

# Chapter 16

## Configure Channelized T3 Interfaces

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For examples of Channelized T3 interface configuration, see the following sections:

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Examples: Configure Channelized DS-3 to DS-0 Interfaces on page 235

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### Configure Channelized T3 QPP Interfaces

This section describes how to configure Channelized T3 QPP interfaces, discussing the following topics:

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Configure T1 QPP Interfaces on page 222

Configure Fractional T1 QPP Interfaces on page 223

Configure an NxDS-0 QPP Interface on page 223

### **Configure T3 QPP Interfaces**

On a four-port Channelized T3 PIC with QPP, you can configure up to four T3 interfaces. To configure an E1 interface, include the no-partition statement at the [edit interfaces ce1-*fpc/pic/port*] hierarchy level:

```
[edit interfaces ct3-fpc/pic/port]  
no-partition;
```

This configuration creates interface t3-*fpc/pic/port*.

## Configure T1 QPP Interfaces

On a Channelized DS-3 PIC with QPP, you can create up to 112 T1 interfaces. To configure a T1 interface on a Channelized DS-3 PIC with QPP, include the partition and interface-type statements at the [edit interfaces ct3-*fpc/pic/port*] hierarchy level, specifying the t1 interface type:

```
[edit interfaces ct3-fpc/pic/port]  
partition partition-number interface-type t1;
```

This configuration creates interface t1-*fpc/pic/port:channel*.

The partition number is the sublevel interface partition index and correlates with the channel number. For Channelized T3 interfaces, the partition number can be in the range 1 through 28.



**Note**

For Channelized T3 interfaces, channel numbering begins with 0 (:0). For Channelized T3 QPP interfaces, channel numbering begins with 1 (:1).

The interface type is the channelized interface type or clear channel you are creating. For Channelized T3 interfaces, *type* can be ct1 or t1.

### Example: Configure T1 QPP Interfaces

Configure the following five T1 interfaces:

```
t1-0/0/0:1  
t1-0/0/0:2  
t1-0/0/0:3  
t1-0/0/0:4  
t1-0/0/0:5
```

```
[edit interfaces ct3-0/0/0]  
partition 1-5 interface-type t1;
```

## Configure Fractional T1 QPP Interfaces

On a Channelized DS-3 PIC with QPP, you can configure up to 112 fractional T1 interfaces. To configure a fractional T1 interface on a Channelized DS-3 PIC with QPP, you must perform the following tasks:

1. Configure a T1 QPP interface. For more information, see “Configure T1 QPP Interfaces” on page 222:

This configuration creates interface `t1-fpc/pic/port:channel`.

2. Configure the number of time slots allocated to the T1 QPP interface by including the `timeslots` statement at the [edit interfaces `t1-fpc/pic/port:channel` t1-options] hierarchy level:

```
[edit interfaces t1-fpc/pic/port:channel t1-options]
timeslots time-slot-range;
```

For Channelized T1 QPP interfaces, the time-slot range is 1 through 24. The default is to use all the time slots. You can designate any combination of time slots for usage. You can configure a range of values with hyphens, and you can separate multiple values with commas. Do not include spaces when you specify time slot numbers.

For more information about T1 time slots, see “Configure Fractional T1 Time Slots” on page 394.

### Example: Configure Fractional T1 QPP Interfaces

Configure a fractional T1 interface that uses time slots 1 through 10:

```
[edit interfaces ct3-0/0/0:1]
partition 1 interface-type t1;

[edit interfaces t1-0/0/0:1:1 t1-options]
timeslots 1-10;
```

## Configure an NxDS-0 QPP Interface

On a Channelized DS-3 PIC with QPP, you can configure up to 128 NxDS-0 channels. To configure an NxDS-0 QPP interface on a Channelized DS-3 PIC with QPP, you must perform the following tasks:

1. Partition the Channelized T3 interface into Channelized T1 interfaces by including the `partition` and `interface-type` statements at the [edit interfaces `ct3-fpc/pic/port`] hierarchy level, specifying the `ct1` interface type:

```
[edit interfaces ct3-fpc/pic/port]
partition partition-number interface-type ct1;
```

This configuration creates interface `ct1-fpc/pic/port:channel`.

The partition number is the sublevel interface partition index and correlates with the channel number. For Channelized T1 interfaces, the partition number can be in the range 1 through 28.

The interface type is the channelized interface type or clear channel you are creating. For Channelized T3 interfaces, *type* can be ct1 or t1.



**Note**

For Channelized T3 interfaces, channel numbering begins with 0 (:0). For Channelized T3 QPP interfaces, channel numbering begins with 1 (:1).

2. Configure the number of time slots allocated to the NxDS-0 QPP interface by including the partition, timeslots, and interface-type statements at the [edit interfaces ct1-fpc/pic/port:channel] hierarchy level, specifying the ds interface type:

```
[edit interfaces ct1-fpc/pic/port:channel]
partition partition-number timeslots time-slot-range interface-type ds;
```

For Channelized T1 QPP interfaces, the partition number range is 1 through 28; the time-slot range is 1 through 24. The default is to use all the time slots. You can designate any combination of time slots for usage. You can configure a range of values with hyphens, and you can separate multiple values with commas. Do not include spaces when you specify time slot numbers.

For more information about T1 time slots, see “Configure Fractional T1 Time Slots” on page 394.

### **Example: Configure an NxDS-0 QPP Interface**

Configure the following two NxDS-0 interfaces with 10 time slots and 4 time slots, respectively:

```
ds-0/0/0:1:1
ds-0/0/0:1:2
```

```
[edit interfaces ct3-0/0/0]
partition 1 interface-type ct1;
```

```
[edit interfaces ct1-0/0/0:1]
partition 1 timeslots 1-10 interface-type ds;
partition 2 timeslots 12-16 interface-type ds;
```

## Configure Channelized T3 QPP Interface Properties

This section lists the interface properties that are valid at each channel level on a Channelized T3 QPP interface, discussing the following topics:

Specify Options at the Channelized T3 QPP Level on page 225

Specify Options at the Channelized T1 QPP Level on page 226

Specify Options at the T3 QPP Interface Level on page 226

Specify Options at the T1 QPP Interface Level on page 227

Specify Options at the NxDS-0 QPP Interface Level on page 228

For more information, see “Channelized QPP Interface Properties” on page 169.

### **Specify Options at the Channelized T3 QPP Level**

To specify options at the Channelized T3 interface level, include the following statements at the [edit interfaces ct3-fpc/pic/port] hierarchy level:

```
[edit interfaces ct3-fpc/pic/port]
clocking clock-source;
disable;
description text;
no-partition;
partition partition-number oc-slice oc-slice-range interface-type type;
t3-options {
    bert-algorithm algorithm;
    bert-error-rate rate;
    bert-period seconds;
    (cbit-parity | no-cbit-parity);
    (feac-loop-respond | no-feac-loop-respond);
    (long-buildout | no-long-buildout);
    loopback (local | payload | remote);
}
traceoptions {
    flag flag <flag-modifier> <disable>;
}
```

For more information about specific parameters, see “Configure Physical Interface Properties” on page 39 and “Configure T3 Interfaces” on page 395.

## Specify Options at the Channelized T1 QPP Level

To specify options at the channelized T1 QPP interface level, include the following statements at the [edit interfaces ct1-fpc/pic/port:channel] hierarchy level:

```
[edit interfaces ct1-fpc/pic/port:channel]
clocking clock-source;
disable;
description text;
partition partition-number oc-slice oc-slice-range interface-type type;
traceoptions {
  flag flag <flag-modifier> <disable>;
}
t1-options {
  bert-algorithm algorithm;
  bert-error-rate rate;
  bert-period seconds;
  framing (esf | sf);
  line-encoding (ami | b8zs);
  loopback (local | remote);
  remote-loopback-respond;
}
```

For more information about specific parameters, see “Configure Physical Interface Properties” on page 39 and “Configure T3 Interfaces” on page 395.

## Specify Options at the T3 QPP Interface Level

To specify options at the T3 interface level, include the following statements at the [edit interfaces t3-fpc/pic/port] hierarchy level:

```
[edit interfaces t3-fpc/pic/port]
dce;
disable;
description text;
encapsulation type;
hold-time up milliseconds down milliseconds;
keepalives <interval seconds> <down-count number> <up-count number>;
mtu bytes;
no-keepalives;
ppp-options {
  chap {
    access-profile name;
    local-name name;
    passive;
  }
}
```

```

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 (32 | 16);
  (feac-loop-respond | no-feac-loop-respond);
  idle-cycle-flag value;
  (long-buildout | no-long-buildout);
  loopback (local | payload | remote);
  (payload-scrambler | no-payload-scrambler);
  start-end-flag (shared | filler);
}
unit logical-unit-number {
  logical-interface-statements;
}

```

For more information about specific parameters, see “Configure Physical Interface Properties” on page 39 and “Configure T3 Interfaces” on page 395.

### ***Specify Options at the T1 QPP Interface Level***

To specify options at the T1 interface level, include the following statements at the [edit interfaces t1-*fpc/pic/port:channel*] hierarchy level:

```

[edit interfaces t1-fpc/pic/port:channel]
clocking clock-source;
dce;
disable;
description text;
encapsulation type;
hold-time up milliseconds down milliseconds;
keepalives <interval seconds> <down-count number> <up-count number>;
lmi {
  lmi-type (ansi | itu);
  n391dte number;
  n392dce number;
  n392dte number;
  n393dce number;
  n393dte number;
  t391dte seconds;
  t392dce seconds;
}
mtu bytes;
no-keepalives;
ppp-options {
  chap {
    access-profile name;
    local-name name;
    passive;
  }
}

```

```

t1-options {
  bert-algorithm algorithm;
  bert-error-rate rate;
  bert-period seconds;
  byte-encoding (nx64 | nx56);
  fcs (32 | 16);
  framing (esf | sf);
  idle-cycle-flag (flags | ones);
  invert-data;
  line-encoding (ami | b8zs);
  loopback (local | payload | remote);
  remote-loopback-respond;
  start-end-flag (shared | filler);
  timeslots time-slot-range;
}
traceoptions {
  flag flag <flag-modifier> <disable>;
}
(traps | no-traps);
unit logical-unit-number {
  logical-interface-statements;
}

```

For more information about specific parameters, see “Configure Physical Interface Properties” on page 39 and “Configure T1 Interfaces” on page 387.

## Specify Options at the NxDS-0 QPP Interface Level

To specify options at the NxDS-0 interface level, include the following statements at the [edit interfaces ds-fpc/pic/port<:channel>] hierarchy level:

```

[edit interfaces ds-fpc/pic/port<:channel>]
accounting-profile name;
dce;
disable;
description text;
ds0-options {
  bert-algorithm algorithm;
  bert-error-rate rate;
  bert-period seconds;
  byte-encoding (nx64 | nx56);
  fcs (32 | 16);
  idle-cycle-flag (flags | ones);
  invert-data;
  loopback (payload | remote);
  start-end-flag (shared | filler);
}
encapsulation type;
hold-time up milliseconds down milliseconds;
keepalives <down-count number> <interval seconds> <up-count number>;

```

```

lmi {
  lmi-type (ansi | itu);
  n391dte number;
  n392dce number;
  n392dte number;
  n393dce number;
  n393dte number;
  t391dte seconds;
  t392dce seconds;
}
mtu bytes;
no-keepalives;
ppp-options {
  chap {
    access-profile name;
    local-name name;
    passive;
  }
}
traceoptions {
  flag flag <flag-modifier> <disable>;
}
(traps | no-traps);
unit {
  logical-interface-statements;
}

```

For more information about specific parameters, see “Configure Physical Interface Properties” on page 39.

## Configure Channelized DS-3 to DS-0 Interfaces

For channelized interfaces, you can configure 28 T1 channels per T3 interface. Each T1 link can have up to eight DS-0 channel groups, and each channel group can hold any combination of DS-0 time slots. To specify the T1 link and DS-0 channel group number in the interface name, use colons (:) as separators. For example, a Channelized DS-3 to DS-0 PIC might have the following physical and virtual interfaces:

```
ds-0/0/0:x:y
```

*x* is a T1 link ranging from 0 through 27 and *y* is a DS-0 channel group ranging from 0 through 7 (see Table 21 on page 230 for more information about ranges).

You can use any of the values within the range available for *x* and *y* and you do not have to configure the links sequentially. In addition, the JUNOS software applies the interface options you configure according to the following rules:

To configure the T1 options, you must set channel group *y* to 0; the T1 link *x* can be any value:

```
ds-0/0/0:x:0
```

To configure the T3 options, you must set the T1 link *x* to 0 and channel group *y* to 0:


```
ds-0/0/0:0:0.
```

There are no restrictions on configuring the DS-0 options.

If you delete a configuration you previously committed for channel group 0, the options return to default values.

To configure the channel groups and time slots for a Channelized DS-3 to DS-0 interface, include the channel-group and timeslots statements at the [edit chassis fpc slot-number pic pic-number ct3 port port-number t1 link-number] hierarchy level:

```
[edit chassis fpc slot-number pic pic-number ct3 port port-number t1 link-number]
channel-group group-number timeslots time-slot-range;
```




**Note** If you commit the interface name but do not include the [edit chassis] configuration, the Channelized DS-3 to DS-0 PIC behaves like a Channelized DS-3 to DS-1 PIC: none of the DS-0 functionality is accessible.

Table 21 shows the ranges you can specify for each of the elements in the preceding configuration.

**Table 21: Ranges for Channelized DS-3 to DS-0 Configuration**

Item	Option	Range
FPC slot	<i>slot-number</i>	0 through 7 (see note below)
PIC slot	<i>pic-number</i>	0 through 3
Port	<i>port-number</i>	0 through 1
T1 link	<i>link-number</i>	0 through 27
DS-0 channel group	<i>group-number</i>	0 through 7
Time slot	<b>time-slot-range</b>	1 through 24



**Note** FPC slot range depends on platform. The maximum range of 0 through 7 applies to M40, M40e, M160, T320, and T640 platforms; for M20 routers, the range is 0 through 3; for M10 routers the range is 0 through 1; for M5 routers, the only applicable value is 0.

Bandwidth limitations restrict the interface to a maximum of 128 channel groups per T3 port, rather than the theoretical maximum of  $8 * 28 = 224$ .

There are 24 time slots on a T1 interface. The default is to use all the time slots. You can designate any combination of time slots for usage. You can configure a range of values with hyphens, and you can separate multiple values with commas. Do not include spaces when you specify time slot numbers. You can use each time slot number on only one channel group within the same T1 link.

To use time slots 1 through 10, configure the time-slot range as follows:

```
[edit chassis fpc slot-number pic pic-number ct3 port port-number t1 link-number]
channel-group group-number timeslots 1-10;
```

To use time slots 1 through 5, time slot 10, and time slot 24, configure the time-slot range as follows:

```
[edit chassis fpc slot-number pic pic-number ct3 port port-number t1 link-number]
channel-group group-number timeslots 1-5,10,24;
```

To configure Channelized DS-3 to DS-0 interface properties, you can include the t3-options, t1-options, or ds0-options statements. Only a subset of the T3 options are valid for this configuration, and the buildout, invert-data, and line-encoding statements at the [edit interfaces *interface-name* t1-options] hierarchy level are ignored; likewise, only a subset of the DS-0 options are valid for this configuration, and the bert-algorithm, bert-error-rate, bert-period, and loopback payload statements at the [edit interfaces *interface-name* ds0-options] hierarchy level are ignored; the following configurations list all the valid parameters.



**Note**

The set of options the JUNOS software applies to the interface depends on how you specify the interface name. For more information, see “Examples: Configure Channelized DS-3 to DS-0 Interfaces” on page 235.

To specify options for the T3 side of the connection, 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);
  (long-buildout | no-long-buildout);
  loopback (local | remote);
}
```

The statements at the t3-options hierarchy are supported only for channel 0; they are ignored if configured on other channels. To specify options for each of the T1 channels, include the t1-options statement at the [edit interfaces *interface-name*] hierarchy level:

```
[edit interfaces interface-name]
t1-options {
  byte-encoding (nx64 | nx56);
  fcs (32 | 16);
  framing (sf | esf);
  idle-cycle-flag (flags | ones);
  invert-data;
  loopback (local | remote);
  start-end-flag (shared | filler);
  timeslots time-slot-number;
}
```

To specify options for each of the DS-0 channels, include the `ds0-options` statement at the [edit interfaces *interface-name*] hierarchy level:

```
[edit interfaces interface-name]
ds0-options {
  byte-encoding (nx64 | nx56);
  fcs (32 | 16);
  idle-cycle-flag (flags | ones);
  invert-data;
  start-end-flag (shared | filler);
}
```

For more information about specific parameters, see “Configure E1 Interfaces” on page 243, “Configure E3 Interfaces” on page 251, “Configure T1 Interfaces” on page 387, and “Configure T3 Interfaces” on page 395. For a configuration example, see “Examples: Configure Channelized DS-3 to DS-0 Interfaces” on page 235.

By default, Channelized T3 and STM-1 interfaces can support a maximum of 64 Frame Relay data-link connection identifiers (DLCIs), numbered 0 through 63, per channel. In DLCI sparse mode, Channelized T3 and STM-1 interfaces support a maximum of three DLCIs, numbered 0 through 1,022, per channel. DLCI 0 is reserved for LMI. You configure the router to use DLCI sparse mode by including the `sparse-dlcis` statement at the [edit chassis *slot-number* *pic-number*] hierarchy level. Channelized T3 QPP interfaces support a maximum of 64 DLCIs, numbered 0 through 1,022, and, therefore, do not require sparse mode. For more information about Frame Relay DLCIs, see “Configure a Point-to-Point Frame Relay Connection” on page 309. For more information about DLCI sparse mode, see the *JUNOS Internet Software Configuration Guide: Getting Started*.

Each T1 link can have up to eight DS-0 channel groups, and each channel group can hold any combination of DS-0 time slots.

## Configure Channelized DS-3 to DS-1 Interfaces

You can configure 28 T1 channels per T3 interface, and each interface can have logical interfaces. To specify the channel number, include it after the colon (:) in the interface name. For example, a four-port T3 PIC in FPC 1 and slot 1 will have the following physical interfaces, depending on the media type:

```
t1-1/1/0:x
t1-1/1/1:x
t1-1/1/2:x
t1-1/1/3:x
```

*x* is a channel number ranging from 0 through 27.

To configure Channelized DS-3 to DS-1 interface properties, you can include both the `t1-options` and `t3-options` statements. Only a subset of the T3 options is valid for this configuration, and the `buildout`, `invert-data`, and `line-encoding` statements at the [edit interfaces *interface-name* *t1-options*] hierarchy level are ignored; likewise, only a subset of the DS-0 options are valid for this configuration, and the `bert-algorithm`, `bert-error-rate`, `bert-period`, and `loopback-payload` statements at the [edit interfaces *interface-name* *ds0-options*] hierarchy level are ignored; the following configuration lists all the valid parameters.

To specify options for the T3 side of the connection, 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);
  (feac-loop-respond | no-feac-loop-respond);
  loopback (local | remote);
}
```

The statements in the `t3-options` hierarchy are supported only for channel 0; they are ignored if configured on other channels.

To specify options for each of the T1 channels, include the `t1-options` statement at the [edit interfaces *interface-name*] hierarchy level:

```
[edit interfaces interface-name]
t1-options {
  byte-encoding (nx64 | nx56);
  fcs (32 | 16);
  framing (sf | esf);
  idle-cycle-flag (flags | ones);
  loopback (local | remote);
  start-end-flag (shared | filler);
  timeslots time-slot-number;
}
```

For T1 channels on a Channelized T3 interface, the clocking statement is supported only for channel 0; it is ignored if included in the configuration of channels 1 through 11. The clock source configured for channel 0 applies to all channels on the Channelized T3 interface. The individual T1 channels use a gapped 45-MHz clock as the transmit clock. When you configure the clock source for a channelized interface—`ds-x/y/z:0`, for example—you must also include the `channel-group` statement at the [edit chassis] hierarchy level, and specify channel group 0. For more information, see “Clock Sources on Channelized Interfaces” on page 166.

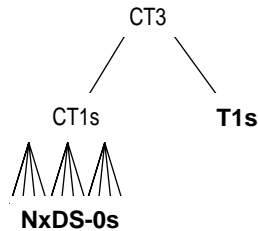
By default, Channelized T3 and STM-1 interfaces can support a maximum of 64 Frame Relay data-link connection identifiers (DLCIs), numbered 0 through 63, per channel. In DLCI sparse mode, Channelized T3 and STM-1 interfaces support a maximum of three DLCIs, numbered 0 through 1,022, per channel. DLCI 0 is reserved for LMI. You configure the router to use DLCI sparse mode by including the `sparse-dlcis` statement at the [edit chassis fpc *slot-number* pic *pic-number*] hierarchy level. Channelized T3 QPP interfaces support a maximum of 64 DLCIs, numbered 0 through 1,022, and, therefore, do not require sparse mode. For more information about Frame Relay DLCIs, see “Configure a Point-to-Point Frame Relay Connection” on page 309. For more information about DLCI sparse mode, see the *JUNOS Internet Software Configuration Guide: Getting Started*.

For more information about specific parameters, see “Configure T1 Interfaces” on page 387 and “Configure T3 Interfaces” on page 395. For a configuration example, see “Examples: Configure Channelized DS-3 to DS-1 Interfaces” on page 238.

## Example: Configure Channelized T3 QPP Interfaces

In Figure 17, a Channelized DS-3 PIC with QPP is partitioned into multiple OC slices.

**Figure 17: Sample Channelization of DS-3 PIC with QPP**



**Bold** entries correspond to actual packet channels.

0003015

Figure 17 shows the following OC slices:

- a. A Channelized T1, which is partitioned into *NxDS-0* channels.
- b. T1 interfaces.

The following example shows how to configure cases (a) and (b):

```
[edit interfaces]
ct3-1/1/0 {
  description "case (a) CT3 to CT1 and case (b) CT3 to T1.";
  t3-options {
    loopback remote;
    looptiming;
  }
  partition 1 interface-type ct1; # ct1-1/1/0:1.
  partition 2-28 interface-type t1; # t1-1/1/0:[2-28]
}
ct1-1/1/0:1 {
  description "case (a) CT1s to NxDS-0s.";
  t1-options {
    bert-algorithm all-ones-repeating;
    framing sf;
    line-encoding ami;
  }
  partition 1 timeslots 2 - 10 interface-type ds0; # ds-1/1/0:1:1, channel group with 10
DS-0s
  partition 2 timeslots 11- 23 interface-type ds0; # ds-1/1/0:1:2, channel group with 13
DS-0s
  ...
}
```

## Examples: Configure Channelized DS-3 to DS-0 Interfaces

The following configuration is sufficient to get the Channelized DS-3 to DS-0 interface up and running. The T3 interface can be divided into 28 channels, each at T1 line rate. DS-3 channels can use the following encapsulation types for their logical interfaces:

PPP, PPP CCC, and PPP TCC

Frame Relay, Frame Relay CCC, and Frame Relay TCC

Cisco HDLC, Cisco HDLC CCC, and Cisco HDLC TCC

For more information, see “Configure a Point-to-Point Frame Relay Connection” on page 309.



All these configuration examples specify channel group 0 in the interface address, which is required for configuring the t3-options and t1-options statements.

Configure Cisco HDLC encapsulation on a Channelized DS-3 to DS-0 interface:

```
[edit interfaces]
ds-2/0/1:20:0 {
  encapsulation cisco-hdlc;
  unit 0 {
    family inet {
      address 20.0.4.40/32 {
        destination 20.0.4.41;
      }
    }
  }
}

[edit chassis]
fpc 2 {
  pic 0 {
    ct3 {
      port 1 {
        t1 20 {
          channel-group 0 timeslots 1-5;
        }
      }
    }
  }
}
```

Configure PPP encapsulation on a Channelized DS-3 to DS-0 interface:

```
[edit interfaces]
ds-2/0/1:20:0 {
  encapsulation ppp;
  unit 0 {
    family inet {
      address 20.0.4.40/32 {
        destination 20.0.4.41;
      }
    }
  }
}
[edit chassis]
fpc 2 {
  pic 0 {
    ct3 {
      port 1 {
        t1 20 {
          channel-group 0 timeslots 1-5;
        }
      }
    }
  }
}
```

Configure three Frame Relay DLCIs on a Channelized DS-3 interface:

```
[edit interfaces]
t1-5/1/3:0 {
  mtu 9192;
  encapsulation frame-relay;
  unit 1 {
    dlc1 101;
    family inet {
      mtu 9000;
      address 10.123.1.2/32 {
        destination 10.123.1.1;
      }
    }
    family iso {
      mtu 9000;
    }
    family mpls {
      mtu 9000;
    }
  }
}
```

```

unit 2 {
  dlc1 102;
  family inet {
    mtu 9000;
    address 10.123.1.4/32 {
      destination 10.123.1.3;
    }
  }
  family iso {
    mtu 9000;
  }
  family mpls {
    mtu 9000;
  }
}
unit 3 {
  dlc1 103;
  family inet {
    mtu 9000;
    address 10.123.1.6/32 {
      destination 10.123.1.5;
    }
  }
  family iso {
    mtu 9000;
  }
  family mpls {
    mtu 9000;
  }
}

```

Configure Cisco HDLC encapsulation with byte-encoding:

```

[edit interfaces ds-0/1/0:5:0]
no-keepalives;
encapsulation cisco-hdlc;
ds0-options {
  byte-encoding nx56;
}
unit 0 {
  family inet {
    address 10.221.2.8/24;
  }
}

```

Configure Cisco HDLC encapsulation with byte-encoding and framing:

```

[edit interfaces ds-0/1/0:5:0]
no-keepalives;
encapsulation cisco-hdlc;
t1-options {
  byte-encoding nx56;
  framing sf;
}
unit 0 {
  family inet {
    address 10.221.2.8/24;
  }
}

```

## Examples: Configure Channelized DS-3 to DS-1 Interfaces

The following configuration is sufficient to get the Channelized DS-3 interface up and running. The T3 interface can be divided into 28 channels, each at T1 line rate. DS-3 channels can use the following encapsulation types for their logical interfaces:

PPP, PPP CCC, and PPP TCC

Frame Relay, Frame Relay CCC, and Frame Relay TCC

Cisco HDLC, Cisco HDLC CCC, and Cisco HDLC TCC

For more information, see “Configure a Point-to-Point Frame Relay Connection” on page 309.

Configure Cisco HDLC encapsulation on a Channelized DS-3 interface:

```
[edit interfaces]
t1-2/0/1:20 {
  encapsulation cisco-hdlc;
  unit 0 {
    family inet {
      address 20.0.4.40/32 {
        destination 20.0.4.41;
      }
    }
  }
}
```

Configure PPP encapsulation on a Channelized DS-3 interface:

```
[edit interfaces]
t1-2/0/1:20 {
  encapsulation ppp;
  unit 0 {
    family inet {
      address 20.0.4.40/32 {
        destination 20.0.4.41;
      }
    }
  }
}
```

Configure five Frame Relay DLCIs on a Channelized DS-3 interface:

```
[edit interfaces]
t1-5/1/3:0 {
  mtu 9192;
  encapsulation frame-relay;
  unit 1 {
    dlc1 101;
    family inet {
      mtu 9000;
      address 10.123.1.2/32 {
        destination 10.123.1.1;
      }
    }
    family iso {
      mtu 9000;
    }
    family mpls {
      mtu 9000;
    }
  }
  unit 2 {
    dlc1 102;
    family inet {
      mtu 9000;
      address 10.123.1.4/32 {
        destination 10.123.1.3;
      }
    }
    family iso {
      mtu 9000;
    }
    family mpls {
      mtu 9000;
    }
  }
  unit 3 {
    dlc1 103;
    family inet {
      mtu 9000;
      address 10.123.1.6/32 {
        destination 10.123.1.5;
      }
    }
    family iso {
      mtu 9000;
    }
    family mpls {
      mtu 9000;
    }
  }
}
```

```
unit 4 {
  dcli 104;
  family inet {
    mtu 9000;
    address 10.123.1.8/32 {
      destination 10.123.1.7;
    }
  }
  family iso {
    mtu 9000;
  }
  family mpls {
    mtu 9000;
  }
}
unit 5 {
  dcli 105;
  family inet {
    mtu 9000;
    address 10.123.1.10/32 {
      destination 10.123.1.9;
    }
  }
  family iso {
    mtu 9000;
  }
  family mpls {
    mtu 9000;
  }
}
}
```

Configure Cisco HDLC encapsulation with byte-encoding:

```
[edit interfaces t1-1/1/0:1]
no-keepalives;
encapsulation cisco-hdlc;
t1-options {
  byte-encoding nx56;
}
unit 0 {
  family inet {
    address 10.221.2.8/24;
  }
}
```

Configure Cisco HDLC encapsulation with byte-encoding and framing:

```
[edit interfaces t1-1/1/0:1]
no-keepalives;
encapsulation cisco-hdlc;
t1-options {
  byte-encoding nx56;
  framing sf;
}
unit 0 {
  family inet {
    address 10.221.2.8/24;
  }
}
```