

Chapter 15

Configure Channelized STM-1 Interfaces

Each Channelized STM-1 PIC and Channelized STM-1 PIC with QPP has one STM-1 port. For both PIC types, You can configure up to 63 E1 channels.

For the Channelized STM-1 PIC with QPP, you can channelize the single port to the *NxDS-0* level. Each E1 interface has 32 time slots (DS-0), in which time slot 0 is reserved. You can combine one or more of these DS-0 time slots (channels) to create a channel group (*NxDS-0*).

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- Configure Channelized STM-1 QPP Interface Properties on page 209

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Configure Channelized STM-1 QPP Interfaces

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Configure an STM-1 QPP Interface

On a one-port Channelized STM-1 PIC with QPP, you can configure one SONET/SDH STM-1 interface. To configure a SONET/SDH STM-1 interface, include the no-partition interface-type statement at the [edit interfaces cstm1-*fpc/pic/port*] hierarchy level, specifying the so interface type:

```
[edit interfaces cstm1-fpc/pic/port]  
no-partition interface-type so;
```

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

Configure E1 QPP Interfaces

On a Channelized STM-1 PIC with QPP, you can configure up to 63 E1 interfaces. To configure an E1 interface on a Channelized STM-1 PIC with QPP, you must perform the following tasks:

1. Include the no-partition and interface-type statements at the [edit interfaces cstm1-*fpc/pic/port*] hierarchy level, specifying the cau4 interface type:

```
[edit interfaces cstm1-fpc/pic/port]  
no-partition interface-type cau4;
```

This converts the Channelized STM-1 interface into a Channelized Administrative Unit 4 (AU-4) interface. The resulting interface name is *cau4-fpc/pic/port*.

2. Partition the Channelized AU-4 interface into E1 interfaces by including the partition and interface-type statements at the [edit interfaces cau4-*fpc/pic/port*] hierarchy level, specifying the e1 interface type:

```
[edit interfaces cau4-fpc/pic/port]  
partition partition-number interface-type e1;
```

This configuration creates interface *e1-fpc/pic/port:channel*.



Note

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

The partition number is the sublevel interface partition index and correlates with the channel number. For Channelized E1 interfaces, the partition number can be in the range 1 through 63.

The interface type is the channelized interface type or clear channel you are creating. For Channelized AU-4 interfaces, *type* can be *ce1* or *e1*.

Example: Configure E1 QPP Interfaces

Configure the following five E1 interfaces:

```
e1-0/0/0:1
e1-0/0/0:2
e1-0/0/0:3
e1-0/0/0:4
e1-0/0/0:5
```

```
[edit interfaces cstm1-0/0/0]
no-partition interface-type cau4;
```

```
[edit interfaces cau4-0/0/0]
partition 1-5 interface-type e1;
```

Configure Fractional E1 QPP Interfaces

On a Channelized STM-1 PIC with QPP, you can configure up to 63 fractional E1 interfaces. To configure a fractional E1 interface on a Channelized STM-1 PIC with QPP, you must perform the following tasks:

1. Include the no-partition and interface-type statements at the [edit interfaces cstm1-*fpc/pic/port*] hierarchy level, specifying the cau4 interface type:

```
[edit interfaces cstm1-fpc/pic/port]
no-partition interface-type cau4;
```

This converts the Channelized STM-1 interface into a Channelized AU-4 interface. The resulting interface name is cau4-*fpc/pic/port*.

2. Partition the Channelized AU-4 interface into E1 interfaces by including the partition and interface-type statements at the [edit interfaces cau4-*fpc/pic/port*] hierarchy level, specifying the e1 interface type:

```
[edit interfaces cau4-fpc/pic/port]
partition partition-number interface-type e1;
```

This configuration creates interface e1-*fpc/pic/port:channel*.

The partition number is the sublevel interface partition index and correlates with the channel number. For Channelized E1 interfaces, the partition number can be in the range 1 through 63.

The interface type is the channelized interface type or clear channel you are creating. For Channelized AU-4 interfaces, *type* can be ce1 or e1.



Note

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

- Configure the number of time slots allocated to the E1 QPP interface by including the `timeslots` statement at the `[edit interfaces e1-fpc/pic/port:channel e1-options]` hierarchy level:

```
[edit interfaces e1-fpc/pic/port:channel e1-options]
timeslots time-slot-range;
```

For Channelized E1 QPP interfaces, the time-slot range is 2 through 31. You can designate any combination of time slots for usage. The default is to use all the time slots.

For more information about E1 time slots, see “Configure Fractional E1 Time Slots” on page 249.

Example: Configure Fractional E1 QPP Interfaces

Configure a fractional E1 interface that uses time slots 2 through 10:

```
[edit interfaces cstm1-0/0/0]
no-partition interface-type cau4;

[edit interfaces cau4-0/0/0]
partition 1 interface-type e1;

[edit interfaces e1-0/0/0 e1-options]
timeslots 2-10;
```

Configure an NxDS-0 QPP Interface

On a Channelized STM-1 PIC with QPP, you can configure up to 128 NxDS-0 channels. To configure an NxDS-0 QPP interface on a Channelized STM-1 PIC with QPP, you must perform the following tasks:

- Include the partition and interface-type statements at the `[edit interfaces cstm1-fpc/pic/port]` hierarchy level, specifying the `cau4` interface type:

```
[edit interfaces cstm1-fpc/pic/port]
no-partition interface-type cau4;
```

This converts the Channelized STM-1 interface into a Channelized AU-4 interface. The resulting interface name is `cau4-fpc/pic/port`.

- Partition the Channelized AU-4 interface into E1 interfaces by including the partition and interface-type statements at the `[edit interfaces cau4-fpc/pic/port]` hierarchy level, specifying the `ce1` interface type:

```
[edit interfaces cau4-fpc/pic/port]
partition partition-number interface-type ce1;
```

This configuration creates interface `ce1-fpc/pic/port:channel`.

The partition number is the sublevel interface partition index and correlates with the channel number. For Channelized E1 interfaces, the partition number can be in the range 1 through 63.

The interface type is the channelized interface type or clear channel you are creating. For Channelized AU-4 interfaces, *type* can be *ce1* or *e1*.



Note

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

3. 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 *e1-fpc/pic/port:channel*] hierarchy level, specifying the ds interface type:

```
[edit interfaces ce1-fpc/pic/port:channel]
partition partition-number timeslots time-slot-range interface-type ds;
```

For Channelized E1 QPP interfaces, the partition number range is 1 through 31; the time-slot range is 2 through 31. You can designate any combination of time slots for usage. The default is to use all the time slots.

For more information about E1 time slots, see “Configure Fractional E1 Time Slots” on page 249.

Example: Configure an *NxDS-0* QPP Interface

Configure an *NxDS-0* interface that uses time slots 2 through 10. This configuration creates the *ds-0/0/0:1:1* interface.

```
[edit interfaces cstm1-0/0/0]
no-partition interface-type cau4;

[edit interfaces cau4-0/0/0]
partition 1 interface-type ce1;

[edit interfaces ce1-0/0/0:1]
partition 1 timeslots 2-10 interface-type ds;
```

Configure Channelized STM-1 QPP Interface Properties

This section lists the interface properties that are valid at each channel level on a Channelized STM-1 QPP interface, discussing the following topics:

Specify Options at the Channelized STM-1 QPP Level on page 210

Specify Options at the Channelized AU-4 QPP Level on page 211

Specify Options at the E1 QPP Interface Level on page 212

Specify Options at the *NxDS-0* QPP Interface Level on page 213

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

Specify Options at the Channelized STM-1 QPP Level

To specify options at the Channelized STM-1 interface level, include the following statements at the [edit interfaces stm1-fpc/pic/port] hierarchy level:

```
[edit interfaces stm1-fpc/pic/port]
clocking clock-source;
description text;
disable;
no-partition interface-type type;
partition partition-number interface-type type;
sonet-options {
  aps {
    advertise-interval milliseconds;
    authentication-key key;
    force;
    hold-time milliseconds;
    lockout;
    neighbor address;
    paired-group group-name;
    protect-circuit group-name;
    request;
    revert-time seconds;
    working-circuit group-name;
  }
  bytes {
    e1-quiet value;
    f1 value;
    f2 value;
    s1 value;
    z3 value;
    z4 value;
  }
  loopback (local | remote);
  (z0-increment | no-z0-increment);
}
traceoptions {
  flag flag <flag-modifier> <disable>;
}
```

For more information about specific parameters, see “Configure Physical Interface Properties” on page 39 and “Configure SONET/SDH Interfaces” on page 359.

Specify Options at the Channelized AU-4 QPP Level

To specify options at the Channelized AU-4 QPP interface level, include the following statements at the [edit interfaces cau4-fpc/pic/port] hierarchy level:

```
[edit interfaces cau4-fpc/pic/port]
clocking clock-source;
description text;
disable;
partition partition-number interface-type type;
sonet-options {
  bytes {
    f2 value;
    z3 value;
    z4 value;
  }
  loopback (local | remote);
  path-trace trace-string;
}
}
traceoptions {
  flag flag <flag-modifier> <disable>;
}
}
```

For more information about specific parameters, see “Configure Physical Interface Properties” on page 39 and “Configure SONET/SDH Interfaces” on page 359.

Configure Virtual Tributary Mapping of Channelized STM-1 QPP Interface

You can configure virtual tributary mapping to use KLM mode or ITU-T mode. By default, virtual tributary mapping uses KLM mode.

For the Channelized STM-1 PIC with QPP, you can configure virtual tributary mapping by including the vtmapping statement at the [edit interfaces cau4-fpc/pic/port sonet-options] hierarchy level:

```
[edit interfaces cau4-fpc/pic/port sonet-options]
vtmapping (klm | itu-t);
```

For the KLM mappings used by Channelized STM-1 to E1 PIC interfaces, see Table 20 on page 217.

Specify Options at the E1 QPP Interface Level

To specify options at the E1 interface level, include the following statements at the [edit interfaces e1-fpc/pic/port:channel] hierarchy level:

```
[edit interfaces e1-fpc/pic/port:channel]
clocking clock-source;
dce;
disable;
description text;
e1-options {
  bert-algorithm algorithm;
  bert-error-rate rate;
  bert-period seconds;
  byte-encoding (nx64 | nx56);
  fcs (32 | 16);
  framing (g704 | g704-no-crc4 | unframed);
  idle-cycle-flag (flags | ones);
  loopback (local | remote);
  start-end-flag (shared | filler);
  timeslots time-slot-range;
}
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;
  }
}
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 E1 Interfaces” on page 243.

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.

Example: Configure Channelized STM-1 QPP Interfaces

Configure STM-1, E1, fractional E1, and NxDS-0 interfaces:

```

STM-1 interface      [edit interfaces]
                        cstm1-0/0/0 {
                            no-partition interface-type so;
                        }
                        so-0/0/0 {
                            unit 0 {
                                family inet {
                                    address 10.10.12.1/30;
                                }
                            }
                        }
}

E1 interface        [edit interfaces]
                        cstm1-1/1/0 {
                            no-partition interface-type cau4;
                        }

                        [edit interfaces]
                        cau4-1/1/0 {
                            partition 1-63 interface-type e1;
                        }

                        [edit interfaces]
                        e1-1/1/0:1 {
                            unit 0 {
                                family inet {
                                    address 10.10.10.1/30;
                                }
                            }
                        }
}
...

Fractional E1 interface [edit interfaces]
                        cstm1-1/0/0 {
                            no-partition interface-type cau4;
                        }

                        [edit interfaces]
                        cau4-1/0/0 {
                            partition 1-63 interface-type e1;
                        }

                        [edit interfaces]
                        e1-1/1/0:1 {
                            e1-options {
                                timeslots 2-10;
                            }
                            unit 0 {
                                family inet {
                                    address 10.10.10.1/30;
                                }
                            }
                        }
}
...

```

```

DS-0 interface      [edit interfaces]
                        cstm1-2/0/0 {
                          no-partition interface-type cau4;
                        }

                        [edit interfaces]
                        cau4-2/0/0 {
                          partition 1-10 interface-type ce1;
                        }

                        [edit interfaces]
                        ce1-2/0/0:1 {
                          partition 1 interface-type ds timeslots 2-10
                        }

                        [edit interfaces]
                        ds-2/0/0:1:1 {
                          unit 0 {
                            family inet {
                              address 12.12.12.1/30;
                            }
                          }
                        }
                        ...

```

Configure Channelized STM-1 Interfaces

You can configure up to 63 E1 channels per single-port Channelized STM-1 to E1 PIC. To specify the channel number, include it after the colon (:) in the interface name. For example, a Channelized STM-1 to E1 PIC in FPC 1 and slot 1 will have the following physical interface, depending on the media type:

```
e1-1/1/0:x
```

The E1 channel number can be from 0 through 62.

This section is organized as follows:

Configure Channelized STM-1 Interface Properties on page 216

Configure Virtual Tributary Mapping of Channelized STM-1 Interface on page 217

Example: Configure Channelized STM-1 Interfaces on page 219

Configure Channelized STM-1 Interface Properties

To configure the interface properties for Channelized STM-1 to E1 PICs, you include the `e1-options` and `sonet-options` statements for both sides of the connection. The following configurations list all the valid statements.

To specify options for each of the E1 channels on the Channelized STM-1 to E1 PIC, include the `e1-options` statement at the `[edit interfaces interface-name]` hierarchy level:

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



Note

When a channelized STM-1 interface experiences a line transition, the E1 channels configured in unframed mode log a large number of drops (around 24,000) as the channelized STM-1 interface clocks resynchronize. This does not occur on framed channels, because the framing resynchronizes clocks very quickly.

To specify options for the SONET/SDH side of the connection, include the `sonet-options` statement at the `[edit interfaces interface-name]` hierarchy level:

```
[edit interfaces interface-name]
sonet-options {
  bytes {
    e1-quiet value;
    f1 value;
    f2 value;
    s1 value;
    z3 value;
    z4 value;
  }
  loopback (local | remote);
}
```



Note

On Channelized STM-1 interfaces, you should configure the clock source on one side of the connection to be internal (the default JUNOS configuration) and on the other side of the connection to be external.

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 statements, see “Configure E1 Interfaces” on page 243, “Configure SONET/SDH Interfaces” on page 359, and “Configure T1 Interfaces” on page 387. For a configuration example, see “Example: Configure Channelized STM-1 Interfaces” on page 219.

Configure Virtual Tributary Mapping of Channelized STM-1 Interface

You can configure virtual tributary mapping to use KLM mode or ITU-T mode. To configure virtual tributary mapping, include the `vtmapping` statement at the [edit chassis fpc slot-number pic pic-number] hierarchy level:

```
[edit chassis fpc slot-number pic pic-number]
  vtmapping (klm | itu-t);
```

By default, virtual tributary mapping uses KLM mode. For more information, see the *JUNOS Internet Software Configuration Guide: Getting Started*.

For the Channelized STM-1 PIC with QPP, you can configure virtual tributary mapping by including the `vtmapping` statement at the [edit interfaces cau4-fpc/pic/port sonet-options] hierarchy level:

```
[edit interfaces cau4-fpc/pic/port sonet-options]
  vtmapping (klm | itu-t);
```

Table 20 lists the KLM mappings used by the Channelized STM-1 to E1 PIC interfaces. The PIC defaults to KLM numbering with an offset of -1; for example, KLM 1 = STM-1 PIC 0.

Table 20: Channelized STM-1 to E1 Channel Mapping

Channel Number	KLM Number	Tributary Unit Group 3	Tributary Unit Group 2	Virtual Tributary	ITU-T Number
0	1	1	1	1	1
1	2	1	1	2	22
2	3	1	1	3	43
3	4	1	2	1	4
4	5	1	2	2	25
5	6	1	2	3	46
6	7	1	3	1	7
7	8	1	3	2	28

Channel Number	KLM Number	Tributary Unit Group 3	Tributary Unit Group 2	Virtual Tributary	ITU-T Number
8	9	1	3	3	49
9	10	1	4	1	10
10	11	1	4	2	31
11	12	1	4	3	52
12	13	1	5	1	13
13	14	1	5	2	34
14	15	1	5	3	55
15	16	1	6	1	16
16	17	1	6	2	37
17	18	1	6	3	58
18	19	1	7	1	19
19	20	1	7	2	40
20	21	1	7	3	61
21	22	2	1	1	2
22	23	2	1	2	23
23	24	2	1	3	44
24	25	2	2	1	5
25	26	2	2	2	26
26	27	2	2	3	47
27	28	2	3	1	8
28	29	2	3	2	29
29	30	2	3	3	50
30	31	2	4	1	11
31	32	2	4	2	32
32	33	2	4	3	53
33	34	2	5	1	14
34	35	2	5	2	35
35	36	2	5	3	56
36	37	2	6	1	17
37	38	2	6	2	38
38	39	2	6	3	59
39	40	2	7	1	20
40	41	2	7	2	41
41	42	2	7	3	62
42	43	3	1	1	3
43	44	3	1	2	24
44	45	3	1	3	45
45	46	3	2	1	6
46	47	3	2	2	27

Channel Number	KLM Number	Tributary Unit Group 3	Tributary Unit Group 2	Virtual Tributary	ITU-T Number
47	48	3	2	3	48
48	49	3	3	1	9
49	50	3	3	2	30
50	51	3	3	3	51
51	52	3	4	1	12
52	53	3	4	2	33
53	54	3	4	3	54
54	55	3	5	1	15
55	56	3	5	2	36
56	57	3	5	3	57
57	58	3	6	1	18
58	59	3	6	2	39
59	60	3	6	3	60
60	61	3	7	1	21
61	62	3	7	2	42
62	63	3	7	3	63

Example: Configure Channelized STM-1 Interfaces

The following configuration is sufficient to get the Channelized STM-1 to E1 PIC interface up and running. The Channelized STM-1 to E1 interface is an STM-1 that is divided into 63 E1 interfaces. E1 interfaces can use the following encapsulation types:

PPP, PPP CCC, and PPP TCC

Frame Relay, Frame Relay CCC, and Frame Relay TCC

Cisco HDLC, Cisco HDLC CCC, and Cisco HDLC TCC

The channels can also have logical interfaces. 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*.

You apply all STM-1 interface SONET/SDH options to the first E1 interface in the configuration by including the `sonet-options` statement at the `[edit interfaces e1-fpc/pic/port:channel]` hierarchy level:

```
[edit]
interfaces {
  e1-fpc/pic/port:0 {
    encapsulation cisco-hdlc;
    sonet-options {
      no-z0-increment;
    }
    e1-options {
      framing g704;
    }
    unit 0 {
      family inet {
        address 10.11.30.1/30;
      }
    }
  }
  e1-fpc/pic/port:1 {
    encapsulation frame-relay;
    e1-options {
      framing g704;
    }
    unit 1 {
      dlci 16;
      family inet {
        address 10.11.31.9/30;
      }
    }
  }
  e1-fpc/pic/port:2 {
    encapsulation ppp;
    no-keepalives;
    unit 0 {
      family inet {
        address 10.11.31.47/30;
      }
    }
  }
}

[edit]
chassis {
  fpc 2 {
    pic 0 {
      vtmapping klm;
    }
  }
}
```