

Chapter 17

Configuring Channelized T3 Interfaces

This chapter is organized as follows:

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

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Examples: Configuring Channelized DS3-to-DS0 Interfaces on page 313

Examples: Configuring Channelized DS3-to-DS1 Interfaces on page 316

For a full configuration example, see the *JUNOS Feature Guide*.

Configuring Channelized T3 IQ Interfaces

This section describes how to configure channelized T3 intelligent queuing (IQ) interfaces, discussing the following topics:

Configuring T3 IQ Interfaces on page 303

Configuring T1 IQ Interfaces on page 304

Configuring Fractional T1 IQ Interfaces on page 305

Configuring an NxDS0 IQ Interface on page 306

Configuring T3 IQ Interfaces

To configure a T3 interface, include the `no-partition` and `interface-type` statements at the `[edit interfaces ct3-fpc/pic/port]` hierarchy level:

```
[edit interfaces ct3-fpc/pic/port]
no-partition interface-type t3;
```

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

Configuring T1 IQ Interfaces

On a Channelized DS3 IQ Physical Interface Card (PIC), you can create up to 112 T1 interfaces. To configure a T1 interface on a Channelized DS3 IQ PIC, 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 is correlated with the channel number. For channelized T3 interfaces, the partition number can be from 1 through 28.



NOTE: For channelized T3 interfaces, channel numbering begins with 0 (:0). For channelized T3 IQ 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: Configuring T1 IQ 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;
```

For a full configuration example, see the *JUNOS Feature Guide*.

Configuring Fractional T1 IQ Interfaces

By default, all the time slots on a channelized T1 interface are used. To configure a fractional T1 interface on a Channelized DS3 IQ PIC, you must perform the following tasks:

1. Configure a T1 IQ interface. For more information, see *Configuring T1 IQ Interfaces* on page 304.

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

2. Configure the number of time slots allocated to the T1 IQ 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 IQ interfaces, the time-slot range is from 1 through 24. You can designate any combination of time slots. To configure ranges, use hyphens. To configure discontinuous time slots, use commas. Do not include spaces. For more information about T1 time slots, see “Configuring Fractional T1 Time Slots” on page 553.

Example: Configuring Fractional T1 IQ 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;
```

For a full configuration example, see the *JUNOS Feature Guide*.

Configuring an NxDS0 IQ Interface

By default, all the time slots on a channelized T3 interface are used. To configure an NxDS0 IQ interface on a Channelized DS3 IQ PIC, 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 is correlated with the channel number. For channelized T1 interfaces, the partition number can be from 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 IQ interfaces, channel numbering begins with 1 (:1).

2. Configure the number of time slots allocated to the NxDS0 IQ 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 IQ interfaces, the partition number range is from 1 through 28; the time-slot range is from 1 through 24. You can designate any combination of time slots. To configure ranges, use hyphens. To configure discontinuous time slots, use commas. Do not include spaces. For more information about T1 time slots, see “Configuring Fractional T1 Time Slots” on page 553.

Example: Configuring an NxDS0 IQ Interface

Configure the following two NxDS0 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;
```

For a full configuration example, see the *JUNOS Feature Guide*.

Configuring Channelized DS3-to-DS0 Interfaces

For channelized interfaces, you can configure 28 T1 channels per T3 interface. Each T1 link can have up to eight DS0 channel groups, and each channel group can hold any combination of DS0 time slots. To specify the T1 link and DS0 channel group number in the interface name, use colons (:) as separators. For example, a Multichannel DS3 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 DS0 channel group ranging from 0 through 7 (for more information about ranges, see Table 28 on page 308).

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 DS0 options.

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

By default, all the time slots are used. To configure the channel groups and time slots for a channelized DS3-to-DS0 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 DS3-to-DS0 interface behaves like a channelized DS3-to-DS1 interface: none of the DS0 functionality is accessible.

Table 28 shows the ranges you can specify for each of the elements in the preceding configuration.

Table 28: Ranges for Channelized DS3-to-DS0 Configuration

Item	Option	Range
FPC slot	slot-number	0 through 7 (see note below)
PIC slot	pic-number	0 through 3
Port	port-number	0 through 1
T1 link	link-number	0 through 27
DS0 channel group	group-number	0 through 7
Time slot	time-slot-range	1 through 24



NOTE: FPC slot range depends on platform. For the TX Matrix platform, the range is from 0 through 31. For M40, M40e, M160, M320, and other T-series routing platforms, the range is from 0 through 7. For M20 routing platforms, the range is from 0 through 3. For M10 and M10i routing platforms the range is from 0 through 1. For M5 and M7i routing platforms, 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. You can designate any combination of time slots. To configure ranges, use hyphens. To configure discontinuous time slots, use commas. Do not include spaces. You can use each time slot number on only one channel group within the same T1 link.

To configure channelized DS3-to-DS0 interface properties, you can include the `t3-options`, `t1-options`, and `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 DS0 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: Configuring Channelized DS3-to-DS0 Interfaces” on page 313.

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 | payload | 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 | payload | remote);
    start-end-flag (shared | filler);
    timeslots time-slot-number;
}
```

To specify options for each of the DS0 channels, include the `ds0-options` statement at the `[edit interfaces interface-name]` hierarchy level:

```
[edit interfaces interface-name]
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;
  start-end-flag (shared | filler);
}
```

For more information about specific parameters, see “Configuring E1 Interfaces” on page 321, “Configuring E3 Interfaces” on page 329, “Configuring T1 Interfaces” on page 545, and “Configuring T3 Interfaces” on page 555. For a configuration example, see “Examples: Configuring Channelized DS3-to-DS0 Interfaces” on page 313.

For information about Frame Relay DLCI limitations for channelized interfaces, see “Data-Link Connection Identifiers on Channelized Interfaces” on page 249. For more information about Frame Relay DLCIs, see “Configuring a Point-to-Point Frame Relay Connection” on page 407. For more information about DLCI sparse mode, see the *JUNOS System Basics Configuration Guide*.

Each T1 link can have up to eight DS0 channel groups, and each channel group can hold any combination of DS0 time slots.

Configuring Channelized DS3-to-DS1 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 4-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 DS3-to-DS1 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 DS0 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 | payload | 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 | payload | 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 250.

For information about Frame Relay DLCI limitations for channelized interfaces, see “Data-Link Connection Identifiers on Channelized Interfaces” on page 249. For more information about Frame Relay DLCIs, see “Configuring a Point-to-Point Frame Relay Connection” on page 407. For more information about DLCI sparse mode, see the *JUNOS System Basics Configuration Guide*.

For more information about specific parameters, see “Configuring T1 Interfaces” on page 545 and “Configuring T3 Interfaces” on page 555. For a configuration example, see “Examples: Configuring Channelized DS3-to-DS1 Interfaces” on page 316.

Example: Configuring Channelized T3 IQ Interfaces

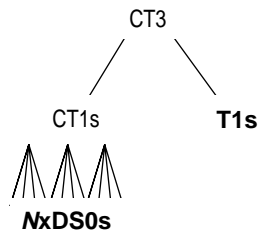
Configuring a T3 Interface Configure a channelized T3 interface as an unpartitioned, clear channel.

```
[edit interfaces]
ct3-5/0/0 {
    no-partition interface-type t3;
}
```

Configuring NxDSO and T1 Interfaces Figure 23 on page 312 shows the following interfaces on a Channelized DS3 IQ PIC:

A channelized T1, which is partitioned into NxDSO interfaces
T1 interfaces

Figure 23: Sample Channelization of DS3 IQ PIC



Bold entries correspond to actual packet channels.

g003015

```
[edit interfaces]
ct3-1/1/0 {
    description "CT3 to CT1 and 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 NxDSOs.";
    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 DSOs
    partition 2 timeslots 11- 23 interface-type ds0; # ds-1/1/0:1:2, channel
group
                                                with 13 DSOs
    ...
}
```

Examples: Configuring Channelized DS3-to-DS0 Interfaces

The following configuration is sufficient to get the channelized DS3-to-DS0 interface up and running. The T3 interface can be divided into 28 channels, each at T1 line rate. DS3 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 “Configuring a Point-to-Point Frame Relay Connection” on page 407.



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

Configuring Cisco HDLC Encapsulation on a Channelized DS3-to-DS0 Interface

```
[edit interfaces]
ds-2/0/1:20:0 {
  encapsulation cisco-hdlc;
  unit 0 {
    family inet {
      address 10.0.4.40/32 {
        destination 10.0.4.41;
      }
    }
  }
}

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

**Configuring PPP
Encapsulation on a
Channelized DS3-to-DS0
Interface**

```
[edit interfaces]
ds-2/0/1:20:0 {
  encapsulation ppp;
  unit 0 {
    family inet {
      address 10.0.4.40/32 {
        destination 10.0.4.41;
      }
    }
  }
}
[edit chassis]
fpc 2 {
  pic 0 {
    ct3 {
      port 1 {
        t1 20 {
          channel-group 0 timeslots 1-5;
        }
      }
    }
  }
}
}
```

**Configuring Three
Frame Relay DLCIs on a
Channelized DS3
Interface**

```
[edit interfaces]
t1-5/1/3:0 {
  mtu 9192;
  encapsulation frame-relay;
  unit 1 {
    dlsi 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 {
    dlsi 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 {
        dlci 103;
        family inet {
            mtu 9000;
            address 10.123.1.6/32 {
                destination 10.123.1.5;
            }
        }
        family iso {
            mtu 9000;
        }
        family mpls {
            mtu 9000;
        }
    }
}

```

Configuring 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;
    }
}

```

Configuring 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;
    }
}

```

Use Time Slots 1 Through 10

```

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

```

Use Time Slots 1 Through 5, 10, and 24

```

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

```

Examples: Configuring Channelized DS3-to-DS1 Interfaces

The following configuration is sufficient to get the channelized DS3-to-DS1 interface up and running. The T3 interface can be divided into 28 channels, each at T1 line rate. DS3 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 “Configuring a Point-to-Point Frame Relay Connection” on page 407.

Configuring Cisco HDLC Encapsulation on a Channelized DS3 Interface

```
[edit interfaces]
t1-2/0/1:20 {
  encapsulation cisco-hdlc;
  unit 0 {
    family inet {
      address 10.0.4.40/32 {
        destination 10.0.4.41;
      }
    }
  }
}
```

Configuring PPP Encapsulation on a Channelized DS3 Interface

```
[edit interfaces]
t1-2/0/1:20 {
  encapsulation ppp;
  unit 0 {
    family inet {
      address 10.0.4.40/32 {
        destination 10.0.4.41;
      }
    }
  }
}
```

**Configuring Five Frame
Relay DLCIs on a
Channelized DS3
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 {
  dlc1 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 {
  dlc1 105;
  family inet {
    mtu 9000;
    address 10.123.1.10/32 {
      destination 10.123.1.9;
    }
  }
  family iso {
    mtu 9000;
  }
  family mpls {
    mtu 9000;
  }
}
}

```

Configuring 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;
  }
}
}

```

Configuring 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;
  }
}
}

```