



Junos[®] OS T1 Interfaces



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About the Documentation

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- [Supported Platforms on page xi](#)
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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.

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Supported Platforms

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

- [ACX Series](#)
- [M Series](#)
- [MX Series](#)
- [T Series](#)
- [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.xsl;
    }
  }
}
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.

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

Table 2: Text and Syntax Conventions

Convention	Description	Examples
Bold text like this	Represents text that you type.	To enter configuration mode, type the configure command: user@host> configure
Fixed-width text like this	Represents output that appears on the terminal screen.	user@host> show chassis alarms No alarms currently active

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

Convention	Description	Examples
<i>Italic text like this</i>	<ul style="list-style-type: none"> Introduces or emphasizes important new terms. Identifies book names. Identifies RFC and Internet draft titles. 	<ul style="list-style-type: none"> A policy <i>term</i> is a named structure that defines match conditions and actions. <i>Junos OS System Basics Configuration Guide</i> RFC 1997, <i>BGP Communities Attribute</i>
<i>Italic text like this</i>	Represents variables (options for which you substitute a value) in commands or configuration statements.	Configure the machine's domain name: [edit] root@# set system domain-name <i>domain-name</i>
Text like this	Represents names of configuration statements, commands, files, and directories; configuration hierarchy levels; or labels on routing platform components.	<ul style="list-style-type: none"> To configure a stub area, include the stub statement at the [edit protocols ospf area area-id] hierarchy level. The console port is labeled CONSOLE.
< > (angle brackets)	Enclose optional keywords or variables.	stub <default-metric metric>;
(pipe symbol)	Indicates a choice between the mutually exclusive keywords or variables on either side of the symbol. The set of choices is often enclosed in parentheses for clarity.	broadcast multicast <i>(string1 string2 string3)</i>
# (pound sign)	Indicates a comment specified on the same line as the configuration statement to which it applies.	rsvp { # Required for dynamic MPLS only
[] (square brackets)	Enclose a variable for which you can substitute one or more values.	community name members [community-ids]
Indentation and braces ({ })	Identify a level in the configuration hierarchy.	[edit] routing-options { static { route default { nexthop <i>address</i> ; retain; } } }
;(semicolon)	Identifies a leaf statement at a configuration hierarchy level.	
J-Web GUI Conventions		
Bold text like this	Represents J-Web graphical user interface (GUI) items you click or select.	<ul style="list-style-type: none"> In the Logical Interfaces box, select All Interfaces. To cancel the configuration, click Cancel.
> (bold right angle bracket)	Separates levels in a hierarchy of J-Web selections.	In the configuration editor hierarchy, select Protocols>Ospf .

Documentation Feedback

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

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

Requesting Technical Support

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

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- JTAC hours of operation—The JTAC centers have resources available 24 hours a day, 7 days a week, 365 days a year.

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- Find product documentation: <http://www.juniper.net/techpubs/>
- Find solutions and answer questions using our Knowledge Base: <http://kb.juniper.net/>
- Download the latest versions of software and review release notes: <http://www.juniper.net/customers/csc/software/>
- Search technical bulletins for relevant hardware and software notifications: <https://www.juniper.net/alerts/>

- Join and participate in the Juniper Networks Community Forum:
<http://www.juniper.net/company/communities/>
- Open a case online in the CSC Case Management tool: <http://www.juniper.net/cm/>

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

Opening a Case with JTAC

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

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

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

PART 1

Overview

- [T1 Interfaces on page 3](#)

CHAPTER 1

T1 Interfaces

- [T1 Interfaces Overview on page 3](#)

T1 Interfaces Overview

T1 is the basic physical layer protocol used by the Digital Signal level 1(DS1) multiplexing method in North America. A T1 interface operates at a bit rate of 1.544 Mbps and can support 24 DS0 channels. Supported DS1 standards include:

- ANSI T1.107, T1.102
- GR 499-core, GR 253-core
- AT&T Pub 54014
- ITU G.751, G.703

PART 2

Configuration

- [T1 Interfaces on page 7](#)
- [Network Interfaces Configuration Statements and Hierarchy on page 17](#)
- [Statement Summary on page 39](#)

CHAPTER 2

T1 Interfaces

- [Configuring T1 Physical Interface Properties on page 7](#)
- [Configuring T1 BERT Properties on page 8](#)
- [Configuring the T1 Buildout on page 9](#)
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- [Configuring Fractional T1 Time Slots on page 15](#)

Configuring T1 Physical Interface Properties

To configure T1-specific physical interface properties, include the **t1-options** statement at the **[edit interfaces *interface-name*]** hierarchy level:

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

Configuring T1 BERT Properties

This section discusses BERT properties for the T1 interface specifically. For general information about the Junos implementation of the BERT procedure, see [“Interface Diagnostics” on page 99](#).

You can configure a T1 interface or partitioned CT1 or T1 channel to execute a bit error rate test (BERT) when the interface receives a request to run this test. You specify the duration of the test and the error rate to include in the bit stream by including the **bert-period** and **bert-error-rate** statements at the **[edit interfaces *interface-name* t1-options]** hierarchy level:

```
[edit interfaces interface-name t1-options]
bert-algorithm algorithm;
bert-error-rate rate;
bert-period seconds;
```

seconds is the duration of the BERT procedure. The test can last from 1 through 239 seconds; the default is 10 seconds. Standard CT1, standard T1, T1 IQ, and T1 IQE interfaces, and PICs partitioned to CT1 and T1 channels, support an extended BERT period range, up to 86,400 seconds (24 hours), and have a default BERT period value of 240 seconds.



NOTE: When configuring T1 and CT1 interfaces on 10-port Channelized E1/T1 IQE PICs, the **bert-period** statement must be included at the **[edit interfaces *ct1-fpc/pic/port*]** hierarchy level.



NOTE: When configuring CT1 interfaces on the 16-port Channelized E1/T1 Circuit Emulation MIC (MIC-3D-16CHE1-T1-CE), you must include BERT configuration options at the **[edit interfaces *ct1-fpc/pic/port*]** hierarchy level.

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. On T1 interfaces, you can also select the pattern to send in the bit stream by including the **bert-algorithm** statement at the **[edit interfaces *interface-name* interface-options]** hierarchy level:

```
[edit interfaces interface-name interface-options]
bert-algorithm algorithm;
```


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 O.152 standard)
pseudo-2e15-o151 Pattern is 2^15 - 1 (per O.151 standard)
pseudo-2e20-o151 Pattern is 2^20 - 1 (per O.151 standard)
pseudo-2e20-o153 Pattern is 2^20 - 1 (per O.153 standard)
```



NOTE: The **bit-error-rate** statement in BERT procedure is not supported on the 16-port Channelized E1/T1 Circuit Emulation MIC (MIC-3D-16CHE1-T1-CE).

For specific hierarchy information, see individual interface types. For information about running the BERT procedure, see the Junos OS System Basics Configuration Guide.

- Related Documentation**
- Configuring E1 BERT Properties
 - [Interface Diagnostics on page 97](#)
 - Interface Diagnostics Operational Mode Commands

Configuring the T1 Buildout

A T1 interface has five possible setting ranges for the T1 line buildout: **0-132**, **133-265**, **266-398**, **399-531**, or **532-655** feet. By default, the T1 interface uses the shortest setting (0-132).

To have the interface drive a line at one of the longer distance ranges, include the **buildout** statement with the appropriate value at the **[edit interfaces *interface-name* t1-options]** hierarchy level:

```
[edit interfaces interface-name t1-options]
  buildout value;
```

Configuring T1 Byte Encoding

By default, T1 interfaces use a byte encoding of 8 bits per byte (nx64). You can configure an alternative byte encoding of 7 bits per byte (nx56).

To have the interface use 7 bits per byte encoding, include the **byte-encoding** statement at the **[edit interfaces *interface-name* t1-options]** hierarchy level, specifying the **nx56** option:

```
[edit interfaces interface-name t1-options]
  byte-encoding nx56;
```

To explicitly configure nx64 byte encoding, include the **byte-encoding** statement at the **[edit interfaces *interface-name* t1-options]** hierarchy level, specifying the **nx64** option:

```
[edit interfaces interface-name t1-options]
```

`byte-encoding nx64;`

Configuring T1 CRC Error Major Alarm Thresholds

Junos OS collects CRC errors from PICs every second. On Channelized OC3 IQ and IQE PICs, Channelized OC12 IQ and IQE PICs, and Channelized T3 IQ PICs, you can configure major error thresholds for T1 CRC errors.

When the threshold is exceeded for 1 second, a defect condition is declared. If the defect condition continues for the monitoring period, an alarm condition is declared. You can display the CRC error threshold configuration, CRC errors count, and the alarm condition using the **show interfaces extensive** command.

To configure a CRC major error threshold, include the **crc-major-alarm-threshold** statement at the **[edit interfaces *interface-name* t1-options]** hierarchy level, specifying the errors per bits as **1e-3**, **5e-4**, **1e-4**, **5e-5** or **1e-5**:

```
[edit interfaces interface-name t1-options]
  crc-major-alarm-threshold (1e-3 | 5e-4 | 1e-4 | 5e-5 | 1e-5);
```

To configure a T1 CRC error major alarm for five errors in 10^{-4} bits, include the **crc-major-alarm-threshold** statement at the **[edit interfaces *interface-name* t1-options]** hierarchy level, specifying the **5e-4** option:

```
[edit interfaces interface-name t1-options]
  crc-major-alarm-threshold 5e-4;
```

All settings except **1e-5** use a 10-second monitoring period. The **1e-5** value uses a 50-second monitoring period.

Configuring T1 CRC Error Minor Alarm Thresholds

Junos OS collects CRC errors from PICs every second. On Channelized OC3 IQ and IQE PICs, Channelized OC12 IQ and IQE PICs, and Channelized T3 IQ PICs, you can configure minor error thresholds for T1 CRC errors.

When the threshold is exceeded for 1 second, a defect condition is declared. If the defect condition continues for the monitoring period, an alarm condition is declared. You can display the CRC error threshold configuration, CRC errors count, and the alarm condition using the **show interfaces extensive** command.

To configure a CRC minor error threshold, include the **crc-minor-alarm-threshold** statement at the **[edit interfaces *interface-name* t1-options]** hierarchy level, specifying the errors per bits as **1e-3**, **5e-4**, **1e-4**, **5e-5**, **1e-5**, **5e-6**, or **1e-6**:

```
[edit interfaces interface-name t1-options]
  crc-minor-alarm-threshold (1e-3 | 5e-4 | 1e-4 | 5e-5 | 1e-5 | 5e-6 | 1e-6);
```

To configure a T1 CRC error minor alarm for five errors in 10^{-4} bits, include the **crc-minor-alarm-threshold** statement at the **[edit interfaces *interface-name* t1-options]** hierarchy level, specifying the **5e-4** option:

```
[edit interfaces interface-name t1-options]
  crc-minor-alarm-threshold 5e-4;
```

The 10-second monitoring period is used for values **1e-3**, **5e-4**, **1e-4**, and **5e-5**. The **1e-5** value uses a 50-second monitoring period. The **5e-6** value uses a 100-second monitoring period. The **1e-6** value uses a 500-second monitoring period.

Configuring T1 Data Inversion

By default, data inversion is disabled. To enable data inversion at the HDLC level, include the **invert-data** statement at the **[edit interfaces *interface-name* t1-options]** hierarchy level:

```
[edit interfaces interface-name t1-options]
invert-data;
```

When you enable data inversion, all data bits in the data stream are transmitted inverted; that is, zeroes are transmitted as ones and ones as zeroes. Data inversion is normally used only in AMI mode to guarantee ones density in the transmitted stream.

Configuring the T1 Frame Checksum

By default, T1 interfaces use a 16-bit frame checksum. You can configure a 32-bit checksum, which provides more reliable packet verification. However, some older equipment might not support 32-bit checksums.

To configure a 32-bit checksum, include the **fcs 32** statement at the **[edit interfaces *interface-name* t1-options]** hierarchy level:

```
[edit interfaces interface-name t1-options]
fcs 32;
```

To return to the default 16-bit frame checksum, delete the **fcs 32** statement from the configuration:

```
[edit]
user@host# delete interfaces t1-fpc/pic/port t1-options fcs 32
```

To explicitly configure a 16-bit checksum, include the **fcs 16** statement at the **[edit interfaces *interface-name* t1-options]** hierarchy level:

```
[edit interfaces interface-name t1-options]
fcs 16;
```

Configuring the T1 Remote Loopback Response

The T1 facilities data-link loop request signal is used to communicate various network information in the form of in-service monitoring and diagnostics. Extended superframe, through the facilities data link (FDL), supports nonintrusive signaling and control, thereby offering clear-channel communication. Remote loopback requests can be over the FDL or inband. To configure the router to respond to remote loopback requests, include the **remote-loopback-respond** statement at the **[edit interfaces *interface-name* t1-options]** hierarchy level:

```
[edit interfaces interface-name t1-options]
remote-loopback-respond;
```

By default, the router does not respond to remote loopback requests.

Configuring T1 Framing

By default, T1 interfaces use extended superframe framing format. You can configure SF (superframe) as an alternative.

To have the interface use the SF framing format, include the **framing** statement at the **[edit interfaces *interface-name* t1-options]** hierarchy level, specifying the **sf** option:

```
[edit interfaces interface-name t1-options]  
framing sf;
```

To explicitly configure ESF framing, include the **framing** statement at the **[edit interfaces *interface-name* t1-options]** hierarchy level, specifying the **esf** option:

```
[edit interfaces interface-name t1-options]  
framing esf;
```

Configuring T1 Line Encoding

By default, T1 interfaces use B8ZS line encoding. You can configure AMI line encoding if necessary.

To have the interface use AMI line encoding, include the **line-encoding** statement at the **[edit interfaces *interface-name* t1-options]** hierarchy level, specifying the **ami** option:

```
[edit interfaces interface-name t1-options]  
line-encoding ami;
```

To explicitly configure B8ZS line encoding, include the **line-encoding** statement at the **[edit interfaces *interface-name* t1-options]** hierarchy level, specifying the **b8zs** option:

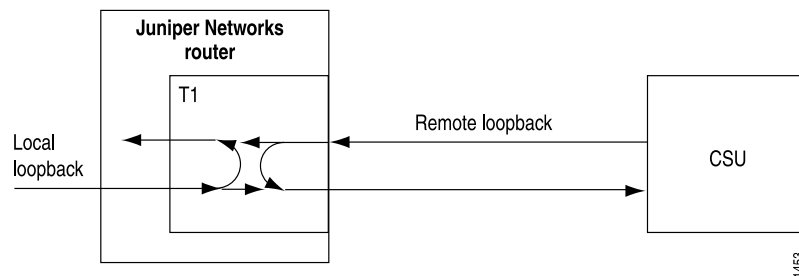
```
[edit interfaces interface-name t1-options]  
line-encoding b8zs;
```

For M Series and T Series routers, you must set the line encoding parameter for paired ports to the same value. Ports 0 and 1 must share the same value, and likewise ports 2 and 3 must share the same value, but ports 0 and 1 can have a different value from that of ports 2 and 3.

Configuring T1 Loopback Capability

You can configure loopback capability between the local T1 interface and the remote channel service unit (CSU), as shown in [Figure 1 on page 13](#). You can configure the loopback to be local or remote. With local loopback, the T1 interface can transmit packets to the CSU, but receives its own transmission back again and ignores data from the CSU. With remote loopback, packets sent from the CSU are received by the T1 interface, forwarded if there is a valid route, and immediately retransmitted to the CSU.

Figure 1: Remote and Local T1 Loopback



To configure loopback capability on a T1 interface, include the **loopback** statement at the **[edit interfaces *interface-name* t1-options]** hierarchy level:

```
[edit interfaces interface-name t1-options]
  loopback (local | payload | remote);
```

Packets can be looped on either the local router or the remote CSU. Local and remote loopback loop back both data and clocking information.

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.

For more information about configuring BERT, see [“Interface Diagnostics” on page 99](#). For more information about using operational mode commands to test interfaces, see the Junos OS Operational Mode Commands.

For channelized T3, T1, and NxDS0 intelligent queuing (IQ) interfaces only, you can include the **loopback payload** statement in the configuration to loop back data only (without clocking information) on the remote router's PIC. In payload loopback, overhead is recalculated. For T3 IQ interfaces, you can include the **loopback payload** statement at the **[edit interfaces *ct3-fpc/pic/port*]** and **[edit interfaces *t3-fpc/pic/port:channel*]** hierarchy levels. For T1 interfaces, you can include the **loopback payload** statement in the configuration at the **[edit interfaces *t1-fpc/pic/port:channel*]** hierarchy level; it is ignored if included at the **[edit interfaces *ct1-fpc/pic/port*]** hierarchy level. For NxDS0 interfaces, payload and remote loopback are the same. If you configure one, the other is ignored. NxDS0 IQ interfaces do not support local loopback.

To determine whether a problem is internal or external, you can loop packets on both the local and the remote router. To do this, include the **no-keepalives** and **encapsulation cisco-hdlc** statements at the **[edit interfaces *interface-name*]** hierarchy level and the **loopback local** statement at the **[edit interfaces *interface-name* t1-options]** hierarchy level, as shown in the following example:

```
[edit interfaces]
  t1-1/0/0 {
    no-keepalives;
    encapsulation cisco-hdlc;
    t1-options {
      loopback local;
    }
    unit 0 {
```

```
family inet {  
    address 10.100.100.1/24;  
}  
}
```



NOTE: To configure the CT1 loopback capability on the 16-port Channelized E1/T1 Circuit Emulation MIC (MIC-3D-16CHE1-T1-CE), use the `loopback` statement at the `[edit interfaces ct1-fpc/pic/port]` hierarchy level.

With this configuration, the link stays up, so you can loop ping packets to a remote router. The `loopback local` statement causes the interface to loop within the PIC just before the data reaches the transceiver.

To turn off the loopback capability, remove the `loopback` statement from the configuration:

```
[edit]  
user@host# delete interfaces t1-fpc/pic/port t1-options loopback
```

You can determine whether there is an internal problem or an external problem by checking the error counters in the output of the `show interface interface-name extensive` command, for example:

```
user@host> show interfaces t1-fpc/pic/port extensive
```

Related Documentation

- [Configuring E1 Loopback Capability](#)
- [Performing a Loopback Test on an Interface on page 106](#)

Configuring the T1 Idle Cycle Flag

By default, a T1 interface transmits the value 0x7E in the idle cycles. To have the interface transmit the value 0xFF (all ones) instead, include the `idle-cycle-flag` statement at the `[edit interfaces interface-name t1-options]` hierarchy level, specifying the `ones` option:

```
[edit interfaces interface-name t1-options]  
idle-cycle-flag ones;
```

To explicitly configure the default value of 0x7E, include the `idle-cycle-flag` statement with the `flags` option:

```
[edit interfaces interface-name t1-options]  
idle-cycle-flag flags;
```

Configuring T1 Start and End Flags

By default, a T1 interface shares the transmission of the start and end flags.

To configure a T1 interface to wait two idle cycles between the start and end flags, include the `start-end-flag` statement with the `filler` option at the `[edit interfaces interface-name t1-options]` hierarchy level:

```
[edit interfaces interface-name t1-options]
start-end-flag filler;
```

To revert to the default behavior, sharing the transmission of start and end flags, include the **start-end-flag** statement with the **shared** option at the **[edit interfaces *interface-name* t1-options]** hierarchy level:

```
[edit interfaces interface-name t1-options]
start-end-flag shared;
```

Configuring Fractional T1 Time Slots

By default, all the time slots on a T1 interface are used. To configure the number of time slots allocated to a fractional T1 interface, include the **timeslots** statement at the **[edit interfaces *interface-name* t1-options]** hierarchy level:

```
[edit interfaces interface-name t1-options]
timeslots time-slot-range;
```

For T1 interfaces, the time-slot range is from 1 through 24. There are 24 time slots on a T1 interface. You can designate any combination of time slots. To configure ranges, use hyphens. To configure discontinuous time slots, use commas. Do not include spaces.

Example: Configuring Fractional T1 Time Slots

Use Time Slots 1 Through 10	[edit interfaces <i>interface-name</i> t1-options] timeslots 1-10;
Use Time Slots 1 Through 5, 10, and 24	[edit interfaces <i>interface-name</i> t1-options] timeslots 1-5,10,24;
Use the First Four Odd-Numbered Time Slots	[edit interfaces <i>interface-name</i> t1-options] timeslots 1,3,5,7;

CHAPTER 3

Network Interfaces Configuration Statements and Hierarchy

- [\[edit interfaces\] Hierarchy Level on page 17](#)
- [\[edit logical-systems\] Hierarchy Level on page 33](#)

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

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



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

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

```
(loopback | no-loopback);
mc-ae{
  chassis-id chassis-id;
  mc-ae-id mc-ae-id;
  mode (active-active | active-standby);
  redundancy-group group-id;
  status-control (active | standby);
}
minimum-links number;
source-address-filter {
  mac-address;
}
(source-filtering | no-source-filtering);
}
aggregated-sonet-options {
  link-speed speed | mixed;
  minimum-links number;
}
atm-options {
  cell-bundle-size cells;
  ilmi;
  linear-red-profiles profile-name {
    high-plp-max-threshold percent;
    low-plp-max-threshold percent;
    queue-depth cells high-plp-threshold percent low-plp-threshold percent;
  }
}
mpls {
  pop-all-labels {
    required-depth number;
  }
}
pic-type (atm1 | atm2);
plp-to-clp;
promiscuous-mode {
  vpi vpi-identifier;
}
scheduler-maps map-name {
  forwarding-class class-name {
    epd-threshold cells plp1 cells;
    linear-red-profile profile-name;
    priority (high | low);
    transmit-weight (cells number | percent number);
  }
  vc-cos-mode (alternate | strict);
}
use-null-cw;
vpi vpi-identifier {
  maximum-vcs maximum-vcs;
  oam-liveness {
    down-count cells;
    up-count cells;
  }
}
oam-period (seconds | disable);
shaping {
  (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate
  burst length);
```

```

        queue-length number;
    }
}
clocking clock-source;
data-input (system | interface interface-name);
dce;
serial-options {
    clock-rate rate;
    clocking-mode (dce | internal | loop);
    control-polarity (negative | positive);
    cts-polarity (negative | positive);
    dcd-polarity (negative | positive);
    dce-options {
        control-signal (assert | de-assert | normal);
        cts (ignore | normal | require);
        dcd (ignore | normal | require);
        dsr (ignore | normal | require);
        dtr signal-handling-option;
        ignore-all;
        indication (ignore | normal | require);
        rts (assert | de-assert | normal);
        tm (ignore | normal | require);
    }
    dsr-polarity (negative | positive);
    dte-options {
        control-signal (assert | de-assert | normal);
        cts (ignore | normal | require);
        dcd (ignore | normal | require);
        dsr (ignore | normal | require);
        dtr signal-handling-option;
        ignore-all;
        indication (ignore | normal | require);
        rts (assert | de-assert | normal);
        tm (ignore | normal | require);
    }
    dtr-circuit (balanced | unbalanced);
    dtr-polarity (negative | positive);
    encoding (nrz | nrzi);
    indication-polarity (negative | positive);
    line-protocol protocol;
    loopback mode;
    rts-polarity (negative | positive);
    tm-polarity (negative | positive);
    transmit-clock invert;
}
description text;
dialer-options {
    pool pool-name <priority priority>;
}
disable;
ds0-options {
    bert-algorithm algorithm;
    bert-error-rate rate;
    bert-period seconds;
    byte-encoding (nx56 | nx64);

```

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

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```
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;
  interface {
    l2tp-interface-id name;
    (dedicated | shared);
  }
  dialer-options {
    activation-delay seconds;
    callback;
    callback-wait-period time;
    deactivation-delay seconds;
    dial-string [ dial-string-numbers ];
    idle-timeout seconds;
    incoming-map {
      caller (caller-id | accept-all);
      initial-route-check seconds;
      load-interval seconds;
      load-threshold percent;
      pool pool-name;
      redial-delay time;
      watch-list {
        [ routes ];
      }
    }
  }
  disable;
  disable-mlppp-inner-ppp-pfc;
  dlci dlci-identifier;
  drop-timeout milliseconds;
  dynamic-call-admission-control {
    activation-priority priority;
    bearer-bandwidth-limit kilobits-per-second;
  }
  encapsulation type;
```

```

epd-threshold cells plp1 cells;
fragment-threshold bytes;
inner-vlan-id-range start start-id end end-id;
input-vlan-map {
    (pop | pop-pop | pop-swap | push | push-push | swap | swap-push | swap-swap);
    inner-tag-protocol-id tpid;
    inner-vlan-id number;
    tag-protocol-id tpid;
    vlan-id number;
}
interleave-fragments;
inverse-arp;
layer2-policer {
    input-policer policer-name;
    input-three-color policer-name;
    output-policer policer-name;
    output-three-color policer-name;
}
link-layer-overhead percent;
minimum-links number;
mrru bytes;
multicast-dlci dlci-identifier;
multicast-vci vpi-identifier.vci-identifier;
multilink-max-classes number;
multipoint;
oam-liveness {
    down-count cells;
    up-count cells;
}
oam-period (seconds | disable);
output-vlan-map {
    (pop | pop-pop | pop-swap | push | push-push | swap | swap-push | swap-swap);
    inner-tag-protocol-id tpid;
    inner-vlan-id number;
    tag-protocol-id tpid;
    vlan-id number;
}
passive-monitor-mode;
peer-unit unit-number;
plp-to-clp;
point-to-point;
ppp-options {
    chap {
        access-profile name;
        default-chap-secret name;
        local-name name;
        passive;
    }
    compression {
        acfc;
        pfc;
        pap;
        default-pap-password password;
        local-name name;
        local-password password;
        passive;
    }
}

```

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

```

bundle ml-fpc/pic/port | ls-fpc/pic/port);
duplicate-protection;
dynamic-profile profile-name;
filter {
    group filter-group-number;
    input filter-name;
    input-list {
        [ filter-names ];
        output filter-name;
    }
    output-list {
        [ filter-names ];
    }
}
ipsec-sa sa-name;
keep-address-and-control;
max-sessions number;
max-sessions-vs-a-ignore;
mtu bytes;
multicast-only;
negotiate-address;
no-redirects;
policer {
    arp policer-template-name;
    input policer-template-name;
    output policer-template-name;
}
primary;
proxy inet-address address;
receive-options-packets;
receive-ttl-exceeded;
remote (inet-address address | mac-address address);
rpf-check {
    fail-filter filter-name;
    mode loose;
}
sampling {
    direction;
}
service {
    input {
        service-set service-set-name <service-filter filter-name>;
        post-service-filter filter-name;
    }
    output {
        service-set service-set-names <service-filter filter-name>;
    }
}
service-name-table table-name;
short-cycle-protection <lockout-time-min minimum-seconds lockout-time-max
    maximum-seconds>;
targeted-broadcast {
    forward-and-send-to-re;
    forward-only;
}
(translate-discard-eligible | no-translate-discard-eligible);

```

```

    (translate-fecn-and-becn | no-translate-fecn-and-becn);
    translate-plp-control-word-de;
    unnumbered-address interface-name <destination address destination-profile
        profile-name | preferred-source-address address>;
    address address {
        arp ip-address (mac | multicast-mac) mac-address <publish>;
        broadcast address;
        destination address;
        destination-profile name;
        eui-64;
        multipoint-destination address (dlci dlci-identifier | vci vci-identifier);
        multipoint-destination address {
            epd-threshold cells plp1 cells;
            inverse-arp;
            oam-liveness {
                up-count cells;
                down-count cells;
            }
            oam-period (seconds | disable);
            shaping {
                (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained
                    rate burst length);
                queue-length number;
            }
            vci vpi-identifier.vci-identifier;
        }
        preferred;
        primary;
        (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*
 - Junos® OS Ethernet Interfaces
 - Junos® OS Network Interfaces

[edit logical-systems] Hierarchy Level

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

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

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

```

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

```

```
input filter-name;  
input-list {  
    [ filter-names ];  
}  
output filter-name;  
output-list {  
    [ filter-names ];  
}  
}  
ipsec-sa sa-name;  
keep-address-and-control;  
mtu bytes;  
multicast-only;  
no-redirects;  
policer {  
    arp policer-template-name;  
    input policer-template-name;  
    output policer-template-name;  
}  
primary;  
proxy inet-address address;  
receive-options-packets;  
receive-ttl-exceeded;  
remote (inet-address address | mac-address address);  
rpf-check <fail-filter filter-name> {  
    <mode loose>;  
}  
sampling {  
    direction;  
}  
service {  
    input {  
        service-set service-set-name <service-filter filter-name>;  
        post-service-filter filter-name;  
    }  
    output {  
        service-set service-set-name <service-filter filter-name>;  
    }  
}  
(translate-discard-eligible | no-translate-discard-eligible);  
(translate-fecn-and-becn | no-translate-fecn-and-becn);  
unnumbered-address interface-name destination address destination-profile  
    profile-name;  
address address {  
    arp ip-address (mac | multicast-mac) mac-address <publish>;  
    broadcast address;  
    destination address;  
    destination-profile name;  
    eui-64;  
    multipoint-destination address (dlci dlci-identifier | vci vci-identifier);  
    multipoint-destination address {  
        epd-threshold cells plp1 cells;  
        inverse-arp;  
        oam-liveness {  
            up-count cells;  
            down-count cells;  
        }  
    }  
}
```

```

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

```

- Related Documentation**
- *Junos OS Hierarchy and RFC Reference*
 - Junos® OS Ethernet Interfaces
 - Junos® OS Network Interfaces

CHAPTER 4

Statement Summary

bert-algorithm

Syntax	<code>bert-algorithm <i>algorithm</i>;</code>
Hierarchy Level	<code>[edit interfaces ce1-fpc/pic/port],</code> <code>[edit interfaces ct1-fpc/pic/port],</code> <code>[edit interfaces interface-name ds0-options],</code> <code>[edit interfaces interface-name e1-options],</code> <code>[edit interfaces interface-name e3-options],</code> <code>[edit interfaces interface-name t1-options],</code> <code>[edit interfaces interface-name t3-options]</code>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.</p>
Description	Configure the pattern to send in the bit stream during a bit error rate test (BERT). Applies to T1, E3, T3, and multichannel DS3 interfaces, the channelized interfaces (DS3, OC12, STM1), and channelized IQ and IQE interfaces (E1, E3 and DS3).



NOTE: When configuring CE1 or CT1 interfaces on 10-port Channelized E1/T1 IQE PICs, the `bert-algorithm` statement must be included at the `[edit interfaces ce1-fpc/pic/port]` or `[edit interfaces ct1-fpc/pic/port]` hierarchy level as appropriate.

Options	<p><i>algorithm</i>—Pattern to send in the bit stream. There are two categories of test patterns: pseudorandom and repetitive. Both patterns conform to CCITT/ITU O.151, O.152, O.153, and O.161 standards. The algorithm can be one of the following patterns:</p> <ul style="list-style-type: none"> • all-ones-repeating—Pattern is all ones. • all-zeros-repeating—Pattern is all zeros. • alternating-double-ones-zeros—Pattern is alternating pairs of ones and zeros. • alternating-ones-zeros—Pattern is alternating ones and zeros. • pseudo-2e3—Pattern is $2^3 - 1$. • pseudo-2e4—Pattern is $2^4 - 1$. • pseudo-2e5—Pattern is $2^5 - 1$. • pseudo-2e6—Pattern is $2^6 - 1$. • pseudo-2e7—Pattern is $2^7 - 1$. • pseudo-2e9-o153—Pattern is $2^9 - 1$, as defined in the O153 standard. • pseudo-2e10—Pattern is $2^{10} - 1$. • pseudo-2e11-o152—Pattern is $2^{11} - 1$, as defined in the O152 standard.
----------------	---

- **pseudo-2e15-o151**—Pattern is $2^{15} - 1$, as defined in the O151 standard.
- **pseudo-2e17**—Pattern is $2^{17} - 1$.
- **pseudo-2e18**—Pattern is $2^{18} - 1$.
- **pseudo-2e20-o151**—Pattern is $2^{20} - 1$, as defined in the O151 standard.
- **pseudo-2e20-o153**—Pattern is $2^{20} - 1$, as defined in the O153 standard.
- **pseudo-2e21**—Pattern is $2^{21} - 1$.
- **pseudo-2e22**—Pattern is $2^{22} - 1$.
- **pseudo-2e23-o151**—Pattern is $2^{23} - 1$, as defined in the O151 standard.
- **pseudo-2e25**—Pattern is $2^{25} - 1$.
- **pseudo-2e28**—Pattern is $2^{28} - 1$.
- **pseudo-2e29**—Pattern is $2^{29} - 1$.
- **pseudo-2e31**—Pattern is $2^{31} - 1$.
- **pseudo-2e32**—Pattern is $2^{32} - 1$.
- **repeating-1-in-4**—One bit in four is set to 1; the others are set to 0.
- **repeating-1-in-8**—One bit in eight is set to 1; the others are set to 0.
- **repeating-3-in-24**—Three bits in twenty four are set to 1; the others are set to 0.

Default: pseudo-2e3

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

Related Documentation

- [Interface Diagnostics on page 99](#)
- Configuring E1 BERT Properties
- Configuring E3 BERT Properties
- [Configuring T1 BERT Properties on page 8](#)
- Configuring T3 BERT Properties
- Examples: Configuring T3 Interfaces
- [bert-error-rate on page 42](#)
- [bert-period on page 44](#)

bert-error-rate

Syntax	<code>bert-error-rate rate;</code>
Hierarchy Level	<code>[edit interfaces ce1-fpc/pic/port],</code> <code>[edit interfaces ct1-fpc/pic/port],</code> <code>[edit interfaces interface-name ds0-options],</code> <code>[edit interfaces interface-name e1-options],</code> <code>[edit interfaces interface-name e3-options],</code> <code>[edit interfaces interface-name t1-options],</code> <code>[edit interfaces interface-name t3-options]</code>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.</p>
Description	Configure the bit error rate to use in a BERT procedure. Applies to E1, E3, T1, or T3 interfaces, and to the channelized interfaces (DS3, OC3, OC12, and STM1).




NOTE: When configuring CE1 or CT1 interfaces on 10-port Channelized E1/T1 IQE PICs, the `bert-error-rate` statement must be included at the `[edit interfaces ce1-fpc/pic/port]` or `[edit interfaces ct1-fpc/pic/port]` hierarchy level as appropriate.

When configuring `t3-options bert-error-rate` on J Series routers, only 0 and 3 through 7 are valid values. If you enter 1 or 2, Junos OS will return the error message `configuration check-out failed`.

Options	<p>rate—Bit error rate.</p> <p>Range: 0 through 7, which corresponds to 10^{-1} (1 error per bit) to 10^{-7} (1 error per 10 million bits)</p> <p>Default: 0</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • bert-algorithm on page 40 • bert-period on page 44 • <code>ds0-options</code> • e1-options on page 50 • <code>e3-options</code> • t1-options on page 61 • <code>t3-options</code>


- [Interface Diagnostics on page 99](#)
- Configuring E1 BERT Properties
- Configuring E3 BERT Properties
- [Configuring T1 BERT Properties on page 8](#)
- Configuring T3 BERT Properties
- Examples: Configuring T3 Interfaces

bert-period

Syntax	<code>bert-period <i>seconds</i>;</code>
Hierarchy Level	<p>[edit interfaces <i>ce1-fpc/pic/port</i>], [edit interfaces <i>ct1-fpc/pic/port</i>], [edit interfaces <i>interface-name</i> <i>ds0-options</i>], [edit interfaces <i>interface-name</i> <i>e1-options</i>], [edit interfaces <i>interface-name</i> <i>e3-options</i>], [edit interfaces <i>interface-name</i> <i>t1-options</i>], [edit interfaces <i>interface-name</i> <i>t3-options</i>]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.</p>
Description	<p>Configure the duration of a BERT test. Applies to E1, E3, T1, and T3 interfaces, and to E1, E3, T1, and T3 partitions on the channelized interfaces (CE1, CT1, DS3, OC3, OC12, OC48, STM1, STM4, and STM16).</p> <p>E1 and T1 IQ, IQE, and standard interfaces support an extended BERT period range, up to 86,400 seconds (24 hours).</p> <div style="border: 1px solid #ccc; padding: 10px; margin-top: 10px;"> <p> NOTE: When configuring CE1 or CT1 interfaces on 10-port Channelized E1/T1 IQE PICs, the <code>bert-period</code> statement must be included at the [edit interfaces <i>ce1-fpc/pic/port</i>] or [edit interfaces <i>ct1-fpc/pic/port</i>] hierarchy level as appropriate.</p> </div>
Options	<p><i>seconds</i>—Test duration. Range and default values vary by interface type.</p> <p>Range:</p> <ul style="list-style-type: none"> PIC-dependent—Normal BERT period: either 1 through 239 seconds or 1 through 240 seconds PIC-dependent—Extended BERT period: from 1 through 86,400 seconds <p>Default:</p> <ul style="list-style-type: none"> Normal BERT period: 10 seconds Extended BERT period (on supported E1 interfaces): 10 seconds Extended BERT period (on supported T1 interfaces): 240 seconds
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Interface Diagnostics on page 99 Configuring E1 BERT Properties

- Configuring E3 BERT Properties
- [Configuring T1 BERT Properties on page 8](#)
- Configuring T3 BERT Properties
- [bert-algorithm on page 40](#)
- [bert-error-rate on page 42](#)

buildout (T1 Interfaces)

Syntax	<code>buildout value;</code>
Hierarchy Level	<code>[edit interfaces ct1-fpc/pic/port]</code> <code>[edit interfaces interface-name t1-options]</code>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.</p>
Description	For T1 interfaces, set the buildout value.
	<div>  <p>NOTE: When configuring CT1 interfaces on 10-port Channelized E1/T1 IQE PICs and 16-Port Channelized E1/T1 Circuit Emulation MICs, the <code>buildout</code> statement must be included at the hierarchy level.</p> </div>
Default	The default buildout value is 0 through 132 feet.
Options	<p>You can set the buildout value to one of the following:</p> <ul style="list-style-type: none"> • 0-132—0 through 132 feet (0 through 40 meters) • 133-265—133 through 265 feet (40 through 81 meters) • 266-398—266 through 398 feet (81 through 121 meters) • 399-531—399 through 531 feet (121 through 162 meters) • 532-655—532 through 655 feet (162 through 200 meters) • long-0db—For J Series routers only, long buildout with 0 decibel (dB) transmit attenuation • long-7.5db—For MX Series and J Series routers only, long buildout with 7.5 dB transmit attenuation • long-15db—For MX Series and J Series routers only, long buildout with 15 dB transmit attenuation • long-22.5db—For MX Series and J Series routers only, long buildout with 22.5 dB transmit attenuation
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring the T1 Buildout on page 9 • <i>Junos OS Interfaces and Routing Configuration Guide</i>

byte-encoding

Syntax	byte-encoding (nx56 nx64);
Hierarchy Level	[edit interfaces <i>t1-fpc/pic/port</i>], [edit interfaces <i>interface-name</i> ds0-options], [edit interfaces <i>interface-name</i> t1-options]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.
Description	Set the byte encoding on a DS0 or T1 interface to use 7 bits per byte or 8 bits per byte.



NOTE: When configuring T1 interfaces on the 10-port Channelized E1/T1 IQE PIC, the **byte-encoding** statement must be included at the [edit interfaces *t1-fpc/pic/port*] hierarchy level.

Default	The default byte encoding is 8 bits per byte (nx64).
Options	nx56 —Use 7 bits per byte. nx64 —Use 8 bits per byte.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring T1 Byte Encoding on page 9

crc-major-alarm-threshold

Syntax	crc-major-alarm-threshold (1e-3 5e-4 1e-4 5e-5 1e-5);
Hierarchy Level	[edit interfaces <i>interface-name</i> t1-options]
Release Information	Statement introduced in Junos OS Release 8.5. Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.
Description	Major alarm error thresholds for T1 CRC errors. When the threshold is exceeded for one second, a defect condition is declared. If the defect condition continues for the monitoring period, an alarm condition is declared.
Default	10-second monitoring period for all settings except 1e-5. The 1e-5 value uses a 50-second monitoring period.
Options	rate —Error rate expressed as the number of errors per number of bits. The value 1e-3 is one error in 10 ⁻³ bits and 5e-4 is five errors in 10 ⁻⁴ bits. Default: 5e-5
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring T1 CRC Error Major Alarm Thresholds on page 10

crc-minor-alarm-threshold

Syntax	crc-minor-alarm-threshold (1e-3 5e-4 1e-4 5e-5 1e-5 5e-6 1e-6);
Hierarchy Level	[edit interfaces <i>interface-name</i> t1-options]
Release Information	Statement introduced in Junos OS Release 8.5. Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.
Description	Minor alarm error thresholds for T1 CRC errors. When the threshold is exceeded for one second, a defect condition is declared. If the defect condition continues for the monitoring period, an alarm condition is declared.
Default	10-second monitoring period for values 1e-3, 5e-4, 1e-4, and 5e-5. The 1e-5 value uses a 50-second monitoring period. The 5e-6 value uses a 100-second monitoring period. The 1e-6 value uses a 500-second monitoring period.
Options	rate —Error rate expressed as the number of errors per number of bits. The value 1e-3 is one error in 10^{-3} bits and 5e-4 is five errors in 10^{-4} bits. Default: 5e-6
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring T1 CRC Error Minor Alarm Thresholds on page 10

e1-options

Syntax e1-options {
 bert-algorithm *algorithm*;
 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*;
 }

Hierarchy Level [edit interfaces *interface-name*]

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

Description Configure E1-specific physical interface properties.


 The statements are explained separately.

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


Related Documentation

- Channelized E1 IQ and IQE Interfaces Overview
- Channelized STM1 Interfaces Overview
- E1 Interfaces Overview
- [T1 Interfaces Overview on page 3](#)

fast-aps-switch

Syntax	fast-aps-switch;
Hierarchy Level	[edit interfaces <i>interface-name</i> sonet-options aps]
Release Information	Statement introduced in Junos OS Release 12.1.
Description	(M320 routers with Channelized OC3/STM1 Circuit Emulation PIC with SFP only) Reduce the Automatic Protection Switching (APS) switchover time in Layer 2 circuits.
	<div>  <p>NOTE:</p> <ul style="list-style-type: none"> Configuring this statement reduces the APS switchover time only when the Layer 2 circuit encapsulation type for the interface receiving traffic from a Layer 2 circuit neighbor is SAToP. When the fast-aps-switch statement is configured in revertive APS mode, you must configure an appropriate value for revert time to achieve reduction in APS switchover time. To prevent the logical interfaces in the data path from being shut down, configure appropriate hold-time values on all the interfaces in the data path that support TDM. The fast-aps-switch statement cannot be configured when the APS annex-b option is configured. The interfaces that have the fast-aps-switch statement configured cannot be used in virtual private LAN service (VPLS) environments. </div>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Reducing APS Switchover Time in Layer 2 Circuits

fcs

Syntax	fcs (16 32);
Hierarchy Level	[edit interfaces e1- <i>fpc/pic/port</i>], [edit interfaces t1- <i>fpc/pic/port</i>], [edit interfaces <i>interface-name</i> ds0-options], [edit interfaces <i>interface-name</i> e1-options], [edit interfaces <i>interface-name</i> e3-options], [edit interfaces <i>interface-name</i> sonet-options], [edit interfaces <i>interface-name</i> t1-options], [edit interfaces <i>interface-name</i> t3-options]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.
Description	<p>For E1/E3, SONET/SDH, and T1/T3 interfaces, configure the frame checksum (FCS) on the interface. The checksum must be the same on both ends of the interface.</p> <p>On a channelized OC12 interface, the SONET/SDH fcs statement is not supported. To configure FCS on each DS3 channel, you must include the t3-options fcs statement in the configuration for each channel. For SONET/SDH, the channelized OC12 interface supports DS3 to STS-1 to OC12. For SDH, the channelized OC12 interface supports NxDS3 to NxVC3 to AU3 to STM.</p> <div style="border: 1px solid #ccc; padding: 10px; margin-top: 10px;">  <p>NOTE: When configuring E1 or T1 interfaces on 10-port Channelized E1/T1 IQE PICs, the fcs statement must be included at the [edit interfaces e1-<i>fpc/pic/port</i>] or [edit interfaces t1-<i>fpc/pic/port</i>] hierarchy level as appropriate.</p> </div>
Options	<p>16—Use a 16-bit frame checksum on the interface.</p> <p>32—Use a 32-bit frame checksum on the interface. Using a 32-bit checksum provides more reliable packet verification, but some older equipment might not support 32-bit checksums.</p> <p>Default: 16</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring the E1 Frame Checksum Configuring the E3 Frame Checksum Configuring the SONET/SDH Frame Checksum Configuring the T1 Frame Checksum on page 11 Configuring the T3 Frame Checksum

framing (E1, E3, and T1 Interfaces)


Syntax	<code>framing (g704 g704-no-crc4 g.751 g.832 unframed sf esf);</code>
Hierarchy Level	[edit interfaces <i>ce1-fpc/pic/port</i>], [edit interfaces <i>ct1-fpc/pic/port</i>], [edit interfaces <i>at-fpc/pic/port</i> e3-options], [edit interfaces <i>e1-fpc/pic/port</i> e1-options], [edit interfaces <i>t1-fpc/pic/port</i> t1-options]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.
Description	Configure the framing format.



NOTE: When configuring CE1 or CT1 interfaces on 10-port Channelized E1/T1 IQE PICs, the `framing` statement must be included at the [edit interfaces *ce1-fpc/pic/port*] or [edit interfaces *ct1-fpc/pic/port*] hierarchy level as appropriate.

Default	<code>esf</code> for T1 interfaces; <code>g704</code> for E1 interfaces. There is no default value for E3 over ATM interfaces.
Options	<p><code>esf</code>—Extended superframe (ESF) mode for T1 interfaces.</p> <p><code>g704</code>—G.704 framing format for E1 interfaces.</p> <p><code>g704-no-crc4</code>—G.704 framing with no cyclic redundancy check 4 (CRC4) for E1 interfaces.</p> <p><code>g.751</code>—G.751 framing format for E3 over ATM interfaces.</p> <p><code>g.832</code>—G.832 framing format for E3 over ATM interfaces.</p> <p><code>sf</code>—Superframe (SF) mode for T1 interfaces.</p> <p><code>unframed</code>—Unframed mode for E1 interfaces.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring E1 Framing Configuring E3 and T3 Parameters on ATM Interfaces Configuring T1 Framing on page 12

idle-cycle-flag

Syntax	<code>idle-cycle-flag <i>value</i>;</code>
Hierarchy Level	<code>[edit interfaces e1-fpc/pic/port],</code> <code>[edit interfaces t1-fpc/pic/port],</code> <code>[edit interfaces <i>interface-name</i> ds0-options],</code> <code>[edit interfaces <i>interface-name</i> e1-options],</code> <code>[edit interfaces <i>interface-name</i> e3-options],</code> <code>[edit interfaces <i>interface-name</i> serial-options],</code> <code>[edit interfaces <i>interface-name</i> t1-options],</code> <code>[edit interfaces <i>interface-name</i> t3-options]</code>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.</p>
Description	Configure the value that the DS0, E1, E3, T1, or T3 interface transmits during idle cycles.
<div>  <p>NOTE: When configuring E1 or T1 interfaces on 10-port Channelized E1/T1 IQE PICs, the <code>idle-cycle-flag</code> statement must be included at the <code>[edit interfaces e1-fpc/pic/port]</code> or <code>[edit interfaces t1-fpc/pic/port]</code> hierarchy level as appropriate.</p> </div>	
Options	<p>value—Value to transmit in the idle cycles:</p> <ul style="list-style-type: none"> flags—Transmit the value 0x7E. ones—Transmit the value 0xFF (all ones). <p>Default: Flags</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring the E1 Idle Cycle Flag Configuring the E3 Idle Cycle Flag Configuring the T1 Idle Cycle Flag on page 14 Configuring the T3 Idle Cycle Flag

invert-data

Syntax	invert-data;
Hierarchy Level	[edit interfaces e1- <i>fpc/pic/port</i>], [edit interfaces t1- <i>fpc/pic/port</i>], [edit interfaces <i>interface-name</i> ds0-options], [edit interfaces <i>interface-name</i> e1-options], [edit interfaces <i>interface-name</i> t1-options], [edit interfaces <i>interface-name</i> e3-options]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.
Description	Invert the transmission of unused data bits on the DS0, E1, E3, and T1 interface.



NOTE: When configuring E1 or T1 interfaces on 10-port Channelized E1/T1 IQE PICs, the invert-data statement must be included at the [edit interfaces e1-*fpc/pic/port*] or [edit interfaces t1-*fpc/pic/port*] hierarchy level as appropriate.

Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring E1 Data Inversion Configuring E3 Data Inversion Configuring T1 Data Inversion on page 11

line-encoding

Syntax	line-encoding (ami b8zs);
Hierarchy Level	[edit interfaces <i>ct1-fpc/pic/port</i>], [edit interfaces <i>interface-name</i> t1-options]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.
Description	Set the line encoding format on the T1 interface.



NOTE: When configuring CT1 interfaces on the 10-port Channelized E1/T1 IQE PIC, the **line-encoding** statement must be included at the [edit interfaces *ct1-fpc/pic/port*] hierarchy level.

Default	The default line encoding is B8ZS.
Options	ami —Use Alternate Mark Inversion (AMI) line encoding. b8zs —Use bipolar with 8-zeros substitution (B8ZS) line encoding.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring T1 Line Encoding on page 12

loopback (ADSL, DS0, E1/E3, SONET/SDH, SHDSL, and T1/T3)

Syntax	<code>loopback (local payload remote);</code>
Hierarchy Level	<code>[edit interfaces ce1-<i>fpc/pic/port</i>],</code> <code>[edit interfaces ct1-<i>fpc/pic/port</i>],</code> <code>[edit interfaces t1-<i>fpc/pic/port</i>],</code> <code>[edit interfaces <i>interface-name</i> ds0-options],</code> <code>[edit interfaces <i>interface-name</i> dsl-options],</code> <code>[edit interfaces <i>interface-name</i> e1-options],</code> <code>[edit interfaces <i>interface-name</i> e3-options],</code> <code>[edit interfaces <i>interface-name</i> shdsl-options],</code> <code>[edit interfaces <i>interface-name</i> sonet-options],</code> <code>[edit interfaces <i>interface-name</i> t1-options],</code> <code>[edit interfaces <i>interface-name</i> t3-options]</code>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.</p>
Description	Configure a loopback connection. To turn off the loopback capability, remove the loopback statement from the configuration.



NOTE: When configuring CE1 or CT1 interfaces on 10-port Channelized E1/T1 IQE PICs, the **loopback** statement must be included with the **local** or **remote** option at the `[edit interfaces ce1-fpc/pic/port]` or `[edit interfaces ct1-fpc/pic/port]` hierarchy level as appropriate.

When configuring T1 interfaces on 10-port Channelized E1/T1 IQE PICs, the **loopback** statement must be included with the **payload** option at the `[edit interfaces t1-fpc/pic/port]` hierarchy level.



NOTE: When configuring CE1 or CT1 interfaces on the 16-port Channelized E1/T1 MIC (MIC-3D-16CHE1-T1-CE), you must include the **loopback** statement at the `[edit interfaces ce1-fpc/pic/port]` hierarchy level, or `[edit interfaces ct1-fpc/pic/port]`

To configure loopback on channelized IQ and IQE PICs, SONET/SDH level, use the **sonet-options loopback** statement **local** and **remote** options at the controller interface (`coc48`, `cstm16`, `coc12`, `cstm4`, `coc3`, `cstm1`). It is ignored for path-level interfaces `so-fpc/pic/port` or `so-fpc/pic/port:channel`.

Options **local**—Loop packets, including both data and timing information, back on the local router's PIC. NxDS0 IQ interfaces do not support local loopback.

payload—For channelized T3, T1, and NxDSO IQ interfaces only, loop back data only (without clocking information) on the remote router's PIC. With payload loopback, overhead is recalculated. Neither ATM-over-asymmetrical digital subscriber line (ADSL) interfaces nor ATM-over-SHDSL interfaces support payload loopback.

remote—Loop packets, including both data and timing information, back on the remote router's interface card. NxDSO IQ interfaces do not support remote loopback.

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

Related Documentation

- Configuring E3 and T3 Parameters on ATM Interfaces
- Configuring E1 Loopback Capability
- Configuring E3 Loopback Capability
- Configuring SONET/SDH Loopback Capability
- Configuring SHDSL Operating Mode on an ATM Physical Interface
- [Configuring T1 Loopback Capability on page 12](#)
- Configuring T3 Loopback Capability
- feac-loop-respond

remote-loopback-respond


Syntax	remote-loopback-respond;
Hierarchy Level	[edit interfaces <i>ct1-fpc/pic/port</i>], [edit interfaces <i>interface-name</i> t1-options]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.
Description	For T1 interfaces only, configure the router to respond to remote loopback requests. Remote loopback requests can be from the facilities data link or inband.



NOTE: When configuring CT1 interfaces on the 10-port Channelized E1/T1 IQE PIC, the `remote-loopback-respond` statement must be included at the [edit interfaces *ct1-fpc/pic/port*] hierarchy level.

Default	The router does not respond to remote loop requests.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring the T1 Remote Loopback Response on page 11 • <code>feac-loop-respond</code> • loopback (ADSL, DS0, E1/E3, SONET/SDH, SHDSL, and T1/T3) on page 57

start-end-flag

Syntax	start-end-flag (filler shared);
Hierarchy Level	[edit interfaces e1- <i>fpc/pic/port</i>], [edit interfaces t1- <i>fpc/pic/port</i>], [edit interfaces <i>interface-name</i> ds0-options], [edit interfaces <i>interface-name</i> e1-options], [edit interfaces <i>interface-name</i> e3-options], [edit interfaces <i>interface-name</i> t1-options], [edit interfaces <i>interface-name</i> t3-options]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.
Description	For DS0, E1, E3, T1, and T3 interfaces, configure the interface to share the transmission of start and end flags.
	<div>  <p>NOTE: When configuring E1 or T1 interfaces on the 10-port Channelized E1/T1 IQE PIC, the start-end-flag statement must be included at the [edit interfaces e1-<i>fpc/pic/port</i>] or [edit interfaces t1-<i>fpc/pic/port</i>] hierarchy level as appropriate.</p> </div>
Options	filler—Wait two idle cycles between the start and end flags. shared—Share the transmission of the start and end flags. This is the default.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring E1 Start and End Flags Configuring the E3 Start and End Flags Configuring T1 Start and End Flags on page 14 Configuring T3 Start and End Flags

t1-options

Syntax	<pre> t1-options { bert-algorithm <i>algorithm</i>; bert-error-rate <i>rate</i>; bert-period <i>seconds</i>; buildout <i>value</i>; 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 <i>time-slot-range</i>; } </pre>
Hierarchy Level	[edit interfaces <i>interface-name</i>]
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.</p>
Description	<p>Configure T1-specific physical interface properties.</p> <p>The statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • T1 Interfaces Overview on page 3

timeslots

Syntax	<code>timeslots <i>time-slot-range</i>;</code>
Hierarchy Level	<code>[edit interfaces <i>e1-fpc/pic/port</i>],</code> <code>[edit interfaces <i>t1-fpc/pic/port</i>],</code> <code>[edit interfaces <i>interface-name</i> e1-options],</code> <code>[edit interfaces <i>interface-name</i> partition <i>partition-number</i>],</code> <code>[edit interfaces <i>interface-name</i> t1-options]</code>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For E1 and T1 interfaces, allocate the specific time slots by number.



NOTE: When configuring E1 or T1 interfaces on the 10-port Channelized E1/T1 IQE PIC, the `timeslots` statement must be included at the `[edit interfaces e1-fpc/pic/port]` or `[edit interfaces t1-fpc/pic/port]` hierarchy level as appropriate.

Options	<p><i>time-slot-range</i>—Actual time slot numbers allocated:</p> <p>Range: Ranges vary by interface type and configuration option as follows:</p> <ul style="list-style-type: none"> • 1 through 24 for T1 interfaces (0 is reserved) • 1 through 31 for 4-port E1 PICs (0 is reserved) • 1 through 31 for NxDS0 interfaces (0 is reserved) • 2 through 32 for 10-port Channelized E1 and 10-port Channelized E1 IQ PICs (1 is reserved) • 2 through 32 for the setting under e1-options with IQE PICs (1 is reserved) (when creating fractional E1) • 1 through 31 for the setting under partition with IQE PICs (0 is reserved) (when creating NxDS0)
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NOTE: When creating fractional E1 interfaces only, if you connect a 4-port E1 PIC interface to a device that uses time slot numbering from 2 through 32, you must subtract 1 from the configured number of time slots.

Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring Fractional E1 IQ and IQE Interfaces • Configuring Fractional T1 IQ and IQE Interfaces

- Configuring Fractional E1 Time Slots
- [Configuring Fractional T1 Time Slots on page 15](#)
- Configuring a Channelized T1/E1 Interface to Drop and Insert Time Slots

PART 3

Administration

- [Monitoring Commands on page 67](#)
- [Command Summary on page 93](#)

CHAPTER 5

Monitoring Commands

show interfaces (T1, E1, or DS)

Syntax	<code>show interfaces <i>interface-type</i></code> <code><brief detail extensive terse></code> <code><descriptions></code> <code><media></code> <code><snmp-index <i>snmp-index</i>></code> <code><statistics></code>
Release Information	Command introduced before Junos OS Release 7.4.
Description	Display status information about the specified T1, E1, or DS interface.
Options	<p><i>interface-type</i>—On ACX Series, M Series, MX Series, and T Series routers, the T1 interface type is <i>t1-fpc/pic/port</i>, whereas the E1 interface type is <i>e1-fpc/pic/port</i>, and DS interface type is <i>ds-fpc/pic/port:<channel></i>. On the J Series routers, the T1 interface type is <i>t1-pim/O/port</i>, whereas the E1 interface type is <i>e1-pim/O/port</i>.</p> <p><i>brief detail extensive terse</i>—(Optional) Display the specified level of output.</p> <p><i>descriptions</i>—(Optional) Display interface description strings.</p> <p><i>media</i>—(Optional) Display media-specific information about network interfaces.</p> <p><i>snmp-index snmp-index</i>—(Optional) Display information for the specified SNMP index of the interface.</p> <p><i>statistics</i>—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none">• Understanding Interfaces on ACX Series Universal Access Routers
List of Sample Output	show interfaces (T1, IMA Link) on page 81 show interfaces (T1, PPP) on page 81 show interfaces detail (T1, PPP) on page 82 show interfaces extensive (T1 CRC Errors) on page 82 show interfaces extensive (T1, PPP) on page 83 show interfaces (E1, Frame Relay) on page 84 show interfaces detail (E1, Frame Relay) on page 85 show interfaces extensive (E1, Frame Relay) on page 86 show interfaces (E1, IMA Link) on page 88 show interfaces extensive (T1, TDM-CCC-SATOP) on page 89 show interfaces extensive (DS, TDM-CCC-CESoPSN) on page 91
Output Fields	Table 3 on page 69 lists the output fields for the show interfaces (T1 or E1) command. Output fields are listed in the approximate order in which they appear.

Table 3: T1 or E1 show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface. Possible values are described in the “Enabled Field” section under Common Output Fields Description.	All levels
Interface index	Physical interface's index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	SNMP index number for the physical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Link-level type	Encapsulation being used on the physical interface.	All levels
MTU	MTU size on the physical interface.	All levels
Clocking	Reference clock source: Internal or External .	All levels
Speed	Speed at which the interface is running.	All levels
Loopback	Whether loopback is enabled and the type of loopback (local or remote).	All levels
FCS	Frame check sequence on the interface (either 16 or 32). The default is 16 bits.	All levels
Framing	Physical layer framing format used for the E1 interface on the link: G704 , G704-NO-CRC4 , or Unframed . The default is G704 . Physical layer framing format used for the T1 interface on the link: SF and ESF . The default is ESF .	All levels
Device flags	Information about the physical device. Possible values are described in the “Device Flags” section under Common Output Fields Description.	All levels
Interface flags	Information about the interface. Possible values are described in the “Interface Flags” section under Common Output Fields Description.	All levels
Link flags	Information about the link. Possible values are described in the “Link Flags” section under Common Output Fields Description.	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	detail extensive

Table 3: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
IMA Link alarms	Current active IMA link alarms, including the following: <ul style="list-style-type: none"> • LIF • LODS • RFI-IMA • Tx-Mis-Connected • Tx-Unusable-FE • Rx-Unusable-FE • Link Fault 	detail extensive none
IMA Link defects	Current active IMA link defects, including the following: <ul style="list-style-type: none"> • LIF • LODS • RFI-IMA • Tx-Mis-Connected • Tx-Unusable-FE • Rx-Unusable-FE • Link Fault 	detail extensive none
IMA Link state	Current active IMA link status, including the following: <ul style="list-style-type: none"> • Line: synchronized or not synchronized • Near end:—Status of near-end receive and transmit links <ul style="list-style-type: none"> • Rx: Usable or Unusable • Tx: Usable or Unusable • Far end:—Status of far-end receive and transmit links <ul style="list-style-type: none"> • Rx: Usable or Unusable • Tx: Usable or Unusable 	detail extensive none

Table 3: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
IMA link media	<p>IMA Link Media Status, which provides the seconds and count state for the following link media parameters:</p> <ul style="list-style-type: none"> • LIF • LODS • Err-ICP • IV • Rx-FC • Tx-FC • FE-Defects • FE-Rx-FC • FE-Tx-FC • Rx-ICP • Rx-Stuff • Tx-ICP • Tx-Stuff • Rx-SES • Rx-UAS • Rx-UUS • Tx-UUS • FE-Rx-SES • FE-Rx-UAS • FE-Rx-UUS • FE-Tx-UUS 	detail extensive none
Keepalive settings	<p>(PPP and HDLC) Configured settings for keepalives.</p> <ul style="list-style-type: none"> • interval seconds—The time in seconds between successive keepalive requests. The range is 10 seconds through 32,767 seconds, with a default of 10 seconds. • down-count number—The 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. • up-count number—The 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. 	detail extensive none
Keepalive statistics	<p>(PPP and HDLC) Information about keepalive packets. (When no level of output is specified, the word statistics is not part of the field name and the last seen text is not displayed.)</p> <ul style="list-style-type: none"> • Input—Number of keepalive packets received by PPP. <ul style="list-style-type: none"> • (last seen 00:00:00 ago)—Time since the last keepalive packet was received, in the format <i>hh:mm:ss</i>. • Output—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"> • (last seen 00:00:00 ago)—Time since the last keepalive packet was sent, in the format <i>hh:mm:ss</i>. 	detail extensive none

Table 3: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
LMI settings	<p>(Frame Relay) Settings for Local Management Interface (LMI) which can be either ANSI LMI settings or ITU LMI settings. ANSI LMI settings is the default. The format is (ANSI or ITU) LMI settings: value, value... xx seconds, where <i>value</i> can be:</p> <ul style="list-style-type: none"> • n391dte—DTE full status polling interval (1–255) • n392dce—DCE error threshold (1–10) • n392dte—DTE error threshold (1–10) • n393dce—DCE monitored event count (1–10) • n393dte—DTE monitored event count (1–10) • t391dte—DTE polling timer (5–30 seconds) • t392dce—DCE polling verification timer (5–30 seconds) 	detail extensive none
LMI	<p>(Frame Relay) Local Management Interface (LMI) packet statistics:</p> <ul style="list-style-type: none"> • Input—Number of packets coming in on the interface (<i>nn</i>) and how much time has passed since the last packet arrived. The format is Input: nn (last seen hh:mm:ss ago). • Output—Number of packets sent out on the interface (<i>nn</i>) and how much time has passed since the last packet was sent. The format is Output: nn (last sent hh:mm:ss ago). 	detail extensive none
DTE statistics	<p>(Frame Relay) Statistics about messages transmitted from the data terminal equipment (DTE) to the data communications equipment (DCE):</p> <ul style="list-style-type: none"> • Enquiries sent—Number of link status enquiries sent from the DTE to the DCE. • Full enquiries sent—Number of full enquiries sent from the DTE to the DCE. • Enquiry responses received—Number of enquiry responses received by the DTE from the DCE. • Full enquiry responses received—Number of full enquiry responses sent from the DTE to the DCE. 	detail extensive none
DCE statistics	<p>(Frame Relay) Statistics about messages transmitted from the DCE to the DTE:</p> <ul style="list-style-type: none"> • Enquiries received—Number of enquiries received by the DCE from the DTE. • Full enquiries received—Number of full enquiries received by the DCE from the DTE. • Enquiry responses sent—Number of enquiry responses sent from the DCE to the DTE. • Full enquiry responses sent—Number of full enquiry responses sent from the DCE to the DTE. 	detail extensive none

Table 3: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Common statistics	(Frame Relay) Statistics about messages sent between the DTE and the DCE: <ul style="list-style-type: none"> • Unknown messages received—Number of received packets that do not fall into any category. • Asynchronous updates received—Number of link status peer changes received. • Out-of-sequence packets received—Number of packets for which the sequence of the packets received is different from the expected sequence. • Keepalive responses timedout—Number of keepalive responses that timed out when no Local Management Interface (LMI) packet was reported for <code>n392dte</code> or <code>n393dce</code> intervals. (See LMI settings.) 	detail extensive none
Nonmatching DCE-end DLCIs	(Frame Relay. Displayed only from the DTE.) Number of DLCIs configured from the DCE.	detail extensive none
LCP state	(PPP) Link Control Protocol state. <ul style="list-style-type: none"> • Conf-ack-received—Acknowledgement was received. • Conf-ack-sent—Acknowledgement was sent. • Conf-req-sent—Request was sent. • Down—LCP negotiation is incomplete (not yet completed or has failed). • Not configured—LCP is not configured on the interface. • Opened—LCP negotiation is successful. 	detail extensive none
NCP state	(PPP) Network Control Protocol state. <ul style="list-style-type: none"> • Conf-ack-received—Acknowledgement was received. • Conf-ack-sent—Acknowledgement was sent. • Conf-req-sent—Request was sent. • Down—NCP negotiation is incomplete (not yet completed or has failed). • Not configured—NCP is not configured on the interface. • Opened—NCP negotiation is successful. 	detail extensive none
CHAP state	(PPP) State of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. <ul style="list-style-type: none"> • Chap-Chal-received—Challenge was received but response is not yet sent. • Chap-Chal-sent—Challenge was sent. • Chap-Resp-received—Response was received for the challenge sent, but CHAP has not yet moved into the Success state. (Most likely with RADIUS authentication.) • Chap-Resp-sent—Response was sent for the challenge received. • Down—CHAP authentication is incomplete (not yet completed or has failed). • Not-configured—CHAP is not configured on the interface. • Opened—CHAP authentication was successful. 	detail extensive none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is Last flapped: year-month-day hour:minute:second timezone (hour:minute:second ago) . For example, Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago) .	detail extensive none

Table 3: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
CoS Queues	Number of CoS queues configured.	detail extensive none
Input rate	Input rate in bits per second (bps) and packets per second (pps).	None specified
Output rate	Output rate in bps and pps.	None specified
Statistics last cleared	Time when the statistics for the interface were last set to zero.	detail extensive
Traffic statistics	<p>Number and rate of bytes and packets received and transmitted on the physical interface.</p> <ul style="list-style-type: none"> • Input bytes—Number of bytes received on the interface. • Output bytes—Number of bytes transmitted on the interface. • Input packets—Number of packets received on the interface • Output packets—Number of packets transmitted on the interface. 	detail extensive
Input errors	<p>Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Errors—Sum of the incoming frame aborts and FCS errors. • Drops—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Framing errors—Number of packets received with an invalid frame checksum (FCS). • Policed discards—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle. • L3 incompletes—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. • L2 channel errors—Number of times the software did not find a valid logical interface for an incoming frame. • L2 mismatch timeouts—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • HS link CRC errors—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces. • SRAM errors—Number of hardware errors that occurred in the static RAM (SRAM) on the PIC or PIM. If the value of this field increments, the PIC or PIM is malfunctioning. • Resource errors—Sum of transmit drops. 	extensive

Table 3: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Output errors	<p>Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:</p> <ul style="list-style-type: none"> • Carrier transitions—Number of times the interface has gone from down to up. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC or PIM is malfunctioning. • Errors—Sum of the outgoing frame aborts and FCS errors. • Drops—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • Aged packets—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • MTU errors—Number of packets whose size exceeded the MTU of the interface. • Resource errors—Sum of transmit drops. 	extensive
Queue counters	<p>CoS queue number and its associated user-configured forwarding class name.</p> <ul style="list-style-type: none"> • Queued packets—Number of queued packets. • Transmitted packets—Number of transmitted packets. • Dropped packets—Number of packets dropped by the ASIC's RED mechanism. 	detail extensive
DS1 alarms DS1 defects	<p>E1 media-specific defects that can prevent the interface from passing packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface. The following lists all possible alarms and defects. For complete explanations of most of these alarms and defects, see <i>Bellcore Telcordia GR-499-CORE</i>.</p> <ul style="list-style-type: none"> • AIS—Alarm indication signal. • LOF—Loss of frame. • LOS—Loss of signal. • YLW—Yellow alarm. Indicates errors at the remote site receiver. 	detail extensive none

Table 3: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
T1 media or E1 media	<p>Counts of T1 or E1 media-specific errors.</p> <ul style="list-style-type: none"> • Seconds—Number of seconds the defect has been active. • Count—Number of times that the defect has gone from inactive to active. • State—State of the error. State other than OK indicates a problem. The T1 or E1 media-specific error types are: • SEF—Severely errored framing • BEE—Bit error • AIS—Alarm indication signal • LOF—Loss of frame • LOS—Loss of signal • YELLOW—Errors at the remote site receiver • CRC Major—Cyclic redundancy check major alarm threshold exceeded • CRC Minor—Cyclic redundancy check minor alarm threshold exceeded • BPV—Bipolar violation • EXZ—Excessive zeros • LCV—Line code violation • PCV—Pulse code violation • CS—Carrier state • CRC—Cyclic redundancy check • FEBE—Far-end block error (E1 only) • LES—Line error seconds • ES—Errored seconds • BES—Bursty errored seconds • SES—Severely errored seconds • SEFS—Severely errored framing seconds • UAS—Unavailable seconds 	extensive
SAToP Configuration	<p>Information about the SAToP configuration.</p> <ul style="list-style-type: none"> • payload-size—Configure the payload size, in bytes (from 32 through 1024 bytes). • idle-pattern—An 8-bit hexadecimal pattern to replace TDM data in a lost packet (from 0 through 255). • jitter-buffer-packets—Number of packets in the jitter buffer (from 1 through 64 packets). • jitter-buffer-latency—Time delay in the jitter buffer (from 1 through 1000 milliseconds). • excessive-packet-loss-rate—Set packet loss options. The options are groups, sample-period, and threshold. • sample-period—Time required to calculate excessive packet loss rate (from 1000 through 65,535 milliseconds). • threshold—Percentile designating the threshold of excessive packet loss rate (1–100 percent). 	extensive

Table 3: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
CESoPSN Configuration	<p>Information about the CESoPSN configuration.</p> <ul style="list-style-type: none"> • packetization-latency—Time required to create packets (from 1000 through 8000 microseconds). • idle-pattern—An 8-bit hexadecimal pattern to replace TDM data in a lost packet (from 0 through 255). • jitter-buffer-packets—Number of packets in the jitter buffer (from 1 through 64 packets). • jitter-buffer-latency—Time delay in the jitter buffer (from 1 through 1000 milliseconds). • excessive-packet-loss-rate—Set packet loss options. The options are sample-period and threshold. • sample-period—Time required to calculate excessive packet loss rate (from 1000 through 65,535 milliseconds). • threshold—Percentile designating the threshold of excessive packet loss rate (1–100 percent). 	extensive
HDLC configuration	<p>Information about the HDLC configuration.</p> <ul style="list-style-type: none"> • Policing bucket—Configured state of the receiving policer. • Shaping bucket—Configured state of the transmitting shaper. • Giant threshold—Giant threshold programmed into the hardware. • Runt threshold—Runt threshold programmed into the hardware. • Timeslots—Time slots configured on the interface. • Buildout—(T1 only) Buildout setting: 0-132, 133-265, 266-398, 399-531, or 532-655 feet. • Timeslots—Configured time slots for the interface. • Byte encoding—(T1 only) Byte encoding used: Nx64K or Nx56K. • Line encoding—Line encoding used. For T1, the value can be B8ZS or AMI. For E1, the value is HDB3. • Data inversion—HDLC data inversion setting: Enabled or Disabled. • Idle cycle flag—Idle cycle flags. • Start end flag—Start and end flag. 	extensive
DS1 BERT configuration	<p>BERT (bit error rate test) checks the quality of the line. This output appears only when a BERT is run on the interface.</p> <ul style="list-style-type: none"> • BERT time period—Configured total time period that the BERT is to run. • Elapsed—Actual time elapsed since the start of the BERT (in seconds). • Induced error rate—Configured rate at which the bit errors are induced in the BERT pattern. • Algorithm—Type of algorithm selected for the BERT. 	detail extensive none
Packet Forwarding Engine configuration	<p>Information about the configuration of the Packet Forwarding Engine:</p> <ul style="list-style-type: none"> • Destination slot—FPC slot number. • PLP byte—Packet Level Protocol byte. 	extensive

Table 3: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
CoS information	Information about the CoS queue for the physical interface. <ul style="list-style-type: none"> • CoS transmit queue—Queue number and its associated user-configured forwarding class name. • Bandwidth %—Percentage of bandwidth allocated to the queue. • Bandwidth bps—Bandwidth allocated to the queue (in bps). • Buffer %—Percentage of buffer space allocated to the queue. • Buffer usec—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. • Priority—Queue priority: low or high. • Limit—Displayed if rate limiting is configured for the queue. Possible values are none and exact. If exact is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If none is configured, the queue transmits beyond the configured bandwidth if bandwidth is available. 	extensive
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Logical interface index number, which reflects its initialization sequence.	detail extensive none
SNMP ifIndex	Logical interface SNMP interface index number.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Flags	Information about the interface. Possible values are described in the “Interface Flags” section under Common Output Fields Description.	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
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	(Frame Relay) Number and rate of bytes and packets received and transmitted on the logical interface. <ul style="list-style-type: none"> • Input bytes—Number of bytes received on the interface. • Output bytes—Number of bytes transmitted on the interface. • Input packets—Number of packets received on the interface. • Output packets—Number of packets transmitted on the interface. 	detail extensive
Local statistics	(Frame Relay) 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 a while (generally, less than 1 second) for this counter to stabilize.	detail extensive

Table 3: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
Transit statistics	(Frame Relay) 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.	detail extensive
Protocol	Protocol family configured on the logical interface, such as iso , inet6 , mlfr , or mpls .	detail extensive none
Multilink bundle	Interface name for the multilink bundle, if configured.	detail extensive none
MTU	MTU size on the logical interface.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive
Route table	Routing table in which the logical interface address is located. For example, 0 refers to the routing table inet.0 .	detail extensive
Flags	Information about the protocol family flags. Possible values are described in the “Family Flags” section under Common Output Fields Description.	detail extensive none
Addresses, Flags	Information about the address flags. Possible values are described in the “Addresses Flags” section under Common Output Fields Description.	detail extensive none
Destination	IP address of the remote side of the connection.	detail extensive none
Local	IP address of the logical interface.	detail extensive none
Broadcast	Broadcast address.	detail extensive none
Generation	Unique number for use by Juniper Networks technical support only.	detail extensive none
DLCI	<p>(Frame Relay) DLCI number of the logical interface. The following DLCI information is displayed: Flags, Total down time, Last down, and Traffic statistics or (Input packets, Output packets). Flags can be one or more of the following:</p> <ul style="list-style-type: none"> • Active—Set when the link is active and the DTE and DCE are exchanging information. • Down—Set when the link is active, but no information is received from the DCE. • DCE-Unconfigured—Set when the corresponding DLCI in the DCE is not configured. • Configured—Set when the corresponding DLCI in the DCE is configured. • DCE-configured—Displayed when the command is issued from the DTE. 	detail extensive none
DLCI statistics	<p>(Frame Relay) Data-link connection identifier (DLCI) statistics.</p> <ul style="list-style-type: none"> • Active DLCI—Number of active DLCIs. • Inactive DLCI—Number of inactive DLCIs. 	detail extensive none

Table 3: T1 or E1 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
CE Info	<p>Information related to the circuit emulation statistics.</p> <ul style="list-style-type: none"> • CE Tx—Number of transmitted packets and bytes (TDM to PSN flow). • CE Rx—Number of received packets and bytes and forward bytes (PSN to TDM flow). • CE Rx Forwarded—Number of forwarded bytes. • CE Strayed—Number of stray packets. • CE Lost—Number of lost packets. • CE Malformed—Number of malformed packets • CE Misinserted—Number of misinserted packets. • CE AIS dropped—Number of dropped bytes due to buffer overrun (PSN to TDM). • CE Dropped—Number of dropped packets during resynchronization • CE Overrun Events—Number of overrun events. • CE Underrun Events—Number of underrun events. 	extensive

Sample Output

show interfaces (T1,
IMA Link)

```
user@host> show interfaces t1-1/0/0
IMA Link alarms      : None
IMA Link defects     : LIF, LODS
IMA Link state:
  Line       : Not synchronized
  Near end   : Rx: Unusable, Tx: Usable
  Far end    : Rx: Unusable, Tx: Usable
IMA link media:      Seconds      Count  State
LIF                  0            0      OK
LODS                  0            0      OK
Err-ICP              0            0      OK
IV                    0            0      OK
Rx-FC                 0            0      OK
Tx-FC                 0            0      OK
FE-Defects           0            0
FE-Rx-FC              0            0
FE-Tx-FC              0            0
Rx-ICP                0            0
Rx-Stuff              0            0
Tx-ICP                0            0
Tx-Stuff              0            0
Rx-SES                0            0
Rx-UAS                0            0
Rx-UUS                1            0
Tx-UUS                0            0
FE-Rx-SES             0            0
FE-Rx-UAS             0            0
FE-Rx-UUS             0            0
FE-Tx-UUS             0            0
```

show interfaces
(T1, PPP)

```
user@host> show interfaces t1-1/1/0
Physical interface: t1-1/1/0, Enabled, Physical link is Up
Interface index: 149, SNMP ifIndex: 45
Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
Loopback: None, FCS: 16, Framing: ESF
Device flags      : Present Running
Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
Link flags        : Keepalives
Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
Keepalive: Input: 0 (never), Output: 0 (never)
LCP state: Opened
NCP state: Opened
CHAP state: Opened
CoS queues        : 4 supported, 4 in use
Last flapped      : 2005-12-05 08:43:06 PST (02:13:35 ago)
Input rate        : 0 bps (0 pps)
Output rate       : 72 bps (0 pps)
DS1 alarms        : None
DS1 defects       : None

Logical interface t1-1/1/0.0 (Index 66) (SNMP ifIndex 51)
Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
Protocol inet, MTU: 1500
Flags: Protocol-Down
Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
Destination: 1.1.1/24, Local: 1.1.1.1, Broadcast: 1.1.1.255
```

**show interfaces detail
(T1, PPP)**

```

user@host> show interfaces t1-1/1/0 detail
Physical interface: t1-1/1/0, Enabled, Physical link is Up
  Interface index: 149, SNMP ifIndex: 45, Generation: 32
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 0 (last seen: never)
    Output: 0 (last sent: never)
  LCP state: Opened
  NCP state: Opened
  CHAP state: Opened
  CoS queues   : 4 supported, 4 in use
  Last flapped : 2005-12-05 08:43:06 PST (02:13:52 ago)
  Statistics last cleared: Never
  Traffic statistics:
    Input bytes   : 0          0 bps
    Output bytes  : 798        0 bps
    Input packets : 0          0 pps
    Output packets: 42         0 pps
  Queue counters:

```

	Queued packets	Transmitted packets	Dropped packets
0 best-effort	0	0	0
1 expedited-fo	0	0	0
2 assured-forw	0	0	0
3 network-cont	40	40	0

```

  DS1  alarms   : None
  DS1  defects  : None
  DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: 2^15 - 1
  Logical interface t1-1/1/0.0 (Index 66) (SNMP ifIndex 51) (Generation 5)
  Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 1500, Generation: 14, Route table: 0
  Flags: Protocol-Down
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 1.1.1/24, Local: 1.1.1.1, Broadcast: 1.1.1.255,
    Generation: 18

```

**show interfaces
extensive (T1 CRC
Errors)**

```

user@host> show interfaces t1-3/2/0:1:1 extensive
Physical interface: t1-3/2/0:1:1, Enabled, Physical link is Down
  Interface index: 179, SNMP ifIndex: 79, Generation: 180
  :
  :
  DS1  alarms   : AIS, LOF, CRC Major, CRC Minor
  DS1  defects  : AIS, LOF, CRC Major, CRC Minor
  T1 media:

```

	Seconds	Count	State
SEF	1	1	OK
BEE	1	1	OK
AIS	1128	1	Defect Active
LOF	1128	1	Defect Active
LOS	0	0	OK

```

YELLOW                0                0 OK
CRC Major              154              1 Defect Active
CRC Minor              154              1 Defect Active
BPV                    0                0
EXZ                    0                0
LCV                    0                0
PCV                    0                0
CS                     0                0
CRC                    154             15400
...

```

show interfaces extensive (T1, PPP)

```

user@host> show interfaces t1-1/1/0 extensive
Physical interface: t1-1/1/0, Enabled, Physical link is Up
Interface index: 149, SNMP ifIndex: 45, Generation: 32
Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1,
Loopback: None, FCS: 16, Framing: ESF
Device flags      : Present Running
Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
Link flags       : Keepalives
Hold-times       : Up 0 ms, Down 0 ms
Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
Keepalive statistics:
  Input : 0 (last seen: never)
  Output: 0 (last sent: never)
LCP state: Down
NCP state: inet: Not-configured, inet6: Not-configured, iso: Not-configured,
mpls: Not-configured
CHAP state: Closed
CoS queues      : 4 supported, 4 in use
Last flapped    : 2005-12-05 08:43:06 PST (02:13:54 ago)
Statistics last cleared: Never
Traffic statistics:
  Input bytes :                0                0 bps
  Output bytes:                817             72 bps
  Input packets:                0                0 pps
  Output packets:              43                0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 0,
  L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
  HS link CRC errors: 0, SRAM errors: 0, Resource errors: 0
Output errors:
  Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0, MTU errors: 0,
  Resource errors: 0
Queue counters:      Queued packets  Transmitted packets      Dropped packets

  0 best-effort                0                0                0
  1 expedited-fo                0                0                0
  2 assured-forw                0                0                0
  3 network-cont              42               42                0

DS1  alarms   : None
DS1  defects  : None
T1 media:      Seconds      Count  State
  SEF          1           1  OK
  BEE          0           0  OK
  AIS          0           0  OK
  LOF          1           1  OK

```

```

LOS                0                0 OK
YELLOW             1                1 OK
BPV                1                1
EXZ                1                1
LCV                1                65535
PCV                1                1023
CS                 0                0
LES                1
ES                 1
SES                1
SEFS               1
BES                0
UAS                0

```

HDLC configuration:

```

Policing bucket: Disabled
Shaping bucket : Disabled
Giant threshold: 1514, Runt threshold: 3
Timeslots       : All active
Line encoding: B8ZS
Buildout        : 0 to 132 feet
Byte encoding: Nx64K, Data inversion: Disabled, Idle cycle flag: flags,
Start end flag: shared

```

DS1 BERT configuration:

```

BERT time period: 10 seconds, Elapsed: 0 seconds
Induced Error rate: 10e-0, Algorithm: 2^15 - 1

```

Packet Forwarding Engine configuration:

```

Destination slot: 1, PLP byte: 1 (0x00)

```

CoS information:

CoS transmit queue	%	Bandwidth bps	%	Buffer usec	Priority	Limit
0 best-effort	95	1459200	95	0	low	none
3 network-control	5	76800	5	0	low	none

Logical interface t1-1/1/0.0 (Index 66) (SNMP ifIndex 51) (Generation 5)

```

Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP

```

```

Protocol inet, MTU: 1500, Generation: 14, Route table: 0

```

```

Flags: Protocol-Down

```

```

Addresses, Flags: Dest-route-down Is-Preferred Is-Primary

```

```

Destination: 1.1.1/24, Local: 1.1.1.1, Broadcast: 1.1.1.255,

```

```

Generation: 18

```

show interfaces (E1, Frame Relay)

```

user@host> show interfaces e1-3/0/0

```

```

Physical interface: e1-3/0/0, Enabled, Physical link is Up

```

```

Interface index: 146, SNMP ifIndex: 37

```

```

Link-level type: Frame-Relay, MTU: 1504, Clocking: Internal, Speed: E1,

```

```

Loopback: None, FCS: 16, Framing: G704

```

```

Device flags : Present Running

```

```

Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps 16384

```

```

Link flags : Keepalives DTE

```

```

ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds

```

```

LMI: Input: 0 (never), Output: 11 (00:00:05 ago)

```

DTE statistics:

```

Enquiries sent           : 10
Full enquiries sent      : 1
Enquiry responses received : 0
Full enquiry responses received : 0

```

DCE statistics:

```

Enquiries received       : 0
Full enquiries received   : 0
Enquiry responses sent    : 0
Full enquiry responses sent : 0

```

```

Common statistics:
  Unknown messages received      : 0
  Asynchronous updates received  : 0
  Out-of-sequence packets received : 0
  Keepalive responses timedout    : 1
CoS queues      : 8 supported
Last flapped    : 2005-11-30 14:50:34 PST (4d 20:33 ago)
Input rate      : 0 bps (0 pps)
Output rate     : 0 bps (0 pps)
DS1 alarms     : None
DS1 defects    : None
Logical interface e1-3/0/0.0 (Index 72) (SNMP ifIndex 32)
  Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
Input packets : 0
Output packets: 0
  Protocol inet, MTU: 1500
  Flags: None
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
  Destination: 10.1.3/24, Local: 10.1.3.1, Broadcast: 10.1.3.255
  DLCI 100
  Flags: Down, DCE-Unconfigured
  Total down time: 00:01:13 sec, Last down: 00:01:13 ago
  Input packets : 0
  Output packets: 0
DLCI statistics:
  Active DLCI :0 Inactive DLCI :1

```

show interfaces detail (E1, Frame Relay)

```

user@host> show interfaces e1-3/0/0 detail
Physical interface: e1-3/0/0, Enabled, Physical link is Up
Interface index: 146, SNMP ifIndex: 37, Generation: 69
Link-level type: Frame-Relay, MTU: 1504, Clocking: Internal, Speed: E1,
Loopback: None, FCS: 16, Framing: G704
Device flags : Present Running
Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps 16384
Link flags : Keepalives DTE
Hold-times : Up 0 ms, Down 0 ms
ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
LMI statistics:
  Input : 0 (last seen: never)
  Output: 12 (last sent 00:00:02 ago)
DTE statistics:
  Enquiries sent : 10
  Full enquiries sent : 2
  Enquiry responses received : 0
  Full enquiry responses received : 0
DCE statistics:
  Enquiries received : 0
  Full enquiries received : 0
  Enquiry responses sent : 0
  Full enquiry responses sent : 0
Common statistics:
  Unknown messages received : 0
  Asynchronous updates received : 0
  Out-of-sequence packets received : 0
  Keepalive responses timedout : 1
CoS queues : 8 supported
Last flapped : 2005-11-30 14:50:34 PST (4d 20:33 ago)
Statistics last cleared: Never
Traffic statistics:
  Input bytes : 0 0 bps
  Output bytes : 225 56 bps

```

```

Input packets:          0          0 pps
Output packets:         15         0 pps
Queue counters:         Queued packets  Transmitted packets  Dropped packets

  0 limited              0              0              0
  1 expedited-fo         0              0              0
  2 real-plus            0              0              0
  3 network-cont         15             15             0

DS1  alarms   : None
DS1  defects  : None
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
Logical interface e1-3/0/0.0 (Index 72) (SNMP ifIndex 32) (Generation 26)
Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
Traffic statistics:
  Input bytes   :          0
  Output bytes  :          0
  Input packets:          0
  Output packets:         0
Local statistics:
  Input bytes   :          0
  Output bytes  :          0
  Input packets:          0
  Output packets:         0
Transit statistics:
  Input bytes   :          0          0 bps
  Output bytes  :          0          0 bps
  Input packets:          0          0 pps
  Output packets:         0          0 pps
Protocol inet, MTU: 1500, Generation: 32, Route table: 0
  Flags: None
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 10.1.3/24, Local: 10.1.3.1, Broadcast: 10.1.3.255,
    Generation: 42
DLCI 100
  Flags: Down, DCE-Unconfigured
  Total down time: 00:01:18 sec, Last down: 00:01:18 ago
  Traffic statistics:
    Input bytes   :          0
    Output bytes  :          0
    Input packets:          0
    Output packets:         0
DLCI statistics:
  Active DLCI :0 Inactive DLCI :1

```

show interfaces extensive (E1, Frame Relay)

```

user@host> show interfaces e1-3/0/0 extensive
Physical interface: e1-3/0/0, Enabled, Physical link is Up
Interface index: 146, SNMP ifIndex: 37, Generation: 69
Link-level type: Frame-Relay, MTU: 1504, Clocking: Internal, Speed: E1,
Loopback: None, FCS: 16, Framing: G704
Device flags   : Present Running
Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps 16384
Link flags     : Keepalives DTE
Hold-times     : Up 0 ms, Down 0 ms
ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
LMI statistics:

```

```

Input : 0 (last seen: never)
Output: 12 (last sent 00:00:05 ago)
DTE statistics:
  Enquiries sent           : 10
  Full enquiries sent      : 2
  Enquiry responses received : 0
  Full enquiry responses received : 0
DCE statistics:
  Enquiries received       : 0
  Full enquiries received  : 0
  Enquiry responses sent   : 0
  Full enquiry responses sent : 0
Common statistics:
  Unknown messages received : 0
  Asynchronous updates received : 0
  Out-of-sequence packets received : 0
  Keepalive responses timedout : 1
CoS queues : 8 supported
Last flapped : 2005-11-30 14:50:34 PST (4d 20:33 ago)
Statistics last cleared: Never
Traffic statistics:
  Input bytes : 0 0 bps
  Output bytes : 225 0 bps
  Input packets: 0 0 pps
  Output packets: 15 0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 0,
  L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
  HS link CRC errors: 0, SRAM errors: 0, Resource errors: 0
Output errors:
  Carrier transitions: 17, Errors: 0, Drops: 0, Aged packets: 0,
  MTU errors: 0, Resource errors: 0
Queue counters:

```

	Queued packets	Transmitted packets	Dropped packets
0 limited	0	0	0
1 expedited-fo	0	0	0
2 real-plus	0	0	0
3 network-cont	15	15	0

```

DS1 alarms : None
DS1 defects : None
E1 media:

```

	Seconds	Count	State
SEF	0	0	OK
BEE	5	5	OK
AIS	0	0	OK
LOF	245	15	OK
LOS	245	4	OK
YELLOW	0	11	OK
BPV	0	0	
EXZ	9	9	
LCV	0	0	
PCV	0	0	
CS	0	0	
FEBE	0	0	
LES	0		
ES	0		
SES	0		
SEFS	0		

```

BES                                0
UAS                                271
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 1506, Runt threshold: 0
  Timeslots      : All active
  Line encoding: HDB3, Data inversion: Disabled, Idle cycle flag: flags,
  Start end flag: shared
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 10e-0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
  Destination slot: 3, PLP byte: 1 (0x00)
CoS information:
  CoS transmit queue      Bandwidth      Buffer      Priority      Limit
                           %             bps        %          usec
0 limited                 95      1945600    95          0      low      none
3 network-control         5       102400     5           0      low      none
Logical interface e1-3/0/0.0 (Index 72) (SNMP ifIndex 32) (Generation 26)
Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
Traffic statistics:
  Input bytes : 0
  Output bytes : 0
  Input packets: 0
  Output packets: 0
Local statistics:
  Input bytes : 0
  Output bytes : 0
  Input packets: 0
  Output packets: 0
Transit statistics:
  Input bytes : 0
  Output bytes : 0
  Input packets: 0
  Output packets: 0
Protocol inet, MTU: 1500, Generation: 32, Route table: 0
Flags: None
Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
  Destination: 10.1.3/24, Local: 10.1.3.1, Broadcast: 10.1.3.255,
  Generation: 42
DLCI 100
Flags: Down, DCE-Unconfigured
Total down time: 00:01:21 sec, Last down: 00:01:21 ago
Traffic statistics:
  Input bytes : 0
  Output bytes : 0
  Input packets: 0
  Output packets: 0
DLCI statistics:
  Active DLCI :0 Inactive DLCI :1

```

show interfaces (E1,
IMA Link)

```

user@host> show interfaces e1-1/0/0
IMA Link alarms : None
IMA Link defects : LIF, LODS
IMA Link state:
  Line : Not synchronized
  Near end : Rx: Unusable, Tx: Usable
  Far end : Rx: Unusable, Tx: Usable
IMA link media:      Seconds      Count  State
LIF                                0

```



```

LODS                                0
Err-ICP                            0
IV                                  0
Rx-FC                               0
Tx-FC                               0
FE-Defects                          0
FE-Rx-FC                            0
FE-Tx-FC                            0
Rx-ICP                              0
Rx-Stuff                             0
Tx-ICP                              11
Tx-Stuff                             0
Rx-SES                               0
Rx-UAS                               0
Rx-UUS                               1
Tx-UUS                               0
FE-Rx-SES                           0
FE-Rx-UAS                           0
FE-Rx-UUS                           0
FE-Tx-UUS                           0

```

show interfaces extensive (T1, TDM-CCC-SATOP)

```

user@host>show interfaces t1-1/0/0:1:1 extensive
Physical interface: t1-1/0/0:1:1, Enabled, Physical link is Down
  Interface index: 153, SNMP ifIndex: 579, Generation: 817
  Link-level type: TDM-CCC-SATOP, MTU: 1504, Clocking: Internal, Speed: T1,
  Loopback: None, FCS: 16, Framing: ESF,
  Parent: coc1-1/0/0:1 Interface index 152
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps Internal: 0x0
  Link flags     : None
  Hold-times    : Up 0 ms, Down 0 ms
  CoS queues    : 8 supported, 8 maximum usable queues
  Last flapped  : 2012-10-28 02:12:40 PDT (22:32:13 ago)
  Statistics last cleared: 2012-10-29 00:44:52 PDT (00:00:01 ago)
  Egress queues: 8 supported, 4 in use
  Queue counters:      Queued packets  Transmitted packets      Dropped packets

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

  Queue number:      Mapped forwarding classes
    0                best-effort
    1                expedited-forwarding
    2                assured-forwarding
    3                network-control

  DS1  alarms   : None
  DS1  defects  : None
  T1  media:      Seconds      Count  State
    SEF              0          0  OK
    BEE              0          0  OK
    AIS              0          0  OK
    LOF              0          0  OK
    LOS              0          0  OK
    YELLOW           0          0  OK
    CRC Major        0          0  OK
    CRC Minor        0          0  OK

```

```

BPV                0          0
EXZ                0          0
LCV                0          0
PCV                0          0
CS                 0          0
CRC                0          0
LES                0
ES                 0
SES                0
SEFS               0
BES                0
UAS                0
SAToP configuration:
  Payload size: 192
  Idle pattern: 0xFF
  Octet aligned: Disabled
  Jitter buffer: packets: 8, latency: 7 ms, auto adjust: Disabled
  Excessive packet loss rate: sample period: 10000 ms, threshold: 30%
DS1 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Induced Error rate: 0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
SONET alarms      : None
SONET defects     : AIS-V, RDI-V
SONET vt:
  BIP-BIP2        0          0
  REI-V           0          0
  LOP-V           0          0 OK
  AIS-V           2          0 Defect Active
  RDI-V           2          0 Defect Active
  UNEQ-V          0          0 OK
  PLM-V           0          0 OK
  ES-V            0
  SES-V           0
  UAS-V           2
  ES-VFE          0
  SES-VFE         0
  UAS-VFE         0
Received SONET overhead:
V5      : 0x07
V5(cmp) : 0x02
Transmitted SONET overhead:
V5      : 0x02
Packet Forwarding Engine configuration:
  Destination slot: 1
CoS information:
  Direction : Output
  CoS transmit queue
Limit      Bandwidth      Buffer Priority
           %      bps      %      usec
0 best-effort 95      1459200 95      0      low
none
3 network-control 5      76800 5      0      low
none

Logical interface t1-1/0/0:1:1.0 (Index 69) (SNMP ifIndex 580) (Generation 525)

Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: TDM-CCC-SAToP
CE info      Packets      Bytes Count
CE Tx        1005      192960
CE Rx        1004      192768
CE Rx Forwarded      0

```

```

CE Strayed          0
CE Lost             0
CE Malformed        0
CE Misinserted      0
CE AIS dropped       0
CE Dropped          1005      192960
CE Overrun Events    0
CE Underrun Events   0
Protocol ccc, MTU: 1504, Generation: 814, Route table: 0
Flags: Is-Primary

```

show interfaces extensive (DS, TDM-CCC-CESoPSN)

```

user@host>show interfaces ds-1/0/0:1:1:1 extensive
Physical interface: ds-1/0/0:1:1:1, Enabled, Physical link is Down
Interface index: 154, SNMP ifIndex: 597, Generation: 819
Link-level type: TDM-CCC-CESoPSN, MTU: 1504, Speed: 1536kbps, Loopback: None,
FCS: 16, Parent: ct1-1/0/0:1:1 Interface index 153
Device flags      : Present Running Down
Interface flags: Hardware-Down Point-To-Point SNMP-Traps Internal: 0x0
Link flags       : None
Hold-times       : Up 0 ms, Down 0 ms
CoS queues       : 8 supported, 8 maximum usable queues
Last flapped    : 2012-10-29 00:49:03 PDT (00:00:35 ago)
Statistics last cleared: Never
Egress queues: 8 supported, 4 in use
Queue counters:

```

	Queued packets	Transmitted packets	Dropped packets
0 best-effort	0	0	0
1 expedited-fo	0	0	0
2 assured-forw	0	0	0
3 network-cont	0	0	0

```

Queue number:      Mapped forwarding classes
0                  best-effort
1                  expedited-forwarding
2                  assured-forwarding
3                  network-control
CESoPSN configuration:
Packetization latency: 1000 us
Idle pattern: 0xFF
Jitter buffer: packets: 8, latency: 8 ms, auto adjust: Disabled
Excessive packet loss rate: sample period: 10000 ms, threshold: 30%
DSO BERT configuration:
BERT time period: 10 seconds, Elapsed: 0 seconds
Induced Error rate: 0, Algorithm: 2^15 - 1, 0.151, Pseudorandom (9)
Packet Forwarding Engine configuration:
Destination slot: 1
CoS information:
Direction : Output
CoS transmit queue

```

Limit		Bandwidth	Buffer Priority
	%	bps	usec
0 best-effort	95	1459200	0
none			
3 network-control	5	76800	0
none			

```

Logical interface ds-1/0/0:1:1:1.0 (Index 69) (SNMP ifIndex 598) (Generation 549)

```

```
Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: TDM-CCC-CESoPSN
CE info          Packets      Bytes  Count
CE Tx            0            0
CE Rx            35712        6856704
CE Rx Forwarded          0
CE Strayed           0
CE Lost             0
CE Malformed        0
CE Misinserted      0
CE AIS dropped       0
CE Dropped          0            0
CE Overrun Events              0
CE Underrun Events             1
Protocol ccc, MTU: 1504, Generation: 857, Route table: 0
Flags: Is-Primary
```

CHAPTER 6

Command Summary

PART 4

Troubleshooting

- [Interface Diagnostics on page 97](#)
- [Investigate T1 Interfaces on page 105](#)

CHAPTER 7

Interface Diagnostics

- [Interface Diagnostics on page 97](#)

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 97](#)
- [Interface Diagnostics on page 99](#)

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 4 on page 98 shows the loopback modes supported on the various interface types.

Table 4: Loopback Modes by Interface Type

Interface	Loopback Modes	Usage Guidelines
Aggregated Ethernet, Fast Ethernet, Gigabit Ethernet	Local	Configuring Ethernet Loopback Capability
Circuit Emulation E1	Local and remote	Configuring E1 Loopback Capability
Circuit Emulation T1	Local and remote	"Configuring T1 Loopback Capability" on page 12
E1 and E3	Local and remote	Configuring E1 Loopback Capability and Configuring E3 Loopback Capability
NxDSO	Payload	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
Serial (V.35 and X.21)	Local and remote	Configuring Serial Loopback Capability
Serial (EIA-530)	DCE local, DCE remote, local, and remote	Configuring Serial Loopback Capability
SONET/SDH	Local and remote	Configuring SONET/SDH Loopback Capability

Table 4: Loopback Modes by Interface Type (*continued*)

Interface	Loopback Modes	Usage Guidelines
T1 and T3	Local, payload, and remote	<p>“Configuring T1 Loopback Capability” on page 12 and Configuring T3 Loopback Capability</p> <p>See also “Configuring the T1 Remote Loopback Response” on page 11</p>

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 5 on page 102 shows the BERT capabilities for various interface types.

Table 5: 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"> Limited algorithms
4-port Channelized OC3/STM1 Circuit Emulation	Yes (port 0–3)		<ul style="list-style-type: none"> Limited algorithms
E1 or T1	Yes (port 0–3)	Yes (port 0–3)	<ul style="list-style-type: none"> Single port at a time Limited algorithms
E3 or T3	Yes (port 0–3)	Yes (port 0–3)	<ul style="list-style-type: none"> Single port at a time
Channelized OC12	N/A	Yes (channel 0–11)	<ul style="list-style-type: none"> Single channel at a time Limited algorithms No bit count
Channelized STM1	Yes (channel 0–62)	N/A	<ul style="list-style-type: none"> Multiple channels Only one algorithm No error insert No bit count
Channelized T3 and Multichannel T3	Yes (channel 0–27)	Yes (port 0–3 on channel 0)	<ul style="list-style-type: none"> Multiple ports and channels Limited algorithms for T1 No error insert for T1 No bit count for T1

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 Junos OS Operational Mode Commands.



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 8

Investigate T1 Interfaces

- [Investigating Interface Steps and Commands on page 105](#)
- [Monitor T1 Interfaces on page 108](#)
- [Use Loopback Testing for T1 Interfaces on page 114](#)
- [Locate T1 Alarms and Errors on page 127](#)

Investigating Interface Steps and Commands

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

- [Investigating Interface Steps and Commands Overview on page 105](#)
- [Monitoring Interfaces on page 105](#)
- [Performing a Loopback Test on an Interface on page 106](#)
- [Locating Interface Alarms on page 108](#)

Investigating Interface Steps and Commands Overview

The “[Monitoring Interfaces](#)” on [page 105](#) section helps you determine the nature of the interface problem. The “[Performing a Loopback Test on an Interface](#)” on [page 106](#) section provides information to help you isolate the source of the problem. The “[Locating Interface Alarms](#)” on [page 108](#) section explains some of the alarms and errors for the media.

Monitoring Interfaces

Problem The following steps are a general outline of how you monitor interfaces to determine the nature of interface problems. For more detailed information on a specific interface, see the corresponding monitor interfaces section.

Solution To monitor interfaces, follow these steps:

1. Display the status of an interface.
2. Display the status of a specific interface.
3. Display extensive status information for a specific interface.
4. Monitor statistics for an interface.

The [Table 6 on page 106](#) lists and describes the operational mode commands you use to monitor interfaces.

Table 6: Commands Used to Monitor Interfaces

CLI Command	Description
show interfaces terse <i>interface-name</i> For example: show interfaces terse t1*	Displays summary information about the named interfaces.
show interfaces <i>interface-name</i> For example: show interfaces t1-x/x/x	Displays static status information about a specific interface.
show interfaces <i>interface-name</i> extensive For example: show interfaces t1-x/x/x extensive	Displays very detailed interface information about a specific interface.
monitor interface <i>interface-name</i> For example: monitor interface t1-x/x/x	Displays real-time statistics about a physical interface, updated every second.

Performing a Loopback Test on an Interface

Problem The following steps are a general outline of how you use loopback testing to isolate the source of the interface problem. For more detailed information on a specific interface, see the corresponding loopback section.

Solution To use loopback testing for interfaces, follow these steps:

1. Diagnose a suspected hardware problem.
 - a. Create a loopback.
 - b. Set clocking to internal. (Not for Fast Ethernet/Gigabit Ethernet or Multichannel DS3 interfaces.)
 - c. Verify that the status of the interface is up.
 - d. Configure a static address resolution protocol table entry. (Fast Ethernet/Gigabit Ethernet interfaces only)
 - e. Clear the interface statistics.
 - f. Force the link layer to stay up.
 - g. Verify the status of the logical interface.
 - h. Ping the interface.
 - i. Check for interface error statistics.
2. Diagnose a suspected connection problem.
 - a. Create a loop from the router to the network.

- b. Create a loop to the router from various points in the network.

The [Table 7 on page 107](#) lists and describes the operational and configuration mode commands you use to perform loopback testing on interfaces (the commands are shown in the order in which you perform them).

Table 7: Commands Used to Perform Loopback Testing on Interfaces

CLI Statement or Command	Interface Type	Description
<code>[edit interfaces <i>interface-name</i> <i>interface- options</i>] set loopback (local remote)</code>	All interfaces	The loopback statement at the hierarchy level configures a loopback on the interface. Packets can be looped on either the local router or the remote channel service unit (CSU). To turn off loopback, remove the loopback statement from the configuration.
<code>show</code>	All interfaces	Verify the configuration before you commit it.
<code>commit</code>	All interfaces	Save the set of changes to the database and cause the changes to take operational effect. Use after you have verified a configuration in all configuration steps.
<code>[edit interfaces <i>interface-name</i>] set clocking internal</code>	T1, T3, ATM, and SONET interfaces	The clocking statement at this hierarchy level configures the clock source of the interface to internal.
<code>show interfaces <i>interface-name</i></code>	Used for all interfaces	Display static status information about a specific interface.
<code>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family inet <i>address address</i>] arp <i>ip-address</i> mac <i>mac-address</i></code>	Fast Ethernet and Gigabit Ethernet interfaces	The arp statement at this hierarchy level defines mappings between IP and Media Access Control (MAC) addresses.
<code>show arp no-resolve</code>	Fast Ethernet and Gigabit Ethernet interfaces	Display the entries in the ARP table without attempting to determine the hostname that corresponds to the IP address (the no-resolve option).
<code>clear interfaces statistics <i>interface-name</i></code>	All interfaces	Reset the statistics for an interface to zero.
<code>[edit interfaces <i>interface-name</i>] set encapsulation cisco-hdlc</code>	T1, T3, SONET, and Multichannel DS3 interfaces	The encapsulation statement at this hierarchy level sets the encapsulation to the Cisco High-level Data-Link Control (HDLC) transport protocol on the physical interface.
<code>[edit interfaces <i>interface-name</i>] set no-keepalives</code>	T1, T3, SONET, and Multichannel DS3 interfaces	The no-keepalives statement at this level disables the sending of keepalives on the physical interface.

Table 7: Commands Used to Perform Loopback Testing on Interfaces (*continued*)

CLI Statement or Command	Interface Type	Description
show interfaces <i>interface-name</i> terse	T1, T3, and SONET interfaces	Display summary information about interfaces. (Use to display the status of the logical interfaces for these interfaces.)
ping interface t1-<i>x/x/x</i> <i>local-IP-address</i> bypass-routing count 1000 rapid	All interfaces	<p>Check the reachability of network hosts by sending ICMP ECHO_REQUEST messages to elicit ICMP ECHO_RESPONSE messages from the specified host.</p> <p>Use the bypass-routing option to ping a local system through an interface that has no route through it.</p> <p>The count option sends 1000 ping requests through the system.</p> <p>Type Ctrl+C to interrupt a ping command.</p>
show interfaces <i>interface-name</i> extensive	All interfaces	Display very detailed interface information about a specific interface.

Locating Interface Alarms

Problem Locating alarms and errors for the media can be a simple process.

Solution To locate interface alarms and errors, use the **show interfaces *interface-name* extensive** command and examine the output for active alarms and defects.

Monitor T1 Interfaces

This section includes the following information to assist you when troubleshooting T1 interfaces:

- [Checklist for Monitoring T1 Interfaces on page 108](#)
- [Display the Status of T1 Interfaces on page 109](#)
- [Display the Status of a Specific T1 Interface on page 110](#)
- [Display Extensive Status Information for a Specific T1 Interface on page 110](#)
- [Monitor Statistics for a T1 Interface on page 113](#)

Checklist for Monitoring T1 Interfaces

Purpose To monitor T1 interfaces and beginning the process of isolating T1 interface problems when they occur.

Action [Table 8 on page 109](#) provides the links and commands for monitoring T1 interfaces.

Table 8: Checklist for Monitoring T1 Interfaces

Tasks	Command or Action
Monitor T1 Interfaces	
1. Display the Status of T1 Interfaces on page 109	<code>show interfaces terse t1*</code>
2. Display the Status of a Specific T1 Interface on page 110	<code>show interfaces t1-fpc/pic/port</code>
3. Display Extensive Status Information for a Specific T1 Interface on page 110	<code>show interfaces t1-fpc/pic/port extensive</code>
4. Monitor Statistics for a T1 Interface on page 113	<code>monitor interface t1-fpc/pic/port</code>

Display the Status of T1 Interfaces

Purpose To display the status of T1 interfaces.

Action Use the following Junos OS command-line interface (CLI) operational mode command to display the status of T1 interfaces:

```
user@host> show interfaces terse t1*
```

Sample Output

```
user@host> show interfaces terse t1*
Interface      Admin Link Proto Local Remote
t1-1/0/0       down up --- administratively disabled
t1-1/0/0.0     up   down inet 1.1.1.1/30
t1-1/0/1       up   down --- physical layer down
t1-1/0/1.0     up   down inet 2.2.2.2/30 --- link layer down
t1-1/0/2       up   up
t1-1/0/2.0     up   up  inet 3.3.3.3/30 --- link layer up
t1-1/0/3       up   down
```

Meaning This sample output shows the status of both the physical and logical interfaces. See [Table 9 on page 109](#) for a description of what the output means.

Table 9: Status of T1 Interfaces

Physical Interface	Logical Interface	Status Description
t1-1/0/0	t1-1/0/0.0	This interface is administratively disabled and the physical link is healthy (Link Up), but the logical interface is not established. The logical interface is administratively enabled (Admin Up), but is down because the physical link is disabled.
AdminDown	Admin Up	
Link Up	Link Down	
t1-1/0/1	t1-1/0/1.0	This interface is not functioning between the local router and the remote router because both the physical and logical links are down (Link Down). The interface is not administratively disabled because both the physical and logical links are up (Admin Up).
Admin Up	Admin Up	
Link Down	Link Down	

Table 9: Status of T1 Interfaces (*continued*)

Physical Interface	Logical Interface	Status Description
t1-1/0/2	t1-1/0/2.0	This interface has both the physical and logical links up and running.
Admin Up	Admin Up	
Link Up	Link Up	
t1-1/0/3		The physical interfaces is added to the configuration, but the logical link is not configured.
Admin Up		
Link Down		

Display the Status of a Specific T1 Interface

Purpose To display the status of a specific T1 interface when you need to investigate its status further.

Action To display the status of a specific T1 interface, use the following Junos OS CLI operational mode command:

```
user@host> show interfaces t1-fpc/pic/port
```

Sample Output

```
user@host> show interfaces t1-1/1/0
Physical interface: t1-1/1/0, Enabled, Physical link is Down
  Interface index: 24, SNMP ifIndex: 20
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1, Loopback: None,
  FCS: 16, Framing: ESF
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Last flapped   : 2002-01-01 00:00:35 UTC (00:00:59 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  DSI alarms    : LOF, LOS
  DSI defects    : LOF, LOS
```

Meaning The first line of the sample output shows the status of the link. In this example, the first line shows that the physical link is down. If the first line shows that the physical link is up, the physical link is healthy and can pass packets. If this line shows that the physical link is down, the physical link is unhealthy and cannot pass packets. Also, the output shows loss of frame (LOF) and loss of signal (LOS) alarms active. Any active alarm or defect can cause the interface to be down.

Display Extensive Status Information for a Specific T1 Interface

Purpose To display extensive status information about a specific T1 interface.

Action To display extensive status information about a specific T1 interface, use the following Junos OS CLI operational mode command:

```
user@host> show interfaces t1-fpc/port extensive
```

Sample Output

```

user@host> show interfaces t1-1/1/0 extensive
Physical interface: t1-1/1/0, Enabled, Physical link is Down
  Interface index: 24, SNMP ifIndex: 20, Generation: 27
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1, Loopback: None,
  FCS: 16, Framing: ESF
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times    : Up 0 ms, Down 0 ms
  Last flapped  : 2002-01-01 00:00:35 UTC (00:01:00 ago)
  Statistics last cleared: 2002-01-01 00:01:03 UTC (00:00:32 ago)
  Traffic statistics:
    Input bytes :                0                0 bps
    Output bytes:                0                0 bps
    Input packets:                0                0 pps
    Output packets:                0                0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 0, L3 incompletes:
    0, L2 channel errors: 0, L2 mismatch timeouts: 0,
    HS link CRC errors: 0, SRAM errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0
  DSI alarms :LOF,LOS
  DSI defects : LOF, LOS
  T1 media:
    Seconds      Count  State
    SEF          32      0 Defect Active
    BEE          0       0 OK
    AIS          0       0 OK
    LOF          32      0 Defect Active
    LOS          32      0 Defect Active
    YELLOW       0       0 OK
    BPV          0       0
    EXZ          0       0
    LCV          0       0
    PCV          32     10667
    CS           0       0
    LES          0       0
    ES           32      0
    SES          32      0
    SEFS         32      0
    BES          0       0
    UAS          32      0
  HDLC configuration:
    Policing bucket: Disabled
    Shaping bucket : Disabled
    Giant threshold: 1514, Runt threshold: 3
    Timeslots      : All active
    Line encoding: B8ZS, Byte encoding: Nx64K, Data inversion: Disabled
    Buildout       : 0 to 132 feet
  DSI BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: Unknown (0)
  Packet Forwarding Engine configuration:
    Destination slot: 1, PLP byte: 1 (0x00)
    CoS transmit queue      Bandwidth      Buffer      Priority  Limit
                             %          bps      %          bytes
    0 best-effort            0          0      0          0      low  none
    1 expedited-forwarding  0          0      0          0      low  none
    2 assured-forwarding    0          0      0          0      low  none
    3 network-control        0          0      0          0      low  none

```


Meaning The sample output shows where the errors might be occurring. Look at the active alarms and active defects for the T1 interface and investigate the T1 media accordingly. See [“Checklist for T1 Alarms and Errors” on page 127](#) for an explanation of T1 alarms.

Monitor Statistics for a T1 Interface

Purpose To monitor statistics for a T1 interface.

Action To monitor statistics for a T1 interface, use the following Junos OS CLI operational mode command:

```
user@host> monitor interface t1-fpc/pic/port
```

Sample Output

```
user@host> monitor interface t1-1/0/0
Seconds: 2                               Time: 00:04:49    Delay: 0/0/1
Interface: t1-1/1/0, Enabled, Link is Down
Encapsulation: PPP, Keepalives, Speed: T1
Traffic statistics:
  Input bytes:                               0 (0 bps)           [0]
  Output bytes:                              0 (0 bps)           [0]
  Input packets:                             0 (0 pps)           [0]
  Output packets:                            0 (0 pps)           [0]
Error statistics:
  Input errors:                              0                    [0]
  Input drops:                               0                    [0]
  Input framing errors:                      0                    [0]
  Policed discards:                         0                    [0]
  L3 incompletes:                           0                    [0]
  L2 channel errors:                        0                    [0]
  L2 mismatch timeouts:                    0                    [0]
  Carrier transitions:                      0                    [0]
  Output errors:                            0                    [0]
  Output drops:                             0                    [0]
  Aged packets:                             0                    [0]
Active alarms : LOF LOS
Active defects: LOF LOS
T1 statistics:
  BPV                               0                    [0]
  EXZ                               0                    [0]
  LCV                               0                    [0]
  PCV                             40335                  [332]
  CS                               0                    [0]
Interface warnings:
  o Outstanding DS1 alarm(s)
Next='n', Quit='q' or ESC, Freeze='f', Thaw='t', Clear='c', Interface='i'
```

Meaning The sample output shows that the T1 interface is enabled but the link is down. The **bps** value is in bytes per second and not bits per second. To calculate bits per second, multiply the **bps** value by 8.

The **monitor** command checks for and displays common interface failures, indicates whether loopback is detected, and shows any increases in framing errors. Use information from this command to help to narrow down possible causes of an interface problem.



NOTE: If you are accessing the router from the console connection, make sure you set the CLI terminal type using the `set cli terminal` command.

Table 10 on page 114 lists additional problem situations and actions to help you further diagnose a problem.

Table 10: Problem Situations and Actions

Problem Situation	Action
Framing errors are increasing.	Check the frame checksum sequence (FCS), scrambling, and subrate configuration.
Framing errors are increasing, and the configuration is correct.	Check the cabling to the router and have the carrier verify the integrity of the line.
Input errors are increasing.	Check the cabling to the router and have the carrier verify the integrity of the line.



NOTE: We recommend that you use this command only for diagnostic purposes. Do not leave it on during normal router operations because real-time monitoring of traffic consumes additional CPU and memory resources.

Use Loopback Testing for T1 Interfaces

This section includes the following information to assist you when troubleshooting T1 interfaces:

- [Checklist for Using Loopback Testing for T1 Interfaces on page 115](#)
- [Diagnose a Suspected Hardware Problem with a T1 Interface on page 116](#)
- [Create a Loopback on page 116](#)
- [Set Clocking to Internal on page 118](#)
- [Verify That the T1 Interface Is Up on page 118](#)
- [Clear T1 Interface Statistics on page 120](#)
- [Force the Link Layer To Stay Up on page 120](#)
- [Verify the Status of the Logical Interface on page 122](#)
- [Ping the T1 Interface on page 124](#)
- [Check for T1 Interface Error Statistics on page 124](#)
- [Diagnose a Suspected Circuit Problem on page 126](#)

Checklist for Using Loopback Testing for T1 Interfaces

Purpose To use loopback testing for T1 interfaces.

Action Table 11 on page 115 provides commands for using loopback testing for T1 interfaces.

Table 11: Checklist for Using Loopback Testing for T1 Interfaces

Tasks	Command or Action
“Diagnose a Suspected Hardware Problem with a T1 Interface” on page 116	
1. Create a Loopback on page 116	
a. Create a Physical Loopback on page 117	Connect a T1 loopback plug.
b. Configure a Local Loopback on page 117	<code>[edit interfaces <i>interface-name</i> t1-options]</code> <code>set loopback local</code> <code>show</code> <code>commit</code>
2. Set Clocking to Internal on page 118	<code>[edit interfaces <i>interface-name</i>]</code> <code>set clocking internal</code> <code>show</code> <code>commit</code>
3. Verify That the T1 Interface Is Up on page 118	<code>show interfaces t1-<i>fpc/pic/port</i></code>
4. Clear T1 Interface Statistics on page 120	<code>clear interfaces statistics t1-<i>fpc/pic/port</i></code>
5. Force the Link Layer To Stay Up on page 120	
a. Configure Encapsulation to Cisco-HDLC on page 120	<code>[edit interfaces <i>interface-name</i>]</code> <code>set encapsulation cisco-hdlc</code> <code>show</code> <code>commit</code>
b. Configure No-Keepalives on page 121	<code>[edit interfaces <i>interface-name</i>]</code> <code>set no-keepalives</code> <code>show</code> <code>commit</code>
6. Verify the Status of the Logical Interface on page 122	<code>show interfaces t1-<i>fpc/pic/port</i></code> <code>show interfaces t1-<i>fpc/pic/port</i> terse</code>
7. Ping the T1 Interface on page 124	<code>ping interface t1-<i>fpc/pic/port</i> local-IP-address</code> <code>bypass-routing count 1000 rapid</code>
8. Check for T1 Interface Error Statistics on page 124	<code>show interfaces t1-<i>fpc/pic/port</i> extensive</code>
“Diagnose a Suspected Circuit Problem” on page 126	

Table 11: Checklist for Using Loopback Testing for T1 Interfaces (*continued*)

Tasks	Command or Action
1. Create a Loop from the Router to the Network on page 126	<code>[edit interfaces <i>interface-name</i> t1-options]</code> <code>set loopback remote</code> <code>show</code> <code>commit</code>
2. Create a Loop to the Router from Various Points in the Network on page 127	Perform Steps 2 through 8 from “ Diagnose a Suspected Hardware Problem with a T1 Interface ” on page 116.

Diagnose a Suspected Hardware Problem with a T1 Interface

Problem Take the following steps to verify if there is a hardware problem with a T1 interface.

Solution To diagnose a suspected hardware problem with a T1 interface, follow these steps:

1. [Create a Loopback on page 116](#)
2. [Set Clocking to Internal on page 118](#)
3. [Verify That the T1 Interface Is Up on page 118](#)
4. [Clear T1 Interface Statistics on page 120](#)
5. [Force the Link Layer To Stay Up on page 120](#)
6. [Verify the Status of the Logical Interface on page 122](#)
7. [Ping the T1 Interface on page 124](#)
8. [Check for T1 Interface Error Statistics on page 124](#)

Create a Loopback

You can create a physical loopback or configure a local loopback to help diagnose a suspected hardware problem. Creating a physical loopback is recommended because it allows you to test and verify the T1 port. If a field engineer is not available to create the physical loopback, you can configure a local loopback for the interface. The local loopback creates a loopback internally in the Physical Interface Card (PIC).

1. [Create a Physical Loopback on page 117](#)
2. [Configure a Local Loopback on page 117](#)

Create a Physical Loopback

- Action** To create a physical loopback at the T1 port, connect a T1 loopback plug to the T1 port. You can make a T1 loopback plug by connecting pin 1 to pin 4 and pin 2 to pin 5 on an RJ-48 plug.
- Meaning** When you create and test a physical loopback, you are testing the T1 port. This action is recommended if a field engineer is available to create the physical loop as it provides a more complete test of the PIC.

Configure a Local Loopback

- Action** To configure a local loopback without physically connecting the transmit port to the receive port, follow these steps:

1. In configuration mode, go to the following hierarchy level:

```
[edit]
user@host# edit interfaces interface-name t1-options
```

2. Configure the loopback:

```
[edit interfaces interface-name t1-options]
user@host# set loopback local
```

3. Verify the configuration:

```
user@host# show

For example:
[edit interfaces t1-1/3/0 t1-options]
user@host# show
loopback local;
```

4. Commit the change:

```
user@host# commit
```

For example:

```
[edit interfaces t1-1/3/0 t1-options]
user@host# commit
commit complete
```

- Meaning** When you create a local loopback, you create an internal loop on the interface being tested. A local loopback loops the traffic internally on that PIC. A local loopback tests the interconnection of the PIC but does not test the transmit and receive ports.



NOTE: Remember to delete the loopback statement after completing the test.

Set Clocking to Internal

Purpose You set clocking to internal because there is no external clock source in a loopback connection.

Action To configure clocking to internal, follow these steps:

1. In configuration mode, go to the following hierarchy level:

```
[edit]
user@host# edit interfaces interface-name
```

2. Configure the clocking to internal:

```
[edit interfaces interface-name]
user@host# set clocking internal
```

3. Verify the configuration:

```
user@host# show
```

For example:

```
[edit interfaces t1-1/3/0]
user@host# show
clocking internal;
```

4. Commit the change:

```
user@host# commit
```

For example:

```
[edit interfaces t1-1/3/0]
user@host# commit
commit complete
```

Meaning This command saves the clocking change to the configuration database, activates the configuration on the router, and exits configuration mode.

Verify That the T1 Interface Is Up

Purpose Display the status of the T1 interface to determine whether the physical link is up or down.

Action To verify that the status of the T1 interface is up, use the following Junos OS command-line interface (CLI) operational mode command:

```
user@host> show interfaces t1-fpc/pic/port
```

Sample Output

The following output is for a T1 interface with the physical link up:

```
user@host> show interfaces t1-1/1/0
Physical interface: t1-1/1/0, Enabled, Physical link is Up
  Interface index: 24, SNMP ifIndex: 20
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1, Loopback:
None, FCS: 16, Framing: ESF
  Device flags   : Present Running Loop-Detected
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 3 (00:00:06 ago), Output: 9 (00:00:06 ago)
  Last flapped   : 2002-01-06 00:59:00 UTC (00:00:40 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  DS1 alarms :None
  DS1 defects   : None
  Logical interface t1-1/1/0.0 (Index 9) (SNMP ifIndex 34)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
    Protocol inet, MTU: 1500, Flags: None
    Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 1.1.1.0/30, Local: 1.1.1.1
```

Meaning

The sample output shows that the physical link is up, the loop is detected, and there are no T1 alarms or defects.

Sample Output

If the physical link is down, there may be a problem with the port. The following output is an example of the **show interfaces t1-*fpc/pic/port*** command when the physical link is down:

```
user@host> show interfaces t1-1/1/0
Physical interface: t1-1/1/0, Enabled, Physical link is Down
  Interface index: 24, SNMP ifIndex: 20
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1, Loopback:
None, FCS: 16, Framing: ESF
  Device flags :Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 32 (00:00:23 ago), Output: 35 (00:00:04 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  DS1 alarms :LOF,LOS
  DS1 defects   : LOF, LOS
  Logical interface t1-0/0/0.0 (Index 9) (SNMP ifIndex 34)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
    Protocol inet, MTU: 1500, Flags: None
    Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 1.1.1.0/30, Local: 1.1.1.1
```

Meaning The sample output shows that the physical link is down, the device flags and interface flags are down, and that there are T1 alarms and defects. Verify that the fiber can successfully loop a known good port of the same type by checking for damage to the cable.

Clear T1 Interface Statistics

Purpose	You must reset T1 interface statistics before initiating the ping test. Resetting the statistics provides a clean start so that previous input/output errors and packet statistics do not interfere with the current diagnostics.
Action	To clear all statistics for the interface, use the following Junos OS CLI operational mode command: <pre>user@host> clear interfaces statistics t1-fpc/pic/port</pre>
Sample Output	<pre>user@host> clear interfaces statistics t1-1/1/0 user@host></pre>
Meaning	This command clears the interface statistics counters for interface t1-1/1/0 only.

Force the Link Layer To Stay Up

To complete the loopback test, the link layer must remain up. However, Junos OS is designed to recognize that loop connections are not valid connections and to bring the link layer down. You need to force the link layer to stay up by making some configuration changes to the encapsulation and keepalives.

To force the link layer to stay up, follow these steps:

1. [Configure Encapsulation to Cisco-HDLC on page 120](#)
2. [Configure No-Keepalives on page 121](#)

Configure Encapsulation to Cisco-HDLC

Action	To configure encapsulation on a T1 physical interface, follow these steps: <ol style="list-style-type: none">1. In configuration mode, go to the following hierarchy level: <pre>[edit] user@host# edit interfaces <i>interface-name</i></pre>2. Configure encapsulation to Cisco-HDLC: <pre>[edit interfaces <i>interface-name</i>] user@host# set encapsulation cisco-hdlc</pre>3. Verify the configuration: <pre>user@host# show</pre> For example: <pre>[edit interfaces t1-1/3/0] user@host# show encapsulation hdlc;</pre>
---------------	---

4. Commit the change:

```
user@host# commit
```

For example:

```
[edit interfaces t1-1/3/0]  
user@host# commit  
commit complete
```

Meaning

This command sets the interface encapsulation to the Cisco High-level Data-Link Control (HDLC) transport protocol.

Configure No-Keepalives

Action

To disable the sending of link-layer keepalives on a T1 physical interface, follow these steps:

1. In configuration mode, go to the following hierarchy level:

```
[edit]  
user@host# edit interfaces interface-name
```

2. Configure no-keepalives:

```
[edit interfaces interface-name]  
user@host# set no-keepalives
```

For example:

```
[edit interfaces t1-1/3/0]  
user@host# set no-keepalives
```

3. Verify the configuration:

```
user@host# show
```

For example:

```
[edit interfaces t1-1/3/0]  
user@host# show  
no-keepalives;
```

4. Commit the change:

```
user@host# commit
```

For example:

```
[edit interfaces t1-1/3/0]  
user@host# commit  
commit complete
```

Meaning

By setting no-keepalives, the link layer is forced to stay up. If the setting remains at keepalive, the router will recognize that the same link-layer keepalives are being looped back and will bring the link layer down.

Verify the Status of the Logical Interface

Purpose To verify the status of the logical interface, use the following two Junos OS CLI operational mode commands:

Action `user@host> show interfaces t1-fpc/pic/port`
 `user@host> show interfaces t1-fpc/pic/port terse`

Sample Output

The following output is for a logical interface that is up:

```
user@host> show interfaces t1-1/1/0
Physical interface: t1-1/1/0, Enabled, Physical link is Up
  Interface index: 29, SNMP ifIndex: 20
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1, Loopback:
None, FCS: 16, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : No-Keepalives
  Last flapped   : 2002-01-06 01:09:00 UTC (00:00:44 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  DS1 alarms    : None
  DS1 defects    : None
  Logical interface t1-1/1/0.0 (Index 9) (SNMP ifIndex 34)
    Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
    Bandwidth: 0
    Protocol inet, MTU: 1500, Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 1.1.1.0/30, Local: 1.1.1.1

user@host> show interfaces terse t1-1/1/0
Interface      Admin Link Proto Local                                Remote
t1-1/1/0        up    up
t1-1/1/0.0      up    up   inet  1.1.1.1/30
```

Meaning

The sample output for the first command shows that the logical link is up because there are no flags indicating that the link layer is down. The output for the **show interfaces terse** command shows that logical interface **t1-1/0/0** is up.

Sample Output

The following output is for a logical interface that is down:

```
user@host> show interfaces t1-1/1/0
Physical interface: t1-1/1/0, Enabled, Physical link is Up
  Interface index: 29, SNMP ifIndex: 20
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1, Loopback:
None, FCS: 16, Framing: ESF
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 14 (00:01:01 ago), Output: 9 (00:00:05 ago)
  Last flapped   : 2002-01-06 01:09:00 UTC (00:03:39 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  DS1 alarms    : None
  DS1 defects    : None
  Logical interface t1-1/1/0.0 (Index 9) (SNMP ifIndex 34)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
    Bandwidth: 0
    Protocol inet, MTU: 1500, Flags: None
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 1.1.1.0/30, Local: 1.1.1.1

user@host> show interfaces terse t1-1/1/0
Interface      Admin Link Proto Local                                Remote
t1-1/1/0        up    down
```

```
t1-1/1/0.0      up      down inet  1.1.1.1/30
```

Meaning

The sample output for both commands shows that the logical interface is down. The first command shows that the link layer, device, and destination route are all down. The second command shows that logical interface **t1-1/1/0.0** is down.

Ping the T1 Interface

Purpose Use the **ping** command to verify the loopback connection.

Action To ping the local interface, use the following Junos OS CLI operational mode command:

```
user@host> ping interface t1-fpc/pic/port local-IP-address bypass-routing count 1000
rapid
```

Sample Output

```
user@host> ping interface tl-1/I/O 1.1.1.1 bypass-routing count 1000 rapid
PING 1.1.1.1 (1.1.1.1): 56 data bytes
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
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!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
--- 1.1.1.1 ping statistics ---
1000 packets transmitted, 1000 packets received, 0% packet loss
round-trip min/avg/max/stddev = 2.036/2.120/9.809/0.681 ms
```

Meaning

This command sends 1000 ping packets out of the interface to the local IP address. The ping should complete successfully with no packet loss. If there is any persistent packet loss, open a case with the Juniper Networks Technical Assistance Center (JTAC) at support@juniper.net, or at 1-888-314-JTAC (within the United States) or 1-408-745-9500 (from outside the United States).

Check for T1 Interface Error Statistics

Purpose Persistent interface error statistics indicate that you need to open a case with JTAC.

Action To check the local interface for error statistics, use the following Junos OS CLI operational mode command:

```
user@host> show interfaces t1-fpc/pic/port extensive
```

Sample Output

```

user@host> show interfaces t1-1/1/0 extensive
Physical interface: t1-1/1/0, Enabled, Physical link is Up
  Interface index: 29, SNMP ifIndex: 20, Generation: 32
  Link-level type: Cisco-HDLC, MTU: 1504, Clocking: Internal, Speed: T1, Loopback:
  None, FCS: 16, Framing: ESF
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 28 (last seen 00:00:02 ago)
    Output: 32 (last sent 00:00:06 ago)
  Last flapped   : 2002-01-06 01:09:00 UTC (00:07:19 ago)
  Statistics last cleared: Never
  Traffic statistics:
    Input bytes   :           84682           80 bps
    Output bytes  :           92685           0 bps
    Input packets :           1031           0 pps
    Output packets:           1077           0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 70, L3 incompletes:
    0, L2 channel errors: 0, L2 mismatch timeouts: 0,
    HS link CRC errors: 0, SRAM errors: 0
  Output errors:
    Carrier transitions: 1, Errors: 0, Drops: 0, Aged packets: 0
  DS1 alarms   : None
  DS1 defects  : None
  T1 media:
    Seconds      Count  State
    SEF          1       1 OK
    BEE          0       0 OK
    AIS          0       0 OK
    LOF          1       1 OK
    LOS          0       0 OK
    YELLOW       1       2 OK
    BPV          1       1
    EXZ          1       1
    LCV          1       2
    PCV          1       6
    CS           0       0
    LES          1
    ES           1
    SES          1
    SEFS         1
    BES          1
    UAS          0
  HDLC configuration:
    Policing bucket: Disabled
    Shaping bucket : Disabled
    Giant threshold: 1514, Runt threshold: 3
    Timeslots      : All active
    Line encoding: B8ZS, Byte encoding: Nx64K, Data inversion: Disabled
    Buildout       : 0 to 132 feet
  DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: Unknown (0)
  Packet Forwarding Engine configuration:
    Destination slot: 1, PLP byte: 1 (0x00)
    CoS transmit queue      Bandwidth      Buffer      Priority  Limit
                             %      bps      %      bytes
    0 best-effort           0      0      0      0      low  none

```

```

1 expedited-forwarding 0          0 0          0 low none
2 assured-forwarding 0          0 0          0 low none
3 network-control 0          0 0          0 low none
Logical interface t1-1/1/0.0 (Index 9) (SNMP ifIndex 34) (Generation 14)
Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
Bandwidth: 0
Protocol inet, MTU: 1500, Flags: None, Generation: 29 Route table: 0
Addresses, Flags: Is-Preferred Is-Primary
Destination: 1.1.1.0/30, Local: 1.1.1.1, Broadcast: Unspecified,
Generation: 36

```

Meaning

Check for any error statistics that may appear in the output. There should not be any input or output errors. If there are any persistent input or output errors, open a case with JTAC at support@juniper.net, or at 1-888-314-JTAC (within the United States) or 1-408-745-9500 (from outside the United States).

Diagnose a Suspected Circuit Problem

When you suspect a circuit problem, it is important to work with the transport-layer engineer to resolve the problem. The transport-layer engineer may ask you to create a loop from the router to the network, or the engineer may create a loop to the router from various points in the network.

To diagnose a suspected circuit problem, follow these steps:

1. [Create a Loop from the Router to the Network on page 126](#)
2. [Create a Loop to the Router from Various Points in the Network on page 127](#)

Create a Loop from the Router to the Network

Purpose

Creating a loop from the router to the network allows the transport-layer engineer to test the router from various points in the network. This helps the engineer isolate where the problem is located.

Action

To create a loop from the router to the network, follow these steps:

1. In configuration mode, go to the following hierarchy level:

```

[edit]
user@host# edit interfaces interface-name t1-options

```

2. Configure remote loopback:

```

[edit interfaces interface-name t1-options]
user@host# set loopback remote

```

3. Verify the configuration:

```

user@host# show

```

For example:

```

[edit interfaces t1-1/3/0 t1-options]
user@host# show

```

```
loopback remote;
```

4. Commit the change:

```
user@host# commit
```

For example:

```
[edit interfaces t1-1/3/0 t1-options]
user@host# commit
commit complete
```

Meaning

This command loops any traffic from the network back into the network.

Create a Loop to the Router from Various Points in the Network

Purpose

The transport-layer engineer creates a loop to the router from various points in the network. You can then perform tests to verify the connection from the router to that loopback in the network.

Action

After the transport-layer engineer has created the loop to the router from the network, you must verify the connection from the router to the loopback in the network. Follow Step 2 through Step 8 in [“Diagnose a Suspected Hardware Problem with a T1 Interface” on page 116](#). Keep in mind that any problems encountered in the test indicate a problem with the connection from the router to the loopback in the network.

By performing tests to loopbacks at various points in the network, you can isolate the source of the problem.

Locate T1 Alarms and Errors

This section includes the following information to assist you when troubleshooting T1 interfaces:

- [Checklist for T1 Alarms and Errors on page 127](#)
- [Display T1 Alarms and Errors on page 128](#)
- [Locate Most Common T1 Alarms and Errors on page 131](#)

Checklist for T1 Alarms and Errors

Purpose To check T1 alarms and errors.

Action [Table 12 on page 127](#) provides the links and commands for checking T1 alarms and errors.

Table 12: Checklist for T1 Alarms and Errors

Tasks	Command or Action
“Display T1 Alarms and Errors” on page 128	<code>show interfaces t1-fpc/pic/port extensive</code>

Table 12: Checklist for T1 Alarms and Errors (*continued*)

Tasks	Command or Action
“Locate Most Common T1 Alarms and Errors” on page 131	
1. Locate Loss of Signal and Loss of Frame Alarms on page 131	Check the connection between the router port and the first T1 network element.
2. Locate Alarm Indication Signal Alarms on page 132	Check the T1 network element connected to the T1 interface.
3. Locate an Incoming Yellow Alarm on page 133	Check the cable between the T1 interface and the directly connected T1 network element.

Display T1 Alarms and Errors

Purpose To display T1 alarms and errors, use the following Junos OS command-line interface (CLI) operational mode command:

Action `user@host> show interfaces t1-fpc/pic/port extensive`

Sample Output

```

user@host> show interfaces t1-1/1/0 extensive
Physical interface: t1-1/1/0, Enabled, Physical link is Down
  Interface index: 24, SNMP ifIndex: 20, Generation: 27
  Link-level type: PPP, MTU: 1504, Clocking: Internal, Speed: T1, Loopback: None,
  FCS: 16, Framing: ESF
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
  Last flapped   : 2002-01-01 00:00:35 UTC (00:01:00 ago)
  Statistics last cleared: 2002-01-01 00:01:03 UTC (00:00:32 ago)
  Traffic statistics:
    Input bytes :                0                0 bps
    Output bytes:                0                0 bps
    Input packets:              0                0 pps
    Output packets:            0                0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Policed discards: 0, L3 incompletes:
  0, L2 channel errors: 0, L2 mismatch timeouts: 0,
    HS link CRC errors: 0, SRAM errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0
  DS1 alarms   : LOF, LOS
  DS1 defects  : LOF, LOS
  T1 media:
    Seconds      Count  State
    SEF          32      0 Defect Active
    BEE          0       0 OK
    AIS          0       0 OK
    LOF          32      0 Defect Active
    LOS          32      0 Defect Active
    YELLOW       0       0 OK
    BPV          0       0
    EXZ          0       0
    LCV          0       0
    PCV          32     10667
    CS           0       0
    LES          0       0
    ES           32      0
    SES          32      0
    SEFS         32      0
    BES          0       0
    UAS          32      0
  HDLC configuration:
    Policing bucket: Disabled
    Shaping bucket : Disabled
    Giant threshold: 1514, Runt threshold: 3
    Timeslots      : All active
    Line encoding: B8ZS, Byte encoding: Nx64K, Data inversion: Disabled
    Buildout       : 0 to 132 feet
  DS1 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Induced Error rate: 10e-0, Algorithm: Unknown (0)
  Packet Forwarding Engine configuration:
    Destination slot: 1, PLP byte: 1 (0x00)
    CoS transmit queue      Bandwidth      Buffer      Priority  Limit
                             %      bps      %      bytes
    0 best-effort            0      0      0      0      low  none
    1 expedited-forwarding   0      0      0      0      low  none
    2 assured-forwarding     0      0      0      0      low  none
    3 network-control        0      0      0      0      low  none

```

Meaning The sample output shows active alarms and active defects. When a major error (such as an alarm indication signal [AIS]) is seen for a few consecutive frames, a defect is declared within 1 second from detection. At the defect level, the interface is taken down and routing protocols are immediately notified (this is the default). In most cases, when a defect persists for 2.5 seconds plus or minus 0.5 seconds, an alarm is declared.

Notification messages are logged at the alarm level. Depending on the type of T1 alarm, you can configure the craft panel to display the red or yellow alarm LED and simultaneously have the alarm relay activate a physically connected device (such as a bell).

[Table 13 on page 130](#) lists the T1 media-specific alarms or defects that can render the interface unable to pass packets.

Table 13: T1 Interface Alarms and Error Definitions

T1 Alarm or Error	Definitions
SEF	Severely errored frame
BEE	Block error event
AIS	Alarm indication signal (blue alarm)
LOF	Loss of frame
LOS	Loss of signal
YLW	Yellow alarm
BPV	Bipolar violation
EXZ	Excessive zeros
LCV	Line code violation
PCV	Path code violation
CS	Controlled slip
LES	Line errored seconds
ES	Errored seconds
SES	Severely errored seconds
SEFS	Severely errored frame seconds
BES	Bursty errored seconds

Table 13: T1 Interface Alarms and Error Definitions (*continued*)

T1 Alarm or Error	Definitions
UAS	Unavailable seconds

Locate Most Common T1 Alarms and Errors

To locate common alarms and errors, follow these steps:

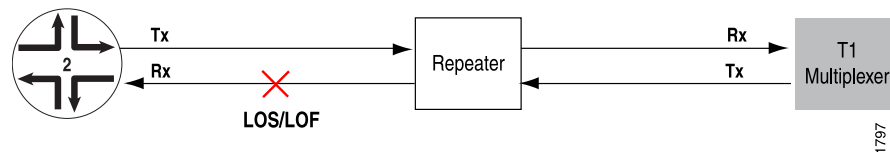
1. [Locate Loss of Signal and Loss of Frame Alarms on page 131](#)
2. [Locate Alarm Indication Signal Alarms on page 132](#)
3. [Locate an Incoming Yellow Alarm on page 133](#)

Locate Loss of Signal and Loss of Frame Alarms

Problem A loss of signal (LOS) or loss of frame (LOF) alarm indicates that a signal could not be detected at the T1 interface.

Solution To locate the LOS or LOF alarm, check the connection between the router port and the first T1 network element. In the example network in [Figure 2 on page 131](#), the X indicates that there is a connection problem between Router2 and the nearest T1 network element.

Figure 2: Location of an LOS or LOF Alarm in a T1 Network



NOTE: Tx represents the transmit port and Rx represents the receive port.

Sample Output

```

user@router2> show interfaces t1-1/1/1 extensive
[... Output truncated...]
DS1  alarms   : LOF, LOS
DS1  defects  : LOF, LOS
T1  media :
Seconds      Count  State
SEF          32      0 Defect Active
BEE          0       0 OK
AIS          0       0 OK
LOF          32      0 Defect Active
LOS          32      0 Defect Active
YELLOW       0       0 OK
BPV          0       0
EXZ          0       0
LCV          0       0
PCV          32    10667
CS           0       0
LES          0       0
ES           32      0
SES          32      0
SEFS         32      0
BES          0       0
UAS          32      0
[...Output truncated...]

```

Meaning

The sample output shows that Router 2 (Rx) detected a cumulative LOS and LOF alarm for 32 seconds.

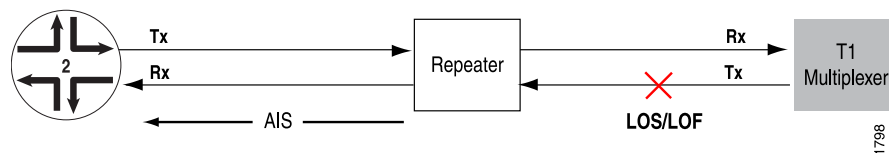
Locate Alarm Indication Signal Alarms

Problem An alarm indication signal (AIS) is a valid framed signal with payload containing a repeating 1010 pattern. An AIS alarm indicates a problem with the line upstream from the T1 network element connected to the T1 interface.

Solution To locate the AIS alarm, have the carrier check the T1 network element connected to the T1 interface and trace the problem.

All diagnostics are from the perspective of Router 2 (the Juniper Networks router). [Figure 3 on page 132](#) illustrates the location of an AIS alarm in a T1 network.

Figure 3: Location of an AIS Alarm in a T1 Network



Meaning

In [Figure 3 on page 132](#), the X indicates that there is an LOS or LOF alarm between the repeater and the Tx T1 multiplexer. An AIS alarm is sent from the repeater to Router 2.

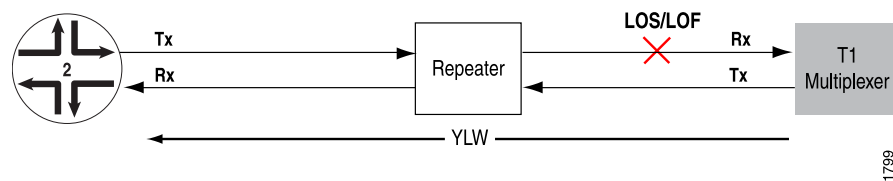
Locate an Incoming Yellow Alarm

Problem An incoming yellow alarm indicates that the T1 network element connected to the T1 interface has a problem with the signal it is receiving from the T1 interface.

Solution To locate the yellow alarm, check the cable between the T1 interface and the directly connected T1 network element.

All diagnostics are from the perspective of Router 2. [Figure 4 on page 133](#) illustrates the location of a yellow alarm in a T1 network.

Figure 4: Location of a Yellow Alarm in a T1 Network

**Meaning**

In [Figure 4 on page 133](#), the T1 multiplexer detects an LOS or LOF alarm on its connection from Router 2 and sends a yellow (YLW) alarm to Router 2.

PART 5

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