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Junos® OS

Circuit Emulation Interfaces Configuration Guide

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Junos® OS Circuit Emulation Interfaces Configuration Guide
Release 12.2

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The information in this document is current as of the date on the title page.

YEAR 2000 NOTICE

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About This Guide

This preface provides the following guidelines for using the *Junos® OS Circuit Emulation Interfaces Configuration Guide*:

Documentation and Release Notes

To obtain the most current version of all Juniper Networks® technical documentation, see the product documentation page on the Juniper Networks website at http://www.juniper.net/techpubs/.

If the information in the latest release notes differs from the information in the documentation, follow the product Release Notes.

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Supported Routing Platforms

For the features described in this manual, the Junos Software currently supports the following routing platforms:

- J Series
- M Series
- MX Series
- T Series
- ACX Series
- PTX Series

Using the Examples in This Manual

If you want to use the examples in this manual, you can use the **load merge** or the **load merge relative** command. These commands cause the software to merge the incoming configuration into the current candidate configuration. The example does not become active until you commit the candidate configuration.

If the example configuration contains the top level of the hierarchy (or multiple hierarchies), the example is a *full example*. In this case, use the **load merge** command.

If the example configuration does not start at the top level of the hierarchy, the example is a *snippet*. In this case, use the **load merge relative** command. These procedures are described in the following sections.

Merging a Full Example

To merge a full example, follow these steps:

1. From the HTML or PDF version of the manual, copy a configuration example into a text file, save the file with a name, and copy the file to a directory on your routing platform.

   For example, copy the following configuration to a file and name the file **ex-script.conf**. Copy the **ex-script.conf** file to the **/var/tmp** directory on your routing platform.

   ```
   system {
     scripts {
       commit {
         file ex-script.xsl;
       }
     }
   }
   interfaces {
     fxp0 {
       disable;
       unit 0 {
         family inet {
           address 10.0.0.1/24;
         }
       }
     }
   }
   ```

2. Merge the contents of the file into your routing platform configuration by issuing the **load merge** configuration mode command:

   ```
   [edit]
   user@host# load merge /var/tmp/ex-script.conf
   load complete
   ```

Merging a Snippet

To merge a snippet, follow these steps:

1. From the HTML or PDF version of the manual, copy a configuration snippet into a text file, save the file with a name, and copy the file to a directory on your routing platform.

   For example, copy the following snippet to a file and name the file **ex-script-snippet.conf**. Copy the **ex-script-snippet.conf** file to the **/var/tmp** directory on your routing platform.

   ```
   commit {
     file ex-script-snippet.xsl; }
   ```

2. Move to the hierarchy level that is relevant for this snippet by issuing the following configuration mode command:

   ```
   [edit]
   user@host# edit system scripts
   [edit system scripts]
   ```

3. Merge the contents of the file into your routing platform configuration by issuing the **load merge relative** configuration mode command:

   ```
   [edit system scripts]
   user@host# load merge relative /var/tmp/ex-script-snippet.conf
   load complete
   ```

For more information about the **load** command, see the CLI User Guide.

Documentation Conventions

Table 1 on page xvii defines notice icons used in this guide.

Table 1: Notice Icons

Icon	Meaning	Description
	Informational note	Indicates important features or instructions.
	Caution	Indicates a situation that might result in loss of data or hardware damage.
	Warning	Alerts you to the risk of personal injury or death.
	Laser warning	Alerts you to the risk of personal injury from a laser.

Table 2 on page xviii defines the text and syntax conventions used in this guide.

Table 2: Text and Syntax Conventions

Convention	Description	Examples
Bold text like this	Represents text that you type.	To enter configuration mode, type the**configure** command: user@host> **configure**
`Fixed-width text like this`	Represents output that appears on the terminal screen.	`user@host>` **show chassis alarms** `No alarms currently active`
Italic text like this	• Introduces or emphasizes important new terms. • Identifies book names. • Identifies RFC and Internet draft titles.	• A policy *term* is a named structure that defines match conditions and actions. • *Junos OS System Basics Configuration Guide* • RFC 1997, *BGP Communities Attribute*
Italic text like this	Represents variables (options for which you substitute a value) in commands or configuration statements.	Configure the machine's domain name: [edit] root@# **set system domain-name** *domain-name*
Text like this	Represents names of configuration statements, commands, files, and directories; configuration hierarchy levels; or labels on routing platform components.	• To configure a stub area, include the **stub** statement at the**[edit protocols ospf area area-id]** hierarchy level. • The console port is labeled **CONSOLE**.
< > (angle brackets)	Enclose optional keywords or variables.	**stub <default-metric** ***metric*****>;**
| (pipe symbol)	Indicates a choice between the mutually exclusive keywords or variables on either side of the symbol. The set of choices is often enclosed in parentheses for clarity.	**broadcast | multicast** **(*string1* | *string2* | *string3*)**
# (pound sign)	Indicates a comment specified on the same line as the configuration statement to which it applies.	**rsvp { # Required for dynamic MPLS only**
[ ] (square brackets)	Enclose a variable for which you can substitute one or more values.	**community name members [** ***community-ids*** **]**

Indention and braces ({ })	Identify a level in the configuration hierarchy.	[edit]
		routing-options {
		  static {
		  route default {
		  nexthop *address*;
		  retain;
		  }
		  }
		}

; (semicolon)	Identifies a leaf statement at a configuration hierarchy level.	

J-Web GUI Conventions

Table 2: Text and Syntax Conventions *(continued)*

Convention	Description	Examples
Bold text like this	Represents J-Web graphical user interface (GUI) items you click or select.	• In the Logical Interfaces box, select **All Interfaces**. • To cancel the configuration, click **Cancel**.
> (bold right angle bracket)	Separates levels in a hierarchy of J-Web selections.	In the configuration editor hierarchy, select **Protocols>Ospf**.

Documentation Feedback

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- Document or topic name
- URL or page number
- Software release version (if applicable)

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- JTAC policies—For a complete understanding of our JTAC procedures and policies, review the JTAC User Guide located at http://www.juniper.net/us/en/local/pdf/resource-guides/7100059-en.pdf.
- Product warranties—For product warranty information, visit http://www.juniper.net/support/warranty/.
- JTAC Hours of Operation —The JTAC centers have resources available 24 hours a day, 7 days a week, 365 days a year.

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- Find product documentation: http://www.juniper.net/techpubs/

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- Download the latest versions of software and review release notes: http://www.juniper.net/customers/csc/software/
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- Join and participate in the Juniper Networks Community Forum: http://www.juniper.net/company/communities/
- Open a case online in the CSC Case Management tool: http://www.juniper.net/cm/

To verify service entitlement by product serial number, use our Serial Number Entitlement (SNE) Tool: https://tools.juniper.net/SerialNumberEntitlementSearch/

Opening a Case with JTAC

You can open a case with JTAC on the Web or by telephone.

- Use the Case Management tool in the CSC at http://www.juniper.net/cm/.
- Call 1-888-314-JTAC (1-888-314-5822 toll-free in the USA, Canada, and Mexico).

For international or direct-dial options in countries without toll-free numbers, visit us at http://www.juniper.net/support/requesting-support.html

PART 1

Circuit Emulation Interfaces Configuration Statements Overview

CHAPTER 1

Circuit Emulation Interfaces Configuration Statements and Hierarchy

The following interfaces hierarchy listings show the complete configuration statement hierarchy for the indicated hierarchy levels, listing all possible configuration statements within the indicated hierarchy levels, and showing their level in the configuration hierarchy. When you are configuring the Junos OS, your current hierarchy level is shown in the banner on the line preceding the **user@host#** prompt.

This section contains the following topics:

[edit chassis] Hierarchy Level

```
chassis {
  aggregated-devices {
    ethernet {
      device-count number;
    }
    sonet {
      device-count number;
    }
```

```
}
channel-group number {
  ethernet {
    device-count number;
  }
  fpc slot-number{
    pic pic-number {
      adaptive-services{
        service-package (layer-2 | layer-3);
      }
      aggregate-ports;
      atm-cell-relay-accumulation;
      atm-l2circuit-mode (aal5 | cell | trunk trunk);
      ce1 {
        e1 link-number {
          channel-group group-number;
          timeslots time-slot-range;
        }
      }
      channelization;
      ct1 {
        t1 link-number {
          channel-group group-number;
          timeslots time-slot-range;
        }
      }
      ct3 {
        port port-number {
          t1 link-number {
            channel-group group-number;
            timeslots time-slot-range;
          }
        }
        framing sdh;
      }
      max-queues-per-interface number;
      mlfr-uni-nni-bundles num-intf;
      no-concatenate;
      shdsl {
        pic-mode (1-port-atm | 2-port-atm);
      }
      vtmapping (klm | itu-t);
    }
  }
  fpc slot-number{
  pic pic-number{
    egress-policer-overhead bytes;
      ingress-policer-overhead bytes;
    }
  }
}
```

[edit interfaces] Hierarchy Level

The statements at the **[edit interfaces *interface-name* unit *logical-unit-number*]** hierarchy level can also be configured at the **[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]** hierarchy level.

NOTE: The accounting-profile statement is an exception to this rule. The accounting-profile statement can be configured at the [edit interfaces *interface-name* unit *logical-unit-number*] hierarchy level, but it cannot be configured at the [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*] hierarchy level.

```
interfaces {
  traceoptions {
    file filename <files number> <match regular-expression> <size size> <world-readable |
      no-world-readable> ;
    flag flag <disable>;
  }
  interface-name {
    accounting-profile name;
    aggregated-ether-options {
      (flow-control | no-flow-control);
      lacp {
        (active | passive);
        link-protection {
          disable;
        (revertive | non-revertive);
        periodic interval;
        system-priority priority;
      }
      link-protection;
      link-speed speed;
      (loopback | no-loopback);
      mc-ae{
        chassis-id chassis-id;
        mc-ae-id mc-ae-id;
        mode (active-active | active-standby);
        redundancy-group group-id;
        status-control (active | standby);
      }
      minimum-links number;
      source-address-filter {
        mac-address;
      }
      (source-filtering | no-source-filtering);
    }
    aggregated-sonet-options {
      link-speed speed | mixed;
      minimum-links number;
    }
    atm-options {
```

```
    cell-bundle-size cells;
    ilmi;
    linear-red-profiles profile-name {
      high-plp-max-threshold percent;
      low-plp-max-threshold percent;
      queue-depth cells high-plp-threshold percent low-plp-threshold percent;
    }
    mpls {
      pop-all-labels {
        required-depth number;
      }
    }
    pic-type (atm1 | atm2);
    plp-to-clp;
    promiscuous-mode {
      vpi vpi-identifier;
    }
    scheduler-maps map-name {
      forwarding-class class-name {
        epd-threshold cells plp1 cells;
        linear-red-profile profile-name;
        priority (high | low);
        transmit-weight (cells number | percent number);
      }
      vc-cos-mode (alternate | strict);
    }
    use-null-cw;
      vpi vpi-identifier {
      maximum-vcs maximum-vcs;
      oam-liveness {
        down-count cells;
        up-count cells;
      }
      oam-period (seconds | disable);
      shaping {
        (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate
          burst length);
        queue-length number;
      }
    }
  }
  clocking clock-source;
  data-input (system | interface interface-name);
  dce;
  serial-options {
    clock-rate rate;
    clocking-mode (dce | internal | loop);
    control-polarity (negative | positive);
    cts-polarity (negative | positive);
    dcd-polarity (negative | positive);
    dce-options {
      control-signal (assert | de-assert | normal);
      cts (ignore | normal | require);
      dcd (ignore | normal | require);
      dsr (ignore | normal | require);
      dtr signal-handling-option;
```

```
      ignore-all;
      indication (ignore | normal | require);
      rts (assert | de-assert | normal);
      tm (ignore | normal | require);
    }
    dsr-polarity (negative | positive);
    dte-options {
      control-signal (assert | de-assert | normal);
      cts (ignore | normal | require);
      dcd (ignore | normal | require);
      dsr (ignore | normal | require);
      dtr signal-handling-option;
      ignore-all;
      indication (ignore | normal | require);
      rts (assert | de-assert | normal);
      tm (ignore | normal | require);
    }
    dtr-circuit (balanced | unbalanced);
    dtr-polarity (negative | positive);
    encoding (nrz | nrzi);
    indication-polarity (negative | positive);
    line-protocol protocol;
    loopback mode;
    rts-polarity (negative | positive);
    tm-polarity (negative | positive);
    transmit-clock invert;
  }
  description text;
  dialer-options {
    pool pool-name <priority priority>;
  }
  disable;
  ds0-options {
    bert-algorithm algorithm;
    bert-error-rate rate;
    bert-period seconds;
    byte-encoding (nx56 | nx64);
    fcs (16 | 32);
    idle-cycle-flag (flags | ones);
    invert-data;
    loopback payload;
    start-end-flag (filler | shared);
  }
  e1-options {
    bert-error-rate rate;
    bert-period seconds;
    fcs (16 | 32);
    framing (g704 | g704-no-crc4 | unframed);
    idle-cycle-flag (flags | ones);
    invert-data;
    loopback (local | remote);
    start-end-flag (filler | shared);
    timeslots time-slot-range;
  }
  e3-options {
    atm-encapsulation (direct | plcp);
```

```
    bert-algorithm algorithm;
    bert-error-rate rate;
    bert-period seconds;
    framing feet;
    compatibility-mode (digital-link | kentrox | larscom) <subrate value>;
    fcs (16 | 32);
    framing (g.751 | g.832);
    idle-cycle-flag (filler | shared);
    invert-data;
    loopback (local | remote);
    (payload-scrambler | no-payload-scrambler);
    start-end-flag (filler | shared);
    (unframed | no-unframed);
}
encapsulation type;
es-options {
    backup-interface es-fpc/pic/port;
}
fastether-options {
    802.3ad aex;
    (flow-control | no-flow-control);
    ignore-l3-incompletes;
    ingress-rate-limit rate;
    (loopback | no-loopback);
    mpls {
        pop-all-labels {
            required-depth number;
        }
    }
    source-address-filter {
        mac-address;
    }
    (source-filtering | no-source-filtering);
}
flexible-vlan-tagging;
gigether-options {
    802.3ad aex;
    (asynchronous-notification | no-asynchronous-notification);
    (auto-negotiation | no-auto-negotiation) remote-fault <local-interface-online |
        local-interface-offline>;
    auto-reconnect seconds;
    (flow-control | no-flow-control);
    ignore-l3-incompletes;
    (loopback | no-loopback);
    mpls {
        pop-all-labels {
            required-depth number;
        }
    }
    no-auto-mdix;
    source-address-filter {
        mac-address;
    }
    (source-filtering | no-source-filtering);
    ethernet-switch-profile {
        (mac-learn-enable | no-mac-learn-enable);
```

```
      tag-protocol-id [ tpids ];
      ethernet-policer-profile {
        input-priority-map {
          ieee802.1p premium [ values ];
        }
        output-priority-map {
          classifier {
            premium {
              forwarding-class class-name {
                loss-priority (high | low);
              }
            }
          }
        }
        policer cos-policer-name {
          aggregate {
            bandwidth-limit bps;
            burst-size-limit bytes;
          }
          premium {
            bandwidth-limit bps;
            burst-size-limit bytes;
          }
        }
      }
    }
  }
(gratuitous-arp-reply | no-gratuitous-arp-reply);
hold-time up milliseconds down milliseconds;
ima-group-options {
  differential-delay number;
  frame-length (32 | 64 | 128 | 256);
  frame-synchronization {
    alpha number;
    beta number;
    gamma number;
  }
  minimum-links number;
  symmetry (symmetrical-config-and-operation |
    symmetrical-config-asymmetrical-operation);
  test-procedure {
    ima-test-start;
    ima-test-stop;
    interface name;
    pattern number;
    period number;
  }
  transmit-clock (common | independent);
  version (1.0 |1.1);
}
ima-link-options group-id group-id;
interface-set interface-set-name {
  interface ethernet-interface-name {
    (unit unit-number | vlan-tags-outer vlan-tag);
  }
  interface interface-name {
```

```
      (unit unit-number);
    }
  }
  isdn-options {
    bchannel-allocation (ascending | descending);
    calling-number number;
    pool pool-name <priority priority>;
    spid1 spid-string;
    spid2 spid-string;
    static-tei-val value;
    switch-type (att5e | etsi | ni1 | ntdms100 | ntt);
    t310 seconds;
    tei-option (first-call | power-up);
  }
  keepalives <down-count number> <interval seconds> <up-count number>;
  link-mode mode;
  lmi {
    lmi-type (ansi | itu | c-lmi);
    n391dte number;
    n392dce number;
    n392dte number;
    n393dce number;
    n393dte number;
    t391dte seconds;
    t392dce seconds;
  }
  lsq-failure-options {
    no-termination-request;
    [ trigger-link-failure interface-name ];
  }
  mac mac-address;
  mlfr-uni-nni-bundle-options {
    acknowledge-retries number;
    acknowledge-timer milliseconds;
    action-red-differential-delay (disable-tx | remove-link);
    drop-timeout milliseconds;
    fragment-threshold bytes;
    cisco-interoperability send-lip-remove-link-for-link-reject;
    hello-timer milliseconds;
    link-layer-overhead percent;
    lmi-type (ansi | itu | c-lmi);
    minimum-links number;
    mrru bytes;
    n391 number;
    n392 number;
    n393 number;
    red-differential-delay milliseconds;
    t391 seconds;
    t392 seconds;
    yellow-differential-delay milliseconds;
  }
  modem-options {
    dialin (console | routable);
    init-command-string initialization-command-string;
  }
  mtu bytes;
```

```
multi-chassis-protection {
   peer a.b.c.d {
      interfaceinterface-name;
      }
   }
multiservice-options {
   (core-dump | no-core-dump);
   (syslog | no-syslog);
}
native-vlan-id number;
no-gratuitous-arp-request;
no-keepalives;
no-partition {
   interface-type type;
}
no-vpivci-swapping;
otn-options {
   fec (efec | gfec | none);
   (laser-enable | no-laser-enable);
   (line-loopback | no-line-loopback);
   pass-thru;
   rate (fixed-stuff-bytes | no-fixed-stuff-bytes | pass-thru);
   transmit-payload-type number;
   trigger (oc-lof | oc-lom | oc-los | oc-wavelength-lock | odu-ais | odu-bbe-th | odu-bdi
      | odu-es-th | odu-lck | odu-oci | odu-sd | odu-ses-th | odu-ttim | odu-uas-th |
      opu-ptm | otu-ais | otu-bbe-th | otu-bdi | otu-es-th | otu-fec-deg | otu-fec-exe |
      otu-iae | otu-sd | otu-ses-th | otu-ttim | otu-uas-th);
   tti;
}
optics-options {
   wavelength nm;
   alarm alarm-name {
      (syslog | link-down);
   }
   warning warning-name {
      (syslog | link-down);
   }
}
partition partition-number oc-slice oc-slice-range interface-type type;
timeslots time-slot-range;
passive-monitor-mode;
per-unit-scheduler;
ppp-options {
   chap {
      access-profile name;
      default-chap-secret name;
      local-name name;
      passive;
   }
   compression {
      acfc;
      pfc;
   }
   dynamic-profile profile-name;
   no-termination-request;
   pap {
```

```
        access-profile name;
        local-name name;
        local-password password;
        compression;
    }
}
psn-vcipsn-vci-identifier;
psn-vpipsn-vpi-identifier;
receive-bucket {
    overflow (discard | tag);
    rate percentage;
    threshold bytes;
}
redundancy-options {
    priority sp-fpc/pic/port;
    secondary sp-fpc/pic/port;
    hot-standby;
}
satop-options {
    payload-size n;
}
schedulers number;
serial-options {
    clock-rate rate;
    clocking-mode (dce | internal | loop);
    control-polarity (negative | positive);
    cts-polarity (negative | positive);
    dcd-polarity (negative | positive);
    dce-options {
        control-signal (assert | de-assert | normal);
        cts (ignore | normal | require);
        dcd (ignore | normal | require);
        dsr (ignore | normal | require);
        dtr signal-handling-option;
        ignore-all;
        indication (ignore | normal | require);
        rts (assert | de-assert | normal);
        tm (ignore | normal | require);
    }
    dsr-polarity (negative | positive);
    dte-options {
        control-signal (assert | de-assert | normal);
        cts (ignore | normal | require);
        dcd (ignore | normal | require);
        dsr (ignore | normal | require);
        dtr signal-handling-option;
        ignore-all;
        indication (ignore | normal | require);
        rts (assert | de-assert | normal);
        tm (ignore | normal | require);
    }
    dtr-circuit (balanced | unbalanced);
    dtr-polarity (negative | positive);
    encoding (nrz | nrzi);
    indication-polarity (negative | positive);
    line-protocol protocol;
```

```
    loopback mode;
    rts-polarity (negative | positive);
    tm-polarity (negative | positive);
    transmit-clock invert;
}
services-options {
    inactivity-timeout seconds;
    open-timeout seconds;
    session-limit {
        maximum number;
        rate new-sessions-per-second;
        }
        syslog {
        host hostname {
            facility-override facility-name;
            log-prefix prefix-number;
            services priority-level;
        }
    }
}
shdsl-options {
    annex (annex-a | annex-b);
    line-rate line-rate;
    loopback (local | remote);
    snr-margin {
        current margin;
        snext margin;
    }
}
sonet-options {
    aggregate asx;
    aps {
        advertise-interval milliseconds;
        annex-b;
        authentication-key key;
        fast-aps-switch;
        force;
        hold-time milliseconds;
        lockout;
        neighbor address;
        paired-group group-name;
        preserve-interface;
        protect-circuit group-name;
        request;
        revert-time seconds;
        switching-mode (bidirectional | unidirectional);
        working-circuit group-name;
    }
    bytes {
        c2 value;
        e1-quiet value;
        f1 value;
        f2 value;
        s1 value;
        z3 value;
        z4 value;
```

```
    }
    fcs (16 | 32);
    loopback (local | remote);
    mpls {
      pop-all-labels {
        required-depth number;
      }
    }
    path-trace trace-string;
    (payload-scrambler | no-payload-scrambler);
    rfc-2615;
    trigger {
      defect ignore;
      hold-time up milliseconds down milliseconds;
    }
    vtmapping (itu-t | klm);
    (z0-increment | no-z0-increment);
  }
  speed (10m | 100m | 1g | oc3 | oc12 | oc48);
  stacked-vlan-tagging;
  switch-options {
    switch-port port-number {
      (auto-negotiation | no-auto-negotiation);
      speed (10m | 100m | 1g);
      link-mode (full-duplex | half-duplex);
    }
  }
  t1-options {
    bert-algorithm algorithm;
    bert-error-rate rate;
    bert-period seconds;
    buildout value;
    byte-encoding (nx56 | nx64);
    crc-major-alarm-threshold (1e-3 | 5e-4 | 1e-4 | 5e-5 | 1e-5);
    crc-minor-alarm-threshold (1e-3 | 5e-4 | 1e-4 | 5e-5 | 1e-5 | 5e-6 | 1e-6);
    fcs (16 | 32);
    framing (esf | sf);
    idle-cycle-flag (flags | ones);
    invert-data;
    line-encoding (ami | b8zs);
    loopback (local | payload | remote);
    remote-loopback-respond;
    start-end-flag (filler | shared);
    timeslots time-slot-range;
  }
  t3-options {
    atm-encapsulation (direct | plcp);
    bert-algorithm algorithm;
    bert-error-rate rate;
    bert-period seconds;
    buildout feet;
    (cbit-parity | no-cbit-parity);
    compatibility-mode (adtran | digital-link | kentrox | larscom | verilink) <subrate
      value>;
    fcs (16 | 32);
    (feac-loop-respond | no-feac-loop-respond);
```

```
    idle-cycle-flag value;
    (long-buildout | no-long-buildout);
    (loop-timing | no-loop-timing);
    loopback (local | payload | remote);
    (mac | no-mac);
    (payload-scrambler | no-payload-scrambler);
    start-end-flag (filler | shared);
}
traceoptions {
    flag flag <flag-modifier> <disable>;
}
transmit-bucket {
    overflow discard;
    rate percentage;
    threshold bytes;
}
(traps | no-traps);
unidirectional;
vlan-tagging;
vlan-vci-tagging;
unit logical-unit-number {
    accept-source-mac {
        mac-address mac-address {
            policer {
                input cos-policer-name;
                output cos-policer-name;
            }
        }
    }
    accounting-profile name;
    advisory-options {
        downstream-rate rate;
        upstream-rate rate;
    }
    allow-any-vci;
    atm-scheduler-map (map-name | default);
    backup-options {
        interface interface-name;
    }
    bandwidth rate;
    cell-bundle-size cells;
    clear-dont-fragment-bit;
    compression {
        rtp {
            f-max-period number;
            maximum-contexts number <force>;
            queues [ queue-numbers ];
            port {
                minimum port-number;
                maximum port-number;
            }
        }
    }
    compression-device interface-name;
    copy-tos-to-outer-ip-header;
    demux-destination family;
```

```
demux-source family;
demux-options {
  underlying-interface interface-name;
}
description text;
interface {
  l2tp-interface-id name;
  (dedicated | shared);
}
dialer-options {
  activation-delay seconds;
  callback;
  callback-wait-period time;
  deactivation-delay seconds;
  dial-string [ dial-string-numbers ];
  idle-timeout seconds;
  incoming-map {
    caller (caller-id | accept-all);
    initial-route-check seconds;
    load-interval seconds;
    load-threshold percent;
    pool pool-name;
    redial-delay time;
    watch-list {
      [ routes ];
    }
  }
}
disable;
disable-mlppp-inner-ppp-pfc;
dlci dlci-identifier;
drop-timeout milliseconds;
dynamic-call-admission-control {
  activation-priority priority;
  bearer-bandwidth-limit kilobits-per-second;
}
encapsulation type;
epd-threshold cells plp1 cells;
fragment-threshold bytes;
inner-vlan-id-range start start-id end end-id;
input-vlan-map {
  (pop | pop-pop | pop-swap | push | push-push | swap | swap-push | swap-swap);
  inner-tag-protocol-id tpid;
  inner-vlan-id number;
  tag-protocol-id tpid;
  vlan-id number;
}
interleave-fragments;
inverse-arp;
layer2-policer {
  input-policer policer-name;
  input-three-color policer-name;
  output-policer policer-name;
  output-three-color policer-name;
}
link-layer-overhead percent;
```

```
minimum-links number;
mrru bytes;
multicast-dlci dlci-identifier;
multicast-vci vpi-identifier.vci-identifier;
multilink-max-classes number;
multipoint;
oam-liveness {
  down-count cells;
  up-count cells;
}
oam-period (seconds | disable);
output-vlan-map {
  (pop | pop-pop | pop-swap | push | push-push | swap | swap-push | swap-swap);
  inner-tag-protocol-id tpid;
  inner-vlan-id number;
  tag-protocol-id tpid;
  vlan-id number;
}
passive-monitor-mode;
peer-unit unit-number;
plp-to-clp;
point-to-point;
ppp-options {
  chap {
    access-profile name;
    default-chap-secret name;
    local-name name;
    passive;
  }
  compression {
    acfc;
    pfc;
    pap;
    default-pap-password password;
    local-name name;
    local-password password;
    passive;
  }
  dynamic-profile profile-name;
  lcp-max-conf-req number;
  lcp-restart-timer milliseconds;
  loopback-clear-timer seconds;
  ncp-max-conf-req number;
  ncp-restart-timer milliseconds;
}
pppoe-options {
  access-concentrator name;
  auto-reconnect seconds;
  (client | server);
  service-name name;
  underlying-interface interface-name;
}
proxy-arp;
service-domain (inside | outside);
shaping {
```

```
    (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate
      burst length);
    queue-length number;
  }
  short-sequence;
  transmit-weight number;
  (traps | no-traps);
  trunk-bandwidth rate;
  trunk-id number;
  tunnel {
    backup-destination address;
    destination address;
    key number;
    routing-instance {
      destination routing-instance-name;
    }
    source source-address;
    ttl number;
  }
  vci vpi-identifier.vci-identifier;
  vci-range start start-vci end end-vci;
  vpi vpi-identifier;
  vlan-id number;
  vlan-id-list [vlan-id vlan-id–vlan-id];
  vlan-id-range number-number;
  vlan-tags inner tpid.vlan-id outer tpid.vlan-id;
  vlan-tags-outer tpid.vlan-id inner-list [vlan-id vlan-id–vlan-id];
  family family {
    accounting {
      destination-class-usage;
      source-class-usage {
        direction;
      }
    }
    access-concentrator name;
    address address {
      destination address;
    }
    bundle ml-fpc/pic/port | ls-fpc/pic/port);
    duplicate-protection;
    dynamic-profile profile-name;
    filter {
      group filter-group-number;
      input filter-name;
      input-list {
        [ filter-names ];
        output filter-name;
      }
      output-list {
        [ filter-names ];
      }
    }
    ipsec-sa sa-name;
    keep-address-and-control;
    max-sessions number;
    max-sessions-vsa-ignore;
```

```
mtu bytes;
multicast-only;
negotiate-address;
no-redirects;
policer {
   arp policer-template-name;
   input policer-template-name;
   output policer-template-name;
}
primary;
proxy inet-address address;
receive-options-packets;
receive-ttl-exceeded;
remote (inet-address address | mac-address address);
rpf-check {
   fail-filter filter-name;
   mode loose;
}
sampling {
   direction;
}
service {
   input {
      service-set service-set-name <service-filter filter-name>;
      post-service-filter filter-name;
   }
   output {
      service-set service-set-names <service-filter filter-name>;
   }
}
service-name-table table-name;
short-cycle-protection <lockout-time-min minimum-seconds lockout-time-max
   maximum-seconds>;
targeted-broadcast {
   forward-and-send-to-re;
   forward-only;
}
(translate-discard-eligible | no-translate-discard-eligible);
(translate-fecn-and-becn | no-translate-fecn-and-becn);
translate-plp-control-word-de;
unnumbered-address interface-name <destination address destination-profile
   profile-name | preferred-source-address address>;
address address {
   arp ip-address (mac | multicast-mac) mac-address <publish>;
   broadcast address;
   destination address;
   destination-profile name;
   eui-64;
   multipoint-destination address (dlci dlci-identifier | vci vci-identifier);
   multipoint-destination address {
      epd-threshold cells plp1 cells;
      inverse-arp;
      oam-liveness {
         up-count cells;
         down-count cells;
      }
```

```
                oam-period (seconds | disable);
                shaping {
                  (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained
                    rate burst length);
                  queue-length number;
                }
                vci vpi-identifier.vci-identifier;
              }
              preferred;
              primary;
              (vrrp-group | vrrp-inet6-group) group-number {
                (accept-data | no-accept-data);
                advertise–interval seconds;
                authentication-type authentication;
                authentication-key key;
                fast-interval milliseconds;
                (preempt | no-preempt) {
                  hold-time seconds;
                }
                priority-number number;
                track {
                  priority-cost seconds;
                  priority-hold-time interface-name {
                    bandwidth-threshold bits-per-second {
                      priority;
                    }
                    interface priority;
                  }
                  route ip-address/mask routing-instance instance-name priority-cost cost;
                }
                virtual-address [ addresses ];
              }
            }
          }
        }
      }
    }
```

Related Documentation

- *Junos OS Hierarchy and RFC Reference*
- Junos® OS Ethernet Interfaces
- Junos® OS Network Interfaces

[edit logical-systems] Hierarchy Level

The following lists the statements that can be configured at the **[edit logical-systems]** hierarchy level that are also documented in this manual. For more information about logical systems, see the Junos OS Routing Protocols Configuration Guide.

```
logical-systems logical-system-name {
  interfaces interface-name {
    unit logical-unit-number {
      accept-source-mac {
        mac-address mac-address {
```

```
      policer {
        input cos-policer-name;
        output cos-policer-name;
      }
    }
}
allow-any-vci;
atm-scheduler-map (map-name | default);
bandwidth rate;
backup-options {
  interface interface-name;
}
cell-bundle-size cells;
clear-dont-fragment-bit;
compression {
  rtp {
    f-max-period number;
    port {
      minimum port-number;
      maximum port-number;
    }
    queues [ queue-numbers ];
  }
}
compression-device interface-name;
description text;
interface {
  l2tp-interface-id name;
  (dedicated | shared);
}
dialer-options {
  activation-delay seconds;
  deactivation-delay seconds;
  dial-string [ dial-string-numbers ];
  idle-timeout seconds;
  initial-route-check seconds;
  load-threshold number;
  pool pool;
  remote-name remote-callers;
  watch-list {
    [ routes ];
  }
}
disable;
dlci dlci-identifier;
drop-timeout milliseconds;
dynamic-call-admission-control {
  activation-priority priority;
  bearer-bandwidth-limit kilobits-per-second;
}
encapsulation type;
epd-threshold cells plp1 cells;
fragment-threshold bytes;
input-vlan-map {
  inner-tag-protocol-id;
  inner-vlan-id;
```

```
    (pop | pop-pop | pop-swap | push | push-push | swap | swap-push | swap-swap);
    tag-protocol-id tpid;
    vlan-id number;
  }
  interleave-fragments;
  inverse-arp;
  layer2-policer {
    input-policer policer-name;
    input-three-color policer-name;
    output-policer policer-name;
    output-three-color policer-name;
  }
  link-layer-overhead percent;
  minimum-links number;
  mrru bytes;
  multicast-dlci dlci-identifier;
  multicast-vci vpi-identifier.vci-identifier;
  multilink-max-classes number;
  multipoint;
  oam-liveness {
    up-count cells;
    down-count cells;
  }
  oam-period (seconds | disable);
  output-vlan-map {
    inner-tag-protocol-id;
    inner-vlan-id;
    (pop | pop-pop | pop-swap | push | push-push | swap | swap-swap);
    tag-protocol-id tpid;
    vlan-id number;
  }
  passive-monitor-mode;
  peer-unit unit-number;
  plp-to-clp;
  point-to-point;
  ppp-options {
    chap {
      access-profile name;
      default-chap-secret name;
      local-name name;
      passive;
    }
    compression {
      acfc;
      pfc;
      }
    }
    dynamic-profile profile-name;
    pap {
      default-pap-password password;
      local-name name;
      local-password password;
      passive;
    }
  }
  proxy-arp;
```

```
service-domain (inside | outside);
shaping {
  (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate
    burst length);
  queue-length number;
}
short-sequence;
transmit-weight number;
(traps | no-traps);
trunk-bandwidth rate;
trunk-id number;
tunnel {
  backup-destination address;
  destination address;
  key number;
  routing-instance {
    destination routing-instance-name;
  }
  source source-address;
  ttl number;
}
vci vpi-identifier.vci-identifier;
vlan-id number;
vlan-id-list [vlan-id vlan-id–vlan-id]
vlan-tags inner tpid.vlan-id outer tpid.vlan-id;
vlan-tags outer tpid.vlan-id inner-list [vlan-id vlan-id–vlan-id]
vpi vpi-identifier;
family family {
  accounting {
    destination-class-usage;
    source-class-usage {
      direction;
    }
  }
  bundle interface-name;
  filter {
    group filter-group-number;
    input filter-name;
    input-list {
      [ filter-names ];
    }
    output filter-name;
    output-list {
      [ filter-names ];
    }
  }
  ipsec-sa sa-name;
  keep-address-and-control;
  mtu bytes;
  multicast-only;
  no-redirects;
  policer {
    arp policer-template-name;
    input policer-template-name;
    output policer-template-name;
  }
```

```
primary;
proxy inet-address address;
receive-options-packets;
receive-ttl-exceeded;
remote (inet-address address | mac-address address);
rpf-check <fail-filter filter-name> {
  <mode loose>;
}
sampling {
  direction;
}
service {
  input {
    service-set service-set-name <service-filter filter-name>;
    post-service-filter filter-name;
  }
  output {
    service-set service-set-name <service-filter filter-name>;
  }
}
(translate-discard-eligible | no-translate-discard-eligible);
(translate-fecn-and-becn | no-translate-fecn-and-becn);
unnumbered-address interface-name destination address destination-profile
  profile-name;
address address {
  arp ip-address (mac | multicast-mac) mac-address <publish>;
  broadcast address;
  destination address;
  destination-profile name;
  eui-64;
  multipoint-destination address (dlci dlci-identifier | vci vci-identifier);
  multipoint-destination address {
    epd-threshold cells plp1 cells;
    inverse-arp;
    oam-liveness {
      up-count cells;
      down-count cells;
    }
    oam-period (seconds | disable);
    shaping {
      (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained
        rate burst length);
      queue-length number;
    }
    vci vpi-identifier.vci-identifier;
  }
  preferred;
  primary;
  (vrrp-group | vrrp-inet6-group) group-number {
    (accept-data | no-accept-data);
    advertise–interval seconds;
    authentication-type authentication;
    authentication-key key;
    fast-interval milliseconds;
    (preempt | no-preempt) {
      hold-time seconds;
```

```
                    }
                    priority-number number;
                    track {
                      priority-cost seconds;
                      priority-hold-time interface-name {
                        interface priority;
                        bandwidth-threshold bits-per-second {
                          priority;
                        }
                      }
                      route ip-address/mask routing-instance instance-name priority-cost cost;
                    }
                  }
                  virtual-address [ addresses ];
                }
              }
            }
          }
        }
```

Related Documentation

- *Junos OS Hierarchy and RFC Reference*
- Junos® OS Ethernet Interfaces
- Junos® OS Network Interfaces

[edit protocols connections] Hierarchy Level

The following statements can also be configured at the **[edit logical-systems *logical-system-name* protocols connections]** hierarchy level.

```
interface-switch connection-name {
  interface interface-name.unit-number;
  interface interface-name.unit-number;
}
```

Related Documentation

- *Junos OS Hierarchy and RFC Reference*
- Junos® OS Ethernet Interfaces
- Junos® OS Network Interfaces

[edit protocols dot1x] Hierarchy Level

```
dot1x {
  authenticator
    authentication-profile-name access-profile-name;
    interface interface-ids {
      maximum-requests integer;
      retries integer;
      quiet-period seconds;
      transmit-period seconds;
      reauthentication (disable | interval seconds);
      server-timeout seconds;
      supplicant (single);
      supplicant-timeout seconds;
    }
  }
}
```

Related Documentation

- *Junos OS Hierarchy and RFC Reference*
- Junos® OS Ethernet Interfaces
- Junos® OS Network Interfaces

[edit protocols iccp] Hierarchy Level

```
iccp {
  traceoptions;
  local-ip-address ip address;
  session-establishment-hold-time value;
  authentication-key string;
  peer ip-address {
    local-ip-address ip address;
    session-establishment-hold-time value;
    authentication-key string;
    redundancy-group-id-list redundancy-group-id-list;
    liveness-detection;
  }
}
```

Related Documentation

- *Junos OS Hierarchy and RFC Reference*
- Junos® OS Ethernet Interfaces
- Junos® OS Network Interfaces

[edit protocols lacp] Hierarchy Level

```
traceoptions {
  file filename <files number> <size size> <world-readable | no-world-readable>;
  flag flag <disable>);
}
```

Related Documentation

- *Junos OS Hierarchy and RFC Reference*
- Junos® OS Ethernet Interfaces
- Junos® OS Network Interfaces

[edit protocols oam] Hierarchy Level

```
ethernet {
  connectivity-fault-management {
    action-profile profile-name {
      default-actions {
        interface-down;
      }
      event {
        adjacency-loss;
        interface-status-tlv (down | lower-layer-down);
        port-status-tlv blocked;
        rdi;
      }
    }
    linktrace {
      age (30m | 10m | 1m | 30s | 10s);
      path-database-size path-database-size;
    }
    maintenance-domain domain-name {
      bridge-domain name;
      routing-instance r1 {
      bridge-domain name;
      instance vpls-instance;
      interface (ge | xe) fpc/pic/port.domain;
      level number;
      maintenance-association name{
        mep identifier {
          direction (up | down)
          interface (ge | xe) fpc/pic/port.domain (working | protect );
          auto-discovery;
          lowest-priority-defect (all-defects | err-xcon | mac-rem-err-xcon | no-defect |
            rem-err-xcon | xcon);
          priority number;
        }
      }
      mip-half-function (none | default | explicit);
      name-format (character-string | none | dns | mac+2oct);
      short-name-format (character-string | vlan | 2octet | rfc-2685-vpn-id);
        protect-maintenance-association protect-ma-name;
        remote-maintenance-association remote-ma-name;
```

```
        continuity-check {
          hold-interval minutes;
          interval (10m | 10s | 1m | 1s | 100ms);
          loss-threshold number;
        }
        maintenance-association ma-name {
        mip-half-function (none | default | explicit);
        mep mep-id {
          auto-discovery;
          direction (up | down);
          interface interface-name (working |protect);
          priority number;
          remote-mep mep-id {
            action-profile profile-name;
            sla-iterator-profile profile-name {
              data-tlv-size bytes;
              iteration-count frames;
              priority priority-value;
            }
          }
        }
      }
    }
    performance-monitoring {
      hardware-assisted-timestamping;
      sla-iterator-profiles {
        profile-name {
          disable;
          calculation-weight {
            delay delay-weight;
            delay-variation delay-variation-weight;
          }
          cycle-time milliseconds;
          iteration-period connections;
          measurement-type (loss | statistical-frame-loss | two-way-delay);
        }
      }
    }
  }
  link-fault-management {
    action-profile profile-name {
      action {
        syslog;
        link-down;
        send-critical-event;
      }
      event {
        link-adjacency-loss;
        link-event-rate {
          frame-error count;
          frame-period count;
          frame-period-summary count;
          symbol-period count;
        }
        protocol-down;
      }
```

```
    }
    interface interface-name {
      apply-action-profile profile-name;
      event-thresholds {
        frame-error count;
        frame-period count;
        frame-period-summary count;
        symbol-period count;
      }
      link-discovery (active | passive);
      negotiation-options {
        allow-remote-loopback;
        no-allow-link-events;
      }
      pdu-interval interval;
      pdu-threshold threshold-value;
      remote-loopback;
    }
  }
  fnp {
    interval <100ms | 1s | 10s | 1m | 10m>;
    loss-threshold number
    interface interface name {
        domain-id domain-id
    }
  }
}
```

Related Documentation

- *Junos OS Hierarchy and RFC Reference*
- Junos® OS Ethernet Interfaces
- Junos® OS Network Interfaces

[edit protocols ppp] Hierarchy Level

```
monitor-session (interface-name | all);
traceoptions {
  file filename <files number> <match regular-expression> <size size> <world-readable |
    no-world-readable> ;
  flag flag <disable>;
}
```

Related Documentation

- *Junos OS Hierarchy and RFC Reference*
- Junos® OS Ethernet Interfaces
- Junos® OS Network Interfaces

[edit protocols pppoe] Hierarchy Level

```
protocols {
  pppoe {
    no-send-pads-error;
```

```
    no-send-pads-ac-info
    pado-advertise;
    service-name-tables table-name {
      service service-name {
        agent-specifier {
          aci circuit-id-string ari remote-id-string {
            (delay seconds | drop | terminate);
            dynamic-profile profile-name;
            routing-instance routing-instance-name;
            static-interface interface-name;
          }
        }
        (delay seconds | drop | terminate);
        dynamic-profile profile-name;
        max-sessions number;
        routing-instance routing-instance-name;
      }
    }
    traceoptions {
      file <filename> <files number> <match regular-expression> <size maximum-file-size>
        <world-readable | no-world-readable>;
      filter {
        aci regular-expression;
        ari regular-expresion;
        service-name regular-expresion;
        underlying-interface interface-name;
      }
      flag flag;
      level (all | error | info | notice | verbose | warning);
      no-remote-trace;
    }
  }
}
```

Related Documentation

- Notational Conventions Used in Junos OS Configuration Hierarchies
- [edit protocols] Hierarchy Level
- *Junos OS Hierarchy and RFC Reference*
- Junos® OS Ethernet Interfaces
- Junos® OS Network Interfaces

[edit protocols protection-group] Hierarchy Level

```
ethernet-ringring-name {
  east-interface {
    control-channel channel-name {
      vlan number;
    }
  }
  guard-interval number;
  node-id mac-address;
  restore-interval number;
  ring-protection-link-owner;
```

```
    west-interface {
      control-channel channel-name {
        vlan number;
      }
    }
}
```

Related Documentation

- *Junos OS Hierarchy and RFC Reference*
- Junos® OS Ethernet Interfaces
- Junos® OS Network Interfaces

[edit protocols vrrp] Hierarchy Level

The following statement hierarchy can also be included at the **[edit logical-systems *logical-system-name*]** hierarchy level.

```
protocols {
  vrrp {
    failover-delay milliseconds;
    global-advertisements-threshold advertisement-value;
    skew-timer-disable;
    startup-silent-period seconds;
    traceoptions {
      file <filename> <files number> <match regular-expression> <microsecond-stamp>
        <size maximum-file-size> <world-readable | no-world-readable>;
      flag flag;
      no-remote-trace;
      }
    version-3;
  }
}
```

Related Documentation

- Notational Conventions Used in Junos OS Configuration Hierarchies
- [edit protocols] Hierarchy Level
- *Junos OS Hierarchy and RFC Reference*
- Junos® OS Ethernet Interfaces
- Junos® OS Network Interfaces

[edit system processes] Hierarchy Level

```
dialer-services {
  disable;
}
isdn-signaling {
  disable;
  reject-incoming;
}
```


PART 2

Configuring Circuit Emulation PICs

CHAPTER 2

Circuit Emulation PICs Overview

Mobile Backhaul and Circuit Emulation Overview

Juniper Networks IP/MPLS-based mobile backhaul solutions provide the following benefits:

- Flexibility to support converged networks that accommodate both IP and legacy services (leveraging proven circuit emulation techniques).
- Scalability to support emerging data-intensive technologies.
- Cost-effectiveness to compensate for rising levels of backhaul traffic.

M7i, M10i, M40e, M120, and M320 routers with 12-port T1/E1 interfaces, 4-port Channelized OC3/STM1 interfaces, and MX Series routers with ATM MICs with SFP, with 2-port OC3/STM1 or 8-port OC12/STM4 circuit emulation interfaces, offer IP/MPLS-based mobile backhaul solutions that enable operators to combine diverse transport technologies onto a single transport architecture, to reduce operating costs while enhancing user features and increasing profits. This architecture accommodates the backhaul of legacy services, emerging IP-based services, location-based services, mobile gaming and mobile TV, and new emerging technologies such as LTE and WiMAX.

Related Documentation

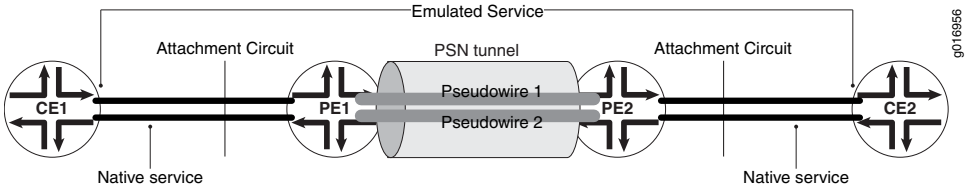
- Mobile Backhaul Application Overview on page 36
- Understanding Circuit Emulation PIC Types on page 37
- Understanding Circuit Emulation PIC Clocking Features on page 37
- Understanding T1 and E1 Options Exceptions on Circuit Emulation PICs on page 38

- Displaying Information About Circuit Emulation PICs on page 39

Mobile Backhaul Application Overview

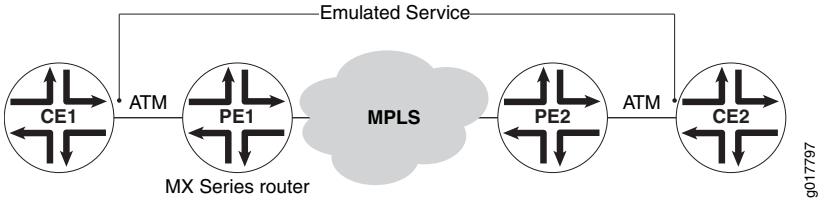
This topic provides an application example (see Figure 1 on page 36) based on the mobile backhaul reference model where customer edge 1 (CE1) is a base station controller (BSC), provider edge 1 (PE1) is a cell site router, PE2 is an M Series (aggregation) router, and CE2 is a BSC and Radio Network Controller (RNC). The Internet Engineering Task Force (RFC 3895) describes pseudowire as "a mechanism that emulates the essential attributes of a telecommunications service (such as a T1 leased line or Frame Relay) over a PSN" (Packet Switching Network).

Figure 1: Mobile Backhaul Application



For MX Series routers with ATM MICs with SFP, the mobile backhaul reference model is modified (see Figure 2 on page 36), where the provider edge 1 (PE1) router is an MX Series router with an ATM MIC with SFP. The PE2 router can be any router, such as an M Series (aggregation router) that might or might not support swapping (rewriting) of virtual path identifier (VPI) or virtual circuit identifier (VCI) values. An ATM pseudowire carries ATM cells over an MPLS network. The pseudowire encapsulation can be either cell relay or AAL5. Both modes enable sending of ATM cells between the ATM MIC and the Layer 2 network. You can configure the ATM MIC to swap the VPI value, VCI value, or both. You can also disable swapping of the values.

Figure 2: Mobile Backhaul Application on MX Series Routers with ATM MICs with SFP



Related Documentation

- ATM Cell Relay Pseudowire VPI/VCI Swapping Overview on page 98
- Mobile Backhaul and Circuit Emulation Overview on page 35
- no-vpivci-swapping on page 157
- psn-vci on page 162
- psn-vpi on page 162

Understanding Circuit Emulation PIC Types

The following Circuit Emulation PICs are specifically designed for mobile backhaul applications:

- 4-port Channelized OC3/STM1 Circuit Emulation PIC
- 12-port T1/E1 Circuit Emulation PIC
- 8-port OC3/STM1 or 12-port OC12/STM4 ATM MIC

The four-port Channelized OC3/STM1 Circuit Emulation PIC allows each of its four ports to be independently configured to either SONET or SDH framing mode, and supports mixed SAToP and ATM interfaces on any port. In SONET mode, each OC3 port can be channelized down to 3 coc1 channels, and then each coc1 can channel down to 28 T1 channels. In SDH mode, each STM1 port can be channelized down to 4 cau4 channels, and then each cau4 can channel down to 63 E1 channels. The T1/E1 channels support time-division multiplexing (TDM) interfaces using the Structure-Agnostic time-division multiplexing over Packet (SAToP) protocol [RFC 4553] encapsulation, and support T1/E1 and SONET clocking features. Mixing T1 and E1 channels is not supported on individual ports.

The 12-port Channelized T1/E1 Circuit Emulation PIC supports TDM interfaces using the SAToP protocol [RFC 4553] encapsulation, and supports T1/E1 and SONET clocking features. The 12-port Channelized T1/E1 Circuit Emulation PIC can be configured to work as either 12 T1s or 12 E1s. Mixing T1s and E1s is not supported.

The 8-port OC3/STM1 or 2-port OC12/STM4 Circuit Emulation ATM MIC supports both SONET and SDH framing mode. The mode can be set at the MIC level or at the port level. ATM MICs are rate-selectable at the following rates: 2-port OC12 or 8-port OC3. The ATM MIC supports ATM pseudowire encapsulation and swapping of VPI and VCI values in both directions.

NOTE: **Cell-relay VPI/VCI swapping and cell-relay VPI swapping on both egress and ingress are not compatible with the ATM policing feature.**

Related Documentation

- Configuring the PIC Type on page 110
- Displaying Information About Circuit Emulation PICs on page 39

Understanding Circuit Emulation PIC Clocking Features

All Circuit Emulation PICs support the following clocking features:

- External clocking—Also known as *loop timing.* Clock is distributed via TDM interfaces.
- Internal clocking with external synchronization—Also known as *external timing* or *external synchronization.*

- Internal clocking with PIC-level line synchronization—The PIC's internal clock is synchronized with a clock recovered from a TDM interface local to the PIC.

This feature set is useful for aggregation in mobile backhaul applications.

NOTE: The primary reference source (PRS) of the clock recovered from one interface may not be the same as that of another TDM interface. There is a limitation on the number of timing domains that can be supported in practice.

Understanding T1 and E1 Options Exceptions on Circuit Emulation PICs

The 12-port T1/E1 Circuit Emulation PICs support T1 and E1 options with the following exceptions:

- **bert-algorithm**, **bert-error-rate**, and **bert-period** options are supported for CT1 or CE1 configurations only.
- **framing** is supported for CT1 or CE1 configurations only. It is not applicable in SAToP configurations.
- **buildout** is supported in CT1 configurations only.
- **line-encoding** is supported in CT1 configurations only.
- **loopback *local*** and **loopback *remote*** are supported in CE1 and CT1 configurations only.
- **loopback payload** is not supported. It is not applicable in SAToP configurations.
- **idle-cycle-flag** is not supported. It is not applicable in SAToP or ATM configurations.
- **start-end-flag** is not supported. It is not applicable in SAToP or ATM configurations.
- **invert-data** is not supported. It is not applicable in SAToP configurations.
- **fcs32** is not supported. **fcs** is not applicable in SAToP or ATM configurations.
- **timeslots** is not supported. It is not applicable in SAToP configurations.
- **byte-encoding nx56** is not supported. It is not applicable in SAToP or ATM configurations.
- **crc-major-alarm-threshold** and **crc-minor-alarm-threshold** are not supported.
- **remote-loopback-respond** is not supported. It is not applicable in SAToP configurations.

The 4-port Channelized OC3/STM1 Circuit Emulation PICs support T1 and E1 options with the following exceptions:

- **bert-algorithm**, **bert-error-rate**, and **bert-period** options are supported for CT1 or CE1 configurations only.
- **framing** is supported for CT1 or CE1 configurations only. It is not applicable in SAToP configurations.
- **buildout** is supported in CT1 configurations only.
- **line-encoding** is supported in CT1 configurations only.

- **loopback** ***local*** and **loopback** ***remote*** are supported in CE1 and CT1 configurations only. By default, no loopback is configured.
- **loopback payload** is not supported. It is not applicable in SAToP configurations.
- **idle-cycle-flag** is not supported. It is not applicable in SAToP configurations.
- **start-end-flag** is not supported. It is not applicable in SAToP configurations.
- **invert-data** is not supported. It is not applicable in SAToP configurations.
- **fcs16** is not supported in E1 and T1 configurations only.
- **fcs32** is not supported in E1 and T1 configurations only. It is not applicable in SAToP configurations.
- **timeslots** is not supported. It is not applicable in SAToP or ATM configurations.
- **byte-encoding** is not supported in T1 configurations only. It is not applicable in SAToP configurations. **nx56** byte encoding is not supported.
- **crc-major-alarm-threshold** and **crc-minor-alarm-threshold** are T1 options supported in SAToP configurations only.
- **remote-loopback-respond** is not supported. It is not applicable in SAToP configurations.

Displaying Information About Circuit Emulation PICs

Use the CLI **show chassis hardware** command to display information about the PIC configuration.

- For a T1 Circuit Emulation PIC configuration, the output designation is **T1 CE**.
- For an E1 Circuit Emulation PIC configuration, the output designation is **E1 CE**.
- For a COC3 Circuit Emulation PIC configuration, the output designation is **COC1 CE**.
- For a CSTM1 Circuit Emulation PIC configuration, the output designation is **CSTM1 CE**.
- For a OC3/STM1 or OC12/STM4 Circuit Emulation ATM MIC configuration, the output designation is **2xOC12/8xOC3 CC-CE**.

Channelized OC3/STM1 (Multi-Rate) Circuit Emulation MIC with SFP Overview

The Channelized OC3/STM1 (Multi-Rate) Circuit Emulation MIC with SFP is a channelized circuit emulation MIC with rate-selectability. You can specify its port speed as COC3-CSTM1 or COC12-CSTM4. The default port speed is COC3-CSTM1.

The following features are supported on this MIC:

- Per-MIC SONET/SDH framing
- Internal and loop clocking
- Structure-Agnostic time-division multiplexing (TDM) over Packet (SAToP)

- Structure-aware time-division multiplexed Circuit Emulation Service over Packet Switched Network (CESoPSN)
- Pseudowire Emulation Edge to Edge (PWE3) control word for use over an MPLS packet-switched network (PSN)

Related Documentation

- Configuring Channelized IQ and IQE SONET/SDH Loop Timing
- Configuring SAToP on Channelized OC3/STM1 (Multi-Rate) Circuit Emulation MIC with SFP on page 51
- Configuring CESoPSN on Channelized OC3/STM1 (Multi-Rate) Circuit Emulation MIC with SFP on page 65

16-Port Channelized E1/T1 Circuit Emulation MIC Overview

The Channelized E1/T1 Circuit Emulation MIC (MIC-3D-16CHE1-T1-CE) is a channelized MIC with 16 E1/T1 ports. The following features are supported on this MIC:

- Each MIC can be separately configured in either T1 or E1 framing mode
- Each T1 port supports the following framing modes:
  - Superframe (D4)
  - Extended superframe (ESF)
- Each E1 port supports the following framing modes:
  - G704 with CRC4
  - G704 without CRC4
  - Unframed
- Clear channel and *N*xDS0 channelization. For T1 the value of *N* ranges from 1 through 24 and for E1 the value of *N* ranges from 1 through 31.
- Diagnostic features:
  - T1/E1
  - T1 facilities data link (FDL)
  - Channel service unit (CSU)
  - Bit error rate test (BERT)
  - Juniper Integrity Test (JIT)
- T1/E1 alarm and performance monitoring (a Layer 1 OAM function)
- External (loop) timing and internal (system) timing
- TDM circuit emulation services CESoPSN and SAToP

- CoS parity with IQE PICs. The CoS features supported on MPCs are supported on this MIC.
- Graceful Routing Engine switchover (GRES)

Related Documentation

- Configuring SAToP on Channelized E1/T1 Circuit Emulation MIC on page 61
- Configuring CESoPSN on Channelized E1/T1 Circuit Emulation MIC on page 77

CHAPTER 3

Configuring SAToP Support on Circuit Emulation PICs

Configuring SAToP on 4-Port Channelized OC3/STM1 Circuit Emulation PICs

This configuration applies to the mobile backhaul application shown in Figure 1 on page 36.

Configuring SONET/SDH Framing Mode at the PIC Level

To set the framing mode at the PIC level, for all four ports on the PIC, include the **framing** statement at the **[edit chassis fpc *fpc-slot* pic *pic-slot*]** hierarchy level.

```
[edit chassis fpc fpc-slot pic pic-slot]
user@host# set framing (sonet | sdh); # SONET for COC3 or SDH for CSTM1
```

After a PIC is brought online, interfaces are created for the PIC's available ports according to the PIC type and the framing option used.

- If you include the **framing sonet** statement (for a COC3 Circuit Emulation PIC), four COC3 interfaces are created.
- If you include the **framing sdh** statement (for a CSTM1 Circuit Emulation PIC), four CSTM1 interfaces are created.
- If you do not specify framing at the PIC level, then the default framing is SONET for all four ports.

NOTE: If you set the framing option incorrectly for the PIC type, the commit operation fails.

Bit error rate test (BERT) patterns with all ones received by T1/E1 interfaces on Circuit Emulation PICs configured for SAToP do not result in an alarm indication signal (AIS) defect. As a result, the T1/E1 interfaces remain up.

Configuring SONET/SDH Framing Mode at the Port Level

Each port's framing mode can be configured individually, as either COC3 (SONET) or STM1 (SDH). Ports not configured for framing retain the PIC framing configuration, which is SONET by default if you have not specified framing at the PIC level. To set the framing mode for individual ports, include the **framing** statement at the **[edit chassis fpc *fpc-slot* pic *pic-slot* port *port-number*]** hierarchy level:

```
[edit chassis fpc fpc-slot pic pic-slot port port-number]
user@host# set framing (sonet | sdh); # SONET for COC3 or SDH for CSTM1
```

Configuring the framing mode at the port level overwrites the previous PIC-level framing mode configuration for the specified port. Subsequently, configuring the PIC-level framing mode overwrites the port-level framing configuration. For example, if you want three STM1 ports and one COC3 port, then it is practical to first configure the PIC for SDH framing and then configure one port for SONET framing.

Configuring COC3 Ports Down to T1 Channels

On any port configured for SONET framing (numbered 0 through 3), you can configure three COC1 channels (numbered 1 through 3). On each COC1 channel, you can configure 28 T1 channels (numbered 1 through 28).

To configure COC3 channelization down to COC1 and then down to T1 channels, include the **partition** statement at the **[edit interfaces (coc1 | coc3)-*fpc-slot/pic-slot/port*]** hierarchy level:

1. In configuration mode, go to the **[edit interfaces coc3-*fpc-slot/pic-slot/port*]**

   ```
   [edit]
   user@host# edit interfaces coc3-fpc-slot/pic-slot/port
   ```

   For example:

   ```
   [edit]
   user@host# edit interfaces coc3-1/0/0
   ```

2. Configure the sublevel interface partition index, range of SONET/SDH slices, and sublevel interface type.

   ```
   [edit interfaces coc3-1/0/0]
   user@host# set partition partition-number oc-slice oc-slice interface-type coc1
   ```

   For example:

   ```
   [edit interfaces coc3-1/0/0]
   user@host# set partition 1 oc-slice 1 interface-type coc1
   ```

3. Enter **up** command to go to **[edit interfaces]** hierarchy level.

   ```
   [edit interfaces coc3-1/0/0]
   user@host# up
   ```

4. Configure the channelized OC1 interface, sublevel interface partition index, and the interface type.

   ```
   [edit interfaces]
   user@host# set coc1-1/0/0:1 partition partition-number interface-type t1
   ```

   For example:

   ```
   [edit interfaces]
   user@host# set coc1-1/0/0:1 partition 1 interface-type t1
   ```

To verify the configuration use the **show** command at the **[edit interfaces]** hierarchy level.

```
[edit interfaces]
user@host# show
coc3-1/0/0 {
   partition 1 oc-slice 1 interface-type coc1;
}
coc1-1/0/0:1 {
   partition 1 interface-type t1;
}
```

After you partition the T1 channels, configure the SAToP options on them in the same way as you do on T1 interfaces. See "Setting the SAToP Options" on page 48.

Configuring CSTM1 Ports Down to E1 Channels

On any port configured for SDH framing (numbered 0 through 3), you can configure one CAU4 channel. On each CAU4 channel, you can configure 63 T1 channels (numbered 1 through 63).

To configure CSTM1 channelization down to CAU4 and then down to E1 channels, include statements for the various interface types at the **[edit interfaces]** hierarchy level.

1. In configuration mode, go to the **[edit interfaces cstm1-*fpc-slot/pic-slot/port*]**

   ```
   [edit]
   [edit interfaces cstm1-fpc-slot/pic-slot/port]
   ```

   For example:

   ```
   [edit]
   [edit interfaces cstm1-1/0/1]
   ```

2. Configure the channelize interface as clear channel and the set the interface-type as cau4

   ```
   [edit interfaces cstm1-1/0/1]
   user@host# set no-partition interface-type cau4;
   ```

3. Enter **up** to go to **[edit interfaces]** hierarchy level.

4. Configure the fpc slot, pic slot and the port for CAU4 interface. Set the sublevel interface partition index and set the interface type as E1.

```
[edit interfaces]
user@host# set cau4-fpc-slot/pic-slot/port partition partition-number interface-type
  e1
```

For example:

```
[edit interfaces]
user@host# set cau4-1/0/1 partition 1 interface-type e1
```

5. Enter **up** to go to **[edit interfaces]** hierarchy level.
6. Configure the fpc slot, pic slot and the port for E1 interface. Set the Structure-Agnostic TDM over Packet and the logical interface for E1 interface

```
[edit interfaces]
user@host# set e1-fpc-slot/pic-slot/port:channel encapsulation encapsulation-type
  unit interface-unit-number;
```

For example:

```
[edit interfaces]
user@host# set e1-1/0/:1 encapsulation satop unit 0;
```

To verify the configuration use the **show** command at the **[edit interfaces]** hierarchy level.

```
[edit interfaces]
user@host# show
cstm1-1/0/1 {
  no-partition interface-type cau4;
}
cau4-1/0/1 {
  partition 1 interface-type e1;
}
e1-1/0/1:1 {
  encapsulation satop;
  unit 0;
}
```

After you configure the E1 channels, configure SAToP options on them in the same way as you do on E1 interfaces. See "Setting the SAToP Options" on page 48.

Related Documentation

- Mobile Backhaul and Circuit Emulation Overview on page 35
- Configuring SAToP Emulation on T1/E1 Interfaces on Circuit Emulation PICs on page 46

Configuring SAToP Emulation on T1/E1 Interfaces on Circuit Emulation PICs

This configuration applies to the mobile backhaul application shown in Figure 1 on page 36.

Setting the Emulation Mode

To set the framing emulation mode, include the **framing** statement at the **[edit chassis fpc *fpc-slot* pic *pic-slot*]** hierarchy level:

```
[edit chassis fpc fpc-slot pic pic-slot]
user@host# set framing (t1 | e1);
```

After a PIC is brought online, interfaces are created for the PIC's available ports according to the PIC type and the framing option used:

- If you include the **framing t1** statement (for a T1 Circuit Emulation PIC), 12 CT1 interfaces are created.
- If you include the **framing e1** statement (for an E1 Circuit Emulation PIC), 12 CE1 interfaces are created.

NOTE: If you set the framing option incorrectly for the PIC type, the commit operation fails.

Circuit Emulation PICs with SONET and SDH ports require prior channelization down to T1 or E1 before you can configure them. Only T1/E1 channels support SAToP encapsulation or SAToP options.

Bit error rate test (BERT) patterns with all ones received by T1/E1 interfaces on Circuit Emulation PICs configured for SAToP do not result in an alarm indication signal (AIS) defect. As a result, the T1/E1 interfaces remain up.

Configuring SAToP Emulation on T1/E1 Interfaces

Setting the Encapsulation Mode

E1 channels on Circuit Emulation PICs can be configured with SAToP encapsulation at the provider edge (PE) router, as follows:

NOTE: The below mentioned procedure can be used to configure T1 channels on circuit emulation PICs with SAToP encapsulation at the PE router.

1. In the configuration mode, go to **[edit interfaces e1-*fpc-slot/pic-slot/port*]** hierarchy level.

   ```
   [edit]
   user@host# [edit interfaces e1 fpc-slot/pic-slot/port]
   ```

   For example:

   ```
   [edit]
   [edit interfaces e1-1/0/0]
   ```

2. Configure SAToP encapsulation and the logical interface for E1 interface

   [edit interfaces e1-1/0/0]
   user@host# **set encapsulation** *encapsulation-type*unit *interface-unit-number*;

   For example:

   [edit interfaces e1-1/0/0]
   user@host# **set encapsulation satop unit 0**;

You do not need to configure any cross-connect circuit family because it is automatically created for the above encapsulation.

T1/E1 Loopback Support

Use the CLI to configure remote and local loopback as T1 (CT1) or E1 (CE1). By default, no loopback is configured. See Configuring T1 Loopback Capability and Configuring E1 Loopback Capability.

T1 FDL Support

If T1 is used for SAToP, the T1 facility data-link (FDL) loop is *not* supported on the CT1 interface device because SAToP does not analyze T1 framing bits.

Setting the SAToP Options

To configure SAToP options on T1/E1 interfaces:

1. In configuration mode, go to the **[edit interfaces e1-*fpc-slot/pic-slot/port*]** hierarchy level.

   [edit]
   user@host# **edit interfaces e1-*fpc-slot/pic-slot/port***

   For example:

   [edit]
   user@host# **edit interfaces e1-1/0/0**

2. Use the **edit** command to go to the **satop-options** hierarchy level.

   [edit]
   user@host# **edit satop-options**

3. In this hierarchy level, using the **set** command you can configure the following SAToP options:

   - **excessive-packet-loss-rate**—Set packet loss options. The options are **groups**, **sample-period**, and **threshold**.
     - **groups**—Specify groups.
     - **sample-period**—Time required to calculate excessive packet loss rate (from 1000 through 65,535 milliseconds).

    - **threshold**—Percentile designating the threshold of excessive packet loss rate (1–100 percent).

- **idle-pattern**—An 8-bit hexadecimal pattern to replace TDM data in a lost packet (from 0 through 255).
- **jitter-buffer-auto-adjust**—Automatically adjust the jitter buffer.

  NOTE: **The jitter-buffer-auto-adjust option is not applicable on MX Series routers.**

- **jitter-buffer-latency**—Time delay in the jitter buffer (from 1 through 1000 milliseconds).
- **jitter-buffer-packets**—Number of packets in the jitter buffer (from 1 through 64 packets).
- **payload-size**—Configure the payload size, in bytes (from 32 through 1024 bytes).

  NOTE: **In this section, we are configuring only one SAToP option. You can follow the same method to configure all the other SAToP options.**

  ```
  [edit interfaces e1-1/0/0 satop-options]
  user@host# set excessive-packet-loss-rate sample-period sample-period
  ```

  For example:

  ```
  [edit interfaces e1-1/0/0 satop-options]
  user@host# set excessive-packet-loss-rate sample-period 4000
  ```

To verify this configuration, use the **show** command at the **[edit interfaces e1-1/0/0]** hierarchy level:

```
[edit interfaces e1-1/0/0]
user@host# show
satop-options {
   excessive-packet-loss-rate {
      sample-period 4000;
   }
}
```

Configuring the Pseudowire Interface

To configure the TDM pseudowire at the provider edge (PE) router, use the existing Layer 2 circuit infrastructure, as shown in the following procedure:

1. In the configuration mode, go to **[edit protocols l2circuit]** hierarchy level.

   ```
   [edit]
   user@host# edit protocol l2circuit
   ```

2. Configure the IP address of the neighboring router or switch, interface forming the layer 2 circuit and the identifier for the layer 2 circuit.

   ```
   [edit protocol l2circuit]
   user@host# set neighbor ip-address interface
     interface-name-fpc-slot/pic-slot/port.interface-unit-number virtual-circuit-id
     virtual-circuit-id;
   ```

   NOTE: To configure T1 interface as the layer 2 circuit, replace e1 with t1 in the below statement.

   For example:

   ```
   [edit protocol l2circuit]
   user@host# set neighbor 10.255.0.6 interface e1-1/0/0.0 virtual-circuit-id 1
   ```

3. To verify the configuration use the **show** command at the **[edit protocols l2circuit]** hierarchy level.

   ```
   [edit protocols l2circuit]
   user@host# show
   neighbor 10.255.0.6 {
     interface e1-1/0/0.0 {
       virtual-circuit-id 1;
     }
   }
   ```

After the customer edge (CE)-bound interfaces (for both PE routers) are configured with proper encapsulation, payload size, and other parameters, the two PE routers try to establish a pseudowire with Pseudowire Emulation Edge-to-Edge (PWE3) signaling extensions. The following pseudowire interface configurations are disabled or ignored for TDM pseudowires:

- **ignore-encapsulation**
- **mtu**

The supported pseudowire types are:

- 0x0011 Structure-Agnostic E1 over Packet
- 0x0012 Structure-Agnostic T1 (DS1) over Packet

When the local interface parameters match the received parameters, and the pseudowire type and control word bit are equal, the pseudowire is established.

For detailed information about configuring TDM pseudowire, see the Junos OS VPNs Configuration Guide.

For detailed information about PICs, see the *PIC Guide* for your router.

Related Documentation

- Mobile Backhaul and Circuit Emulation Overview on page 35
- Configuring SAToP on 4-Port Channelized OC3/STM1 Circuit Emulation PICs on page 43

CHAPTER 4

Configuring SAToP Support on Circuit Emulation MICs

Configuring SAToP on Channelized OC3/STM1 (Multi-Rate) Circuit Emulation MIC with SFP

This configuration applies to the mobile backhaul application shown in Figure 1 on page 36.

Configuring SONET/SDH Rate-Selectability

You can configure rate-selectability on the Channelized OC3/STM1 (Multi-Rate) MICs with SFP (MIC-3D-4COC3-1COC12-CE) by specifying its port speed as COC3-CSTM1 or COC12-CSTM4.

To configure the rate-selectability:

1. In configuration mode, go to the **[edit chassis fpc *slot* pic *slot* port *slot*]** hierarchy level.

   ```
   [edit]
   user@host# edit chassis fpc slot pic slot port slot
   ```

   For example:

   ```
   [edit]
   user@host# edit chassis fpc 1 pic 0 port 0
   ```

2. Set the speed as **coc3-cstm1** or **coc12-cstm4**.

```
[edit chassis fpc slot pic slot port slot]
user@host# set speed (coc3-cstm1 | coc12-cstm4)
```

For example:

```
[edit chassis fpc 1 pic 0 port 0]
user@host# set speed coc3-cstm1
```

NOTE: When the speed is set as **coc12-cstm4**, instead of configuring COC3 ports down to T1 channels and CSTM1 ports down to E1 channels, you must configure COC12 ports down to T1 channels and CSTM4 channels down to E1 channels.

Configuring SONET/SDH Framing Mode at the MIC Level

To set the framing mode at the MIC (MIC-3D-4COC3-1COC12-CE) level, for all four ports on the MIC, include the **framing** statement at the **[edit chassis fpc *slot* pic *slot*]** hierarchy level.

```
[edit chassis fpc slot pic slot]
user@host# set framing (sonet | sdh)# SONET for COC3/COC12 or SDH for CSTM1/CSTM4
```

After a MIC is brought online, interfaces are created for the MIC's available ports on the basis of the MIC type and the framing option used.

- If you include the **framing sonet** statement, four COC3 interfaces are created when the speed is configured as **coc3-cstm1**.
- If you include the **framing sdh** statement, four CSTM1 interfaces are created when the speed is configured as **coc3-cstm1**.
- If you include the **framing sonet** statement, one COC12 interface is created when the speed is configured as **coc12-cstm4**.
- If you include the **framing sdh** statement, one CSTM4 interface is created when the speed is configured as **coc12-cstm4**.
- If you do not specify framing at the MIC level, then the default framing is SONET for all the ports.

NOTE: If you set the framing option incorrectly for the MIC type, the commit operation fails.

Bit error rate test (BERT) patterns with all binary 1s (ones) received by T1/E1 interfaces on Circuit Emulation MICs configured for SAToP do not result in an alarm indication signal (AIS) defect. As a result, the T1/E1 interfaces remain up.

Configuring COC3/COC12 Ports Down to T1 Channels

When configuring COC3 ports down to T1 channels, on any port configured for SONET framing (numbered 0 through 3), you can configure three COC1 channels (numbered 1 through 3). On each COC1 channel, you can configure 28 T1 channels (numbered 1 through 28).

When configuring COC12 ports down to T1 channels, on a port configured for SONET framing, you can configure twelve COC1 channels (numbered 1 through 12). On each COC1 channel, you can configure 28 T1 channels (numbered 1 through 28).

To configure COC3 channelization down to COC1 and then down to T1 channels, include the **partition** statement at the **[edit interfaces (coc1 | coc3)-*mpc-slot/mic-slot/port-number*]** hierarchy level:

NOTE: To configure COC12 ports down to T1 channels, replace coc3 with coc12 ports in the following procedure.

1. In configuration mode, go to the **[edit interfaces coc3-*mpc-slot/mic-slot/port-number*]** hierarchy level.

   ```
   [edit]
   user@host# edit interfaces coc3-mpc-slot/mic-slot/port-number
   ```

   For example:

   ```
   [edit]
   user@host# edit interfaces coc3-1/0/0
   ```

2. Configure the sublevel interface partition index and the range of SONET/SDH slices, and set the sublevel interface type as **coc1**.

   ```
   [edit interfaces coc3-mpc-slot/mic-slot/port-number]
   user@host# set partition partition-number oc-slice oc-slice interface-type coc1
   ```

   For example:

   ```
   [edit interfaces coc3-1/0/0]
   user@host# set partition 1 oc-slice 1 interface-type coc1
   ```

3. Enter the **up** command to go to the **[edit interfaces]** hierarchy level.

   ```
   [edit interfaces coc3-mpc-slot/mic-slot/port-number]
   user@host# up
   ```

   For example:

   ```
   [edit interfaces coc3-1/0/0]
   user@host# up
   ```

4. Configure the channelized OC1 interface and the sublevel interface partition index, and set the interface type as **t1**.

   ```
   [edit interfaces]
   user@host# set coc1-mpc-slot/mic-slot/port-number:channel partition partition-number
     interface-type t1
   ```

For example:

```
[edit interfaces]
user@host# set coc1-1/0/0:1 partition 1 interface-type t1
```

To verify this configuration, use the **show** command at the **[edit interfaces]** hierarchy level.

```
[edit interfaces]
user@host# show
coc3-1/0/0 {
    partition 1 oc-slice 1 interface-type coc1;
}
coc1-1/0/0:1 {
    partition 1 interface-type t1;
}
```

After you partition the T1 channels, configure the SAToP options on them in the same way as you do on T1 interfaces. See "Setting the SAToP Options" on page 48.

Configuring CSTM1 Ports Down to E1 Channels

On any port configured for SDH framing (numbered 0 through 3), you can configure one CAU4 channel. On each CAU4 channel, you can configure 63 T1 channels (numbered 1 through 63).

To configure CSTM1 channelization down to CAU4 and then down to E1 channels, include statements for the various interface types at the **[edit interfaces]** hierarchy level.

1. In configuration mode, go to the **[edit interfaces cstm1-*mpc-slot/mic-slot/port-number*]** hierarchy level.

   ```
   [edit]
   user@host# [edit interfaces cstm1-mpc-slot/mic-slot/port-number]
   ```

   For example:

   ```
   [edit]
   user@host# [edit interfaces cstm1-1/0/1]
   ```

2. Configure the channelized interface as clear channel and then set the interface type as CAU4.

   ```
   [edit interfaces cstm1-mpc-slot/mic-slot/port-number]
   user@host# set no-partition interface-type cau4
   ```

3. Enter **up** to go to the **[edit interfaces]** hierarchy level.

   ```
   [edit interfaces cstm1-mpc-slot/mic-slot/port-number]
   user@host# up
   ```

   For example:

   ```
   [edit interfaces cstm1-1/0/1]
   user@host# up
   ```

4. Configure the MPC slot, the MIC slot, and the port for the CAU4 interface. Set the sublevel interface partition index and set the interface type as E1.

```
[edit interfaces]
user@host# set cau4-mpc-slot/mic-slot/port-number partition partition-number
  interface-type e1
```

For example:

```
[edit interfaces]
user@host# set cau4-1/0/1 partition 1 interface-type e1
```

5. Configure the MPC slot, the MIC slot, and the port for the E1 interface. Set SAToP as the encapsulation type and then set the logical interface for E1 interface.

```
[edit interfaces]
user@host# set e1-mpc-slot/mic-slot/port-number:channel encapsulation satop unit
  interface-unit-number
```

For example:

```
[edit interfaces]
user@host# set e1-1/0/:1 encapsulation satop unit 0
```

To verify this configuration, use the **show** command at the **[edit interfaces]** hierarchy level.

```
[edit interfaces]
user@host# show
cstm1-1/0/1 {
  no-partition interface-type cau4;
}
cau4-1/0/1 {
  partition 1 interface-type e1;
}
e1-1/0/1:1 {
  encapsulation satop;
  unit 0;
}
```

After you configure the E1 channels, configure SAToP options on them in the same way as you do on E1 interfaces. See "Setting the SAToP Options" on page 48.

Configuring CSTM4 Ports Down to E1 Channels

NOTE: When the port speed is configured as coc12-cstm4 at the **[edit chassis fpc *slot* pic *slot* port *slot*]** hierarchy level, you must configure CSTM4 ports down to E1 channels.

On any port configured for SDH framing (numbered 0 through 3), you can configure four CAU4 channels. On each CAU4 channel, you can configure 63 T1 channels (numbered 1 through 63).

To configure CSTM4 ports down to E1 channels, include statements for the various interface types at the **[edit interfaces]** hierarchy level.

1. In configuration mode, go to the **[edit interfaces cstm4-*mpc-slot/mic-slot/port-number*]** hierarchy level.

```
[edit]
user@host# edit interfaces cstm4-mpc-slot/mic-slot/port-number
```

For example:

```
[edit]
user@host# edit interfaces cstm4-1/0/1
```

2. Configure the sublevel interface partition index and the range of SONET/SDH slices, and set the sublevel interface type as **cau4**.

```
[edit interfaces cstm4-mpc-slot/mic-slot/port-number]
user@host# set partition partition-number oc-slice oc-slice interface-type cau4
```

For example:

```
[edit interfaces cstm4-1/0/1]
user@host# set partition 1 oc-slice 1 interface-type cau4
```

3. Enter **up** to go to the **[edit interfaces]** hierarchy level.

```
[edit interfaces cstm4-mpc-slot/mic-slot/port-number]
user@host# up
```

For example:

```
[edit interfaces cstm4-1/0/1]
user@host# up
```

4. Configure the MPC slot, the MIC slot, and the port for the CAU4 interface. Set the sublevel interface partition index and set E1 as the interface type.

```
[edit interfaces]
user@host# set cau4-mpc-slot/mic-slot/port-number:channel partition
  partition-number interface-type e1
```

For example:

```
[edit interfaces]
user@host# set cau4-1/0/1:1 partition 1 interface-type e1
```

5. Configure the MPC slot, the MIC slot, and the port for the E1 interface. Set SAToP as the encapsulation type and then set the logical interface for the E1 interface.

```
[edit interfaces]
user@host# set e1-mpc-slot/mic-slot/port-number:channel encapsulation satop unit
  interface-unit-number
```

For example:

```
[edit interfaces]
user@host# set e1-1/0/1:1:1 encapsulation satop unit 0
```

To verify this configuration, use the **show** command at the **[edit interfaces]** hierarchy level.

```
[edit interfaces]
user@host# show
cstm4-1/0/1 {
   partition 1 oc-slice 1 interface-type cau4;
}
cau4-1/0/1:1 {
```

```
    partition 1 interface-type e1;
  }
  e1-1/0/1:1:1 {
    encapsulation satop;
    unit 0;
  }
```

After you configure the E1 channels, configure the SAToP options on them in the same way as you do on E1 interfaces. See "Setting the SAToP Options" on page 48.

Related Documentation

- Mobile Backhaul and Circuit Emulation Overview on page 35
- Configuring SAToP Encapsulation on T1/E1 Interfaces on Channelized OC3/STM1 (Multi-Rate) Circuit Emulation MIC with SFP on page 57

Configuring SAToP Encapsulation on T1/E1 Interfaces on Channelized OC3/STM1 (Multi-Rate) Circuit Emulation MIC with SFP

This configuration applies to the mobile backhaul application shown in Figure 1 on page 36.

This topic includes the following tasks:

Setting the Encapsulation Mode

E1 channels on Circuit Emulation MICs can be configured with SAToP encapsulation at the provider edge (PE) router, as follows:

NOTE: The below mentioned procedure can be used to configure T1 channels on circuit emulation MICs with SAToP encapsulation at the PE router.

1. In configuration mode, go to the **[edit interfaces e1-*fpc-slot/pic-slot/port*]** hierarchy level.

   ```
   [edit]
   user@host# edit interfaces e1-fpc-slot/pic-slot/port
   ```

   For example:

   ```
   [edit]
   user@host# edit interfaces e1-1/0/0
   ```

2. Configure the SAToP encapsulation and the logical interface for E1 interface.

   ```
   [edit interfaces e1-1/0/0]
   user@host# set encapsulation satop unit interface-unit-number
   ```

For example:

```
[edit interfaces e1-1/0/0]
user@host# set encapsulation satop unit 0
```

You do not need to configure any cross-connect circuit family because it is automatically created for the SAToP encapsulation.

T1/E1 Loopback Support

Use the CLI to configure remote and local loopback as T1 (CT1) or E1 (CE1). By default, no loopback is configured. See Configuring T1 Loopback Capability and Configuring E1 Loopback Capability.

T1 FDL Support

If T1 is used for SAToP, the T1 facility data-link (FDL) loop is *not* supported on the CT1 interface device because SAToP does not analyze T1 framing bits.

Setting the SAToP Options

To configure SAToP options on T1/E1 interfaces:

1. In configuration mode, go to the **[edit interfaces e1-*fpc-slot/pic-slot/port*]** hierarchy level.

   ```
   [edit]
   user@host# edit interfaces e1-fpc-slot/pic-slot/port
   ```

   For example:

   ```
   [edit]
   user@host# edit interfaces e1-1/0/0
   ```

2. Use the **edit** command to go to the **satop-options** hierarchy level.

   ```
   [edit]
   user@host# edit satop-options
   ```

3. In this hierarchy level, using the **set** command you can configure the following SAToP options:

   - **excessive-packet-loss-rate**—Set packet loss options. The options are **groups**, **sample-period**, and **threshold**.
     - **groups**—Specify groups.
     - **sample-period**—Time required to calculate excessive packet loss rate (from 1000 through 65,535 milliseconds).
     - **threshold**—Percentile designating the threshold of excessive packet loss rate (1–100 percent).
   - **idle-pattern**—An 8-bit hexadecimal pattern to replace TDM data in a lost packet (from 0 through 255).
   - **jitter-buffer-auto-adjust**—Automatically adjust the jitter buffer.

NOTE: The **jitter-buffer-auto-adjust** option is not applicable on MX Series routers.

- **jitter-buffer-latency**—Time delay in the jitter buffer (from 1 through 1000 milliseconds).
- **jitter-buffer-packets**—Number of packets in the jitter buffer (from 1 through 64 packets).
- **payload-size**—Configure the payload size, in bytes (from 32 through 1024 bytes).

NOTE: In this section, we are configuring only one SAToP option. You can follow the same method to configure all the other SAToP options.

```
[edit interfaces e1-1/0/0 satop-options]
user@host# set excessive-packet-loss-rate sample-period sample-period
```

For example:

```
[edit interfaces e1-1/0/0 satop-options]
user@host# set excessive-packet-loss-rate sample-period 4000
```

To verify this configuration, use the **show** command at the **[edit interfaces e1-1/0/0]** hierarchy level:

```
[edit interfaces e1-1/0/0]
user@host# show
satop-options {
   excessive-packet-loss-rate {
      sample-period 4000;
   }
}
```

Configuring the Pseudowire Interface

To configure the TDM pseudowire at the provider edge (PE) router, use the existing Layer 2 circuit infrastructure, as shown in the following procedure:

1. In configuration mode, go to the **[edit protocols l2circuit]** hierarchy level.

   ```
   [edit]
   user@host# edit protocol l2circuit
   ```

2. Configure the IP address of the neighboring router or switch, the interface forming the Layer 2 circuit, and the identifier for the Layer 2 circuit.

   ```
   [edit protocol l2circuit]
   user@host# set neighbor ip-address interface
     interface-name-fpc-slot/pic-slot/port.interface-unit-number virtual-circuit-id
     virtual-circuit-id
   ```

NOTE: To configure the T1 interface as the Layer 2 circuit, replace e1 with t1 in the configuration statement.

For example:

```
[edit protocol l2circuit]
user@host# set neighbor 10.255.0.6 interface e1-1/0/0.0 virtual-circuit-id 1
```

3. To verify this configuration, use the **show** command at the **[edit protocols l2circuit]** hierarchy level.

```
[edit protocols l2circuit]
user@host# show
neighbor 10.255.0.6 {
  interface e1-1/0/0.0 {
    virtual-circuit-id 1;
  }
}
```

After the customer edge (CE)-bound interfaces (for both PE routers) are configured with proper encapsulation, payload size, and other parameters, the two PE routers try to establish a pseudowire with Pseudowire Emulation Edge-to-Edge (PWE3) signaling extensions. The following pseudowire interface configurations are disabled or ignored for TDM pseudowires:

- **ignore-encapsulation**
- **mtu**

The supported pseudowire types are:

- 0x0011 Structure-Agnostic E1 over Packet
- 0x0012 Structure-Agnostic T1 (DS1) over Packet

When the local interface parameters match the received parameters, and the pseudowire type and control word bit are equal, the pseudowire is established.

For detailed information about configuring TDM pseudowire, see the Junos OS VPNs Configuration Guide.

For detailed information about MICs, see the *PIC Guide* for your router.

Related Documentation

- Mobile Backhaul and Circuit Emulation Overview on page 35
- Configuring SAToP on Channelized OC3/STM1 (Multi-Rate) Circuit Emulation MIC with SFP on page 51

Configuring SAToP on Channelized E1/T1 Circuit Emulation MIC

The following sections describes configuring SAToP on the Channelized E1/T1 Circuit Emulation MIC (MIC-3D-16CHE1-T1-CE).

Configuring T1/E1 Framing Mode at the MIC Level

To set the framing mode at the MIC (MIC-3D-16CHE1-T1-CE) level, include the **framing** statement at the **[edit chassis fpc *slot* pic *slot*]** hierarchy level.

```
[edit chassis fpc slot pic slot]
user@host# set framing (t1 | e1);
```

After a MIC is brought online, all 16 CT1 or CE1 interfaces are created for the MIC according to the framing option used at the **[edit chassis fpc *slot* pic *slot*]** hierarchy level.

- If you include the **framing t1** statement, 16 channelized T1 (CT1) interfaces are created.
- If you include the **framing e1** statement, 16 channelized E1 (CE1) interfaces are created.

NOTE: If you set the framing option incorrectly for the MIC type, the commit operation fails.

By default, t1 framing mode is selected.

Bit error rate test (BERT) patterns with all binary 1s (ones) received by CT1/CE1 interfaces on Circuit Emulation MICs configured for SAToP do not result in an alarm indication signal (AIS) defect. As a result, the CT1/CE1 interfaces remain up.

Configuring CT1 Ports Down to T1 Channels

To configure a CT1 port down to a T1 channel, use the following procedure:

NOTE: To configure a CE1 port down to the E1 channel, replace ct1 with ce1 and t1 with e1 in the procedure.

1. In configuration mode, go to the **[edit interfaces ct1-*mpc-slot/mic-slot/port-number*]** hierarchy level.

   ```
   [edit]
   user@host# edit interfaces ct1-mpc-slot/mic-slot/port-number
   ```

For example:

```
[edit]
user@host# edit interfaces ct1-1/0/0
```

2. On the CT1 interface, set the **no-partition** option and then set the interface type as T1.

   ```
   [edit interfaces ct1-mpc-slot/mic-slot/port-number]
   user@host# set no-partition interface-type t1
   ```

   In the following example, the ct1-1/0/1 interface is configured to be of type T1 and to have no partitions.

   ```
   [edit interfaces ct1-1/0/1]
   user@host# set no-partition interface-type t1
   ```

Configuring CT1 Ports Down to DS Channels

To configure a channelized T1 (CT1) port down to a DS channel, include the **partition** statement at the **[edit interfaces ct1-*mpc-slot/mic-slot/port-number*]** hierarchy level:

NOTE: To configure a CE1 port down to a DS channel, replace ct1 with ce1 in the following procedure.

1. In configuration mode, go to the **[edit interfaces ct1-*mpc-slot/mic-slot/port-number*]** hierarchy level.

   ```
   [edit]
   user@host# edit interfaces ct1-mpc-slot/mic-slot/port-number
   ```

   For example:

   ```
   [edit]
   user@host# edit interfaces ct1-1/0/0
   ```

2. Configure the partition, the time slot, and the interface type.

   ```
   [edit interfaces ct1-mpc-slot/mic-slot/port-number]
   user@host# set partition partition-number timeslots timeslots interface-type ds
   ```

   In the following example, the ct1-1/0/0 interface is configured as a DS interface with one partition and three time slots:

   ```
   [edit interfaces ct1-1/0/0]
   user@host# set partition 1 timeslots 1-4,9,22-24 interface-type ds
   ```

To verify the configuration of the ct1-1/0/0 interface, use the **show** command at the **[edit interfaces ct1-1/0/0]** hierarchy level.

```
[edit interfaces ct1-1/0/0]
user@host# show
partition 1 timeslots 1-4,9,22-24 interface-type ds;
```

An *N*xDS0 interface can be configured from channelized T1 interface. Here *N* represents the time slots on the CT1 interface. The value of *N* is:

- 1 through 24 when a DS0 interface is configured from a CT1 interface.

- 1 through 31 when a DS0 interface is configured from a CE1 interface.

After you partition the DS interface, configure the SAToP options on it. See "Setting the SAToP Options" on page 48.

Related Documentation

- 16-Port Channelized E1/T1 Circuit Emulation MIC Overview on page 40

CHAPTER 5

Configuring CESoPSN Support on Circuit Emulation MICs

Configuring CESoPSN on Channelized OC3/STM1 (Multi-Rate) Circuit Emulation MIC with SFP

This configuration applies to the mobile backhaul application shown in Figure 1 on page 36.

Configuring SONET/SDH Rate-Selectability

You can configure rate-selectability on the Channelized OC3/STM1 (Multi-Rate) MICs with SFP(MIC-3D-4COC3-1COC12-CE) by specifying the port speed. The Channelized OC3/STM1 (Multi-Rate) Circuit Emulation MIC with SFP is rate-selectable and its port speed can be specified as COC3-CSTM1 or COC12-CSTM4.

To configure the rate-selectability:

1. In configuration mode, go to the **[edit chassis fpc *slot* pic *slot* port *slot*]** hierarchy level.

   ```
   [edit]
   user@host# edit chassis fpc slot pic slot port slot
   ```

   For example:

   ```
   [edit]
   user@host# edit chassis fpc 1 pic 0 port 0
   ```

2. Set the speed as **coc3-cstm1** or **coc12-cstm4**.

   ```
   [edit chassis fpc slot pic slot port slot]
   ```

```
user@host# set speed (coc3-cstm1 | coc12-cstm4)
```

For example:

```
[edit chassis fpc 1 pic 0 port 0]
user@host# set speed coc3-cstm1
```

NOTE: When the speed is set as **coc12-cstm4**, instead of configuring COC3 ports down to T1 channels and CSTM1 ports down to E1 channels, you must configure COC12 ports down to T1 channels and CSTM4 channels down to E1 channels.

Configuring SONET/SDH Framing Mode at the MIC Level

To set the framing mode at the MIC (MIC-3D-4COC3-1COC12-CE) level, for all four ports on the MIC, include the **framing** statement at the **[edit chassis fpc *slot* pic *slot*]** hierarchy level.

```
[edit chassis fpc slot pic slot]
user@host# set framing (sonet | sdh) # SONET for COC3/COC12 or SDH for CSTM1/CSTM4
```

After a MIC is brought online, interfaces are created for the MIC's available ports on the basis of the MIC type and the framing option used.

- If you include the **framing sonet** statement, four COC3 interfaces are created when the speed is configured as **coc3-cstm1**.
- If you include the **framing sdh** statement, four CSTM1 interfaces are created when the speed is configured as **coc3-cstm1**.
- If you include the **framing sonet** statement, one COC12 interface is created when the speed is configured as **coc12-cstm4**.
- If you include the **framing sdh** statement, one CSTM4 interface is created when the speed is configured as **coc12-cstm4**.
- If you do not specify framing at the MIC level, then the default framing is SONET for all the ports.

NOTE: If you set the framing option incorrectly for the MIC type, the commit operation fails.

Bit error rate test (BERT) patterns with all binary 1s (ones) received by CT1/CE1 interfaces on Circuit Emulation MICs configured for CESoPSN do not result in an alarm indication signal (AIS) defect. As a result, the CT1/CE1 interfaces remain up.

Configuring CESoPSN Encapsulation on DS Interfaces on CT1 Channels

This topic includes the following tasks:

1. Configuring COC3 Ports Down to CT1 Channels on page 67
2. Configuring CT1 Channels Down to DS Interfaces on page 68
3. Configuring CESoPSN on DS Interfaces on page 69

Configuring COC3 Ports Down to CT1 Channels

When configuring COC3 ports down to CT1 channels, on any MIC configured for SONET framing (numbered 0 through 3), you can configure three COC1 channels (numbered 1 through 3). On each COC1 channel, you can configure a maximum of 28 CT1 channels and a minimum of 1 CT1 channel based on the time slots.

When configuring COC12 ports down to CT1 channels on a MIC configured for SONET framing, you can configure 12 COC1 channels (numbered 1 through 12). On each COC1 channel, you can configure 24 CT1 channels (numbered 1 through 28).

To configure COC3 channelization down to COC1 and then down to CT1 channels, include the **partition** statement at the **[edit interfaces (coc1 | coc3)-*mpc-slot/mic-slot/port-number*]** hierarchy level:

NOTE: To configure COC12 ports down to CT1 channels, replace coc3 with coc12 in the following procedure.

1. In configuration mode, go to the **[edit interfaces coc3-*mpc-slot/mic-slot/port-number*]** hierarchy level.

   ```
   [edit]
   user@host# edit interfaces coc3-mpc-slot/mic-slot/port-number
   ```

   For example:

   ```
   [edit]
   user@host# edit interfaces coc3-1/0/0
   ```

2. Configure the sublevel interface partition index and the range of SONET/SDH slices, and set the sublevel interface type as **coc1**.

   ```
   [edit interfaces coc3-mpc-slot/mic-slot/port-number]
   user@host# set partition partition-number oc-slice oc-slice interface-type coc1
   ```

   For example:

   ```
   [edit interfaces coc3-1/0/0]
   user@host# set partition 1 oc-slice 1 interface-type coc1
   ```

3. Enter the **up** command to go to the **[edit interfaces]** hierarchy level.

   ```
   [edit interfaces coc3-mpc-slot/mic-slot/port-number]
   user@host# up
   ```

For example:

```
[edit interfaces coc3-1/0/0]
user@host# up
```

4. Configure the channelized OC1 interface and the sublevel interface partition index, and set the interface type as **ct1**.

```
[edit interfaces]
user@host# set coc1-1/0/0:1 partition partition-number interface-type ct1
```

For example:

```
[edit interfaces]
user@host# set coc1-1/0/0:1 partition 1 interface-type ct1
```

To verify the configuration, use the **show** command at the **[edit interfaces]** hierarchy level.

```
[edit interfaces]
user@host# show
coc3-1/0/0 {
    partition 1 oc-slice 1 interface-type coc1;
}
coc1-1/0/0:1 {
    partition 1 interface-type ct1;
}
```

Configuring CT1 Channels Down to DS Interfaces

To configure CT1 channels down to a DS interface, include the **partition** statement at the **[edit interfaces ct1-*mpc-slot/mic-slot/port-number:channel:channel*]** hierarchy level:

1. In configuration mode, go to the **[edit interfaces ct1-*mpc-slot/mic-slot/port-number:channel:channel*]** hierarchy level.

```
[edit]
user@host# edit interfaces ct1-mpc-slot/mic-slot/port-number:channel:channel
```

For example:

```
[edit]
user@host# edit interfaces ct1-1/0/0:1:1
```

2. Configure the partition, the time slots, and the interface type.

```
[edit interfaces ct1-mpc-slot/mic-slot/port-number:channel:channel]
user@host# set partition partition-number timeslots timeslots interface-type ds
```

For example:

```
[edit interfaces ct1-1/0/0:1:1]
user@host# set partition 1 timeslots 1-4 interface-type ds
```

NOTE: You can assign multiple time slots on a CT1 interface. In the set command, separate the time slots by commas and do not include spaces between them. For example:

```
[edit interfaces ct1-1/0/0:1:1]
user@host# set partition 1 timeslots 1-4,9,22-24 interface-type ds
```

To verify this configuration, use the **show** command at the **[edit interfaces ct1-1/0/0:1:1]** hierarchy level.

```
[edit interfaces ct1-1/0/0:1:1]
user@host# show
partition 1 timeslots 1-4 interface-type ds;
```

An *N*xDS0 interface can be configured from channelized T1 interface (ct1). Here *N* represents the time slots on the CT1 interface.

The value of *N* is 1 through 24 when a DS0 interface is configured from a CT1 interface.

After you partition the DS interface, configure the CESoPSN options on it. See "Setting the CESoPSN Options" on page 75.

Configuring CESoPSN on DS Interfaces

To configure CESoPSN encapsulation on a DS interface, include the **encapsulation** statement at the **[edit interfaces ds-*mpc-slot/mic-slot/port-number*:*channel*:*channel*:*channel*]** hierarchy level.

1. In configuration mode, go to the **[edit interfaces ds-*mpc-slot/mic-slot/port-number*:*channel*:*channel*:*channel*]** hierarchy level.

   ```
   [edit]
   user@host# edit interfaces ds-mpc-slot/mic-slot/ port-number:channel:channel:channel
   ```

   For example:

   ```
   [edit]
   user@host# edit interfaces ds-1/0/0:1:1:1
   ```

2. Configure CESoPSN as the encapsulation type and the logical interface for the DS interface.

   ```
   [edit interfaces ds-mpc-slot/mic-slot/port-number:channel:channel:channel]
   user@host# set encapsulation cesopsn unit interface-unit-number
   ```

   For example:

   ```
   [edit interfaces ds-1/0/0:1:1:1 ]
   user@host# set encapsulation cesopsn unit 0
   ```

To verify this configuration, use the **show** command at the **[edit interfaces ds-1/0/0:1:1:1]** hierarchy level.

```
[edit interfaces ds-1/0/0:1:1:1]
user@host# show
encapsulation cesopsn;
```

unit 0;

Configuring CESoPSN Encapsulation on DS Interfaces on CE1 Channels

This topic includes the following tasks:

Configuring CSTM1 Ports Down to CE1 Channels

On any port configured for SDH framing (numbered 0 through 3), you can configure one CAU4 channel. On each CAU4 channel, you can configure 31 CE1 channels (numbered 1 through 31).

To configure CSTM1 channelization down to CAU4 and then down to CE1 channels, include the **partition** statement at the **[edit interfaces (cau4 | cstm1)-*mpc-slot/mic-slot/port-number*]** hierarchy level, as shown in the following example:

1. In configuration mode, go to the **[edit interfaces cstm1-*mpc-slot/mic-slot/port-number*]** hierarchy level.

   ```
   [edit]
   user@host# edit interfaces cstm1-mpc-slot/mic-slot/port-number
   ```

   For example:

   ```
   [edit]
   user@host# edit interfaces cstm1-1/0/1
   ```

2. On the CSTM1 interface, set the **no-partition** option, and then set the interface type as **cau4**.

   ```
   [edit interfaces cstm1-mpc-slot/mic-slot/port-number]
   user@host# set no-partition interface-type cau4
   ```

   For example:

   ```
   [edit interfaces cstm1-1/0/1]
   user@host# set no-partition interface-type cau4
   ```

3. Enter the **up** command to go to the **[edit interfaces]** hierarchy level.

   ```
   [edit interfaces cstm1-mpc-slot/mic-slot/port-number]
   user@host# up
   ```

   For example:

   ```
   [edit interfaces cstm1-1/0/1]
   user@host# up
   ```

4. Configure the MPC slot, the MIC slot, and the port for the CAU4 interface. Set the sublevel interface partition index and set the interface type as **ce1**.

   ```
   [edit interfaces]
   ```

```
user@host# set cau4-mpc-slot/mic-slot/port-number partition partition-number
  interface-type ce1
```

For example:

```
[edit interfaces]
user@host# set cau4-1/0/1 partition 1 interface-type ce1
```

To verify this configuration, use the **show** command at the **[edit interfaces]** hierarchy level.

```
[edit interfaces]
user@host# show
cstm1-1/0/1 {
  no-partition interface-type cau4;
}
cau4-1/0/1 {
  partition 1 interface-type ce1;
}
```

Configuring CSTM4 Ports Down to CE1 Channels

NOTE: When the port speed is configured as coc12-cstm4 at the **[edit chassis fpc *slot* pic *slot* port *slot*]** hierarchy level, you must configure CSTM4 ports down to CE1 channels.

On a port configured for SDH framing, you can configure one CAU4 channel. On the CAU4 channel, you can configure 31 CE1 channels (numbered 1 through 31).

To configure CSTM4 channelization down to CAU4 and then down to CE1 channels, include the **partition** statement at the **[edit interfaces (cau4|cstm4)-*mpc-slot/mic-slot/port-number*]** hierarchy level.

1. In configuration mode, go to the **[edit interfaces cstm4-*mpc-slot/mic-slot/port-number*]** hierarchy level.

   ```
   [edit]
   user@host# edit interfaces cstm4-mpc-slot/mic-slot/port-number
   ```

   For example:

   ```
   [edit]
   user@host# edit interfaces cstm4-1/0/0
   ```

2. Configure the sublevel interface partition index and the range of SONET/SDH slices, and set the sublevel interface type as **cau4**.

   ```
   [edit interfaces cstm4-1/0/0]
   user@host# set partition partition-number oc-slice oc-slice interface-type cau4
   ```

   For **oc-slice**, select from the following ranges: 1–3, 4–6, 7–9, and 10–12.

   For **partition**, select a value from 1 through 4.

   For example:

   ```
   [edit interfaces cstm4-1/0/0]
   ```

```
user@host# set partition 1 oc-slice 1-3 interface-type cau4
```

3. Enter the **up** command to go to the **[edit interfaces]** hierarchy level.

```
[edit interfaces cstm4-mpc-slot/mic-slot/port-number]
user@host# up
```

For example:

```
[edit interfaces cstm4-1/0/0]
user@host# up
```

4. Configure the MPC slot, the MIC slot, and the port for the CAU4 interface. Set the sublevel interface partition index and set the interface type as **ce1**.

```
[edit interfaces]
user@host# set cau4-mpc-slot/mic-slot/port-number:channel partition
  partition-number interface-type ce1
```

For example:

```
[edit interfaces]
user@host# set cau4-1/0/0:1 partition 1 interface-type ce1
```

To verify this configuration, use the **show** command at the **[edit interfaces]** hierarchy level.

```
[edit interfaces]
user@host# show
cstm4-1/0/0 {
   partition 1 oc-slice 1-3 interface-type cau4;
}
cau4-1/0/0:1 {
   partition 1 interface-type ce1;
}
```

Configuring CE1 Channels Down to DS Interfaces

To configure CE1 channels down to a DS interface, include the **partition** statement at the **[edit interfaces ce1-*mpc-slot/mic-slot/port*:*channel*]** hierarchy level.

1. In configuration mode, go to the **[edit interfaces ce1-*mpc-slot/mic-slot/port*:*channel*]** hierarchy level.

```
[edit]
user@host# edit interfaces ce1-mpc-slot/mic-slot/port:channel
```

```
[edit]
user@host# edit interfaces ce1-1/0/0:1:1
```

2. Configure the partition and the time slots, and set the interface type as **ds**.

```
[edit interfaces ce1-1/0/0:1:1]
user@host# set partition partition-number timeslots timeslots interface-type ds
```

For example:

```
[edit interfaces ce1-1/0/0:1:1]
user@host# set partition 1 timeslots 1-4 interface-type ds
```

NOTE: You can assign multiple time slots on a CE1 interface. In the set command, separate the time slots by commas and do not include spaces between them. For example:

```
[edit interfaces ce1-1/0/0:1:1]
user@host# set partition 1 timeslots 1-4,9,22-31 interface-type ds
```

To verify this configuration, use the **show** command at the **[edit interfaces ce1-1/0/0:1:1** hierarchy level.

```
[edit interfaces ce1-1/0/0:1:1 ]
user@host# show
partition 1 timeslots 1-4 interface-type ds;
```

An *N*xDS0 interface can be configured from a channelized E1 interface (CE1). Here *N* represents the number of time slots on the CE1 interface.

The value of *N* is 1 through 31 when a DS0 interface is configured from a CE1 interface.

After you partition the DS interface, configure the CESoPSN options on it. See "Setting the CESoPSN Options" on page 75.

Configuring CESoPSN on DS Interfaces

To configure CESoPSN encapsulation on a DS interface, include the **encapsulation** statement at the **[edit interfaces ds-*mpc-slot/mic-slot/port-number*:*channel*:*channel*:*channel*]** hierarchy level.

1. In configuration mode, go to the **[edit interfaces ds-*mpc-slot/mic-slot/port-number*:*channel*:*channel*:*channel*]** hierarchy level.

   ```
   [edit]
   user@host# edit interfaces ds-mpc-slot/mic-slot/port-number:channel:channel:channel
   ```

   For example:

   ```
   [edit]
   user@host# edit interfaces ds-1/0/0:1:1:1
   ```

2. Configure CESoPSN as the encapsulation type and then set the logical interface for the ds interface.

   ```
   [edit interfaces ds-1/0/0:1:1:1 ]
   user@host# set encapsulation cesopsn unit interface-unit-number
   ```

   For example:

   ```
   [edit interfaces ds-1/0/0:1:1:1 ]
   user@host# set encapsulation cesopsn unit 0
   ```

To verify this configuration, use the **show** command at the **[edit interfaces ds-1/0/0:1:1:1]** hierarchy level.

```
[edit interfaces ds-1/0/0:1:1:1]
user@host# show
```

```
encapsulation cesopsn;
unit 0;
```

Related Documentation

- Mobile Backhaul and Circuit Emulation Overview on page 35
- Configuring CESoPSN Encapsulation on DS Interfaces on Channelized OC3/STM1 (Multi-Rate) Circuit Emulation MIC with SFP on page 74

Configuring CESoPSN Encapsulation on DS Interfaces on Channelized OC3/STM1 (Multi-Rate) Circuit Emulation MIC with SFP

This configuration applies to the mobile backhaul application shown in Figure 1 on page 36.

This topic includes the following tasks:

1. Setting the Encapsulation Mode on page 74
2. Setting the CESoPSN Options on page 75
3. Configuring the Pseudowire Interface on page 76

Setting the Encapsulation Mode

To configure a DS interface on Circuit Emulation MICs with CESoPSN encapsulation at the provider edge (PE) router:

1. In configuration mode, go to the **[edit interfaces ds-*mpc-slot/mic-slot/port*<:channel>]** hierarchy level.

   ```
   [edit]
   user@host# edit interfaces ds-mpc-slot/mic-slot/port<:channel>
   ```

   For example:

   ```
   [edit]
   user@host# edit interfaces ds-1/0/0:1:1:1
   ```

2. Configure CESoPSN as the encapsulation type and set the logical interface for the DS interface.

   ```
   [edit interfaces ds-mpc-slot/mic-slot/port<:channel>]
   user@host# set encapsulation cesopsn unit logical-unit-number
   ```

   For example:

   ```
   [edit interfaces ds-1/0/0:1:1:1]
   user@host# set encapsulation cesopsn unit 0
   ```

To verify this configuration, use the **show** command at the **[edit interfaces ds-1/0/0:1:1:1]** hierarchy level:

```
[edit interfaces ds-1/0/0:1:1:1]
user@host# show
encapsulation cesopsn;
unit 0;
```

You do not need to configure any circuit cross-connect family because it is automatically created for the CESoPSN encapsulation.

Setting the CESoPSN Options

To configure CESoPSN options:

1. In configuration mode, go to the **[edit interfaces ds-*fpc-slot/pic-slot/port*:*channel*]** hierarchy level.

   ```
   [edit]
   user@host# edit interfaces ds-fpc-slot/pic-slot/port:channel
   ```

   For example:

   ```
   [edit]
   user@host# edit interfaces ds-1/0/0:1:1:1
   ```

2. Use the **edit** command to go to the **[edit cesopsn-options]** hierarchy level.

   ```
   [edit]
   user@host# edit cesopsn-options
   ```

3. In this hierarchy level, using the **set** command you can configure the following CESoPSN options:

   - **excessive-packet-loss-rate**—Set packet loss options. The options are **sample-period** and **threshold**.
     - **sample-period**—Time required to calculate excessive packet loss rate (from 1000 through 65,535 milliseconds).
     - **threshold**—Percentile designating the threshold of excessive packet loss rate (1–100 percent).
   - **idle-pattern**—An 8-bit hexadecimal pattern to replace TDM data in a lost packet (from 0 through 255).
   - **jitter-buffer-latency**—Time delay in the jitter buffer (from 1 through 1000 milliseconds).
   - **jitter-buffer-packets**—Number of packets in the jitter buffer (from 1 through 64 packets).
   - **packetization-latency**—Time required to create packets (from 1000 through 8000 microseconds).

   NOTE: In this section, we are configuring only one CESoPSN option. You can follow the same method to configure all the other CESoPSN options.

   ```
   [edit interfaces ds-1/0/0:1:1:1 cesopsn-options]
   user@host# set excessive-packet-loss-rate sample-period sample-period
   ```

   For example:

   ```
   [edit interfaces ds-1/0/0:1:1:1 cesopsn-options]
   user@host# set excessive-packet-loss-rate sample-period 4000
   ```

To verify this configuration, use the **show** command at the **[edit interfaces ds-1/0/0:1:1:1]** hierarchy level:

```
[edit interfaces ds-1/0/0:1:1:1]
user@host# show
cesopsn-options {
   excessive-packet-loss-rate {
      sample-period 4000;
   }
}
```

Configuring the Pseudowire Interface

To configure the TDM pseudowire at the provider edge (PE) router, use the existing Layer 2 circuit infrastructure, as shown in the following procedure:

1. In configuration mode, go to the **[edit protocols l2circuit]** hierarchy level.

   ```
   [edit]
   user@host# edit protocol l2circuit
   ```

2. Configure the IP address of the neighboring router or switch, the interface forming the Layer 2 circuit, and the identifier for the Layer 2 circuit.

   ```
   [edit protocol l2circuit]
   user@host# set neighbor ip-address interface
     interface-name-fpc-slot/pic-slot/port.interface-unit-number virtual-circuit-id
     virtual-circuit-id
   ```

   For example:

   ```
   [edit protocol l2circuit]
   user@host# set neighbor 10.255.0.6 interface ds-1/0/0:1:1:1 virtual-circuit-id 1
   ```

To verify this configuration, use the **show** command at the **[edit protocols l2circuit]** hierarchy level.

```
[edit protocols l2circuit]
user@host# show
neighbor 10.255.0.6 {
   interface ds-1/0/0:1:1:1 {
      virtual-circuit-id 1;
   }
}
```

After the customer edge (CE)-bound interfaces (for both PE routers) are configured with proper encapsulation, packetization latency, and other parameters, the two PE routers try to establish a pseudowire with Pseudowire Emulation Edge-to-Edge (PWE3) signaling extensions. The following pseudowire interface configurations are disabled or ignored for TDM pseudowires:

- **ignore-encapsulation**
- **mtu**

The supported pseudowire type is 0x0015 CESoPSN basic mode.

When the local interface parameters match the received parameters, and the pseudowire type and control word bit are equal, the pseudowire is established.

For detailed information about configuring TDM pseudowire, see the Junos OS VPNs Configuration Guide.

For detailed information about PICs, see the *PIC Guide* for your router.

Related Documentation

- Configuring CESoPSN on Channelized OC3/STM1 (Multi-Rate) Circuit Emulation MIC with SFP on page 65
- Mobile Backhaul and Circuit Emulation Overview on page 35

Configuring CESoPSN on Channelized E1/T1 Circuit Emulation MIC

This configuration applies to the mobile backhaul application shown in Figure 1 on page 36.

- Configuring T1/E1 Framing Mode at the MIC Level on page 77
- Configuring CT1 Interface Down to DS channels on page 78
- Configuring CESoPSN on DS Interfaces on page 79

Configuring T1/E1 Framing Mode at the MIC Level

To set the framing mode at the MIC (MIC-3D-16CHE1-T1-CE) level, for all four ports on the MIC, include the **framing** statement at the **[edit chassis fpc *slot* pic *slot*]** hierarchy level.

```
[edit chassis fpc slot pic slot]
user@host# set framing (t1 | e1);
```

After a MIC is brought online, interfaces are created for the MIC's available ports on the basis of the MIC type and the framing option used.

- If you include the **framing t1** statement, 16 CT1 interfaces are created.
- If you include the **framing e1** statement, 16 CE1 interfaces are created.

NOTE: If you set the framing option incorrectly for the MIC type, the commit operation fails.

Bit error rate test (BERT) patterns with all binary 1s (ones) received by CT1/CE1 interfaces on Circuit Emulation MICs configured for CESoPSN do not result in an alarm indication signal (AIS) defect. As a result, the CT1/CE1 interfaces remain up.

Configuring CT1 Interface Down to DS channels

To configure a channelized T1 (CT1) interface down to DS channels, include the **partition** statement at the **[edit interfaces ct1-*mpc-slot/mic-slot/port-number*]** hierarchy level:

NOTE: To configure a CE1 interface down to DS channels, replace **ct1** with **ce1** in the following procedure.

1. In configuration mode, go to the **[edit interfaces ct1-*mpc-slot/mic-slot/port-number*]** hierarchy level.

   ```
   [edit]
   user@host# edit interfaces ct1-mpc-slot/mic-slot/port-number
   ```

   For example:

   ```
   [edit]
   user@host# edit interfaces ct1-1/0/0
   ```

2. Configure the sublevel interface partition index and the time slots, and set the interface type as **ds**.

   ```
   [edit interfaces ct1-mpc-slot/mic-slot/port-number]
   user@host# set partition partition-number timeslots timeslots interface-type ds
   ```

   For example:

   ```
   [edit interfaces ct1-1/0/0]
   user@host# set partition 1 timeslots 1-4 interface-type ds
   ```

   NOTE: You can assign multiple time slots on a CT1 interface. In the **set** command, separate the time slots by commas and do not include spaces between them. For example:

   ```
   [edit interfaces ct1-1/0/0]
   user@host# set partition 1 timeslots 1-4,9,22-24 interface-type ds
   ```

To verify this configuration, use the **show** command at the **[edit interfaces ct1-1/0/0]** hierarchy level.

```
[edit interfaces ct1-1/0/0]
user@host# show
partition 1 timeslots 1-4 interface-type ds;
```

An *N*xDS0 interface can be configured from a CT1 interface. Here *N* represents the number of time slots on the CT1 interface. The value of *N* is:

- 1 through 24 when a DS0 interface is configured from a CT1 interface.
- 1 through 31 when a DS0 interface is configured from a CE1 interface.

After you partition the DS interface, configure CESoPSN options on it. See "Setting the CESoPSN Options" on page 75.

Configuring CESoPSN on DS Interfaces

To configure CESoPSN encapsulation on a DS interface, include the **encapsulation** statement at the **[edit interfaces ds-*mpc-slot/mic-slot/port-number*:*channel*]** hierarchy level.

1. In configuration mode, go to the **[edit interfaces ds-*mpc-slot/mic-slot/port-number*:*channel*]** hierarchy level.

   ```
   [edit]
   user@host# edit interfaces ds-mpc-slot/mic-slot/ port-number:channel
   ```

   For example:

   ```
   [edit]
   user@host# edit interfaces ds-1/0/0:1
   ```

2. Configure CESoPSN as the encapsulation type.

   ```
   [edit interfaces ds-mpc-slot/mic-slot/port-number:partition ]
   user@host# set encapsulation cesopsn
   ```

   For example:

   ```
   [edit interfaces ds-1/0/0:1 ]
   user@host# set encapsulation cesopsn
   ```

3. Configure the logical interface for the DS interface.

   ```
   [edit interfaces ds-mpc-slot/mic-slot/port-number:partition ]
   uset@host# set unit interface-unit-number
   ```

   For example:

   ```
   [edit interfaces ds-1/0/0:1 ]
   user@host# set unit 0
   ```

To verify this configuration, use the **show** command at the **[edit interfaces ds-1/0/0:1]** hierarchy level.

```
[edit interfaces ds-1/0/0:1]
user@host# show
encapsulation cesopsn;
unit 0;
```

Related Documentation

- 16-Port Channelized E1/T1 Circuit Emulation MIC Overview on page 40

CHAPTER 6

Configuring ATM Support on Circuit Emulation PICs

ATM Support on Circuit Emulation PICs Overview

M7i, M10i routers with 4-port COC3/CSTM1 Circuit Emulation PIC and 12-port T1/E1 Circuit Emulation PIC support ATM over MPLS (RFC 4717) and packet encapsulations (RFC 2684). Circuit Emulation PIC ATM configuration and behavior is consistent with existing ATM2 PICs.

The following protocols are supported:

- ATM over MPLS (RFC 4717)

- ATM via dynamic labels (LDP, RSVP-TE)

ATM OAM support:

- Generation and monitoring of F4 and F5 OAM cells
- Generation and monitoring of end-to-end cells of type AIS and RDI
- Monitor and terminate loopback cells
- Supports OAM on each VP and VC simultaneously

The following protocols are not supported:

- QoS or CoS queues. All VCs are unspecified bit rate (UBR).
- NxDS0 grooming.

The following ATM2 encapsulations are not supported:

- **atm-cisco-nlpid**—Cisco-compatible ATM NLPID encapsulation
- **atm-mlppp-llc**—ATM MLPPP over AAL5/LLC
- **atm-nlpid**—ATM NLPID encapsulation
- **atm-ppp-llc**—ATM PPP over AAL5/LLC
- **atm-ppp-vc-mux**—ATM PPP over raw AAL5
- **atm-snap**—ATM LLC/SNAP encapsulation
- **atm-tcc-snap**—ATM LLC/SNAP for translational cross-connect
- **atm-tcc-vc-mux**—ATM VC for translational cross-connect
- **vlan-vci-ccc**—CCC for VLAN Q-in-Q and ATM VPI/VCI interworking
- **atm-vc-mux**—ATM VC multiplexing
- **ether-over-atm-llc**—Ethernet over ATM (LLC/SNAP) encapsulation
- **ether-vpls-over-atm-llc**—Ethernet VPLS over ATM (bridging) encapsulation

NOTE: **Circuit Emulation PICs require firmware version rom-ce-9.3.pbin or rom-ce-10.0.pbin for ATM IMA functionality on M7i, M10i, M40e, M120, and M320 routers running JUNOS OS Release 10.0R1 or later.**

Related Documentation

- Configuring the 12-Port Channelized T1/E1 Circuit Emulation PIC Operating Mode on page 83
- Configuring the 4-Port Channelized COC3/STM1 Circuit Emulation PIC Operating Mode on page 84
- ATM IMA Configuration Overview on page 86
- Configuring ATM IMA on page 92

Configuring the 12-Port Channelized T1/E1 Circuit Emulation PIC Operating Mode

This section contains the following topics:

T1/E1 Mode Selection

After the PIC is brought online, 12 ct1 interfaces or 12 ce1 interfaces are created, depending on the T1 or E1 mode selection of the PIC.

Figure 3 on page 83 and Figure 4 on page 83 illustrate the possible interfaces that can be created on the 12-port T1/E1 Circuit Emulation PIC.

Figure 3: 12-Port T1/E1 Circuit Emulation PIC Possible Interfaces (T1 Size)

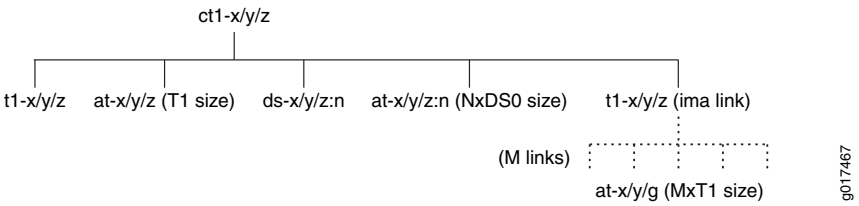


Figure 4: 12-Port T1/E1 Circuit Emulation PIC Possible Interfaces (E1 Size)

12-Port Channelized T1/E1 Circuit Emulation PIC Configuration Statements

Setting the T1/E1 Mode at the PIC Level

To set the T1/E1 mode at the PIC level, enter the following command:

```
set chassis fpc fpc-slot pic pic-slot framing (t1 | e1)
```

Or specify the following:

```
chassis {
```

```
    fpc fpc-slot {
      pic pic-slot {
        framing (t1 | e1);
      }
    }
  }
```

After the PIC is brought online, 12 ct1 interfaces or 12 ce1 interfaces are created.

If the mode is not manually configured, then the PIC defaults to T1.

Creating an ATM Interface on a CT1 or CE1

To create an ATM interface on a CT1, enter the following command:

set interfaces ct1-*fpc/pic/port* no-partition interface-type at

Or specify the following:

```
interfaces {
  ct1-fpc/pic/port {
    no-partition {
      interface-type at;
    }
  }
}
```

To create an ATM interface on a CE1, enter the following command:

set interfaces ce1-*fpc/pic/port* no-partition interface-type at

Or specify the following:

```
interfaces {
  ce1-fpc/pic/port {
    no-partition {
      interface-type at;
    }
  }
}
```

The interface **at-*fpc/pic/port*** is created.

You can use the **show chassis hardware** command to display a list of the installed PICs.

Related Documentation

- ATM Support on Circuit Emulation PICs Overview on page 81

Configuring the 4-Port Channelized COC3/STM1 Circuit Emulation PIC Operating Mode

T1/E1 Mode Selection

All ATM interfaces are either T1 or E1 channels within the COC3/CSTM1 hierarchy. Each COC3 can be partitioned as 3 COC1 slices, each of which in turn can be partitioned further

into 28 ATM interfaces and the size of each interface created is that of a T1. Each CS1 can be portioned as 1 CAU4, which can be further partitioned as E1 sized ATM interfaces.

To configure the T1/E1 mode selection, keep the following in mind:

1. To create **coc3-*fpc/pic/port*** or **cstm1-*fpc/pic/port*** interfaces, chassisd will look for configuration at the **[edit chassis fpc *fpc-slot* pic *pic-slot* port *port* framing (sonet | sdh)]** hierarchy level. If the **sdh** option is specified, chassisd will create a **cstm1-*fpc/pic/port*** interface. Otherwise, chassisd will create **coc3-*fpc/pic/port*** interfaces.
2. Only interface **coc1** can be created from **coc3**, and **t1** can be created from **coc1**.
3. Only interface **cau4** can be created from **cstm1**, and **e1** can be created from **cau4**.

Figure 5 on page 85 and Figure 6 on page 85 illustrate the possible interfaces that can be created on the 4-port Channelized COC3/STM1 Circuit Emulation PIC.

Figure 5: 4-Port Channelized COC3/STM1 Circuit Emulation PIC Possible Interfaces (T1 Size)

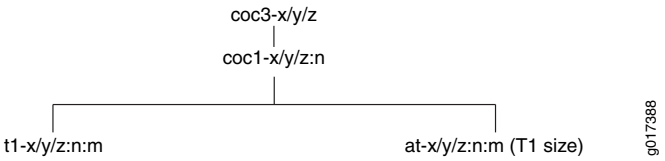
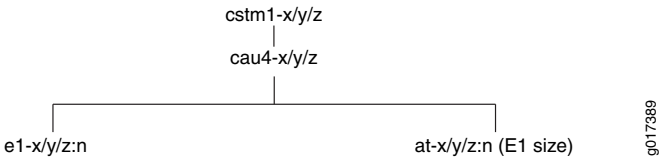


Figure 6: 4-Port Channelized COC3/STM1 Circuit Emulation PIC Possible Interfaces (E1 Size)



Subrate T1 is not supported.

ATM NxDS0 grooming is not supported.

External and internal loopback of T1/E1 (on ct1/ce1 physical interfaces) can be configured using the **sonet-options** statement. By default, no loopback is configured.

Configuring a Port for SONET or SDH Mode on a 4-Port Channelized COC3/STM1 Circuit Emulation PIC

Each port of the 4-port Channelized COC3/STM1 Circuit Emulation PIC can be independently configured for either SONET or SDH mode. To configure a port for either SONET or SDH mode, enter the **framing (sonet | sdh)** statement at the **[chassis fpc *number* pic *number* port *number*]** hierarchy level.

The following example shows how to configure FPC 1, PIC 1, and port 0 for SONET mode and port 1 for SDH mode:

```
set chassis fpc 1 pic 1 port 0 framing sonet
set chassis fpc 1 pic 1 port 1 framing sdh
```

Or specify the following:

```
[edit]
fpc 1 {
  pic 1 {
    port 0 {
      framing sonet;
    }
    port 1 {
      framing sdh;
    }
  }
}
```

Configuring an ATM Interface on a COC1

To create an ATM interface on a COC1, enter the following command:

To create an ATM interface on CAU4, enter the following command:

set interfaces cau4-*fpc/pic/port* partition interface-type at

Or specify the following:

```
interfaces {
  cau4-fpc/pic/port {
  }
}
```

You can use the **show chassis hardware** command to display a list of the installed PICs.

Related Documentation

- ATM Support on Circuit Emulation PICs Overview on page 81

ATM IMA Configuration Overview

M7i, M10i, M40e, M120, and M320 routers with 4-port COC3 Circuit Emulation PICs and 12-port T1/E1 Circuit Emulation PICs support inverse multiplexing over ATM (IMA). The 12-portT1/E1 PIC supports discrete T1 ATM IMA. The 4-portCOC3 PIC supports channelized OC3/STM1 (down to T1) ATM IMA.

The 4-port COC3 Circuit Emulation PIC and 12-port T1/E1 Circuit Emulation PIC support the ATM (IMA) protocol at the T1/E1 level with up to 4 IMA groups with from 2 to 8 IMA links each.

NOTE: **Circuit Emulation PICs require firmware version rom-ce-9.3.pbin or rom-ce-10.0.pbin for ATM IMA functionality on M7i, M10i, M40e, M120, and M320 routers running JUNOS OS Release 10.0R1 or later.**

This section includes the following topics:

- IMA Version on page 87
- IMA Groups on page 87

IMA Version

Either IMA 1.0 (af-phy-0086.000-IMA) or IMA 1.1 (af-phy-0086.001-IMA) can be selected through the CLI. If not specified, IMA 1.1 is selected by default.

IMA 1.0 and IMA 1.1 do not interoperate.

IMA Groups

You can configure up to 42 IMA groups. Each group can contain from 1 to 32 links.

Group Frame Size

When you create an IMA group, you can choose a frame size of 32, 64, 128, or 256. Frame size can be selected independently in each direction and in each group. If not specified, 128 is the default group frame size.

Transmit Clock

When you create an IMA group, you can configure common transmit clock independent transmit clock mode to reflect the PRS of the clock for each link in a group. Common mode is the default.

IMA Group Symmetry

IMA group symmetry supports the following modes:

- Symmetrical configuration and operation (default)
- Symmetrical configuration and asymmetrical operation

Asymmetrical configuration and operation are not supported.

The mode can be configured through the CLI when an IMA group is created.

Minimum Active Links

PTx is the minimum number of links required to be active in the transmit direction for the IMA group to move into the operational state. PRx is the minimum number of links required to be active in the transmit direction for the IMA group to move into the operational state. You configure PTx and PRx through the CLI when an IMA group is created. By default, 1 is selected.

For a symmetrical configuration, PTx is equal to PRx.

State Transition Variables: Alpha, Beta, and Gamma

You can configure the IMA frame synchronization link state transition variables—alpha, beta, and gamma—through the CLI. The valid range and default value are shown in Table 3 on page 88.

Table 3: IMA Frame Synchronization Link State Transition Variables

Setting	Range	Default	Description
alpha	1-2	2	Consecutive invalid ICP cells
beta	1-5	2	Consecutive errored ICP cells
gamma	1-5	1	Consecutive valid ICP cells

IMA Link Addition and Deletion

When an IMA group is up, you can add links to or delete links from the group without dropping cells.

IMA Test Pattern Procedure

A test pattern procedure is supported. You can use the CLI to start and end the test pattern procedure.

Per-PIC Limit on the Number of Links

The per-PIC limit on the number of links with the 12-port T1/E1 Circuit Emulation PIC is up to 12 T1 or E1 links.

The per-PIC limits on the number of links with the 4-port ChOC3/STM PIC are:

- T1p to 168
- E1p to 126
- Mixed: total bandwidth limited to 2xOC3; 258,048,000 bps

IMA Group Alarms and Group Defects

Table 4 on page 89 shows the supported IMA group alarms and their associated IMA standard requirement numbers.

Table 4: IMA Group Alarms with IMA Standard Requirement Numbers

Alarm	IMA Standard Requirement Number
Start-up-FE	R-145
Config-Aborted	R-146
Config-Aborted-FE	R-147
Insufficient-Links	R-148
Insufficient-Links-FE	R-149
Blocked-FE	R-150
GR-Timing-Mismatch	R-151

Table 5 on page 89 shows the supported IMA group defects and their associated IMA standard requirement numbers.

Table 5: IMA Group Defects with IMA Standard Requirement Numbers

Defects	IMA Standard Requirement Number
Start-up-FE	R-145
Config-Aborted	R-146
Config-Aborted-FE	R-147
Insufficient-Links	R-148
Insufficient-Links-FE	R-149
Blocked-FE	R-150
GR-Timing-Mismatch	R-151

IMA Link Alarms and Link Defects

Table 6 on page 89 shows the supported IMA link alarms and their associated IMA standard requirement numbers.

Table 6: IMA Link Alarms with IMA Standard Requirement Numbers

Alarm	IMA Standard Requirement Number	Description
LIF	R-138	Loss of IMA frame
LODS	R-139	Link out of delay synchronization

Table 6: IMA Link Alarms with IMA Standard Requirement Numbers *(continued)*

Alarm	IMA Standard Requirement Number	Description
RFI-IMA	R-140	Remote defect/failure
Tx-Mis-Connected	R-141	Transmit misconnected
Rx-Mis-Connected	R-142	Receive misconnected
Tx-Unusable-FE	R-143	Transmit unusable far end
Rx-Unusable-FE	R-144	Receive unusable far end
Link Fault		Link fault

Table 7 on page 90 shows the supported IMA link defects and their associated IMA standard requirement numbers.

Table 7: IMA Link Defects with IMA Standard Requirement Numbers

Defect	IMA Standard Requirement Number	Description
LIF	R-138	Loss of IMA frame
LODS	R-139	Link out of delay synchronization
RFI-IMA	R-140	Remote defect/failure
Tx-Mis-Connected	R-141	Transmit misconnected
Rx-Mis-Connected	R-142	Receive misconnected
Tx-Unusable-FE	R-143	Transmit unusable far end
Rx-Unusable-FE	R-144	Receive unusable far end
Link Fault		Link fault

IMA Group Statistics

You can use the **show interfaces** command to display the following IMA group statistics:

- Near-end failure count
- Far-end failure count
- Rx faulty cells due to address mismatch

- Running seconds
- Unavailable seconds

For more information about IMA group statistic, see the **show interfaces** command description in the Junos OS Operational Mode Commands.

IMA Link Statistics

Table 8 on page 91 shows the IMA link statistics.

Table 8: IMA Link Statistics with IMA Standard Requirement Numbers

Performance Parameter	IMA Standard Requirement Number
Rx LIF	
Rx ICP cells	
Rx errored ICP cells	R-106
Rx LODS	R-106
Rx ICP violation	R-107
Rx stuff	O-17
Near-end Rx SES	R-108
Near-end Rx UAS	R-110
Near-end Rx UUS	R-113
Near-end Rx failure	R-117
Near-end Tx failure	
Far-end Rx SES	R-109
Far-end Rx UAS	R-111
Far-end Rx UUS	R-115
Far-end defects	
Far-end Rx failure	
Tx ICP cells	
Tx stuff	O-16
Near-end Tx UUS	R-112

Table 8: IMA Link Statistics with IMA Standard Requirement Numbers *(continued)*

Performance Parameter	IMA Standard Requirement Number
Far-end Tx UUS	R-114
Far-end Tx failure	

IMA

Clocking is applicable only to IMA links. The clocking statement does not apply to the **at-*x/y/g*** interface because the IMA group it represents is a virtual interface.

Related Documentation

- ATM Support on Circuit Emulation PICs Overview on page 81

Configuring ATM IMA

Creating the IMA Groups (ATM Interfaces)

The following shows the configuration for IMA groups on ATM interfaces:

```
[edit chassis]
  fpc fpc-slot {
  pic pic-slot {
    aggregated-devices {
      ima {
        device-count count;
      }
    }
  }
}
```

The PIC is automatically rebooted when a configuration that changes the IMA group count is committed.

IMA Link Options

```
ima-link-options {
  group-id g;   # IMA group number, g is integer range
}
```

IMA Group Options

```
ima-group-options {
  # IMA specification version
  version (1.0|1.1);
  # IMA group minimum active links; integer; default is 1
  minimum-links (1-8);
  # Transmit clock configuration; default is common
```

```
    transmit-clock (common|independent);
    # IMA frame length in integer number of cells; default is 128
    frame-length (32|64|128|256);
    # IMA group symmetry mode selection
    symmetry (symmetrical-config-and-operation |
      symmetrical-config-asymmetrical-operation);
    frame-synchronization {
      # Number of consecutive invalid ICP cells for IFSM, integer; default 2
      alpha 1-2;
      # Number of consecutive errored ICP cells for IFSM, integer; default 2
      beta 1-2;
      # Number of consecutive valid ICP cells for IFSM, integer; default 1
      gamma 1-5;
    }
    # Maximum differential delay among links in msec, integer; default 25
    differential-delay 1-56;
    test-procedure {
      # Interface name of the IMA link to test
      interface name;
      # IMA test pattern, integer; default is 0xAA
      pattern 1-254;
      # Length of IMA pattern test in seconds, integer; default 10
      period 1-4294967294
    }
  }
```

Related Documentation

- ATM Support on Circuit Emulation PICs Overview on page 81

Configuring ATM Pseudowires

ATM pseudowires are described in RFC 4717. Pseudowire encapsulation is selected by configuring for a cell-relay pseudowire:

[edit interfaces at-*fpc/pic/port*:*unit n*]

```
encapsulation atm-ccc-cell-relay;
atm-l2circuit-mode cell;
```

Or for an AAL5 pseudowire:

```
encapsulation atm-ccc-vc-mux;
atm-l2circuit-mode aal5;
```

NOTE: **encapsulation atm-ccc-cell-relay** can be set at either the physical interface or logical interface level. **atm-ccc-vc-mux** can only be set at the logical interface level.

The following sections describe:

- Cell Relay Mode (atm-l2circuit-mode cell) on page 94
- Configuring AAL5 SDU Mode (atm-l2circuit-mode aal5) on page 95

Cell Relay Mode (atm-l2circuit-mode cell)

In cell relay mode, one or more cells are bundled together to form a packet that is sent across the PSN tunnel. N-to-one mode is used to encapsulate cell bundles. In this mode, 52 bytes of each cell are transported across the PSN (the HEC field of the ATM header is omitted). The optional one-to-one mode is not supported.

By default, each ATM cell is encapsulated into a pseudowire packet (per RFC 4717) and sent over the pseudowire (**cell-bundle-size** = 1). The pseudowire may be configured to aggregate a user-configured number of cells into a packet to increase network utilization efficiency.

```
[edit interfaces at-fpc/pic/port]
atm-options {
   cell-bundle-size cells;
}
```

where ***cells*** is the number of cells each pseudowire packet should contain.

- Configuring VP or Port Promiscuous Mode on page 94

Configuring VP or Port Promiscuous Mode

By default, all incoming cells are mapped from a single VC to an ATM pseudowire. For ATM physical interfaces configured with **atm-l2circuit-mode cell**, you can configure port or VP promiscuous mode.

In VP promiscuous mode, all cells with the same VPI are forwarded on a single pseudowire:

```
[edit interfaces at-fpc/pic/port]
atm-options {
   pic-type atm-ce;
   promiscuous-mode {
      vpi number;
   }
}
unit 0 {
   vpi number;
}
```

In port promiscuous mode, all cells received on a T1 or E1 ATM port are forwarded across a single pseudowire:

```
[edit interfaces at-fpc/pic/port]
encapsulation atm-ccc-cell-relay;
atm-options {
   pic-type atm-ce;
   promiscuous-mode
}
unit 0 {
   allow-any-vci;
}
```

Use the **show interface at-*x/y/z*:*n*** command to view cell relay statistics.

Configuring AAL5 SDU Mode (atm-l2circuit-mode aal5)

In AAL5 SDU mode, the ATM logical interface (VC) expects all data to be either AAL5 encapsulated packets or OAM cells. AAL5 packets are deencapsulated (AAL5 trailer is stripped off), prepended with an ATM pseudowire control word (RFC 4717) and forwarded on the pseudowire.

OAM cells that are received while an AAL5 packet is being reassembled are forwarded on the pseudowire immediately (they are reordered ahead of the packet being reassembled).

Use the **show interface at-*x/y/z:n*** command to view AAL5 statistics.

Configuring ATM Cell-Relay Pseudowire

In ATM cell-relay mode, one or more ATM cells are bundled together to form a packet that is sent across the packet-switched network (PSN) using MPLS. In this mode, each ATM cell and its header are transported over the MPLS cloud. The ATM header consisting of the VPI and VCI values is transported across the MPLS cloud or the backhaul network.

By default, all incoming cells are mapped from a single virtual circuit to an ATM pseudowire. For ATM logical interfaces configured with **atm-ccc-cell-relay** encapsulation, you can configure ATM cell-relay pseudowire in VP-promiscuous mode, port-promiscuous mode, and VCC mode.

This topic includes the following tasks:

- Configuring ATM Cell-Relay Pseudowire in Port-Promiscuous Mode on page 95
- Configuring ATM Cell-Relay Pseudowire in VP-Promiscuous Mode on page 96
- Configuring ATM Cell-Relay Pseudowire in VCC Mode on page 97

Configuring ATM Cell-Relay Pseudowire in Port-Promiscuous Mode

To configure ATM cell-relay pseudowire in port-promiscuous mode:

1. In configuration mode, go to the **[edit interfaces]**hierarchy level and set the interface as at-0/2/2.

   ```
   [edit]
   user@host#edit interfaces at-0/2/2
   ```

2. To map incoming traffic, include the **promiscuous mode** statement at the **[edit interfaces *interface-name* atm-options]** hierarchy level.

   ```
   [edit interfaces at-0/2/2]
   user@host#set atm-options promiscuous-mode
   ```

3. To configure ATM encapsulation on unit 0, include the **encapsulation** statement at the **[edit interfaces *interface-name*]** hierarchy level.

   ```
   [edit interfaces at-0/2/2]
   user@host#set unit 0 encapsulation atm-ccc-cell-relay
   ```

4. Include the **allow-any-vci** statement at the **[edit interfaces *interface-name*]** hierarchy level.

   ```
   [edit interfaces at-0/2/2]
   user@host#set unit 0 allow-any-vci
   ```

5. To verify the configuration, you can issue the following operational mode command in configuration mode:

   ```
   [edit]
   user@host#show at-0/2/2
   ```

   ```
   atm-options{
   promiscuous-mode;
   }
   unit 0{
   encapsulation atm-ccc-cell-relay;
   allow-any-vci;
   }
   ```

Configuring ATM Cell-Relay Pseudowire in VP-Promiscuous Mode

To configure ATM cell-relay pseudowire in VP-promiscuous mode:

1. In configuration mode, go to the **[edit interfaces]** hierarchy level and set the interface as at-0/2/2.

   ```
   [edit]
   user@host#edit interfaces at-0/2/2
   ```

2. To map incoming traffic to a single LSP and to specify the VPI value as 8, include the **promiscuous mode** statement and **vpi *vpi-identifier*** statement at the **[edit interfaces *interface-name* atm-options]** hierarchy level.

   ```
   [edit interfaces at-0/2/2]
   user@host#set atm-options promiscuous-mode vpi 8
   ```

3. To configure ATM encapsulation on unit 0, include the **encapsulation** statement at the **[edit interfaces *interface-name*]** hierarchy level.

   ```
   [edit interfaces at-0/2/2]
   user@host#set unit 0 encapsulation atm-ccc-cell-relay
   ```

4. To specify 8 as the VPI value on unit 0, include the **vpi *vpi-identifier*** statement at the **[edit interfaces *interface-name*]** hierarchy level.

   ```
   [edit interfaces at-0/2/2]
   user@host#set unit 0 vpi 8
   ```

5. To verify the configuration, you can issue the following operational mode command in configuration mode:

   ```
   [edit]
   user@host#show at-0/2/2
   ```

   ```
   atm-options{
   vpi 8;
   promiscuous-mode;
   }
   unit 0{
   encapsulation atm-ccc-cell-relay;
   ```

```
vpi 8;
}
```

Configuring ATM Cell-Relay Pseudowire in VCC Mode

To configure ATM cell-relay pseudowire in VCC mode:

1. In configuration mode, go to the **[edit interfaces]** hierarchy level and set the interface as at-0/2/2.

   ```
   [edit]
   user@host#edit interfaces at-0/2/2
   ```

2. To map incoming traffic to a single LSP and to specify the VPI value as 9, include the **promiscuous mode** statement and **vpi *vpi-identifier*** statement at the **[edit interfaces *interface-name* atm-options]** hierarchy level.

   ```
   [edit interfaces at-0/2/2]
   user@host#set atm-options promiscuous-mode vpi 9
   ```

3. To configure ATM encapsulation on unit 0, include the **encapsulation** statement at the **[edit interfaces *interface-name*]** hierarchy level.

   ```
   [edit interfaces at-0/2/2]
   user@host#set unit 0 encapsulation atm-ccc-cell-relay
   ```

4. To specify the VCI value as 9.99 on unit 0, include the **vci *vci-identifier*** statement at the **[edit interfaces *interface-name*]** hierarchy level.

   ```
   [edit interfaces at-0/2/2]
   user@host#set unit 0 vci 9.99
   ```

5. To verify the configuration, you can issue the following operational mode command in configuration mode:

   ```
   [edit]
   user@host#show at-0/2/2
   ```

```
atm-options{
vpi 9;
promiscuous-mode;
}
unit 0{
encapsulation atm-ccc-cell-relay;
vci 9.99;
}
```

Related Documentation

- ATM Cell Relay Pseudowire VPI/VCI Swapping Overview on page 98
- Configuring ATM Cell-Relay Pseudowire VPI/VCI Swapping on page 99
- allow-any-vci
- no-vpivci-swapping on page 157
- psn-vci (ATM CCC Cell-Relay Promiscuous Mode VPI/VCI Swapping) on page 162
- psn-vpi (ATM CCC Cell-Relay Promiscuous Mode VPI/VCI Swapping) on page 162
- vci

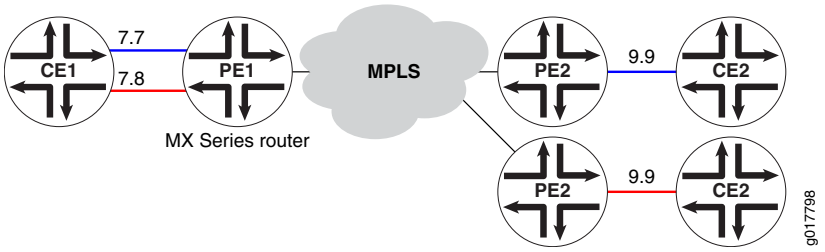
- vpi on page 177

ATM Cell Relay Pseudowire VPI/VCI Swapping Overview

In ATM cell-relay mode, one or more ATM cells are bundled together to form a packet that is sent across the packet-switched network (PSN) using MPLS. In this mode, each ATM cell and its header are transported over the MPLS cloud. The ATM header consisting of the VPI and VCI values is transported across the MPLS cloud or the backhaul network. You can configure the ATM MIC to swap the VPI value, the VCI value, or both. You can swap the VPI and VCI values in both directions (ingress and egress). You can also enable swapping only on the egress side. Further, you can disable swapping of the values.

Figure 7 on page 98 illustrates a sample application based on the mobile backhaul reference model.

Figure 7: ATM Cell Relay Pseudowire VPI/VCI Swapping



In the case of ingress swapping, PE1 (MX Series router with ATM MIC with SFP) swaps the ATM value (7.7 or 7.8) for the configured PSN value (9.9). PE2 transmits the cell without making any change.

In the case of egress swapping, PE1 (MX Series router with ATM MIC with SFP) swaps the PSN value (9.9) for the local ATM value. The local ATM value depends on the ATM pseudowire on which the value arrived. In this example, it can be either 7.7 or 7.8.

NOTE: This feature is not supported in port-promiscuous mode.

The following guidelines apply to configuring the ATM MIC for swapping:

NOTE: In the case of promiscuous ports, no swapping is done because the feature is not supported. Values in the ATM cell are inserted into the pseudowire unchanged.

Each locally configured virtual path connection (VPC) or virtual channel connection (VCC) might be assigned a PSN VPI value or a PSN VCI value such that:

- In the case of VCCs, the mapping is between the ATM identifier and the PSN identifier.

- In the case of VPCs, the mapping is between the ATM identifier and the PSN identifier. No change is made to the VCI.

The following rule applies when the MIC inserts the VPI or VCI values in the outgoing pseudowire cell headers—that is, in case of ingress swapping:

- VCCs or promiscuous VPCs—For a given ATM value, the specified PSN identifier is inserted in the outgoing pseudowire cell header.

  If no PSN value is specified, then the MIC does not perform ingress swapping. The value inserted in the pseudowire cell header is the one found the in ATM cell.

The following rule applies when the MIC inserts the VPI or VCI values in the outgoing ATM cells—that is, in case of egress swapping:

- VCCs or promiscuous VPCs—By default, the MIC performs egress swapping. The ATM identifier is inserted in the outgoing ATM cell irrespective of the value in the pseudowire cell header. If the **no-vpivci-swapping** statement is present, no swapping is performed and the value in the pseudowire is transmitted as is.

Related Documentation

- Configuring ATM Cell-Relay Pseudowire VPI/VCI Swapping on page 99
- no-vpivci-swapping on page 157
- psn-vci on page 162
- psn-vpi on page 162

Configuring ATM Cell-Relay Pseudowire VPI/VCI Swapping

Starting in Junos OS Release 12.1, on MX Series routers with ATM MIC with SFP, you can configure the ATM MIC to swap the VPI value, the VCI value, or both. You can also disable swapping of the VPI or VCI values. You can opt to swap the VPI and VCI values in both directions (ingress and egress). You can also enable swapping only on the egress side. In VPC mode, only the VPI values are swapped.

You can configure the ATM MIC on the local PE router to swap only VPI values in both directions when the remote PE router does not perform any swapping. If the remote PE router performs egress swapping by default, you can configure the ATM MIC on the local PE router to swap only in the egress direction. If you want to disable swapping, you can configure both the local and remote PE router to disable swapping.

This topic includes the following tasks:

- Configuring VPI Swapping on Egress and Ingress on ATM MICs on page 100
- Configuring Egress Swapping on ATM MICs on page 101
- Disabling Swapping on Local and Remote Provider Edge (PE) Routers on page 103

Configuring VPI Swapping on Egress and Ingress on ATM MICs

This procedure describes the steps to configure swapping on the local PE router where the ATM MIC swaps in both directions (egress and ingress). You can also explicitly disable swapping on the remote PE router.

NOTE: The configuration included here is specific to VPI or VCI swapping and does not include the entire ATM pseudowire configuration. For information on ATM pseudowire configuration, see "Configuring ATM Cell-Relay Pseudowire" on page 95

To configure the local PE router to perform swapping in both directions:

1. To specify the VPI value as 1 on unit 1, include the **vpi *vpi-identifier*** statement at the **[edit interfaces *interface-name*]** hierarchy level.

   ```
   [edit interfaces at-0/2/2]
   user@host#set unit 1 vpi 1
   ```

2. To specify the PSN identifier as 11 on unit 1, include the **psn-vpi *psn-vpi-identifier*** statement at the **[edit interfaces *interface-name*]** hierarchy level.

   ```
   [edit interfaces at-0/2/2 ]
   user@host#set unit 1 psn-vpi 11
   ```

3. To specify the VPI value as 2 on unit 2, include the **vpi *vpi-identifier*** statement at the **[edit interfaces *interface-name*]** hierarchy level.

   ```
   [edit interfaces at-0/2/2]
   user@host#set unit 2 vpi 2
   ```

4. To specify the PSN identifier as 11 on unit 2, include the **psn-vpi *psn-vpi-identifier*** statement at the **[edit interfaces *interface-name*]** hierarchy level.

   ```
   [edit interfaces at-0/2/2 ]
   user@host#set unit 2 psn-vpi 11
   ```

5. To verify the configuration, you can issue the following operational mode command in configuration mode:

   ```
   [edit]
   user@host#show at-0/2/2
   ```

```
..
unit 1{
vpi 1;
psn-vpi 11;
}
unit 2 {
vpi 2;
psn-vpi 11;
}
..
```

To disable swapping by the remote PE router:

1. To specify the VPI value as 11 on unit 1, include the **vpi *vpi-identifier*** statement at the **[edit interfaces *interface-name*]** hierarchy level.

   ```
   [edit interfaces at-0/2/2]
   user@host#set unit 1 vpi 11
   ```

2. To disable swapping on the remote PE router on unit 1, include the **no-vpivci-swapping** statement at the **[edit interfaces *interface-name*]** hierarchy level.

   ```
   [edit interfaces at-0/2/2 ]
   user@host#set unit 1 no-vpivci-swapping
   ```

3. To specify the VPI value as 11 on unit 2, include the **vpi *vpi-identifier*** statement at the **[edit interfaces *interface-name*]** hierarchy level.

   ```
   [edit interfaces at-0/2/2]
   user@host#set unit 2 vpi 11
   ```

4. To disable swapping on the remote PE router on unit 2, include the **no-vpivci-swapping** statement at the **[edit interfaces *interface-name*]** hierarchy level.

   ```
   [edit interfaces at-0/2/2 ]
   user@host#set unit 2 no-vpivci-swapping
   ```

5. To verify the configuration, you can issue the following operational mode command in configuration mode:

   ```
   [edit]
   user@host#show at-0/2/2
   ```

```
..
unit 1{
vpi 11;
no-vpivci-swapping;
}
unit 2 {
vpi 11;
no-vpivci-swapping ;
}
..
```

Configuring Egress Swapping on ATM MICs

If the remote PE router only performs egress swapping, you must configure the local PE router to perform egress swapping as well. This procedure describes the steps to configure egress swapping on both the local and remote PE routers.

NOTE: The configuration included here is specific to VPI or VCI swapping and does not include the entire ATM pseudowire configuration. For information on ATM pseudowire configuration, see "Configuring ATM Cell-Relay Pseudowire" on page 95

To configure the local PE router to perform egress swapping:

1. To specify the VPI value as 1 on unit 1, include the **vpi *vpi-identifier*** statement at the **[edit interfaces *interface-name*]** hierarchy level.

   ```
   [edit interfaces at-0/2/2]
   user@host#set unit 1 vpi 1
   ```

2. To specify the VPI value as 2 on unit 2, include the **vpi *vpi-identifier*** statement at the **[edit interfaces *interface-name*]** hierarchy level.

   ```
   [edit interfaces at-0/2/2]
   user@host#set unit 2 vpi 2
   ```

3. To verify the configuration, you can issue the following operational mode command in configuration mode:

   ```
   [edit]
   user@host#show at-0/2/2
   ```

   ```
   ..
   unit 1{
   vpi 1;
   }
   unit 2 {
   vpi 2;
   }
   ..
   ```

To configure the remote PE router:

1. To specify the VPI value as 11 on unit 1, include the **vpi *vpi-identifier*** statement at the **[edit interfaces *interface-name*]** hierarchy level:

   ```
   [edit interfaces at-0/2/2]
   user@host#set unit 1 vpi 11
   ```

2. To specify the VPI value as 11 on unit 2, include the **vpi *vpi-identifier*** statement at the **[edit interfaces *interface-name*]** hierarchy level:

   ```
   [edit interfaces at-0/2/2]
   user@host#set unit 2 vpi 11
   ```

3. To verify the configuration, you can issue the following operational mode command in configuration mode:

   ```
   [edit]
   user@host#show at-0/2/2
   ```

   ```
   ..
   unit 1{
   vpi 11;
   }
   unit 2 {
   vpi 11;
   }
   ..
   ```

Disabling Swapping on Local and Remote Provider Edge (PE) Routers

To explicitly disable swapping, you must use the no-vpivci-swapping statement. When cell relay of many VPCs and VCCs happens over the same pseudowire, it is recommended that you explicitly disable swapping. This procedure describes the steps to explicitly disable swapping on both the local and remote PE routers.

NOTE: The configuration included here is specific to VPI or VCI swapping and does not include the entire ATM pseudowire configuration. For information on ATM pseudowire configuration, see "Configuring ATM Cell-Relay Pseudowire" on page 95

To disable swapping on the local PE router:

1. To specify the VPI value as 1 on unit 1, include the **vpi *vpi-identifier*** statement at the **[edit interfaces *interface-name*]** hierarchy level.

   ```
   [edit interfaces at-0/2/2]
   user@host#set unit 1 vpi 1
   ```

2. To disable swapping, include the **no-vpivci-swapping** statement at the **[edit interfaces *interface-name*]** hierarchy level.

   ```
   [edit interfaces at-0/2/2]
   user@host#set unit 1 no-vpivci-swapping
   ```

3. To specify the VPI value as 2 on unit 2, include the **vpi *vpi-identifier*** statement at the **[edit interfaces *interface-name*]** hierarchy level.

   ```
   [edit interfaces at-0/2/2]
   user@host#set unit 2 vpi 2
   ```

4. To disable swapping, include the **no-vpivci-swapping** statement at the **[edit interfaces *interface-name*]** hierarchy level.

   ```
   [edit interfaces at-0/2/2]
   user@host#set unit 2 no-vpivci-swapping
   ```

5. To verify the configuration, you can issue the following operational mode command in configuration mode:

   ```
   [edit]
   user@host#show at-0/2/2
   ```

```
..
unit 1{
vpi 1;
no-vpivci-swapping
}
unit 2{
vpi 2;
no-vpivci-swapping;
}
..
```

To disable swapping on the remote PE router:

1. To specify the VPI value as 1 on unit 1, include the **vpi *vpi-identifier*** statement at the **[edit interfaces *interface-name*]** hierarchy level.

   ```
   [edit interfaces at-0/2/2]
   user@host#set unit 1 vpi 1
   ```

2. To disable swapping on unit 1, include the **no-vpivci-swapping** statement at the **[edit interfaces *interface-name*]** hierarchy level.

   ```
   [edit interfaces at-0/2/2]
   user@host#set unit 1 no-vpivci-swapping
   ```

3. To specify the VPI value as 2 on unit 2, include the **vpi *vpi-identifier*** statement at the **[edit interfaces *interface-name*]** hierarchy level.

   ```
   [edit interfaces at-0/2/2]
   user@host#set unit 2 vpi 2
   ```

4. To disable swapping on unit 2, include the **no-vpivci-swapping** statement at the **[edit interfaces *interface-name*]** hierarchy level.

   ```
   [edit interfaces at-0/2/2]
   user@host#set unit 2 no-vpivci-swapping
   ```

5. To verify the configuration, you can issue the following operational mode command in configuration mode:

   ```
   [edit]
   user@host#show at-0/2/2
   ```

```
..
unit 1{
vpi 1;
no-vpivci-swapping;
}
unit 2 {
vpi 2;
no-vpivci-swapping;
}
..
```

Related Documentation

- ATM Cell Relay Pseudowire VPI/VCI Swapping Overview on page 98
- allow-any-vci
- no-vpivci-swapping on page 157
- psn-vci on page 162
- psn-vpi on page 162
- vci
- vpi on page 177

ATM OAM

Circuit Emulation PICs provide ATM support for the following OAM-FM cell types:

- F4 AIS (end-to-end)
- F4 RDI (end-to-end)
- F4 loopback (end-to-end)
- F5 loopback
- F5 AIS
- F5 RDI

The following sections describe:

- VP Pseudowires (CCC Encapsulation) on page 105
- Port Pseudowires (CCC Encapsulation) on page 105
- VC Pseudowires (CCC Encapsulation) on page 105

VP Pseudowires (CCC Encapsulation)

In the case of ATM VP pseudowires (all VCs in a VP are transported over a single *N-to-one* mode pseudowire), all F4 and F5 OAM cells are forwarded through the pseudowire.

Port Pseudowires (CCC Encapsulation)

Like VP pseudowires, with port pseudowires, all F4 and F5 OAM cells are forwarded through the pseudowire.

VC Pseudowires (CCC Encapsulation)

In the case of VC pseudowires, F5 OAM cells are forwarded through the pseudowire, while F4 OAM cells are terminated at the Routing Engine.

Related Documentation

- ATM Support on Circuit Emulation PICs Overview on page 81

Scaling

The 12-port Channelized T1/E1 Circuit Emulation PIC supports a maximum of 1000 VCs.

The 4-port Channelized COC3/STM1 Circuit Emulation PIC supports a maximum of 2000 VCs.

Related Documentation

- ATM Support on Circuit Emulation PICs Overview on page 81

Congestion Control

ATM encapsulations provide congestion control via EPD thresholds on a per logical interface basis. For Circuit Emulation PICs, the EPD number specifies the number of packets (or frames or cell bundles).

[edit interfaces at-*fpc/pic/port* unit *logical-unit-number*]
epd-threshold *packets* plp1 *packets*;

Related Documentation

- ATM Support on Circuit Emulation PICs Overview on page 81

Configuring ATM QoS or Shaping

M7i, M10i, M40e, M120, and M320 routers with 4-port channelized OC3/STM1 Circuit Emulation PICs and 12-port T1/E1 Circuit Emulation PICs support ATM pseudowire service with QoS features for ingress and egress direction traffic shaping. Policing is performed by monitoring the configured parameters on the incoming traffic and is also referred to as ingress shaping. Egress shaping uses queuing and scheduling to shape the outgoing traffic. Classification is provided per virtual circuit (VC).

The following QoS features are supported:

- CBR, rtVBR, nrtVBR, and UBR
- Policing on a per VC basis
- Independent PCR and SCR policing
- Counting policing actions

Circuit Emulation PICs provide pseudowire service towards the core. This section describes the ATM service QoS features.

Circuit Emulation PICs support two types of ATM pseudowires:

- cell—**atm-ccc-cell-relay** encapsulation
- aal5—**atm-ccc-vc-mux**

NOTE: **Only ATM pseudowires are supported; no other encapsulation types are supported.**

Since cells within a VC cannot be re-ordered, and since only the VC is mapped to a pseudowire, classification is not meaningful in the context of a pseudowire. However, different VCs can be mapped to different classes of traffic and can be classified in the core network.

Such a service would connect two ATM networks with an IP/MPLS core. Figure 8 on page 107 shows that the routers marked PE are equipped with Circuit Emulation PICs.

Figure 8: Two ATM Networks with QoS Shaping and Pseudowire Connection

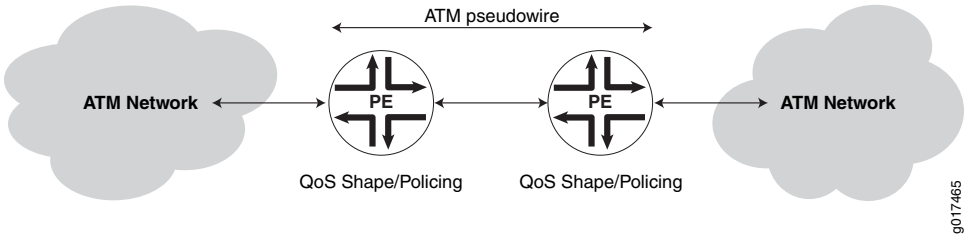


Figure 8 on page 107 shows that traffic is shaped in the egress direction towards the ATM networks. In the ingress direction towards the core, the traffic is policed and the appropriate action is taken. Depending on a very elaborate state machine in the PIC, the traffic is either discarded or sent towards the core with a particular QoS class.

Each port has four transmit queues and one receive queue. Packets arrive from the ingress network on this single queue. Remember that this is per port and multiple VCs arrive on this queue, each with its own QoS class. To simplify unidirectional connections, only a Circuit Emulation PIC (PE 1 router) to Circuit Emulation PIC (PE 2 router) configuration is shown in Figure 9 on page 107.

Figure 9: VC Mapping with Circuit Emulation PICs

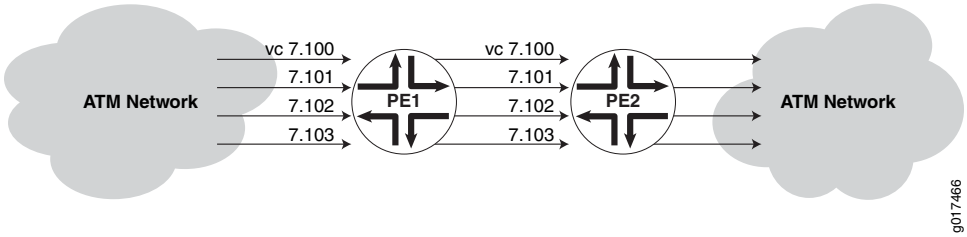


Figure 9 on page 107 shows the four VCs with different classes mapped to different pseudowires in the core. Each VC has a different QoS class and is assigned a unique queue number. This queue number is copied to the EXP bits in the MPLS header as follows:

Qn concatenated with CLP -> EXP

Qn is 2 bits and can have four combinations; 00, 01, 10, and 11. Since CLP cannot be extracted from the PIC and put into each packet prefix, it is 0. The valid combinations are shown in Table 9 on page 107.

Table 9: Valid EXP Bit Combinations

Qn	CLP
00	0
01	0
10	0
11	0

For example, VC 7.100 has CBR, VC 7.101 has rt-VBR, 7.102 has nrt-VBR, 7.103 has UBR, and each VC is assigned a queue number as follows:

- VC 7.100 -> 00
- VC 7.101 -> 01
- VC 7.102 -> 10
- VC 7.103 -> 11

NOTE: Lower queue numbers have higher priorities.

Each VC will have the following EXP bits:

- VC 7.100 -> 000
- VC 7.101 -> 010
- VC 7.102 -> 100
- VC 7.103 -> 110

A packet arriving on VC 7.100 at the ingress router has the queue number 00 before being forwarded to the Packet Forwarding Engine. The Packet Forwarding Engine then translates this to 000 EXP bits in the core. At the egress router, the Packet Forwarding Engine retranslates this to queue 00 and stamps the packet with this queue number. The PIC receiving this queue number sends the packet out on the transmit queue that is mapped to queue 0, which could be the highest priority transmit queue on the egress side.

To briefly summarize, shaping and policing are possible. Classification is possible at the VC level by mapping a specific VC to a particular class.

To configure QoS shaping for Circuit Emulation PICs, use the shaping statement and its subordinate statements at the **[interfaces at-*fpc/pic/port* unit *n*]** hierarchy level. Most Circuit Emulation PIC QoS CLI commands are similar to those used for the ATM2 PIC QoS features. The interface configuration is sent to the PIC and the PIC driver configures the PIC appropriately.

Example: Shaping for Logical Interfaces in Port Promiscuous Mode

Shaping for logical interfaces in port promiscuous mode is configured under the following hierarchy:

```
interfaces {
  at-<fpc>/<pic>/<port> {
    atm-options {
      pic-type atm-ce;
      promiscuous-mode {
        vpi 0;
        vpi 1;
      }
    }
    unit 0 {
      encapsulation atm-ccc-cell-relay;
      vpi 0;
```

```
    }
    unit 1 {
      encapsulation atm-ccc-cell-relay;
      vpi 1;
      shaping {
        cbr|rtvbr|vbr {
          <shaping specific parameters>
        }
      }
    }
  }
}
```

Example: Shaping for Logical Interfaces in VC Mode

Shaping for logical interfaces in VC mode is configured under the following hierarchy:

```
at-<fpc>/<pic>/<port> {
  atm-options {
    pic-type atm-ce;
    vpi 0;
    vpi 1;
  }
  unit 0 {
    encapsulation atm-ccc-cell-relay;
    vci 0.100;
  }
  unit 1 {
    encapsulation atm-ccc-cell-relay;
    vci 1.100;
    shaping {
      cbr|rtvbr|vbr {
        <shaping specific parameters>
      }
    }
  }
  }
}
```

The Routing Engine and the Packet Forwarding Engine prefix the packet with information including a field that indicates the queue number associated with the VC.

Circuit Emulation PICs internally define queue 0 for CBR, queue 1 for RTVBR, queue 2 for VBR, and queue 3 for UBR.

Example: Shaping for Logical Interfaces in VC Mode with a Policer

You can similarly configure shaping for a policer configuration under the following similar configuration, but you must additionally use the policer required **shaping specific parameters (cdvt)** statement option:

```
at-fpc/pic/port{
  atm-options {
    pic-type atm-ce;
    vpi 0;
    vpi 1;
  }
  unit 0 {
    encapsulation atm-ccc-cell-relay;
    vci 0.100;
```

```
    }
    unit 1 {
      encapsulation atm-ccc-cell-relay;
      vci 1.100;
      shaping {
        cbr|rtvbr|vbr {
          <shaping specific parameters> cdvt
        }
      }
    }
    }
}
```

Related Documentation

- ATM Support on Circuit Emulation PICs Overview on page 81
- shaping on page 166

Configuring the PIC Type

To configure Circuit Emulation PICs, you must specify the **atm-options** statement's **pic-type** option as **atm-ce**, as follows:

```
[edit interfaces at-fpc/pic/port]
atm-options {
  pic-type atm-ce;
}
```

On MX Series routers with ATM MICs with SFP, Junos OS automatically sets the PIC type to ATM MIC.

NOTE: This topic uses the term PIC for ATM MICs where the reference is to a CLI or Junos OS entity.

Related Documentation

- ATM Support on Circuit Emulation PICs Overview on page 81

Configuring Layer 2 Circuit and Layer 2 VPN Pseudowires

ATM Layer 2 circuit and Layer 2 VPN pseudowires are configured using the same syntax described for ATM2 PICs:

```
protocols {
  # MPLS and routing configuration omitted for brevity.
  l2circuit {
    neighbor 10.255.245.1 { # loopback address on remote router
      interface at-0/0/0.0 { # Circuit Emulation PIC ATM interface configured for CCC
        virtual-circuit-id 100;
      }
    }
  }
}
```

Related Documentation

- ATM Support on Circuit Emulation PICs Overview on page 81

Supported Interface Configurations

With 12-port Channelized T1/E1 Circuit Emulation PICs, ATM supports T1 and E1 interfaces:

```
[edit interfaces at-fpc/pic/port ]
t1-options
e1-options
```

A sample configuration follows:

```
at-0/2/1:3 {
  atm-options {
    pic-type atm-ce;
  }
  e1-options {
    framing g704;
  }
  t1-options {
    framing sf;
  }
}
```

NOTE: In the sample configuration above, both T1 and E1 framing are set. Depending on which Circuit Emulation PIC you are using (T1 or E1), only the appropriate options are functional.

The following CLI output showing the available T1 interface options:

```
[edit interfaces at-0/2/1:3]
user@host# set t1-options ?

  Possible completions:
  + apply-groups         Groups from which to inherit configuration data
  + apply-groups-except  Don't inherit configuration data from these groups
    bert-algorithm       Set BERT algorithm
    byte-encoding        Byte encoding
    crc-major-alarm-threshold  CRC Major alarm threshold value
    crc-minor-alarm-threshold  CRC Minor alarm threshold value
    framing              Framing mode
    invert-data          Invert data
    line-encoding        Line encoding
    loopback             Loopback mode
```

The following CLI output showing the available E1 interface options:

```
[edit interfaces at-0/2/1:3]
user@host#set e1-options ?

  Possible completions:
  + apply-groups         Groups from which to inherit configuration data
  + apply-groups-except  Don't inherit configuration data from these groups
```

```
      bert-error-rate      Bit error rate (10^-n for n > 0, and zero for n = 0)
(0..7)
      bert-period          Length of BERT test (1..86400 seconds)
      framing              Framing mode
      loopback             Loopback mode
```

Related Documentation

- ATM Support on Circuit Emulation PICs Overview on page 81

ATM Limitations

The following limitations apply to ATM support on Circuit Emulation PICs:

- Packet MTU—Packet MTU is limited to 2048 bytes.
- Trunk mode ATM pseudowires—Circuit Emulation PICs do not support trunk mode ATM pseudowires:
- OAM-FM segment—Segment F4 flows are not supported. Only end-to-end F4 flows are supported.
- IP and Ethernet encapsulations—IP and Ethernet encapsulations are not supported.
- F5 OAM—OAM termination is not supported.

Related Documentation

- ATM Support on Circuit Emulation PICs Overview on page 81

PART 3

Circuit Emulation Interface Configuration Statements

CHAPTER 7

Summary of Circuit Emulation Interfaces Configuration Statements

The following descriptions explain each of the interface configuration statements. The statements are organized alphabetically.

atm-options

Syntax

```
atm-options {
  cell-bundle-size cells;
  ilmi;
  linear-red-profiles profile-name {
    high-plp-max-threshold percent;
    low-plp-max-threshold percent;
    queue-depth cells high-plp-threshold percent low-plp-threshold percent;
  }
  mpls {
    pop-all-labels {
      required-depth number;
    }
  }
  pic-type (atm1 | atm2);
  plp-to-clp;
  promiscuous-mode {
    vpi vpi-identifier;
  }
  scheduler-maps map-name {
    forwarding-class class-name {
      epd-threshold cells plp1 cells;
      linear-red-profile profile-name;
      priority (high | low);
      transmit-weight (cells number | percent number);
    }
    vc-cos-mode (alternate | strict);
  }
  use-null-cw;
  vpi vpi-identifier {
    maximum-vcs maximum-vcs;
    oam-liveness {
      up-count cells;
      down-count cells;
    }
    oam-period (disable | seconds);
    shaping {
      (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate burst
        length);
      queue-length number;
    }
  }
}
```

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description Configure ATM-specific physical interface properties.

The statements are explained separately.

NOTE: Certain options apply only to specific platforms.

Required Privilege Level

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Interface Encapsulations Overview
- multipoint-destination
- shaping on page 166
- vci

bert-algorithm

Syntax bert-algorithm *algorithm*;

Hierarchy Level [edit interfaces ce1-*fpc/pic/port*],
[edit interfaces ct1-*fpc/pic/port*],
[edit interfaces *interface-name* ds0-options],
[edit interfaces *interface-name* e1-options],
[edit interfaces *interface-name* e3-options],
[edit interfaces *interface-name* t1-options],
[edit interfaces *interface-name* t3-options]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description Configure the pattern to send in the bit stream during a bit error rate test (BERT). Applies to T1, E3, T3, and multichannel DS3 interfaces, the channelized interfaces (DS3, OC12, STM1), and channelized IQ and IQE interfaces (E1, E3 and DS3).

NOTE: When configuring CE1 or CT1 interfaces on 10-port Channelized E1/T1 IQE PICs, the **bert-algorithm** statement must be included at the **[edit interfaces ce1-*fpc/pic/port*]** or **[edit interfaces ct1-*fpc/pic/port*]** hierarchy level as appropriate.

Options ***algorithm***—Pattern to send in the bit stream. There are two categories of test patterns: pseudorandom and repetitive. Both patterns conform to CCITT/ITU O.151, O.152, O.153, and O.161 standards. The algorithm can be one of the following patterns:

- **all-ones-repeating**—Pattern is all ones.
- **all-zeros-repeating**—Pattern is all zeros.
- **alternating-double-ones-zeros**—Pattern is alternating pairs of ones and zeros.
- **alternating-ones-zeros**—Pattern is alternating ones and zeros.
- **pseudo-2e3**—Pattern is $2^3 - 1$.
- **pseudo-2e4**—Pattern is $2^4 - 1$.
- **pseudo-2e5**—Pattern is $2^5 - 1$.
- **pseudo-2e6**—Pattern is $2^6 - 1$.
- **pseudo-2e7**—Pattern is $2^7 - 1$.
- **pseudo-2e9-o153**—Pattern is $2^9 - 1$, as defined in the O153 standard.
- **pseudo-2e10**—Pattern is $2^{10} - 1$.
- **pseudo-2e11-o152**—Pattern is $2^{11} - 1$, as defined in the O152 standard.

- **pseudo-2e15-o151**—Pattern is $2^{15} - 1$, as defined in the O151 standard.
- **pseudo-2e17**—Pattern is $2^{17} - 1$.
- **pseudo-2e18**—Pattern is $2^{18} - 1$.
- **pseudo-2e20-o151**—Pattern is $2^{20} - 1$, as defined in the O151 standard.
- **pseudo-2e20-o153**—Pattern is $2^{20} - 1$, as defined in the O153 standard.
- **pseudo-2e21**—Pattern is $2^{21} - 1$.
- **pseudo-2e22**—Pattern is $2^{22} - 1$.
- **pseudo-2e23-o151**—Pattern is $2^{23} - 1$, as defined in the O151 standard.
- **pseudo-2e25**—Pattern is $2^{25} - 1$.
- **pseudo-2e28**—Pattern is $2^{28} - 1$.
- **pseudo-2e29**—Pattern is $2^{29} - 1$.
- **pseudo-2e31**—Pattern is $2^{31} - 1$.
- **pseudo-2e32**—Pattern is $2^{32} - 1$.
- **repeating-1-in-4**—One bit in four is set to 1; the others are set to 0.
- **repeating-1-in-8**—One bit in eight is set to 1; the others are set to 0.
- **repeating-3-in-24**—Three bits in twenty four are set to 1; the others are set to 0.

Default: **pseudo-2e3**

Required Privilege Level

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Interface Diagnostics
- Configuring E1 BERT Properties
- Configuring E3 BERT Properties
- Configuring T1 BERT Properties
- Configuring T3 BERT Properties
- Examples: Configuring T3 Interfaces
- bert-error-rate on page 120
- bert-period on page 122

bert-error-rate

Syntax bert-error-rate *rate*;

Hierarchy Level [edit interfaces ce1-*fpc/pic/port*],
[edit interfaces ct1-*fpc/pic/port*],
[edit interfaces *interface-name* ds0-options],
[edit interfaces *interface-name* e1-options],
[edit interfaces *interface-name* e3-options],
[edit interfaces *interface-name* t1-options],
[edit interfaces *interface-name* t3-options]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description Configure the bit error rate to use in a BERT procedure. Applies to E1, E3, T1, or T3 interfaces, and to the channelized interfaces (DS3, OC3, OC12, and STM1).

NOTE: When configuring CE1 or CT1 interfaces on 10-port Channelized E1/T1 IQE PICs, the **bert-error-rate** statement must be included at the **[edit interfaces ce1-*fpc/pic/port*]** or **[edit interfaces ct1-*fpc/pic/port*]** hierarchy level as appropriate.

When configuring **t3-options bert-error-rate** on J Series routers, only 0 and 3 through 7 are valid values. If you enter 1 or 2, Junos OS will return the error message **configuration check-out failed**.

Options ***rate***—Bit error rate.

Range: 0 through 7, which corresponds to 10^{-1} (1 error per bit) to 10^{-7} (1 error per 10 million bits)

Default: 0

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- bert-algorithm on page 118
- bert-period on page 122
- ds0-options
- e1-options on page 130
- e3-options
- t1-options on page 168
- t3-options

- Interface Diagnostics
- Configuring E1 BERT Properties
- Configuring E3 BERT Properties
- Configuring T1 BERT Properties
- Configuring T3 BERT Properties
- Examples: Configuring T3 Interfaces

bert-period

Syntax bert-period *seconds*;

Hierarchy Level [edit interfaces ce1-*fpc/pic/port*],
[edit interfaces ct1-*fpc/pic/port*],
[edit interfaces *interface-name* ds0-options],
[edit interfaces *interface-name* e1-options],
[edit interfaces *interface-name* e3-options],
[edit interfaces *interface-name* t1-options],
[edit interfaces *interface-name* t3-options]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description Configure the duration of a BERT test. Applies to E1, E3, T1, and T3 interfaces, and to E1, E3, T1, and T3 partitions on the channelized interfaces (CE1, CT1, DS3, OC3, OC12, OC48, STM1, STM4, and STM16).

E1 and T1 IQ, IQE, and standard interfaces support an extended BERT period range, up to 86,400 seconds (24 hours).

NOTE: When configuring CE1 or CT1 interfaces on 10-port Channelized E1/T1 IQE PICs, the **bert-period** statement must be included at the **[edit interfaces ce1-*fpc/pic/port*]** or **[edit interfaces ct1-*fpc/pic/port*]** hierarchy level as appropriate.

Options ***seconds***—Test duration. Range and default values vary by interface type.

Range:

- PIC-dependent—Normal BERT period: either 1 through 239 seconds or 1 through 240 seconds
- PIC-dependent—Extended BERT period: from 1 through 86,400 seconds

Default:

- Normal BERT period: 10 seconds
- Extended BERT period (on supported E1 interfaces): 10 seconds
- Extended BERT period (on supported T1 interfaces): 240 seconds

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Interface Diagnostics
- Configuring E1 BERT Properties

- Configuring E3 BERT Properties
- Configuring T1 BERT Properties
- Configuring T3 BERT Properties
- bert-algorithm on page 118
- bert-error-rate on page 120

buildout (T1 Interfaces)

Syntax buildout *value*;

Hierarchy Level [edit interfaces ct1-*fpc/pic/port*]
[edit interfaces *interface-name* t1-options]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description For T1 interfaces, set the buildout value.

NOTE: When configuring CT1 interfaces on 10-port Channelized E1/T1 IQE PICs, the buildout statement must be included at the hierarchy level.

Default The default buildout value is 0 through 132 feet.

Options You can set the buildout value to one of the following:

- **0-132**—0 through 132 feet (0 through 40 meters)
- **133-265**—133 through 265 feet (40 through 81 meters)
- **266-398**—266 through 398 feet (81 through 121 meters)
- **399-531**—399 through 531 feet (121 through 162 meters)
- **532-655**—532 through 655 feet (162 through 200 meters)
- **long-0db**—For J Series routers only, long buildout with 0 decibel (dB) transmit attenuation
- **long-7.5db**—For MX80, MX240, MX480, MX960 routers, and J Series routers only, long buildout with 7.5 dB transmit attenuation
- **long-15db**—For MX80, MX240, MX480, MX960 routers, and J Series routers only, long buildout with 15 dB transmit attenuation
- **long-22.5db**—For MX80, MX240, MX480, MX960 routers, and J Series routers only, long buildout with 22.5 dB transmit attenuation

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring the T1 Buildout
- *Junos OS Interfaces and Routing Configuration Guide*

byte-encoding

Syntax byte-encoding (nx56 | nx64);

Hierarchy Level [edit interfaces t1-*fpc/pic/port*],
[edit interfaces *interface-name* ds0-options],
[edit interfaces *interface-name* t1-options]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description Set the byte encoding on a DS0 or T1 interface to use 7 bits per byte or 8 bits per byte.

NOTE: When configuring T1 interfaces on the 10-port Channelized E1/T1 IQE PIC, the **byte-encoding** statement must be included at the **[edit interfaces t1-*fpc/pic/port*]** hierarchy level.

Default The default byte encoding is 8 bits per byte (nx64).

Options **nx56**—Use 7 bits per byte.

nx64—Use 8 bits per byte.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring T1 Byte Encoding

cell-bundle-size

Syntax cell-bundle-size *cells*;

Hierarchy Level [edit interfaces at-*fpc/pic/port* atm-options],
[edit interfaces at-*fpc/pic/port* unit *logical-unit-number*],
[edit logical-systems *logical-system-name* interfaces at-*fpc/pic/port* unit *logical-unit-number*]

Release Information Statement introduced before Junos OS Release 7.4.

Description For ATM2 IQ interfaces using ATM Layer 2 circuit cell-relay transport mode only, configure the maximum number of ATM cells per frame.

Options ***cells***—Maximum number of cells.

Default: 1 cell

Range: 1 through 176 cells

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring the Layer 2 Circuit Cell-Relay Cell Maximum

cesopsn-options

Syntax

```
cesopsn-options {
  excessive-packet-loss-rate {
    sample-period milliseconds;
    threshold percentile;
  }
  idle-pattern pattern;
  jitter-buffer-latency milliseconds;
  jitter-buffer-packets packets;
  packetization-latency microseconds;
}
```

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced in Junos OS Release 12.2R1.
Statement introduced in Junos OS Release 12.3R1 for ACX Series Universal Access Routers.

Description Set Circuit Emulation Service over Packet-Switched Network (CESoPSN) protocol options.

Options You can configure the following CESoPSN options:

- **idle-pattern**—An 8-bit hexadecimal pattern to replace TDM data in a lost packet (from 0 through 255).
- **jitter-buffer-packets**—Number of packets in the jitter buffer (from 1 through 64 packets).
- **jitter-buffer-latency**—Time delay in the jitter buffer (from 1 through 1000 milliseconds).
- **packetization-latency**—Time required to create packets (from 1000 through 8000 microseconds).
- **excessive-packet-loss-rate**—Set packet loss options. The option is **sample-period**.
  - **sample-period**—Time required to calculate the excessive packet loss rate (from 1000 through 65535 milliseconds.
  - **threshold**—Percentile designating the threshold of excessive packet loss rate (1–100 percent).

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Setting the CESoPSN Options on page 75

crc-major-alarm-threshold

Syntax crc-major-alarm-threshold (1e-3 | 5e-4 | 1e-4 | 5e-5 | 1e-5);

Hierarchy Level [edit interfaces *interface-name* t1-options]

Release Information Statement introduced in Junos OS Release 8.5.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description Major alarm error thresholds for T1 CRC errors. When the threshold is exceeded for one second, a defect condition is declared. If the defect condition continues for the monitoring period, an alarm condition is declared.

Default 10-second monitoring period for all settings except **1e-5**. The **1e-5** value uses a 50-second monitoring period.

Options **rate**—Error rate expressed as the number of errors per number of bits. The value **1e-3** is one error in 10^{-3} bits and **5e-4** is five errors in 10^{-4} bits.

Default: 5e-5

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring T1 CRC Error Major Alarm Thresholds

crc-minor-alarm-threshold

Syntax crc-minor-alarm-threshold (1e-3 | 5e-4 | 1e-4 | 5e-5 | 1e-5 | 5e-6 | 1e-6);

Hierarchy Level [edit interfaces *interface-name* t1-options]

Release Information Statement introduced in Junos OS Release 8.5.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description Minor alarm error thresholds for T1 CRC errors. When the threshold is exceeded for one second, a defect condition is declared. If the defect condition continues for the monitoring period, an alarm condition is declared.

Default 10-second monitoring period for values **1e-3**, **5e-4**, **1e-4**, and **5e-5**. The **1e-5** value uses a 50-second monitoring period. The **5e-6** value uses a 100-second monitoring period. The **1e-6** value uses a 500-second monitoring period.

Options **rate**—Error rate expressed as the number of errors per number of bits. The value **1e-3** is one error in 10^{-3} bits and **5e-4** is five errors in 10^{-4} bits.

Default: 5e-6

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring T1 CRC Error Minor Alarm Thresholds

e1-options

Syntax

```
e1-options {
  bert-algorithm algorithm;
  bert-error-rate rate;
  bert-period seconds;
  fcs (16 | 32);
  framing (g704 | g704-no-crc4 | unframed);
  idle-cycle-flag (flags | ones);
  invert-data;
  loopback (local | remote);
  start-end-flag (filler | shared);
  timeslots time-slot-range;
}
```

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description Configure E1-specific physical interface properties.

The statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Channelized E1 IQ and IQE Interfaces Overview
- Channelized STM1 Interfaces Overview
- E1 Interfaces Overview
- T1 Interfaces Overview

encapsulation

See the following sections:

- encapsulation (Logical Interface) on page 132
- encapsulation (Physical Interface) on page 136

encapsulation (Logical Interface)

Syntax encapsulation (atm-ccc-cell-relay | atm-ccc-vc-mux | atm-cisco-nlpid | atm-mlppp-llc | atm-nlpid | atm-ppp-llc | atm-ppp-vc-mux | atm-snap | atm-tcc-snap | atm-tcc-vc-mux | atm-vc-mux | ether-over-atm-llc | ether-vpls-over-atm-llc | ether-vpls-over-fr | ether-vpls-over-ppp | ethernet | ethernet-vpls | ethernet-vpls-fr | frame-relay-ccc | frame-relay-ether-type | frame-relay-ether-type-tcc | frame-relay-ppp | frame-relay-tcc | gre-fragmentation | multilink-frame-relay-end-to-end | multilink-ppp | ppp-over-ether | ppp-over-ether-over-atm-llc | vlan-bridge | vlan-ccc | vlan-vci-ccc | vlan-tcc | vlan-vpls);

Hierarchy Level [edit interfaces *interface-name* unit *logical-unit-number*],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*],
[edit interfaces rlsq *number* unit *logical-unit-number*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.1 for PTX Series Packet Transport Switches (**vlan-ccc** and **vlan-tcc** options only).
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers. Only the **atm-ccc-cell-relay** and **atm-ccc-vc-mux** options are supported on ACX Series routers.

Description Configure a logical link-layer encapsulation type.

Options

atm-ccc-cell-relay—Use ATM cell-relay encapsulation.

atm-ccc-vc-mux—Use ATM virtual circuit (VC) multiplex encapsulation on CCC circuits. When you use this encapsulation type, you can configure the **ccc** family only.

atm-cisco-nlpid—Use Cisco ATM network layer protocol identifier (NLPID) encapsulation. When you use this encapsulation type, you can configure the **inet** family only.

atm-mlppp-llc—For ATM2 IQ interfaces only, use Multilink Point-to-Point (MLPPP) over AAL5 LLC. For this encapsulation type, your router must be equipped with a Link Services or Voice Services PIC. MLPPP over ATM encapsulation is not supported on ATM2 IQ OC48 interfaces.

atm-nlpid—Use ATM NLPID encapsulation. When you use this encapsulation type, you can configure the **inet** family only.

atm-ppp-llc—(ATM2 IQ interfaces and MX Series routers with MPC/MIC interfaces using the ATM MIC with SFP only) Use PPP over AAL5 LLC encapsulation.

atm-ppp-vc-mux—(ATM2 IQ interfaces and MX Series routers with MPC/MIC interfaces using the ATM MIC with SFP only) Use PPP over ATM AAL5 multiplex encapsulation.

atm-snap—(All interfaces including MX Series routers with MPC/MIC interfaces using the ATM MIC with SFP) Use ATM subnetwork attachment point (SNAP) encapsulation.

atm-tcc-snap—Use ATM SNAP encapsulation on translational cross-connect (TCC) circuits.

atm-tcc-vc-mux—Use ATM VC multiplex encapsulation on TCC circuits. When you use this encapsulation type, you can configure the **tcc** family only.

atm-vc-mux—(All interfaces including MX Series routers with MPC/MIC interfaces using the ATM MIC with SFP) Use ATM VC multiplex encapsulation. When you use this encapsulation type, you can configure the **inet** family only.

ether-over-atm-llc—(All IP interfaces including MX Series routers with MPC/MIC interfaces using the ATM MIC with SFP) For interfaces that carry IP traffic, use Ethernet over ATM LLC encapsulation. When you use this encapsulation type, you cannot configure multipoint interfaces.

ether-vpls-over-atm-llc—For ATM2 IQ interfaces only, use the Ethernet virtual private LAN service (VPLS) over ATM LLC encapsulation to bridge Ethernet interfaces and ATM interfaces over a VPLS routing instance (as described in RFC 2684, *Multiprotocol Encapsulation over ATM Adaptation Layer 5*). Packets from the ATM interfaces are converted to standard ENET2/802.3 encapsulated Ethernet frames with the frame check sequence (FCS) field removed.

ether-vpls-over-fr—For E1, T1, E3, T3, and SONET interfaces only, use the Ethernet virtual private LAN service (VPLS) over Frame Relay encapsulation to support Bridged Ethernet over Frame Relay encapsulated TDM interfaces for VPLS applications, per RFC 2427, *Multiprotocol Interconnect over Frame Relay*.

NOTE: **The SONET/SDH OC3/STM1 (Multi-Rate) MIC with SFP, the Channelized SONET/SDH OC3/STM1 (Multi-Rate) MIC with SFP, and the DS3/E3 MIC do not support Ethernet over Frame Relay encapsulation.**

ether-vpls-over-ppp—For E1, T1, E3, T3, and SONET interfaces only, use the Ethernet virtual private LAN service (VPLS) over Point-to-Point Protocol (PPP) encapsulation to support Bridged Ethernet over PPP-encapsulated TDM interfaces for VPLS applications.

ethernet—Use Ethernet II encapsulation (as described in RFC 894, *A Standard for the Transmission of IP Datagrams over Ethernet Networks*).

ethernet-vpls—Use Ethernet VPLS encapsulation on Ethernet interfaces that have VPLS enabled and that must accept packets carrying standard Tag Protocol ID (TPID) values.

NOTE: **The built-in Gigabit Ethernet PIC on an M7i router does not support extended VLAN VPLS encapsulation.**

ethernet-vpls-fr—Use in a VPLS setup when a CE device is connected to a PE device over a time-division multiplexing (TDM) link. This encapsulation type enables the PE device to terminate the outer layer 2 Frame Relay connection, use the 802.1p bits inside the inner Ethernet header to classify the packets, look at the MAC address from the Ethernet header, and use the MAC address to forward the packet into a given VPLS instance.

frame-relay-ccc—Use Frame Relay encapsulation on CCC circuits. When you use this encapsulation type, you can configure the **ccc** family only.

frame-relay-ether-type—Use Frame Relay ether type encapsulation for compatibility with Cisco Frame Relay. The physical interface must be configured with flexible-frame-relay encapsulation.

frame-relay-ether-type-tcc—Use Frame Relay ether type TCC for Cisco-compatible Frame Relay on TCC circuits to connect different media. The physical interface must be configured with flexible-frame-relay encapsulation.

frame-relay-ppp—Use PPP over Frame Relay circuits. When you use this encapsulation type, you can configure the **ppp** family only. J Series routers do not support frame-relay-ppp encapsulation.

frame-relay-tcc—Use Frame Relay encapsulation on TCC circuits for connecting different media. When you use this encapsulation type, you can configure the **tcc** family only.

gre-fragmentation—For adaptive services interfaces only, use GRE fragmentation encapsulation to enable fragmentation of IPv4 packets in GRE tunnels. This encapsulation clears the do not fragment (DF) bit in the packet header. If the packet's size exceeds the tunnel's maximum transmission unit (MTU) value, the packet is fragmented before encapsulation.

multilink-frame-relay-end-to-end—Use MLFR FRF.15 encapsulation. This encapsulation is used only on multilink, link services, and voice services interfaces and their constituent T1 or E1 interfaces, and is supported on LSQ and redundant LSQ interfaces.

multilink-ppp—Use MLPPP encapsulation. This encapsulation is used only on multilink, link services, and voice services interfaces and their constituent T1 or E1 interfaces.

ppp-over-ether—For underlying Ethernet interfaces on J Series routers, use PPP over Ethernet encapsulation. When you use this encapsulation type, you cannot configure the interface address. Instead, configure the interface address on the PPP interface. You also use PPP over Ethernet encapsulation to configure an underlying Ethernet interface for a dynamic PPPoE logical interface on M120 and M320 routers with Intelligent Queuing 2 (IQ2) PICs, and on MX Series routers with MPCs.

ppp-over-ether-over-atm-llc—(J Series routers and MX Series routers with MPCs using the ATM MIC with SFP only) For underlying ATM interfaces, use PPP over Ethernet over ATM LLC encapsulation. When you use this encapsulation type, you cannot configure the interface address. Instead, configure the interface address on the PPP interface.

vlan-bridge—Use Ethernet VLAN bridge encapsulation on Ethernet interfaces that have IEEE 802.1Q tagging, flexible-ethernet-services, and bridging enabled and that must accept packets carrying TPID 0x8100 or a user-defined TPID.

vlan-ccc—Use Ethernet virtual LAN (VLAN) encapsulation on CCC circuits. When you use this encapsulation type, you can configure the **ccc** family only.

vlan-vci-ccc—Use ATM-to-Ethernet interworking encapsulation on CCC circuits. When you use this encapsulation type, you can configure the **ccc** family only.

vlan-tcc—Use Ethernet VLAN encapsulation on TCC circuits. When you use this encapsulation type, you can configure the **tcc** family only.

vlan-vpls—Use Ethernet VLAN encapsulation on VPLS circuits.

Required Privilege Level

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring Layer 2 Switching Cross-Connects Using CCC
- Configuring the Encapsulation for Layer 2 Switching TCCs
- Configuring Interface Encapsulation on Logical Interfaces
- Configuring MPLS LSP Tunnel Cross-Connects Using CCC
- Circuit and Translational Cross-Connects Overview
- Identifying the Access Concentrator
- Configuring ATM Interface Encapsulation
- Configuring VLAN Encapsulation
- Configuring Extended VLAN Encapsulation
- Configuring ISDN Logical Interface Properties
- Configuring ATM-to-Ethernet Interworking
- Configuring Interface Encapsulation on PTX Series Packet Transport Switches
- Configuring CCC Encapsulation for Layer 2 VPNs
- Configuring TCC Encapsulation for Layer 2 VPNs and Layer 2 Circuits
- Configuring ATM for Subscriber Access
- Junos Services Interfaces Configuration Release 11.2
- CoS on ATM IMA Pseudowire Interfaces Overview
- Configuring Policing on an ATM IMA Pseudowire

encapsulation (Physical Interface)

Syntax encapsulation (atm-ccc-cell-relay | atm-pvc | cisco-hdlc | cisco-hdlc-ccc | cisco-hdlc-tcc | ethernet-bridge | ethernet-ccc | ethernet-over-atm | ethernet-tcc | ethernet-vpls | ethernet-vpls-fr | ether-vpls-over-atm-llc | ethernet-vpls-ppp |extended-frame-relay-ccc | extended-frame-relay-ether-type-tcc | extended-frame-relay-tcc | extended-vlan-bridge | extended-vlan-ccc | extended-vlan-tcc | extended-vlan-vpls | flexible-ethernet-services | flexible-frame-relay | frame-relay | frame-relay-ccc | frame-relay-ether-type | frame-relay-ether-type-tcc | frame-relay-port-ccc | frame-relay-tcc | generic-services | multilink-frame-relay-uni-nni | ppp | ppp-ccc | ppp-tcc | vlan-ccc | vlan-vci-ccc | vlan-vpls);

Hierarchy Level [edit interfaces *interface-name*],
[edit interfaces rlsq *number*:*number*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 11.1 for EX Series switches.
Statement introduced in Junos OS Release 12.1 for PTX Series Packet Transport Switches (**flexible-ethernet-services**, **ethernet-ccc**, and **ethernet-tcc** options only).

Description Specify the physical link-layer encapsulation type. Not all encapsulation types are supported on the switches. See the switch CLI.

Default **ppp**—Use serial PPP encapsulation.

Options **atm-ccc-cell-relay**—Use ATM cell-relay encapsulation.

atm-pvc—Use ATM PVC encapsulation.

cisco-hdlc—Use Cisco-compatible High-Level Data Link Control (HDLC) framing.

cisco-hdlc-ccc—Use Cisco-compatible HDLC framing on CCC circuits.

cisco-hdlc-tcc—Use Cisco-compatible HDLC framing on TCC circuits for connecting different media.

ethernet-bridge—Use Ethernet bridge encapsulation on Ethernet interfaces that have bridging enabled and that must accept all packets.

ethernet-ccc—Use Ethernet CCC encapsulation on Ethernet interfaces that must accept packets carrying standard Tag Protocol ID (TPID) values. For 8-port, 12-port, and 48-port Fast Ethernet PICs, CCC is not supported.

ethernet-over-atm—For interfaces that carry IPv4 traffic, use Ethernet over ATM encapsulation. When you use this encapsulation type, you cannot configure multipoint interfaces. As defined in RFC 2684, *Multiprotocol Encapsulation over ATM Adaptation Layer 5*, this encapsulation type allows ATM interfaces to connect to devices that support only bridge protocol data units (BPDUs). Junos OS does not completely support bridging, but accepts BPDU packets as a default gateway. If you use the router as an edge device, then the router acts as a default gateway. It accepts Ethernet LLC/SNAP frames with IP or ARP in the payload, and drops the rest. For packets destined to the Ethernet LAN, a route lookup is done using the destination

IP address. If the route lookup yields a full address match, the packet is encapsulated with an LLC/SNAP and MAC header, and the packet is forwarded to the ATM interface.

ethernet-tcc—For interfaces that carry IPv4 traffic, use Ethernet TCC encapsulation on interfaces that must accept packets carrying standard TPID values. For 8-port, 12-port, and 48-port Fast Ethernet PICs, TCC is not supported.

ethernet-vpls—Use Ethernet VPLS encapsulation on Ethernet interfaces that have VPLS enabled and that must accept packets carrying standard TPID values. On M Series routers, except the M320 router, the 4-port Fast Ethernet TX PIC and the 1-port, 2-port, and 4-port, 4-slot Gigabit Ethernet PICs can use the Ethernet VPLS encapsulation type.

ethernet-vpls-fr—Use in a VPLS setup when a CE device is connected to a PE device over a time division multiplexing (TDM) link. This encapsulation type enables the PE device to terminate the outer layer 2 Frame Relay connection, use the 802.1p bits inside the inner Ethernet header to classify the packets, look at the MAC address from the Ethernet header, and use the MAC address to forward the packet into a given VPLS instance.

ethernet-vpls-ppp—Use in a VPLS setup when a CE device is connected to a PE device over a time division multiplexing (TDM) link. This encapsulation type enables the PE device to terminate the outer layer 2 PPP connection, use the 802.1p bits inside the inner Ethernet header to classify the packets, look at the MAC address from the Ethernet header, and use it to forward the packet into a given VPLS instance.

ether-vpls-over-atm-llc—For ATM intelligent queuing (IQ) interfaces only, use the Ethernet virtual private LAN service (VPLS) over ATM LLC encapsulation to bridge Ethernet interfaces and ATM interfaces over a VPLS routing instance (as described in RFC 2684, *Multiprotocol Encapsulation over ATM Adaptation Layer 5*). Packets from the ATM interfaces are converted to standard ENET2/802.3 encapsulated Ethernet frames with the frame check sequence (FCS) field removed.

extended-frame-relay-ccc—Use Frame Relay encapsulation on CCC circuits. This encapsulation type allows you to dedicate DLCIs 1 through 1022 to CCC.

extended-frame-relay-ether-type-tcc—Use extended Frame Relay ether type TCC for Cisco-compatible Frame Relay for DLCIs 1 through 1022. This encapsulation type is used for circuits with different media on either side of the connection.

extended-frame-relay-tcc—Use Frame Relay encapsulation on TCC circuits to connect different media. This encapsulation type allows you to dedicate DLCIs 1 through 1022 to TCC.

extended-vlan-bridge—Use extended VLAN bridge encapsulation on Ethernet interfaces that have IEEE 802.1Q VLAN tagging and bridging enabled and that must accept packets carrying TPID 0x8100 or a user-defined TPID.

extended-vlan-ccc—Use extended VLAN encapsulation on CCC circuits with Gigabit Ethernet and 4-port Fast Ethernet interfaces that must accept packets carrying 802.1Q values. For 8-port, 12-port, and 48-port Fast Ethernet PICs, extended VLAN CCC is not supported. For 4-port Gigabit Ethernet PICs, extended VLAN CCC is not supported.

extended-vlan-tcc—For interfaces that carry IPv4 traffic, use extended VLAN encapsulation on TCC circuits with Gigabit Ethernet interfaces on which you want to use 802.1Q tagging. For 4-port Gigabit Ethernet PICs, extended VLAN TCC is not supported.

extended-vlan-vpls—Use extended VLAN VPLS encapsulation on Ethernet interfaces that have VLAN 802.1Q tagging and VPLS enabled and that must accept packets carrying TPIDs 0x8100, 0x9100, and 0x9901. On M Series routers, except the M320 router, the 4-port Fast Ethernet TX PIC and the 1-port, 2-port, and 4-port, 4-slot Gigabit Ethernet PICs can use the Ethernet VPLS encapsulation type.

NOTE: **The built-in Gigabit Ethernet PIC on an M7i router does not support extended VLAN VPLS encapsulation.**

flexible-ethernet-services—For Gigabit Ethernet IQ interfaces and Gigabit Ethernet PICs with small form-factor pluggable transceivers (SFPs) (except the 10-port Gigabit Ethernet PIC and the built-in Gigabit Ethernet port on the M7i router), use flexible Ethernet services encapsulation when you want to configure multiple per-unit Ethernet encapsulations. Aggregated Ethernet bundles can use this encapsulation type. This encapsulation type allows you to configure any combination of route, TCC, CCC, Layer 2 virtual private networks (VPNs), and VPLS encapsulations on a single physical port. If you configure flexible Ethernet services encapsulation on the physical interface, VLAN IDs from 1 through 511 are no longer reserved for normal VLANs.

flexible-frame-relay—For IQ interfaces only, use flexible Frame Relay encapsulation when you want to configure multiple per-unit Frame Relay encapsulations. This encapsulation type allows you to configure any combination of TCC, CCC, and standard Frame Relay encapsulations on a single physical port. Also, each logical interface can have any DLCI value from 1 through 1022.

frame-relay—Use Frame Relay encapsulation.

frame-relay-ccc—Use Frame Relay encapsulation on CCC circuits.

frame-relay-ether-type—Use Frame Relay ether type encapsulation for compatibility with the Cisco Frame Relay.

frame-relay-ether-type-tcc—Use Frame Relay ether type TCC for Cisco-compatible Frame Relay on TCC circuits to connect different media.

frame-relay-port-ccc—Use Frame Relay port CCC encapsulation to transparently carry all the DLCIs between two customer edge (CE) routers without explicitly configuring each DLCI on the two provider edge (PE) routers with Frame Relay transport. When you use this encapsulation type, you can configure the **ccc** family only.

frame-relay-tcc—Use Frame Relay encapsulation on TCC circuits to connect different media.

generic-services—Use generic services encapsulation for services with a hierarchical scheduler.

multilink-frame-relay-uni-nni—Use MLFR UNI NNI encapsulation. This encapsulation is used on link services, voice services interfaces functioning as FRF.16 bundles, and their constituent T1 or E1 interfaces, and is supported on LSQ and redundant LSQ interfaces.

ppp—Use serial PPP encapsulation.

ppp-ccc—Use serial PPP encapsulation on CCC circuits. When you use this encapsulation type, you can configure the **ccc** family only.

ppp-tcc—Use serial PPP encapsulation on TCC circuits for connecting different media. When you use this encapsulation type, you can configure the **tcc** family only.

vlan-ccc—Use Ethernet VLAN encapsulation on CCC circuits.

vlan-vci-ccc—Use ATM-to-Ethernet interworking encapsulation on CCC circuits. When you use this encapsulation type, you can configure the **ccc** family only. All logical interfaces configured on the Ethernet interface must also have the encapsulation type set to **vlan-vci-ccc**.

vlan-vpls—Use VLAN VPLS encapsulation on Ethernet interfaces with VLAN tagging and VPLS enabled. Interfaces with VLAN VPLS encapsulation accept packets carrying standard TPID values only. On M Series routers, except the M320 router, the 4-port Fast Ethernet TX PIC and the 1-port, 2-port, and 4-port, 4-slot Gigabit Ethernet PICs can use the Ethernet VPLS encapsulation type.

NOTE: **Label-switched interfaces (LSIs) do not support VLAN VPLS encapsulation. Therefore, you can only use VLAN VPLS encapsulation on a PE-router-to-CE-router interface and not a core-facing interface.**

Required Privilege Level

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring Interface Encapsulation on Physical Interfaces
- Configuring CCC Encapsulation for Layer 2 VPNs
- Configuring Layer 2 Switching Cross-Connects Using CCC
- Configuring TCC Encapsulation for Layer 2 VPNs and Layer 2 Circuits
- Configuring ATM Interface Encapsulation
- Configuring ATM-to-Ethernet Interworking
- Configuring VLAN Encapsulation
- Configuring Extended VLAN Encapsulation
- Configuring Encapsulation for Layer 2 Wholesale VLAN Interfaces
- Configuring Interfaces for Layer 2 Circuits
- Configuring Interface Encapsulation on PTX Series Packet Transport Switches
- Configuring an MPLS-Based Layer 2 VPN (CLI Procedure)
- Configuring MPLS LSP Tunnel Cross-Connects Using CCC
- Configuring TCC
- Configuring VPLS Interface Encapsulation
- Configuring Interfaces for VPLS Routing
- Defining the Encapsulation for Switching Cross-Connects
- Understanding Encapsulation on an Interface

fast-aps-switch

Syntax fast-aps-switch;

Hierarchy Level [edit interfaces *interface-name* sonet-options aps]

Release Information Statement introduced in Junos OS Release 12.1.

Description (M320 routers with Channelized OC3/STM1 Circuit Emulation PIC with SFP only) Reduce the Automatic Protection Switching (APS) switchover time in Layer 2 circuits.

NOTE:

- Configuring this statement reduces the APS switchover time only when the Layer 2 circuit encapsulation type for the interface receiving traffic from a Layer 2 circuit neighbor is SAToP.
- When the **fast-aps-switch** statement is configured in revertive APS mode, you must configure an appropriate value for revert time to achieve reduction in APS switchover time.
- To prevent the logical interfaces in the data path from being shut down, configure appropriate hold-time values on all the interfaces in the data path that support TDM.
- The **fast-aps-switch** statement cannot be configured when the APS **annex-b** option is configured.
- The interfaces that have the **fast-aps-switch** statement configured cannot be used in virtual private LAN service (VPLS) environments.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Reducing APS Switchover Time in Layer 2 Circuits

fcs

Syntax fcs (16 | 32);

Hierarchy Level
[edit interfaces e1-*fpc/pic/port*],
[edit interfaces t1-*fpc/pic/port*],
[edit interfaces *interface-name* ds0-options],
[edit interfaces *interface-name* e1-options],
[edit interfaces *interface-name* e3-options],
[edit interfaces *interface-name* sonet-options],
[edit interfaces *interface-name* t1-options],
[edit interfaces *interface-name* t3-options]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description For E1/E3, SONET/SDH, and T1/T3 interfaces, configure the frame checksum (FCS) on the interface. The checksum must be the same on both ends of the interface.

On a channelized OC12 interface, the SONET/SDH **fcs** statement is not supported. To configure FCS on each DS3 channel, you must include the **t3-options fcs** statement in the configuration for each channel. For SONET/SDH, the channelized OC12 interface supports DS3 to STS-1 to OC12. For SDH, the channelized OC12 interface supports *N*xDS3 to *N*xVC3 to AU3 to STM.

NOTE: When configuring E1 or T1 interfaces on 10-port Channelized E1/T1 IQE PICs, the **fcs** statement must be included at the **[edit interfaces e1-*fpc/pic/port*]** or **[edit interfaces t1-*fpc/pic/port*]** hierarchy level as appropriate.

Options **16**—Use a 16-bit frame checksum on the interface.

32—Use a 32-bit frame checksum on the interface. Using a 32-bit checksum provides more reliable packet verification, but some older equipment might not support 32-bit checksums.

Default: 16

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Configuring the E1 Frame Checksum
- Configuring the E3 Frame Checksum
- Configuring the SONET/SDH Frame Checksum
- Configuring the T1 Frame Checksum
- Configuring the T3 Frame Checksum

framing

See the following sections:

framing (E1, E3, and T1 Interfaces)

Syntax framing (g704 | g704-no-crc4 | g.751 | g.832 | unframed | sf | esf);

Hierarchy Level [edit interfaces ce1-*fpc/pic/port*],
[edit interfaces ct1-*fpc/pic/port*],
[edit interfaces at-*fpc/pic/port* e3-options],
[edit interfaces e1-*fpc/pic/port* e1-options],
[edit interfaces t1-*fpc/pic/port* t1-options]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description Configure the framing format.

NOTE: When configuring CE1 or CT1 interfaces on 10-port Channelized E1/T1 IQE PICs, the **framing** statement must be included at the **[edit interfaces ce1-*fpc/pic/port*]** or **[edit interfaces ct1-*fpc/pic/port*]** hierarchy level as appropriate.

Default **esf** for T1 interfaces; **g704** for E1 interfaces. There is no default value for E3 over ATM interfaces.

Options **esf**—Extended superframe (ESF) mode for T1 interfaces.

g704—G.704 framing format for E1 interfaces.

g704-no-crc4—G.704 framing with no cyclic redundancy check 4 (CRC4) for E1 interfaces.

g.751—G.751 framing format for E3 over ATM interfaces.

g.832—G.832 framing format for E3 over ATM interfaces.

sf—Superframe (SF) mode for T1 interfaces.

unframed—Unframed mode for E1 interfaces.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring E1 Framing
- Configuring E3 and T3 Parameters on ATM Interfaces
- Configuring T1 Framing

framing (SONET and SDH Interfaces)

Syntax framing (sdh | sonet);

Hierarchy Level [edit interfaces so-*fpc/pic/port*]

Release Information Statement introduced in Junos OS Release 8.1.

Description This functionality allows you to mix SONET and SDH modes on interfaces on the same PIC.

- For the 4-port OC48 PIC with SFP installed and the 4-port OC192 PIC in T Series and M Series routers, configure SONET or SDH framing on a per-port basis.
- For 1-port OC192/STM64 MICs with XFP on MX Series routers, configure the SONET or SDH framing on the single port.

Default Default framing mode is **SONET**.

Options **sdh**—SDH framing.

sonet—SONET framing.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring SONET/SDH Framing Mode

idle-cycle-flag

Syntax idle-cycle-flag *value*;

Hierarchy Level
[edit interfaces e1-*fpc/pic/port*],
[edit interfaces t1-*fpc/pic/port*],
[edit interfaces *interface-name* ds0-options],
[edit interfaces *interface-name* e1-options],
[edit interfaces *interface-name* e3-options],
[edit interfaces *interface-name* serial-options],
[edit interfaces *interface-name* t1-options],
[edit interfaces *interface-name* t3-options]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description Configure the value that the DS0, E1, E3, T1, or T3 interface transmits during idle cycles.

NOTE: When configuring E1 or T1 interfaces on 10-port Channelized E1/T1 IQE PICs, the **idle-cycle-flag** statement must be included at the **[edit interfaces e1-*fpc/pic/port*]** or **[edit interfaces t1-*fpc/pic/port*]** hierarchy level as appropriate.

Options ***value***—Value to transmit in the idle cycles:

- **flags**—Transmit the value 0x7E.
- **ones**—Transmit the value 0xFF (all ones).

Default: Flags

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Configuring the E1 Idle Cycle Flag
- Configuring the E3 Idle Cycle Flag
- Configuring the T1 Idle Cycle Flag
- Configuring the T3 Idle Cycle Flag

ima-group-options

Syntax

```
ima-group-options {
  differential-delay number;
  frame-length (32 |64 |128 |256);
  frame-synchronization {
    alpha number;
    beta number;
    gamma number;
  }
  minimum-links number;
  symmetry (symmetrical-config-and-operation |
    symmetrical-config-asymmetrical-operation);
  test-procedure {
    ima-test-start;
    ima-test-stop;
    interface name;
    pattern number;
    period number;
  }
  transmit-clock (common |independent);
  version (1.0 |1.1);
}
```

Hierarchy Level [edit interfaces (t1-*fpc/pic/port*:*m*:*n* | e1-*fpc/pic/port*:*n* | t1|e1-*fpc/pic/port*)]

Release Information Statement introduced in Junos OS Release 10.0.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description Specify IMA group options.

Options

differential-delay *1–56*—Maximum differential delay among links in msec, the default is 25.

frame-length (32 |64 |128 |256)—IMA frame length in number of cells; default is **128**.

frame-synchronization—IMA group frame synchronization selection.

alpha *1–2*—Number of consecutive invalid ICP cells for IFSM, the default is 2.

beta *1–2*—Number of consecutive errored ICP cells for IFSM, the default is 2.

gamma *1–5*—Number of consecutive valid ICP cells for IFSM, the default is 1.

minimum-links *1-8*—IMA group minimum active links; the default is 1.

symmetry (symmetrical-config-and-operation |
symmetrical-config-asymmetrical-operation)—IMA group symmetry mode selection.

test-procedure—Specify an IMA link interface test.

ima-test-start—Start IMA group test.

ima-test-stop—Stop IMA group test.

interface *name*—Interface name of the IMA link to test.

pattern *1–254*—IMA test pattern, default is 170.

period *1-4294967294*—Length of IMA pattern test in seconds, the default is 10.

transmit-clock (common |independent)—Transmit clock configuration; the default is common.

version (1.0 |1.1)—IMA specification version.

Required Privilege Level
interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- ATM Support on Circuit Emulation PICs Overview on page 81
- ima-link-options on page 148
- Inverse Multiplexing for ATM (IMA) Overview

ima-link-options

Syntax
ima-link-options group *g*

Hierarchy Level
[edit interfaces (t1-*fpc/pic/port*:*m*:*n* | e1-*fpc/pic/port*:*n* | t1|e1-*fpc/pic/port*)]

Release Information
Statement introduced in Junos OS Release 10.0.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description
Specify an interface as a member of an IMA group.

Options
group *g*—Implying **at-*x/y/g***.

Required Privilege Level
interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- ATM Support on Circuit Emulation PICs Overview on page 81
- ima-group-options on page 147
- Inverse Multiplexing for ATM (IMA) Overview

interface

See the following sections:

NOTE: For information about the interface statement available at the [edit interfaces *interface-name* unit *logical-unit-number* family (inet | inet6) address *address* (vrrp-group | vrrp-inet6-group) *group-number* track] and [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family (inet | inet6) address *address* (vrrp-group | vrrp-inet6-group) *group-number* track] hierarchy levels, see the Junos OS High Availability Configuration Guide.

interface (IEEE 802.1ag OAM Connectivity-Fault Management)

Syntax interface (*interface-name* | ((ge- | xe-) (*fpc/pic/port* | *fpc/pic/port.unit-number* | *fpc/pic/port.unit-number* vlan *vlan-id*)));

Hierarchy Level [edit protocols oam ethernet connectivity-fault-management maintenance-domain *domain-name* maintenance-association *ma-name* mep *mep-id*]

Release Information Statement introduced in Junos OS Release 8.4.

Description For Ethernet interfaces on M320, MX Series, and T Series routers, configure IEEE 802.1ag Operation, Administration, and Management (OAM) support.

For Gigabit Ethernet interfaces and 10-Gigabit Ethernet interfaces on MX Series routers, configure IEEE 802.1ag Connectivity Fault Management (CFM) support on trunk interface ports.

Options **interface-name**—Interface to which the MEP is attached. It could be a physical Ethernet interface, logical Ethernet interface, or on a specific VLAN of a trunk port interface (MX Series only).

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring a Maintenance Endpoint
- Example: Configuring Connectivity Fault Management for a PBB Network on MX Series Routers

interface (OAM Link-Fault Management)

Syntax

```
interface interface-name {
  apply-action-profile profile-name;
  link-discovery (active | passive);
  pdu-interval interval;
  pdu-threshold threshold-value;
  remote-loopback;
  event-thresholds {
    frame-error count;
    frame-period count;
    frame-period-summary count;
    symbol-period count;
  }
  negotiation-options {
    allow-remote-loopback;
    no-allow-link-events;
  }
}
```

Hierarchy Level [edit protocols oam ethernet link-fault-management]

Release Information Statement introduced in Junos OS Release 8.2.

Description For Ethernet interfaces on M320, MX Series, and T Series routers, configure IEEE 802.3ah Operation, Administration, and Management (OAM) support.

Options

interface *interface-name*—Interface to be enabled for IEEE 802.3ah link fault management OAM support.

Range: 1 through 10 interfaces can be tracked.

The remaining statements are described separately.

Required Privilege Level

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Enabling IEEE 802.3ah OAM Support

interface-type (Interfaces)

Syntax interface-type (bc | coc1 | ct1 | ct3 | dc | ds |so | t1 | t3);

Hierarchy Level [edit interfaces *interface-range name* no-partition],
[edit interfaces *interface-range name* partition *partition-number*],
[edit interfaces *interface-range name* partition *partition-number* oc-slice *oc-slice-range*],
[edit interfaces *interface-range name* partition *partition-number* timeslot *timeslot-range*]

Release Information Statement introduced before Junos OS Release 7.4.

Description For IQ and IQE interfaces only, configure the sublevel interface type.

Options

bc—Dual—Port Channelized E1 and T1 ISDN PRI interface type. You can specify this interface type at the **[edit interfaces *interface-name* partition *partition-number* timeslot *timeslot-range*]** hierarchy level to create a bearer (B) channel **bc-*pim/0/port*:*channel*** interface for each time you want to function as an ISDN PRI B-channel.

coc1—Channelized OC1 interface type. You can specify this interface type at the **[edit interfaces *interface-name* partition *partition-number* oc-slice *oc-slice-range* interface-type coc12-*fpc/pic/port*]** hierarchy level.

ct1—Channelized T1 interface type. You can specify this interface type at the **[edit interfaces *interface-name* partition *partition-number* interface-type ct3-*fpc/pic/port*<:*channel*>]** hierarchy level.

ct3—Channelized T3 interface type. You can specify this interface type at the **[edit interfaces *interface-name* partition *partition-number* oc-slice *oc-slice-range* interface-type coc1-*fpc/pic/port*:*channel* no-partition]** hierarchy level.

dc—Dual-Port Channelized E1 and T1 ISDN PRI interface type. You can specify this interface type at the **[edit interfaces *interface-name* partition *partition-number* timeslot *timeslot-range*]** hierarchy level to create a (D) channel **dc-*pim/0/port*** to control the B-channels.

ds—DS0 interface type. You can specify this interface type at the **[edit interfaces *interface-name*partition *partition-number* interface-type (ce1-*fpc/pic/port* | ct1-*fpc/pic/port*<:*channel*>)]** hierarchy level.

so—SONET/SDH interface type. You can specify this interface type at the **[edit interfaces *interface-name* partition *partition-number* oc-slice *oc-slice-range* interface-type coc12-*fpc/pic/port*]** hierarchy level.

t1—T1 interface type. You can specify this interface type at the **[edit interfaces *interface-name* partition *partition-number* oc-slice *oc-slice-range* interface-type (coc12-*fpc/pic/port* | coc1-*fpc/pic/port*)]** hierarchy level.

t3—T3 interface type. You can specify this interface type at the **[edit interfaces *interface-name* partition *partition-number* oc-slice*oc-slice-range* interface-type (coc12-*fpc/pic/port* | coc1-*fpc/pic/port*:*channel* no-partition)]** hierarchy level.

Required Privilege Level
interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Channelized E1 IQ and IQE Interfaces Overview
- Channelized OC12/STM4 IQ and IQE Interfaces Overview
- Configuring Channelized T3 IQ Interfaces

invert-data

Syntax
```
invert-data;
```

Hierarchy Level
[edit interfaces e1-*fpc/pic/port*],
[edit interfaces t1-*fpc/pic/port*],
[edit interfaces *interface-name* ds0-options],
[edit interfaces *interface-name* e1-options],
[edit interfaces *interface-name* t1-options],
[edit interfaces *interface-name* e3-options]

Release Information
Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description
Invert the transmission of unused data bits on the DS0, E1, E3, and T1 interface.

NOTE: When configuring E1 or T1 interfaces on 10-port Channelized E1/T1 IQE PICs, the **invert-data** statement must be included at the **[edit interfaces e1-*fpc/pic/port*]** or **[edit interfaces t1-*fpc/pic/port*]** hierarchy level as appropriate.

Required Privilege Level
interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Configuring E1 Data Inversion
- Configuring E3 Data Inversion
- Configuring T1 Data Inversion

line-encoding

Syntax line-encoding (ami | b8zs);

Hierarchy Level [edit interfaces ct1-*fpc/pic/port*],
[edit interfaces *interface-name* t1-options]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description Set the line encoding format on the T1 interface.

NOTE: When configuring CT1 interfaces on the 10-port Channelized E1/T1 IQE PIC, the **line-encoding** statement must be included at the **[edit interfaces ct1-*fpc/pic/port*]** hierarchy level.

Default The default line encoding is B8ZS.

Options **ami**—Use Alternate Mark Inversion (AMI) line encoding.

b8zs—Use bipolar with 8-zeros substitution (B8ZS) line encoding.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring T1 Line Encoding

loopback (ADSL, DS0, E1/E3, SONET/SDH, SHDSL, and T1/T3)

Syntax loopback (local | payload | remote);

Hierarchy Level
[edit interfaces ce1-*fpc/pic/port*],
[edit interfaces ct1-*fpc/pic/port*],
[edit interfaces t1-*fpc/pic/port*],
[edit interfaces *interface-name* ds0-options],
[edit interfaces *interface-name* dsl-options],
[edit interfaces *interface-name* e1-options],
[edit interfaces *interface-name* e3-options],
[edit interfaces *interface-name* shdsl-options},
[edit interfaces *interface-name* sonet-options],
[edit interfaces *interface-name* t1-options],
[edit interfaces *interface-name* t3-options]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description Configure a loopback connection. To turn off the loopback capability, remove the **loopback** statement from the configuration.

NOTE: When configuring CE1 or CT1 interfaces on 10-port Channelized E1/T1 IQE PICs, the **loopback** statement must be included with the **local** or **remote** option at the **[edit interfaces ce1-*fpc/pic/port*]** or **[edit interfaces ct1-*fpc/pic/port*]** hierarchy level as appropriate.

When configuring T1 interfaces on 10-port Channelized E1/T1 IQE PICs, the **loopback** statement must be included with the **payload** option at the **[edit interfaces t1-*fpc/pic/port*]** hierarchy level.

NOTE: When configuring CE1 or CT1 interfaces on the 16-port Channelized E1/T1 MIC (MIC-3D-16CHE1-T1-CE), you must include the **loopback** statement at the **[edit interfaces ce1-*fpc/pic/port*]** hierarchy level, or **[edit interfaces ct1-*fpc/pic/port*]**

To configure loopback on channelized IQ and IQE PICs, SONET/SDH level, use the **sonet-options loopback** statement **local** and **remote** options at the controller interface (coc48, cstm16, coc12, cstm4, coc3, cstm1). It is ignored for path-level interfaces **so-*fpc/pic/port*** or **so-*fpc/pic/port*:*channel***.

Options **local**—Loop packets, including both data and timing information, back on the local router's PIC. *N*xDS0 IQ interfaces do not support local loopback.

payload—For channelized T3, T1, and *N*xDS0 IQ interfaces only, loop back data only (without clocking information) on the remote router's PIC. With payload loopback, overhead is recalculated. Neither ATM-over-asymmetrical digital subscriber line (ADSL) interfaces nor ATM-over-SHDSL interfaces support payload loopback.

remote—Loop packets, including both data and timing information, back on the remote router's interface card. *N*xDS0 IQ interfaces do not support remote loopback.

Required Privilege Level
interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Configuring E3 and T3 Parameters on ATM Interfaces
- Configuring E1 Loopback Capability
- Configuring E3 Loopback Capability
- Configuring SONET/SDH Loopback Capability
- Configuring SHDSL Operating Mode on an ATM Physical Interface
- Configuring T1 Loopback Capability
- Configuring T3 Loopback Capability
- feac-loop-respond

neighbor (Automatic Protection Switching for SONET/SDH)

Syntax
neighbor *address*;

Hierarchy Level
[edit interfaces *interface-name* sonet-options aps]

Release Information
Statement introduced before Junos OS Release 7.4.

Description
If you are configuring one router to be the working router and a second to be the protect router, configure the address of the remote interface. You configure this on one or both of the interfaces.

The address you specify for the neighbor must never be routed through the interface on which APS is configured, or instability will result. We strongly recommend that you directly connect the working and protect routers and that you configure the interface address of this shared network as the neighbor address.

Options
address—Neighbor's address.

Required Privilege Level
interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Configuring Basic Automatic Protect Switching

no-partition

Syntax no-partition interface-type (e1 | (cau4 | so) | (ct3 | t3) | so | t3);

Hierarchy Level [edit interfaces ce1-*fpc/pic/port*],
[edit interfaces coc1-*fpc/pic/port*:*channel*],
[edit interfaces coc12-*fpc/pic/port*],
[edit interfaces cstm1-*fpc/pic/port*],
[edit interfaces ct3-*fpc/pic/port*]

Release Information Statement introduced before Junos OS Release 7.4.

Description For Channelized E1 IQ PICs only, configure the channelized E1 interface as an unpartitioned, clear channel.

For Channelized OC12 PIC only, convert the channelized OC1 IQ interface into a channelized T3 interface or a T3 interface. You perform this configuration task for C-bit parity and M13-mapped configurations.

For Channelized OC12 IQ PICs only, configure the channelized OC12 interface as an unpartitioned, clear channel.

For Channelized STM1 PIC only, convert the channelized STM1 IQ interface into a channelized Administrative Unit 4 (AU-4) interface or a SONET/SDH STM1 interface.

For Channelized DS3 PIC only, configure the channelized T3 interface as an unpartitioned, clear channel.

Default If you do not include either this statement or the **partition** statement, the Channelized IQ PIC is not partitioned, and no data channels are configured.

Options The option used must correspond to the physical interface type:

e1—E1 interface type.

coc12 so—Channelized OC12 interface type, in SONET mode.

cau4—Channelized AU-4 interface type.

cstm1—SONET/SDH STM1 interface type, in SDH mode.

ct3—Channelized T3 interface type.

t3—T3 interface type.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Channelized E1 IQ and IQE Interfaces Overview
- Channelized OC12/STM4 IQ and IQE Interfaces Overview
- Configuring an OC12/STM4 Interface

- Configuring Channelized STM1 IQ and IQE Interfaces
- Configuring T3 IQ Interfaces
- partition on page 159
- no-partition

no-termination-request

Syntax no-termination-request;

Hierarchy Level [edit interfaces *interface-name* ppp-options],
[edit interfaces lsq-*fpc/pic/port* lsq-failure-options]

Release Information Statement introduced in Junos OS Release 7.4.
Support at the **[edit interfaces *interface-name* ppp-options]** hierarchy level added in Junos OS Release 8.3.

Description For LSQ PICs or link PICs in redundant LSQ configurations, you can inhibit the router from sending PPP termination-request messages to the remote host if the PIC fails.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring Link PIC Failover on Channelized OC3 IQ and IQE Interfaces
- Configuring Link PIC Failover on Channelized OC12/STM4 IQ and IQE Interfaces
- Configuring Link PIC Failover on Channelized STM1 Interfaces
- Junos Services Interfaces Configuration Release 11.2

no-vpivci-swapping

Syntax no-vpivci-swapping;

Hierarchy Level [edit interfaces at-*fpc/pic/port* unit *logical-unit-number*]

Release Information Statement introduced in Junos OS Release 12.1.

Description (MX Series routers) Disable the swapping of VPI and VCI values in ATM CCC cell-relay mode on ATM MICs. The VPI and VCI values are not modified on ingress or egress. This statement is compatible with the ATM policing feature.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring ATM Cell-Relay Promiscuous Mode

oc-slice

Syntax oc-slice *oc-slice-range*;

Hierarchy Level [edit interfaces *interface-name* partition *partition-number*]

Release Information Statement introduced before Junos OS Release 7.4.

Description For channelized OC12 IQ interfaces only, configure the range of SONET/SDH slices.

Default If you do not include either this statement or the **no-partition** statement, the Channelized OC12 IQ PICs not partitioned, and no data channels are configured.

Options ***oc-slice-range***—Range of SONET/SDH slices. OC3 interfaces must occupy three consecutive OC slices per interface, in the form 1–3, 4–6, 7–9, or 10–12. The T3, T1, and DS0 interface types each occupy one OC slice per interface.

Range: For OC3 interfaces,1–3, 4–6, 7–9, or 10–12; for SONET/SDH and T3 interfaces, 1–12

The remaining statement is explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Channelized OC12/STM4 IQ and IQE Interfaces Overview

partition

Syntax partition *partition-number* oc-slice *oc-slice-range* interface-type *type* timeslots *time-slot-range*;

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced before Junos OS Release 7.4.

Description For IQ interfaces and J Series interfaces on the Dual-Port Channelized E1 and T1PIM, configure the channelized interface partition. The partition number is correlated with the channel number. Partition and channel numbering on IQ interfaces begins with **:1**, not **:0**.

Default If you omit this statement, the channelized PIC or PIM is not partitioned, and no data channels are configured.

Options ***partition-number***—Sublevel interface partition index.

Range:

- 1 through 4 for an OC3 interface on a channelized OC12 IQ interface.
- 1 through 12 for a T3 interface on a channelized OC12 IQ interface.
- 1 through 4 for a T3 interface on a channelized T3 IQ interface.
- 1 through 28 for a T1 IQ interface on a channelized OC12 IQ or channelized T3 IQ interface.
- 1 through 10 for an E1 interface on a channelized E1 IQ interface.
- 1 through 30 on a channelized E1 interface.
- 1 through 23 on a channelized T1 interface.
- 1 through 24 for *N*xDS0 interfaces on either channelized OC12 IQ or channelized DS3 IQ interfaces.
- 0 through 31(with 0 reserved for framing) for *N*xDS0 interfaces on channelized E1 IQ interfaces.

The remaining statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Channelized E1 IQ and IQE Interfaces Overview
- Channelized OC12/STM4 IQ and IQE Interfaces Overview
- Configuring Channelized T3 IQ Interfaces
- no-partition on page 156

payload-size

Syntax payload-size *bytes* ;

Hierarchy Level [edit interfaces *interface-name* satop-options]

Release Information Option introduced in Junos OS Release 9.3.

Description Specify the **satop-options** payload-size in integer number of bytes.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- ATM Support on Circuit Emulation PICs Overview on page 81
- satop-options on page 164

pic-type

Syntax pic-type (atm1 | atm2);

Hierarchy Level [edit interfaces at-*fpc/pic/port* atm-options]

Release Information Statement introduced before Junos OS Release 7.4.

Description For ATM interfaces, configure the type of ATM PIC installed in your router.

Options **atm1**—ATM1 PIC.

atm2—ATM2 IQ PIC.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Configuring the ATM PIC Type

promiscuous-mode

Syntax

```
promiscuous-mode {
  vpi vpi-identifier;
}
```

Hierarchy Level [edit interfaces *interface-name* atm-options]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description For ATM interfaces with **atm-ccc-cell-relay** encapsulation, map all incoming cells from either an interface port or a VP to a single label-switched path (LSP) without restricting the VCI number. Promiscuous mode allows you to map traffic from all 65,535 VCIs to a single LSP, or from all 256 VPIs to a single LSP.

Options ***vpi-identifier***—Open this VPI in promiscuous mode.

Range: 0 through 255

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring ATM Cell-Relay Promiscuous Mode
- vpi (ATM CCC Cell-Relay Promiscuous Mode) on page 177

protocols

Syntax protocols [inet iso mpls];

Hierarchy Level [edit interfaces *interface-name* unit logical-unit-number family tcc]

Release Information Statement introduced in Junos OS Release 8.3.

Description For Layer 2.5 VPNs on T Series, MX Series, M120, and M320 routers support, configure IS-IS (ISO traffic) or MPLS traffic to traverse a TCC interface. By default, IPv4 (inet) traffic runs on T Series, MX, Series, M120, and M320 routers and over TCC interfaces. You must configure the same traffic type on both ends of the Layer 2.5 VPN.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring IS-IS or MPLS Traffic for TCC Interfaces

psn-vci (ATM CCC Cell-Relay Promiscuous Mode VPI/VCI Swapping)

Syntax psn-vci *psn-vci-identifier*;

Hierarchy Level [edit interfaces at-*fpc/pic/port* unit *logical-unit-number*]

Release Information Statement introduced in Junos OS Release 12.1.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description (MX Series routers) Swap both the VPI and VCI values on both egress and ingress in ATM CCC cell-relay mode on ATM MICs. This statement is not compatible with the ATM policing feature.

Options ***psn-vci-identifier***—ATM PSN virtual circuit identifier.
Range: 0 through 255

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Configuring ATM Cell-Relay Promiscuous Mode

psn-vpi (ATM CCC Cell-Relay Promiscuous Mode VPI/VCI Swapping)

Syntax psn-vpi *psn-vpi-identifier*;

Hierarchy Level [edit interfaces at-*fpc/pic/port* unit *logical-unit-number*]

Release Information Statement introduced in Junos OS Release 12.1.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description (MX Series routers) Swap only the VPI values on both egress and ingress in ATM CCC cell-relay mode on ATM MICs. This statement is not compatible with the ATM policing feature.

Options ***psn-vpi-identifier***—ATM PSN virtual path identifier.
Range: 0 through 255

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation
- Configuring ATM Cell-Relay Promiscuous Mode

remote-loopback-respond

Syntax remote-loopback-respond;

Hierarchy Level [edit interfaces ct1-*fpc/pic/port*],
[edit interfaces *interface-name* t1-options]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description For T1 interfaces only, configure the router to respond to remote loopback requests. Remote loopback requests can be from the facilities data link or inband.

NOTE: When configuring CT1 interfaces on the 10-port Channelized E1/T1 IQE PIC, the **remote-loopback-respond** statement must be included at the **[edit interfaces ct1-*fpc/pic/port*]** hierarchy level.

Default The router does not respond to remote loop requests.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring the T1 Remote Loopback Response
- feac-loop-respond
- loopback (ADSL, DS0, E1/E3, SONET/SDH, SHDSL, and T1/T3) on page 154

satop-options

Syntax

```
satop-options {
  excessive-packet-loss-rate {
    apply-groups group-name
    apply-groups-except group-name
    groups group-name
    sample-period milliseconds
    threshold percentile
  )
  idle-pattern pattern
  jitter-buffer-auto-adjust
  jitter-buffer-latency milliseconds
  jitter-buffer-packets packets
  payload-size bytes;
}
```

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced in Junos OS Release 9.3.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description Set Structure-Agnostic TDM over Packet (SAToP) protocol options.

On ACX Series routers, the following statements are not supported:

```
apply-groups group-name
apply-groups-except group-name
groups group-name
jitter-buffer-auto-adjust
```

Options **excessive-packet-loss-rate options**—Set packet loss options.

- **apply-groups *group-name***—Groups from which to inherit configuration data.
- **apply-groups-except *group-name***—Don't inherit configuration data from these groups.
- **groups *group-name***—Specify groups.
- **sample-period *milliseconds***—Number of milliseconds over which excessive packet loss rate is calculated.
- **threshold *percentile***—Percentile designating the threshold of excessive packet loss rate (from 1 to 100).

idle-pattern *pattern*—An 8–bit hexadecimal pattern to replace TDM data in a lost packet (from 0 to 255).

jitter-buffer-auto-adjust—Automatically adjust the jitter buffer.

NOTE: This option is not applicable on MX Series routers.

jitter-buffer-latency *milliseconds*—Number of milliseconds delay in jitter buffer (from 1 to 1000 milliseconds).

jitter-buffer-packets *packets*—Number of packets in jitter buffer (from 1 to 64).

payload-size *bytes*—Payload size in integer number of bytes.

Required Privilege Level

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring SAToP on 4-Port Channelized OC3/STM1 Circuit Emulation PICs on page 43
- Configuring SAToP Emulation on T1/E1 Interfaces on Circuit Emulation PICs on page 46
- Configuring SAToP on Channelized OC3/STM1 (Multi-Rate) Circuit Emulation MIC with SFP on page 51
- Configuring SAToP Encapsulation on T1/E1 Interfaces on Channelized OC3/STM1 (Multi-Rate) Circuit Emulation MIC with SFP on page 57
- Configuring SAToP on Channelized E1/T1 Circuit Emulation MIC on page 61
- ATM Support on Circuit Emulation PICs Overview on page 81

shaping

Syntax

```
shaping {
  (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate burst
    length);
  queue-length number;
}
```

Hierarchy Level

[edit interfaces *interface-name* atm-options vpi *vpi-identifier*],
[edit interfaces *interface-name* unit *logical-unit-number*],
[edit interfaces *interface-name* unit *logical-unit-number* address *address* family *family*
multipoint-destination *address*],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*],
[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*
address *address* family *family* multipoint-destination *address*]

Release Information

Statement introduced before Junos OS Release 7.4.

Description

For ATM encapsulation only, define the traffic-shaping profile.

For Circuit Emulation PICs, specify traffic shaping in the ingress and egress directions.

For ATM2 IQ interfaces, changing or deleting VP tunnel traffic shaping causes all logical interfaces on a VP to be deleted and then re-added.

VP tunnels are not supported on multipoint interfaces.

The statements are explained separately.

Required Privilege Level

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Defining Virtual Path Tunnels
- Defining the ATM Traffic-Shaping Profile
- Configuring ATM QoS or Shaping on page 106
- Applying Scheduler Maps to Logical ATM Interfaces

start-end-flag

Syntax start-end-flag (filler | shared);

Hierarchy Level [edit interfaces e1-*fpc/pic/port*],
[edit interfaces t1-*fpc/pic/port*],
[edit interfaces *interface-name* ds0-options],
[edit interfaces *interface-name* e1-options],
[edit interfaces *interface-name* e3-options],
[edit interfaces *interface-name* t1-options],
[edit interfaces *interface-name* t3-options]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description For DS0, E1, E3, T1, and T3 interfaces, configure the interface to share the transmission of start and end flags.

NOTE: When configuring E1 or T1 interfaces on the 10-port Channelized E1/T1 IQE PIC, the **start-end-flag** statement must be included at the **[edit interfaces e1-*fpc/pic/port*]** or **[edit interfaces t1-*fpc/pic/port*]** hierarchy level as appropriate.

Options **filler**—Wait two idle cycles between the start and end flags.

shared—Share the transmission of the start and end flags. This is the default.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring E1 Start and End Flags
- Configuring the E3 Start and End Flags
- Configuring T1 Start and End Flags
- Configuring T3 Start and End Flags

t1-options

Syntax

```
t1-options {
  bert-algorithm algorithm;
  bert-error-rate rate;
  bert-period seconds;
  buildout value;
  byte-encoding (nx56 | nx64);
  crc-major-alarm-threshold (1e-3 | 5e-4 | 1e-4 | 5e-5 | 1e-5);
  crc-minor-alarm-threshold (1e-3 | 5e-4 | 1e-4 | 5e-5 | 1e-5 | 5e-6 | 1e-6);
  fcs (16 | 32);
  framing (esf | sf);
  idle-cycle-flag (flags | ones);
  invert-data;
  line-encoding (ami | b8zs);
  loopback (local | payload | remote);
  remote-loopback-respond;
  start-end-flag (filler | shared);
  timeslots time-slot-range;
}
```

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 12.2 for the ACX Series Universal Access Routers.

Description Configure T1-specific physical interface properties.

The statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- T1 Interfaces Overview

timeslots

Syntax timeslots *time-slot-range*;

Hierarchy Level [edit interfaces e1-*fpc/pic/port*],
[edit interfaces t1-*fpc/pic/port*],
[edit interfaces *interface-name* e1-options],
[edit interfaces *interface-name* partition *partition-number*],
[edit interfaces *interface-name* t1-options]

Release Information Statement introduced before Junos OS Release 7.4.

Description For E1 and T1interfaces, allocate the specific time slots by number.

NOTE: When configuring E1 or T1 interfaces on the 10-port Channelized E1/T1 IQE PIC, the **timeslots** statement must be included at the **[edit interfaces e1-*fpc/pic/port*]** or **[edit interfaces t1-*fpc/pic/port*]** hierarchy level as appropriate.

Options ***time-slot-range***—Actual time slot numbers allocated:

Range: Ranges vary by interface type and configuration option as follows:

- 1 through 24 for T1 interfaces (0 is reserved)
- 1 through 31 for 4-port E1 PICs (0 is reserved)
- 1 through 31 for *Nx*DS0 interfaces (0 is reserved)
- 2 through 32 for 10-port Channelized E1 and 10-port Channelized E1 IQ PICs (1 is reserved)
- 2 through 32 for the setting under **e1-options** with IQE PICs (1 is reserved) (when creating fractional E1)
- 1 through 31 for the setting under **partition** with IQE PICs (0 is reserved) (when creating *Nx*DS0)

NOTE: When creating fractional E1 interfaces only, if you connect a 4-port E1 PIC interface to a device that uses time slot numbering from 2 through 32, you must subtract 1 from the configured number of time slots.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring Fractional E1 IQ and IQE Interfaces
- Configuring Fractional T1 IQ and IQE Interfaces

- Configuring Fractional E1 Time Slots
- Configuring Fractional T1 Time Slots
- Configuring a Channelized T1/E1 Interface to Drop and Insert Time Slots

unit

Syntax

```
unit logical-unit-number {
  accept-source-mac {
    mac-address mac-address {
      policer {
        input cos-policer-name;
        output cos-policer-name;
      }
    }
  }
  accounting-profile name;
  advisory-options {
    downstream-rate rate;
    upstream-rate rate;
  }
  allow-any-vci;
  atm-scheduler-map (map-name | default);
  backup-options {
    interface interface-name;
  }
  bandwidth rate;
  cell-bundle-size cells;
  clear-dont-fragment-bit;
  compression {
    rtp {
      maximum-contexts number <force>;
      f-max-period number;
      queues [ queue-numbers ];
      port {
        minimum port-number;
        maximum port-number;
      }
    }
  }
  compression-device interface-name;
  copy-tos-to-outer-ip-header;
  demux-destination family;
  demux-source family;
  demux-options {
    underlying-interface interface-name;
  }
  description text;
  interface {
    l2tp-interface-id name;
    (dedicated | shared);
  }
  dialer-options {
    activation-delay seconds;
    callback;
    callback-wait-period time;
    deactivation-delay seconds;
    dial-string [ dial-string-numbers ];
    idle-timeout seconds;
```

```
    incoming-map {
      caller caller-id) | accept-all;
      initial-route-check seconds;
      load-interval seconds;
      load-threshold percent;
      pool pool-name;
      redial-delay time;
      watch-list {
        [ routes ];
      }
    }
}
disable;
disable-mlppp-inner-ppp-pfc;
dlci dlci-identifier;
drop-timeout milliseconds;
dynamic-call-admission-control {
  activation-priority priority;
  bearer-bandwidth-limit kilobits-per-second;
}
encapsulation type;
epd-threshold cells plp1 cells;
family family-name {
  ... the family subhierarchy appears after the main [edit interfaces interface-name unit
    logical-unit-number] hierarchy ...
}
fragment-threshold bytes;
inner-vlan-id-range start start-id end end-id;
input-vlan-map {
  (pop | pop-pop | pop-swap | push | push-push | swap |
  swap-push | swap-swap);
  inner-tag-protocol-id tpid;
  inner-vlan-id number;
  tag-protocol-id tpid;
  vlan-id number;
}
interleave-fragments;
inverse-arp;
layer2-policer {
  input-policer policer-name;
  input-three-color policer-name;
  output-policer policer-name;
  output-three-color policer-name;
}
link-layer-overhead percent;
minimum-links number;
mrru bytes;
multicast-dlci dlci-identifier;
multicast-vci vpi-identifier.vci-identifier;
multilink-max-classes number;
multipoint;
oam-liveness {
  up-count cells;
  down-count cells;
}
oam-period (disable | seconds);
```

```
output-vlan-map {
  (pop | pop-pop | pop-swap | push | push-push | swap |
  swap-push | swap-swap);
  inner-tag-protocol-id tpid;
  inner-vlan-id number;
  tag-protocol-id tpid;
  vlan-id number;
}
passive-monitor-mode;
peer-unit unit-number;
plp-to-clp;
point-to-point;
ppp-options {
  chap {
    access-profile name;
    default-chap-secret name;
    local-name name;
    passive;
  }
  compression {
    acfc;
    pfc;
  }
  dynamic-profile profile-name;
  lcp-restart-timer milliseconds;
  loopback-clear-timer seconds;
  ncp-restart-timer milliseconds;
  pap {
    access-profile name;
    default-pap-password password;
    local-name name;
    local-password password;
    passive;
  }
}
pppoe-options {
  access-concentrator name;
  auto-reconnect seconds;
  (client | server);
  service-name name;
  underlying-interface interface-name;
}
pppoe-underlying-options {
  access-concentrator name;
  dynamic-profile profile-name;
  max-sessions number;
}
proxy-arp;
service-domain (inside | outside);
shaping {
  (cbr rate | rtvbr peak rate sustained rate burst length | vbr peak rate sustained rate burst
    length);
  queue-length number;
}
short-sequence;
targeted-distribution;
```

```
transmit-weight number;
(traps | no-traps);
trunk-bandwidth rate;
trunk-id number;
tunnel {
  backup-destination address;
  destination address;
  key number;
  routing-instance {
    destination routing-instance-name;
  }
  source source-address;
  ttl number;
}
vci vpi-identifier.vci-identifier;
vci-range start start-vci end end-vci;
vpi vpi-identifier;
vlan-id number;
vlan-id-range number-number;
vlan-tags inner tpid.vlan-id outer tpid.vlan-id;
family family {
  accounting {
    destination-class-usage;
    source-class-usage {
      (input | output | input output);
    }
  }
  access-concentrator name;
  address address {
    ... the address subhierarchy appears after the main [edit interfaces interface-name unit
      logical-unit-number family family-name] hierarchy ...
  }
  bridge-domain-type (bvlan | svlan);
  bundle interface-name;
  core-facing;
  demux-destination {
    destination-prefix;
  }
  demux-source {
    source-prefix;
  }
  duplicate-protection;
  dynamic-profile profile-name;
  filter {
    group filter-group-number;
    input filter-name;
    input-list [ filter-names ];
    output filter-name;
    output-list [ filter-names ];
  }
  interface-mode (access | trunk);
  ipsec-sa sa-name;
  isid-list all-service-groups;
  keep-address-and-control;
  mac-validate (loose | strict);
  max-sessions number;
```

```
mtu bytes;
multicast-only;
no-redirects;
policer {
  arp policer-template-name;
  input policer-template-name;
  output policer-template-name;
}
primary;
protocols [inet iso mpls];
proxy inet-address address;
receive-options-packets;
receive-ttl-exceeded;
remote (inet-address address | mac-address address);
rpf-check {
  fail-filter filter-name
  mode loose;
}
sampling {
  input;
  output;
}
service {
  input {
    post-service-filter filter-name;
    service-set service-set-name <service-filter filter-name>;
  }
  output {
    service-set service-set-name <service-filter filter-name>;
  }
}
service-name-table table-name
(translate-discard-eligible | no-translate-discard-eligible);
(translate-fecn-and-becn | no-translate-fecn-and-becn);
translate-plp-control-word-de;
unnumbered-address interface-name destination address destination-profile profile-name;
vlan-id number;
vlan-id-list [number number-number];
address address {
  arp ip-address (mac | multicast-mac) mac-address <publish>;
  broadcast address;
  destination address;
  destination-profile name;
  eui-64;
  master-only;
  multipoint-destination address {
    dlci dlci-identifier;
    epd-threshold cells <plp1 cells>;
    inverse-arp;
    oam-liveness {
      up-count cells;
      down-count cells;
    }
    oam-period (disable | seconds);
    shaping {
```

```
            (cbr rate | rtvbr burst length peak rate sustained rate | vbr burst length peak rate
              sustained rate);
            queue-length number;
          }
          vci vpi-identifier.vci-identifier;
        }
        preferred;
        primary;
        (vrrp-group | vrrp-inet6-group) group-number {
          (accept-data | no-accept-data);
          advertise–interval seconds;
          authentication-type authentication;
          authentication-key key;
          fast-interval milliseconds;
          (preempt | no-preempt) {
            hold-time seconds;
          }
          priority number;
          track {
            interface interface-name {
              bandwidth-threshold bits-per-second priority-cost number;
            }
            priority-hold-time seconds;
            route ip-address/prefix-length routing-instance instance-name priority-cost cost;
          }
          virtual-address [ addresses ];
          virtual-link-local-address ipv6–address;
          vrrp-inherit-from {
            active-interface interface-name;
            active-group group-number;
          }
        }
      }
    }
  }
}
```

Hierarchy Level [edit interfaces *interface-name*],
[edit logical-systems *logical-system-name* interfaces *interface-name*],
[edit interfaces interface-set *interface-set-name* interface *interface-name*]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure a logical interface on the physical device. You must configure a logical interface to be able to use the physical device.

Options ***logical-unit-number***—Number of the logical unit.

Range: 0 through 1,073,741,823 for demux and PPPoE static interfaces only. 0 through 16,385 for all other static interface types.

The remaining statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring Logical Interface Properties
- Example: Configuring E-LINE and E-LAN Services for a PBB Network on MX Series Routers
- Junos Services Interfaces Configuration Release 11.2

vpi (ATM CCC Cell-Relay Promiscuous Mode)

Syntax vpi *vpi-identifier*;

Hierarchy Level [edit interfaces at-*fpc/pic/port* atm-options promiscuous-mode]

Release Information Statement introduced before Junos OS Release 7.4.
Junos OS Release 12.2 for the ACX Series Universal Access routers.

Description For ATM interfaces, allow all VCIs in this VPI to open in ATM CCC cell-relay mode.

When you include **vpi** statements at the **[edit interfaces *interface-name* atm-options promiscuous-mode]** hierarchy level, the specified VPIs open in promiscuous mode.

Options ***vpi-identifier***—ATM virtual path identifier. This is one of the VPIs that you define in the vci statement. (For a list of hierarchy levels at which you can include the **vci** statement, see vci.)

Range: 0 through 255

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Configuring ATM Cell-Relay Promiscuous Mode

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