

Chapter 19

Configure E3 Interfaces

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.

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 (32 | 16);  
  idle-cycle-flag value;  
  loopback (local | remote);  
  (payload-scrambler | no-payload-scrambler);  
  start-end-flag value;  
}
```

You can configure the following E3-specific properties:

Configure E3 BERT Properties on page 252

Configure the E3 CSU Compatibility Mode on page 253

Configure the E3 Frame Checksum on page 253

Configure the E3 Idle Cycle Flag on page 254

Configure E3 Loopback Capability on page 254

Configure E3 HDLC Payload Scrambling on page 255

Configure the E3 Start End Flags on page 256

Configure E3 BERT Properties

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;
```

seconds is the duration of the BERT procedure. The test can last from 1 to 240 seconds; the default is 10 seconds.

rate is the bit error rate. This can be an integer in the range 0 through 7, which corresponds to a bit error rate in the range 10^{-0} (that is, 0, which corresponds to no errors) to 10^{-7} (that is, 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, see the CLI possible completions; 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 0.152 standard)
pseudo-2e15-o151  Pattern is 2^15 - 1 (per 0.152 standard)
pseudo-2e20-o151  Pattern is 2^20 - 1 (per 0.151 standard)
pseudo-2e20-o153  Pattern is 2^20 - 1 (per 0.153 standard)
```

See individual interface types for specific hierarchy information. For information about running the BERT procedure, see the *JUNOS Internet Software Operational Mode Command Reference*.

Configure the E3 CSU Compatibility Mode

Subrating an E3 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. For E3 interfaces, you can configure the interface to be compatible with a Digital Link, Kentrox, or Larscom CSU. To configure an E3 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* 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 Digital Link CSUs only, you can specify the subrate *value* to match the data rate configured on the CSU in the format *x*kb or *x.x*Mb. For a list of specific rate values, use the command completion feature in the CLI. The range is 358 kbps through 33.7 Mbps.

Kentrox and Larscom CSUs do not support E3 subrate.

Configure 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 OC-12 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;
```

Configure the E3 Idle Cycle Flag

By default, a 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;
```

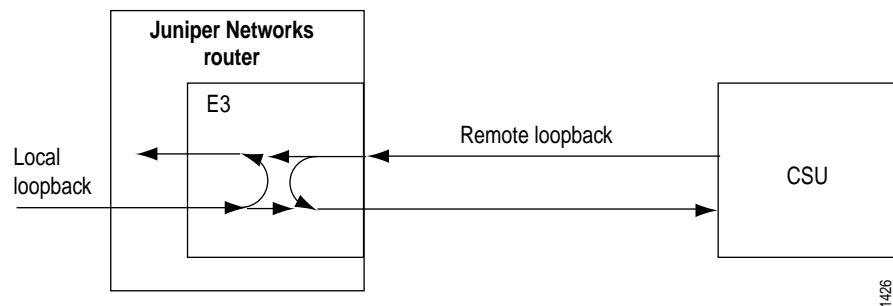
To explicitly configure the default value of 0x7E, include the `idle-cycle-flag` statement with the `flags` option:

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

Configure 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 19).

Figure 19: 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 turn off the loopback capability, remove the `loopback` statement from the configuration:

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

Example: Configure 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 100.100.100.1/24;
    }
  }
}
```

Check the error counters 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:

```
> show interfaces e3-1/0/0 extensive
```

Configure 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
```

Configure the E3 Start End Flags

By default, a E3 interface waits two idle cycles between sending start and end flags. To configure the interface to share the transmission of start and end flags, include the start-end-flag statement at the [edit interfaces *interface-name* e3-options] hierarchy level, specifying the shared option.

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

To explicitly configure the default of waiting two idle cycles between the start and end flags, include the idle-cycle-flag statement with the filler option:

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