Chapter 16b

Configuring Channelized STM1 Interfaces

Each Channelized STM1 PIC and Channelized STM1 Intelligent Queuing (IQ) PIC has one STM1 port.

For the Channelized STM1 IQ PIC, you can channelize the single port to the *N*xDS0 level. Each E1 interface has 32 time slots (DS0), in which time slot 0 is reserved.

You can combine one or more of these DS0 time slots (channels) to create a channel group (*N*xDS0).

This chapter is organized as follows:

For examples of channelized STM1 interface configuration, see the following:

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

Configuring Channelized STM1 IQ Interfaces

This section includes the following topics:

Configuring an STM1 IQ Interface

On a 1-port Channelized STM1 IQ PIC, you can configure one SONET/SDH STM1 interface. To configure a SONET/SDH STM1 interface, include the no-partition interface-type statement at the [edit interfaces cstm-1-*fpc/pic/port*] hierarchy level, specifying the so interface type:

```
[edit interfaces cstm-1-fpc/pic/port]
no-partition interface-type so;
```

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

Configuring E1 IQ Interfaces

To configure an E1 interface on a Channelized STM1 IQ PIC, you must perform the following tasks:

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

   ```
   [edit interfaces cstm-1-fpc/pic/port]
   no-partition interface-type cau4;
   ```

   This converts the channelized STM1 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 STM1 interfaces, channel numbering begins with 0 (:0). For channelized STM1 IQ interfaces, channel numbering begins with 1 (:1).

The partition number is the sublevel interface partition index and is correlated with the channel number. For channelized E1 interfaces, the partition number can be from 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: Configuring E1 IQ 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 cstm-1-0/0/0]
no-partition interface-type cau4;

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

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

Configuring Fractional E1 IQ Interfaces

By default, all the time slots on a channelized E1 interface are used. To configure a fractional E1 interface on a Channelized STM1 IQ PIC, you must perform the following tasks:

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

   ```
   [edit interfaces cstm-1-fpc/pic/port]
   no-partition interface-type cau4;
   ```

   This converts the channelized STM1 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 is correlated with the channel number. For channelized E1 interfaces, the partition number can be from 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 STM1 interfaces, channel numbering begins with 0 (:0). For channelized STM1 IQ interfaces, channel numbering begins with 1 (:1).

3. Configure the number of time slots allocated to the E1 IQ 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;
   ```

   *N*xDS0 timeslots configured on either a channelized STM1 IQ interface or channelized E1 IQ interface are numbered from 1 to 31 (0 is reserved), while fractional E1 timeslots range from 2 to 32 (1 is reserved). To configure ranges, use hyphens. To configure discontinuous time slots, use commas. Do not include spaces. For more information about E1 time slots, see "Configuring Fractional E1 Time Slots" on page 326.

Example: Configuring Fractional E1 IQ Interfaces

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

```
[edit interfaces cstm-1-0/0/0]
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;
```

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

Configuring an NxDS0 IQ Interface

By default, all the time slots on a channelized STM1 interface are used. To configure an *N*xDS0 IQ interface on a Channelized STM1 IQ PIC, you must perform the following tasks:

1. Include the partition and interface-type statements at the [edit interfaces cstm-1-*fpc/pic/port*] hierarchy level, specifying the cau4 interface type:

   ```
   [edit interfaces cstm-1-fpc/pic/port]
   no-partition interface-type cau4;
   ```

   This converts the channelized STM1 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 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 is correlated with the channel number. For channelized E1 interfaces, the partition number can be from 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 STM1 interfaces, channel numbering begins with 0 (:0). For channelized STM1 IQ interfaces, channel numbering begins with 1 (:1).

3. Configure the number of time slots allocated to the *N*xDS0 IQ 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 IQ interfaces, the partition number range is from 1 through 31.

   For E1 IQ interfaces (e1-*fpc*/*pic*/*port*), the time-slot range is from 2 through 31. For channelized E1 IQ interfaces (ce1-*fpc*/*pic*/*port*), the time-slot range is from 1 through 31. 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 E1 time slots, see “Configuring Fractional E1 Time Slots” on page 326.

Example: Configuring an *N*xDS0 IQ Interface

Configure an *N*xDS0 interface that uses time slots 1 through 10. This configuration creates the ds-0/0/0:1:1 interface.

```
[edit interfaces cstm-1-0/0/0]
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 1-10 interface-type ds;
```

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

Example: Configuring Channelized STM1 IQ Interfaces

Configure STM1, E1, fractional E1, and *N*xDS0 interfaces:

STM1 Interface

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

E1 Interface

```
[edit interfaces]
cstm-1-1/1/0 {
    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]
cstm-1-1/0/0 {
    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;
        }
    }
}
...
```

DS0 Interface

```
[edit interfaces]
cstm-1-2/0/0 {
    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 10.12.12.1/30;
        }
    }
}
...
```

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

Configuring Channelized STM1 Interfaces

To specify the channel number, include it after the colon (:) in the interface name. For example, a Channelized STM1-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:

Configuring Channelized STM1 Interface Properties

To configure the interface properties for Channelized STM1-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 STM1-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 STM1 interface experiences a line transition, the E1 channels configured in unframed mode log a large number of drops (around 24,000) as the channelized STM1 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 STM1 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.

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 information about DLCI sparse mode, see the *JUNOS System Basics Configuration Guide*.

For more information about specific statements, see “Configuring E1 Interfaces” on page 321, “Configuring SONET/SDH Interfaces” on page 509, and “Configuring T1 Interfaces” on page 545. For a configuration example, see “Example: Configuring Channelized STM1 Interfaces” on page 300.

Configuring Virtual Tributary Mapping of Channelized STM1 Interfaces

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 System Basics Configuration Guide*.

For the Channelized STM1 IQ PIC, 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 27 lists the KLM mappings used by the channelized STM1-to-E1 PIC interfaces. The PIC defaults to KLM numbering with an offset of –1; for example, KLM 1 = STM1 PIC 0.

Table 27: Channelized STM1-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
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

Channel Number	KLM Number	Tributary Unit Group 3	Tributary Unit Group 2	Virtual Tributary	ITU-T Number
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
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: Configuring Channelized STM1 Interfaces

The following configuration is sufficient to get the Channelized STM1-to-E1 PIC interface up and running. The channelized STM1-to-E1 interface is an STM1 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. 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*.

You apply all STM1 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;
      }
    }
}
```