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Junos<sup>®</sup> OS

## E1/E3/T1/T3 Interfaces Configuration Guide

Release  
11.2



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# Abbreviated Table of Contents

	About This Guide .....	xvii
Part 1	E1/E3/T1/T3 Interfaces Configuration Statements Overview	
Chapter 1	E1/E3/T1/T3 Interfaces Configuration Statements and Hierarchy .....	3
Part 2	Configuring E1, E3, T1, and T3 Interfaces	
Chapter 2	Configuring E1 Interfaces .....	27
Chapter 3	Configuring E3 Interfaces .....	35
Chapter 4	Configuring T1 Interfaces .....	43
Chapter 5	Configuring T3 Interfaces .....	53
Part 3	E1/E3/T1/T3 Configuration Statements	
Chapter 6	Summary of E1/E3/T1/T3 Interfaces Configuration Statements .....	69
Part 4	Index	
	Index .....	101
	Index of Statements and Commands .....	103





# Table of Contents

	<b>About This Guide . . . . .</b>	<b>xvii</b>
	JUNOS Documentation and Release Notes . . . . .	xvii
	Objectives . . . . .	xviii
	Audience . . . . .	xviii
	Supported Routing Platforms . . . . .	xviii
	Using the Indexes . . . . .	xix
	Using the Examples in This Manual . . . . .	xix
	Merging a Full Example . . . . .	xix
	Merging a Snippet . . . . .	xx
	Documentation Conventions . . . . .	xx
	Documentation Feedback . . . . .	xxii
	Requesting Technical Support . . . . .	xxii
	Self-Help Online Tools and Resources . . . . .	xxiii
	Opening a Case with JTAC . . . . .	xxiii
<b>Part 1</b>	<b>E1/E3/T1/T3 Interfaces Configuration Statements Overview</b>	
<b>Chapter 1</b>	<b>E1/E3/T1/T3 Interfaces Configuration Statements and Hierarchy . . . . .</b>	<b>3</b>
	[edit interfaces] Hierarchy Level . . . . .	3
	[edit logical-systems] Hierarchy Level . . . . .	18
<b>Part 2</b>	<b>Configuring E1, E3, T1, and T3 Interfaces</b>	
<b>Chapter 2</b>	<b>Configuring E1 Interfaces . . . . .</b>	<b>27</b>
	E1 Interfaces Overview . . . . .	27
	Configuring E1 Physical Interface Properties . . . . .	28
	Configuring E1 BERT Properties . . . . .	28
	Configuring the E1 Frame Checksum . . . . .	29
	Configuring E1 Framing . . . . .	29
	Configuring the E1 Idle Cycle Flag . . . . .	30
	Configuring E1 Data Inversion . . . . .	30
	Configuring E1 Loopback Capability . . . . .	30
	Example: Configuring E1 Loopback Capability . . . . .	31
	Configuring E1 Start and End Flags . . . . .	32
	Configuring Fractional E1 Time Slots . . . . .	32
	Example: Configuring Fractional E1 Time Slots . . . . .	33
<b>Chapter 3</b>	<b>Configuring E3 Interfaces . . . . .</b>	<b>35</b>
	E3 Interfaces Overview . . . . .	35
	Configuring E3 Physical Interface Properties . . . . .	36
	Configuring E3 BERT Properties . . . . .	36

	Configuring the E3 CSU Compatibility Mode . . . . .	37
	Configuring the E3 Frame Checksum . . . . .	38
	Configuring the E3 Idle Cycle Flag . . . . .	39
	Configuring E3 Data Inversion . . . . .	39
	Configuring E3 Loopback Capability . . . . .	39
	Example: Configuring E3 Loopback Capability . . . . .	40
	Configuring E3 HDLC Payload Scrambling . . . . .	41
	Configuring the E3 Start and End Flags . . . . .	41
	Configuring E3 IQ and IQE Unframed Mode . . . . .	41
<b>Chapter 4</b>	<b>Configuring T1 Interfaces . . . . .</b>	<b>43</b>
	T1 Interfaces Overview . . . . .	43
	Configuring T1 Physical Interface Properties . . . . .	44
	Configuring T1 BERT Properties . . . . .	44
	Configuring the T1 Buildout . . . . .	45
	Configuring T1 Byte Encoding . . . . .	45
	Configuring T1 CRC Error Major Alarm Thresholds . . . . .	46
	Configuring T1 CRC Error Minor Alarm Thresholds . . . . .	46
	Configuring T1 Data Inversion . . . . .	47
	Configuring the T1 Frame Checksum . . . . .	47
	Configuring the T1 Remote Loopback Response . . . . .	47
	Configuring T1 Framing . . . . .	48
	Configuring T1 Line Encoding . . . . .	48
	Configuring T1 Loopback Capability . . . . .	48
	Configuring the T1 Idle Cycle Flag . . . . .	50
	Configuring T1 Start and End Flags . . . . .	50
	Configuring Fractional T1 Time Slots . . . . .	51
	Example: Configuring Fractional T1 Time Slots . . . . .	51
<b>Chapter 5</b>	<b>Configuring T3 Interfaces . . . . .</b>	<b>53</b>
	T3 Interfaces Overview . . . . .	53
	Configuring T3 Physical Interface Properties . . . . .	54
	Configuring T3 BERT Properties . . . . .	54
	Disabling T3 C-Bit Parity Mode . . . . .	55
	Configuring the T3 CSU Compatibility Mode . . . . .	56
	Configuring the T3 Frame Checksum . . . . .	58
	Configuring the T3 FEAC Response . . . . .	59
	Configuring the T3 Idle Cycle Flag . . . . .	59
	Configuring the T3 Line Buildout . . . . .	60
	Configuring T3 Loopback Capability . . . . .	60
	Configuring T3 HDLC Payload Scrambling . . . . .	62
	Configuring T3 Start and End Flags . . . . .	62
	Examples: Configuring T3 Interfaces . . . . .	63
<b>Part 3</b>	<b>E1/E3/T1/T3 Configuration Statements</b>	
<b>Chapter 6</b>	<b>Summary of E1/E3/T1/T3 Interfaces Configuration Statements . . . . .</b>	<b>69</b>
	bert-algorithm . . . . .	70
	bert-error-rate . . . . .	72
	bert-period . . . . .	73

buildout (T1 Interfaces) .....	74
byte-encoding .....	75
cbit-parity .....	76
compatibility-mode .....	77
crc-major-alarm-threshold .....	78
crc-minor-alarm-threshold .....	79
e1-options .....	80
e3-options .....	81
fcs .....	82
feac-loop-respond .....	83
framing (E1, E3, and T1 Interfaces) .....	84
idle-cycle-flag .....	85
invert-data .....	86
line-encoding .....	87
long-buildout .....	88
loopback (ADSL, DS0, E1/E3, SONET/SDH, SHDSL, and T1/T3) .....	89
payload-scrambler .....	91
remote-loopback-respond .....	92
start-end-flag .....	93
t1-options .....	94
t3-options .....	95
timeslots .....	96
unframed .....	97

## Part 4

## Index

Index .....	101
Index of Statements and Commands .....	103



# List of Figures

<b>Part 2</b>	<b>Configuring E1, E3, T1, and T3 Interfaces</b>	
<b>Chapter 2</b>	<b>Configuring E1 Interfaces</b> .....	<b>27</b>
	Figure 1: Remote and Local E1 Loopback .....	31
<b>Chapter 3</b>	<b>Configuring E3 Interfaces</b> .....	<b>35</b>
	Figure 2: Remote and Local E3 Loopback .....	40
<b>Chapter 4</b>	<b>Configuring T1 Interfaces</b> .....	<b>43</b>
	Figure 3: Remote and Local T1 Loopback .....	49
<b>Chapter 5</b>	<b>Configuring T3 Interfaces</b> .....	<b>53</b>
	Figure 4: Remote and Local T3 Loopback .....	60



# List of Tables

	<b>About This Guide</b> . . . . .	<b>xvii</b>
	Table 1: Notice Icons . . . . .	xxi
	Table 2: Text and Syntax Conventions . . . . .	xxi
<b>Part 2</b>	<b>Configuring E1, E3, T1, and T3 Interfaces</b>	
<b>Chapter 3</b>	<b>Configuring E3 Interfaces</b> . . . . .	<b>35</b>
	Table 3: Subrate Values for E3 Digital Link Compatibility Mode . . . . .	38
<b>Chapter 5</b>	<b>Configuring T3 Interfaces</b> . . . . .	<b>53</b>
	Table 4: Subrate Values for T3 Digital Link Compatibility Mode . . . . .	57





# About This Guide

This preface provides the following guidelines for using the *Junos<sup>®</sup> OS E1/E3/T1/T3 Interfaces Configuration Guide*:

- JUNOS Documentation and Release Notes on page xvii
- Objectives on page xviii
- Audience on page xviii
- Supported Routing Platforms on page xviii
- Using the Indexes on page xix
- Using the Examples in This Manual on page xix
- Documentation Conventions on page xx
- Documentation Feedback on page xxii
- Requesting Technical Support on page xxii

## JUNOS Documentation and Release Notes

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

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

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## Objectives

---

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



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

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## Audience

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

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

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

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

## Supported Routing Platforms

---

For the features described in this manual, the JUNOS Software currently supports the following routing platforms:

- J Series
- M Series

- MX Series
- T Series

## Using the Indexes

---

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

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

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

## Using the Examples in This Manual

---

If you want to use the examples in this manual, you can use the **load merge** or the **load merge relative** command. These commands cause the software to merge the incoming configuration into the current candidate configuration. If the example configuration contains the top level of the hierarchy (or multiple hierarchies), the example is a *full example*. In this case, use the **load merge** command.

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

## Merging a Full Example

To merge a full example, follow these steps:

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

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

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

```
        address 10.0.0.1/24;
    }
}
}
```

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

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

## Merging a Snippet

To merge a snippet, follow these steps:

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

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

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

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

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

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

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

For more information about the **load** command, see the [Junos OS CLI User Guide](#).

---

## Documentation Conventions

Table 1 on page xxi 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 xxi defines the text and syntax conventions used in this guide.

Table 2: Text and Syntax Conventions

Convention	Description	Examples
<b>Bold text like this</b>	Represents text that you type.	To enter configuration mode, type the <b>configure</b> command:  <code>user@host&gt; configure</code>
Fixed-width text like this	Represents output that appears on the terminal screen.	<code>user@host&gt; show chassis alarms</code> <code>No alarms currently active</code>
<i>Italic text like this</i>	<ul style="list-style-type: none"> <li>Introduces important new terms.</li> <li>Identifies book names.</li> <li>Identifies RFC and Internet draft titles.</li> </ul>	<ul style="list-style-type: none"> <li>A policy <i>term</i> is a named structure that defines match conditions and actions.</li> <li><i>Junos OS System Basics Configuration Guide</i></li> <li>RFC 1997, <i>BGP Communities Attribute</i></li> </ul>
<i>Italic text like this</i>	Represents variables (options for which you substitute a value) in commands or configuration statements.	Configure the machine's domain name:  [edit] root@# <b>set system domain-name</b> <i>domain-name</i>
Text like this	Represents names of configuration statements, commands, files, and directories; interface names; configuration hierarchy levels; or labels on routing platform components.	<ul style="list-style-type: none"> <li>To configure a stub area, include the <b>stub</b> statement at the [edit protocols ospf area area-id] hierarchy level.</li> <li>The console port is labeled <b>CONSOLE</b>.</li> </ul>
< > (angle brackets)	Enclose optional keywords or variables.	<code>stub &lt;default-metric metric&gt;;</code>

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

Convention	Description	Examples
(pipe symbol)	Indicates a choice between the mutually exclusive keywords or variables on either side of the symbol. The set of choices is often enclosed in parentheses for clarity.	<b>broadcast   multicast</b>  <i>(string1   string2   string3)</i>
# (pound sign)	Indicates a comment specified on the same line as the configuration statement to which it applies.	<b>rsvp { # Required for dynamic MPLS only</b>
[ ] (square brackets)	Enclose a variable for which you can substitute one or more values.	<b>community name members [ community-ids ]</b>
Indentation and braces ( { } )	Identify a level in the configuration hierarchy.	<b>[edit]</b> <b>routing-options {</b> <b>static {</b> <b>route default {</b> <b>nexthop address;</b> <b>retain;</b> <b>}</b> <b>}</b> <b>}</b>
;(semicolon)	Identifies a leaf statement at a configuration hierarchy level.	
<b>J-Web GUI Conventions</b>		
<b>Bold text like this</b>	Represents J-Web graphical user interface (GUI) items you click or select.	<ul style="list-style-type: none"> <li>In the Logical Interfaces box, select <b>All Interfaces</b>.</li> <li>To cancel the configuration, click <b>Cancel</b>.</li> </ul>
> (bold right angle bracket)	Separates levels in a hierarchy of J-Web selections.	In the configuration editor hierarchy, select <b>Protocols&gt;Ospf</b> .

## Documentation Feedback

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

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- Search technical bulletins for relevant hardware and software notifications: <https://www.juniper.net/alerts/>
- Join and participate in the Juniper Networks Community Forum: <http://www.juniper.net/company/communities/>
- Open a case online in the CSC Case Management tool: <http://www.juniper.net/cm/>

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

## Opening a Case with JTAC

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

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

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





## PART 1

# E1/E3/T1/T3 Interfaces Configuration Statements Overview

- E1/E3/T1/T3 Interfaces Configuration Statements and Hierarchy on page 3



## CHAPTER 1

# E1/E3/T1/T3 Interfaces Configuration Statements and Hierarchy

The following network interfaces hierarchy listings show the complete configuration statement hierarchy for the indicated hierarchy levels, listing all possible configuration statements within the indicated hierarchy levels, and showing their level in the configuration hierarchy. When you are configuring the Junos OS, your current hierarchy level is shown in the banner on the line preceding the **user@host#** prompt.

This section contains the following topics:

- [edit interfaces] Hierarchy Level on page 3
- [edit logical-systems] Hierarchy Level on page 18

### [edit interfaces] Hierarchy Level

---

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



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

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

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

```

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

```

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

7

```
ima-group-options {
  differential-delay number;
  frame-length (32 | 64 | 128 | 256);
  frame-synchronization {
    alpha number;
    beta number;
    gamma number;
  }
  minimum-links number;
  symmetry (symmetrical-config-and-operation |
    symmetrical-config-asymmetrical-operation);
  test-procedure {
    ima-test-start;
    ima-test-stop;
    interface name;
    pattern number;
    period number;
  }
  transmit-clock (common | independent);
  version (1.0 | 1.1);
}
ima-link-options group-id group-id;
interface-set interface-set-name {
  interface ethernet-interface-name {
    (unit unit-number | vlan-tags-outer vlan-tag);
  }
  interface interface-name {
    (unit unit-number);
  }
}
isdn-options {
  bchannel-allocation (ascending | descending);
  calling-number number;
  pool pool-name <priority priority>;
  spid1 spid-string;
  spid2 spid-string;
  static-tei-val value;
  switch-type (att5e | etsi | ni1 | ntdms100 | ntt);
  t310 seconds;
  tei-option (first-call | power-up);
}
keepalives <down-count number> <interval seconds> <up-count number>;
link-mode mode;
lmi {
  lmi-type (ansi | itu);
  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);
    minimum-links number;
    mrru bytes;
    n391 number;
    n392 number;
    n393 number;
    red-differential-delay milliseconds;
    t391 seconds;
    t392 seconds;
    yellow-differential-delay milliseconds;
}
modem-options {
    dialin (console | routable);
    init-command-string initialization-command-string;
}
mtu bytes;
multiservice-options {
    (core-dump | no-core-dump);
    (syslog | no-syslog);
}
native-vlan-id number;
no-gratuitous-arp-request;
no-keepalives;
no-partition {
    interface-type type;
}
otn-options {
    fec (efec | gfec | none);
    (laser-enable | no-laser-enable);
    (line-loopback | no-line-loopback);
    pass-thru;
    rate (fixed-stuff-bytes | no-fixed-stuff-bytes | pass-thru);
    transmit-payload-type number;
    trigger (oc-lof | oc-lom | oc-los | oc-wavelength-lock | odu-ais | odu-bbe-th | odu-bdi
        | odu-es-th | odu-lck | odu-oci | odu-sd | odu-ses-th | odu-ttim | odu-uas-th |
        opu-ptm | otu-ais | otu-bbe-th | otu-bdi | otu-es-th | otu-fec-deg | otu-fec-exe |
        otu-iae | otu-sd | otu-ses-th | otu-ttim | otu-uas-th);
    tti;
}
optics-options {
    wavelength nm;
    alarm alarm-name {
        (syslog | link-down);
    }
    warning warning-name {

```

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

```

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

```

```
    lockout;
    neighbor address;
    paired-group group-name;
    preserve-interface;
    protect-circuit group-name;
    request;
    revert-time seconds;
    switching-mode (bidirectional | unidirectional);
    working-circuit group-name;
  }
  bytes {
    c2 value;
    e1-quiet value;
    f1 value;
    f2 value;
    s1 value;
    z3 value;
    z4 value;
  }
  fcs (16 | 32);
  loopback (local | remote);
  mpls {
    pop-all-labels {
      required-depth number;
    }
  }
  }
  path-trace trace-string;
  (payload-scrambler | no-payload-scrambler);
  rfc-2615;
  trigger {
    defect ignore;
    hold-time up milliseconds down milliseconds;
  }
  vtmapping (itu-t | klm);
  (z0-increment | no-z0-increment);
}
speed (10m | 100m | 1g | oc3 | oc12 | oc48);
stacked-vlan-tagging;
switch-options {
  switch-port port-number {
    (auto-negotiation | no-auto-negotiation);
    speed (10m | 100m | 1g);
    link-mode (full-duplex | half-duplex);
  }
}
}
t1-options {
  bert-algorithm algorithm;
  bert-error-rate rate;
  bert-period seconds;
  buildout value;
  byte-encoding (nx56 | nx64);
  crc-major-alarm-threshold (1e-3 | 5e-4 | 1e-4 | 5e-5 | 1e-5);
  crc-minor-alarm-threshold (1e-3 | 5e-4 | 1e-4 | 5e-5 | 1e-5 | 5e-6 | 1e-6);
  fcs (16 | 32);
  framing (esf | sf);
  idle-cycle-flag (flags | ones);
```

```

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

---

## [edit logical-systems] Hierarchy Level

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

```
logical-systems logical-system-name {
  interfaces interface-name {
```

```

unit logical-unit-number {
  accept-source-mac {
    mac-address mac-address {
      policer {
        input cos-policer-name;
        output cos-policer-name;
      }
    }
  }
  allow-any-vci;
  atm-scheduler-map (map-name | default);
  bandwidth rate;
  backup-options {
    interface interface-name;
  }
  cell-bundle-size cells;
  clear-dont-fragment-bit;
  compression {
    rtp {
      f-max-period number;
      port {
        minimum port-number;
        maximum port-number;
      }
      queues [ queue-numbers ];
    }
  }
  compression-device interface-name;
  description text;
  dial-options {
    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 ];  
}  
}  
}  
}
```





## PART 2

# Configuring E1, E3, T1, and T3 Interfaces

- [Configuring E1 Interfaces on page 27](#)
- [Configuring E3 Interfaces on page 35](#)
- [Configuring T1 Interfaces on page 43](#)
- [Configuring T3 Interfaces on page 53](#)



## CHAPTER 2

# Configuring E1 Interfaces

- E1 Interfaces Overview on page 27
- Configuring E1 Physical Interface Properties on page 28
- Configuring E1 BERT Properties on page 28
- Configuring the E1 Frame Checksum on page 29
- Configuring E1 Framing on page 29
- Configuring the E1 Idle Cycle Flag on page 30
- Configuring E1 Data Inversion on page 30
- Configuring E1 Loopback Capability on page 30
- Configuring E1 Start and End Flags on page 32
- Configuring Fractional E1 Time Slots on page 32

## E1 Interfaces Overview

---

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

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



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

---

## Configuring E1 Physical Interface Properties

---

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

```
[edit interfaces interface-name]  
e1-options {  
  bert-error-rate rate;  
  bert-period seconds;  
  fcs (16 | 32);  
  framing (g704 | g704-no-crc4 | unframed);  
  idle-cycle-flag (flags | ones);  
  invert-data;  
  loopback (local | remote);  
  start-end-flag (filler | shared);  
  timeslots time-slot-range;  
}
```

## Configuring E1 BERT Properties

---

This section discusses BERT properties for the E1 interface specifically. For general information about the Junos implementation of the BERT procedure, see Interface Diagnostics.

You can configure an E1 interface or a CE1 or E1 partition on a channelized PIC to execute a bit error rate test (BERT) when the interface receives a request to run this test. You specify the duration of the test and the error rate to include in the bit stream by including the **bert-period** and **bert-error-rate** statements at the **[edit interfaces *interface-name* e1-options]** hierarchy level:

```
[edit interfaces interface-name e1-options]  
bert-error-rate rate;  
bert-period seconds;
```

By default, the BERT period is 10 seconds. You can configure the BERT period to last from 1 through 239 seconds on some PICs and from 1 through 240 seconds on other PICs. Standard CE1, standard E1, E1 IQ, and E1 IQE interfaces, and PICs partitioned to CE1 and E1 channels, support an extended BERT period range, up to 86,400 seconds (24 hours), and have a default BERT period value of 240 seconds.



**NOTE:** When configuring E1 and CE1 interfaces on 10-port Channelized E1/T1 IQE PICs, the **bert-period** statement must be included at the **[edit interfaces *ce1-fpc/pic/port*]** hierarchy level.

**rate** is the bit error rate. This can be an integer from 0 through 7, which corresponds to a bit error rate from  $10^{-0}$  (0, which corresponds to no errors) to  $10^{-7}$  (1 error per 10 million bits). The default is 0.

Individual concatenated E1 interfaces do not support the **bert-algorithm** configuration statement. For individual concatenated E1 interfaces, the **bert-algorithm** statement at

the **[edit interfaces *interface-name* e1-options]** hierarchy level is ignored. The algorithm for the E1 BERT procedure is **pseudo-2e15-o151** (pattern is  $2^{15}-1$ , as defined in the CCITT/ITU O.151 standard).

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

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

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

```
[edit interfaces ce1-0/0/0 e1-options]
user@host# set bert-algorithm ?
Possible completions:
pseudo-2e11-o152 Pattern is 2^11 -1 (per O.152 standard)
pseudo-2e15-o151 Pattern is 2^15 - 1 (per O.152 standard)
pseudo-2e20-o151 Pattern is 2^20 - 1 (per O.151 standard)
pseudo-2e20-o153 Pattern is 2^20 - 1 (per O.153 standard)
```

## Configuring the E1 Frame Checksum

By default, the E1 interface supports a 16-bit checksum. You can configure a 32-bit checksum, which provides more reliable packet verification. However, some older equipment might not support 32-bit checksums.

To configure a 32-bit checksum, include the **fcs 32** statement at the **[edit interfaces *interface-name* e1-options]** hierarchy level:

```
[edit interfaces interface-name e1-options]
fcs 32;
```

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

```
[edit]
user@host# delete interfaces e1-fpc/pic/port e1-options fcs 32
```

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

```
[edit interfaces interface-name e1-options]
fcs 16;
```

## Configuring E1 Framing

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

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

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

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

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

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

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

---

## Configuring the E1 Idle Cycle Flag

By default, an E1 interface transmits the value 0x7E in the idle cycles. To have the interface transmit the value 0xFF (all ones) instead, include the **idle-cycle-flag** statement at the **[edit interfaces *interface-name* e1-options]** hierarchy level, specifying the **ones** option:

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

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

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

---

## Configuring E1 Data Inversion

By default, data inversion is disabled. To enable data inversion at the HDLC level, include the **invert-data** statement at the **[edit interfaces *interface-name* e1-options]** hierarchy level:

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

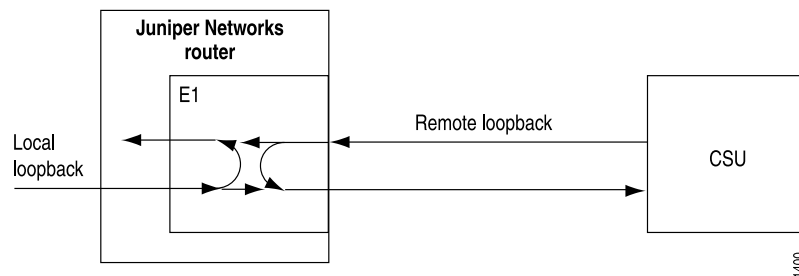
When you enable data inversion, all data bits in the data stream are transmitted inverted; that is, zeroes are transmitted as ones and ones as zeroes. Data inversion is normally used only in AMI mode to guarantee ones density in the transmitted stream.

---

## Configuring E1 Loopback Capability

You can configure loopback capability between the local E1 interface and the remote channel service unit (CSU), as shown in Figure 1 on page 31. You can configure the loopback to be local or remote. With local loopback, the E1 interface can transmit packets to the CSU, but receives its own transmission back again and ignores data from the CSU. With remote loopback, packets sent from the CSU are received by the E1 interface, forwarded if there is a valid route, and immediately retransmitted to the CSU.

Figure 1: Remote and Local E1 Loopback



To configure loopback capability on an E1 interface, include the **loopback** statement at the **[edit interfaces *interface-name* e1-options]** hierarchy level:

```
[edit interfaces interface-name e1-options]
loopback (local | remote);
```

Packets can be looped on either the local router or the remote CSU.

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](#). For more information about using operational mode commands to test interfaces, see the [Junos OS System Basics and Services Command Reference](#).

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

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

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

### Example: Configuring E1 Loopback Capability

To determine whether a problem is internal or external, 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* e1-options]** hierarchy level.

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

```
[edit interfaces]
e1-1/0/0 {
  no-keepalives;
  encapsulation cisco-hdlc;
  e1-options {
    loopback local;
```

```
    }  
    unit 0 {  
        family inet {  
            address 10.100.100.1/24;  
        }  
    }  
}
```

---

## Configuring E1 Start and End Flags

By default, start and end flags are shared.

To configure an E1 interface to wait two idle cycles between the start and end flags, include the **start-end-flag** statement with the **filler** option at the **[edit interfaces *interface-name* e1-options]** hierarchy level:

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

To revert to the default behavior, sharing the transmission of start and end flags, include the **start-end-flag** statement with the **shared** option at the **[edit interfaces *interface-name* e1-options]** hierarchy level:

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

---

## Configuring Fractional E1 Time Slots

By default, all the time slots on an E1 interface are used. To configure the number of time slots allocated to a fractional E1 interface, include the **timeslots** statement at the **[edit interfaces *interface-name* e1-options]** hierarchy level:

```
[edit interfaces interface-name e1-options]  
timeslots time-slot-range;
```

There are 32 time slots on an E1 interface. Time slot 0 is always reserved for framing and cannot be used to configure a fractional E1 interface.

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

- For 4-port E1 PICs, the configurable time slot range is 1 through 31 (time slot 0 is reserved for framing).
- For 10-port Channelized E1 and 10-port Channelized E1 Intelligent Queuing (IQ) PICs, the configurable time slot range is 2 through 32 (time slots 0 and 1 are reserved for framing).
- For Enhanced Intelligent Queuing (IQE) PICs, the configurable time slot range is 2 through 32.



- NxDSO time slots configured on either a channelized STM1 IQ interface or a channelized E1IQ interface are numbered from 1 to 31 (0 is reserved), while fractional E1 time slots are numbered from 2 to 32 (0 and 1 are reserved).
- For fractional E1 interfaces only, if you connect a 4-port E1 PIC to a device that uses time slot numbering from 2 through 32, you must subtract 1 from the configured number of time slots. To do this, include the **timeslots** statement at the **[edit interfaces interface-name e1-options]** hierarchy level, and offset 1 from the specified slot number.



**NOTE:** When configuring fractional E1 time slots, you also must include the **framing g704** statement at the **[edit interfaces e1-fpc/port e1-options]** hierarchy level.

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

### Example: Configuring Fractional E1 Time Slots

In this example, time slots are offset by 1 to compensate for the fractional E1 interface being connected to a device that uses time slot numbering from 0 through 31.

Use Time Slots 4 Through 6, 11, and 25	[edit interfaces interface-name e1-options] # Fractional E1 interface timeslots 4-6,11,25;
Use Time Slots 1 Through 10	[edit interfaces interface-name e1-options] timeslots 1-10;
Use Time Slots 1 Through 5, 10, and 24	[edit interfaces interface-name e1-options] timeslots 1-5,10,24;



## CHAPTER 3

# Configuring E3 Interfaces

- E3 Interfaces Overview on page 35
- Configuring E3 Physical Interface Properties on page 36
- Configuring E3 BERT Properties on page 36
- Configuring the E3 CSU Compatibility Mode on page 37
- Configuring the E3 Frame Checksum on page 38
- Configuring the E3 Idle Cycle Flag on page 39
- Configuring E3 Data Inversion on page 39
- Configuring E3 Loopback Capability on page 39
- Configuring E3 HDLC Payload Scrambling on page 41
- Configuring the E3 Start and End Flags on page 41
- Configuring E3 IQ and IQE Unframed Mode on page 41

### E3 Interfaces Overview

---

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

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

The Junos OS supports the E3 Physical Interface Card (PIC) and the E3 Intelligent Queuing (IQ and IQE) PICs. The E3 IQ and E3 IQE PICs supports transmission scheduling on logical interfaces. For more information, see the [Junos OS Class of Service Configuration Guide](#).



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

## Configuring E3 Physical Interface Properties

---

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

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

## Configuring E3 BERT Properties

---

This section discusses BERT properties for the E3 interface specifically. For general information about the Junos implementation of the BERT procedure, see Interface Diagnostics.

You can configure an E3 interface to execute a bit error rate test (BERT) when the interface receives a request to run this test. You specify the duration of the test, the pattern to send in the bit stream, and the error rate to include in the bit stream by including the **bert-period**, **bert-algorithm**, and **bert-error-rate** statements at the **[edit interfaces *interface-name* e3-options]** hierarchy level:

```
[edit interfaces interface-name e3-options]  
bert-algorithm algorithm;  
bert-error-rate rate;  
bert-period seconds;
```

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

**rate** is the bit error rate. This can be an integer from 0 through 7, which corresponds to a bit error rate from  $10^{-0}$  (0, which corresponds to no errors) to  $10^{-7}$  (1 error per 10 million bits).

**algorithm** is the pattern to send in the bit stream. On E3 interfaces, you can also select the pattern to send in the bit stream by including the **bert-algorithm** statement at the **[edit interfaces *interface-name* *interface-options*]** hierarchy level:

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

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

```
[edit interfaces e3-0/0/0 e3-options]
user@host# set bert-algorithm ?
Possible completions:
pseudo-2e11-o152 Pattern is 2^11 - 1 (per O.152 standard)
pseudo-2e15-o151 Pattern is 2^15 - 1 (per O.152 standard)
pseudo-2e20-o151 Pattern is 2^20 - 1 (per O.151 standard)
pseudo-2e20-o153 Pattern is 2^20 - 1 (per O.153 standard)
```

For specific hierarchy information, see individual interface types. For information about running the BERT procedure, see the *Junos OS System Basics and Services Command Reference*.

## Configuring the E3 CSU Compatibility Mode

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

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



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

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

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

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

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

- For Kentrox CSUs, specify the subrate as a number from 1 through 48 that exactly matches the value configured on the CSU. Each increment of the subrate value corresponds to a rate increment of about 0.5 Mbps.
- For Digital Link CSUs, you can specify the subrate value to match the data rate configured on the CSU in the format `xkb` or `x.xMb`. You can configure the subrate values shown in Table 3 on page 38.
- Larscom CSUs do not support the E3 subrate.

Table 3: Subrate Values for E3 Digital Link Compatibility Mode

358 Kbps	7.2 Mbps	14.0 Mbps	20.8 Mbps	27.6 Mbps
716 Kbps	7.5 Mbps	14.3 Mbps	21.1 Mbps	27.9 Mbps
1.1 Mbps	7.9 Mbps	14.7 Mbps	21.5 Mbps	28.3 Mbps
1.4 Mbps	8.2 Mbps	15.0 Mbps	21.8 Mbps	28.6 Mbps
1.8 Mbps	8.6 Mbps	15.4 Mbps	22.2 Mbps	29.0 Mbps
2.1 Mbps	9.0 Mbps	15.8 Mbps	22.6 Mbps	29.4 Mbps
2.5 Mbps	9.3 Mbps	16.1 Mbps	22.9 Mbps	29.7 Mbps
2.9 Mbps	9.7 Mbps	16.5 Mbps	23.3 Mbps	30.1 Mbps
3.2 Mbps	10.0 Mbps	16.8 Mbps	23.6 Mbps	30.4 Mbps
3.6 Mbps	10.4 Mbps	17.2 Mbps	24.0 Mbps	30.8 Mbps
3.9 Mbps	10.7 Mbps	17.5 Mbps	24.3 Mbps	31.1 Mbps
4.3 Mbps	11.1 Mbps	17.9 Mbps	24.7 Mbps	31.5 Mbps
4.7 Mbps	11.5 Mbps	18.3 Mbps	25.1 Mbps	31.9 Mbps
5.0 Mbps	11.8 Mbps	18.6 Mbps	25.4 Mbps	32.2 Mbps
5.4 Mbps	12.2 Mbps	19.0 Mbps	25.8 Mbps	32.6 Mbps
5.7 Mbps	12.5 Mbps	19.3 Mbps	26.1 Mbps	32.9 Mbps
6.1 Mbps	12.9 Mbps	19.7 Mbps	26.5 Mbps	33.3 Mbps
6.4 Mbps	13.2 Mbps	20.0 Mbps	26.9 Mbps	33.7 Mbps
6.8 Mbps	13.6 Mbps	20.4 Mbps	27.2 Mbps	

For information about subrating a T3 interface, see “Configuring the T3 CSU Compatibility Mode” on page 56.

## Configuring the E3 Frame Checksum

You can configure a 32-bit checksum, which provides more reliable packet verification. However, some older equipment might not support 32-bit checksums.

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

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

```
[edit interfaces interface-name e3-options]  
fcs 32;
```

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

```
[edit]  
user@host# delete interfaces e3-fpc/pic/port e3-options fcs 32
```

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

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

---

## Configuring the E3 Idle Cycle Flag

By default, an E3 interface transmits the value 0x7E in the idle cycles. To have the interface transmit the value 0xFF (all ones) instead, include the **idle-cycle-flag** statement at the **[edit interfaces *interface-name* e3-options]** hierarchy level, specifying the **ones** option:

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

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

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

---

## Configuring E3 Data Inversion

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

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

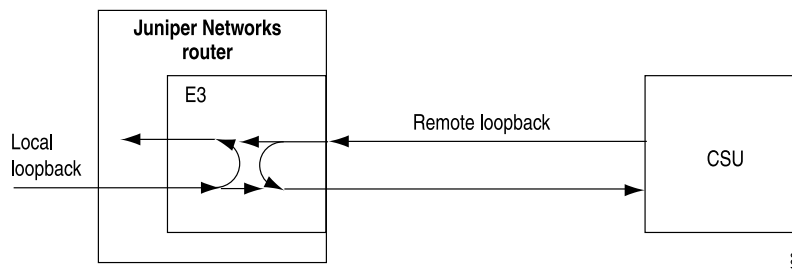
When you enable data inversion, unused data bits in the data stream are transmitted inverted; that is, zeroes are transmitted as ones and ones as zeroes. Enable inversion to be compatible with another vendor's E3 interface.

---

## Configuring E3 Loopback Capability

You can configure loopback capability between the local E3 interface and the remote CSU. You can configure the loopback to be local or remote. With local loopback, the E3 interface can transmit packets to the CSU, but receives its own transmission back again and ignores data from the CSU. With remote loopback, packets sent from the CSU are received by the E3 interface, forwarded if there is a valid route, and immediately retransmitted to the CSU (see Figure 2 on page 40).

Figure 2: Remote and Local E3 Loopback



To configure loopback capability on an E3 interface, include the **loopback** statement at the **[edit interfaces *interface-name* e3-options]** hierarchy level:

```
[edit interfaces interface-name e3-options]
loopback (local | remote);
```

Packets can be looped on either the local router or the remote CSU.

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](#). For more information about using operational mode commands to test interfaces, see the [Junos OS System Basics and Services Command Reference](#).

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

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

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

### Example: Configuring E3 Loopback Capability

To determine whether a problem is internal or external, 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* e3-options]** hierarchy level. With this configuration, the link stays up, so you can loop ping packets to a remote router. The **loopback local** statement causes the interface to loop within the PIC just before the data reaches the transceiver.

```
[edit interfaces]
e3-1/0/0 {
  no-keepalives;
  encapsulation cisco-hdlc;
  e3-options {
    loopback local;
  }
}
```



```

unit 0 {
  family inet {
    address 10.100.100.1/24;
  }
}

```

## Configuring E3 HDLC Payload Scrambling

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

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

```

[edit interfaces interface-name e3-options]
payload-scrambler;

```

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

```

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

```

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

```

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

```

## Configuring the E3 Start and End Flags

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

To configure an E3 interface to wait two idle cycles between the start and end flags, include the **start-end-flag** statement with the **filler** option at the **[edit interfaces *interface-name* e3-options]** hierarchy level:

```

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

```

To revert to the default behavior, sharing the transmission of start and end flags, include the **start-end-flag** statement with the **shared** option at the **[edit interfaces *interface-name* e3-options]** hierarchy level:

```

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

```

## Configuring E3 IQ and IQE Unframed Mode

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

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

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

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

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

## CHAPTER 4

# Configuring T1 Interfaces

- T1 Interfaces Overview on page 43
- Configuring T1 Physical Interface Properties on page 44
- Configuring T1 BERT Properties on page 44
- Configuring the T1 Buildout on page 45
- Configuring T1 Byte Encoding on page 45
- Configuring T1 CRC Error Major Alarm Thresholds on page 46
- Configuring T1 CRC Error Minor Alarm Thresholds on page 46
- Configuring T1 Data Inversion on page 47
- Configuring the T1 Frame Checksum on page 47
- Configuring the T1 Remote Loopback Response on page 47
- Configuring T1 Framing on page 48
- Configuring T1 Line Encoding on page 48
- Configuring T1 Loopback Capability on page 48
- Configuring the T1 Idle Cycle Flag on page 50
- Configuring T1 Start and End Flags on page 50
- Configuring Fractional T1 Time Slots on page 51

## T1 Interfaces Overview

---

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

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

## Configuring T1 Physical Interface Properties

---

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

```
[edit interfaces interface-name]  
t1-options {  
  bert-algorithm algorithm;  
  bert-error-rate rate;  
  bert-period seconds;  
  buildout value;  
  byte-encoding (nx56 | nx64);  
  crc-major-alarm-threshold (1e-3 | 5e-4 | 1e-4 | 5e-5 | 1e-5);  
  crc-minor-alarm-threshold (1e-3 | 5e-4 | 1e-4 | 5e-5 | 1e-5 | 5e-6 | 1e-6);  
  fcs (16 | 32);  
  framing (esf | sf);  
  idle-cycle-flag (flags | ones);  
  invert-data;  
  line-encoding (ami | b8zs);  
  loopback (local | payload | remote);  
  remote-loopback-respond;  
  start-end-flag (filler | shared);  
  timeslots time-slot-range;  
}
```

## Configuring T1 BERT Properties

---

This section discusses BERT properties for the T1 interface specifically. For general information about the Junos implementation of the BERT procedure, see Interface Diagnostics.

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

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

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



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

---

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

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

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

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

```
[edit interfaces t1-0/0/0 t1-options]  
user@host# set bert-algorithm ?  
Possible completions:  
pseudo-2e11-o152 Pattern is 2^11 - 1 (per O.152 standard)  
pseudo-2e15-o151 Pattern is 2^15 - 1 (per O.152 standard)  
pseudo-2e20-o151 Pattern is 2^20 - 1 (per O.151 standard)  
pseudo-2e20-o153 Pattern is 2^20 - 1 (per O.153 standard)
```

For specific hierarchy information, see individual interface types. For information about running the BERT procedure, see the [Junos OS System Basics and Services Command Reference](#).

---

## Configuring the T1 Buildout

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

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

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

---

## Configuring T1 Byte Encoding

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

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

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

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

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

**byte-encoding nx64;**

## Configuring T1 CRC Error Major Alarm Thresholds

---

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

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

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

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

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

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

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

## Configuring T1 CRC Error Minor Alarm Thresholds

---

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

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

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

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

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

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

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

## Configuring T1 Data Inversion

---

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

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

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

## Configuring the T1 Frame Checksum

---

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

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

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

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

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

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

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

## Configuring the T1 Remote Loopback Response

---

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

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

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

## Configuring T1 Framing

---

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

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

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

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

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

## Configuring T1 Line Encoding

---

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

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

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

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

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

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

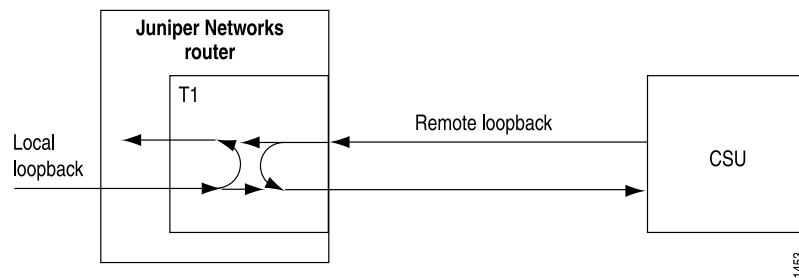
## Configuring T1 Loopback Capability

---

You can configure loopback capability between the local T1 interface and the remote channel service unit (CSU), as shown in Figure 3 on page 49. You can configure the loopback to be local or remote. With local loopback, the T1 interface can transmit packets to the CSU, but receives its own transmission back again and ignores data from the CSU. With remote loopback, packets sent from the CSU are received by the T1 interface, forwarded if there is a valid route, and immediately retransmitted to the CSU.



Figure 3: Remote and Local T1 Loopback



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

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

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

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

For more information about configuring BERT, see *Interface Diagnostics*. For more information about using operational mode commands to test interfaces, see the [Junos OS System Basics and Services Command Reference](#).

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

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

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

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

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

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

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

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

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

---

## Configuring the T1 Idle Cycle Flag

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

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

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

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

---

## Configuring T1 Start and End Flags

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

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

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

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

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

## Configuring Fractional T1 Time Slots

---

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

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

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

### Example: Configuring Fractional T1 Time Slots

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



## CHAPTER 5

# Configuring T3 Interfaces

- T3 Interfaces Overview on page 53
- Configuring T3 Physical Interface Properties on page 54
- Configuring T3 BERT Properties on page 54
- Disabling T3 C-Bit Parity Mode on page 55
- Configuring the T3 CSU Compatibility Mode on page 56
- Configuring the T3 Frame Checksum on page 58
- Configuring the T3 FEAC Response on page 59
- Configuring the T3 Idle Cycle Flag on page 59
- Configuring the T3 Line Buildout on page 60
- Configuring T3 Loopback Capability on page 60
- Configuring T3 HDLC Payload Scrambling on page 62
- Configuring T3 Start and End Flags on page 62
- Examples: Configuring T3 Interfaces on page 63

### 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

## 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;  
}
```

## 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.

You can configure a T3 interface to execute a bit error rate test (BERT) when the interface receives a request to run this test. You specify the duration of the test, the pattern to send in the bit stream, and the error rate to include in the bit stream by including the **bert-period**, **bert-algorithm**, and **bert-error-rate** statements at the **[edit interfaces *interface-name* t3-options]** hierarchy level:

```
[edit interfaces interface-name t3-options]  
bert-algorithm algorithm;  
bert-error-rate rate;  
bert-period seconds;
```

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

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

**algorithm** is the pattern to send in the bit stream. The default algorithm for the DS3 BERT procedure is **pseudo-2e15-o151** (pattern is  $2^{15}-1$ , as defined in the CCITT/ITU O.151 standard).

On T3 interfaces, you can also select the pattern to send in the bit stream by including the **bert-algorithm** statement at the **[edit interfaces *interface-name* *interface-options*]** hierarchy level:

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

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

```
[edit interfaces t3-0/0/0 t3-options]
user@host# set bert-algorithm ?
Possible completions:
all-ones-repeating Repeating one bits
all-zeros-repeating Repeating zero bits
alternating-double-ones-zeros Alternating pairs of ones and zeros
alternating-ones-zeros Alternating ones and zeros
pseudo-2e10 Pattern is 2^10 - 1
...
```

For specific hierarchy information, see individual interface types. For information about running the BERT procedure, see the *Junos OS System Basics and Services Command Reference*.

## Disabling T3 C-Bit Parity Mode

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

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

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



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

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

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

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

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

## Configuring the T3 CSU Compatibility Mode

---

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

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



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

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

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

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

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

- For Adtran CSUs, specify the subrate as a number from 1 through 588 that exactly matches the value configured on the CSU. A subrate value of 588 corresponds to 44.2 Mbps, or 100 percent of the HDLC-encapsulated payload. A subrate value of 1 corresponds to  $44.2 / 588$ , which is 75.17 Kbps, or 0.17 percent of the HDLC-encapsulated payload.
- For Digital Link CSUs, specify the subrate as the data rate you configured on the CSU in the format xKb or x.xMb. For Digital Link CSUs, you can specify the subrate value to match the data rate configured on the CSU in the format **xkb** or **x.xMb**. You can configure the subrate values shown in Table 4 on page 57.
- 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  $28 \times 1.578$  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  $20 \times 1.578$  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 4: Subrate Values for T3 Digital Link Compatibility Mode**

301 Kbps	9.3 Mbps	18.3 Mbps	27.4 Mbps	36.4 Mbps
601 Kbps	9.6 Mbps	18.6 Mbps	27.7 Mbps	36.7 Mbps
902 Kbps	9.9 Mbps	18.9 Mbps	28.0 Mbps	37.0 Mbps
1.2 Mbps	10.2 Mbps	19.2 Mbps	28.3 Mbps	37.3 Mbps
1.5 Mbps	10.5 Mbps	19.5 Mbps	28.6 Mbps	37.6 Mbps
1.8 Mbps	10.8 Mbps	19.8 Mbps	28.9 Mbps	37.9 Mbps
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 4: 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” on page 37.

## 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;
```

## 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;
```

## 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;
```

## 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;
```

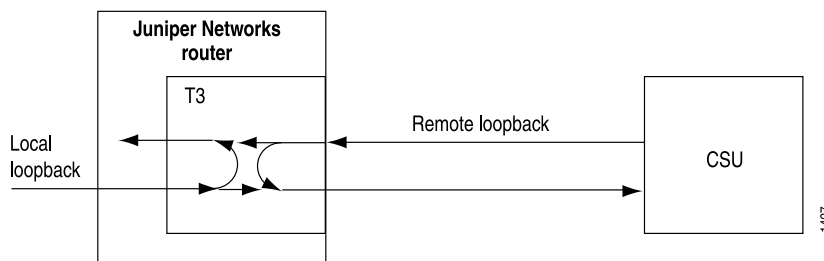
To explicitly configure the default short line buildout, include the **no-long-buildout** statement at the **[edit interfaces *interface-name* t3-options]** hierarchy level:

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

## Configuring T3 Loopback Capability

You can configure loopback capability between the local T3 interface and the remote CSU, as shown in Figure 4 on page 60. You can configure the loopback to be local or remote. With local loopback, the T3 interface can transmit packets to the CSU, but receives its own transmission back again and ignores data from the CSU. With remote loopback, packets sent from the CSU are received by the T3 interface, forwarded if there is a valid route, and immediately retransmitted to the CSU.

Figure 4: Remote and Local T3 Loopback



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

```
[edit interfaces interface-name t3-options]
loopback (local | payload | remote);
```

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

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

For more information about configuring BERT, see Interface Diagnostics. For more information about using operational mode commands to test interfaces, see the *Junos OS System Basics and Services Command Reference*.

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.

---

## 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 56.

```
[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/port t3-options payload-scrambler
```

---

## 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;
```

## 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;  
  }  
}
```



## PART 3

# E1/E3/T1/T3 Configuration Statements

- Summary of E1/E3/T1/T3 Interfaces Configuration Statements on page 69



## CHAPTER 6

# Summary of E1/E3/T1/T3 Interfaces Configuration Statements

The following descriptions explain each of the interface configuration statements. The statements are organized alphabetically.

## bert-algorithm

**Syntax** `bert-algorithm algorithm;`

**Hierarchy Level** `[edit interfaces ce1-fpc/pic/port],`  
`[edit interfaces ct1-fpc/pic/port],`  
`[edit interfaces interface-name ds0-options],`  
`[edit interfaces interface-name e1-options],`  
`[edit interfaces interface-name e3-options],`  
`[edit interfaces interface-name t1-options],`  
`[edit interfaces interface-name t3-options]`

**Release Information** Statement introduced before Junos OS Release 7.4.

**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** `algorithm`—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:

- `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

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

<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• Interface Diagnostics</li><li>• Configuring E1 BERT Properties on page 28</li><li>• Configuring E3 BERT Properties on page 36</li><li>• Configuring T1 BERT Properties on page 44</li><li>• Configuring T3 BERT Properties on page 54</li><li>• Examples: Configuring T3 Interfaces on page 63</li><li>• <b>bert-error-rate</b> on page 72</li><li>• <b>bert-period</b> on page 73</li></ul>
------------------------------	--

## bert-error-rate

---

<b>Syntax</b>	<code>bert-error-rate rate;</code>
<b>Hierarchy Level</b>	[edit interfaces <i>ce1-fpc/pic/port</i> ], [edit interfaces <i>ct1-fpc/pic/port</i> ], [edit interfaces <i>interface-name</i> <i>ds0-options</i> ], [edit interfaces <i>interface-name</i> <i>e1-options</i> ], [edit interfaces <i>interface-name</i> <i>e3-options</i> ], [edit interfaces <i>interface-name</i> <i>t1-options</i> ], [edit interfaces <i>interface-name</i> <i>t3-options</i> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	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.

<b>Options</b>	<b>rate</b> —Bit error rate. <b>Range:</b> 0 through 7, which corresponds to $10^{-1}$ (1 error per bit) to $10^{-7}$ (1 error per 10 million bits) <b>Default:</b> 0
<b>Required Privilege Level</b>	<b>interface</b> —To view this statement in the configuration. <b>interface-control</b> —To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• Interface Diagnostics</li><li>• Configuring E1 BERT Properties on page 28</li><li>• Configuring E3 BERT Properties on page 36</li><li>• Configuring T1 BERT Properties on page 44</li><li>• Configuring T3 BERT Properties on page 54</li><li>• Examples: Configuring T3 Interfaces on page 63</li><li>• <b>bert-algorithm</b> on page 70</li><li>• <b>bert-period</b> on page 73</li></ul>




## bert-period

<b>Syntax</b>	<code>bert-period <i>seconds</i>;</code>
<b>Hierarchy Level</b>	<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> <i>e3-options</i>],</code> <code>[edit interfaces <i>interface-name</i> <i>t1-options</i>],</code> <code>[edit interfaces <i>interface-name</i> <i>t3-options</i>]</code>
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	<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: 10px;">  <p><b>NOTE:</b> 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>
<b>Options</b>	<p><b><i>seconds</i></b>—Test duration. Range and default values vary by interface type.</p> <p><b>Range:</b></p> <ul style="list-style-type: none"> <li>PIC-dependent—Normal BERT period: either 1 through 239 seconds or 1 through 240 seconds</li> <li>PIC-dependent—Extended BERT period: from 1 through 86,400 seconds</li> </ul> <p><b>Default:</b></p> <ul style="list-style-type: none"> <li>Normal BERT period: 10 seconds</li> <li>Extended BERT period (on supported E1 interfaces): 10 seconds</li> <li>Extended BERT period (on supported T1 interfaces): 240 seconds</li> </ul>
<b>Required Privilege Level</b>	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>Interface Diagnostics</li> <li>Configuring E1 BERT Properties on page 28</li> <li>Configuring E3 BERT Properties on page 36</li> </ul>

- Configuring T1 BERT Properties on page 44
- Configuring T3 BERT Properties on page 54
- **bert-algorithm** on page 70
- **bert-error-rate** on page 72

## buildout (T1 Interfaces)

---

<b>Syntax</b>	<code>buildout value;</code>
<b>Hierarchy Level</b>	<code>[edit interfaces ct1-fpc/pic/port]</code> <code>[edit interfaces interface-name t1-options]</code>
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	For T1 interfaces, set the buildout value.
	<div><b>NOTE:</b> When configuring CT1 interfaces on 10-port Channelized E1/T1 IQE PICs, the <b>buildout</b> statement must be included at the hierarchy level.</div>
<b>Default</b>	The default buildout value is 0 through 132 feet.
<b>Options</b>	You can set the buildout value to one of the following: <ul style="list-style-type: none"><li>• <b>0-132</b>—0 through 132 feet (0 through 40 meters)</li><li>• <b>133-265</b>—133 through 265 feet (40 through 81 meters)</li><li>• <b>266-398</b>—266 through 398 feet (81 through 121 meters)</li><li>• <b>399-531</b>—399 through 531 feet (121 through 162 meters)</li><li>• <b>532-655</b>—532 through 655 feet (162 through 200 meters)</li><li>• <b>long-0db</b>—For J Series routers only, long buildout with 0 decibel (dB) transmit attenuation</li><li>• <b>long-7.5db</b>—For J Series routers only, long buildout with 7.5 dB transmit attenuation</li><li>• <b>long-15db</b>—For J Series routers only, long buildout with 15 dB transmit attenuation</li><li>• <b>long-22.5db</b>—For J Series routers only, long buildout with 22.5 dB transmit attenuation</li></ul>
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• Configuring the T1 Buildout on page 45</li><li>• <i>Junos OS Interfaces and Routing Configuration Guide</i></li></ul>

## byte-encoding

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



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



<b>Default</b>	The default byte encoding is 8 bits per byte (nx64).
<b>Options</b>	nx56—Use 7 bits per byte.  nx64—Use 8 bits per byte.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>Configuring T1 Byte Encoding on page 45</li> </ul>

## cbit-parity

---

<b>Syntax</b>	(cbit-parity   no-cbit-parity);
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> t3-options]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	For T3 interfaces only, enable or disable C-bit parity mode, which controls the type of framing that is present on the transmitted T3 signal. When C-bit parity mode is enabled, the C-bit positions are used for the far-end block error (FEBE), far-end alarm and control (FEAC), terminal data link, path parity, and mode indicator bits, as defined in ANSI T1.107a-1989. For ATM and ATM2 IQ2 and IQ2-E interfaces, M23 framing is used when the <b>no-cbit-parity</b> statement is included. For all other interfaces, M13 framing is used when the <b>no-cbit-parity</b> statement is included.
<b>Default</b>	C-bit parity mode is enabled.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• Configuring E3 and T3 Parameters on ATM Interfaces</li><li>• Disabling T3 C-Bit Parity Mode on page 55</li></ul>

## compatibility-mode

<b>Syntax</b>	<code>compatibility-mode (adtran   digital-link   kentrox   larscom   verilink) &lt;subrate value&gt;;</code>
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> e3-options], [edit interfaces <i>interface-name</i> t3-options]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	Configure the E3 or T3 interface to be compatible with the channel service unit (CSU) at the remote end of the line.
	<div>  <p><b>NOTE:</b> 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>
<b>Default</b>	If you omit this option, the full E3 or T3 rate is used.
<b>Options</b>	<p><b>adtran</b>—For T3 IQ interfaces only, configure compatibility with Adtran CSUs.</p> <p><b>digital-link</b>—Configure compatibility with Digital Link CSUs. If you include this option on an E3 interface, you must also disable payload scrambling.</p> <p><b>kentrox</b>—Configure compatibility with Kentrox CSUs. Kentrox subrate is valid for E3 IQ and T3 IQ interfaces only.</p> <p><b>larscom</b>—For T3 and T3 IQ interfaces only, configure compatibility with Larscom CSUs.</p> <p><b>verilink</b>—For T3 IQ and T3 IQE interfaces only, configure compatibility with Verilink CSUs.</p> <div>  <p><b>NOTE:</b> Verilink configuration is not functional if an IQ interface is paired with an IQE interface.</p> </div> <p><b>subrate value</b>—Subrate of the E3 or T3 line.</p> <p><b>Range:</b> 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>
<b>Required Privilege Level</b>	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>Configuring the E3 CSU Compatibility Mode on page 37</li> <li>Configuring the T3 CSU Compatibility Mode on page 56</li> <li><code>payload-scrambler</code> on page 91</li> </ul>

## crc-major-alarm-threshold

---

<b>Syntax</b>	crc-major-alarm-threshold (1e-3   5e-4   1e-4   5e-5   1e-5);
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> t1-options]
<b>Release Information</b>	Statement introduced in Junos OS Release 8.5.
<b>Description</b>	Major alarm error thresholds for T1 CRC errors. When the threshold is exceeded for one second, a defect condition is declared. If the defect condition continues for the monitoring period, an alarm condition is declared.
<b>Default</b>	10-second monitoring period for all settings except 1e-5. The 1e-5 value uses a 50-second monitoring period.
<b>Options</b>	<b>rate</b> —Error rate expressed as the number of errors per number of bits. The value 1e-3 is one error in 10 <sup>-3</sup> bits and 5e-4 is five errors in 10 <sup>-4</sup> bits. <b>Default:</b> 5e-5
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>Configuring T1 CRC Error Major Alarm Thresholds on page 46</li></ul>

## crc-minor-alarm-threshold

---

<b>Syntax</b>	crc-minor-alarm-threshold (1e-3   5e-4   1e-4   5e-5   1e-5   5e-6   1e-6);
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> t1-options]
<b>Release Information</b>	Statement introduced in Junos OS Release 8.5.
<b>Description</b>	Minor alarm error thresholds for T1 CRC errors. When the threshold is exceeded for one second, a defect condition is declared. If the defect condition continues for the monitoring period, an alarm condition is declared.
<b>Default</b>	10-second monitoring period for values 1e-3, 5e-4, 1e-4, and 5e-5. The 1e-5 value uses a 50-second monitoring period. The 5e-6 value uses a 100-second monitoring period. The 1e-6 value uses a 500-second monitoring period.
<b>Options</b>	<b>rate</b> —Error rate expressed as the number of errors per number of bits. The value 1e-3 is one error in 10 <sup>-3</sup> bits and 5e-4 is five errors in 10 <sup>-4</sup> bits. <b>Default:</b> 5e-6
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>Configuring T1 CRC Error Minor Alarm Thresholds on page 46</li></ul>

## e1-options

---

<b>Syntax</b>	<pre>e1-options {     bert-algorithm <i>algorithm</i>;     bert-error-rate <i>rate</i>;     bert-period <i>seconds</i>;     fcs (16   32);     framing (g704   g704-no-crc4   unframed);     idle-cycle-flag (flags   ones);     invert-data;     loopback (local   remote);     start-end-flag (filler   shared);     timeslots <i>time-slot-range</i>; }</pre>
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	<p>Configure E1-specific physical interface properties.</p> <p>The statements are explained separately.</p>
<b>Required Privilege Level</b>	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• Channelized E1 IQ and IQE Interfaces Overview</li><li>• Channelized STM1 Interfaces Overview</li><li>• E1 Interfaces Overview on page 27</li><li>• T1 Interfaces Overview on page 43</li></ul>



## e3-options

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

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

**Release Information**    Statement introduced before Junos OS Release 7.4.

**Description**    Configure E3-specific physical interface properties.

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

The statements are explained separately.


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

**Related Documentation**

- E3 Interfaces Overview on page 35
- T3 Interfaces Overview on page 53
- atm-options

## fcs

---

<b>Syntax</b>	fcs (16   32);
<b>Hierarchy Level</b>	[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]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	<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 <b>fcs</b> statement is not supported. To configure FCS on each DS3 channel, you must include the <b>t3-options fcs</b> 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> <b>NOTE:</b> When configuring E1 or T1 interfaces on 10-port Channelized E1/T1 IQE PICs, the <b>fcs</b> 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.</div>
<b>Options</b>	<p><b>16</b>—Use a 16-bit frame checksum on the interface.</p> <p><b>32</b>—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><b>Default:</b> 16</p>
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• Configuring the E1 Frame Checksum on page 29</li><li>• Configuring the E3 Frame Checksum on page 38</li><li>• Configuring the SONET/SDH Frame Checksum</li><li>• Configuring the T1 Frame Checksum on page 47</li><li>• Configuring the T3 Frame Checksum on page 58</li></ul>


## feac-loop-respond

---

<b>Syntax</b>	(feac-loop-respond   no-feac-loop-respond);
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> t3-options]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	<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 <b>loopback</b> statement, the router does not respond to FEAC requests from the CSU even if you include the <b>feac-loop-respond</b> statement in the configuration. For the router to respond, you must delete the <b>loopback</b> 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>
<b>Default</b>	The router does not respond to FEAC requests.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• Configuring the T3 FEAC Response on page 59</li><li>• loopback (ADSL, DS0, E1/E3, SONET/SDH, SHDSL, and T1/T3) on page 89</li><li>• remote-loopback-respond on page 92</li></ul>

## framing (E1, E3, and T1 Interfaces)

---

<b>Syntax</b>	framing (g704   g704-no-crc4   g.751   g.832   unframed   sf   esf);
<b>Hierarchy Level</b>	[edit interfaces ce1- <i>fpc/pic/port</i> ], [edit interfaces ct1- <i>fpc/pic/port</i> ], [edit interfaces at- <i>fpc/pic/port</i> e3-options], [edit interfaces e1- <i>fpc/pic/port</i> e1-options], [edit interfaces t1- <i>fpc/pic/port</i> t1-options]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	Configure the framing format.
	<div><p><b>NOTE:</b> When configuring CE1 or CT1 interfaces on 10-port Channelized E1/T1 IQE PICs, the framing statement must be included at the [edit interfaces ce1-<i>fpc/pic/port</i>] or [edit interfaces ct1-<i>fpc/pic/port</i>] hierarchy level as appropriate.</p></div>
<b>Default</b>	<b>esf</b> for T1 interfaces; <b>g704</b> for E1 interfaces. There is no default value for E3 over ATM interfaces.
<b>Options</b>	<b>esf</b> —Extended superframe (ESF) mode for T1 interfaces.  <b>g704</b> —G.704 framing format for E1 interfaces.  <b>g704-no-crc4</b> —G.704 framing with no cyclic redundancy check 4 (CRC4) for E1 interfaces.  <b>g.751</b> —G.751 framing format for E3 over ATM interfaces.  <b>g.832</b> —G.832 framing format for E3 over ATM interfaces.  <b>sf</b> —Superframe (SF) mode for T1 interfaces.  <b>unframed</b> —Unframed mode for E1 interfaces.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>Configuring E1 Framing on page 29</li><li>Configuring E3 and T3 Parameters on ATM Interfaces</li><li>Configuring T1 Framing on page 48</li></ul>

## idle-cycle-flag

<b>Syntax</b>	<code>idle-cycle-flag <i>value</i>;</code>
<b>Hierarchy Level</b>	<code>[edit interfaces e1-<i>fpc/pic/port</i>],</code> <code>[edit interfaces t1-<i>fpc/pic/port</i>],</code> <code>[edit interfaces <i>interface-name</i> ds0-options],</code> <code>[edit interfaces <i>interface-name</i> e1-options],</code> <code>[edit interfaces <i>interface-name</i> e3-options],</code> <code>[edit interfaces <i>interface-name</i> serial-options],</code> <code>[edit interfaces <i>interface-name</i> t1-options],</code> <code>[edit interfaces <i>interface-name</i> t3-options]</code>
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	Configure the value that the DS0, E1, E3, T1, or T3 interface transmits during idle cycles.



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

<b>Options</b>	<p><b><i>value</i></b>—Value to transmit in the idle cycles:</p> <ul style="list-style-type: none"> <li><b>flags</b>—Transmit the value 0x7E.</li> <li><b>ones</b>—Transmit the value 0xFF (all ones).</li> </ul> <p><b>Default:</b> <code>Flags</code></p>
<b>Required Privilege Level</b>	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>Configuring the E1 Idle Cycle Flag on page 30</li> <li>Configuring the E3 Idle Cycle Flag on page 39</li> <li>Configuring the T1 Idle Cycle Flag on page 50</li> <li>Configuring the T3 Idle Cycle Flag on page 59</li> </ul>

## invert-data

---


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



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

<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• Configuring E1 Data Inversion on page 30</li><li>• Configuring E3 Data Inversion on page 39</li><li>• Configuring T1 Data Inversion on page 47</li></ul>

## line-encoding

<b>Syntax</b>	line-encoding (ami   b8zs);
<b>Hierarchy Level</b>	[edit interfaces <i>ct1-fpc/pic/port</i> ], [edit interfaces <i>interface-name</i> t1-options]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	Set the line encoding format on the T1 interface.
	<div>  <p><b>NOTE:</b> When configuring CT1 interfaces on the 10-port Channelized E1/T1 IQE PIC, the <code>line-encoding</code> statement must be included at the [edit interfaces <i>ct1-fpc/pic/port</i>] hierarchy level.</p> </div>
<b>Default</b>	The default line encoding is B8ZS.
<b>Options</b>	<b>ami</b> —Use Alternate Mark Inversion (AMI) line encoding.  <b>b8zs</b> —Use bipolar with 8-zeros substitution (B8ZS) line encoding.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>Configuring T1 Line Encoding on page 48</li> </ul>


## long-buildout

---

<b>Syntax</b>	(long-buildout   no-long-buildout);
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> t3-options]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	<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>
<b>Default</b>	A T3 interface uses the short line buildout setting ( <b>no-long-buildout</b> ) for wires shorter than 255 feet (68 meters).
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>Configuring the T3 Line Buildout on page 60</li></ul>




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

<b>Syntax</b>	loopback (local   payload   remote);
<b>Hierarchy Level</b>	[edit interfaces <i>ce1-fpc/pic/port</i> ], [edit interfaces <i>ct1-fpc/pic/port</i> ], [edit interfaces <i>t1-fpc/pic/port</i> ], [edit interfaces <i>interface-name</i> ds0-options], [edit interfaces <i>interface-name</i> dsl-options], [edit interfaces <i>interface-name</i> e1-options], [edit interfaces <i>interface-name</i> e3-options], [edit interfaces <i>interface-name</i> shdsl-options], [edit interfaces <i>interface-name</i> sonet-options], [edit interfaces <i>interface-name</i> t1-options], [edit interfaces <i>interface-name</i> t3-options]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	Configure a loopback connection. To turn off the loopback capability, remove the <b>loopback</b> statement from the configuration.
<div style="display: flex; align-items: flex-start;"> <div style="flex: 1;">  </div> <div style="flex: 3;"> <p><b>NOTE:</b> When configuring CE1 or CT1 interfaces on 10-port Channelized E1/T1 IQE PICs, the loopback statement must be included with the <b>local</b> or <b>remote</b> option at the [edit interfaces <i>ce1-fpc/pic/port</i>] or [edit interfaces <i>ct1-fpc/pic/port</i>] hierarchy level as appropriate.</p> <p>When configuring T1 interfaces on 10-port Channelized E1/T1 IQE PICs, the loopback statement must be included with the <b>payload</b> option at the [edit interfaces <i>t1-fpc/pic/port</i>] hierarchy level.</p> </div> </div>	
<p>To configure loopback on channelized IQ and IQE PICs, SONET/SDH level, use the <b>sonet-options loopback</b> statement <b>local</b> and <b>remote</b> options at the controller interface (<i>coc48</i>, <i>cstm16</i>, <i>coc12</i>, <i>cstm4</i>, <i>coc3</i>, <i>cstm1</i>). It is ignored for path-level interfaces <i>so-fpc/pic/port</i> or <i>so-fpc/pic/port:channel</i>.</p>	
<b>Options</b>	<p><b>local</b>—Loop packets, including both data and timing information, back on the local router's PIC. NxDS0 IQ interfaces do not support local loopback.</p> <p><b>payload</b>—For channelized T3, T1, and NxDS0 IQ interfaces only, loop back data only (without clocking information) on the remote router's PIC. With payload loopback, overhead is recalculated. Neither ATM-over-asymmetrical digital subscriber line (ADSL) interfaces nor ATM-over-SHDSL interfaces support payload loopback.</p> <p><b>remote</b>—Loop packets, including both data and timing information, back on the remote router's interface card. NxDS0 IQ interfaces do not support remote loopback.</p>
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

**Related  
Documentation**

- [Configuring E3 and T3 Parameters on ATM Interfaces](#)
- [Configuring E1 Loopback Capability on page 30](#)
- [Configuring E3 Loopback Capability on page 39](#)
- [Configuring Channelized IQ and IQE SONET/SDH Loop Timing](#)
- [Configuring SHDSL Operating Mode on an ATM Physical Interface](#)
- [Configuring T1 Loopback Capability on page 48](#)
- [Configuring T3 Loopback Capability on page 60](#)
- [feac-loop-respond on page 83](#)

## payload-scrambler

<b>Syntax</b>	(payload-scrambler   no-payload-scrambler);
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> e3-options], [edit interfaces <i>interface-name</i> sonet-options], [edit interfaces <i>interface-name</i> t3-options]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	<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 <b>sonet payload-scrambler</b> statement is ignored. To configure scrambling on the DS3 channels on the interface, you can include the <b>t3-options payload-scrambler</b> statement in the configuration for each DS3 channel.</p>
	<div>  <p><b>NOTE:</b> The <b>payload-scrambler</b> statement at the [edit interfaces <i>interface-name</i> e3-options] hierarchy level is not valid for IQE PICs.</p> </div>
<b>Default</b>	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.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>Configuring E3 and T3 Parameters on ATM Interfaces</li> <li>Configuring E3 HDLC Payload Scrambling on page 41</li> <li>Configuring SONET/SDH HDLC Payload Scrambling</li> <li>Configuring T3 HDLC Payload Scrambling on page 62</li> <li>Examples: Configuring T3 Interfaces on page 63</li> <li><b>compatibility-mode on page 77</b></li> </ul>

## remote-loopback-respond

---


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



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

<b>Default</b>	The router does not respond to remote loop requests.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• Configuring the T1 Remote Loopback Response on page 47</li><li>• feac-loop-respond on page 83</li><li>• loopback (ADSL, DS0, E1/E3, SONET/SDH, SHDSL, and T1/T3) on page 89</li></ul>

## start-end-flag

<b>Syntax</b>	start-end-flag (filler   shared);
<b>Hierarchy Level</b>	[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]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	For DS0, E1, E3, T1, and T3 interfaces, configure the interface to share the transmission of start and end flags.
<div>  <p><b>NOTE:</b> 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>	
<b>Options</b>	<b>filler</b> —Wait two idle cycles between the start and end flags.  <b>shared</b> —Share the transmission of the start and end flags. This is the default.
<b>Required Privilege Level</b>	<b>interface</b> —To view this statement in the configuration. <b>interface-control</b> —To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>Configuring E1 Start and End Flags on page 32</li> <li>Configuring the E3 Start and End Flags on page 41</li> <li>Configuring T1 Start and End Flags on page 50</li> <li>Configuring T3 Start and End Flags on page 62</li> </ul>

## t1-options

---

**Syntax**    t1-options {  
              bert-algorithm *algorithm*;  
              bert-error-rate *rate*;  
              bert-period *seconds*;  
              buildout *value*;  
              byte-encoding (nx56 | nx64);  
              crc-major-alarm-threshold (1e-3 | 5e-4 | 1e-4 | 5e-5 | 1e-5);  
              crc-minor-alarm-threshold (1e-3 | 5e-4 | 1e-4 | 5e-5 | 1e-5 | 5e-6 | 1e-6);  
              fcs (16 | 32);  
              framing (esf | sf);  
              idle-cycle-flag (flags | ones);  
              invert-data;  
              line-encoding (ami | b8zs);  
              loopback (local | payload | remote);  
              remote-loopback-respond;  
              start-end-flag (filler | shared);  
              timeslots *time-slot-range*;  
              }

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

**Release Information**    Statement introduced before Junos OS Release 7.4.

**Description**    Configure T1-specific physical interface properties.

                  The statements are explained separately.

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

**Related Documentation**    • T1 Interfaces Overview on page 43

## t3-options

<b>Syntax</b>	<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) &lt;subrate <i>value</i>&gt;;   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>
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	<p>Configure T3-specific physical interface properties, including the properties of DS3 channels on a channelized OC12 interface. The <b>long-buildout</b> 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>
<b>Required Privilege Level</b>	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>T3 Interfaces Overview on page 53</li> </ul>

## timeslots

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



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

<b>Options</b>	<p><b><i>time-slot-range</i></b>—Actual time slot numbers allocated:</p> <p><b>Range:</b> Ranges vary by interface type and configuration option as follows:</p> <ul style="list-style-type: none"> <li>• 1 through 24 for T1 interfaces (0 is reserved)</li> <li>• 1 through 31 for 4-port E1 PICs (0 is reserved)</li> <li>• 1 through 31 for NxDS0 interfaces (0 is reserved)</li> <li>• 2 through 32 for 10-port Channelized E1 and 10-port Channelized E1 IQ PICs (1 is reserved)</li> <li>• 2 through 32 for the setting under <b>e1-options</b> with IQE PICs (1 is reserved) (when creating fractional E1)</li> <li>• 1 through 31 for the setting under <b>partition</b> with IQE PICs (0 is reserved) (when creating NxDS0)</li> </ul>
----------------	--



**NOTE:** When creating fractional E1 interfaces only, if you connect a 4-port E1 PIC interface to a device that uses time slot numbering from 2 through 32, you must subtract 1 from the configured number of time slots.

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



- Configuring Fractional E1 Time Slots on page 32
- Configuring Fractional T1 Time Slots on page 51
- Configuring a Channelized T1/E1 Interface to Drop and Insert Time Slots

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## unframed

---

<b>Syntax</b>	(unframed   no-unframed);
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> e3-options]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	For E3 IQ interfaces only, enable or disable unframed mode. In unframed mode, the E3 IQ interface do not detect yellow ( <b>ylw</b> ) or loss-of-frame ( <b>lof</b> ) alarms.
<b>Default</b>	Unframed mode is disabled.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• Configuring E3 IQ and IQE Unframed Mode on page 41</li></ul>



## PART 4

# Index

- Index on page 101
- Index of Statements and Commands on page 103



# Index

## Symbols

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

## B

bert-algorithm statement.....	70
usage guidelines.....	36, 44, 54
bert-error-rate statement.....	72
bert-period statement.....	73
braces, in configuration statements.....	xxii
brackets	
angle, in syntax descriptions.....	xxi
square, in configuration statements.....	xxii
buildout statement	
T1 interfaces.....	74
byte encoding.....	75
byte-encoding statement.....	75

## C

C-bit parity mode.....	76
cbit-parity statement.....	76
Cisco HDLC encapsulation	
example configuration.....	63
comments, in configuration statements.....	xxii
compatibility-mode statement.....	77
conventions	
text and syntax.....	xxi
crc-major-alarm-threshold statement.....	78
crc-minor-alarm-threshold statement.....	79
curly braces, in configuration statements.....	xxii
customer support.....	xxii
contacting JTAC.....	xxii

## D

DCE.....	63
----------	----

documentation	
comments on.....	xxii
DTE.....	63

## E

E1 interfaces	
configuration statements.....	27
ITU-T standards.....	27
physical interface properties.....	27
time slots	
example configuration.....	33
e1-options statement.....	80
usage guidelines.....	27
E3 interfaces	
configuration statements.....	35
ITU-T standards.....	35
e3-options statement.....	81
usage guidelines.....	35
encoding	
byte.....	75

## F

fcs statement.....	82
feac-loop-respond statement.....	83
font conventions.....	xxi
Frame Relay encapsulation	
example configuration.....	63
framing statement	
E1, E3, and T1 interfaces.....	84

## I

icons defined, notice.....	xx
idle-cycle-flag statement.....	85
interfaces	
configuration statements.....	3, 69
invert-data statement.....	86
ITU-T standards	
E1 interfaces.....	27
E3 interfaces.....	35

## L

line-encoding statement.....	87
logical systems	
configuration statements.....	18
long-buildout statement.....	88
loopback capability	
E1 interfaces	
example configuration.....	31
E3 interfaces	
example configuration.....	40
loopback statement	
ADSL, DS0, E1/E3, SONET/SDH, SHDSL, and	
T1/T3.....	89

## M

manuals	
comments on.....	xxii

## N

no-cbit-parity statement.....	76
no-feac-loop-respond statement.....	83
no-long-buildout statement.....	88
no-payload-scrambler statement.....	91
no-unframed statement.....	97
notice icons defined.....	xx

## P

parentheses, in syntax descriptions.....	xxii
payload-scrambler statement.....	91
physical interfaces	
byte encoding.....	75
C-bit parity mode.....	76

## R

remote-loopback-respond statement.....	92
--	----

## S

start-end-flag statement.....	93
support, technical See technical support	
syntax conventions.....	xxi

## T

T1 interfaces	
byte encoding.....	75
configuration statements.....	43
overview.....	43
time slots	
example configuration.....	51

t1-options statement.....	94
usage guidelines.....	43
T3 interfaces	
C-bit parity mode.....	76
configuration statements.....	54
overview.....	53
t3-options statement.....	95
usage guidelines.....	54
technical support	
contacting JTAC.....	xxii
time slots	
E1 interfaces	
example configuration.....	33
T1 interfaces	
example configuration.....	51
timeslots statement.....	96

## U

unframed statement.....	97
-------------------------	----

# Index of Statements and Commands

## B

bert-algorithm statement.....	70
bert-error-rate statement.....	72
bert-period statement.....	73
buildout statement	
T1 interfaces.....	74
byte-encoding statement.....	75

## C

cbit-parity statement.....	76
compatibility-mode statement.....	77
crc-major-alarm-threshold statement.....	78
crc-minor-alarm-threshold statement.....	79

## E

e1-options statement.....	80
e3-options statement.....	81

## F

fcs statement.....	82
feac-loop-respond statement.....	83
framing statement	
E1, E3, and T1 interfaces.....	84

## I

idle-cycle-flag statement.....	85
invert-data statement.....	86

## L

line-encoding statement.....	87
long-buildout statement.....	88
loopback statement	
ADSL, DS0, E1/E3, SONET/SDH, SHDSL, and	
T1/T3.....	89

## N

no-cbit-parity statement.....	76
no-feac-loop-respond statement.....	83
no-long-buildout statement.....	88
no-payload-scrambler statement.....	91

no-unframed statement.....	97
----------------------------	----

## P

payload-scrambler statement.....	91
----------------------------------	----

## R

remote-loopback-respond statement.....	92
--	----

## S

start-end-flag statement.....	93
-------------------------------	----

## T

t1-options statement.....	94
t3-options statement.....	95
timeslots statement.....	96

## U

unframed statement.....	97
-------------------------	----

