

Chapter 18

Configure T1 Interfaces

T1 is the basic physical layer protocol used by the Digital Signal level 1 (DS-1) multiplexing method in North America. A T1 interface operates at a bit rate of 1.544 Mbps and can support 24 DS-0 channels. DS-1 standards supported include:

ANSI T1.107, T1.102

GR 499-core, GR 253-core

AT&T Pub 54014

ITU G.751, G.703

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 {  
  buildout (0-133 | 133-266 | 266-399 | 399-532 | 532-655);  
  byte-encoding (nx64 | nx56);  
  fcs (32 | 16);  
  framing (sf | esf);  
  idle-cycle-flag (flags | ones);  
  invert-data;  
  line-encoding (ami | b8zs);  
  loopback (local | remote);  
  start-end-flag (shared | filler);  
  timeslots slot-number;  
}
```

You can configure the following T1 interface-specific properties:

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See also the following properties, which apply to a number of different interfaces:

- Configure the Media MTU on page 30

- Configure the Clock Source on page 35

- Configure Receive and Transmit Leaky Bucket Properties on page 36

Configure T1 Buildout

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

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 532-655;
```

Configure 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;
```

Configure 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.

Configure 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 may 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;
```

Configure T1 Framing

By default, T1 interfaces use ESF (extended super frame) framing format. You can configure SF (super frame) 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;
```

Configure 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:

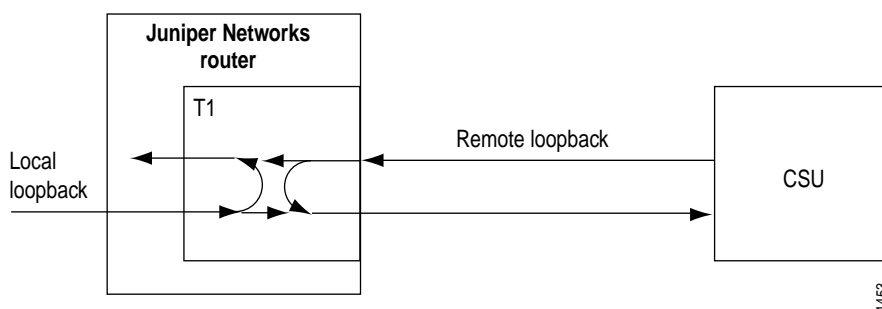
```
[edit interfaces interface-name t1-options]
line-encoding b8zs;
```

When setting the line encoding parameter, you must set the same value for paired ports. 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.

Configure T1 Loopback Capability

You can configure loopback capability between the local T1 interface and the remote CSU. 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 but also are immediately retransmitted to the CSU (see Figure 13).

Figure 13: 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. Packets can be looped on either the local router or the remote CSU.

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

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

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

Configure 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;
```

Configure T1 Start-End Flag

By default, a T1 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 t1-options]` hierarchy level, specifying the `shared` option. This configuration can result in better performance on the interface.

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

Configure T1 Timeslots

To configure the number of timeslots allocated to the interface, include the `timeslots` statement at the `[edit interfaces interface-name t1-options]` hierarchy level, specifying the `slot-number`. The range is 1 through 24 for T1 interfaces.

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

There are 24 timeslots on a T1 interface. You can designate any combination of timeslots for usage. The default is to use all the timeslots.

To use timeslots 1 through 10, designate `slot-number` as follows:

```
[edit interfaces interface-name t1-options]
timeslots 1-10;
```

To use timeslots 1 through 5, timeslot 10, and timeslot 24, designate `slot-number` as follows:

```
[edit interfaces interface-name t1-options]
timeslots 1-5,10,24;
```

To use the first four odd-numbered timeslots, designate `slot-number` as follows:

```
[edit interfaces interface-name t1-options]
timeslots 1,3,5,7;
```

Note that spaces are not allowed in specifying timeslot numbers.

