physical link is Up
  Interface index: 150, SNMP ifIndex: 73
  Type: Serial, Link-level type: 55, MTU: 4092, Clocking: Internal,
  Speed: 16kbps,
  Parent: br-4/0/0 Interface index 129
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Link type      : Full-Duplex
  Link flags     : None
  Last flapped   : 2006-06-13 19:50:38 PDT (15:29:32 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  ISDN alarms    : None

Logical interface dc-4/0/0.32767 (Index 73) (SNMP ifIndex 74)
  Flags: Point-To-Point SNMP-Traps Encapsulation: 60
  Input packets : 23482
  Output packets: 21686

```

### show interfaces brief (ISDN D-Channel)

```

user@host> show interfaces dc-4/0/0 brief
Physical interface: dc-4/0/0, Enabled, Physical link is Up
  Type: Serial, Link-level type: 55, MTU: 4092, Clocking: Internal,
  Speed: 16kbps
  Device flags   : Present Running

```

```
Interface flags: SNMP-Traps Internal: 0x4000
ISDN alarms : None
```

```
Logical interface dc-4/0/0.32767
Flags: Point-To-Point SNMP-Traps Encapsulation: 60
```

### show interfaces detail (ISDN D-Channel)

```
user@host> show interfaces dc-4/0/0 detail
Physical interface: dc-4/0/0, Enabled, Physical link is Up
  Interface index: 150, SNMP ifIndex: 73, Generation: 151
  Type: Serial, Link-level type: 55, MTU: 4092, Clocking: Internal,
  Speed: 16kbps,
  Parent: br-4/0/0 Interface index 129
  Device flags : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Link type : Full-Duplex
  Link flags : None
  Physical info : Unspecified
  Hold-times : Up 0 ms, Down 0 ms
  Current address: Unspecified, Hardware address: Unspecified
  Alternate link address: Unspecified
  Last flapped : 2006-06-13 19:50:38 PDT (15:29:42 ago)
  Statistics last cleared: Never
  Traffic statistics:
    Input bytes : 257592 0 bps
    Output bytes : 231162 0 bps
    Input packets: 23483 0 pps
    Output packets: 21687 0 pps
  ISDN alarms : None

Logical interface dc-4/0/0.32767 (Index 73) (SNMP ifIndex 74) (Generation 139)

  Flags: Point-To-Point SNMP-Traps Encapsulation: 60
  Traffic statistics:
    Input bytes : 257592
    Output bytes : 664902
    Input packets: 23483
    Output packets: 21687
  Local statistics:
    Input bytes : 257592
    Output bytes : 664902
    Input packets: 23483
    Output packets: 21687
```

### show interfaces extensive (ISDN D-Channel)

```
user@host> show interfaces dc-4/0/0 extensive
Physical interface: dc-4/0/0, Enabled, Physical link is Up
  Interface index: 150, SNMP ifIndex: 73, Generation: 151
  Type: Serial, Link-level type: 55, MTU: 4092, Clocking: Internal,
  Speed: 16kbps,
  Parent: br-4/0/0 Interface index 129
  Device flags : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Link type : Full-Duplex
  Link flags : None
  Physical info : Unspecified
  Hold-times : Up 0 ms, Down 0 ms
  Current address: Unspecified, Hardware address: Unspecified
  Alternate link address: Unspecified
```

Last flapped : 2006-06-13 19:50:38 PDT (15:29:49 ago)  
Statistics last cleared: Never  
Traffic statistics:  
Input bytes : 257596 0 bps  
Output bytes : 231167 0 bps  
Input packets: 23484 0 pps  
Output packets: 21688 0 pps  
Input errors:  
Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,  
Policed discards: 0, Resource errors: 0  
Output errors:  
Carrier transitions: 5, Errors: 0, Drops: 0, MTU errors: 0,  
Resource errors: 0  
ISDN alarms : None  
ISDN media:           Seconds           Count   State  
LOF                   1874           2   OK  
LOS                   1874           2   OK

Logical interface dc-4/0/0.32767 (Index 73) (SNMP ifIndex 74) (Generation 139)

Flags: Point-To-Point SNMP-Traps Encapsulation: 60  
Traffic statistics:  
Input bytes : 257596  
Output bytes : 664927  
Input packets: 23484  
Output packets: 21688  
Local statistics:  
Input bytes : 257596  
Output bytes : 664927  
Input packets: 23484  
Output packets: 21688

## show interfaces (ISDN Dialer)

<b>Syntax</b>	<pre>show interfaces dlnumber &lt;brief   detail   extensive   terse&gt; &lt;descriptions&gt; &lt;media&gt; &lt;snmp-index snmp-index&gt; &lt;statistics&gt;</pre>
<b>Release Information</b>	Command introduced before Junos OS Release 7.4.
<b>Description</b>	(J Series routers only) Display information about the ISDN dialer interface.
<b>Options</b>	<p><b>dlnumber</b>—Display standard information about the specified ISDN dialer interface.</p> <p><b>brief   detail   extensive   terse</b>—(Optional) Display brief interface information.</p> <p><b>descriptions</b>—(Optional) Display the interface description string.</p> <p><b>media</b>—(Optional) Display media-specific information.</p> <p><b>snmp-index snmp-index</b>—(Optional) Display information for the specified SNMP index of the interface.</p> <p><b>statistics</b>—(Optional) Display static interface statistics.</p>
<b>Required Privilege Level</b>	view
<b>List of Sample Output</b>	<a href="#">show interfaces (ISDN Dialer) on page 139</a> <a href="#">show interfaces brief (ISDN Dialer) on page 140</a> <a href="#">show interfaces detail (ISDN Dialer) on page 140</a> <a href="#">show interfaces extensive (ISDN Dialer) on page 141</a>
<b>Output Fields</b>	<p><a href="#">Table 11 on page 134</a> lists the output fields for the <b>show interfaces</b> (ISDN dialer) command. Output fields are listed in the approximate order in which they appear.</p>

Table 11: ISDN Dialer show interfaces Output Fields

Field Name	Field Description	Level of Output
<b>Physical Interface</b>		
<b>Physical Interface</b>	Name of the physical interface type.	All levels
<b>Enabled</b>	State of the interface. Possible values are described in the "Enabled Field" section under <i>Common Output Fields Description</i> .	All levels
<b>Interface index</b>	Physical interface index number that reflects its initialization sequence.	<b>detail extensive none</b>
<b>SNMP ifIndex</b>	SNMP index number for the physical interface.	<b>detail extensive none</b>
<b>Generation</b>	Unique number for use by Juniper Networks technical support only.	<b>detail extensive</b>

Table 11: ISDN Dialer show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Type</b>	Interface type.	All levels
<b>Link-level type</b>	Type of encapsulation configured on the physical interface.	All levels
<b>MTU</b>	Maximum transmission unit (MTU)—Size of the largest transmitted packet.	All levels
<b>Clocking</b>	Reference clock source of the interface.	All levels
<b>Speed</b>	Network speed on the interface.	All levels
<b>Device flags</b>	Information about the physical device.	All levels
<b>Interface flags</b>	Information about the interface.	All levels
<b>Link type</b>	Data transmission type.	detail extensive none
<b>Link flags</b>	Information about the link.	detail extensive none
<b>Physical info</b>	Information about the physical interface.	detail extensive
<b>Hold-times</b>	Current interface hold-time up and hold-time down. Value is in milliseconds.	detail extensive
<b>Current address</b>	Configured MAC address.	detail extensive
<b>Hardware address</b>	MAC address of the hardware.	detail extensive
<b>Alternate link address</b>	Backup link address.	detail extensive
<b>Last flapped</b>	Date, time, and length of time since the interface status changed from <b>down</b> to <b>up</b> .	detail extensive none
<b>Input rate</b>	Input rate in bits per second (bps) and packets per second (pps).	none specified
<b>Output rate</b>	Output rate in bps and pps.	none specified
<b>Statistics last cleared</b>	Time when the statistics for the interface were last set to zero.	detail extensive
<b>Traffic statistics</b>	Number and rate of bytes and packets received and transmitted on the physical interface. <ul style="list-style-type: none"> <li>• <b>Input bytes</b>—Number of bytes received on the interface.</li> <li>• <b>Output bytes</b>—Number of bytes transmitted on the interface.</li> <li>• <b>Input packets</b>—Number of packets received on the interface.</li> <li>• <b>Output packets</b>—Number of packets transmitted on the interface.</li> </ul>	detail extensive

Table 11: ISDN Dialer show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Input errors</b>	<ul style="list-style-type: none"> <li>• <b>Errors</b>—Input errors on the interface.</li> <li>• <b>Drops</b>—Number of packets dropped by the output queue of the I/O Manager ASIC.</li> <li>• <b>Framing errors</b>—Number of packets received with an invalid frame checksum (FCS).</li> <li>• <b>Runts</b>—Frames received smaller than the runt threshold.</li> <li>• <b>Giants</b>—Frames received larger than the giant threshold.</li> <li>• <b>Policed discards</b>—Frames that the incoming packet match code discarded because they were not recognized or were not of interest. Usually, this field reports protocols that the Junos OS does not support.</li> <li>• <b>Resource errors</b>—Sum of transmit drops.</li> </ul>	<b>extensive</b>
<b>Output errors</b>	<ul style="list-style-type: none"> <li>• <b>Carrier transitions</b>—Number of times the interface has gone from <b>down</b> to <b>up</b>. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly, possibly once every 10 seconds, the cable, the remote system, or the interface is malfunctioning.</li> <li>• <b>Errors</b>—Sum of outgoing frame aborts and FCS errors.</li> <li>• <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 dropped by the ASIC RED mechanism.</li> <li>• <b>MTU errors</b>—Number of packets larger than the MTU threshold.</li> <li>• <b>Resource errors</b>—Sum of transmit drops.</li> </ul>	<b>extensive</b>
<b>Logical Interface</b>		
<b>Logical interface</b>	Name of the logical interface.	All levels
<b>Index</b>	Index number of the logical interface (which reflects its initialization sequence).	<b>detail extensive none</b>
<b>SNMP ifIndex</b>	SNMP interface index number for the logical interface.	<b>detail extensive none</b>
<b>Generation</b>	Unique number for use by Juniper Networks technical support only.	<b>detail extensive</b>
<b>Flags</b>	Information about the logical interface. Possible values are described in the "Logical Interface Flags" section under <i>Common Output Fields Description</i> .	All levels
<b>Encapsulation</b>	Encapsulation on the logical interface.	All levels



Table 11: ISDN Dialer show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Dialer	<p>Information about the status and configuration of the dialer interface:</p> <ul style="list-style-type: none"> <li>• <b>State</b>—State of the interface: <b>Active</b> or <b>Inactive</b>.</li> <li>• <b>Dial pool</b>—Dial pool name.</li> <li>• <b>Dial strings</b>—Dialing number for the ISDN connection.</li> <li>• <b>Subordinate interfaces</b>—Associated B-channel interface name and SNMP index number.</li> <li>• <b>Activation delay</b>—Length of time (in seconds) to wait before enabling the interface after the primary interface has failed.</li> <li>• <b>Deactivation delay</b>—Length of time (in seconds) to wait before disabling the interface after the primary interface is operational.</li> <li>• <b>Initial route check delay</b>—Wait period (in seconds) for the software to check if the primary interface is up after the router comes up. The range is from 1 through 300 seconds. The default is 120 seconds.</li> <li>• <b>Redial delay</b>—(Available on interfaces configured for ISDN dial-out.) Delay, in seconds, between two successive calls made. The range of values is 2 to 255. The default value is 3.</li> <li>• <b>Callback wait period</b>—Time, in seconds, that the dialer waits before it calls back the caller ID. The default value is 5.</li> <li>• <b>Load threshold</b>—Bandwidth threshold percentage used for adding interfaces. Another link is added to the multilink bundle when the load reaches the threshold value you set. The range of values is 0 to 100. The default value is 100.</li> <li>• <b>Load interval</b>—Interval used to calculate the average load on the network. By default, the average interface load is calculated every 60 seconds.</li> </ul>	All levels
Bandwidth	Speed at which the interface is running.	detail extensive none
Input packets	Number of packets received on the logical interface.	None specified
Output packets	Number of packets transmitted on the logical interface.	None specified
Traffic statistics	<p>Total number of bytes and packets received and transmitted on the logical interface. These statistics are the sum of the local and transit statistics. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.</p> <ul style="list-style-type: none"> <li>• <b>Input bytes</b>—Number of bytes received on the interface.</li> <li>• <b>Output bytes</b>—Number of bytes transmitted on the interface.</li> <li>• <b>Input packets</b>—Number of packets received on the logical interface.</li> <li>• <b>Output packets</b>—Number of packets transmitted on the logical interface</li> </ul>	detail extensive
Local statistics	Statistics for traffic received from and transmitted to the Routing Engine. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. It takes awhile (generally, less than 1 second) for this counter to stabilize.	detail extensive

Table 11: ISDN Dialer show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>Transit statistics</b>	Statistics for traffic transiting the router. When a burst of traffic is received, the value in the output packet rate field might briefly exceed the peak cell rate. This counter normally stabilizes in less than 1 second.	<b>detail extensive</b>
<b>Keepalive settings</b>	<p>Configured settings for keepalives.</p> <ul style="list-style-type: none"> <li><b>interval <i>seconds</i></b>—Time in seconds between successive keepalive requests. The range is 10 seconds through 32,767 seconds, with a default of 10 seconds.</li> <li><b>up-count <i>number</i></b>—Number of keepalive packets a destination must receive to change a link's status from down to up. The range is 1 through 255, with a default of 1.</li> <li><b>down-count <i>number</i></b>—Number of keepalive packets a destination must fail to receive before the network takes a link down. The range is 1 through 255, with a default of 3.</li> </ul>	<b>detail extensive none</b>
<b>Keepalive statistics</b>	<p>Information about keepalive packets. (When no level of output is specified, the word "statistics" is not part of the field name and the phrase "last seen" is not displayed.)</p> <ul style="list-style-type: none"> <li><b>Input</b>—Number of keepalive packets received by PPP. <ul style="list-style-type: none"> <li><b>(last seen 00:00:00 ago)</b>—Time since the last keepalive packet was received, in the format <i>hh:mm:ss</i>.</li> </ul> </li> <li><b>Output</b>—Number of keepalive packets sent by PPP and how long ago the last keepalive packets were sent and received. <ul style="list-style-type: none"> <li><b>(last seen 00:00:00 ago)</b>—Time since the last keepalive packet was sent, in the format <i>hh:mm:ss</i>.</li> </ul> </li> </ul>	<b>detail extensive none</b>
<b>LCP state</b>	<p>Link Control Protocol state.</p> <ul style="list-style-type: none"> <li><b>Conf-ack-received</b>—Acknowledgement was received.</li> <li><b>Conf-ack-sent</b>—Acknowledgement was sent.</li> <li><b>Conf-req-sent</b>—Request was sent.</li> <li><b>Down</b>—LCP negotiation is incomplete (not yet completed or has failed).</li> <li><b>Not configured</b>—LCP is not configured on the interface.</li> <li><b>Opened</b>—LCP negotiation is successful.</li> </ul>	<b>detail extensive none</b>
<b>NCP state</b>	<p>Network Control Protocol state.</p> <ul style="list-style-type: none"> <li><b>Conf-ack-received</b>—Acknowledgement was received.</li> <li><b>Conf-ack-sent</b>—Acknowledgement was sent.</li> <li><b>Conf-req-sent</b>—Request was sent.</li> <li><b>Down</b>—NCP negotiation is incomplete (not yet completed or has failed).</li> <li><b>Not configured</b>—NCP is not configured on the interface.</li> <li><b>Opened</b>—NCP negotiation is successful.</li> </ul>	<b>detail extensive none</b>

Table 11: ISDN Dialer show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
<b>CHAP state</b>	Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. <ul style="list-style-type: none"> <li>• <b>Chap-Resp-received</b>—Response received for the challenge sent, but CHAP not yet moved into the Success state. (Most likely with RADIUS authentication.)</li> <li>• <b>Chap-Resp-sent</b>—Response sent for the challenge received.</li> <li>• <b>Chap-Chal-sent</b>—Challenge sent.</li> <li>• <b>Chap-Chal-received</b>—Challenge received but response not yet sent.</li> <li>• <b>Down</b>—CHAP authentication is incomplete (not yet completed or has failed).</li> <li>• <b>Not-configured</b>—CHAP is not configured on the interface.</li> <li>• <b>Opened</b>—CHAP authentication was successful.</li> </ul>	<b>detail extensive none</b>
<b>protocol family</b>	Protocol family configured on the logical interface. If the family is <b>inet</b> , the IP address of the logical interface and the IP address on the remote side of the connection are included.	<b>brief</b>
<b>Protocol</b>	Protocol family configured on the logical interface.	<b>detail extensive none</b>
<b>MTU</b>	MTU size on the logical interface.	<b>detail extensive none</b>
<b>Generation</b>	Unique number for use by Juniper Networks technical support only.	<b>detail extensive</b>
<b>Route table</b>	Routing table in which the logical interface address is located. For example, <b>0</b> refers to the routing table <b>inet.0</b> .	<b>detail extensive</b>
<b>Flags</b>	Information about the protocol family flags. Possible values are described in the “Family Flags” section under <i>Common Output Fields Description</i> .	<b>detail extensive none</b>
<b>Addresses, Flags</b>	Information about the address flags. Possible values are described in the “Addresses Flags” section under <i>Common Output Fields Description</i> .	<b>detail extensive none</b>
<b>Destination</b>	IP address of the remote side of the connection.	<b>detail extensive none</b>
<b>Local</b>	IP address of the logical interface.	<b>detail extensive none</b>
<b>Broadcast</b>	Broadcast address.	<b>detail extensive</b>
<b>Generation</b>	Unique number for use by Juniper Networks technical support only.	<b>detail extensive</b>

## Sample Output

### show interfaces (ISDN Dialer)

```

user@host>show interfaces dl0
Physical interface: dl0, Enabled, Physical link is Up
Interface index: 153, SNMP ifIndex: 77
Type: 27, Link-level type: PPP, MTU: 1504
Device flags   : Present Running

```

```

Interface flags: SNMP-Traps
Link type      : Full-Duplex
Link flags     : Keepalives
Last flapped   : Never
Input rate     : 0 bps (0 pps)
Output rate    : 0 bps (0 pps)

```

```

Logical interface d10.0 (Index 76) (SNMP ifIndex 78)
  Flags: Point-To-Point SNMP-Traps 0x4000 LinkAddress 23-0 Encapsulation: PPP
  Dialer:
    State: Active, Dial pool: 10
    Dial strings: 5551212
    Subordinate interfaces: bc-4/0/0:1 (Index 151)
    Activation delay: 0, Deactivation delay: 0
    Initial route check delay: 120
    Redial delay: 3
    Callback wait period: 5
    Load threshold: 0, Load interval: 60
  Bandwidth: 64kbps
  Input packets : 13
  Output packets: 10846
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 5412 (00:00:06 ago), Output: 5416 (00:00:05 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured,
  mpls: Not-configured
  CHAP state: Closed
    Protocol inet, MTU: 1500
    Flags: None
    Addresses, Flags: Is-Preferred Is-Primary
    Destination: 10.0.40.1, Local: 10.0.40.2

```

#### show interfaces brief (ISDN Dialer)

```

user@host> show interfaces d10 brief
Physical interface: d10, Enabled, Physical link is Up
  Type: 27, Link-level type: PPP, MTU: 1504, Clocking: Unspecified,
  Speed: Unspecified
  Device flags   : Present Running
  Interface flags: SNMP-Traps

Logical interface d10.0
  Flags: Point-To-Point SNMP-Traps 0x4000 LinkAddress 23-0 Encapsulation: PPP
  Dialer:
    State: Active, Dial pool: 10
    Dial strings: 5551212
    Subordinate interfaces: bc-4/0/0:1 (Index 151)
    Activation delay: 0, Deactivation delay: 0
    Initial route check delay: 120
    Redial delay: 3
    Callback wait period: 5
    Load threshold: 0, Load interval: 60
  inet 10.0.40.2      --> 10.0.40.1

```

#### show interfaces detail (ISDN Dialer)

```

user@host> show interfaces d10 detail
Physical interface: d10, Enabled, Physical link is Up
  Interface index: 153, SNMP ifIndex: 77, Generation: 154
  Type: 27, Link-level type: PPP, MTU: 1504, Clocking: Unspecified,
  Speed: Unspecified

```

```

Device flags      : Present Running
Interface flags:  SNMP-Traps
Link type        : Full-Duplex
Link flags       : Keepalives
Physical info    : Unspecified
Hold-times       : Up 0 ms, Down 0 ms
Current address:  Unspecified, Hardware address: Unspecified
Alternate link address: Unspecified
Last flapped     : Never
Statistics last cleared: Never
Traffic statistics:
  Input bytes   :          131116          40 bps
  Output bytes  :              0           0 bps
  Input packets :          10847           0 pps
  Output packets:              0           0 pps

Logical interface dl0.0 (Index 76) (SNMP ifIndex 78) (Generation 142)
Flags: Point-To-Point SNMP-Traps 0x4000 LinkAddress 23-0 Encapsulation: PPP
Dialer:
  State: Active, Dial pool: 10
  Dial strings: 5551212
  Subordinate interfaces: bc-4/0/0:1 (Index 151)
  Activation delay: 0, Deactivation delay: 0
  Initial route check delay: 120
  Redial delay: 3
  Callback wait period: 5
  Load threshold: 0, Load interval: 60
Bandwidth: 64kbps
Traffic statistics:
  Input bytes   :          1092
  Output bytes  :        131459
  Input packets :           13
  Output packets:        10848
Local statistics:
  Input bytes   :          1092
  Output bytes  :        131459
  Input packets :           13
  Output packets:        10848
Transit statistics:
  Input bytes   :              0           0 bps
  Output bytes  :              0           0 bps
  Input packets :              0           0 pps
  Output packets:              0           0 pps
Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
Keepalive statistics:
  Input : 5413 (last seen 00:00:03 ago)
  Output: 5417 (last sent 00:00:02 ago)
LCP state: Opened
NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured,
mpls: Not-configured
CHAP state: Closed
  Protocol inet, MTU: 1500, Generation: 142, Route table: 0
  Flags: None
  Addresses, Flags: Is-Preferred Is-Primary
    Destination: 10.0.40.1, Local: 10.0.40.2, Broadcast: Unspecified,
    Generation: 142

```

### show interfaces extensive (ISDN Dialer)

```
user@host> show interfaces dl0 extensive
```

```

Physical interface: d10, Enabled, Physical link is Up
Interface index: 153, SNMP ifIndex: 77, Generation: 154
Type: 27, Link-level type: PPP, MTU: 1504, Clocking: Unspecified,
Speed: Unspecified
Device flags : Present Running
Interface flags: SNMP-Traps
Link type : Full-Duplex
Link flags : Keepalives
Physical info : Unspecified
Hold-times : Up 0 ms, Down 0 ms
Current address: Unspecified, Hardware address: Unspecified
Alternate link address: Unspecified
Last flapped : Never
Statistics last cleared: Never
Traffic statistics:
Input bytes : 131116 0 bps
Output bytes : 0 0 bps
Input packets: 10847 0 pps
Output packets: 0 0 pps
Input errors:
Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
Policed discards: 0,
Resource errors: 0
Output errors:
Carrier transitions: 0, Errors: 0, Drops: 0, MTU errors: 0,
Resource errors: 0

Logical interface d10.0 (Index 76) (SNMP ifIndex 78) (Generation 142)
Flags: Point-To-Point SNMP-Traps 0x4000 LinkAddress 23-0 Encapsulation: PPP
Dialer:
State: Active, Dial pool: 10
Dial strings: 5551212
Subordinate interfaces: bc-4/0/0:1 (Index 151)
Activation delay: 0, Deactivation delay: 0
Initial route check delay: 120
Redial delay: 3
Callback wait period: 5
Load threshold: 0, Load interval: 60
Bandwidth: 64kbps
Traffic statistics:
Input bytes : 1092
Output bytes : 131459
Input packets: 13
Output packets: 10848
Local statistics:
Input bytes : 1092
Output bytes : 131459
Input packets: 13
Output packets: 10848
Transit statistics:
Input bytes : 0 0 bps
Output bytes : 0 0 bps
Input packets: 0 0 pps
Output packets: 0 0 pps
Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
Keepalive statistics:
Input : 5413 (last seen 00:00:07 ago)
Output: 5417 (last sent 00:00:06 ago)
LCP state: Opened
NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured,
mpls: Not-configured

```

```
CHAP state: Closed
Protocol inet, MTU: 1500, Generation: 142, Route table: 0
  Flags: None
  Addresses, Flags: Is-Preferred Is-Primary
    Destination: 10.0.40.1, Local: 10.0.40.2, Broadcast: Unspecified,
    Generation: 142
```

## show isdn calls

<b>Syntax</b>	show isdn calls
<b>Release Information</b>	Command introduced in Junos OS Release 7.4.
<b>Description</b>	(J Series routers only) Display ISDN connection calls.
<b>Options</b>	This command has no options.
<b>Required Privilege Level</b>	view
<b>List of Sample Output</b>	<a href="#">show isdn calls on page 144</a>
<b>Output Fields</b>	<a href="#">Table 12 on page 144</a> lists the output fields for the <b>show isdn calls</b> command. Output fields are listed in the approximate order in which they appear.

Table 12: show isdn calls Output Fields

Field Name	Field Description
<b>Interface</b>	ISDN interface configured for calling out.
<b>Status</b>	Current calling conditions of the ISDN interface.
<b>Call Duration</b>	Connection time (in seconds) for the call.
<b>Call Direction</b>	Indicates whether the call is a <b>Dialout</b> call, <b>Dialincall</b> , or <b>Callback</b> call.
<b>Most recent error code</b>	Calling errors on the ISDN interface.

## Sample Output

### show isdn calls

```
user@host> show isdn calls
Interface: bc-4/0/0:1
  Status: No call in progress
  Most recent error code: protocol error, unspecified
Interface: bc-4/0/0:2
  Status: Connected to 5552121
  Call Duration: 58549 seconds
  Call Direction: Dialout
  Most recent error code: No error
```



## show isdn history

<b>Syntax</b>	show isdn history
<b>Release Information</b>	Command introduced in Junos OS Release 7.4.
<b>Description</b>	(J Series routers only) Display ISDN call history.
<b>Options</b>	This command has no options.
<b>Required Privilege Level</b>	view
<b>List of Sample Output</b>	<a href="#">show isdn history on page 145</a>
<b>Output Fields</b>	<a href="#">Table 13 on page 145</a> lists the output fields for the <b>show isdn history</b> command. Output fields are listed in the approximate order in which they appear.

**Table 13: show isdn history Output Fields**

Field Name	Field Description
<b>Calling Number</b>	Telephone number configured as the primary dialing number.
<b>Called Number</b>	Telephone number used to dial the service provider.
<b>Interface</b>	ISDN interface used for calling the service provider.
<b>Duration</b>	Length of time (in seconds) that the ISDN call is connected.
<b>Direction</b>	Indicates whether the call is a <b>Dialout</b> call, <b>Dialin</b> call, or <b>Callback</b> call.

## Sample Output

### show isdn history

```

user@host> show isdn history
Calling      Called      Interface   Duration    Direction
Number      Number
551212      5552121     bc-4/0/0:1  58663       Dialin

```

## show isdn q921 statistics

<b>Syntax</b>	<code>show isdn q921 statistics br-pim/0/port</code>
<b>Release Information</b>	Command introduced before Junos OS Release 7.4.
<b>Description</b>	(J Series routers only) Display ISDN Layer 2 statistics based on the Q.921 standard for the specified Basic Rate Interface (BRI) interface.
<b>Options</b>	<code>br-pim/0/port</code> —Basic Rate Interface (BRI) interface name.
<b>Required Privilege Level</b>	view
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li><a href="#">clear isdn q921 statistics on page 110</a></li> </ul>
<b>List of Sample Output</b>	<a href="#">show isdn q921 statistics on page 147</a>
<b>Output Fields</b>	<a href="#">Table 14 on page 146</a> lists the output fields for the <b>show isdn q921 statistics</b> command. Output fields are listed in the approximate order in which they appear.

**Table 14: show isdn q921 statistics Output Fields**

Field Name	Field Description
Frame Type	<p>Frame type:</p> <ul style="list-style-type: none"> <li><b>INFO</b>—Number of information frames sent and received.</li> <li><b>RR</b>—Number of receive ready frames sent and received.</li> <li><b>RNR</b>—Number of receive not ready frames sent and received.</li> <li><b>REJ</b>—Number of reject frames sent and received.</li> <li><b>SABME</b>—Number of set asynchronous balanced mode extended frames sent and received.</li> <li><b>DISC</b>—Number of disconnect frames sent and received.</li> <li><b>UA</b>—Number of unnumbered acknowledgement frames sent and received.</li> <li><b>DM</b>—Number of disconnect mode frames sent and received.</li> <li><b>FRMR</b>—Number of frame reject frames sent and received.</li> <li><b>XID</b>—Number of exchange identification frames sent and received.</li> <li><b>UI</b>—Number of unnumbered information frames sent and received.</li> </ul>
Transmitted	Number of frames transmitted.
Received	Number of frames received.

## Sample Output

### show isdn q921 statistics

```
user@host> show isdn q921 statistics br-6/0/0
```

Frame Type	Transmitted	Received
INFO	2196	3290
RR	9853	8759
RNR	0	0
REJ	0	0
SABME	1	0
DISC	0	0
UA	0	1
DM	0	0
FRMR	0	0
XID	0	0
UI	1	1

## show isdn q931 statistics

---

<b>Syntax</b>	<code>show isdn q931 statistics br-pim/0/port</code>
<b>Release Information</b>	Command introduced before Junos OS Release 7.4.
<b>Description</b>	(J Series routers only) Display ISDN Layer 3 statistics based on the Q.931 standard for the specified Basic Rate Interface (BRI) interface.
<b>Options</b>	<code>br-pim/0/port</code> —Basic Rate Interface (BRI) interface name.
<b>Required Privilege Level</b>	view
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">clear isdn q931 statistics on page 111</a></li></ul>
<b>List of Sample Output</b>	<a href="#">show isdn q931 statistics on page 150</a>
<b>Output Fields</b>	<a href="#">Table 15 on page 149</a> lists the output fields for the <code>show isdn q931 statistics</code> command. Output fields are listed in the approximate order in which they appear.

Table 15: show isdn q931 Statistics Output Fields

Field Name	Field Description
Message Type	<p>Type of message:</p> <ul style="list-style-type: none"> <li>• <b>ALERTING</b>—Number of messages indicating that called user alerting is initiated.</li> <li>• <b>CALL PROCEED</b>—Number of messages indicating that requested call establishment has been initiated and no more call establishment information is accepted.</li> <li>• <b>CONNECT</b>—Number of messages indicating that a call has gone through and is accepted.</li> <li>• <b>CONNECT ACK</b>—Number of messages sent by the network to the called user to indicate that the user is awarded the call.</li> <li>• <b>PROGRESS</b>—Number of messages indicating the progress of a call in relation to the provision of inband information or patterns.</li> <li>• <b>SETUP</b>—Number of requests to initiate call establishment.</li> <li>• <b>SETUP ACK</b>—Number of messages indicating that call establishment is initiated but additional information might be required.</li> <li>• <b>DISCONNECT</b>—Number of messages sent by the user to request clearing an end-to-end connection.</li> <li>• <b>RELEASE</b>—Number of messages sent by the network to indicate that the equipment sending the message has disconnected the channel and intends to release the channel and call reference.</li> <li>• <b>RELEASE COMPLETE</b>—Number of messages sent by the user or network to indicate that the equipment sending the message has released the channel and call reference, and that the channel is available for reuse.</li> <li>• <b>RESTART</b>—Number of messages that restart a call connection.</li> <li>• <b>RESTART ACK</b>—Number of messages that acknowledge the restart request by the remote network.</li> <li>• <b>INFORMATION</b>—Number of messages that provide information for call establishment or miscellaneous call-related information.</li> <li>• <b>NOTIFY</b>—Number of messages that contain information pertaining to a call.</li> <li>• <b>STATUS</b>—Number of messages sent in response to a status enquiry message or at any time during a call to report certain error conditions.</li> <li>• <b>STATUS ENQUIRY</b>—Number of messages sent to solicit a status message from the peer Layer 3 entity.</li> </ul>
Transmitted	Number of messages transmitted.
Received	Number of messages received.

## Sample Output

### show isdn q931 statistics

```
user@host> show isdn q931 statistics br-4/0/0
```

Message Type	Transmitted	Received
ALERTING	1	0
CALL PROCEED	1	229
CONNECT	1	0
CONNECT ACK	0	1
PROGRESS	0	0
SETUP	229	1096
SETUP ACK	0	0
DISCONNECT	0	229
RELEASE	1324	0
RELEASE COMPLETE	0	1324
RESTART	0	0
RESTART ACK	0	0
INFORMATION	0	0
NOTIFY	0	0
STATUS	0	0
STATUS ENQUIRY	0	0

## show isdn status

<b>Syntax</b>	show isdn status <brief   detail> <br-pim/0/port>
<b>Release Information</b>	Command introduced before Junos OS Release 7.4.
<b>Description</b>	(J Series routers only) Display ISDN status information.
<b>Options</b>	<p><b>none</b>—Display standard ISDN status information for all Basic Rate Interface (BRI) interfaces.</p> <p><b>brief   detail</b>—(Optional) Display the specified level of output.</p> <p><b>br-pim/0/port</b>—(Optional) Display status information for the specified BRI interface only.</p>
<b>Required Privilege Level</b>	view
<b>List of Sample Output</b>	<a href="#">show isdn status on page 152</a>
<b>Output Fields</b>	<a href="#">Table 16 on page 151</a> lists the output fields for the <b>show isdn status</b> command. Output fields are listed in the approximate order in which they appear.

**Table 16: show isdn status Output Fields**

Field Name	Field Description
<b>Interface</b>	ISDN BRI interface name.
<b>Layer 1 status</b>	Layer 1 status: <b>active</b> or <b>inactive</b> .
<b>Layer 2 status</b>	Layer 2 status: <ul style="list-style-type: none"> <li>• <b>CES</b>—Common endpoint suffix value.</li> <li>• <b>Q.921</b>—Q.921 status: <b>up</b> or <b>down</b>.</li> <li>• <b>TEI</b>—Assigned terminal endpoint identifier (TEI) number.</li> </ul>
<b>Layer 3 status</b>	Number of active calls, plus: <ul style="list-style-type: none"> <li>• <b>Switch Type</b>—Type of ISDN switch based on the manufacturer.</li> <li>• <b>Interface Type</b>—Information relating to a local or network interface.</li> <li>• <b>Calling number</b>—Telephone number configured as the primary dialing number.</li> <li>• <b>T310</b>—Q.931-specific timer value.</li> <li>• <b>Tei Option</b>—Initial connectivity configuration of the ISDN interface.</li> </ul>

## Sample Output

### show isdn status

```
user@host> show isdn status
Interface: br-4/0/0
Layer 1 status: active
Layer 2 status:
  CES: 0, Q.921: up, TEI: 64
Layer 3 status: 1 Active calls
Switch Type       : ATTSE
Interface Type    : USER
Calling number    : 5551212
T310              : 10 seconds
Tei Option        : Power Up
```



## CHAPTER 6

# Index

- [Index on page 155](#)



# Index

## Symbols

#, comments in configuration statements.....	xiv
( ), in syntax descriptions.....	xiv
< >, in syntax descriptions.....	xiv
[ ], in configuration statements.....	xiv
{ }, in configuration statements.....	xiv
(pipe), in syntax descriptions.....	xiv

## A

access-profile statement.....	67
activation-delay statement.....	68
usage guidelines.....	34

## B

backup-options statement.....	68
BERT	
configuring interface diagnostics.....	43
bert-algorithm statement	
usage guidelines.....	43
bert-error-rate statement	
usage guidelines.....	43
bert-period statement	
usage guidelines.....	43
bit error rate test See BERT	
braces, in configuration statements.....	xiv
brackets	
angle, in syntax descriptions.....	xiv
square, in configuration statements.....	xiv

## C

callback statement.....	69
usage guidelines.....	32
callback-wait-period statement.....	70
usage guidelines.....	32
caller statement.....	71
usage guidelines.....	31
calling-number statement.....	72
usage guidelines.....	21
chap statement.....	73
clear isdn q921 statistics command.....	110
clear isdn q931 statistics command.....	111

comments, in configuration statements.....	xiv
conventions	
text and syntax.....	xiii
curly braces, in configuration statements.....	xiv
customer support.....	xv
contacting JTAC.....	xv

## D

deactivation-delay statement.....	74
usage guidelines.....	23
dial-string statement.....	74
usage guidelines.....	34
dialer statement.....	75
dialer-options	
usage guidelines.....	23
dialer-options statement.....	76
documentation	
comments on.....	xv

## E

encapsulation statement	
logical interfaces.....	77
physical interface.....	81

## F

f-max-period statement.....	91
family statement.....	86
fast-aps-switch statement.....	90
font conventions.....	xiii
fragment-threshold statement.....	91
usage guidelines.....	30

## I

idle-timeout	
usage guidelines.....	23
idle-timeout statement.....	92
incoming-called-number statement.....	92
usage guidelines.....	38
incoming-map statement.....	93
usage guidelines.....	31
initial-route-check statement.....	94
interfaces	
configuration statements.....	50
ISDN	
B-channel interfaces, displaying.....	118
BRI interfaces, displaying.....	124
calls, displaying.....	144
D-channel interfaces, displaying.....	128
default software values, displaying.....	112

dialer interfaces, displaying.....	114, 134
dialer pools, displaying.....	116
history, displaying.....	145
q921 statistics	
clearing.....	110
displaying.....	146
q931 statistics	
clearing.....	111
displaying.....	148
status, displaying.....	151
ISDN interfaces	
callback-wait-period.....	70
caller.....	71
calling-number.....	72
configuration (called router).....	37
configuration (calling router).....	35
redial-delay.....	104
isdn-options statement.....	95
usage guidelines.....	21
<b>L</b>	
load-interval statement.....	96
usage guidelines.....	23
load-threshold statement.....	97
usage guidelines.....	23
loopback testing.....	41
<b>M</b>	
manuals	
comments on.....	xv
mrru statement.....	98
usage guidelines.....	28
mtu statement.....	99
<b>N</b>	
negotiate-address statement.....	101
<b>P</b>	
parentheses, in syntax descriptions.....	xiv
pool statement.....	102
usage guidelines.....	21
ppp-options statement.....	103
<b>R</b>	
redial-delay statement.....	104
<b>S</b>	
show dialer defaults command.....	112
show dialer interfaces command.....	114
show dialer pools command.....	116
show interfaces (ISDN B-channel) command.....	118
show interfaces (ISDN BRI) command.....	124
show interfaces (ISDN D-channel) command.....	128
show interfaces (ISDN dialer) command.....	134
show isdn calls command.....	144
show isdn history command.....	145
show isdn q921 statistics command.....	146
show isdn q931 statistics command.....	148
show isdn status command.....	151
spid1 statement.....	105
spid2 statement.....	105
static-tei-val statement.....	106
support, technical See technical support	
switch-type statement.....	106
syntax conventions.....	xiii
system processes	
configuration statements.....	66
<b>T</b>	
t310 statement.....	107
usage guidelines.....	21
technical support	
contacting JTAC.....	xv
tei-option statement.....	107
<b>W</b>	
watch-list statement.....	108
usage guidelines.....	34