



Junos[®] OS

E1/E3/T1/T3 Interfaces Feature Guide for Routing Devices



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About the Documentation

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- Using the Examples in This Manual on page xiii
- Documentation Conventions on page xv
- Documentation Feedback on page xvii
- Requesting Technical Support on page xvii

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 <https://www.juniper.net/documentation/>.

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Using the Examples in This Manual

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

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

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

Merging a Full Example

To merge a full example, follow these steps:

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

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

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

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

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

Merging a Snippet

To merge a snippet, follow these steps:

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

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

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

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

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

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

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

For more information about the **load** command, see [CLI Explorer](#).

Documentation Conventions

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

Table 1: Notice Icons

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

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

Table 2: Text and Syntax Conventions

Convention	Description	Examples
Bold text like this	Represents text that you type.	To enter configuration mode, type the configure command: user@host> configure
Fixed-width text like this	Represents output that appears on the terminal screen.	user@host> show chassis alarms No alarms currently active
<i>Italic text like this</i>	<ul style="list-style-type: none"> Introduces or emphasizes important new terms. Identifies guide 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 CLI User 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)	Encloses optional keywords or variables.	stub <default-metric <i>metric</i> >;
(pipe symbol)	Indicates a choice between the mutually exclusive keywords or variables on either side of the symbol. The set of choices is often enclosed in parentheses for clarity.	broadcast multicast (<i>string1</i> <i>string2</i> <i>string3</i>)
# (pound sign)	Indicates a comment specified on the same line as the configuration statement to which it applies.	rsvp { # Required for dynamic MPLS only
[] (square brackets)	Encloses a variable for which you can substitute one or more values.	community name members [community-ids]
Indentation and braces ({ })	Identifies a level in the configuration hierarchy.	[edit] routing-options { static { route default { nexthop <i>address</i> ; retain; } } }
;(semicolon)	Identifies a leaf statement at a configuration hierarchy level.	

GUI Conventions

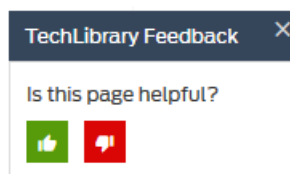
Table 2: Text and Syntax Conventions (continued)

Convention	Description	Examples
Bold text like this	Represents 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 menu selections.	In the configuration editor hierarchy, select Protocols>Ospf .

Documentation Feedback

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- Click the thumbs-down icon if the information on the page was not helpful to you or if you have suggestions for improvement, and use the pop-up form to provide feedback.
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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 Partner Support Service support contract, or are covered under warranty, and need post-sales technical support, you can access our tools and resources online or open a case with JTAC.

- JTAC policies—For a complete understanding of our JTAC procedures and policies, review the *JTAC User Guide* located at <https://www.juniper.net/us/en/local/pdf/resource-guides/7100059-en.pdf>.
- Product warranties—For product warranty information, visit <https://www.juniper.net/support/warranty/>.
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Self-Help Online Tools and Resources

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

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- Find product documentation: <https://www.juniper.net/documentation/>
- Find solutions and answer questions using our Knowledge Base: <https://kb.juniper.net/>
- Download the latest versions of software and review release notes: <https://www.juniper.net/customers/csc/software/>
- Search technical bulletins for relevant hardware and software notifications: <https://kb.juniper.net/InfoCenter/>
- Join and participate in the Juniper Networks Community Forum: <https://www.juniper.net/company/communities/>
- Create a service request online: <https://myjuniper.juniper.net>

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

Creating a Service Request with JTAC

You can create a service request with JTAC on the Web or by telephone.

- Visit <https://myjuniper.juniper.net>.
- 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 <https://support.juniper.net/support/requesting-support/>.

PART 1

E1 Interfaces

- [E1 Interfaces Overview on page 3](#)
- [Configuring E1 Interfaces on page 5](#)

CHAPTER 1

E1 Interfaces Overview

- [E1 Interfaces Overview on page 3](#)

E1 Interfaces Overview

E1 is a standard WAN digital communication format designed to operate over copper facilities at a rate of 2.048 Mbps. Widely used outside North America, it is a basic time-division multiplexing scheme used to carry digital circuits. The following standards apply to E1 interfaces:

- ITU-T Recommendation G.703, *Physical/electrical characteristics of hierarchical digital interfaces*, describes data rates and multiplexing schemes for the E Series.
- ITU-T Recommendation G.751, *General Aspects of Digital Transmission Systems: Terminal Equipment*, describes framing methods.
- ITU-T Recommendation G.775, *Loss of Signal (LOS) and Alarm Indication Signal (AIS) Defect Detection and Clearance Criteria*, describes alarm reporting methods.



NOTE: The Juniper Networks E1 Physical Interface Card (PIC) does not support Channel Associated Signaling (CAS).

Related Documentation

- [Physical Interfaces](#)

CHAPTER 2

Configuring E1 Interfaces

- [Configuring E1 Physical Interface Properties on page 5](#)
- [Configuring E1 BERT Properties on page 6](#)
- [Configuring the E1 Frame Checksum on page 7](#)
- [Configuring E1 Framing on page 8](#)
- [Configuring the E1 Idle Cycle Flag on page 8](#)
- [Configuring E1 Data Inversion on page 9](#)
- [Configuring E1 Loopback Capability on page 9](#)
- [Configuring E1 Start and End Flags on page 11](#)
- [Configuring Fractional E1 Time Slots on page 11](#)

Configuring E1 Physical Interface Properties

To configure E1-specific physical interface properties, include the **e1-options** statement at the **[edit interfaces *interface-name*]** hierarchy level:

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

Related Documentation

- [E1 Interfaces Overview on page 3](#)

Configuring E1 BERT Properties

This topic discusses BERT properties for the E1 interface specifically. For general information about the Junos OS implementation of the BERT procedure, see *Configuring Interface Diagnostics Tools to Test the Physical Layer Connections*.

You can configure an E1 interface or a CE1 or E1 partition on a channelized PIC 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* e1-options]** hierarchy level:

```
[edit interfaces interface-name e1-options]
  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. Standard CE1, standard E1, E1 IQ, and E1 IQE interfaces, and PICs partitioned to CE1 and E1 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 E1 and CE1 interfaces on 10-port Channelized E1/T1 IQE PICs, you must include the **bert-period** statement at the **[edit interfaces *ce1-fpc/pic/port*]** hierarchy level.



NOTE: When configuring CE1 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 *ce1-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} (0, which corresponds to no errors) to 10^{-7} (1 error per 10 million bits). The default is 0.



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).

Individual concatenated E1 interfaces do not support the **bert-algorithm** configuration statement. For individual concatenated E1 interfaces, the **bert-algorithm** statement at the **[edit interfaces *interface-name* e1-options]** hierarchy level is ignored. The algorithm for the E1 BERT procedure is **pseudo-2e15-o151** (pattern is $2^{15}-1$, as defined in the CCITT/ITU O.151 standard).

For channelized E1 intelligent queuing (IQ and IQE) interfaces, you can configure the BERT algorithm by including the **bert-algorithm** statement at the **[edit interfaces ce1-fpc/pic/port e1-options]** or **[edit interfaces e1-fpc/pic/port e1-options]** hierarchy level:

```
[edit interfaces ce1-fpc/pic/port e1-options]
bert-algorithm algorithm;
[edit interfaces e1-fpc/pic/port e1-options]
bert-algorithm algorithm;
```

For a list of supported algorithms, enter a ? after the **bert-algorithm** statement; for example:

```
[edit interfaces ce1-0/0/0 e1-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)
```

For specific hierarchy information, see individual interface types. For information about running the BERT procedure, see the [CLI Explorer](#).

Related Documentation

- [Configuring T1 BERT Properties on page 34](#)
- [Configuring Interface Diagnostics Tools to Test the Physical Layer Connections on page 69](#)

Configuring the E1 Frame Checksum

By default, the E1 interface supports a 16-bit 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 e1-options]** hierarchy level:

```
[edit interfaces interface-name e1-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 e1-fpc/pic/port e1-options fcs 32
```

To explicitly configure a 16-bit checksum, include the **fcs 16** statement at the **[edit interfaces interface-name e1-options]** hierarchy level:

```
[edit interfaces interface-name e1-options]
```

```
fcs 16;
```

Related Documentation

- [fcs on page 147](#)

Configuring E1 Framing

By default, E1 interfaces use the G704 framing mode. You can configure the alternative unframed mode if needed.

To have the interface use the unframed mode, include the **framing** statement at the **[edit interfaces *interface-name* e1-options]** hierarchy level, specifying the **unframed** option:

```
[edit interfaces interface-name e1-options]  
framing unframed;
```

To explicitly configure G704 framing, include the **framing** statement at the **[edit interfaces *interface-name* e1-options]** hierarchy level, specifying the **g704** option:

```
[edit interfaces interface-name e1-options]  
framing g704;
```

By default, G704 framing uses CRC4. To explicitly configure an interface's G704 framing to not use CRC4, include the **framing** statement at the **[edit interfaces *interface-name* e1-options]** hierarchy level, specifying the **g704-no-crc4** option:

```
[edit interfaces interface-name e1-options]  
framing g704-no-crc4;
```

Related Documentation

- [framing on page 149](#)

Configuring the E1 Idle Cycle Flag

By default, an E1 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* e1-options]** hierarchy level, specifying the **ones** option:

```
[edit interfaces interface-name e1-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 e1-options]  
idle-cycle-flag flags;
```

Related Documentation • [idle-cycle-flag on page 150](#)

Configuring E1 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* e1-options]** hierarchy level:

```
[edit interfaces interface-name e1-options]
invert-data;
```

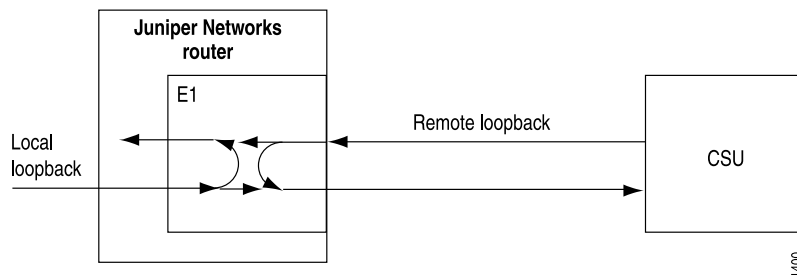
When you enable data inversion, all data bits in the data stream are transmitted inverted; that is, zeroes are transmitted as ones and ones as zeroes. Data inversion is normally used only in AMI mode to guarantee ones density in the transmitted stream.

Related Documentation • [invert-data on page 151](#)

Configuring E1 Loopback Capability

You can configure loopback capability between the local E1 interface and the remote channel service unit (CSU), as shown in [Figure 1 on page 9](#). You can configure the loopback to be local or remote. With local loopback, the E1 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 E1 interface, forwarded if there is a valid route, and immediately retransmitted to the CSU.

Figure 1: Remote and Local E1 Loopback



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, you issue the **test interface** command.

For more information about configuring BERT, see *Configuring Interface Diagnostics Tools to Test the Physical Layer Connections*. For more information about using operational mode commands to test interfaces, see the [CLI Explorer](#).

To configure E1 Loopback capability on an E1 interface:

1. In the configuration mode go to the **[edit interfaces *interface-name* e1-options]** hierarchy level.

```
[edit]
user@host# edit interfaces interface-name fpc/pic/port e1-options
```

2. Include the **loopback** statement. Note that the **loopback local** statement causes the interface to loop within the PIC just before the data reaches the transceiver.

```
[edit interfaces interface-name fpc/pic/port e1-options ]
user@host# set loopback (local | remote)
```

3. To determine whether a problem is internal or external, loop packets on both the local and the remote router. Include the **no-keepalives** and **encapsulation cisco-hdlc** statements at the **[edit interfaces *interface-name*]** hierarchy level. With this configuration, the link stays up, so you can loop ping packets to a remote router.

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

4. Check the error counters in the output of the **show interface *interface-name* extensive** to determine whether there is an internal problem or an external problem.

```
user@host# show interfaces interface-name extensive
```

5. View the configuration by issuing the show command at the **[edit interfaces *e1-fpc/pic/port*]** hierarchy level.

```
[edit interfaces]
user@host# show
e1-1/0/0 {
  no-keepalives;
  encapsulation cisco-hdlc;
  e1-options {
    loopback local;
  }
  unit 0 {
    family inet {
      address 10.100.100.1/24;
    }
  }
}
```

**NOTE:**

- You can turn off the loopback capability by removing the `loopback` statement from the configuration

```
[edit]
user@host# delete interfaces e1-fpc/pic/port e1-options loopback
```

- You can configure the CE1 loopback capability on the 16-port Channelized E1/T1 Circuit Emulation MIC (MIC-3D-16CHE1-T1-CE), by including the `loopback` statement at the `[edit interfaces ce1-fpc/pic/port]` hierarchy level.

Related Documentation

- [Configuring T1 Loopback Capability on page 39](#)
- [Performing a Loopback Test on an Interface on page 66](#)

Configuring E1 Start and End Flags

By default, start and end flags are shared.

To configure an E1 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 e1-options]` hierarchy level:

```
[edit interfaces interface-name e1-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 e1-options]` hierarchy level:

```
[edit interfaces interface-name e1-options]
start-end-flag shared;
```

Related Documentation

- [start-end-flag on page 158](#)

Configuring Fractional E1 Time Slots

Overview

An E1 interface consists of 32 time slots. By default, all the time slots on an E1 interface are used. Time slot 0 is always reserved for framing and cannot be used to configure a fractional E1 interface.

Time slot numbering constraints vary for different E1 PICs, as follows:

- For 4-port E1 PICs, the configurable time slot range is 1 through 31 (time slot 0 is reserved for framing).
- For 10-port Channelized E1 and 10-port Channelized E1 Intelligent Queuing (IQ) PICs, the configurable time slot range is 2 through 32 (time slots 0 and 1 are reserved for framing).
- For Enhanced Intelligent Queuing (IQE) PICs, the configurable time slot range is 2 through 32.
- NxDS0 time slots configured on either a channelized STM1 IQ interface or a channelized E1IQ interface are numbered from 1 to 31 (0 is reserved), while fractional E1 time slots are numbered from 2 to 32 (0 and 1 are reserved).
- For fractional E1 interfaces only, if you connect a 4-port E1 PIC to a device that uses time slot numbering from 2 through 32, you must subtract 1 from the configured number of time slots.



NOTE:

- To configure ranges, use hyphens.
- To configure discontinuous time slots, use commas. Do not include spaces.

Configuration

Configuring Fractional E1 Time Slots

Step-by-Step Procedure

1. In the configuration mode go to the `[edit interfaces interface-name e1-options]` hierarchy level.

```
[edit]
user@host# edit interfaces interface-name fpc/pic/port e1-options
```

2. Include the `timeslots` statement.

```
[edit interfaces interface-name fpc/pic/port e1-options ]
user@host# set timeslots time-slot-range
```

Following examples illustrates how to configure different time slots at the `[edit interfaces interface-name e1-options]` hierarchy level.

- To configure time slots 4 through 6, 11, and 25:

```
user@host# set timeslots 4-6,11,25
```

- To configure time slots 1 through 10:

```
user@host# set timeslots 1-10
```

- To configure time slots 1 through 5, 10, and 24:

```
user@host# set timeslots 1-5,10,24
```

3. Include the **framing g704** statement at the `[edit interfaces e1-fpc/pic/port e1-options]` hierarchy level.

```
[edit interfaces e1-fpc/pic/port e1-options ]
user@host# set framing g704
```

Related Documentation

- [timeslots on page 161](#)

PART 2

E3 Interfaces

- [E3 Interfaces Overview on page 17](#)
- [Configuring E3 Interfaces on page 19](#)

CHAPTER 3

E3 Interfaces Overview

- [E3 Interfaces Overview on page 17](#)

E3 Interfaces Overview

E3 is a high-speed WAN digital communication technique designed to operate over copper facilities at a rate of 34.368 Mbps. Widely used outside North America, it is the time-division multiplexing scheme used to carry 16 E1 circuits. The following standards apply to E3 interfaces:

- ITU-T Recommendation G.703, *Physical/electrical characteristics of hierarchical digital interfaces*, describes data rates and multiplexing schemes for the E Series.
- ITU-T Recommendation G.751, *General Aspects of Digital Transmission Systems: Terminal Equipment*, describes framing methods.
- ITU-T Recommendation G.775, *Loss of Signal (LOS) and Alarm Indication Signal (AIS) Defect Detection and Clearance Criteria*, describes alarm reporting methods.

The Junos OS supports the E3 Physical Interface Card (PIC) and the E3 Intelligent Queuing (IQ and IQE) PICs. The E3 IQ and E3 IQE PICs supports transmission scheduling on logical interfaces. For more information, see the *Class of Service Feature Guide for Routing Devices and EX9200 Switches*.



NOTE: In unframed mode, the E3 IQ and E3 IQE PICs do not detect yellow or loss-of-frame alarms.

Related Documentation

- [Physical Interfaces](#)

CHAPTER 4

Configuring E3 Interfaces

- [Configuring E3 Physical Interface Properties on page 19](#)
- [Configuring E3 BERT Properties on page 20](#)
- [Configuring the E3 CSU Compatibility Mode on page 21](#)
- [Configuring the E3 Frame Checksum on page 22](#)
- [Configuring the E3 Idle Cycle Flag on page 23](#)
- [Configuring E3 Data Inversion on page 23](#)
- [Configuring E3 Loopback Capability on page 24](#)
- [Configuring E3 HDLC Payload Scrambling on page 25](#)
- [Configuring the E3 Start and End Flags on page 26](#)
- [Configuring E3 IQ and IQE Unframed Mode on page 26](#)

Configuring E3 Physical Interface Properties

To configure E3-specific physical interface properties, include the **e3-options** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]  
e3-options {  
  bert-algorithm algorithm;  
  bert-error-rate rate;  
  bert-period seconds;  
  compatibility-mode (digital-link | kentrox | larscom) <subrate value>;  
  fcs (16 | 32);  
  idle-cycle-flag value;  
  invert-data;  
  loopback (local | remote);  
  (payload-scrambler | no-payload-scrambler);  
  start-end-flag value;  
  (unframed | no-unframed);  
}
```

Related Documentation

- [Physical Interfaces](#)

Configuring E3 BERT Properties

This section discusses BERT properties for the E3 interface specifically. For general information about the Junos implementation of the BERT procedure, see *Configuring Interface Diagnostics Tools to Test the Physical Layer Connections*.

You can configure an E3 interface 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, the pattern to send in the bit stream, and the error rate to include in the bit stream by including the **bert-period**, **bert-algorithm**, and **bert-error-rate** statements at the **[edit interfaces interface-name e3-options]** hierarchy level:

```
[edit interfaces interface-name e3-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} (0, which corresponds to no errors) to 10^{-7} (1 error per 10 million bits).

algorithm is the pattern to send in the bit stream. On E3 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 e3-0/0/0 e3-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)
```

For specific hierarchy information, see individual interface types. For information about running the BERT procedure, see the [CLI Explorer](#).

Related Documentation

- [Configuring T3 BERT Properties on page 50](#)
- [Configuring Interface Diagnostics Tools to Test the Physical Layer Connections on page 69](#)

Configuring the E3 CSU Compatibility Mode

Subrating an E3 interface reduces the maximum allowable peak rate by limiting the High-level Data Link Control (HDLC)-encapsulated payload. Subrate modes configure the PIC to connect with channel service units (CSUs) that use proprietary methods of multiplexing.

On M Series and T Series routers, you can configure E3 interfaces to be compatible with a Digital Link, Kentrox, or Larscom CSU.



NOTE: To subrate an E3 interface to be compatible with a Kentrox CSU, you must have an IQ-based PIC. Non-IQ PICs allow a commit of the configuration, but the interfaces remain at the full E3 rate for the Kentrox compatibility mode.

For E3 interfaces on IQE PICs, subrate is not supported and the `E3-options compatibility-mode` and `payload-scrambler` are invalid. Although Junos OS CLI allows a commit of this configuration, the interfaces remain at the full E3 rate and implicitly default to only Kentrox compatibility mode.

To configure an E3 interface so that it is compatible with the CSU at the remote end of the line, include the `compatibility-mode` statement at the `[edit interfaces interface-name e3-options]` hierarchy level:

```
[edit interfaces interface-name e3-options]
compatibility-mode (digital-link | kentrox | larscom) <subrate value>;
```

The subrate of an E3 interface must exactly match that of the remote CSU. To specify the subrate, include the `subrate` statement in the configuration:

- For Kentrox CSUs, specify the subrate as a number from 1 through 48 that exactly matches the value configured on the CSU. Each increment of the subrate value corresponds to a rate increment of about 0.5 Mbps.
- For Digital Link CSUs, you can specify the subrate value to match the data rate configured on the CSU in the format `xkb` or `x.xMb`. You can configure the subrate values shown in [Table 3 on page 21](#).
- Larscom CSUs do not support the E3 subrate.

Table 3: Subrate Values for E3 Digital Link Compatibility Mode

358 Kbps	7.2 Mbps	14.0 Mbps	20.8 Mbps	27.6 Mbps
716 Kbps	7.5 Mbps	14.3 Mbps	21.1 Mbps	27.9 Mbps
1.1 Mbps	7.9 Mbps	14.7 Mbps	21.5 Mbps	28.3 Mbps
1.4 Mbps	8.2 Mbps	15.0 Mbps	21.8 Mbps	28.6 Mbps

Table 3: Subrate Values for E3 Digital Link Compatibility Mode (continued)

1.8 Mbps	8.6 Mbps	15.4 Mbps	22.2 Mbps	29.0 Mbps
2.1 Mbps	9.0 Mbps	15.8 Mbps	22.6 Mbps	29.4 Mbps
2.5 Mbps	9.3 Mbps	16.1 Mbps	22.9 Mbps	29.7 Mbps
2.9 Mbps	9.7 Mbps	16.5 Mbps	23.3 Mbps	30.1 Mbps
3.2 Mbps	10.0 Mbps	16.8 Mbps	23.6 Mbps	30.4 Mbps
3.6 Mbps	10.4 Mbps	17.2 Mbps	24.0 Mbps	30.8 Mbps
3.9 Mbps	10.7 Mbps	17.5 Mbps	24.3 Mbps	31.1 Mbps
4.3 Mbps	11.1 Mbps	17.9 Mbps	24.7 Mbps	31.5 Mbps
4.7 Mbps	11.5 Mbps	18.3 Mbps	25.1 Mbps	31.9 Mbps
5.0 Mbps	11.8 Mbps	18.6 Mbps	25.4 Mbps	32.2 Mbps
5.4 Mbps	12.2 Mbps	19.0 Mbps	25.8 Mbps	32.6 Mbps
5.7 Mbps	12.5 Mbps	19.3 Mbps	26.1 Mbps	32.9 Mbps
6.1 Mbps	12.9 Mbps	19.7 Mbps	26.5 Mbps	33.3 Mbps
6.4 Mbps	13.2 Mbps	20.0 Mbps	26.9 Mbps	33.7 Mbps
6.8 Mbps	13.6 Mbps	20.4 Mbps	27.2 Mbps	

For information about subrating a T3 interface, see [“Configuring the T3 CSU Compatibility Mode” on page 52](#).

Related Documentation

- [Configuring the T3 CSU Compatibility Mode on page 52](#)

Configuring the E3 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.

On a channelized OC12 interface, the **fcs** statement is not supported. To configure FCS on each E3 channel, you must include the **e3-options fcs** statement in the configuration for each channel.

To configure a 32-bit checksum, include the **fcs** statement at the **[edit interfaces interface-name e3-options]** hierarchy level:


```
[edit interfaces interface-name e3-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 e3-fpc/pic/port e3-options fcs 32
```

To explicitly configure a 16-bit checksum, include the **fcs** statement at the **[edit interfaces *interface-name* e3-options]** hierarchy level:

```
[edit interfaces interface-name e3-options]
fcs 16;
```

Related Documentation

- [fcs on page 147](#)

Configuring the E3 Idle Cycle Flag

By default, an E3 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* e3-options]** hierarchy level, specifying the **ones** option:

```
[edit interfaces interface-name e3-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 e3-options]
idle-cycle-flag flags;
```

Related Documentation

- [idle-cycle-flag on page 150](#)

Configuring E3 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* e3-options]** hierarchy level:

```
[edit interfaces interface-name e3-options]
invert-data;
```

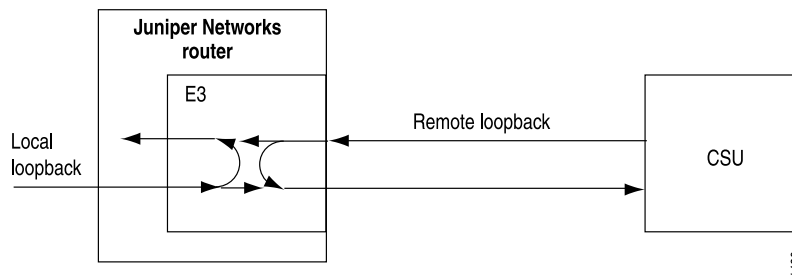
When you enable data inversion, unused data bits in the data stream are transmitted inverted; that is, zeroes are transmitted as ones and ones as zeroes. Enable inversion to be compatible with another vendor's E3 interface.

Related Documentation • [invert-data on page 151](#)

Configuring E3 Loopback Capability

You can configure loopback capability between the local E3 interface and the remote channel service unit (CSU), as shown in [Figure 2 on page 24](#). You can configure the loopback to be local or remote. With local loopback, the E3 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 E3 interface, forwarded if there is a valid route, and immediately retransmitted to the CSU.

Figure 2: Remote and Local E3 Loopback



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, you issue the **test interface** command.

For more information about configuring BERT, see *Configuring Interface Diagnostics Tools to Test the Physical Layer Connections*. For more information about using operational mode commands to test interfaces, see the [CLI Explorer](#).

To configure E3 Loopback capability on an E3 interface:

1. In the configuration mode go to the **[edit interfaces interface-name e3-options]** hierarchy level.

```
[edit]
user@host# edit interfaces interface-name fpc/pic/port e3-options
```

2. Include the **loopback** statement. Note that the **loopback local** statement causes the interface to loop within the PIC just before the data reaches the transceiver.

```
[edit interfaces interface-name fpc/pic/port e3-options ]
user@host# set loopback (local | remote)
```

3. To determine whether a problem is internal or external, loop packets on both the local and the remote router. Include the **no-keepalives** and **encapsulation cisco-hdlc** statements at the **[edit interfaces interface name]** hierarchy level. With this configuration, the link stays up, so you can loop ping packets to a remote router.

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

4. Check the error counters in the output of the **show interface *interface-name* extensive** to determine whether there is an internal problem or an external problem.

```
user@host# show interfaces interface-name extensive
```

5. View the configuration by issuing the show command at the **[edit interfaces *e3-fpc/pic/port*]** hierarchy level.

```
[edit interfaces]
user@host# show
e3-1/0/0 {
  no-keepalives;
  encapsulation cisco-hdlc;
  e3-options {
    loopback local;
  }
  unit 0 {
    family inet {
      address 10.100.100.1/24;
    }
  }
}
```



NOTE:

- You can turn off the loopback capability by removing the loopback statement from the configuration

```
[edit]
user@host# delete interfaces e3-fpc/pic/port e3-options loopback
```

Related Documentation • [loopback on page 153](#)

Configuring E3 HDLC Payload Scrambling

E3 HDLC payload scrambling, which is disabled by default, provides better link stability. Both sides of a connection must either use or not use scrambling.

To configure scrambling on the interface, you can include the **payload-scrambler** statement at the **[edit interfaces *interface-name* e3-options]** hierarchy level:

```
[edit interfaces interface-name e3-options]
```

```
payload-scrambler;
```

To explicitly disable HDLC payload scrambling, include the **no-payload-scrambler** statement at the **[edit interfaces *interface-name* e3-options]** hierarchy level:

```
[edit interfaces interface-name e3-options]  
no-payload-scrambler;
```

To disable payload scrambling again (return to the default), delete the **payload-scrambler** statement from the configuration:

```
[edit]  
user@host# delete interfaces e3-fpc/pic/port e3-options payload-scrambler
```

Related Documentation

- [payload-scrambler on page 156](#)

Configuring the E3 Start and End Flags

By default, an E3 interface shares the transmission of the start and end flags

To configure an E3 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* e3-options]** hierarchy level:

```
[edit interfaces interface-name e3-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* e3-options]** hierarchy level:

```
[edit interfaces interface-name e3-options]  
start-end-flag shared;
```

Related Documentation

- [start-end-flag on page 158](#)

Configuring E3 IQ and IQE Unframed Mode

For E3 IQ and IQE interfaces only, you can enable or disable unframed mode. In unframed mode, the E3 IQ and IQE interfaces do not detect yellow (**ylw**) or loss-of-frame (**lof**) alarms.

By default, unframed mode is disabled. To enable unframed mode, include the **unframed** statement at the **[edit interfaces *interface-name* e3-options]** hierarchy level:

```
[edit interfaces interface-name e3-options]  
unframed;
```

To explicitly configure the default of framed mode, include the **no-unframed** statement:

```
[edit interfaces interface-name e3-options]  
no-unframed;
```

**Related
Documentation**

- [unframed on page 162](#)

PART 3

T1 Interfaces

- [T1 Interfaces Overview on page 31](#)
- [Configuring T1 Interfaces on page 33](#)

CHAPTER 5

T1 Interfaces Overview

- [T1 Interfaces Overview on page 31](#)

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

Related Documentation

- *Physical Interfaces*

CHAPTER 6

Configuring T1 Interfaces

- [Configuring T1 Physical Interface Properties on page 33](#)
- [Configuring T1 BERT Properties on page 34](#)
- [Configuring the T1 Buildout on page 35](#)
- [Configuring T1 Byte Encoding on page 36](#)
- [Configuring T1 CRC Error Major Alarm Thresholds on page 36](#)
- [Configuring T1 CRC Error Minor Alarm Thresholds on page 37](#)
- [Configuring T1 Data Inversion on page 37](#)
- [Configuring the T1 Frame Checksum on page 38](#)
- [Configuring the T1 Remote Loopback Response on page 38](#)
- [Configuring T1 Framing on page 39](#)
- [Configuring T1 Line Encoding on page 39](#)
- [Configuring T1 Loopback Capability on page 39](#)
- [Configuring the T1 Idle Cycle Flag on page 41](#)
- [Configuring T1 Start and End Flags on page 42](#)
- [Configuring Fractional T1 Time Slots on page 43](#)

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;
}

```

Related Documentation • [T1 Interfaces Overview on page 31](#)

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 *Configuring Interface Diagnostics Tools to Test the Physical Layer Connections*.

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 [CLI Explorer](#).

Related Documentation

- [Configuring E1 BERT Properties on page 6](#)
- [Configuring Interface Diagnostics Tools to Test the Physical Layer Connections on page 69](#)

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;
```

Related Documentation

- [buildout on page 138](#)

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;
```

Related Documentation

- [byte-encoding on page 139](#)

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.

Related Documentation • [crc-major-alarm-threshold on page 142](#)

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.

Related Documentation • [crc-minor-alarm-threshold on page 143](#)

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 AML mode to guarantee ones density in the transmitted stream.

Related Documentation • [invert-data on page 151](#)

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;
```

Related Documentation • [fcs on page 147](#)

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.

Related Documentation • [remote-loopback-respond on page 157](#)

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;
```

Related
Documentation

- [framing on page 149](#)

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.

Related
Documentation

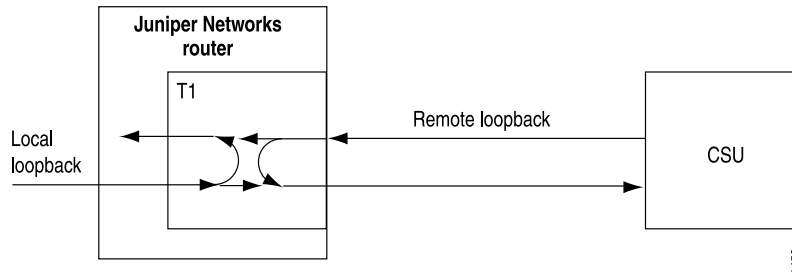
- [line-encoding on page 152](#)

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 3 on page 40](#). 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 3: 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 *Configuring Interface Diagnostics Tools to Test the Physical Layer Connections*. For more information about using operational mode commands to test interfaces, see the [CLI Explorer](#).

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 on page 9](#)
- [Performing a Loopback Test on an Interface on page 66](#)

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;
```

Related Documentation

- [idle-cycle-flag on page 150](#)

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;
```

Related Documentation

- [start-end-flag on page 158](#)

Configuring Fractional T1 Time Slots

A T1 interface has 24 time slots. For T1 interfaces, the time-slot range is from 1 through 24. By default, all the time slots on a T1 interface are used. You can designate any combination of time slots. To configure the number of time slots allocated to a fractional T1 interface:

1. In the configuration mode go to the `[edit interfaces interface-name t1-options]` hierarchy level.

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

2. Include the **timeslots** statement.

```
[edit interfaces interface-name fpc/pic/port t1-options ]
user@host# set timeslots time-slot-range
```

Following examples illustrates how to configure different time slots at the `[edit interfaces interface-name t1-options]` hierarchy level.

- To configure time slots 1 through 10:

```
user@host# set timeslots 1-10
```

- To configure time slots 1 through 5, 10 and, 24:

```
user@host# set timeslots 1-5,10,24
```

- To configure the first four odd-numbered time slots:

```
user@host# set timeslots 1,3,5,7
```



NOTE:

- To configure ranges, use hyphens.
- To configure discontinuous time slots, use commas. Do not include spaces.

Related Documentation

- [timeslots on page 161](#)

PART 4

T3 Interfaces

- [T3 Interfaces Overview on page 47](#)
- [Configuring T3 Interfaces on page 49](#)

CHAPTER 7

T3 Interfaces Overview

- [T3 Interfaces Overview on page 47](#)

T3 Interfaces Overview

T3 is the physical layer protocol used by the Digital Signal level 3 (DS3) multiplexing method in North America. A T3 interface operates at a bit rate of 44.736 Mbps. The Junos OS supports payload scrambling and subrate operation on each physical T3 interface. One encapsulation format—Point-to-Point Protocol (PPP), Frame Relay, or High-level Data Link Control (HDLC)—must be configured for the interface. DS3 standards supported include:

- ANSI T1.107, T1.102
- GR 499-core, GR 253-core
- Bellcore TR-TSY-000009
- AT&T Pub 5404
- ITU G.751, G.703, G823

Related Documentation

- *Physical Interfaces*

CHAPTER 8

Configuring T3 Interfaces

- [Configuring T3 Physical Interface Properties on page 49](#)
- [Configuring T3 BERT Properties on page 50](#)
- [Disabling T3 C-Bit Parity Mode on page 51](#)
- [Configuring the T3 CSU Compatibility Mode on page 52](#)
- [Configuring the T3 Frame Checksum on page 55](#)
- [Configuring the T3 FEAC Response on page 55](#)
- [Configuring the T3 Idle Cycle Flag on page 56](#)
- [Configuring the T3 Line Buildout on page 56](#)
- [Configuring T3 Loopback Capability on page 57](#)
- [Configuring T3 HDLC Payload Scrambling on page 59](#)
- [Configuring T3 Start and End Flags on page 59](#)
- [Examples: Configuring T3 Interfaces on page 60](#)

Configuring T3 Physical Interface Properties

To configure T3-specific physical interface properties, include the **t3-options** statement at the **[edit interfaces *interface-name*]** hierarchy level:

```
[edit interfaces interface-name]  
t3-options {  
  bert-algorithm algorithm;  
  bert-error-rate rate;  
  bert-period seconds;  
  (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);  
  (payload-scrambler | no-payload-scrambler);  
  start-end-flag value;  
}
```

Related Documentation • [T3 Interfaces Overview on page 47](#)

Configuring T3 BERT Properties

This section discusses BERT properties for the T3 interface specifically. For general information about the Junos implementation of the BERT procedure, see *Configuring Interface Diagnostics Tools to Test the Physical Layer Connections*.

You can configure a T3 interface 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, the pattern to send in the bit stream, and the error rate to include in the bit stream by including the **bert-period**, **bert-algorithm**, and **bert-error-rate** statements at the **[edit interfaces interface-name t3-options]** hierarchy level:

```
[edit interfaces interface-name t3-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. The default algorithm for the DS3 BERT procedure is **pseudo-2e15-o151** (pattern is $2^{15}-1$, as defined in the CCITT/ITU O.151 standard).

On T3 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 t3-0/0/0 t3-options]
user@host# set bert-algorithm ?
Possible completions:
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-2e10 Pattern is 2^10 - 1
...
```

For specific hierarchy information, see individual interface types. For information about running the BERT procedure, see the [CLI Explorer](#).

- Related Documentation
- [bert-algorithm on page 132](#)
 - [bert-error-rate on page 134](#)
 - [bert-period on page 136](#)
 - [t3-options on page 160](#)
 - *Configuring Interface Diagnostics Tools to Test the Physical Layer Connections*

Disabling T3 C-Bit Parity Mode

C-bit parity mode controls the type of framing that is present on the transmitted T3 signal. When C-bit parity mode is enabled, the C-bit positions are used for the FEBE, FEAC, terminal data link, path parity, and mode indicator bits, as defined in ANSI T1.107a-1989. When C-bit parity mode is disabled, the basic T3 framing mode (M23) is used.

By default, C-bit parity mode is enabled. To disable C-bit parity mode and use M23 framing for your T3 link, include the **no-cbit-parity** statement at the **[edit interfaces *interface-name* t3-options]** hierarchy level:

```
[edit interfaces interface-name t3-options]
no-cbit-parity;
```



NOTE: For ATM, ATM2 IQ2, IQ2-E, and T3 interfaces, M23 framing is used when the **no-cbit-parity** statement is included. For all other interfaces, M13 framing is used when the **no-cbit-parity** statement is included.

To return to the default, enabling C-bit parity mode, delete the **no-cbit-parity** statement from the configuration:

```
[edit]
user@host# delete interfaces t3-fpc/pic/port t3-options no-cbit-parity
```

To explicitly enable C-bit parity mode, include the **cbit-parity** statement at the **[edit interfaces *interface-name* t3-options]** hierarchy level:

```
[edit interfaces interface-name t3-options]
cbit-parity;
```

- Related Documentation
- [cbit-parity on page 140](#)

Configuring the T3 CSU Compatibility Mode

Subrating a T3 interface reduces the maximum allowable peak rate by limiting the HDLC-encapsulated payload. Subrate modes configure the PIC to connect with channel service units (CSUs) that use proprietary methods of multiplexing.

You can configure T3 interfaces to be compatible with a Digital Link, Kentrox, or Larscom CSUs. For T3 intelligent queuing (IQ) channels only, you can also configure Adtran or Verilink CSU compatibility.



NOTE: To subrate an E3 interface to be compatible with a Kentrox CSU, you must have an IQ or IQE based PIC. Non-IQ or IQE PICs allow a commit of the configuration, but the interfaces remain at the full E3 rate for the Kentrox compatibility mode.

4-port and 2-port channelized DS3(T3) IQ PICs do not support Adtran and Verilink compatibility modes. If configured, the default mode is applied on both the interfaces.

To configure a T3 interface so that it is compatible with the CSU at the remote end of the line, include the **compatibility** statement at the **[edit interfaces *interface-name* t3-options]** hierarchy level:

```
[edit interfaces interface-name t3-options]
  compatibility-mode (adtran | digital-link | kentrox | larscom | verilink) <subrate value>;
```

The subrate of a T3 interface must exactly match that of the remote CSU. To specify the subrate, include the **subrate** statement in the configuration:

- For Adtran CSUs, specify the subrate as a number from 1 through 588 that exactly matches the value configured on the CSU. A subrate value of 588 corresponds to 44.2 Mbps, or 100 percent of the HDLC-encapsulated payload. A subrate value of 1 corresponds to $44.2 / 588$, which is 75.17 Kbps, or 0.17 percent of the HDLC-encapsulated payload.
- For Digital Link CSUs, specify the subrate as the data rate you configured on the CSU in the format xKb or x.xMb. For Digital Link CSUs, you can specify the subrate value to match the data rate configured on the CSU in the format **xkb** or **x.xMb**. You can configure the subrate values shown in [Table 4 on page 53](#).
- For Kentrox CSUs, specify the subrate as a number from 1 through 69 that exactly matches the value configured on the CSU. A subrate value of 69 corresponds to 34.995097 Mbps, or 79.17 percent of the HDLC-encapsulated payload (44.2 Mbps). A subrate value of 1 corresponds to 999.958 Kbps, which is 2.26 percent of the HDLC-encapsulated payload. Each increment of the subrate value corresponds to a rate increment of about 0.5 Mbps.
- For Larscom CSUs, specify the subrate as a number from 1 through 14 that exactly matches the value configured on the CSU. A subrate value of 14 corresponds to

44.2 Mbps, or 100 percent of the HDLC-encapsulated payload. A subrate value of 1 corresponds to $44.2 / 14$, which is 3.16 Mbps, 7.15 percent of the HDLC-encapsulated payload.

- For Verilink CSUs, specify the subrate as a number from 1 through 28 that exactly matches the value configured on the CSU. To calculate the maximum allowable peak rate, multiply the configured subrate by 1.578 Mbps. For example, a subrate value of 28 corresponds to 28×1.578 Mbps, which is 44.2 Mbps, 100 percent of the HDLC-encapsulated payload. A subrate value of 1 corresponds to 1.578 Mbps, 3.57 percent of the HDLC-encapsulated payload. A subrate value of 20 corresponds to 20×1.578 Mbps, which is 31.56 Mbps, 71.42 percent of the HDLC-encapsulated payload.



NOTE: Verilink configuration is not functional if an IQ interface is paired with an IQE interface.

Verilink configuration on an IQE PIC is also not functional when the PIC is connected to any other vendor equipment that operates in Verilink Port B mode. The Verilink configuration on an IQE PIC works only when it is paired with another IQE PIC or any other vendor equipment that operates in Port A mode.

- When subrate is configured under a T3 interface on a Channelized OC12 IQE PIC in SONET mode, link flaps are observed periodically when the interface is congested close to the subrate level. This behavior is expected. However, the flaps are not seen with shaping rates of traffic that are approximately 95 percent of the configured subrate. We recommend that when you configure the subrate on Channelized DS3/E3 Enhanced IQ (IQE) PICs, Channelized OC48/STM16 IQE PICs, Channelized OC12/STM4 IQE PICs, and Channelized OC3/STM1 PICs, configure the shaping rate of the interface to be the same as the subrate. For example, if you want to configure the subrate and shaping rate on a **t3-fpc/pic/port:n** interface, you can configure both the rates to be the same as follows:

```
user@host# set interfaces t3-3/1/0:1 t3-options compatibility-mode digital-link subrate
18.0Mb
user@host# set class-of-service interfaces t3-3/1/0:1 shaping-rate 18m
```

Table 4: Subrate Values for T3 Digital Link Compatibility Mode

301 Kbps	9.3 Mbps	18.3 Mbps	27.4 Mbps	36.4 Mbps
601 Kbps	9.6 Mbps	18.6 Mbps	27.7 Mbps	36.7 Mbps
902 Kbps	9.9 Mbps	18.9 Mbps	28.0 Mbps	37.0 Mbps
1.2 Mbps	10.2 Mbps	19.2 Mbps	28.3 Mbps	37.3 Mbps
1.5 Mbps	10.5 Mbps	19.5 Mbps	28.6 Mbps	37.6 Mbps
1.8 Mbps	10.8 Mbps	19.8 Mbps	28.9 Mbps	37.9 Mbps

Table 4: Subrate Values for T3 Digital Link Compatibility Mode (continued)

2.1 Mbps	11.1 Mbps	20.1 Mbps	29.2 Mbps	38.2 Mbps
2.4 Mbps	11.4 Mbps	20.5 Mbps	29.5 Mbps	38.5 Mbps
2.7 Mbps	11.7 Mbps	20.8 Mbps	29.8 Mbps	38.8 Mbps
3.0 Mbps	12.0 Mbps	21.1 Mbps	30.1 Mbps	39.1 Mbps
3.3 Mbps	12.3 Mbps	21.4 Mbps	30.4 Mbps	39.4 Mbps
3.6 Mbps	12.6 Mbps	21.7 Mbps	30.7 Mbps	39.7 Mbps
3.9 Mbps	12.9 Mbps	22.0 Mbps	31.0 Mbps	40.0 Mbps
4.2 Mbps	13.2 Mbps	22.3 Mbps	31.3 Mbps	40.3 Mbps
4.5 Mbps	13.5 Mbps	22.6 Mbps	31.6 Mbps	40.6 Mbps
4.8 Mbps	13.8 Mbps	22.9 Mbps	31.9 Mbps	40.9 Mbps
5.1 Mbps	14.1 Mbps	23.2 Mbps	32.2 Mbps	41.2 Mbps
5.4 Mbps	14.4 Mbps	23.5 Mbps	32.5 Mbps	41.5 Mbps
5.7 Mbps	14.7 Mbps	23.8 Mbps	32.8 Mbps	41.8 Mbps
6.0 Mbps	15.0 Mbps	24.1 Mbps	33.1 Mbps	42.1 Mbps
6.3 Mbps	15.3 Mbps	24.4 Mbps	33.4 Mbps	42.4 Mbps
6.6 Mbps	15.6 Mbps	24.7 Mbps	33.7 Mbps	42.7 Mbps
6.9 Mbps	15.9 Mbps	25.0 Mbps	34.0 Mbps	43.0 Mbps
7.2 Mbps	16.2 Mbps	25.3 Mbps	34.3 Mbps	43.3 Mbps
7.5 Mbps	16.5 Mbps	25.6 Mbps	34.6 Mbps	43.6 Mbps
7.8 Mbps	16.8 Mbps	25.9 Mbps	34.9 Mbps	43.9 Mbps
8.1 Mbps	17.1 Mbps	26.2 Mbps	35.2 Mbps	44.2 Mbps
8.4 Mbps	17.4 Mbps	26.5 Mbps	35.5 Mbps	
8.7 Mbps	17.7 Mbps	26.8 Mbps	35.8 Mbps	
9.0 Mbps	18.0 Mbps	27.1 Mbps	36.1 Mbps	

For information about subrating an E3 interface, see [“Configuring the E3 CSU Compatibility Mode” on page 21](#).

Related Documentation

- [Configuring the E3 CSU Compatibility Mode on page 21](#)

Configuring the T3 Frame Checksum

By default, T3 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.

On a channelized OC12 interface, the **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.

To configure a 32-bit checksum, include the **fcs** statement at the **[edit interfaces interface-name t3-options]** hierarchy level:

```
[edit interfaces interface-name t3-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 t3-fpc/pic/port t3-options fcs 32
```

To explicitly configure a 16-bit checksum, include the **fcs** statement at the **[edit interfaces interface-name t3-options]** hierarchy level:

```
[edit interfaces interface-name t3-options]
fcs 16;
```

Related Documentation

- [fcs on page 147](#)

Configuring the T3 FEAC Response

The T3 far-end alarm and control (FEAC) signal is used to send alarm or status information from the far-end terminal back to the near-end terminal and to initiate T3 loopbacks at the far-end terminal from the near-end terminal.

By default, the router does not respond to FEAC requests. To allow the remote CSU to place the local router into loopback, you must configure the router to respond to the CSU's FEAC request by including the **feac-loop-respond** statement at the **[edit interfaces interface-name t3-options]** hierarchy level:

```
[edit interfaces interface-name t3-options]
```

```
feac-loop-respond;
```

If you configure remote or local loopback with the T3 **loopback** statement, the router does not respond to FEAC requests from the CSU even if you include the **feac-loop-respond** statement in the configuration. For the router to respond, you must delete the **loopback** statement from the configuration.

To explicitly configure the router not to respond to FEAC requests, include the **no-feac-loop** statement at the **[edit interfaces *interface-name* t3-options]** hierarchy level:

```
[edit interfaces interface-name t3-options]  
no-feac-loop-respond;
```

Related Documentation

- [feac-loop-respond on page 148](#)

Configuring the T3 Idle Cycle Flag

By default, a T3 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* t3-options]** hierarchy level, specifying the **ones** option:

```
[edit interfaces interface-name t3-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 t3-options]  
idle-cycle-flag flags;
```

Related Documentation

- [idle-cycle-flag on page 150](#)

Configuring the T3 Line Buildout

A T3 interface has two settings for the T3 line buildout: a short setting, which is less than 255 feet (about 68 meters), and a long setting, which is greater than 255 feet and less than 450 feet (about 137 meters). By default, the interface uses the short setting.

The **long-buildout** and **no-long-buildout** statements apply only to copper-cable-based T3 interfaces. You cannot configure a line buildout for a DS3 channel on a channelized OC12 interface, which runs over fiber-optic cable. If you configure this statement on a channelized OC12 interface, it is ignored.

To have the interface drive a line that is longer than 255 feet and shorter than 450 feet, include the **long-buildout** statement at the **[edit interfaces *interface-name* t3-options]** hierarchy level:

```
[edit interfaces interface-name t3-options]
long-buildout;
```

To explicitly configure the default short line buildout, include the **no-long-buildout** statement at the `[edit interfaces interface-name t3-options]` hierarchy level:

```
[edit interfaces interface-name t3-options]
no-long-buildout;
```

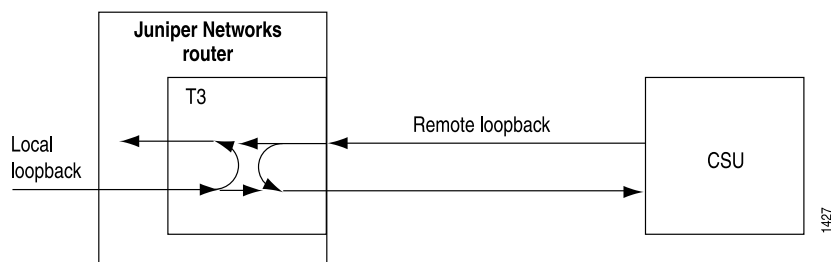
Related Documentation

- [long-buildout on page 155](#)

Configuring T3 Loopback Capability

You can configure loopback capability between the local T3 interface and the remote CSU, as shown in [Figure 4 on page 57](#). You can configure the loopback to be local or remote. With local loopback, the T3 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 T3 interface, forwarded if there is a valid route, and immediately retransmitted to the CSU.

Figure 4: Remote and Local T3 Loopback



To configure loopback capability on a T3 interface, include the **loopback** statement at the `[edit interfaces interface-name t3-options]` hierarchy level:

```
[edit interfaces interface-name t3-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, you issue the **test interface** command.

For more information about configuring BERT, see *Configuring Interface Diagnostics Tools to Test the Physical Layer Connections*. For more information about using operational mode commands to test interfaces, see the [CLI Explorer](#).

For channelized T3, T1, and NxDS0 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 t3-options]** hierarchy level, as shown in the following example:

```
[edit interfaces]
t3-1/0/0 {
  no-keepalives;
  encapsulation cisco-hdlc;
  t3-options {
    loopback local;
  }
  unit 0 {
    family inet {
      address 10.100.100.1/24;
    }
  }
}
```

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 t3-fpc/pic/port t3-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 t3-fpc/pic/port extensive
```

For channel 0 on channelized interfaces only, you can include the **loopback** statement at the **[edit interfaces interface-name interface-type-options]** hierarchy level. The loopback setting configured for channel 0 applies to all channels on the channelized interface. The **loopback** statement is ignored if you include it at this hierarchy level in the configuration of other channels. To configure loopbacks on individual channels, you must include the

channel-type-options loopback statement in the configuration for each channel. This allows each channel to be put in loopback mode independently.

For example, for DS3 channels on a channelized OC12 interface, the **sonet-options loopback** statement is supported only for channel 0; it is ignored if included in the configuration for channels 1 through 11. The SONET loopback configured for channel 0 applies to all 12 channels equally. To configure loopbacks on the individual DS3 channels, you must include the **t3-options loopback** statement in the configuration for each channel. This allows each DS3 channel can be put in loopback mode independently.

Related Documentation • [loopback on page 153](#)

Configuring T3 HDLC Payload Scrambling

T3 HDLC payload scrambling, which is disabled by default, provides better link stability. Both sides of a connection must either use or not use scrambling.

On a channelized OC12 interface, the SONET **payload-scrambler** statement is ignored. To configure scrambling on the DS3 channels on the interface, you can include the **t3-options payload-scrambler** statement at the **[edit interfaces interface-name t3-options]** hierarchy level for each DS3 channel.

If you enable HDLC payload scrambling on a T3 interface, you must also configure the interface to be compatible with the channel service unit (CSU) at the remote end of the line before you commit the interface configuration. For information about subrating a T3 interface, see “[Configuring the T3 CSU Compatibility Mode](#)” on page 52.

```
[edit interfaces interface-name t3-options]
  compatibility-mode (adtran | digital-link | kentrox | larscom | verilink) <subrate value>;
  payload-scrambler;
```

To explicitly disable HDLC payload scrambling, include the **no-payload-scrambler** statement at the **[edit interfaces interface-name t3-options]** hierarchy level:

```
[edit interfaces interface-name t3-options]
  no-payload-scrambler;
```

To disable payload scrambling again (return to the default), delete the **payload-scrambler** statement from the configuration:

```
[edit]
user@host# delete interfaces t3-fpc/pic/port t3-options payload-scrambler
```

Related Documentation • [payload-scrambler on page 156](#)

Configuring T3 Start and End Flags

By default, a T3 interface shares the transmission of the start and end flags.

To configure a T3 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* t3-options]** hierarchy level:

```
[edit interfaces interface-name t3-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* t3-options]** hierarchy level:

```
[edit interfaces interface-name t3-options]
start-end-flag shared;
```

Related Documentation

- [start-end-flag on page 158](#)

Examples: Configuring T3 Interfaces

T3 interfaces can use PPP, Cisco HDLC, or Frame Relay encapsulation.

PPP Encapsulation on a DS3 PIC

```
[edit]
interfaces {
  t3-0/0/0 {
    encapsulation ppp;
    t3-options {
      no-long-buildout;
      compatibility-mode larscom;
      payload-scrambler;
    }
    unit 0 {
      family inet {
        address 10.0.0.1/32 {
          destination 10.0.0.2;
        }
      }
      family iso;
    }
  }
}
```

Cisco HDLC Encapsulation on a DS3 PIC

```
[edit]
interfaces {
  t3-0/0/1 {
    encapsulation cisco-hdlc;
    t3-options {
      no-long-buildout;
      compatibility-mode larscom;
      payload-scrambler;
    }
  }
}
```

```

unit 0 {
  family inet {
    address 10.0.0.1/32 {
      destination 10.0.0.2;
    }
  }
  family iso;
}
}

```

Configure Frame Relay encapsulation on two routers, where one router is a DTE device and the other is a DCE device:

On DTE Router

```

[edit]
interfaces {
  t3-1/0/1 {
    encapsulation frame-relay;
    t3-options {
      no-long-buildout;
      compatibility-mode larscom;
      payload-scrambler;
    }
    unit 1 {
      dlci 1;
      family inet {
        address 10.0.0.1/32 {
          destination 10.0.0.2;
        }
      }
      family iso;
    }
    unit 2 {
      dlci 2;
      family inet {
        address 10.0.0.3/32 {
          destination 10.0.0.4;
        }
      }
      family iso;
    }
  }
}

```

On DCE Router

```

[edit]
interfaces {
  t3-1/1/1 {
    dce;
    encapsulation frame-relay;
    t3-options {
      no-long-buildout;
      compatibility-mode larscom;
    }
  }
}

```

```
    payload-scrambler;
  }
  unit 1 {
    dlci 1;
    family inet {
      address 10.0.0.2/32 {
        destination 10.0.0.1;
      }
    }
    family iso;
  }
  unit 2 {
    dlci 2;
    family inet {
      address 10.0.0.4/32 {
        destination 10.0.0.3;
      }
    }
    family iso;
  }
}
```

Related Documentation

- *Physical Interfaces*

PART 5

Monitoring and Troubleshooting Interfaces

- [General Interface Troubleshooting Information on page 65](#)
- [Monitoring and Troubleshooting T1 Interfaces on page 77](#)
- [Monitoring and Troubleshooting T3 Interfaces on page 105](#)

CHAPTER 9

General Interface Troubleshooting Information

- [Investigating Interface Steps and Commands on page 65](#)
- [Configuring Interface Diagnostics Tools to Test the Physical Layer Connections on page 69](#)
- [Diagnose a Suspected Circuit Problem on page 75](#)

Investigating Interface Steps and Commands

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

- [Investigating Interface Steps and Commands Overview on page 65](#)
- [Monitoring Interfaces on page 65](#)
- [Performing a Loopback Test on an Interface on page 66](#)
- [Locating Interface Alarms on page 68](#)

Investigating Interface Steps and Commands Overview

The “[Monitoring Interfaces](#)” on [page 65](#) section helps you determine the nature of the interface problem. The “[Performing a Loopback Test on an Interface](#)” on [page 66](#) section provides information to help you isolate the source of the problem. The “[Locating Interface Alarms](#)” on [page 68](#) section explains some of the alarms and errors for the media.

- See Also**
- [Monitoring Interfaces on page 65](#)
 - [Performing a Loopback Test on an Interface on page 66](#)
 - [Locating Interface Alarms on page 68](#)

Monitoring Interfaces

- Problem Description:** 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 5 on page 66](#) lists and describes the operational mode commands you use to monitor interfaces.

Table 5: 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/y/z	Displays static status information about a specific interface.
show interfaces <i>interface-name</i> extensive For example: show interfaces t1-x/y/z extensive	Displays very detailed interface information about a specific interface.
monitor interface <i>interface-name</i> For example: monitor interface t1-x/y/z	Displays real-time statistics about a physical interface, updated every second.

- See Also**
- [Investigating Interface Steps and Commands Overview on page 65](#)
 - [Performing a Loopback Test on an Interface on page 66](#)
 - [Locating Interface Alarms on page 68](#)

Performing a Loopback Test on an Interface

Problem Description: 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. To 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. To 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 6 on page 67](#) 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 6: Commands Used to Perform Loopback Testing on Interfaces

CLI Statement or Command	Interface Type	Description
<code>[edit interfaces <i>interface-name</i> interface-options] 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 logical-unit-number family inet address ip-address] set arp ip-address mac mac-address</code>	Fast Ethernet and Gigabit Ethernet interfaces	The arp statement at this hierarchy level defines mappings between IP and Media Access Control (MAC) addresses.

Table 6: Commands Used to Perform Loopback Testing on Interfaces (continued)

CLI Statement or Command	Interface Type	Description
<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.
<code>show interfaces <i>interface-name</i> terse</code>	T1, T3, and SONET interfaces	Display summary information about interfaces. (Use to display the status of the logical interfaces for these interfaces.)
<code>ping interface t1-x/y/z <i>local-ip-address</i> bypass-routing count 1000 rapid</code>	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>
<code>show interfaces <i>interface-name</i> extensive</code>	All interfaces	Display very detailed interface information about a specific interface.

- See Also**
- [Investigating Interface Steps and Commands Overview on page 65](#)
 - [Monitoring Interfaces on page 65](#)
 - [Locating Interface Alarms on page 68](#)

Locating Interface Alarms

Problem **Description:** 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.

See Also

- [Investigating Interface Steps and Commands Overview on page 65](#)
- [Monitoring Interfaces on page 65](#)
- [Performing a Loopback Test on an Interface on page 66](#)

Configuring Interface Diagnostics Tools to Test the Physical Layer Connections

- [Configuring Loopback Testing on page 69](#)
- [Configuring BERT Testing on page 71](#)
- [Starting and Stopping a BERT Test on page 74](#)

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 that 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.

The following types of loopback testing are supported by Junos OS:

- DCE local—Loops packets back on the local data circuit-terminating equipment (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 7 on page 70 shows the loopback modes supported on the various interface types.

Table 7: Loopback Modes by Interface Type

Interface	Loopback Modes	Usage Guidelines
Aggregated Ethernet, Fast Ethernet, Gigabit Ethernet	Local	<i>Configuring Ethernet Loopback Capability</i>
Circuit Emulation E1	Local and remote	“Configuring E1 Loopback Capability” on page 9
Circuit Emulation T1	Local and remote	“Configuring T1 Loopback Capability” on page 39
E1 and E3	Local and remote	“Configuring E1 Loopback Capability” on page 9 and “Configuring E3 Loopback Capability” on page 24
NxDSO	Payload	<i>Configuring NxDSO IQ and IQE Interfaces, Configuring T1 and NxDSO Interfaces, Configuring Channelized OC12/STM4 IQ and IQE Interfaces (SONET Mode), Configuring Fractional E1 IQ and IQE Interfaces, and Configuring Channelized T3 IQ Interfaces</i>
Serial (V.35 and X.21)	Local and remote	<i>Configuring Serial Loopback Capability</i>
Serial (EIA-530)	DCE local, DCE remote, local, and remote	<i>Configuring Serial Loopback Capability</i>
SONET/SDH	Local and remote	<i>Configuring SONET/SDH Loopback Capability to Identify a Problem as Internal or External</i>
T1 and T3	Local, payload, and remote	“Configuring T1 Loopback Capability” on page 39 and “Configuring T3 Loopback Capability” on page 57 See also “Configuring the T1 Remote Loopback Response” on page 38

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

```
user@host# 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]

Configuring BERT Testing

To configure BERT:

- Configure the duration of the test.

```
[edit interfaces interface-name interface-type-options]
user@host# bert-period 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. By default, the BERT period is 10 seconds.

- Configure the error rate to monitor when the inbound pattern is received.

```
[edit interfaces interface-name interface-type-options]
user@host# bert-error-rate rate;
```

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).

- Configure the bit pattern to send on the transmit path.

```
[edit interfaces interface-name interface-type-options]
user@host# bert-algorithm algorithm;
```

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 four-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 (per 0.151 standard)
```

Table 8 on page 73 shows the BERT capabilities for various interface types.

Table 8: 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

Table 8: BERT Capabilities by Interface Type (continued)

Interface	T1 BERT	T3 BERT	Comments
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	—	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)	—	<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 want to terminate the test sooner, issue the **test interface *interface-name* *interface-type* bert-stop** command:

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

For example:

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

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

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

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



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

- Related Documentation**
- *show interfaces diagnostics optics (Gigabit Ethernet, 10-Gigabit Ethernet, 40-Gigabit Ethernet, 100-Gigabit Ethernet, and Virtual Chassis Port)*

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 75](#)
2. [Create a Loop to the Router from Various Points in the Network on page 76](#)

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 interface interface-name t3-options
```

2. Configure the remote loopback:

```
[edit interfaces interface-name t3-options]
user@host# set loopback remote
```

3. Verify the configuration:

```
user@host# show
```

For example:

```
[edit interfaces t3-1/0/0 t3-options]
user@host# show
loopback remote;
```

4. Commit the change:

```
user@host# commit
```

For example:

```
[edit interfaces t3-1/0/0 t3-options]
user@host# commit
commit complete
```

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

See Also • [T3 Interfaces Overview on page 47](#)

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 so that you can then perform tests to verify the connection from the router to that loopback in the network.

Action To verify the connection from the router to a loopback in the network, follow Steps 2 through 8 in [“Diagnose a Suspected Hardware Problem with a T3 Interface” on page 112](#).

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.

See Also • [T3 Interfaces Overview on page 47](#)

CHAPTER 10

Monitoring and Troubleshooting T1 Interfaces

- [Monitor T1 Interfaces on page 77](#)
- [Troubleshooting T1 Interfaces on page 82](#)
- [Use Loopback Testing for T1 Interfaces on page 83](#)
- [Locate T1 Alarms and Errors on page 97](#)
- [CT1 and CE1 Interfaces Alarms, Errors, and Defects on page 103](#)

Monitor T1 Interfaces

By monitoring T1 interfaces, you begin the process of isolating T1 interface problems when they occur.

To monitor your T1 interfaces, follow these steps:

1. [Display the Status of T1 Interfaces on page 77](#)
2. [Display the Status of a Specific T1 Interface on page 78](#)
3. [Display Extensive Status Information for a Specific T1 Interface on page 79](#)
4. [Monitor Statistics for a T1 Interface on page 81](#)

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 78](#) for a description of what the output means.

Table 9: Status of T1 Interfaces

Physical Interface	Logical Interface	Status Description
t1-1/0/0 AdminDown Link Up	t1-1/0/0.0 Admin Up Link Down	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.
t1-1/0/1 Admin Up Link Down	t1-1/0/1.0 Admin Up Link Down	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).
t1-1/0/2 Admin Up Link Up	t1-1/0/2.0 Admin Up Link Up	This interface has both the physical and logical links up and running.
t1-1/0/3 Admin Up Link Down		The physical interfaces is added to the configuration, but the logical link is not configured.

See Also

- [T1 Interfaces Overview on page 31](#)
- *Interfaces Fundamentals for Routing Devices*

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.

See Also

- [T1 Interfaces Overview on page 31](#)
- *Interfaces Fundamentals for Routing Devices*

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/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
ES 32
SES 32
SEFS 32
BES 0
UAS 32
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 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 98](#) for an explanation of T1 alarms.

- See Also**
- [T1 Interfaces Overview on page 31](#)
 - *Interfaces Fundamentals for Routing Devices*

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:                       Current delta
Input bytes:                             0 (0 bps)          [0]
Output bytes:                             0 (0 bps)          [0]
Input packets:                           0 (0 pps)          [0]
Output packets:                          0 (0 pps)          [0]
Error statistics:
Input errors:                             0                [0]
Input drops:                             0                [0]
Input framing errors:                     0                [0]
Policed discards:                         0                [0]
L3 incompletes:                           0                [0]
L2 channel errors:                        0                [0]
L2 mismatch timeouts:                     0                [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 82 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.

- See Also**
- [T1 Interfaces Overview on page 31](#)
 - *Interfaces Fundamentals for Routing Devices*

Troubleshooting T1 Interfaces

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

- [Checklist for Monitoring T1 Interfaces on page 82](#)

Checklist for Monitoring T1 Interfaces

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

Action [Table 11 on page 83](#) provides the links and commands for monitoring T1 interfaces.

Table 11: Checklist for Monitoring T1 Interfaces

Tasks	Command or Action
“Monitor T1 Interfaces” on page 77	
1. Display the Status of T1 Interfaces on page 77	<code>show interfaces terse t1*</code>
2. Display the Status of a Specific T1 Interface on page 78	<code>show interfaces t1-fpc/pic/port</code>
3. Display Extensive Status Information for a Specific T1 Interface on page 79	<code>show interfaces t1-fpc/pic/port extensive</code>
4. Monitor Statistics for a T1 Interface on page 81	<code>monitor interface t1-fpc/pic/port</code>

See Also

- [T1 Interfaces Overview on page 31](#)
-

Related Documentation

- [T1 Interfaces Overview on page 31](#)

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 83](#)
- [Diagnose a Suspected Hardware Problem with a T1 Interface on page 85](#)
- [Create a Loopback on page 85](#)
- [Set Clocking to Internal on page 87](#)
- [Verify That the T1 Interface Is Up on page 88](#)
- [Clear T1 Interface Statistics on page 89](#)
- [Force the Link Layer To Stay Up on page 90](#)
- [Verify the Status of the Logical Interface on page 92](#)
- [Ping the T1 Interface on page 93](#)
- [Check for T1 Interface Error Statistics on page 94](#)
- [Diagnose a Suspected Circuit Problem on page 96](#)

Checklist for Using Loopback Testing for T1 Interfaces

Purpose To use loopback testing for T1 interfaces.

Action [Table 12 on page 84](#) provides commands for using loopback testing for T1 interfaces.

Table 12: Checklist for Using Loopback Testing for T1 Interfaces

Tasks	Command or Action
“Diagnose a Suspected Hardware Problem with a T1 Interface” on page 85	
1. Create a Loopback on page 85	
a. Create a Physical Loopback on page 85	Connect a T1 loopback plug.
b. Configure a Local Loopback on page 86	<code>[edit interfaces <i>interface-name</i> t1-options] set loopback local show commit</code>
2. Set Clocking to Internal on page 87	<code>[edit interfaces <i>interface-name</i>] set clocking internal show commit</code>
3. Verify That the T1 Interface Is Up on page 88	<code>show interfaces t1-<i>fpc/pic/port</i></code>
4. Clear T1 Interface Statistics on page 89	<code>clear interfaces statistics t1-<i>fpc/pic/port</i></code>
5. Force the Link Layer To Stay Up on page 90	
a. Configure Encapsulation to Cisco-HDLC on page 90	<code>[edit interfaces <i>interface-name</i>] set encapsulation cisco-hdlc show commit</code>
b. Configure No-Keepalives on page 91	<code>[edit interfaces <i>interface-name</i>] set no-keepalives show commit</code>
6. Verify the Status of the Logical Interface on page 92	<code>show interfaces t1-<i>fpc/pic/port</i> show interfaces t1-<i>fpc/pic/port</i> terse</code>
7. Ping the T1 Interface on page 93	<code>ping interface t1-<i>fpc/pic/port</i> <i>local-IP-address</i> bypass-routing count 1000 rapid</code>
8. Check for T1 Interface Error Statistics on page 94	<code>show interfaces t1-<i>fpc/pic/port</i> extensive</code>
“Diagnose a Suspected Circuit Problem” on page 96	
1. Create a Loop from the Router to the Network on page 96	<code>[edit interfaces <i>interface-name</i> t1-options] set loopback remote show commit</code>
2. Create a Loop to the Router from Various Points in the Network on page 97	Perform Steps 2 through 8 from “Diagnose a Suspected Hardware Problem with a T1 Interface” on page 85.

See Also • [T1 Interfaces Overview on page 31](#)

Diagnose a Suspected Hardware Problem with a T1 Interface

Problem **Description:** 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 85](#)
2. [Set Clocking to Internal on page 87](#)
3. [Verify That the T1 Interface Is Up on page 88](#)
4. [Clear T1 Interface Statistics on page 89](#)
5. [Force the Link Layer To Stay Up on page 90](#)
6. [Verify the Status of the Logical Interface on page 92](#)
7. [Ping the T1 Interface on page 93](#)
8. [Check for T1 Interface Error Statistics on page 94](#)

See Also • [T1 Interfaces Overview on page 31](#)

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 85](#)
2. [Configure a Local Loopback on page 86](#)

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.

See Also • [T1 Interfaces Overview on page 31](#)

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.

See Also • [T1 Interfaces Overview on page 31](#)

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.

See Also • [T1 Interfaces Overview on page 31](#)

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.

See Also • [T1 Interfaces Overview on page 31](#)

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:

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

Sample Output

```

user@host> clear interfaces statistics t1-1/1/0
user@host>

```

Meaning

This command clears the interface statistics counters for interface **t1-1/1/0** only.

See Also • [T1 Interfaces Overview on page 31](#)

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 90](#)
2. [Configure No-Keepalives on page 91](#)

Configure Encapsulation to Cisco-HDLC

Action

To configure encapsulation 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 encapsulation to Cisco-HDLC:

```
[edit interfaces interface-name]
user@host# set encapsulation cisco-hdlc
```

3. Verify the configuration:

```
user@host# show
```

For example:

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

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.

See Also • [T1 Interfaces Overview on page 31](#)

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.

See Also • [T1 Interfaces Overview on page 31](#)

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:
```

```
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.

See Also • [T1 Interfaces Overview on page 31](#)

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

[illegible]

```
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
--- 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).

See Also • [T1 Interfaces Overview on page 31](#)

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).

See Also • [T1 Interfaces Overview on page 31](#)

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 96](#)
2. [Create a Loop to the Router from Various Points in the Network on page 97](#)

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.

See Also • [T1 Interfaces Overview on page 31](#)

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 85. 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.

See Also • [T1 Interfaces Overview on page 31](#)

See Also • [T1 Interfaces Overview on page 31](#)

Related Documentation • [T1 Interfaces Overview on page 31](#)

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 98](#)
- [Display T1 Alarms and Errors on page 98](#)
- [Locate Most Common T1 Alarms and Errors on page 101](#)

Checklist for T1 Alarms and Errors

Purpose To check T1 alarms and errors.

Action [Table 13 on page 98](#) provides the links and commands for checking T1 alarms and errors.

Table 13: Checklist for T1 Alarms and Errors

Tasks	Command or Action
“Display T1 Alarms and Errors” on page 98	<code>show interfaces t1-fpc/pic/port extensive</code>
“Locate Most Common T1 Alarms and Errors” on page 101	
1. Locate Loss of Signal and Loss of Frame Alarms on page 101	Check the connection between the router port and the first T1 network element.
2. Locate Alarm Indication Signal Alarms on page 102	Check the T1 network element connected to the T1 interface.
3. Locate an Incoming Yellow Alarm on page 102	Check the cable between the T1 interface and the directly connected T1 network element.

See Also • [T1 Interfaces Overview on page 31](#)

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 14 on page 100 lists the T1 media-specific alarms or defects that can render the interface unable to pass packets.

Table 14: 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
UAS	Unavailable seconds

See Also • [T1 Interfaces Overview on page 31](#)

Locate Most Common T1 Alarms and Errors

To locate common alarms and errors, follow these steps:

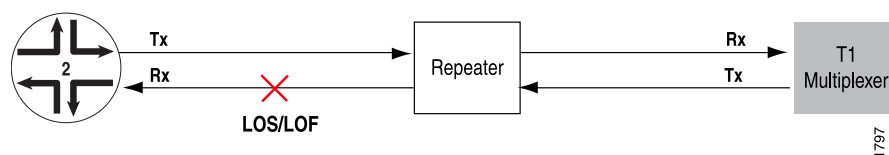
1. [Locate Loss of Signal and Loss of Frame Alarms on page 101](#)
2. [Locate Alarm Indication Signal Alarms on page 102](#)
3. [Locate an Incoming Yellow Alarm on page 102](#)

Locate Loss of Signal and Loss of Frame Alarms

Problem Description: 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 5 on page 101](#), the X indicates that there is a connection problem between Router2 and the nearest T1 network element.

Figure 5: 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		
ES	32		
SES	32		
SEFS	32		
BES	0		

```

UAS                               32
[...Output truncated...]

```

Meaning

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

See Also • [T1 Interfaces Overview on page 31](#)

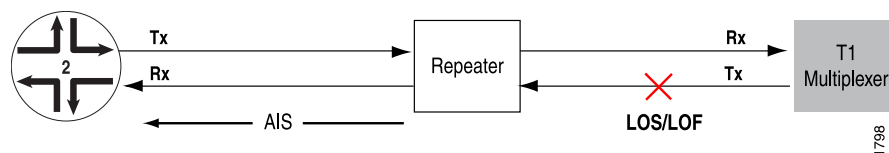
Locate Alarm Indication Signal Alarms

Problem Description: 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 6 on page 102](#) illustrates the location of an AIS alarm in a T1 network.

Figure 6: Location of an AIS Alarm in a T1 Network



Meaning

In [Figure 6 on page 102](#), 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.

See Also • [T1 Interfaces Overview on page 31](#)

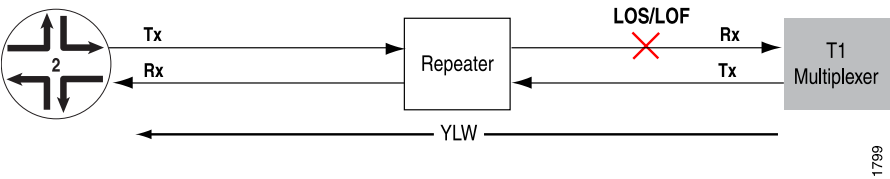
Locate an Incoming Yellow Alarm

Problem Description: 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 7 on page 103](#) illustrates the location of a yellow alarm in a T1 network.

Figure 7: Location of a Yellow Alarm in a T1 Network



Meaning

In [Figure 7 on page 103](#), the T1 multiplexer detects an LOS or LOF alarm on its connection from Router 2 and sends a yellow (YLW) alarm to Router 2.

See Also • [T1 Interfaces Overview on page 31](#)

See Also • [T1 Interfaces Overview on page 31](#)

Related Documentation • [T1 Interfaces Overview on page 31](#)

CT1 and CE1 Interfaces Alarms, Errors, and Defects

[Table 15 on page 103](#) lists the **ct1** and **ce1** media-specific alarms or defects that can render the interface on ACX Series routers unable to pass packets.

Table 15: CT1 and CE1 Interface Alarms and Error Definitions

Alarm or Error	Definitions	Structure-Agnostic Interface Type	Structure-Aware
AIS	Alarm indication signal (blue alarm)	ct1 and ce1 interfaces	ct1 and ce1 interfaces
BEE	Block error event	N/A	ct1 and ce1 interfaces
BES	Bursty errored seconds	N/A	ct1 and ce1 interfaces
BPV	Bipolar violation	N/A	N/A
CRC	Cyclic redundancy check (CRC)	N/A	ce1 interfaces
CRC Major	Major alarm error threshold	N/A	ce1 interfaces
CRC Minor	Minor alarm error threshold	N/A	ce1 interfaces
CS	Controlled slip	N/A	N/A

Table 15: CT1 and CE1 Interface Alarms and Error Definitions (continued)

Alarm or Error	Definitions	Structure-Agnostic Interface Type	Structure-Aware
ES	Errored seconds	ct1 and ce1 interfaces	ct1 and ce1 interfaces
EXZ	Excessive zeros	N/A	N/A
FEBE	Far-end block error	N/A	ct1 and ce1 interfaces
LCV	Line code violation	ct1 and ce1 interfaces	ct1 and ce1 interfaces
LES	Line errored seconds	ct1 and ce1 interfaces	ct1 and ce1 interfaces
LOF	Loss of frame	ce1 interfaces	ct1 and ce1 interfaces
LOS	Loss of signal	ct1 and ce1 interfaces	ct1 and ce1 interfaces
PCV	Path code violation	N/A	ct1 and ce1 interfaces
SEF	Severely errored frame	N/A	ct1 and ce1 interfaces
SEFS	Severely errored frame seconds	N/A	ct1 and ce1 interfaces
SES	Severely errored seconds	ct1 and ce1 interfaces	ct1 and ce1 interfaces
UAS	Unavailable seconds	ct1 and ce1 interfaces	ct1 and ce1 interfaces
YLW	Yellow alarm	N/A	ct1 and ce1 interfaces

CHAPTER 11

Monitoring and Troubleshooting T3 Interfaces

- [Monitor T3 Interfaces on page 105](#)
- [Use Loopback Testing for T3 Interfaces on page 111](#)
- [Diagnose a Suspected Hardware Problem with a T3 Interface on page 112](#)
- [Locate T3 Alarms and Errors on page 123](#)

Monitor T3 Interfaces

This section includes the following information to assist you when troubleshooting T3 interfaces:

- [Checklist for Monitoring T3 Interfaces on page 105](#)
- [Monitor T3 Interfaces on page 106](#)

Checklist for Monitoring T3 Interfaces

Purpose To monitor T3 interfaces and begin the process of isolating T3 interface problems when they occur.

Action [Table 16 on page 105](#) provides the links and commands for monitoring T3 interfaces.

Table 16: Checklist for Monitoring T3 Interfaces

Tasks	Command or Action
“Monitor T3 Interfaces” on page 106	
1. Display the Status of T3 Interfaces on page 106	<code>show interfaces terse t3*</code>
2. Display the Status of a Specific T3 Interface on page 107	<code>show interfaces t3-<i>fpc/pic/port</i></code>
3. Display Extensive Status Information for a Specific T3 Interface on page 108	<code>show interfaces t3-<i>fpc/pic/port</i> extensive</code>
4. Monitor Statistics for a T3 Interface on page 109	<code>monitor interface t3-<i>fpc/pic/port</i></code>

See Also • [T3 Interfaces Overview on page 47](#)

Monitor T3 Interfaces

By monitoring T3 interfaces, you begin the process of isolating T3 interface problems when they occur.

To monitor T3 interfaces, follow these steps:

1. [Display the Status of T3 Interfaces on page 106](#)
2. [Display the Status of a Specific T3 Interface on page 107](#)
3. [Display Extensive Status Information for a Specific T3 Interface on page 108](#)
4. [Monitor Statistics for a T3 Interface on page 109](#)

Display the Status of T3 Interfaces

Purpose To display the status of T3 interfaces, use the following Junos OS command-line interface (CLI) operational mode command:

Action `user@host> show interfaces terse t3*`

Sample Output

```
user@host> show interfaces terse t3*
Interface      Admin Link Proto Local Remote
t3-1/0/0       down up   -   administratively disabled
t3-1/0/0.0     up   down inet  1.1.1.1/30
t3-1/0/1       up   down
t3-1/0/1.0     up   down inet  2.2.2.2/30 - link layer down
t3-1/0/2       up   up
t3-1/0/2.0     up   up   inet  3.3.3.3/30 - link layer up
t3-1/0/3       up   down
```

Meaning The sample output shows the status of both the physical and logical interfaces. See [Table 17 on page 106](#) for a description of what the output means.

Table 17: Status of T3 Interfaces

Physical Interface	Logical Interface	Status Description
t3-1/0/0	t3-1/0/0.0	This interface is administratively disabled and the physical link is healthy (Link Up), but the logical interface is not established. The logical interface is down because the physical link is disabled (Link Down).
Admin Down	Admin Up	
Link Up	Link Down	

Table 17: Status of T3 Interfaces (continued)

Physical Interface	Logical Interface	Status Description
t3-1/0/1 Admin Up Link Down	t3-1/0/1.0 Admin Up Link Down	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).
t3-1/0/2 Admin Up Link Up	t3-1/0/2.0 Admin Up Link Up	This interface has both the physical and logical links up and running.
t3-1/0/3 Admin Up Link Down		This interface does not have a logical link configured.

See Also • [T3 Interfaces Overview on page 47](#)

Display the Status of a Specific T3 Interface

Purpose To display the status of a specific T3 interface when you need to investigate its status further, use the following Junos OS CLI operational mode command:

Action `user@host> show interfaces t3-fpc/pic/port`

Sample Output

```
user@host> show interfaces t3-1/0/0
Physical interface: t3-1/0/0, Enabled, Physical link is Down
  Interface index: 9, SNMP ifIndex: 10
  Link-level type: Cisco-HDLC, MTU: 4474, Clocking: Internal
  Speed: T3, Loopback: None, CRC: 16, Mode: C/Bit parity
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Link-Layer-Down Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Keepalive Input: 116 (00:02:32 ago), Output: 185 (00:00:02 ago)
  Input rate     : 0 bps (0 pps), Output rate: 0 bps (0 pps)
  Active alarms  : LOF, LOS
  Active defects : LOF, LOS
  Logical interface t3-1/0/0.0 (Index 12) (SNMP ifIndex 32)
    Flags: Device-down Point-To-Point SNMP-Traps, Encapsulation: Cisco-HDLC
    Protocol inet, MTU: 4470
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
      Destination: 1.1.1.0/30, Local: 1.1.1.1
```

Meaning The first line of the sample output shows the status of the link. If this 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.

See Also • [T3 Interfaces Overview on page 47](#)

Display Extensive Status Information for a Specific T3 Interface

Purpose To display extensive status information about a specific T3 interface, use the following Junos OS CLI operational mode command:

Action `user@host> show interfaces t3-fpc/pic/port extensive`

Sample Output

```
user@router> show interfaces t3-1/0/0 extensive
Physical interface: t3-1/0/0, Enabled, Physical link is Down
Interface index: 9, SNMP ifIndex: 10
Link-level type: Cisco-HDLC, MTU: 4474, Clocking: Internal
Speed: T3, Loopback: None, CRC: 16, Mode: C/Bit parity
Device flags   : Present Running Down
Interface flags: Hardware-Down Link-Layer-Down Point-To-Point SNMP-Traps
Link flags     : Keepalives
Keepalive statistics:
  Input : 116 (last seen 00:02:59 ago)
  Output: 187 (last seen 00:00:09 ago)
Statistics last cleared: Never
Traffic statistics:
Input bytes :                2552                0 bps
Output bytes :                3703                0 bps
Input packets:                116                0 pps
Output packets:               161                0 pps
Input errors: - Input errors
  Errors: 0, Drops: 0, Framing errors: 229, Policed discards: 1
  L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0
  SRAM errors: 0, HS link CRC errors: 0
Output errors: - Output errors
  Carrier transitions: 4, Errors: 0, Drops: 0, Aged packets: 0
Active alarms : LOF, LOS - DS3 active alarms and defects
Active defects : LOF, LOS
DS3 Media:
Seconds      Count  State - T3 media-specific errors
PLL Lock      0        0 OK
Reframing    273        2 Defect Active
AIS           0        0 OK
LOF          273        2 Defect Active
LOS          273        2 Defect Active
IDLE          0        0 OK
YELLOW        0        0 OK
BPV           0        0
EXZ           0        0
LCV          275    18022125
PCV           0        0
CCV           0        0
LES          275
```

```

PES                273
PSES               273
CES                273
CSES               273
SEFS               273
UAS                277
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 4484, Runt threshold: 3
DSU configuration:
  Compatibility mode: None, Scrambling: Disabled, Subrate: Disabled
  FEAC loopback: Inactive, Response: Disabled, Count: 0
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Algorithm: 2^3 - 1, Pseudorandom (1), Error rate: 10e-0
PFE configuration:
  Destination slot: 1, Stream number: 0, PLP byte: 1 (0x00)
  COS transmit queue bandwidth:
    Queue0: 95, Queue1: 0, Queue2: 0, Queue3: 5
  COS weighted round robin:
    Queue0: 95, Queue1: 0, Queue2: 0, Queue3: 5
Logical interface t3-1/0/0.0 (Index 12) (SNMP ifIndex 32)
Flags: Device-down Point-To-Point SNMP-Traps, Encapsulation: Cisco-HDLC
Protocol inet, MTU: 4470, Flags: None
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 1.1.1.0/30, Local: 1.1.1.1, Broadcast: Unspecified

```

Meaning The sample output shows where the errors might be occurring. Look at the active alarms and active defects for the T3 interface and investigate the T3 media accordingly. See [“Checklist of Common T3 Alarms and Errors” on page 123](#) for an explanation of T3 alarms.

See Also • [T3 Interfaces Overview on page 47](#)

Monitor Statistics for a T3 Interface

Purpose To monitor statistics for a T3 interface, use the following Junos OS CLI operational mode command:

Action `user@host> monitor interface t3-fpc/pic/port`

Sample Output

```

user@host> monitor interface t3-1/0/0

router                Seconds: 78                Time: 21:44:15
Interface: t3-1/0/0, Enabled, Link is Down
Encapsulation: Cisco-HDLC, Keepalives, Speed: T3
Traffic statistics:
Input bytes:          0 (0 bps)                    [0]
Output bytes:         207 (184 bps)                 [184]
Input packets:        0 (0 pps)                    [0]
Output packets:       9 (1 pps)                    [8]

```

```

Encapsulation statistics:
  Input keepalives:      0                      [0]
  Output keepalives:    9                      [8]
Error statistics:
  Input errors:          0                      [0]
  Input drops:          0                      [0]
  Input framing errors:  9                      [8]
  CCV                   0                      [0]
Interface warnings:
  o Received keepalive count is zero
  o Framing errors, check FCS, scrambling and subrate configuration
Next='n', Quit='q' or ESC, Freeze='f', Thaw='t', Clear='c', Interface='i'

```

Meaning This command checks for and displays common interface failures, indicates whether loopback is detected, and reports any increases in framing errors. Use the information from this command 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 18 on page 110 presents problem situations and actions to help you further understand the problem.

Table 18: Problem Situations and Actions

Problem Situation	Action
Framing errors are increasing.	Check the frame check 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 troubleshooting purposes. Do not leave it on during normal router operations because real-time monitoring of traffic consumes additional CPU and memory resources.

See Also • [T3 Interfaces Overview on page 47](#)

See Also • [T3 Interfaces Overview on page 47](#)

Related Documentation

- [T3 Interfaces Overview on page 47](#)

Use Loopback Testing for T3 Interfaces

This section includes the following information to assist you when troubleshooting T3 interfaces:

- [Checklist for Using Loopback Testing for T3 Interfaces on page 111](#)

Checklist for Using Loopback Testing for T3 Interfaces

Purpose To use loopback testing to isolate T3 interface problems.

Action [Table 19 on page 111](#) provides links and commands for using loopback testing for T3 interfaces.

Table 19: Checklist for Using Loopback Testing for T3 Interfaces

"Diagnose a Suspected Hardware Problem with a T3 Interface" on page 112	Command or Action
1. Create a Loopback on page 113	
a. Create a Physical Loopback on page 113	Connect the transmit port to the receive port.
b. Configure a Local Loopback on page 113	<pre>[edit interfaces <i>interface-name</i> t3-options] set loopback local show commit</pre>
2. Set Clocking to Internal on page 114	<pre>[edit interfaces <i>interface-name</i>] set clocking internal show commit</pre>
3. Verify That the T3 Interface Is Up on page 115	<code>show interfaces t3-fpc/pic/port</code>
4. Clear T3 Interface Statistics on page 116	<code>clear interfaces statistics t3-fpc/pic/port</code>
5. Force the Link Layer To Stay Up on page 117	
a. Configure Encapsulation to Cisco-HDLC on page 117	<pre>[edit interfaces <i>interface-name</i>] set encapsulation cisco-hdlc show commit</pre>
b. Configure No-Keepalives on page 118	<pre>[edit interfaces <i>interface-name</i>] set no-keepalives show commit</pre>

Table 19: Checklist for Using Loopback Testing for T3 Interfaces (continued)

"Diagnose a Suspected Hardware Problem with a T3 Interface" on page 112	Command or Action
6. Verify the Status of the Logical Interface on page 119	<pre>show interfaces t3-fpc/pic/port show interfaces t3-fpc/pic/port terse</pre>
7. Ping the T3 Interface on page 120	<pre>ping interface t3-fpc/pic/port local-IP-address bypass-routing count 1000 rapid</pre>
8. Check for T3 Interface Error Statistics on page 121	<pre>show interfaces t3-fpc/pic/port extensive</pre>
"Diagnose a Suspected Circuit Problem" on page 75	
1. Create a Loop from the Router to the Network on page 75	<pre>[edit interfaces interface-name t3-options] set loopback remote show commit</pre>
2. Create a Loop to the Router from Various Points in the Network on page 76	Perform Steps 2 through 8 from "Diagnose a Suspected Hardware Problem with a T3 Interface" on page 112.

See Also • [T3 Interfaces Overview on page 47](#)

Related Documentation • [T3 Interfaces Overview on page 47](#)

Diagnose a Suspected Hardware Problem with a T3 Interface

When you suspect a hardware problem, take the following steps to help verify if there is a hardware problem.

To diagnose a suspected hardware problem with a T3 interface, follow these steps:

1. [Create a Loopback on page 113](#)
2. [Set Clocking to Internal on page 114](#)
3. [Verify That the T3 Interface Is Up on page 115](#)
4. [Clear T3 Interface Statistics on page 116](#)
5. [Force the Link Layer To Stay Up on page 117](#)
6. [Verify the Status of the Logical Interface on page 119](#)
7. [Ping the T3 Interface on page 120](#)
8. [Check for T3 Interface Error Statistics on page 121](#)

Create a Loopback

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

1. [Create a Physical Loopback on page 113](#)
2. [Configure a Local Loopback on page 113](#)

Create a Physical Loopback

Action

To create a physical loopback at the port, connect the transmit port to the receive port.

Meaning

When you create and test a physical loopback, you are testing the transmit and receive ports of the PIC. This action is recommended if a field engineer is available to create the physical loop as it provides a more complete test of the PIC.

See Also • [T3 Interfaces Overview on page 47](#)

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 t3-options
```

2. Configure the loopback:

```
[edit interfaces interface-name t3-options]
user@host# set loopback local
```

3. Verify the configuration:

```
user@host# show
```

For example:

```
[edit interfaces t3-1/0/0 t3-options]
user@host# show
loopback local;
```

4. Commit the change:

```
user@host# commit
```

For example:

```
[edit interfaces t3-1/0/0 t3-options]
user@host# commit
commit complete
```

Meaning

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



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

See Also • [T3 Interfaces Overview on page 47](#)

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 clocking to internal:

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

3. Verify the configuration:

```
user@host# show
```

For example:

```
[edit interfaces t3-1/0/0]
user@host# show
clocking internal;
```

4. Commit the change:

```
user@host# commit
```

For example:

```
[edit interfaces t3-1/0/0]
user@host# commit
commit complete
```

Meaning

The clock source for the interface is set to the internal Stratum 3 clock.

See Also • [T3 Interfaces Overview on page 47](#)

Verify That the T3 Interface Is Up

Purpose Display the status of the T3 interface to provide the information you need to determine whether the physical link is up or down.

Action To verify that the status of the T3 interface is up, use the following Junos OS CLI operational mode command:

```
user@host> show interfaces t3-fpc/pic/port
```

Sample Output

The following output is for a T3 interface with the physical link up:

```
user@router> show interfaces t3-1/0/0
Physical interface: t3-1/0/0, Enabled, Physical link is Up
  Interface index: 9, SNMP ifIndex: 10
  Link-level type: PPP, MTU: 4474, Clocking: Internal
  Speed: T3, Loopback: None, CRC: 16, Mode: C/Bit parity
  Device flags   : Present Running Loop-Detected
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Keepalive Input: 6684 (00:07:51 ago), Output: 6693 (00:06:41 ago)
  NCP state: Down, LCP state: Conf-req-sent
  Input rate    : 224 bps (2 pps), Output rate: 240 bps (2 pps)
  Active alarms : None
```

```

Active defects : None
Logical interface t3-1/0/0.0 (Index 13) (SNMP ifIndex 32)
Flags: Device-down Hardware-Down Point-To-Point SNMP-Traps
Encapsulation: PPP
Protocol inet, MTU: 4470, Flags: Protocol-Down
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 T3 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 t3-fpc/pic/port` command when the physical link is down:

```

user@router> show interfaces t3-1/0/0
Physical interface: t3-1/0/0, Enabled, Physical link is Down
Interface index: 9, SNMP ifIndex: 10
Link-level type: Cisco-HDLC, MTU: 4474, Clocking: Internal
Speed: T3, Loopback: None, CRC: 16, Mode: C/Bit parity
Device flags : Present Running Down
Interface flags: Hardware-Down Link-Layer-Down Point-To-Point SNMP-Traps
Link flags    : Keepalives
Keepalive Input: 116 (00:02:32 ago), Output: 185 (00:00:02 ago)
Input rate    : 0 bps (0 pps), Output rate: 0 bps (0 pps)
Active alarms : LOF, LOS
Active defects : LOF, LOS
Logical interface t3-1/0/0.0 (Index 12) (SNMP ifIndex 32)
Flags: Device-down Point-To-Point SNMP-Traps, Encapsulation: Cisco-HDLC
Protocol inet, MTU: 4470
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 T3 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.

See Also • [T3 Interfaces Overview on page 47](#)

Clear T3 Interface Statistics

Purpose You must reset T3 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:

```
user@host> clear interfaces statistics t3-fpc/pic/port
```

Sample Output

```
user@host> clear interfaces statistics t3-4/0/2
user@host>
```

Meaning This command clears the interface statistics counters for interface **t3-4/0/2** only.

See Also • [T3 Interfaces Overview on page 47](#)

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 117](#)
2. [Configure No-Keepalives on page 118](#)

Configure Encapsulation to Cisco-HDLC

Action To configure encapsulation on a T3 physical interface, follow these steps:

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

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

2. Configure Cisco-HDLC:

```
[edit interfaces interface-name]
user@host# set encapsulation cisco-hdlc
```

3. Verify the configuration:

```
user@host# show
```

For example:

```
[edit interfaces t3-1/0/0]
user@host# show
encapsulation hdlc;
```

4. Commit the change:

```
user@host# commit
```

For example:

```
[edit interfaces t3-1/0/0]  
user@host# commit  
commit complete
```

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

See Also • [T3 Interfaces Overview on page 47](#)

Configure No-Keepalives

Action To disable the sending of link-layer keepalives on a T3 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
```

3. Verify the configuration:

```
user@host# show
```

For example:

```
[edit interfaces t3-1/0/0]  
user@host# show  
no-keepalives;
```

4. Commit the change:

```
user@host# commit
```

For example:

```
[edit interfaces t3-1/0/0]  
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.

See Also • [T3 Interfaces Overview on page 47](#)

Related Documentation • [T3 Interfaces Overview on page 47](#)

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 t3-fpc/pic/port
user@host# show interfaces t3-fpc/pic/terse
```

Sample Output The following sample output is for a T3 logical interface that is up:

```
user@router> show interfaces t3-1/0/0
Physical interface: t3-1/0/0, Enabled, Physical link is Up
  Interface index: 13, SNMP ifIndex: 12
  Link-level type: Cisco-HDLC, MTU: 4474, Clocking: Internal, Speed: T3, Loopback:
  None, FCS: 16,
  Mode: C/Bit parity
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps
  Link flags     : No-Keepalives
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  Active alarms  : None
  Active defects : None
  Logical interface t3-1/0/0.0 (Index 126) (SNMP ifIndex 13)
    Flags: Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
    Protocol inet, MTU: 4470, Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 1.1.1.0/30, Local: 1.1.1.1

user@router> show interfaces terse t3-1/0/0
Interface      Admin Link Proto Local                               Remote
t3-1/0/0       up    up
t3-1/0/0.0     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 **t3-1/0/0** is up.

Sample Output The following sample output is for a T3 logical interface that is down:

```

user@router> show interfaces t3-0/2/0
Physical interface: t3-0/2/0, Enabled, Physical link is Up
  Interface index: 13, SNMP ifIndex: 12
  Link-level type: Cisco-HDLC, MTU: 4474, Clocking: Internal, Speed: T3, Loopback:
  None, FCS: 16,
  Mode: C/Bit parity
  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: 0 (never), Output: 9 (00:00:04 ago)
  Input rate      : 0 bps (0 pps)
  Output rate     : 0 bps (0 pps)
  Active alarms   : None
  Active defects  : None
  Logical interface t3-0/2/0.0 (Index 126) (SNMP ifIndex 13)
    Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: Cisco-HDLC
    Protocol inet, MTU: 4470, Flags: None
    Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
      Destination: 1.1.1.0/30, Local: 1.1.1.1

user@router> show interfaces terse t3-0/2/0
Interface      Admin Link Proto Local                                Remote
t3-0/2/0        up    down
t3-0/2/0.0      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 **t3-0/2/0** is down.

See Also • [T3 Interfaces Overview on page 47](#)

Ping the T3 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 t3- fpc/pic/port local-IP-address bypass-routing count 1000
rapid

```

```
--- 10.0.2.1 ping statistics ---
1000 packets transmitted, 1000 packets received, 0% packet loss
round-trip min/avg/max/stddev = 0.374/0.446/9.744/0.754 ms
```

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

- T3 Interfaces Overview on page 47

Check for T3 Interface Error Statistics

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

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

```
user@host> show interfaces t3-fpc/pic/port extensive
```

Sample Output user@router> show interfaces t3-1/0/0 extensive

```

Physical interface: t3-1/0/0, Enabled, Physical link is Down
Interface index: 9, SNMP ifIndex: 10
Link-level type: Cisco-HDLC, MTU: 4474, Clocking: Internal
Speed: T3, Loopback: None, CRC: 16, Mode: C/Bit parity
Device flags   : Present Running Down
Interface flags: Hardware-Down Link-Layer-Down Point-To-Point SNMP-Traps
Link flags     : Keepalives
Keepalive statistics:
  Input : 116 (last seen 00:02:59 ago)
  Output: 187 (last seen 00:00:09 ago)
Statistics last cleared: Never
Traffic statistics:
  Input bytes   :          2552          0 bps
  Output bytes  :          3703          0 bps
  Input packets :          116          0 pps
  Output packets:          161          0 pps
Input errors:
  Errors: 0, Drops: 0, Framing errors: 229, Policed discards: 1
  L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0
  SRAM errors: 0, HS link CRC errors: 0
Output errors:
  Carrier transitions: 4, Errors: 0, Drops: 0, Aged packets: 0
Active alarms   : LOF, LOS
Active defects  : LOF, LOS
DS3 Media:
  Seconds      Count  State
  PLL Lock     0       0 OK
  Reframing    273     2 Defect Active
  AIS          0       0 OK
  LOF          273     2 Defect Active
  LOS          273     2 Defect Active
  IDLE         0       0 OK
  YELLOW       0       0 OK
  BPV          0       0
  EXZ          0       0
  LCV          275    18022125
  PCV          0       0
  CCV          0       0
  LES          275
  PES          273
  PSES         273
  CES          273
  CSES         273
  SEFS         273
  UAS          277
HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 4484, Runt threshold: 3
DSU configuration:
  Compatibility mode: None, Scrambling: Disabled, Subrate: Disabled
  FEAC loopback: Inactive, Response: Disabled, Count: 0
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Algorithm: 2^3 - 1, Pseudorandom (1), Error rate: 10e-0
PFE configuration:
  Destination slot: 1, Stream number: 0, PLP byte: 1 (0x00)
  COS transmit queue bandwidth:
    Queue0: 95, Queue1: 0, Queue2: 0, Queue3: 5
  COS weighted round robin:

```

```

Queue0: 95, Queue1: 0, Queue2: 0, Queue3: 5
Logical interface t3-1/0/0.0 (Index 12) (SNMP ifIndex 32)
Flags: Device-down Point-To-Point SNMP-Traps, Encapsulation: Cisco-HDLC
Protocol inet, MTU: 4470, Flags: None
Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
Destination: 1.1.1.0/30, Local: 1.1.1.1, Broadcast: Unspecified

```

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).

See Also • [T3 Interfaces Overview on page 47](#)

Locate T3 Alarms and Errors

This section includes the following information to assist you when troubleshooting T3 interfaces:

- [Checklist of Common T3 Alarms and Errors on page 123](#)
- [Display T3 Alarms and Errors on page 124](#)
- [Locate Most Common T3 Alarms and Errors on page 126](#)

Checklist of Common T3 Alarms and Errors

Purpose To check T3 alarms and errors,

Action [Table 20 on page 123](#) provides the links and commands for checking T3 alarms and errors.

Table 20: Checklist of Common T3 Alarms and Errors

Tasks	Command or Action
“Display T3 Alarms and Errors” on page 124	<code>show interfaces t3-fpc/pic/port extensive</code>
“Locate Most Common T3 Alarms and Errors” on page 126	
1. Locate Loss of Signal and Loss of Frame Alarms on page 126	Check the connection between the router port and the first T3 network element.
2. Locate Alarm Indication Signal Alarms on page 127	Check the T3 network element connected to the T3 interface.
3. Locate an Incoming Yellow Alarm on page 127	Check the cable between the T3 interface and the directly connected T3 network element.
4. Locate IDLE on a T3 Interface on page 128	Check that the line is provisioned for service.



NOTE: T3 is a general term used to refer to the transmission of 44.736-Mbps digital circuits over any media. T3 can be transported over copper, fiber, or radio. DS3 is the term for the electrical signal found at the metallic interface for this circuit where most of the testing is performed.

See Also • [T3 Interfaces Overview on page 47](#)

Display T3 Alarms and Errors

Purpose To display T3 alarms and errors, use the following Junos OS command-line interface (CLI) operational mode command:

Action `user@host> show interfaces t3-fpc/pic/port extensive`

Sample Output

```
user@host> show interfaces t3-1/0/0 extensive

Physical interface: t3-1/0/0, Enabled, Physical link is Down
  Interface index: 9, SNMP ifIndex: 10
  Link-level type: Cisco-HDLC, MTU: 4474, Clocking: Internal
  Speed: T3, Loopback: None, CRC: 16, Mode: C/Bit parity
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Link-Layer-Down Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Keepalive statistics:
    Input : 116 (last seen 00:02:59 ago)
    Output: 187 (last seen 00:00:09 ago)
  Statistics last cleared: Never
  Traffic statistics:
    Input bytes :          2552          0 bps
    Output bytes:          3703          0 bps
    Input packets:          116          0 pps
    Output packets:          161          0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 229, Policed discards: 1
    L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0
    SRAM errors: 0, HS link CRC errors: 0
  Output errors:
    Carrier transitions: 4, Errors: 0, Drops: 0, Aged packets: 0
  Active alarms : LOF, LOS    - DS-3 active alarms and defects
  Active defects: LOF, LOS
  DS3 Media:
    Seconds      Count  State - T3 media-specific errors
  PLL Lock      0        0 OK
  Reframing     273        2 Defect Active
  AIS           0        0 OK
  LOF           273        2 Defect Active
  LOS           273        2 Defect Active
  IDLE          0        0 OK
  YELLOW        0        0 OK
  BPV           0        0
```

```

EXZ          0          0
LCV          275      18022125
PCV          0          0
CCV          0          0
LES          275
PES          273
PSES        273
CES          273
CES          273
SEFS        273
UAS          277
[...Output truncated...]

```

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 second plus or minus 0.5 seconds, an alarm is declared.

Notification messages are logged at the alarm level. Depending on the type of T3 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 21 on page 125 lists the T3 media-specific alarms or errors that can render the interface unable to pass packets.

Table 21: T3 Interface Error Counter Definitions

T3 Alarm or Error	Definition
AIS	Alarm indication signal
EXZ	Excessive zeros
FERF	Far-end failures
IDLE	Idle code detected
LCV	Line code violation
LOS	Loss of signal
LOF	Loss of frame
YLW	Remote defect indication (yellow alarm)
PLL	Phase locked loop

See Also • [T3 Interfaces Overview on page 47](#)

Locate Most Common T3 Alarms and Errors

The following alarms and errors are described in this chapter:

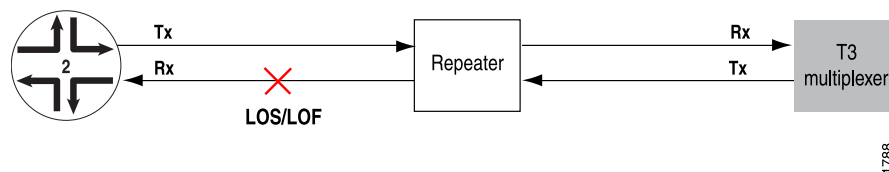
1. [Locate Loss of Signal and Loss of Frame Alarms on page 126](#)
2. [Locate Alarm Indication Signal Alarms on page 127](#)
3. [Locate an Incoming Yellow Alarm on page 127](#)
4. [Locate IDLE on a T3 Interface on page 128](#)

Locate Loss of Signal and Loss of Frame Alarms

Problem **Description:** A loss of signal (LOS) or loss of frame (LOF) alarm indicates that a signal could not be detected at the T3 interface.

Solution To locate the LOS or LOF alarm, check the connection between the router port and the first T3 network element. In the example network in [Figure 8 on page 126](#), the X indicates that there is a connection problem between Router 2 and the nearest T3 network element.

Figure 8: Location of an LOS or LOF Alarm in a T3 Network



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

Sample Output

```
user@router2> show interfaces t3-1/1/1 extensive
```

```
[... Output truncated...]
Active alarms : LOF, LOS
Active defects: LOF, LOS
DS3 Media:
PLL Lock           0          0 OK
Reframing          273         2 Defect Active
AIS                0          0 OK
LOF                273         2 Defect Active
LOS                273         2 Defect Active
[...Output truncated...]
```

Meaning

The sample output shows that Router 2 (Rx) detected a cumulative LOS and LOF for 273 seconds. The defect was declared twice during that time.

See Also • [T3 Interfaces Overview on page 47](#)

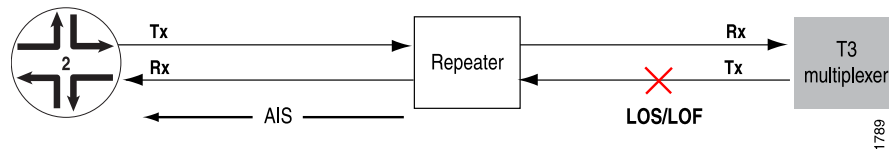
Locate Alarm Indication Signal Alarms

Problem Description: 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 T3 network element connected to the T3 interface.

Solution To locate the AIS alarm, have the carrier check the T3 network element connected to the T3 interface and trace the problem.

All diagnostics are from the perspective of Router 2 (the Juniper Networks router). [Figure 9 on page 127](#) illustrates the location of an AIS alarm in a T3 network.

Figure 9: Location of an AIS Alarm in a T3 Network



Meaning

In [Figure 9 on page 127](#), the X indicates that there is an LOS or LOF alarm between the repeater and the Tx T3 multiplexer. An AIS alarm is sent from the repeater to Router 2.

See Also • [T3 Interfaces Overview on page 47](#)

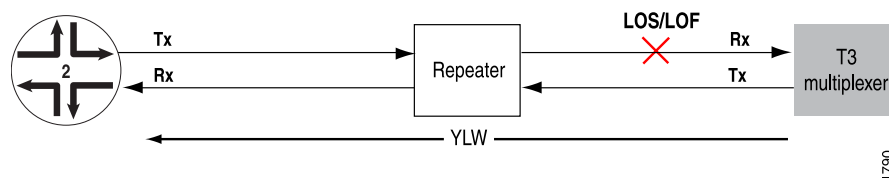
Locate an Incoming Yellow Alarm

Problem Description: An incoming yellow alarm indicates that the T3 network element connected to the T3 interface has a problem with the signal it is receiving from the T3 interface.

Solution To locate the yellow alarm, check the cable between the T3 interface and the directly connected T3 network element.

All diagnostics are from the perspective of Router 2. [Figure 10 on page 127](#) illustrates the location of a yellow alarm in a T3 network.

Figure 10: Location of a Yellow Alarm in a T3 Network



Meaning

The T3 multiplexer detects an LOS or LOF on its connection from Router 2 and sends a yellow (YLW) alarm to Router 2.

See Also • [T3 Interfaces Overview on page 47](#)

Locate IDLE on a T3 Interface

Problem **Description:** The T3 (DS3) IDLE signal is a validly framed DS3 signal with a payload consisting of a repeated 1100 signal. IDLE indicates that the line has not been provisioned for service.

Solution Have the carrier make sure that the line is provisioned for service.

Sample Output

```
user@router2> show interfaces t3-1/1/0
Physical interface: t3-1/1/0, Enabled, Physical link is Down
  Interface index: 13, SNMP ifIndex: 21
  Link-level type: PPP, MTU: 4474, Clocking: Internal
  Speed: T3, Loopback: None, CRC: 16, Mode: C/Bit parity
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps
  Link flags     : Keepalives
  Input rate     : 0 bps (0 pps), Output rate: 0 bps (0 pps)
  Active alarms : IDLE
  Active defects : IDLE
```

See Also • [T3 Interfaces Overview on page 47](#)

See Also • [T3 Interfaces Overview on page 47](#)

Related Documentation • [T3 Interfaces Overview on page 47](#)

PART 6

Configuration Statements and Operational Commands


- Configuration Statements on page 131
- Operational Commands on page 163

CHAPTER 12

Configuration Statements

- [bert-algorithm on page 132](#)
- [bert-error-rate on page 134](#)
- [bert-period on page 136](#)
- [buildout \(T1 Interfaces\) on page 138](#)
- [byte-encoding on page 139](#)
- [cbit-parity on page 140](#)
- [compatibility-mode on page 141](#)
- [crc-major-alarm-threshold on page 142](#)
- [crc-minor-alarm-threshold on page 143](#)
- [e1-options on page 144](#)
- [e3-options on page 145](#)
- [fast-aps-switch on page 146](#)
- [fcs on page 147](#)
- [feac-loop-respond on page 148](#)
- [framing \(E1, E3, and T1 Interfaces\) on page 149](#)
- [idle-cycle-flag on page 150](#)
- [invert-data on page 151](#)
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- [loopback \(ADSL, DS0, E1/E3, SONET/SDH, SHDSL, and T1/T3\) on page 153](#)
- [long-buildout on page 155](#)
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- [remote-loopback-respond on page 157](#)
- [start-end-flag on page 158](#)
- [t1-options on page 159](#)
- [t3-options on page 160](#)
- [timeslots on page 161](#)
- [unframed on page 162](#)

bert-algorithm

Syntax	<code>bert-algorithm <i>algorithm</i>;</code>
Hierarchy Level	<code>[edit interfaces <i>ce1-fpc/pic/port</i>],</code> <code>[edit interfaces <i>ct1-fpc/pic/port</i>],</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> 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 Metro Routers.</p>
Description	<p>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).</p> <p>.....</p> <div>  <p>NOTE: When configuring CE1 or CT1 interfaces on 10-port Channelized E1/T1 IQE PICs, the <code>bert-algorithm</code> statement must be included at the <code>[edit interfaces <i>ce1-fpc/pic/port</i>]</code> or <code>[edit interfaces <i>ct1-fpc/pic/port</i>]</code> hierarchy level as appropriate.</p> <p>.....</p> </div>
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 Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation


- *Interface Diagnostics*
- [Configuring E1 BERT Properties on page 6](#)
- [Configuring E3 BERT Properties on page 20](#)
- [Configuring T1 BERT Properties on page 34](#)
- [Configuring T3 BERT Properties on page 50](#)
- [Examples: Configuring T3 Interfaces on page 60](#)
- [bert-error-rate on page 134](#)
- [bert-period on page 136](#)

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 Metro Routers.</p>
Description	<p>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).</p>
	<p> NOTE: When configuring CE1 or CT1 interfaces on 10-port Channelized E1/T1 IQE PICs, the <code>bert-error-rate</code> statement must be included at the <code>[edit interfaces ce1-fpc/pic/port]</code> or <code>[edit interfaces ct1-fpc/pic/port]</code> hierarchy level as appropriate.</p>
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 132 • bert-period on page 136 • ds0-options • e1-options on page 144 • e3-options on page 145 • t1-options on page 159 • t3-options on page 160 • Interface Diagnostics


- [Configuring E1 BERT Properties on page 6](#)
- [Configuring E3 BERT Properties on page 20](#)
- [Configuring T1 BERT Properties on page 34](#)
- [Configuring T3 BERT Properties on page 50](#)
- [Examples: Configuring T3 Interfaces on page 60](#)

bert-period


Syntax	<code>bert-period seconds;</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 <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> 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 Metro 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>
	<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 <code>[edit interfaces ce1-<i>fpc/pic/port</i>]</code> or <code>[edit interfaces ct1-<i>fpc/pic/port</i>]</code> hierarchy level as appropriate.</p>
Options	<p>seconds—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**
- *Interface Diagnostics*
 - [Configuring E1 BERT Properties on page 6](#)
 - [Configuring E3 BERT Properties on page 20](#)
 - [Configuring T1 BERT Properties on page 34](#)
 - [Configuring T3 BERT Properties on page 50](#)
 - [bert-algorithm on page 132](#)
 - [bert-error-rate on page 134](#)

buildout (T1 Interfaces)

Syntax	<code>buildout value;</code>
Hierarchy Level	<code>[edit interfaces ct1-<i>fpc/pic/port</i>]</code> <code>[edit interfaces <i>interface-name</i> t1-<i>options</i>]</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 Metro Routers.</p>
Description	For T1 interfaces, set the buildout value.
	<p> NOTE: When configuring CT1 interfaces on 10-port Channelized E1/T1 IQE PICs and 16-Port Channelized E1/T1 Circuit Emulation MICs, the buildout statement must be included at the hierarchy level.</p>
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-7.5db—For MX Series only, long buildout with 7.5 dB transmit attenuation • long-15db—For MX Series only, long buildout with 15 dB transmit attenuation • long-22.5db—For MX Series 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 35 • <i>Junos OS Interfaces and Routing Configuration Guide</i>



byte-encoding

Syntax	byte-encoding (nx56 nx64);
Hierarchy Level	[edit interfaces t1- <i>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 Metro Routers.
Description	Set the byte encoding on a DS0 or T1 interface to use 7 bits per byte or 8 bits per byte.
	<div>  <p>NOTE: When configuring T1 interfaces on the 10-port Channelized E1/T1 IQE PIC, the <code>byte-encoding</code> statement must be included at the [edit interfaces t1-<i>fpc/pic/port</i>] hierarchy level.</p> </div>
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 36

cbit-parity

Syntax	(cbit-parity no-cbit-parity);
Hierarchy Level	[edit interfaces <i>interface-name</i> t3-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For T3 interfaces only, enable or disable C-bit parity mode, which controls the type of framing that is present on the transmitted T3 signal. When C-bit parity mode is enabled, the C-bit positions are used for the far-end block error (FEBE), far-end alarm and control (FEAC), terminal data link, path parity, and mode indicator bits, as defined in ANSI T1.107a-1989. For ATM and ATM2 IQ2 and IQ2-E interfaces, M23 framing is used when the no-cbit-parity statement is included. For all other interfaces, M13 framing is used when the no-cbit-parity statement is included.
Default	C-bit parity mode is enabled.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• <i>Configuring E3 and T3 Parameters on ATM Interfaces</i>• Disabling T3 C-Bit Parity Mode on page 51

compatibility-mode

Syntax	<code>compatibility-mode (adtran digital-link kentrox larscom verilink) <subrate value>;</code>
Hierarchy Level	<code>[edit interfaces <i>interface-name</i> e3-options],</code> <code>[edit interfaces <i>interface-name</i> t3-options]</code>
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure the E3 or T3 interface to be compatible with the channel service unit (CSU) at the remote end of the line.
	<p> NOTE: The <code>compatibility-mode</code> statement at the <code>[edit interfaces <i>interface-name</i> e3-options]</code> hierarchy level is not valid for IQE PICs.</p>
Default	If you omit this option, the full E3 or T3 rate is used.
Options	<p>adtran—For T3 IQ interfaces only, configure compatibility with Adtran CSUs.</p> <p>digital-link—Configure compatibility with Digital Link CSUs. If you include this option on an E3 interface, you must also disable payload scrambling.</p> <p>kentrox—Configure compatibility with Kentrox CSUs. Kentrox subrate is valid for E3 IQ and T3 IQ interfaces only.</p> <p>larscom—For T3 and T3 IQ interfaces only, configure compatibility with Larscom CSUs.</p> <p>verilink—For T3 IQ and T3 IQE interfaces only, configure compatibility with Verilink CSUs.</p> <p> NOTE: Verilink configuration is not functional if an IQ interface is paired with an IQE interface.</p> <p>subrate value—Subrate of the E3 or T3 line.</p> <p>Range: For Kentrox CSUs on E3 IQ interfaces and T3 IQ interfaces the subrate value must match the value configured on the CSU. Each increment of the subrate value corresponds to a rate increment of about 0.5 Mbps.</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**
- [Configuring the E3 CSU Compatibility Mode on page 21](#)
 - [Configuring the T3 CSU Compatibility Mode on page 52](#)
 - [payload-scrambler on page 156](#)

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 Metro 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	<p>1e-3—Error rate expressed as the number of errors per number of bits. The value 1e-3 is one crc error in 10³ bits.</p> <p>1e-4—Error rate expressed as the number of errors per number of bits. The value 1e-4 is one crc error in 10⁴ bits.</p> <p>1e-5—Error rate expressed as the number of errors per number of bits. The value 1e-5 is one crc error in 10⁵ bits.</p> <p>5e-4—Error rate expressed as the number of errors per number of bits. The value 5e-4 is five crc errors in 10⁴ bits.</p> <p>5e-5—Error rate expressed as the number of errors per number of bits. The value 5e-5 is five crc errors in 10⁵ bits.</p> <p>Default: 5e-5</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 T1 CRC Error Major Alarm Thresholds on page 36

crc-minor-alarm-threshold

Syntax	<code>crc-minor-alarm-threshold (1e-3 5e-4 1e-4 5e-5 1e-5 5e-6 1e-6);</code>
Hierarchy Level	<code>[edit interfaces <i>interface-name</i> t1-options]</code>
Release Information	Statement introduced in Junos OS Release 8.5. Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Metro 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	<p>1e-3—Error rate expressed as the number of errors per number of bits. The value 1e-3 is one crc error in 10^3 bits.</p> <p>1e-4—Error rate expressed as the number of errors per number of bits. The value 1e-4 is one crc error in 10^4 bits.</p> <p>1e-5—Error rate expressed as the number of errors per number of bits. The value 1e-5 is one crc error in 10^5 bits.</p> <p>1e-6—Error rate expressed as the number of errors per number of bits. The value 1e-5 is one crc error in 10^6 bits.</p> <p>5e-4—Error rate expressed as the number of errors per number of bits. The value 5e-4 is five crc errors in 10^4 bits.</p> <p>5e-5—Error rate expressed as the number of errors per number of bits. The value 5e-5 is five crc errors in 10^5 bits.</p> <p>5e-6—Error rate expressed as the number of errors per number of bits. The value 5e-5 is five crc errors in 10^6 bits.</p> <p>Default: 5e-6</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 T1 CRC Error Minor Alarm Thresholds on page 37

e1-options

Syntax	<pre>e1-options { bert-algorithm <i>algorithm</i>; bert-error-rate <i>rate</i>; bert-period <i>seconds</i>; 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 <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 Metro Routers.</p>
Description	<p>Configure E1-specific physical interface properties.</p> <p>The remaining statements are explained separately. See CLI Explorer.</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"> • <i>Channelized E1 IQ and IQE Interfaces Overview</i> • <i>Channelized STM1 Interfaces Overview</i> • E1 Interfaces Overview on page 3 • T1 Interfaces Overview on page 31

e3-options

Syntax

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

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure E3-specific physical interface properties.

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


The remaining statements are explained separately. See [CLI Explorer](#).

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


Related Documentation

- [E3 Interfaces Overview on page 17](#)
- [T3 Interfaces Overview on page 47](#)
- *atm-options*

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, EX Series switches, and MX series routers with Channelized OC3/STM1 Circuit Emulation PIC with SFP only using container interfaces) Reduce the Automatic Protection Switching (APS) switchover time in Layer 2 circuits.
	<div>  NOTE: <ul style="list-style-type: none"> The fast APS switching feature is supported only within a single chassis on a MX series router using a container interface. 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"> <i>Reducing APS Switchover Time in Layer 2 Circuits</i>

fcs


Syntax	<code>fcs (16 32);</code>
Hierarchy Level	<code>[edit interfaces e1-<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> e1-options],</code> <code>[edit interfaces <i>interface-name</i> e3-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 Metro Routers.</p>
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: 20px;"> <p> NOTE: When configuring E1 or T1 interfaces on 10-port Channelized E1/T1 IQE PICs, the fcs statement must be included at the <code>[edit interfaces e1-<i>fpc/pic/port</i>]</code> or <code>[edit interfaces t1-<i>fpc/pic/port</i>]</code> 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	<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 Frame Checksum on page 7 • Configuring the E3 Frame Checksum on page 22 • Configuring the SONET/SDH Frame Checksum

- [Configuring the T1 Frame Checksum on page 38](#)
- [Configuring the T3 Frame Checksum on page 55](#)


feac-loop-respond

Syntax	(feac-loop-respond no-feac-loop-respond);
Hierarchy Level	[edit interfaces <i>interface-name</i> t3-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>For T3 interfaces only, configure the router so a remote CSU can place the local router into loopback.</p> <p>If you configure remote or local loopback with the T3 loopback statement, the router does not respond to FEAC requests from the CSU even if you include the feac-loop-respond statement in the configuration. For the router to respond, you must delete the loopback statement from the configuration.</p> <p>You must rollback the setting done on the remote CSU prior to deactivating the feac-loop-respond statement. If the remote CSU cannot comply, clear the remote loop through local configuration to achieve the cleanup. For example, configure remote loopback on the interface and then delete the remote loopback.</p>
Default	The router does not respond to FEAC 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 T3 FEAC Response on page 55• loopback (ADSL, DS0, E1/E3, SONET/SDH, SHDSL, and T1/T3) on page 153• remote-loopback-respond on page 157


framing (E1, E3, and T1 Interfaces)

Syntax	<code>framing (g704 g704-no-crc4 g.751 g.832 unframed sf esf);</code>
Hierarchy Level	<code>[edit interfaces ce1-fpc/pic/port],</code> <code>[edit interfaces ct1-fpc/pic/port],</code> <code>[edit interfaces at-fpc/pic/port e3-options],</code> <code>[edit interfaces e1-fpc/pic/port e1-options],</code> <code>[edit interfaces t1-fpc/pic/port 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 Metro Routers.</p>
Description	<p>Configure the framing format.</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>framing</code> statement must be included at the <code>[edit interfaces ce1-fpc/pic/port]</code> or <code>[edit interfaces ct1-fpc/pic/port]</code> hierarchy level as appropriate.</p> </div>
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><code>interface</code>—To view this statement in the configuration.</p> <p><code>interface-control</code>—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring E1 Framing on page 8 • Configuring E3 and T3 Parameters on ATM Interfaces • Configuring T1 Framing on page 39


idle-cycle-flag

Syntax	<code>idle-cycle-flag value;</code>
Hierarchy Level	<code>[edit interfaces e1-fpc/pic/port],</code> <code>[edit interfaces t1-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 serial-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 Metro Routers.</p>
Description	<p>Configure the value that the DS0, E1, E3, T1, or T3 interface transmits during idle cycles.</p> <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: <code>Flags</code></p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring the E1 Idle Cycle Flag on page 8 Configuring the E3 Idle Cycle Flag on page 23 Configuring the T1 Idle Cycle Flag on page 41 Configuring the T3 Idle Cycle Flag on page 56

invert-data

Syntax	invert-data;
Hierarchy Level	<pre>[edit interfaces e1-fpc/pic/port], [edit interfaces t1-fpc/pic/port], [edit interfaces interface-name ds0-options], [edit interfaces interface-name e1-options], [edit interfaces interface-name t1-options], [edit interfaces interface-name e3-options]</pre>
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 Metro Routers.</p>
Description	<p>Invert the transmission of unused data bits on the DS0, E1, E3, and T1 interface.</p> <hr/> <div>  <p>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.</p> </div> <hr/>
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 Data Inversion on page 9 • Configuring E3 Data Inversion on page 23 • Configuring T1 Data Inversion on page 37

line-encoding

Syntax	<code>line-encoding (ami b8zs);</code>
Hierarchy Level	<code>[edit interfaces ct1-<i>fpc/pic/port</i>],</code> <code>[edit interfaces <i>interface-name</i> t1-<i>options</i>]</code>
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Metro Routers.
Description	Set the line encoding format on the T1 interface. <div>  <p>NOTE: When configuring CT1 interfaces on the 10-port Channelized E1/T1 IQE PIC, the <code>line-encoding</code> statement must be included at the <code>[edit interfaces ct1-<i>fpc/pic/port</i>]</code> hierarchy level.</p> </div>
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 39

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

Syntax	<code>loopback (local payload remote);</code>
Hierarchy Level	<pre>[edit interfaces ce1-fpc/pic/port], [edit interfaces ct1-fpc/pic/port], [edit interfaces t1-fpc/pic/port], [edit interfaces interface-name ds0-options], [edit interfaces interface-name dsl-options], [edit interfaces interface-name e1-options], [edit interfaces interface-name e3-options], [edit interfaces interface-name shdsl-options], [edit interfaces interface-name sonet-options], [edit interfaces interface-name t1-options], [edit interfaces interface-name t3-options]</pre>
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 Metro 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 NxDS0 IQ interfaces only, loop back data only (without clocking information) on the remote router's PIC. With payload loopback, overhead is recalculated. Neither ATM-over-asymmetrical digital subscriber line (ADSL) interfaces nor ATM-over-SHDSL interfaces support payload loopback.

remote—Loop packets, including both data and timing information, back on the remote router's interface card. NxDS0 IQ interfaces do not support remote loopback.

Required Privilege interface—To view this statement in the configuration.

Level interface-control—To add this statement to the configuration.


**Related
Documentation**

- *Configuring E3 and T3 Parameters on ATM Interfaces*
- [Configuring E1 Loopback Capability on page 9](#)
- [Configuring E3 Loopback Capability on page 24](#)
- *Configuring SONET/SDH Loopback Capability to Identify a Problem as Internal or External*
- *Configuring SHDSL Operating Mode on an ATM Physical Interface*
- [Configuring T1 Loopback Capability on page 39](#)
- [Configuring T3 Loopback Capability on page 57](#)
- [feac-loop-respond on page 148](#)


long-buildout

Syntax	(long-buildout no-long-buildout);
Hierarchy Level	[edit interfaces <i>interface-name</i> t3-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>Configure the T3 line buildout. A T3 interface has two settings for the T3 line buildout: a short setting, which is less than 255 feet (68 meters), and a long setting, which is greater than 255 feet and shorter than 450 feet (137 meters).</p> <p>This statement applies to copper-cable-based T3 interfaces only. You cannot configure a line buildout for a DS3 channel on a channelized OC12 interface, which runs over fiber-optic cable.</p>
Default	A T3 interface uses the short line buildout setting (no-long-buildout) for wires shorter than 255 feet (68 meters).
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring the T3 Line Buildout on page 56


payload-scrambler

Syntax	(payload-scrambler no-payload-scrambler);
Hierarchy Level	[edit interfaces <i>interface-name</i> e3-options], [edit interfaces <i>interface-name</i> sonet-options], [edit interfaces <i>interface-name</i> t3-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>Enable or disable HDLC scrambling on an E3, a SONET/SDH, or a T3 interface. This type of scrambling provides better link stability. Both sides of a connection must either use or not use scrambling.</p> <p>If you commit a T3 interface configuration that has HDLC payload scrambling enabled, the interface must also be configured to be compatible with the channel service unit (CSU) at the remote end of the line.</p> <p>Disable payload scrambling on an E3 interface if Digital Link compatibility mode is used.</p> <p>On a channelized OC12 interface, the sonet payload-scrambler statement is ignored. To configure scrambling on the DS3 channels on the interface, you can include the t3-options payload-scrambler statement in the configuration for each DS3 channel.</p>
	<p> NOTE: The payload-scrambler statement at the [edit interfaces <i>interface-name</i> e3-options] hierarchy level is not valid for IQE PICs.</p>
Default	Payload scrambling is disabled on all E3 and T3 interfaces; it is enabled by default on E3/T3 over ATM interfaces and on SONET/SDH interfaces.
Required Privilege Level	<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 E3 and T3 Parameters on ATM Interfaces • Configuring E3 HDLC Payload Scrambling on page 25 • Configuring SONET/SDH HDLC Payload Scrambling for Link Stability • Configuring T3 HDLC Payload Scrambling on page 59 • Examples: Configuring T3 Interfaces on page 60 • compatibility-mode on page 141

remote-loopback-respond

Syntax	<code>remote-loopback-respond;</code>
Hierarchy Level	<code>[edit interfaces ct1-<i>fpc/pic/port</i>],</code> <code>[edit interfaces <i>interface-name</i> t1-<i>options</i>]</code>
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Metro 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.
<div>  <p>NOTE: When configuring CT1 interfaces on the 10-port Channelized E1/T1 IQE PIC, the <code>remote-loopback-respond</code> statement must be included at the <code>[edit interfaces ct1-<i>fpc/pic/port</i>]</code> hierarchy level.</p> </div>	
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 38 • feac-loop-respond on page 148 • loopback (ADSL, DS0, E1/E3, SONET/SDH, SHDSL, and T1/T3) on page 153

start-end-flag

Syntax	<code>start-end-flag (filler shared);</code>
Hierarchy Level	<code>[edit interfaces e1-<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> e1-options],</code> <code>[edit interfaces <i>interface-name</i> e3-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 Metro Routers.</p>
Description	For DS0, E1, E3, T1, and T3 interfaces, configure the interface to share the transmission of start and end flags.
	<p> NOTE: When configuring E1 or T1 interfaces on the 10-port Channelized E1/T1 IQE PIC, the <code>start-end-flag</code> statement must be included at the <code>[edit interfaces e1-<i>fpc/pic/port</i>]</code> or <code>[edit interfaces t1-<i>fpc/pic/port</i>]</code> hierarchy level as appropriate.</p>
Options	<p>filler—Wait two idle cycles between the start and end flags.</p> <p>shared—Share the transmission of the start and end flags. This is the default.</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 Start and End Flags on page 11 • Configuring the E3 Start and End Flags on page 26 • Configuring T1 Start and End Flags on page 42 • Configuring T3 Start and End Flags on page 59

t1-options

Syntax

```
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;
}
```

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 Metro Routers.

Description Configure T1-specific physical interface properties.

The remaining statements are explained separately. See [CLI Explorer](#).

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

Related Documentation

- [T1 Interfaces Overview on page 31](#)

t3-options

Syntax

```
t3-options {
  atm-encapsulation (direct | plcp);
  bert-algorithm algorithm;
  bert-error-rate rate;
  bert-period seconds;
  (cbit-parity | no-cbit-parity);
  compatibility-mode (digital-link | kentrox | larscom) <subrate value>;
  fcs (16 | 32);
  (feac-loop-respond | no-feac-loop-respond);
  idle-cycle-flag value;
  (long-buildout | no-long-buildout);
  (loop-timing | no-loop-timing);
  loopback (local | payload | remote);
  start-end-flag value;
}
```

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure T3-specific physical interface properties, including the properties of DS3 channels on a channelized OC12 interface. The **long-buildout** statement is not supported for DS3 channels on a channelized OC12 interface.

On T3 interfaces, the default encapsulation is PPP.

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

The remaining statements are explained separately. See [CLI Explorer](#).

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

Related Documentation

- [T3 Interfaces Overview on page 47](#)

timeslots

Syntax `timeslots time-slot-range;`

Hierarchy Level [edit interfaces *e1-fpc/pic/port*],
[edit interfaces *t1-fpc/pic/port*],
[edit interfaces *interface-name* **e1-options**],
[edit interfaces *interface-name* **partition** *partition-number*],
[edit interfaces *interface-name* **t1-options**]

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 *time-slot-range*—Actual time slot numbers allocated:

Range: Ranges vary by interface type and configuration option as follows:

- 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)



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

- Related Documentation**
- [Configuring Fractional E1 IQ and IQE Interfaces](#)
 - [Configuring Fractional T1 IQ and IQE Interfaces](#)
 - [Configuring Fractional E1 Time Slots on page 11](#)
 - [Configuring Fractional T1 Time Slots on page 43](#)
 - [Configuring a Channelized T1/E1 Interface to Drop and Insert Time Slots](#)

unframed

Syntax	(unframed no-unframed);
Hierarchy Level	[edit interfaces <i>interface-name</i> e3-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	For E3 IQ interfaces only, enable or disable unframed mode. In unframed mode, the E3 IQ interface do not detect yellow (ylw) or loss-of-frame (lof) alarms.
Default	Unframed mode is disabled.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	• Configuring E3 IQ and IQE Unframed Mode on page 26

CHAPTER 13

Operational Commands

- show interfaces (T1, E1, or DS)
- show interfaces (T3 or E3)
- test interface e1-bert-start
- test interface e1-bert-stop
- test interface e3-bert-start
- test interface e3-bert-stop
- test interface ds0-bert-start
- test interface ds0-bert-stop
- test interface t1-bert-start
- test interface t1-bert-stop
- test interface t3-bert-start
- test interface t3-bert-stop

show interfaces (T1, E1, or DS)

Syntax	<pre>show interfaces <i>interface-type</i> <brief detail extensive terse> <descriptions> <media> <snmp-index <i>snmp-index</i>> <statistics></pre>
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 t1-<i>fpc/pic/port</i>, whereas the E1 interface type is e1-<i>fpc/pic/port</i>, and DS interface type is ds-<i>fpc/pic/port</i>:<channel>.</p> <p>brief detail extensive terse—(Optional) Display the specified level of output.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index <i>snmp-index</i>—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> • Understanding Interfaces on ACX Series Universal Metro Routers
List of Sample Output	<p>show interfaces (T1, IMA Link) on page 176</p> <p>show interfaces (T1, PPP) on page 177</p> <p>show interfaces detail (T1, PPP) on page 177</p> <p>show interfaces extensive (T1 CRC Errors) on page 178</p> <p>show interfaces extensive (T1, PPP) on page 178</p> <p>show interfaces (E1, Frame Relay) on page 180</p> <p>show interfaces detail (E1, Frame Relay) on page 181</p> <p>show interfaces extensive (E1, Frame Relay) on page 182</p> <p>show interfaces (E1, IMA Link) on page 184</p> <p>show interfaces extensive (T1, TDM-CCC-SATOP) on page 185</p> <p>show interfaces extensive (DS, TDM-CCC-CESoPSN) on page 187</p>
Output Fields	<p>Table 22 on page 165 lists the output fields for the show interfaces (T1 or E1) command. Output fields are listed in the approximate order in which they appear.</p>

Table 22: 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 <i>Common Output Fields Description</i> .	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 <i>Common Output Fields Description</i> .	All levels
Interface flags	Information about the interface. Possible values are described in the “Interface Flags” section under <i>Common Output Fields Description</i> .	All levels
Link flags	Information about the link. Possible values are described in the “Link Flags” section under <i>Common Output Fields Description</i> .	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	detail extensive

Table 22: 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 22: 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 22: 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 22: 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 n392dte or n393dce 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 22: 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 22: 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>Belcore 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 22: 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 22: 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 22: 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 <i>Common Output Fields Description</i> .	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 22: 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 <i>Common Output Fields Description</i> .	detail extensive none
Addresses, Flags	Information about the address flags. Possible values are described in the “Addresses Flags” section under <i>Common Output Fields Description</i> .	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	(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: <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	(Frame Relay) Data-link connection identifier (DLCI) statistics. <ul style="list-style-type: none"> • Active DLCI—Number of active DLCIs. • Inactive DLCI—Number of inactive DLCIs. 	detail extensive none

Table 22: 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           11          11
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: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
    198.51.100.255
```

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: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255,
    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      Buffer      Priority      Limit
                           %      bps      %      usec
  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: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255,
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 timeout : 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 timeout : 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      Bandwidth      Buffer Priority
Limit
    %      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
CE Tx          Packets      Bytes Count
CE Rx          1005         192960
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 extensive
```

```

Physical interface: ds-1/0/0:1:1, 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	95	0	low
3 network-control	5	76800	5	0	low
none					
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					

show interfaces (T3 or E3)

Syntax	<pre>show interfaces <i>interface-type</i> <brief detail extensive terse> <descriptions> <media> <snmp-index <i>snmp-index</i>> <statistics></pre>
Release Information	Command introduced before Junos OS Release 7.4.
Description	Display status information about the specified T3 or E3 interface.
Options	<p><i>interface-type</i>—On M Series and T Series routers, the T3 interface type is t3-<i>fpc/pic/port</i>, whereas the E3 interface type is e3-<i>fpc/pic/port</i>.</p> <p>brief detail extensive terse—(Optional) Display the specified level of output.</p> <p>descriptions—(Optional) Display interface description strings.</p> <p>media—(Optional) Display media-specific information about network interfaces.</p> <p>snmp-index <i>snmp-index</i>—(Optional) Display information for the specified SNMP index of the interface.</p> <p>statistics—(Optional) Display static interface statistics.</p>
Required Privilege Level	view
List of Sample Output	<p>show interfaces (T3, PPP) on page 198</p> <p>show interfaces detail (T3, PPP) on page 199</p> <p>show interfaces extensive (T3, PPP) on page 200</p> <p>show interfaces (E3, Frame Relay) on page 201</p> <p>show interfaces detail (E3, Frame Relay) on page 202</p> <p>show interfaces extensive (E3, Frame Relay) on page 204</p>
Output Fields	<p>Table 23 on page 189 lists the output fields for the show interfaces (T3 or E3) command. Output fields are listed in the approximate order in which they appear.</p>

Table 23: T3 or E3 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 <i>Common Output Fields Description</i> .	All levels

Table 23: T3 or E3 show interfaces Output Fields (continued)

Field Name	Field Description	Level of Output
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. It can be 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
Mode	(T3 only) Whether C-bit parity mode or M13 mode is enabled.	All levels
Long buildout	(T3 only) Buildout setting: less than 255 feet (68 meters) or greater than 255 feet and shorter than 450 feet (137 meters).	All levels
Framing	(E3 only) Physical layer framing format used on the link. It can be G751 or Unframed . The default is G751 .	All levels
Device flags	Information about the physical device. Possible values are described in the "Device Flags" section under <i>Common Output Fields Description</i> .	All levels
Interface flags	Information about the interface. Possible values are described in the "Interface Flags" section under <i>Common Output Fields Description</i> .	All levels
Link flags	Information about the link. Possible values are described in the "Link Flags" section under <i>Common Output Fields Description</i> .	All levels
Hold-times	Current interface hold-time up and hold-time down, in milliseconds.	detail extensive
Keepalive settings	(PPP and HDLC) Configured settings for keepalives. <ul style="list-style-type: none"> interval seconds—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—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—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

Table 23: T3 or E3 show interfaces Output Fields (continued)

Field Name	Field Description	Level of Output
Keepalive statistics or Keepalive	<p>(PPP and HDLC) Information about keepalive packets.</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
LMI settings	<p>(Frame Relay) Local Management Interface (LMI) settings (ANSI or ITU). ANSI LMI settings is the default. The format is 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) LMI 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 23: T3 or E3 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 LMI packet was reported for n392dte or n393dce 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). 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). Opened—NCP negotiation is successful. 	detail extensive none
CHAP state	(PPP) Displays the state of the Challenge Handshake Authentication Protocol (CHAP) during its transaction. <ul style="list-style-type: none"> Chap-Resp-received—Response received for the challenge sent, but CHAP not yet moved into the Success state. (Most likely with RADIUS authentication.) Chap-Resp-sent—Response sent for the challenge received. Chap-Chal-sent—Challenge sent. Chap-Chal-received—Challenge received but response not yet sent. 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 (year-month-day hour:minute:second ago) . For example, Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago) .	detail extensive none
CoS queues	Number of CoS queues configured.	detail extensive none

Table 23: T3 or E3 show interfaces Output Fields (continued)

Field Name	Field Description	Level of Output
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 received 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). • Runts—(T3 only) Number of frames received that are smaller than the runt threshold. • Giants—(T3 only) Number of frames received that are larger than the giant threshold. • Bucket Drops—Drops resulting from the traffic load exceeding the interface transmit/receive leaky bucket configuration. The default is off. • 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 23: T3 or E3 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 (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
Active alarms Active defects	<p>E3 media-specific defects that can render the interface unable to pass packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router, or turn on the red or yellow alarm LED on the craft interface.</p> <ul style="list-style-type: none"> • AIS—Alarm indication signal • EXZ—Excessive zeros • FERF—Far-end receive failures • IDLE—Idle code detected • LCD—Loss of cell delineation • LCV—Line code violation • LOF—Loss of frame • LOS—Loss of signal • PLL—Phase-locked loop • YLW—Remote defect indication 	detail extensive none

Table 23: T3 or E3 show interfaces Output Fields (continued)

Field Name	Field Description	Level of Output
DS3 media or E3 media	<p>Counts of DS3 (T3) or E3 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. <p>The DS3 or E3 media-specific error types can be:</p> <ul style="list-style-type: none"> • PLL Lock—Phase-locked loop out of lock • Reframing—Frame alignment recovery time • AIS—Alarm indication signal • LOF—Loss of frame • LOS—Loss of signal • IDLE—Idle code detected • YELLOW—Errors at the remote site receiver • BPV—Bipolar violation • EXZ—Excessive zeros • LCV—Line code violation • PCV—(DS3 only) Pulse code violation • CCV—(DS3 only) C-bit coding violation • FEBE—(DS3 only) Far-end block error • LES—Line error seconds • PES—(DS3 only) P-bit errored seconds • PSSES—(DS3 only) P-bit errored seconds (section) • CES—(DS3 only) C-bit errored seconds • CSES—(DS3 only) C-bit severely errored seconds • SEFS—Severely errored framing seconds • UAS—Unavailable seconds 	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. • Idle cycle flag—Idle cycle flags. • Start end flag—Start and end flag. 	extensive

Table 23: T3 or E3 show interfaces Output Fields (continued)

Field Name	Field Description	Level of Output
DSU configuration	<p>Information about the DSU configuration. The last three lines (Bit count, Error bit count, and LOS information) are displayed only if a BERT has ever been run on the interface.</p> <ul style="list-style-type: none"> • Compatibility mod—CSU/DSU compatibility mode: None, Larscom, Kentrox, or Digital-Link. • Scrambling—Payload scrambling: Enabled or Disabled. • Subrate—Configured subrate setting. Applies only when Digital-Link compatibility mode is used. The subrate can be Disabled or display units in Kbps. • FEAC loopbac—(T3) Whether a far-end alarm and control (FEAC) loopback is Active or Inactive. This feature is used to send alarm or status information from the far-end terminal back to the near-end terminal and to initiate T3 loopbacks at the far-end terminal from the near-end terminal. • Response—Whether the FEAC signal is Enabled or Disabled. • Count—Number of FEAC loopbacks. 	extensive
DS3 (or E3) 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
CoS information	<p>Information about the CoS queue for the physical interface.</p> <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

Table 23: T3 or E3 show interfaces Output Fields (continued)

Field Name	Field Description	Level of Output
Logical interface	Name of the logical interface.	detail extensive none
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.	extensive
Flags	Information about the interface. Possible values are described in the “Interface Flags” section under <i>Common Output Fields Description</i> .	detail extensive none
Encapsulation	Encapsulation on the logical interface.	detail extensive none
Input packets	Number of packets received on the logical interface.	None specified
Output packets	Number of packets transmitted on the logical interface.	None specified
Traffic statistics	<p>(Frame Relay) Number and rate of bytes and packets received and transmitted on the logical 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
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 awhile (generally, less than 1 second) for this counter to stabilize.	detail extensive
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	(Multilink) Interface name for the multilink bundle.	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 <i>Common Output Fields Description</i> .	detail extensive none

Table 23: T3 or E3 show interfaces Output Fields (continued)

Field Name	Field Description	Level of Output
Addresses, Flags	Information about the address flags. Possible values are described in the “Addresses Flags” section under <i>Common Output Fields Description</i> .	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 is 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

Sample Output

show interfaces (T3, PPP)

```
user@host> show interfaces t3-0/2/0
```

```
Physical interface: t3-0/2/0, Enabled, Physical link is Up
  Interface index: 139, SNMP ifIndex: 35
  Link-level type: PPP, MTU: 4474, Clocking: Internal, Speed: T3,
  Loopback: None, FCS: 16, Mode: C/Bit parity,
  Long buildout: Shorter than 255 feet
  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: 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 (02:18:40 ago)
```



```

Input rate      : 0 bps (0 pps)
Output rate     : 72 bps (0 pps)
Active alarms   : None
Active defects  : None
DS3 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Algorithm: 2^15 - 1, 0.151, Pseudorandom (9), Induced error rate: 10e-0

Logical interface t3-0/2/0.0 (Index 66) (SNMP ifIndex 54)
  Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 4470
  Flags: Protocol-Down
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
    198.51.100.255

```

show interfaces detail (T3, PPP)

```
user@host> show interfaces t3-0/2/0 detail
```

```

Physical interface: t3-0/2/0, Enabled, Physical link is Up
  Interface index: 139, SNMP ifIndex: 35, Generation: 22
  Link-level type: PPP, MTU: 4474, Clocking: Internal, Speed: T3,
  Loopback: None, FCS: 16, Mode: C/Bit parity,
  Long buildout: Shorter than 255 feet
  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 (02:18:45 ago)
  Statistics last cleared: Never
  Traffic statistics:
    Input bytes   : 0          0 bps
    Output bytes  : 152        0 bps
    Input packets : 0          0 pps
    Output packets: 8          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	6	6	0

```

  Active alarms : None
  Active defects : None
  DS3 BERT configuration:
    BERT time period: 10 seconds, Elapsed: 0 seconds
    Algorithm: 2^15 - 1, 0.151, Pseudorandom (9), Induced error rate: 10e-0

```

```

Logical interface t3-0/2/0.0 (Index 66) (SNMP ifIndex 54) (Generation 8)
  Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 4470, Generation: 17, Route table: 0
  Flags: Protocol-Down
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
    198.51.100.255,
    Generation: 24

```

show interfaces extensive (T3, PPP)

```
user@host> show interfaces t3-0/2/0 extensive
```

```

Physical interface: t3-0/2/0, Enabled, Physical link is Up
  Interface index: 139, SNMP ifIndex: 35, Generation: 22
  Link-level type: PPP, MTU: 4474, Clocking: Internal, Speed: T3,
  Loopback: None, FCS: 16, Mode: C/Bit parity,
  Long buildout: Shorter than 255 feet
  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,
  mp1s: Not-configured
  CHAP state: Closed
  CoS queues   : 4 supported, 4 in use
  Last flapped : 2005-12-05 08:43:06 PST (02:18:47 ago)
  Statistics last cleared: Never
  Traffic statistics:
    Input bytes   :                0                0 bps
    Output bytes  :               171               72 bps
    Input packets :                0                0 pps
    Output packets:                9                0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
    Bucket drops: 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	7	7	0

```

  Active alarms : None
  Active defects : None

```

```

DS3 media:          Seconds      Count  State
  PLL Lock           0           0  OK
  Reframing          0           0  OK
  AIS                0           0  OK
  LOF                0           0  OK
  LOS                0           0  OK
  IDLE               0           0  OK
  YELLOW             0           0  OK
  BPV                0           0
  EXZ                0           0
  LCV                1           4
  PCV                0           0
  CCV                0           0
  FEBE              1           11
  LES               1
  PES               0
  PSES             0
  CES              0
  CSES             0
  SEFS             0
  UAS              0

HDLC configuration:
  Policing bucket: Disabled
  Shaping bucket : Disabled
  Giant threshold: 4484, Runt threshold: 3
  Idle cycle flag: flags, Start end flag: shared

DSU configuration:
  Compatibility mode: None, Scrambling: Disabled, Subrate: Disabled
  FEAC loopback: Inactive, Response: Disabled, Count: 0

DS3 BERT configuration:
  BERT time period: 10 seconds, Elapsed: 0 seconds
  Algorithm: 2^15 - 1, 0.151, Pseudorandom (9), Induced error rate: 10e-0

Packet Forwarding Engine configuration:
  Destination slot: 0, PLP byte: 1 (0x00)

CoS information:
  CoS transmit queue    Bandwidth      Buffer    Priority    Limit
                        %      bps      %      usec
  0 best-effort         95    42499200  95        0      low  none
  3 network-control     5     2236800   5         0      low  none

Logical interface t3-0/2/0.0 (Index 66) (SNMP ifIndex 54) (Generation 8)
  Flags: Hardware-Down Point-To-Point SNMP-Traps Encapsulation: PPP
  Protocol inet, MTU: 4470, Generation: 17, Route table: 0
  Flags: Protocol-Down
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
    198.51.100.255,
    Generation: 24

```

show interfaces (E3, Frame Relay)

```

user@host> show interfaces e3-1/2/0

Physical interface: e3-1/2/0, Enabled, Physical link is Up
  Interface index: 153, SNMP ifIndex: 49
  Link-level type: Frame-Relay, MTU: 4474, Clocking: Internal, Speed: E3,
  Loopback: None, FCS: 16, Framing: G751
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives DTE

```

```

ANSI LMI settings: n391dte 6, n392dte 3, n393dte 4, t391dte 10 seconds
LMI: Input: 0 (never), Output: 4 (00:00:06 ago)
DTE statistics:
  Enquiries sent                : 4
  Full enquiries sent           : 0
  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 timeout    : 1
CoS queues      : 4 supported, 4 in use
Last flapped    : 2005-12-05 08:46:14 PST (02:27:17 ago)
Input rate      : 0 bps (0 pps)
Output rate     : 0 bps (0 pps)
Active alarms   : None
Active defects  : None

Logical interface e3-1/2/0.0 (Index 66) (SNMP ifIndex 57)
  Flags: Device-Down Point-To-Point SNMP-Traps Encapsulation: FR-NLPID
Input packets : 0
Output packets: 0
  Protocol inet, MTU: 4470
  Flags: None
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255
  DLCI 100
    Flags: Down, DCE-Unconfigured
    Total down time: 00:00:06 sec, Last down: 00:00:06 ago
    Input packets : 0
    Output packets: 0
  DLCI statistics:
    Active DLCI :0 Inactive DLCI :1

```

show interfaces detail (E3, Frame Relay)

```
user@host> show interfaces e3-1/2/0 detail
```

```

Physical interface: e3-1/2/0, Enabled, Physical link is Up
Interface index: 153, SNMP ifIndex: 49, Generation: 36
Link-level type: Frame-Relay, MTU: 4474, Clocking: Internal, Speed: E3,
Loopback: None, FCS: 16, Framing: G751
Device flags   : Present Running
Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps Internal: 0x4000
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: 5 (last sent 00:00:07 ago)
DTE statistics:
  Enquiries sent                : 5
  Full enquiries sent           : 0

```

```

    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      : 4 supported, 4 in use
Last flapped    : 2005-12-05 08:46:14 PST (02:27:27 ago)
Statistics last cleared: Never
Traffic statistics:
Input bytes :          0          0 bps
Output bytes :         806          0 bps
Input packets:          0          0 pps
Output packets:         44          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        43          43          0

Active alarms : None
Active defects : None

Logical interface e3-1/2/0.0 (Index 66) (SNMP ifIndex 57) (Generation 15)
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: 4470, Generation: 24, Route table: 0
Flags: None
Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255,
Generation: 38
DLCI 100
Flags: Down, DCE-Unconfigured
Total down time: 00:00:16 sec, Last down: 00:00:16 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 (E3, Frame Relay)

user@host> show interfaces e3-1/2/0 extensive

```

Physical interface: e3-1/2/0, Enabled, Physical link is Up
  Interface index: 153, SNMP ifIndex: 49, Generation: 36
  Link-level type: Frame-Relay, MTU: 4474, Clocking: Internal, Speed: E3,
  Loopback: None, FCS: 16, Framing: G751
  Device flags   : Present Running
  Interface flags: Link-Layer-Down Point-To-Point SNMP-Traps Internal: 0x4000
  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: 6 (last sent 00:00:02 ago)
  DTE statistics:
    Enquiries sent           : 5
    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 timeout : 1
  CoS queues : 4 supported, 4 in use
  Last flapped : 2005-12-05 08:46:14 PST (02:27:30 ago)
  Statistics last cleared: Never
  Traffic statistics:
    Input bytes :          0          0 bps
    Output bytes :        821          56 bps
    Input packets:          0          0 pps
    Output packets:        45          0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 21118, Bucket drops: 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          44         44          0

Active alarms : None
Active defects : None
E3 media:
Seconds      Count  State
PLL Lock      0        0 OK
Reframing    187        1 OK
AIS           0        0 OK
LOF          187        1 OK
LOS          187        1 OK
IDLE          0        0 OK
YELLOW        0        0 OK
BPV           0        0
EXZ           0        0
LCV          188    12303167
LES          188
SEFS         187
UAS          195


DSU configuration:
Compatibility mode: None, Scrambling: Disabled
E3 BERT configuration:
BERT time period: 10 seconds, Elapsed: 0 seconds
Algorithm: 2^15 - 1, 0.151, Pseudorandom (9), Induced Error rate: 10e-0
Packet Forwarding Engine configuration:
Destination slot: 1, PLP byte: 1 (0x00)
CoS information:
CoS transmit queue    Bandwidth    Buffer    Priority    Limit
                        %      bps      %      usec
0 best-effort        95    32649600    95        0      low    none
3 network-control    5     1718400     5        0      low    none

Logical interface e3-1/2/0.0 (Index 66) (SNMP ifIndex 57) (Generation 15)
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: 4470, Generation: 24, Route table: 0
Flags: None
Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
Destination: 198.51.100.0/24, Local: 198.51.100.1, Broadcast:
198.51.100.255,
Generation: 38
DLCI 100
Flags: Down, DCE-Unconfigured
Total down time: 00:00:19 sec, Last down: 00:00:19 ago

```

```
Traffic statistics:
  Input bytes :          0
  Output bytes :         0
  Input packets:         0
  Output packets:        0
DLCI statistics:
  Active DLCI  :0  Inactive DLCI  :1
```


test interface e1-bert-start

Syntax	<code>test interface e1-bert-start <i>interface-name</i></code>
Release Information	Command introduced before Junos OS Release 7.4.
Description	Start a bit error rate test (BERT) on an E1 interface.
Options	<i>interface-name</i> —Interface name: <code>e1-fpc/pic/port</code> or <code>ce1-fpc/pic/port <:channel></code>
Additional Information	Before starting a BERT, you must disable the interface. To do this, include the disable statement at the <code>[edit interfaces <i>interface-name</i>]</code> hierarchy level. You can run a BERT on only one interface per PIC at a time.
	<div>  <p>NOTE: Due to hardware limitations of the framer used in IQ PICs, BERT is not supported in unframed mode on the interface and may return false positive results. BERT in unframed mode is supported on Enhanced IQ (IQE) PICs.</p> </div>
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> • test interface e1-bert-stop on page 208 • test interface t1-bert-start on page 213 • test interface t1-bert-stop on page 214
List of Sample Output	test interface e1-bert-start on page 207
Output Fields	To display the results of the BERT, use the show interfaces extensive command.

Sample Output

test interface e1-bert-start

```
user@host> test interface e1-bert-start e1-1/0/0
```

test interface e1-bert-stop


Syntax	<code>test interface e1-bert-stop <i>interface-name</i></code>
Release Information	Command introduced before Junos OS Release 7.4.
Description	Stop a bit error rate test (BERT) on an E1 interface.
Options	<i>interface-name</i> —Interface name: <i>e1-fpc/pic/port</i> or <i>ce1-fpc/pic/port <:channel></i> .
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none">• test interface e1-bert-start on page 207• test interface t1-bert-start on page 213• test interface t1-bert-stop on page 214
List of Sample Output	test interface e1-bert-stop on page 208
Output Fields	To display the results of the BERT, use the <code>show interfaces extensive</code> command.

Sample Output

test interface e1-bert-stop

```
user@host> test interface e1-bert-stop e1-1/0/0
```

test interface e3-bert-start

Syntax	<code>test interface e3-bert-start e3-<i>fpc/pic/port</i></code>
Release Information	Command introduced before Junos OS Release 7.4.
Description	Start a bit error rate test (BERT) on an E3 interface.
Options	<code>e3-<i>fpc/pic/port</i></code> —E3 interface name.
Additional Information	Before starting a BERT, you must disable the interface. To do so, include the disable statement at the <code>[edit interfaces <i>interface-name</i>]</code> hierarchy level. You can run a BERT on only one interface per PIC at a time.
<div>  <p>NOTE: Due to hardware limitations of the framer used in IQ PICs, BERT is not supported in unframed mode on the interface and may return false positive results. BERT in unframed mode is supported on Enhanced IQ (IQE) PICs.</p> </div>	
Required Privilege Level	view
List of Sample Output	test interface e3-bert-start on page 209
Output Fields	To display the results of the BERT, use the <code>show interfaces extensive</code> command.

Sample Output

test interface e3-bert-start

```
user@host> test interface e3-bert-start e3-1/0/0
```

test interface e3-bert-stop

Syntax	<code>test interface e3-bert-stop e3-<i>fpc/pic/port</i></code>
Release Information	Command introduced before Junos OS Release 7.4.
Description	Stop a bit error rate test (BERT) on an E3 interface.
Options	<code>e3-<i>fpc/pic/port</i></code> —E3 interface name.
Required Privilege Level	view
List of Sample Output	test interface e3-bert-stop on page 210
Output Fields	To display the results of the BERT, use the <code>show interfaces extensive</code> command.

Sample Output

test interface e3-bert-stop

```
user@host> test interface e3-bert-stop e3-1/0/0
```

test interface ds0-bert-start

Syntax	<code>test interface ds0-bert-start ds-<i>fpc/pic/port</i></code>
Release Information	Command introduced before Junos OS Release 7.4.
Description	Start a bit error rate test (BERT) on a DS0 interface.
Options	ds-<i>fpc/pic/port</i> —DS0 interface name.
Additional Information	Before starting a BERT, you must disable the interface. To do so, include the disable statement at the <code>[edit interfaces <i>interface-name</i>]</code> hierarchy level. You can run a BERT on only one interface per PIC at a time.
Required Privilege Level	view
List of Sample Output	test interface ds0-bert-start on page 211
Output Fields	To display the results of the BERT, use the show interfaces extensive command.

Sample Output

test interface ds0-bert-start

```
user@host> test interface ds0-bert-start ds-1/0/0
```

test interface ds0-bert-stop


Syntax	<code>test interface ds0-bert-stop ds-<i>fpc/pic/port</i></code>
Release Information	Command introduced before Junos OS Release 7.4.
Description	Stop a bit error rate test (BERT) on a DS0 interface.
Options	<code>ds-<i>fpc/pic/port</i></code> —DS0 interface name.
Required Privilege Level	view
List of Sample Output	test interface ds0-bert-stop on page 212
Output Fields	To display the results of the BERT, use the <code>show interfaces extensive</code> command.

Sample Output

test interface ds0-bert-stop

```
user@host> test interface ds0-bert-stop ds-1/0/0
```

test interface t1-bert-start

Syntax	<code>test interface t1-bert-start <i>interface-name</i></code>
Release Information	Command introduced before Junos OS Release 7.4.
Description	Start a bit error rate test (BERT) on a T1 interface.
Options	<i>interface-name</i> —Interface name: <code>t1-fpc/pic/port</code> or <code>ct1-fpc/pic/port <:channel></code> .
Additional Information	Before starting a BERT, you must disable the interface. To do so, include the disable statement at the <code>[edit interfaces <i>interface-name</i>]</code> hierarchy level. You can run a BERT on only one interface per PIC at a time.
	<div>  <p>NOTE: Due to hardware limitations of the framer used in IQ PICs, BERT is not supported in unframed mode on the interface and may return false positive results. BERT in unframed mode is supported on Enhanced IQ (IQE) PICs.</p> </div>
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> • test interface t1-bert-stop on page 214 • test interface e1-bert-start on page 207 • test interface e1-bert-stop on page 208
List of Sample Output	test interface t1-bert-start on page 213
Output Fields	To display the results of the BERT, use the show interfaces extensive command.

Sample Output

test interface t1-bert-start

```
user@host> test interface t1-bert-start t1-1/0/0
```

test interface t1-bert-stop


Syntax	<code>test interface t1-bert-stop <i>interface-name</i></code>
Release Information	Command introduced before Junos OS Release 7.4.
Description	Stop a bit error rate test (BERT) on a T1 interface.
Options	<i>interface-name</i> —Interface name: <i>t1-interface-name fpc/pic/port</i> or <i>ct1-fpc/pic/port</i> <:channel>
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none">• test interface t1-bert-start on page 213• test interface e1-bert-start on page 207• test interface e1-bert-stop on page 208
List of Sample Output	test interface t1-bert-stop on page 214
Output Fields	To display the results of the BERT, use the <code>show interfaces extensive</code> command.

Sample Output

test interface t1-bert-stop

```
user@host> test interface t1-bert-stop t1-1/0/0
```


test interface t3-bert-start

Syntax	<code>test interface t3-bert-start <i>interface-name</i></code>
Release Information	Command introduced before Junos OS Release 7.4.
Description	Start a bit error rate test (BERT) on a T3 interface.
Options	<i>interface-name</i> —Interface name: <code>t3-fpc/pic/port</code> or <code>ct3-fpc/pic/port <:channel></code> .
Additional Information	Before starting a BERT, you must disable the interface. To do this, include the disable statement at the <code>[edit interfaces <i>interface-name</i>]</code> hierarchy level. You can run a BERT on only one interface per PIC at a time.
	<div>  <p>NOTE: Due to hardware limitations of the framer used in IQ PICs, BERT is not supported in unframed mode on the interface and may return false positive results. BERT in unframed mode is supported on Enhanced IQ (IQE) PICs.</p> </div>
Required Privilege Level	view
List of Sample Output	test interface t3-bert-start on page 215
Output Fields	To display the results of the BERT, use the <code>show interfaces extensive</code> command.

Sample Output

test interface t3-bert-start

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

test interface t3-bert-stop

Syntax	<code>test interface t3-bert-stop <i>interface-name</i></code>
Release Information	Command introduced before Junos OS Release 7.4.
Description	Stop a bit error rate test (BERT) on a T3 interface.
Options	<i>interface-name</i> —Interface name: <i>t3-fpc/pic/port</i> or <i>ct3-fpc/pic/port <:channel></i> .
Required Privilege Level	view
List of Sample Output	test interface t3-bert-stop on page 216
Output Fields	To display the results of the BERT, use the <code>show interfaces extensive</code> command.

Sample Output

test interface t3-bert-stop

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