



Junos[®] OS

T3 Interfaces Feature Guide for Routing Devices



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

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Junos® OS T3 Interfaces Feature Guide for Routing Devices

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Table of Contents

	About the Documentation	xi
	Documentation and Release Notes	xi
	Supported Platforms	xi
	Using the Examples in This Manual	xi
	Merging a Full Example	xii
	Merging a Snippet	xii
	Documentation Conventions	xiii
	Documentation Feedback	xv
	Requesting Technical Support	xv
	Self-Help Online Tools and Resources	xv
	Opening a Case with JTAC	xvi
Part 1	Overview	
Chapter 1	T3 Interfaces	3
	T3 Interfaces Overview	3
Part 2	Configuration	
Chapter 2	T3 Interfaces	7
	Configuring T3 Physical Interface Properties	7
	Configuring T3 BERT Properties	8
	Disabling T3 C-Bit Parity Mode	9
	Configuring the T3 CSU Compatibility Mode	10
	Configuring the T3 Frame Checksum	12
	Configuring the T3 FEAC Response	13
	Configuring the T3 Idle Cycle Flag	13
	Configuring the T3 Line Buildout	14
	Configuring T3 Loopback Capability	14
	Configuring T3 HDLC Payload Scrambling	16
	Configuring T3 Start and End Flags	17
	Examples: Configuring T3 Interfaces	17
Chapter 3	Network Interfaces Configuration Statements and Hierarchy	21
	[edit interfaces] Hierarchy Level	21
	[edit logical-systems] Hierarchy Level	37
Chapter 4	Statement Summary	43
	bert-algorithm	44
	bert-error-rate	46
	bert-period	48
	cbit-parity	49

	compatibility-mode	50
	e3-options	51
	fast-aps-switch	52
	fcs	53
	feac-loop-respond	54
	idle-cycle-flag	55
	long-buildout	56
	loopback (ADSL, DS0, E1/E3, SONET/SDH, SHDSL, and T1/T3)	57
	payload-scrambler	59
	start-end-flag	60
	t3-options	61
Part 3	Administration	
Chapter 5	Monitoring Commands	65
	show interfaces (T3 or E3)	66
Chapter 6	Command Summary	83
Part 4	Troubleshooting	
Chapter 7	Interface Diagnostics	87
	Interface Diagnostics	87
	Configuring Loopback Testing	87
	Interface Diagnostics	89
	Starting and Stopping a BERT Test	93
	Example: Configuring Bit Error Rate Testing	93
	Interface Diagnostics Operational Mode Commands	94
	Diagnose a Suspected Hardware Problem with a T3 Interface	95
	Create a Loopback	95
	Create a Physical Loopback	95
	Configure a Local Loopback	96
	Set Clocking to Internal	96
	Verify That the T3 Interface Is Up	97
	Clear T3 Interface Statistics	98
	Force the Link Layer To Stay Up	99
	Configure Encapsulation to Cisco-HDLC	99
	Configure No-Keepalives	100
	Verify the Status of the Logical Interface	100
	Ping the T3 Interface	102
	Check for T3 Interface Error Statistics	103
	Diagnose a Suspected Circuit Problem	105
	Create a Loop from the Router to the Network	105
	Create a Loop to the Router from Various Points in the Network	106
Chapter 8	Investigate T3 Interfaces	107
	Investigating Interface Steps and Commands	107
	Investigating Interface Steps and Commands Overview	107
	Monitoring Interfaces	107
	Performing a Loopback Test on an Interface	108

Locating Interface Alarms	110
Monitor T3 Interfaces	110
Checklist for Monitoring T3 Interfaces	110
Monitor T3 Interfaces	111
Display the Status of T3 Interfaces	111
Display the Status of a Specific T3 Interface	112
Display Extensive Status Information for a Specific T3 Interface	113
Monitor Statistics for a T3 Interface	114
Use Loopback Testing for T3 Interfaces	115
Checklist for Using Loopback Testing for T3 Interfaces	115
Locate T3 Alarms and Errors	117
Checklist of Common T3 Alarms and Errors	117
Display T3 Alarms and Errors	117
Locate Most Common T3 Alarms and Errors	119
Locate Loss of Signal and Loss of Frame Alarms	119
Locate Alarm Indication Signal Alarms	120
Locate an Incoming Yellow Alarm	121
Locate IDLE on a T3 Interface	121

Part 5

Index

Index	125
-------------	-----

List of Figures

Part 2	Configuration	
Chapter 2	T3 Interfaces	7
	Figure 1: Remote and Local T3 Loopback	15
Part 4	Troubleshooting	
Chapter 8	Investigate T3 Interfaces	107
	Figure 2: Location of an LOS or LOF Alarm in a T3 Network	120
	Figure 3: Location of an AIS Alarm in a T3 Network	120
	Figure 4: Location of a Yellow Alarm in a T3 Network	121

List of Tables

	About the Documentation	xi
	Table 1: Notice Icons	xiii
	Table 2: Text and Syntax Conventions	xiii
Part 2	Configuration	
Chapter 2	T3 Interfaces	7
	Table 3: Subrate Values for T3 Digital Link Compatibility Mode	11
Part 3	Administration	
Chapter 5	Monitoring Commands	65
	Table 4: T3 or E3 show interfaces Output Fields	66
Part 4	Troubleshooting	
Chapter 7	Interface Diagnostics	87
	Table 5: Loopback Modes by Interface Type	88
	Table 6: BERT Capabilities by Interface Type	92
	Table 7: Interface Diagnostics Operational Mode Commands	94
Chapter 8	Investigate T3 Interfaces	107
	Table 8: Commands Used to Monitor Interfaces	108
	Table 9: Commands Used to Perform Loopback Testing on Interfaces	109
	Table 10: Checklist for Monitoring T3 Interfaces	111
	Table 11: Status of T3 Interfaces	112
	Table 12: Problem Situations and Actions	115
	Table 13: Checklist for Using Loopback Testing for T3 Interfaces	115
	Table 14: Checklist of Common T3 Alarms and Errors	117
	Table 15: T3 Interface Error Counter Definitions	119

About the Documentation

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

Documentation and Release Notes

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Supported Platforms

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

- M Series
- MX Series
- T Series
- J Series

Using the Examples in This Manual

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

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

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

Merging a Full Example

To merge a full example, follow these steps:

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

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

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

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

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

Merging a Snippet

To merge a snippet, follow these steps:

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

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

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

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

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

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

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

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

Documentation Conventions

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

Table 1: Notice Icons

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

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

Table 2: Text and Syntax Conventions

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

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

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

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

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

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

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

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

Opening a Case with JTAC

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

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

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

PART 1

Overview

- [T3 Interfaces on page 3](#)

CHAPTER 1

T3 Interfaces

- [T3 Interfaces Overview on page 3](#)

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*

PART 2

Configuration

- [T3 Interfaces on page 7](#)
- [Network Interfaces Configuration Statements and Hierarchy on page 21](#)
- [Statement Summary on page 43](#)

CHAPTER 2

T3 Interfaces

- [Configuring T3 Physical Interface Properties on page 7](#)
- [Configuring T3 BERT Properties on page 8](#)
- [Disabling T3 C-Bit Parity Mode on page 9](#)
- [Configuring the T3 CSU Compatibility Mode on page 10](#)
- [Configuring the T3 Frame Checksum on page 12](#)
- [Configuring the T3 FEAC Response on page 13](#)
- [Configuring the T3 Idle Cycle Flag on page 13](#)
- [Configuring the T3 Line Buildout on page 14](#)
- [Configuring T3 Loopback Capability on page 14](#)
- [Configuring T3 HDLC Payload Scrambling on page 16](#)
- [Configuring T3 Start and End Flags on page 17](#)
- [Examples: Configuring T3 Interfaces on page 17](#)

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 3](#)

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 [“Interface Diagnostics” on page 89](#).

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
...
```




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

For specific hierarchy information, see individual interface types. For information about running the BERT procedure, see the *Junos OS Operational Mode Commands*.

Related Documentation

- [bert-algorithm on page 44](#)
- [bert-error-rate on page 46](#)
- [bert-period on page 48](#)
- [t3-options on page 61](#)
- [Interface Diagnostics on page 89](#)

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 FEBC, 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 49](#)

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 3 on page 11](#).
- 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.

Table 3: 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
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

Table 3: Subrate Values for T3 Digital Link Compatibility Mode (*continued*)

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*.

Related Documentation

- *Configuring the E3 CSU Compatibility Mode*

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 53](#)

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 54](#)

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 55](#)

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;
```

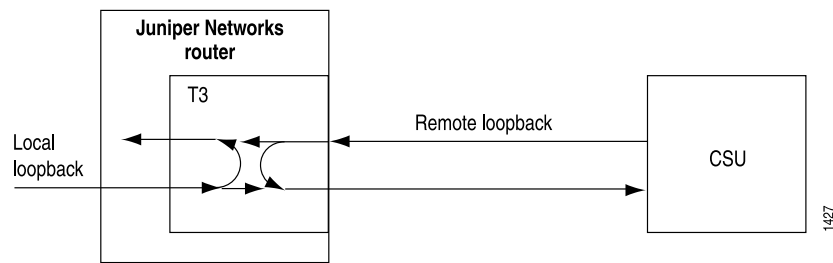
Related Documentation

- [long-buildout on page 56](#)

Configuring T3 Loopback Capability

You can configure loopback capability between the local T3 interface and the remote CSU, as shown in [Figure 1 on page 15](#). 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 1: 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 [“Interface Diagnostics” on page 89](#). For more information about using operational mode commands to test interfaces, see the *Junos OS Operational Mode Commands*.

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 57](#)

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 10](#).


```
[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 59](#)

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 60](#)

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*

CHAPTER 3

Network Interfaces Configuration Statements and Hierarchy

- [\[edit interfaces\] Hierarchy Level on page 21](#)
- [\[edit logical-systems\] Hierarchy Level on page 37](#)

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

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



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

```
interfaces {
  traceoptions {
    file filename <files number> <match regular-expression> <size size> <world-readable |
      no-world-readable> ;
    flag flag <disable>;
  }
  interface-name {
    account-layer2-overhead (Interface Level) {
      value;
      egress bytes;
      ingress bytes;
    }
    accounting-profile name;
    aggregated-ether-options {
      (flow-control | no-flow-control);
      lacp {
        (active | passive);
        link-protection {
          disable;
          (revertive | non-revertive);
        }
      }
    }
  }
}
```

```

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

```

```

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

```

```

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

```

25

```

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

```

```

mlfr-uni-nni-bundle-options {
    acknowledge-retries number;
    acknowledge-timer milliseconds;
    action-red-differential-delay (disable-tx | remove-link);
    drop-timeout milliseconds;
    fragment-threshold bytes;
    cisco-interoperability send-lip-remove-link-for-link-reject;
    hello-timer milliseconds;
    link-layer-overhead percent;
    lmi-type (ansi | itu | c-lmi);
    minimum-links number;
    mrru bytes;
    n391 number;
    n392 number;
    n393 number;
    red-differential-delay milliseconds;
    t391 seconds;
    t392 seconds;
    yellow-differential-delay milliseconds;
}
modem-options {
    dialin (console | routable);
    init-command-string initialization-command-string;
}
mtu bytes;
multi-chassis-protection {
    peer a.b.c.d {
        interface interface-name;
    }
}
multiservice-options {
    (core-dump | no-core-dump);
    (syslog | no-syslog);
}
native-vlan-id number;
no-gratuitous-arp-request;
no-keepalives;
no-partition {
    interface-type type;
}
no-vpivci-swapping;
optics-options {
    alarm low-light-alarm {
        (link-down | syslog);
    }
    tx-power dbm;
    warning low-light-warning {
        (link-down | syslog);
    }
    wavelength nm;
}
otn-options {
    bytes transmit-payload-type value;
    fec (efec | gfec | gfec-sdfec | none);
    (is-ma | no-is-ma);
    (laser-enable | no-laser-enable);
}

```

```

(line-loopback | no-line-loopback);
(local-loopback | no-local-loopback);
(odu-ttim-action-enable | no-odu-ttim-action-enable);
(otu-ttim-action-enable | no-otu-ttim-action-enable);
odu-delay-management {
    (bypass | no-bypass);
    (monitor-end-point | no-monitor-end-point);
    (number-of-frames | no-number-of-frames);
    (start-measurement | no-start-measurement);
}
(prbs | no-prbs);
preemptive-fast-reroute {
    (backward-frr-enable | no-backward-frr-enable);
    (signal-degrade-monitor-enable | no-signal-degrade-monitor-enable);
}
rate {
    (fixed-stuff-bytes | no-fixed-stuff-bytes);
    otu4;
    (pass-through | no-pass-through);
}
signal-degrade {
    ber-threshold-clear value;
    ber-threshold-signal-degrade value;
    interval value;
}
trigger trigger-identifier;
tti tti-identifier;
}
partition partition-number oc-slice oc-slice-range interface-type type;
timeslots time-slot-range;
passive-monitor-mode;
per-unit-scheduler;
ppp-options {
    chap {
        access-profile name;
        default-chap-secret name;
        local-name name;
        passive;
    }
    compression {
        acfc;
        pfc;
    }
    dynamic-profile profile-name;
    no-termination-request;
    pap {
        access-profile name;
        local-name name;
        local-password password;
        compression;
    }
}
psn-vcip psn-vci-identifier;
psn-vpip psn-vpi-identifier;
receive-bucket {
    overflow (discard | tag);
}

```

```

    rate percentage;
    threshold bytes;
}
redundancy-options {
    priority sp-fpc/pic/port;
    secondary sp-fpc/pic/port;
    hot-standby;
}
satop-options {
    payload-size n;
}
schedulers number;
serial-options {
    clock-rate rate;
    clocking-mode (dce | internal | loop);
    control-polarity (negative | positive);
    cts-polarity (negative | positive);
    dcd-polarity (negative | positive);
    dce-options {
        control-signal (assert | de-assert | normal);
        cts (ignore | normal | require);
        dcd (ignore | normal | require);
        dsr (ignore | normal | require);
        dtr signal-handling-option;
        ignore-all;
        indication (ignore | normal | require);
        rts (assert | de-assert | normal);
        tm (ignore | normal | require);
    }
    dsr-polarity (negative | positive);
    dte-options {
        control-signal (assert | de-assert | normal);
        cts (ignore | normal | require);
        dcd (ignore | normal | require);
        dsr (ignore | normal | require);
        dtr signal-handling-option;
        ignore-all;
        indication (ignore | normal | require);
        rts (assert | de-assert | normal);
        tm (ignore | normal | require);
    }
    dtr-circuit (balanced | unbalanced);
    dtr-polarity (negative | positive);
    encoding (nrz | nrzi);
    indication-polarity (negative | positive);
    line-protocol protocol;
    loopback mode;
    rts-polarity (negative | positive);
    tm-polarity (negative | positive);
    transmit-clock invert;
}
services-options {
    inactivity-timeout seconds;
    open-timeout seconds;
    session-limit {
        maximum number;
    }
}

```

```

    rate new-sessions-per-second;
  }
  syslog {
    host hostname {
      facility-override facility-name;
      log-prefix prefix-number;
      services priority-level;
    }
  }
}
shdsl-options {
  annex (annex-a | annex-b);
  line-rate line-rate;
  loopback (local | remote);
  snr-margin {
    current margin;
    snext margin;
  }
}
sonet-options {
  aggregate asx;
  aps {
    advertise-interval milliseconds;
    annex-b;
    authentication-key key;
    fast-aps-switch;
    force;
    hold-time milliseconds;
    lockout;
    neighbor address;
    paired-group group-name;
    preserve-interface;
    protect-circuit group-name;
    request;
    revert-time seconds;
    switching-mode (bidirectional | unidirectional);
    working-circuit group-name;
  }
  bytes {
    c2 value;
    e1-quiet value;
    f1 value;
    f2 value;
    s1 value;
    z3 value;
    z4 value;
  }
  fcs (16 | 32);
  loopback (local | remote);
  mpls {
    pop-all-labels {
      required-depth number;
    }
  }
  path-trace trace-string;
  (payload-scrambler | no-payload-scrambler);

```

```

rfc-2615;
trigger {
    defect ignore;
    hold-time up milliseconds down milliseconds;
}
vtmapping (itu-t | klm);
(z0-increment | no-z0-increment);
}
speed (10m | 100m | 1g | oc3 | oc12 | oc48);
stacked-vlan-tagging;
switch-options {
    switch-port port-number {
        (auto-negotiation | no-auto-negotiation);
        speed (10m | 100m | 1g);
        link-mode (full-duplex | half-duplex);
    }
}
t1-options {
    bert-algorithm algorithm;
    bert-error-rate rate;
    bert-period seconds;
    buildout value;
    byte-encoding (nx56 | nx64);
    crc-major-alarm-threshold (1e-3 | 5e-4 | 1e-4 | 5e-5 | 1e-5);
    crc-minor-alarm-threshold (1e-3 | 5e-4 | 1e-4 | 5e-5 | 1e-5 | 5e-6 | 1e-6);
    fcs (16 | 32);
    framing (esf | sf);
    idle-cycle-flag (flags | ones);
    invert-data;
    line-encoding (ami | b8zs);
    loopback (local | payload | remote);
    remote-loopback-respond;
    start-end-flag (filler | shared);
    timeslots time-slot-range;
}
t3-options {
    atm-encapsulation (direct | plcp);
    bert-algorithm algorithm;
    bert-error-rate rate;
    bert-period seconds;
    buildout feet;
    (cbit-parity | no-cbit-parity);
    compatibility-mode (adtran | digital-link | kentrox | larscom | verilink) <subrate
        value>;
    fcs (16 | 32);
    (feac-loop-respond | no-feac-loop-respond);
    idle-cycle-flag value;
    (long-buildout | no-long-buildout);
    (loop-timing | no-loop-timing);
    loopback (local | payload | remote);
    (mac | no-mac);
    (payload-scrambler | no-payload-scrambler);
    start-end-flag (filler | shared);
}
traceoptions {
    flag flag <flag-modifier> <disable>;
}

```

```
}
transmit-bucket {
    overflow discard;
    rate percentage;
    threshold bytes;
}
(traps | no-traps);
unidirectional;
vlan-tagging;
vlan-vci-tagging;
unit logical-unit-number {
    accept-source-mac {
        mac-address mac-address {
            policer {
                input cos-policer-name;
                output cos-policer-name;
            }
        }
    }
}
account-layer2-overhead {
    value;
    egress bytes;
    ingress bytes;
}
accounting-profile name;
advisory-options {
    downstream-rate rate;
    upstream-rate rate;
}
allow-any-vci;
atm-scheduler-map (map-name | default);
backup-options {
    interface interface-name;
}
bandwidth rate;
cell-bundle-size cells;
clear-dont-fragment-bit;
compression {
    rtp {
        f-max-period number;
        maximum-contexts number <force>;
        queues [ queue-numbers ];
        port {
            minimum port-number;
            maximum port-number;
        }
    }
}
compression-device interface-name;
copy-tos-to-outer-ip-header;
demux-destination family;
demux-source family;
demux-options {
    underlying-interface interface-name;
}
description text;
```



```

interface {
    l2tp-interface-id name;
    (dedicated | shared);
}
dialer-options {
    activation-delay seconds;
    callback;
    callback-wait-period time;
    deactivation-delay seconds;
    dial-string [ dial-string-numbers ];
    idle-timeout seconds;
    incoming-map {
        caller (caller-id | accept-all);
        initial-route-check seconds;
        load-interval seconds;
        load-threshold percent;
        pool pool-name;
        redial-delay time;
        watch-list {
            [ routes ];
        }
    }
}
disable;
disable-mlppp-inner-ppp-pfc;
dlci dlci-identifier;
drop-timeout milliseconds;
dynamic-call-admission-control {
    activation-priority priority;
    bearer-bandwidth-limit kilobits-per-second;
}
encapsulation type;
epd-threshold cells plp1 cells;
fragment-threshold bytes;
inner-vlan-id-range start start-id end end-id;
input-vlan-map {
    (pop | pop-pop | pop-swap | push | push-push | swap | swap-push | swap-swap);
    inner-tag-protocol-id tpid;
    inner-vlan-id number;
    tag-protocol-id tpid;
    vlan-id number;
}
interleave-fragments;
inverse-arp;
layer2-policer {
    input-policer policer-name;
    input-three-color policer-name;
    output-policer policer-name;
    output-three-color policer-name;
}
link-layer-overhead percent;
minimum-links number;
mrru bytes;
multicast-dlci dlci-identifier;
multicast-vci vpi-identifier.vci-identifier;
multilink-max-classes number;

```

```

multipoint;
oam-liveness {
    down-count cells;
    up-count cells;
}
oam-period (seconds | disable);
output-vlan-map {
    (pop | pop-pop | pop-swap | push | push-push | swap | swap-push | swap-swap);
    inner-tag-protocol-id tpid;
    inner-vlan-id number;
    tag-protocol-id tpid;
    vlan-id number;
}
passive-monitor-mode;
peer-unit unit-number;
plp-to-clp;
point-to-point;
ppp-options {
    chap {
        access-profile name;
        default-chap-secret name;
        local-name name;
        passive;
    }
    compression {
        acfc;
        pfc;
        pap;
        default-pap-password password;
        local-name name;
        local-password password;
        passive;
    }
    dynamic-profile profile-name;
    lcp-max-conf-req number;
    lcp-restart-timer milliseconds;
    loopback-clear-timer seconds;
    ncp-max-conf-req number;
    ncp-restart-timer milliseconds;
}
pppoe-options {
    access-concentrator name;
    auto-reconnect seconds;
    (client | server);
    service-name name;
    underlying-interface interface-name;
}
proxy-arp;
service-domain (inside | outside);
shaping {
    (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate
    burst length);
    queue-length number;
}
short-sequence;
transmit-weight number;

```

```

(traps | no-traps);
trunk-bandwidth rate;
trunk-id number;
tunnel {
    backup-destination address;
    destination address;
    key number;
    routing-instance {
        destination routing-instance-name;
    }
    source source-address;
    ttl number;
}
vci vpi-identifier.vci-identifier;
vci-range start start-vci end end-vci;
vpi vpi-identifier;
vlan-id number;
vlan-id-list [vlan-id vlan-id-vlan-id];
vlan-id-range number-number;
vlan-tags inner tpid.vlan-id outer tpid.vlan-id;
vlan-tags-outer tpid.vlan-id inner-list [vlan-id vlan-id-vlan-id];
family family {
    accounting {
        destination-class-usage;
        source-class-usage {
            direction;
        }
    }
}
access-concentrator name;
address address {
    destination address;
}
bundle ml-fpc/pic/port | ls-fpc/pic/port);
duplicate-protection;
dynamic-profile profile-name;
filter {
    group filter-group-number;
    input filter-name;
    input-list {
        [filter-names ];
        output filter-name;
    }
    output-list {
        [filter-names ];
    }
}
}
ipsec-sa sa-name;
keep-address-and-control;
max-sessions number;
max-sessions-vs-a-ignore;
mtu bytes;
multicast-only;
negotiate-address;
no-redirects;
policer {
    arp policer-template-name;

```

```

    input policer-template-name;
    output policer-template-name;
}
primary;
proxy inet-address address;
receive-options-packets;
receive-ttl-exceeded;
remote (inet-address address | mac-address address);
rpf-check {
    fail-filter filter-name;
    mode loose;
}
sampling {
    direction;
}
service {
    input {
        service-set service-set-name <service-filter filter-name>;
        post-service-filter filter-name;
    }
    output {
        service-set service-set-names <service-filter filter-name>;
    }
}
service-name-table table-name;
short-cycle-protection <lockout-time-min minimum-seconds lockout-time-max
    maximum-seconds>;
targeted-broadcast {
    forward-and-send-to-re;
    forward-only;
}
(translate-discard-eligible | no-translate-discard-eligible);
(translate-fecn-and-becn | no-translate-fecn-and-becn);
translate-plp-control-word-de;
unnumbered-address interface-name <destination address destination-profile
    profile-name | preferred-source-address address>;
address address {
    arp ip-address (mac | multicast-mac) mac-address <publish>;
    broadcast address;
    destination address;
    destination-profile name;
    eui-64;
    multipoint-destination address (dlci dlci-identifier | vci vci-identifier);
    multipoint-destination address {
        epd-threshold cells plp1 cells;
        inverse-arp;
        oam-liveness {
            up-count cells;
            down-count cells;
        }
        oam-period (seconds | disable);
        shaping {
            (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained
                rate burst length);
            queue-length number;
        }
    }
}

```

```

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

```

- Related Documentation**
- [Junos OS Hierarchy and RFC Reference](#)
 - [Ethernet Interfaces](#)
 - [Junos OS Network Interfaces Library for Routing Devices](#)

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

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

```

logical-systems logical-system-name {
    interfaces interface-name {
        unit logical-unit-number {
            accept-source-mac {
                mac-address mac-address {
                    policer {
                        input cos-policer-name;
                        output cos-policer-name;
                    }
                }
            }
        }
    }
}

```

```
allow-any-vci;
atm-scheduler-map (map-name | default);
bandwidth rate;
backup-options {
    interface interface-name;
}
cell-bundle-size cells;
clear-dont-fragment-bit;
compression {
    rtp {
        f-max-period number;
        port {
            minimum port-number;
            maximum port-number;
        }
        queues [ queue-numbers ];
    }
}
compression-device interface-name;
description text;
interface {
    l2tp-interface-id name;
    (dedicated | shared);
}
dialer-options {
    activation-delay seconds;
    deactivation-delay seconds;
    dial-string [ dial-string-numbers ];
    idle-timeout seconds;
    initial-route-check seconds;
    load-threshold number;
    pool pool;
    remote-name remote-callers;
    watch-list {
        [ routes ];
    }
}
disable;
dlci dlci-identifier;
drop-timeout milliseconds;
dynamic-call-admission-control {
    activation-priority priority;
    bearer-bandwidth-limit kilobits-per-second;
}
encapsulation type;
epd-threshold cells plp1 cells;
fragment-threshold bytes;
input-vlan-map {
    inner-tag-protocol-id;
    inner-vlan-id;
    (pop | pop-pop | pop-swap | push | push-push | swap | swap-push | swap-swap);
    tag-protocol-id tpid;
    vlan-id number;
}
interleave-fragments;
inverse-arp;
```

```

layer2-policer {
    input-policer policer-name;
    input-three-color policer-name;
    output-policer policer-name;
    output-three-color policer-name;
}
link-layer-overhead percent;
minimum-links number;
mrru bytes;
multicast-dlci dlci-identifier;
multicast-vci vpi-identifier.vci-identifier;
multilink-max-classes number;
multipoint;
oam-liveness {
    up-count cells;
    down-count cells;
}
oam-period (seconds | disable);
output-vlan-map {
    inner-tag-protocol-id;
    inner-vlan-id;
    (pop | pop-pop | pop-swap | push | push-push | swap | swap-swap);
    tag-protocol-id tpid;
    vlan-id number;
}
passive-monitor-mode;
peer-unit unit-number;
plp-to-clp;
point-to-point;
ppp-options {
    chap {
        access-profile name;
        default-chap-secret name;
        local-name name;
        passive;
    }
    compression {
        acfc;
        pfc;
    }
}
dynamic-profile profile-name;
pap {
    default-pap-password password;
    local-name name;
    local-password password;
    passive;
}
}
proxy-arp;
service-domain (inside | outside);
shaping {
    (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate
    burst length);
    queue-length number;
}

```

```
short-sequence;
transmit-weight number;
(traps | no-traps);
trunk-bandwidth rate;
trunk-id number;
tunnel {
    backup-destination address;
    destination address;
    key number;
    routing-instance {
        destination routing-instance-name;
    }
    source source-address;
    ttl number;
}
vci vpi-identifier.vci-identifier;
vlan-id number;
vlan-id-list [vlan-id vlan-id–vlan-id]
vlan-tags inner tpid.vlan-id outer tpid.vlan-id;
vlan-tags outer tpid.vlan-id inner-list [vlan-id vlan-id–vlan-id]
vpi vpi-identifier;
family family {
    accounting {
        destination-class-usage;
        source-class-usage {
            direction;
        }
    }
}
bundle interface-name;
filter {
    group filter-group-number;
    input filter-name;
    input-list {
        [filter-names ];
    }
    output filter-name;
    output-list {
        [filter-names ];
    }
}
ipsec-sa sa-name;
keep-address-and-control;
mtu bytes;
multicast-only;
no-redirects;
policer {
    arp policer-template-name;
    input policer-template-name;
    output policer-template-name;
}
primary;
proxy inet-address address;
receive-options-packets;
receive-ttl-exceeded;
remote (inet-address address | mac-address address);
rpf-check <fail-filter filter-name> {
```



```

    <mode loose>;
}
sampling {
    direction;
}
service {
    input {
        service-set service-set-name <service-filter filter-name>;
        post-service-filter filter-name;
    }
    output {
        service-set service-set-name <service-filter filter-name>;
    }
}
(translate-discard-eligible | no-translate-discard-eligible);
(translate-fecn-and-becn | no-translate-fecn-and-becn);
unnumbered-address interface-name destination address destination-profile
    profile-name;
address address {
    arp ip-address (mac | multicast-mac) mac-address <publish>;
    broadcast address;
    destination address;
    destination-profile name;
    eui-64;
    multipoint-destination address (dlci dlci-identifier | vci vci-identifier);
    multipoint-destination address {
        epd-threshold cells plp1 cells;
        inverse-arp;
        oam-liveness {
            up-count cells;
            down-count cells;
        }
        oam-period (seconds | disable);
        shaping {
            (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained
                rate burst length);
            queue-length number;
        }
        vci vpi-identifier.vci-identifier;
    }
    preferred;
    primary;
    (vrrp-group | vrrp-inet6-group) group-number {
        (accept-data | no-accept-data);
        advertise-interval seconds;
        authentication-type authentication;
        authentication-key key;
        fast-interval milliseconds;
        (preempt | no-preempt) {
            hold-time seconds;
        }
        priority-number number;
        track {
            priority-cost seconds;
            priority-hold-time interface-name {
                interface priority;
            }
        }
    }
}

```

```
        bandwidth-threshold bits-per-second {  
            priority;  
        }  
    }  
    route ip-address/mask routing-instance instance-name priority-cost cost;  
    }  
    virtual-address [ addresses ];  
    }  
    }  
    }  
}
```

**Related
Documentation**

- *Junos OS Hierarchy and RFC Reference*
- *Ethernet Interfaces*
- *Junos OS Network Interfaces Library for Routing Devices*

CHAPTER 4

Statement Summary

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



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

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

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

Default: pseudo-2e3

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

Related Documentation

- [Interface Diagnostics on page 89](#)
- *Configuring E1 BERT Properties*
- *Configuring E3 BERT Properties*
- *Configuring T1 BERT Properties*
- [Configuring T3 BERT Properties on page 8](#)
- [Examples: Configuring T3 Interfaces on page 17](#)
- [bert-error-rate on page 46](#)
- [bert-period on page 48](#)

bert-error-rate

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




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

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

Options	<p>rate—Bit error rate.</p> <p>Range: 0 through 7, which corresponds to 10^{-1} (1 error per bit) to 10^{-7} (1 error per 10 million bits)</p> <p>Default: 0</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • bert-algorithm on page 44 • bert-period on page 48 • <code>ds0-options</code> • <code>e1-options</code> • e3-options on page 51 • <code>t1-options</code> • t3-options on page 61

- [Interface Diagnostics on page 89](#)
- *Configuring E1 BERT Properties*
- *Configuring E3 BERT Properties*
- *Configuring T1 BERT Properties*
- [Configuring T3 BERT Properties on page 8](#)
- [Examples: Configuring T3 Interfaces on page 17](#)

bert-period



Syntax	<code>bert-period <i>seconds</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 Access Routers.</p>
Description	<p>Configure the duration of a BERT test. Applies to E1, E3, T1, and T3 interfaces, and to E1, E3, T1, and T3 partitions on the channelized interfaces (CE1, CT1, DS3, OC3, OC12, OC48, STM1, STM4, and STM16).</p> <p>E1 and T1 IQ, IQE, and standard interfaces support an extended BERT period range, up to 86,400 seconds (24 hours).</p> <div style="margin-top: 20px;">  <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 <i>ce1-fpc/pic/port</i>]</code> or <code>[edit interfaces <i>ct1-fpc/pic/port</i>]</code> hierarchy level as appropriate.</p> </div>
Options	<p><i>seconds</i>—Test duration. Range and default values vary by interface type.</p> <p>Range:</p> <ul style="list-style-type: none"> PIC-dependent—Normal BERT period: either 1 through 239 seconds or 1 through 240 seconds PIC-dependent—Extended BERT period: from 1 through 86,400 seconds <p>Default:</p> <ul style="list-style-type: none"> Normal BERT period: 10 seconds Extended BERT period (on supported E1 interfaces): 10 seconds Extended BERT period (on supported T1 interfaces): 240 seconds
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Interface Diagnostics on page 89 Configuring E1 BERT Properties

- [Configuring E3 BERT Properties](#)
- [Configuring T1 BERT Properties](#)
- [Configuring T3 BERT Properties on page 8](#)
- [bert-algorithm on page 44](#)
- [bert-error-rate on page 46](#)

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 (FEBC), far-end alarm and control (FEAC), terminal data link, path parity, and mode indicator bits, as defined in ANSI T1.107a-1989. For ATM and ATM2 IQ2 and IQ2-E interfaces, M23 framing is used when the no-cbit-parity statement is included. For all other interfaces, M13 framing is used when the no-cbit-parity statement is included.
Default	C-bit parity mode is enabled.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring E3 and T3 Parameters on ATM Interfaces • Disabling T3 C-Bit Parity Mode on page 9


compatibility-mode

Syntax	<code>compatibility-mode (adtran digital-link kentrox larscom verilink) <subrate value>;</code>
Hierarchy Level	[edit interfaces <i>interface-name</i> e3-options], [edit interfaces <i>interface-name</i> t3-options]
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.
	<div>  <p>NOTE: The <code>compatibility-mode</code> statement at the [edit interfaces <i>interface-name</i> e3-options] hierarchy level is not valid for IQE PICs.</p> </div>
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> <div>  <p>NOTE: Verilink configuration is not functional if an IQ interface is paired with an IQE interface.</p> </div> <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	<ul style="list-style-type: none"> • Configuring the E3 CSU Compatibility Mode • Configuring the T3 CSU Compatibility Mode on page 10 • payload-scrambler on page 59


e3-options

Syntax	<pre>e3-options { atm-encapsulation (direct plcp); bert-algorithm <i>algorithm</i>; bert-error-rate <i>rate</i>; bert-period <i>seconds</i>; buildout <i>feet</i>; compatibility-mode (digital-link kentrox larscom) <subrate <i>value</i>>; fcs (16 32); framing (g.751 g.832); idle-cycle-flag <i>value</i>; invert-data; loopback (local remote); (payload-scrambler no-payload-scrambler); start-end-flag <i>value</i>; (unframed no-unframed); }</pre>
Hierarchy Level	[edit interfaces <i>interface-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>Configure E3-specific physical interface properties.</p> <p>For ATM1 interfaces, you can configure a subset of E3 options statements.</p> <p>The statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • <i>E3 Interfaces Overview</i> • T3 Interfaces Overview on page 3 • <i>atm-options</i>

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 and EX Series switches) Reduce the Automatic Protection Switching (APS) switchover time in Layer 2 circuits.
	<div> NOTE:<ul style="list-style-type: none">Configuring this statement reduces the APS switchover time only when the Layer 2 circuit encapsulation type for the interface receiving traffic from a Layer 2 circuit neighbor is SAToP.When the fast-aps-switch statement is configured in revertive APS mode, you must configure an appropriate value for revert time to achieve reduction in APS switchover time.To prevent the logical interfaces in the data path from being shut down, configure appropriate hold-time values on all the interfaces in the data path that support TDM.The fast-aps-switch statement cannot be configured when the APS annex-b option is configured.The interfaces that have the fast-aps-switch statement configured cannot be used in virtual private LAN service (VPLS) environments.</div>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"><i>Reducing APS Switchover Time in Layer 2 Circuits</i>


fcs

Syntax	fcs (16 32);
Hierarchy Level	[edit interfaces e1- <i>fpc/pic/port</i>], [edit interfaces t1- <i>fpc/pic/port</i>], [edit interfaces <i>interface-name</i> ds0-options], [edit interfaces <i>interface-name</i> e1-options], [edit interfaces <i>interface-name</i> e3-options], [edit interfaces <i>interface-name</i> sonet-options], [edit interfaces <i>interface-name</i> t1-options], [edit interfaces <i>interface-name</i> t3-options]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.
Description	<p>For E1/E3, SONET/SDH, and T1/T3 interfaces, configure the frame checksum (FCS) on the interface. The checksum must be the same on both ends of the interface.</p> <p>On a channelized OC12 interface, the SONET/SDH fcs statement is not supported. To configure FCS on each DS3 channel, you must include the t3-options fcs statement in the configuration for each channel. For SONET/SDH, the channelized OC12 interface supports DS3 to STS-1 to OC12. For SDH, the channelized OC12 interface supports NxDS3 to NxVC3 to AU3 to STM.</p> <div style="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 [edit interfaces e1-<i>fpc/pic/port</i>] or [edit interfaces t1-<i>fpc/pic/port</i>] hierarchy level as appropriate.</p> </div>
Options	<p>16—Use a 16-bit frame checksum on the interface.</p> <p>32—Use a 32-bit frame checksum on the interface. Using a 32-bit checksum provides more reliable packet verification, but some older equipment might not support 32-bit checksums.</p> <p>Default: 16</p>
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • <i>Configuring the E1 Frame Checksum</i> • <i>Configuring the E3 Frame Checksum</i> • <i>Configuring the SONET/SDH Frame Checksum</i> • <i>Configuring the T1 Frame Checksum</i> • Configuring the T3 Frame Checksum on page 12

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 13• loopback (ADSL, DS0, E1/E3, SONET/SDH, SHDSL, and T1/T3) on page 57• <i>remote-loopback-respond</i>

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 Access Routers.</p>
Description	Configure the value that the DS0, E1, E3, T1, or T3 interface transmits during idle cycles.
<div>  <p>NOTE: When configuring E1 or T1 interfaces on 10-port Channelized E1/T1 IQE PICs, the <code>idle-cycle-flag</code> statement must be included at the <code>[edit interfaces e1-fpc/pic/port]</code> or <code>[edit interfaces t1-fpc/pic/port]</code> hierarchy level as appropriate.</p> </div>	
Options	<p>value—Value to transmit in the idle cycles:</p> <ul style="list-style-type: none"> flags—Transmit the value 0x7E. ones—Transmit the value 0xFF (all ones). <p>Default: <code>Flags</code></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 the E1 Idle Cycle Flag Configuring the E3 Idle Cycle Flag Configuring the T1 Idle Cycle Flag Configuring the T3 Idle Cycle Flag on page 13

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 14

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

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



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

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



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

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

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

payload—For channelized T3, T1, and 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 Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.


Related Documentation

- *Configuring E3 and T3 Parameters on ATM Interfaces*
- *Configuring E1 Loopback Capability*
- *Configuring E3 Loopback Capability*
- *Configuring SONET/SDH Loopback Capability*
- *Configuring SHDSL Operating Mode on an ATM Physical Interface*
- *Configuring T1 Loopback Capability*
- [Configuring T3 Loopback Capability on page 14](#)
- [feac-loop-respond on page 54](#)

payload-scrambler

Syntax	(payload-scrambler no-payload-scrambler);
Hierarchy Level	[edit interfaces <i>interface-name</i> e3-options], [edit interfaces <i>interface-name</i> sonet-options], [edit interfaces <i>interface-name</i> t3-options]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>Enable or disable HDLC scrambling on an E3, a SONET/SDH, or a T3 interface. This type of scrambling provides better link stability. Both sides of a connection must either use or not use scrambling.</p> <p>If you commit a T3 interface configuration that has HDLC payload scrambling enabled, the interface must also be configured to be compatible with the channel service unit (CSU) at the remote end of the line.</p> <p>Disable payload scrambling on an E3 interface if Digital Link compatibility mode is used.</p> <p>On a channelized OC12 interface, the sonet payload-scrambler statement is ignored. To configure scrambling on the DS3 channels on the interface, you can include the t3-options payload-scrambler statement in the configuration for each DS3 channel.</p>
	<div>  <p>NOTE: The payload-scrambler statement at the [edit interfaces <i>interface-name</i> e3-options] hierarchy level is not valid for IQE PICs.</p> </div>
Default	Payload scrambling is disabled on all E3 and T3 interfaces; it is enabled by default on E3/T3 over ATM interfaces and on SONET/SDH interfaces.
Required Privilege Level	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring E3 and T3 Parameters on ATM Interfaces • Configuring E3 HDLC Payload Scrambling • Configuring SONET/SDH HDLC Payload Scrambling • Configuring T3 HDLC Payload Scrambling on page 16 • Examples: Configuring T3 Interfaces on page 17 • compatibility-mode on page 50

start-end-flag

Syntax	start-end-flag (filler shared);
Hierarchy Level	[edit interfaces e1- <i>fpc/pic/port</i>], [edit interfaces t1- <i>fpc/pic/port</i>], [edit interfaces <i>interface-name</i> ds0-options], [edit interfaces <i>interface-name</i> e1-options], [edit interfaces <i>interface-name</i> e3-options], [edit interfaces <i>interface-name</i> t1-options], [edit interfaces <i>interface-name</i> t3-options]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.
Description	For DS0, E1, E3, T1, and T3 interfaces, configure the interface to share the transmission of start and end flags.
<div>  <p>NOTE: When configuring E1 or T1 interfaces on the 10-port Channelized E1/T1 IQE PIC, the start-end-flag statement must be included at the [edit interfaces e1-<i>fpc/pic/port</i>] or [edit interfaces t1-<i>fpc/pic/port</i>] hierarchy level as appropriate.</p> </div>	
Options	filler —Wait two idle cycles between the start and end flags. shared —Share the transmission of the start and end flags. This is the default.
Required Privilege Level	interface —To view this statement in the configuration. interface-control —To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • <i>Configuring E1 Start and End Flags</i> • <i>Configuring the E3 Start and End Flags</i> • <i>Configuring T1 Start and End Flags</i> • Configuring T3 Start and End Flags on page 17

t3-options

Syntax	<pre> t3-options { atm-encapsulation (direct plcp); bert-algorithm <i>algorithm</i>; bert-error-rate <i>rate</i>; bert-period <i>seconds</i>; (cbit-parity no-cbit-parity); compatibility-mode (digital-link kentrox larscom) <subrate <i>value</i>>; fcs (16 32); (feac-loop-respond no-feac-loop-respond); idle-cycle-flag <i>value</i>; (long-buildout no-long-buildout); (loop-timing no-loop-timing); loopback (local payload remote); start-end-flag <i>value</i>; } </pre>
Hierarchy Level	[edit interfaces <i>interface-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>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.</p> <p>On T3 interfaces, the default encapsulation is PPP.</p> <p>For ATM1 interfaces, you can configure a subset of E3 options statements.</p> <p>The statements are explained separately.</p>
Required Privilege Level	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • T3 Interfaces Overview on page 3

PART 3

Administration

- [Monitoring Commands on page 65](#)
- [Command Summary on page 83](#)

CHAPTER 5

Monitoring Commands

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-fpc/pic/port, whereas the E3 interface type is e3-fpc/pic/port. On the J Series routers, the T3 interface type is t3-pim/0/port, whereas the E3 interface type is e3-pim/0/port.</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 75</p> <p>show interfaces detail (T3, PPP) on page 76</p> <p>show interfaces extensive (T3, PPP) on page 77</p> <p>show interfaces (E3, Frame Relay) on page 78</p> <p>show interfaces detail (E3, Frame Relay) on page 79</p> <p>show interfaces extensive (E3, Frame Relay) on page 80</p>
Output Fields	Table 4 on page 66 lists the output fields for the show interfaces (T3 or E3) command. Output fields are listed in the approximate order in which they appear.

Table 4: 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
Interface index	Physical interface's index number, which reflects its initialization sequence.	detail extensive none

Table 4: T3 or E3 show interfaces Output Fields (*continued*)

Field Name	Field Description	Level of Output
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 4: 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 4: 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 4: 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 4: 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 4: 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 4: 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 4: 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 4: 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: 1.1.1/24, Local: 1.1.1.1, Broadcast: 1.1.1.255

```

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: 1.1.1/24, Local: 1.1.1.1, Broadcast: 1.1.1.255,
 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,
  mpls: 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: 1.1.1/24, Local: 1.1.1.1, Broadcast: 1.1.1.255,
  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 timedout     : 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: 1.1.1/24, Local: 1.1.1.1, Broadcast: 1.1.1.255
  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: 1.1.1/24, Local: 1.1.1.1, Broadcast: 1.1.1.255,
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 timedout : 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: 1.1.1/24, Local: 1.1.1.1, Broadcast: 1.1.1.255,
    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

```

CHAPTER 6

Command Summary

PART 4

Troubleshooting

- [Interface Diagnostics on page 87](#)
- [Investigate T3 Interfaces on page 107](#)

CHAPTER 7

Interface Diagnostics

- [Interface Diagnostics on page 87](#)
- [Interface Diagnostics Operational Mode Commands on page 94](#)
- [Diagnose a Suspected Hardware Problem with a T3 Interface on page 95](#)
- [Diagnose a Suspected Circuit Problem on page 105](#)

Interface Diagnostics

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

- [Configuring Loopback Testing on page 87](#)
- [Interface Diagnostics on page 89](#)

Configuring Loopback Testing

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

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

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

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

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

Table 5 on page 88 shows the loopback modes supported on the various interface types.

Table 5: Loopback Modes by Interface Type

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

Table 5: Loopback Modes by Interface Type (*continued*)

Interface	Loopback Modes	Usage Guidelines
Serial (EIA-530)	DCE local, DCE remote, local, and remote	<i>Configuring Serial Loopback Capability</i>
SONET/SDH	Local and remote	<i>Configuring SONET/SDH Loopback Capability</i>
T1 and T3	Local, payload, and remote	<i>Configuring T1 Loopback Capability and "Configuring T3 Loopback Capability" on page 14</i> <i>See also Configuring the T1 Remote Loopback Response</i>

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

loopback mode;

You can include this statement at the following hierarchy levels:

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

Interface Diagnostics

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

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

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

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

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

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

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

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

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

For specific hierarchy information, see the individual interface types.



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

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

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



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

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

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



NOTE: The IQE PICs support only the following algorithms:

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

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



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

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

Table 6 on page 92 shows the BERT capabilities for various interface types.

Table 6: BERT Capabilities by Interface Type

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

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

Starting and Stopping a BERT Test

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

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

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

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

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

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

For example:

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

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

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

For more information about running and evaluating the results of the BERT procedure, see the *Junos OS Operational Mode Commands*.



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

Example: Configuring Bit Error Rate Testing

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

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

```

    }
}

```

Interface Diagnostics Operational Mode Commands

Table 7 on page 94 summarizes the command-line interface (CLI) commands you can use to run diagnostics on router interfaces. Commands are listed in alphabetical order.

Table 7: Interface Diagnostics Operational Mode Commands

Task	Command
Start a bit error rate test (BERT) on a DS0 interface.	<i>test interface ds0-bert-start</i>
Stop a BERT on a DS0 interface.	<i>test interface ds0-bert-stop</i>
Start a BERT on an E1 interface.	<i>test interface e1-bert-start</i>
Stop a BERT on an E1 interface.	<i>test interface e1-bert-stop</i>
Start a BERT on an E3 interface.	<i>test interface e3-bert-start</i>
Stop a BERT on an E3 interface.	<i>test interface e3-bert-stop</i>
Transmit over a facilities data link (FDL) to initiate or terminate a far-end line loopback.	<i>test interface fdl-line-loop</i>
Transmit over an FDL to initiate or terminate a far-end payload loopback.	<i>test interface fdl-payload-loop</i>
Transmit the line loopback activate code word sequence on the interface's far-end alarm and control (FEAC) channel.	<i>test interface feac-loop-initiate</i>
Transmit the line loopback deactivate code word sequence on the interface's FEAC channel.	<i>test interface feac-loop-terminate</i>
Initiate or terminate a far-end line loopback.	<i>test interface inband-line-loop</i>
Initiate or terminate a far-end payload loopback.	<i>test interface inband-payload-loop</i>
Restart auto-negotiation on a Fast Ethernet or Gigabit Ethernet interface.	<i>test interface restart-auto-negotiation</i>
Start a BERT on a T1 interface.	<i>test interface t1-bert-start</i>
Stop a BERT on a T1 interface.	<i>test interface t1-bert-stop</i>
Start a BERT on a T3 interface.	<i>test interface t3-bert-start</i>
Stop a BERT on a T3 interface.	<i>test interface t3-bert-stop</i>



NOTE: For information about how to configure interface test parameters, see the *Junos OS Network Interfaces Library for Routing Devices*. For information about related tasks performed by network operations center (NOC) personnel, see the *Junos Interfaces Network Operations Guide*.

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 95](#)
2. [Set Clocking to Internal on page 96](#)
3. [Verify That the T3 Interface Is Up on page 97](#)
4. [Clear T3 Interface Statistics on page 98](#)
5. [Force the Link Layer To Stay Up on page 99](#)
6. [Verify the Status of the Logical Interface on page 100](#)
7. [Ping the T3 Interface on page 102](#)
8. [Check for T3 Interface Error Statistics on page 103](#)

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 95](#)
2. [Configure a Local Loopback on page 96](#)

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.

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.

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.

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.

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.

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 99](#)
2. [Configure No-Keepalives on page 100](#)

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.

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.

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.

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
```

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).

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 t3-<i>fpc/pic/port</i> 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).

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 105](#)
2. [Create a Loop to the Router from Various Points in the Network on page 106](#)

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.

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 95](#).

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.

CHAPTER 8

Investigate T3 Interfaces

- [Investigating Interface Steps and Commands on page 107](#)
- [Monitor T3 Interfaces on page 110](#)
- [Use Loopback Testing for T3 Interfaces on page 115](#)
- [Locate T3 Alarms and Errors on page 117](#)

Investigating Interface Steps and Commands

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

- [Investigating Interface Steps and Commands Overview on page 107](#)
- [Monitoring Interfaces on page 107](#)
- [Performing a Loopback Test on an Interface on page 108](#)
- [Locating Interface Alarms on page 110](#)

Investigating Interface Steps and Commands Overview

The “[Monitoring Interfaces](#)” on [page 107](#) section helps you determine the nature of the interface problem. The “[Performing a Loopback Test on an Interface](#)” on [page 108](#) section provides information to help you isolate the source of the problem. The “[Locating Interface Alarms](#)” on [page 110](#) section explains some of the alarms and errors for the media.

Monitoring Interfaces

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

Solution To monitor interfaces, follow these steps:

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

The [Table 8 on page 108](#) lists and describes the operational mode commands you use to monitor interfaces.

Table 8: 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.

Performing a Loopback Test on an Interface

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

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

1. 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 9 on page 109](#) 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 9: Commands Used to Perform Loopback Testing on Interfaces

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

Table 9: Commands Used to Perform Loopback Testing on Interfaces (*continued*)

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

Locating Interface Alarms

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

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

Monitor T3 Interfaces

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

- [Checklist for Monitoring T3 Interfaces on page 110](#)
- [Monitor T3 Interfaces on page 111](#)

Checklist for Monitoring T3 Interfaces

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

Action [Table 10 on page 111](#) provides the links and commands for monitoring T3 interfaces.

Table 10: Checklist for Monitoring T3 Interfaces

Tasks	Command or Action
“Monitor T3 Interfaces” on page 111	
1. Display the Status of T3 Interfaces on page 111	show interfaces terse t3*
2. Display the Status of a Specific T3 Interface on page 112	show interfaces t3-<i>fpc/pic/port</i>
3. Display Extensive Status Information for a Specific T3 Interface on page 113	show interfaces t3-<i>fpc/pic/port</i> extensive
4. Monitor Statistics for a T3 Interface on page 114	monitor interface t3-<i>fpc/pic/port</i>

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 111](#)
2. [Display the Status of a Specific T3 Interface on page 112](#)
3. [Display Extensive Status Information for a Specific T3 Interface on page 113](#)
4. [Monitor Statistics for a T3 Interface on page 114](#)

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 11 on page 112](#) for a description of what the output means.

Table 11: Status of T3 Interfaces

Physical Interface	Logical Interface	Status Description
t3-1/0/0 Admin Down Link Up	t3-1/0/0.0 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 down because the physical link is disabled (Link Down).
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.

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.

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 117](#) for an explanation of T3 alarms.

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:                  Current Delta
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 12 on page 115 presents problem situations and actions to help you further understand the problem.

Table 12: 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.

Related Documentation

- [T3 Interfaces Overview on page 3](#)

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 115](#)

Checklist for Using Loopback Testing for T3 Interfaces

Purpose To use loopback testing to isolate T3 interface problems.

Action Table 13 on page 115 provides links and commands for using loopback testing for T3 interfaces.

Table 13: Checklist for Using Loopback Testing for T3 Interfaces

"Diagnose a Suspected Hardware Problem with a T3 Interface" on page 95	Command or Action
--	-------------------

Table 13: Checklist for Using Loopback Testing for T3 Interfaces (*continued*)

"Diagnose a Suspected Hardware Problem with a T3 Interface" on page 95	Command or Action
1. Create a Loopback on page 95	
a. Create a Physical Loopback on page 95	Connect the transmit port to the receive port.
b. Configure a Local Loopback on page 96	<pre>[edit interfaces <i>interface-name</i> t3-options] set loopback local show commit</pre>
2. Set Clocking to Internal on page 96	<pre>[edit interfaces <i>interface-name</i>] set clocking internal show commit</pre>
3. Verify That the T3 Interface Is Up on page 97	<code>show interfaces t3-<i>fpc/pic/port</i></code>
4. Clear T3 Interface Statistics on page 98	<code>clear interfaces statistics t3-<i>fpc/pic/port</i></code>
5. Force the Link Layer To Stay Up on page 99	
a. Configure Encapsulation to Cisco-HDLC on page 99	<pre>[edit interfaces <i>interface-name</i>] set encapsulation cisco-hdlc show commit</pre>
b. Configure No-Keepalives on page 100	<pre>[edit interfaces <i>interface-name</i>] set no-keepalives show commit</pre>
6. Verify the Status of the Logical Interface on page 100	<pre>show interfaces t3-<i>fpc/pic/port</i> show interfaces t3-<i>fpc/pic/port</i> terse</pre>
7. Ping the T3 Interface on page 102	<pre>ping interface t3-<i>fpc/pic/port</i> <i>local-IP-address</i> bypass-routing count 1000 rapid</pre>
8. Check for T3 Interface Error Statistics on page 103	<code>show interfaces t3-<i>fpc/pic/port</i> extensive</code>
"Diagnose a Suspected Circuit Problem" on page 105	
1. Create a Loop from the Router to the Network on page 105	<pre>[edit interfaces <i>interface-name</i> t3-options] set loopback remote show commit</pre>
2. Create a Loop to the Router from Various Points in the Network on page 106	Perform Steps 2 through 8 from "Diagnose a Suspected Hardware Problem with a T3 Interface" on page 95.

Related Documentation • [T3 Interfaces Overview on page 3](#)

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 117](#)
- [Display T3 Alarms and Errors on page 117](#)
- [Locate Most Common T3 Alarms and Errors on page 119](#)

Checklist of Common T3 Alarms and Errors

Purpose To check T3 alarms and errors,

Action [Table 14 on page 117](#) provides the links and commands for checking T3 alarms and errors.

Table 14: Checklist of Common T3 Alarms and Errors

Tasks	Command or Action
“Display T3 Alarms and Errors” on page 117	<code>show interfaces t3-fpc/pic/port extensive</code>
“Locate Most Common T3 Alarms and Errors” on page 119	
1. Locate Loss of Signal and Loss of Frame Alarms on page 119	Check the connection between the router port and the first T3 network element.
2. Locate Alarm Indication Signal Alarms on page 120	Check the T3 network element connected to the T3 interface.
3. Locate an Incoming Yellow Alarm on page 121	Check the cable between the T3 interface and the directly connected T3 network element.
4. Locate IDLE on a T3 Interface on page 121	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.

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
    CSES          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 15 on page 119](#) lists the T3 media-specific alarms or errors that can render the interface unable to pass packets.

Table 15: 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

Locate Most Common T3 Alarms and Errors

The following alarms and errors are described in this chapter:

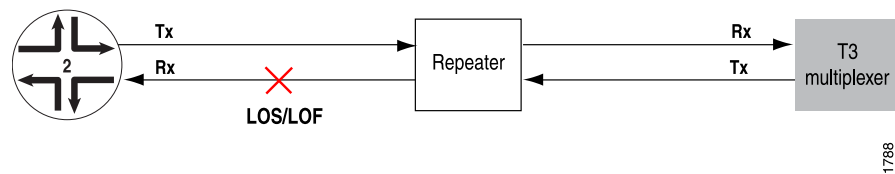
1. [Locate Loss of Signal and Loss of Frame Alarms on page 119](#)
2. [Locate Alarm Indication Signal Alarms on page 120](#)
3. [Locate an Incoming Yellow Alarm on page 121](#)
4. [Locate IDLE on a T3 Interface on page 121](#)

Locate Loss of Signal and Loss of Frame Alarms

Problem A loss of signal (LOS) or loss of frame (LOF) alarm indicates that a signal could not be detected at the 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 2 on page 120](#), the X indicates that there is a connection problem between Router 2 and the nearest T3 network element.

Figure 2: 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:           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
[...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.

Locate Alarm Indication Signal Alarms

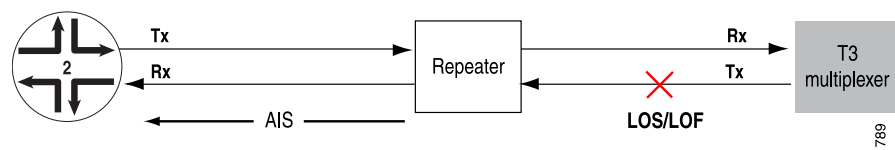
Problem An alarm indication signal (AIS) is a valid framed signal with payload containing a repeating 1010 pattern. An AIS alarm indicates a problem with the line upstream from the T3 network element connected to the T3 interface.

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 3 on page 120](#) illustrates the location of an AIS alarm in a T3 network.

Figure 3: Location of an AIS Alarm in a T3 Network



Meaning

In [Figure 3 on page 120](#), 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.

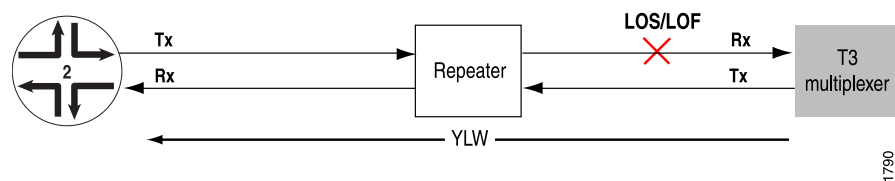
Locate an Incoming Yellow Alarm

Problem 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 4 on page 121](#) illustrates the location of a yellow alarm in a T3 network.

Figure 4: 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.

Locate IDLE on a T3 Interface

Problem 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
```

Related Documentation

- [T3 Interfaces Overview on page 3](#)

PART 5

Index

- [Index on page 125](#)

Index

Symbols

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

A

AIS alarms	
T3 interfaces	120
alarms	
T3 interfaces, checklist.....	117

B

BERT	
configuring interface diagnostics.....	89
bert-algorithm statement.....	44
usage guidelines.....	8, 89
bert-error-rate statement.....	46
usage guidelines.....	89
bert-period statement.....	48
usage guidelines.....	89
bit error rate test See BERT	
braces, in configuration statements.....	xiv
brackets	
angle, in syntax descriptions.....	xiv
square, in configuration statements.....	xiv

C

C-bit parity mode.....	49
cbit-parity statement.....	49
checklist for alarms	
T3 interfaces.....	117
circuit problems	
T3 interfaces	105
Cisco HDLC encapsulation	
example configuration.....	17
Cisco-HDLC, configuring encapsulation	
T3 interfaces	99

clear interfaces statistics command	
T3 interfaces.....	98
clocking	
T3 interfaces	96
commands for router management,	
interfaces.....	108, 109
comments, in configuration statements.....	xiv
compatibility-mode statement.....	50
conventions	
text and syntax.....	xiii
curly braces, in configuration statements.....	xiv
customer support.....	xv
contacting JTAC.....	xv

D

DCE.....	17
documentation	
comments on.....	xv
DTE.....	17

E

E3 interfaces	
status information, displaying.....	66
e3-options statement.....	51
edit interfaces command.....	109
T3 interfaces	97, 99, 100
edit interfaces t3-options command	
T3 interfaces	96, 105
encapsulation	
T3 interfaces.....	99
error statistics	
T3 interfaces	103
errors	
T3 interfaces	103, 114

F

fast-aps-switch statement.....	52
fcs statement.....	53
feac-loop-respond statement.....	54
font conventions.....	xiii
Frame Relay encapsulation	
example configuration.....	17
framing errors	
T3 interfaces.....	114

H

hardware problems	
T3 interfaces	95

HDLC	
configuring encapsulation	
T3 interfaces	99
I	
IDLE signal, T3 interfaces	121
idle-cycle-flag statement	55
interface diagnostics operational mode	
commands	94
interfaces	
alarms	110
configuration statements	21
investigation process	110
locating alarms	110
loopback test commands, table	109
monitoring commands, table	108
monitoring, general steps	107
troubleshooting overview, (monitoring, loopback testing, and locating alarms)	107
investigation process	
interfaces	110
L	
link layer, forcing up	
T3 interfaces	99
LOF alarms	
T3 interfaces	
alarms and errors	119
logical interfaces	
T3 interfaces, status	101
logical systems	
configuration statements	37
long-buildout statement	56
loopback statement	
ADSL, DS0, E1/E3, SONET/SDH, SHDSL, and T1/T3	57
loopback testing	87
loopback, configuring local	
T3 interfaces	96
loopback, creating physical	
T3 interfaces	95
LOS alarms	
T3 interfaces	119
M	
manuals	
comments on	xv
monitor interface command	
T3 interfaces	114
N	
network	105
no-cbit-parity statement	49
no-feac-loop-respond statement	54
no-keepalives, configuring	
T3 interfaces	100
no-long-buildout statement	56
no-payload-scrambler statement	59
P	
parentheses, in syntax descriptions	xiv
payload-scrambler statement	59
physical interfaces	
C-bit parity mode	49
physical link down	
T3 interfaces	113
table	115
physical link up	
T3 interfaces	97, 113
physical loopback	
T3 interfaces	95
ping interface command	
T3 interfaces	102
S	
set cli terminal command	
T3 interfaces	115
set clocking internal command	
T3 interfaces	97
set encapsulation command	
T3 interfaces	99
set loopback local command	
T3 interfaces	96
set loopback remote command	
T3 interfaces	105
set no-keepalives command	
T3 interfaces	100
show interfaces (T3 or E3) command	66
show interfaces command	100
T3 interfaces	97, 112
show interfaces extensive command	
T3 interfaces	103, 113
show interfaces terse command	
T3 interfaces	100, 111
start-end-flag statement	60

statistics	
errors	
T3 interfaces.....	103
T3 interfaces	
checking.....	103
monitoring.....	114
resetting.....	98
status	
T1 interfaces	97
T3 interfaces.....	111
status description, table	
T3 interfaces.....	112
status extensive	
T3 interfaces	113
status for specific interface	
T3.....	113
support, technical See technical support	
syntax conventions.....	xiii

T

T3 interfaces	
alarms and errors	
AIS alarms.....	120
checklist.....	117
displaying.....	117
IDLE signals.....	121
LOS alarms.....	119
yellow alarms.....	121
C-bit parity mode.....	49
circuit problems.....	105
clocking, setting.....	96
configuration statements.....	7
edit interfaces command.....	97, 99, 100
edit interfaces t3-options command.....	96, 105
encapsulation, configuring.....	99
error statistics	103
further investigation	112
hardware problems.....	95
HDLC, configuring encapsulation.....	99
link layer, forcing up.....	99
logical interface, status.....	102
loopback	
configuring local.....	96
creating physical.....	95
monitor interface command.....	114
no keepalives, configuring.....	100
physical link status.....	97
ping interface command.....	102
set cli terminal command.....	115

set clocking internal command.....	97
set encapsulation command.....	99
set loopback local command.....	96
set loopback remote command.....	105
set no-keepalives command.....	100
show interfaces command.....	97, 100, 112
show interfaces extensive command.....	103, 117
show interfaces terse command.....	100, 111
statistics	
checking error.....	103
monitoring.....	114
resetting.....	98
status	
description, table.....	112
displaying	111
displaying all.....	111
displaying specific.....	112
extensive.....	113
verifying.....	97
status information, displaying.....	66
t3-options statement.....	61
usage guidelines.....	7
technical support	
contacting JTAC.....	xv

Y

yellow alarms	
T3 interfaces	121

