

Chapter 6

Configuring Packet over SONET

Use the procedures described in this chapter to configure packet over SONET (POS) on E-series routers.

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Overview

Packet over SONET (Synchronous Optical Network)/SDH (Synchronous Digital Hierarchy) is the serial transmission of data over SONET frames through the use of a protocol such as Point-to-Point Protocol (PPP).

Packet over SONET/SDH is an ideal feature for networks that are built for providing Internet or IP data. It provides superior bandwidth utilization and efficiency compared with other transport methods. For expensive WAN links, packet over SONET can provide as much as 25 to 30 percent higher throughput than networks based on Asynchronous Transfer Mode (ATM). By transporting frames directly into the SONET/SDH payload, the overhead required in an ATM cell header for IP over ATM encapsulation is eliminated.

The router supports PPP, Cisco High-Level Data Link Control (HDLC), and Frame Relay over SONET/SDH.

POS Features

POS supports the following features:

- Payload scrambling
- Clock source configuration
- Maximum transmission unit (MTU) size configuration
- Maximum receive unit (MRU) size configuration
- POS framing
- Cyclic redundancy check (CRC) checking
- Loopback configuration

SONET/SDH

SONET is an ANSI standard for transmitting bits over fiber-optic cable. SDH is the international standard defined by the International Telecommunication Union (ITU). SONET/SDH is the physical infrastructure of choice for carrier ATM networks operating at speeds above 50 Mbps.

SONET/SDH allows carriers to build high-speed international links without requiring conversion from one transmission protocol to another (for example, T1 to T3 or T1 to E3 conversion).

SONET transmission speeds start at 51.84 Mbps and are referred to as OC1. SDH transmission speeds start at 155.52 Mbps and are referred to as STM1. All other speeds are multiples of these base numbers. Table 13 shows the speeds of the most common SONET/SDH implementations.

Table 13: Most Common SONET/SDH Implementations

SONET	SDH	Transmission Speed
OC1	—	51.84 Mbps
OC3	STM1	155.52 Mbps
OC12	STM4	622.08 Mbps
OC48	STM16	2.4 Gbps
OC96	STM32	4.876640 Gbps
OC192	STM64	9.953280 Gbps

Platform Considerations

You can configure POS interfaces on the following E-series routers:

- E120 router
- E320 router
- ERX-1440 router
- ERX-1410 router
- ERX-710 router
- ERX-705 router
- ERX-310 router

Module Requirements

For information about the modules that support POS interfaces on ERX-14xx models, ERX-7xx models, and the ERX-310 router:

- See *ERX Module Guide, Table 1, Module Combinations* for detailed module specifications.
- See *ERX Module Guide, Appendix A, Module Protocol Support* for information about the modules that support POS.

For information about the modules that support POS interfaces on the E120 router and the E320 router:

- See *E120 and E320 Module Guide, Table 1, Modules and IOAs* for detailed module specifications.
- See *E120 and E320 Module Guide, Appendix A, IOA Protocol Support* for information about the modules that support POS.

Interface Specifiers

The configuration task examples in this chapter use the *slot/port[.subinterface]* format to specify a POS interface. However, the interface specifier format that you use depends on the router that you are using.

For ERX-7xx models, ERX-14xx models, and ERX-310 routers, use the *slot/port[.subinterface]* format. For example, the following command specifies a POS interface on slot 0, port 1 of an ERX-7xx model, ERX-14xx model, or ERX-310 router.

```
host1(config)#interface pos 0/1
```

For E120 and E320 routers, use the *slot/adapter/port* format, which includes an identifier for the bay in which the I/O adapter (IOA) resides. In the software, adapter 0 identifies the right IOA bay (E120 router) and the upper IOA bay (E320 router); adapter 1 identifies the left IOA bay (E120 router) and the lower IOA bay (E320 router). For example, the following command specifies a POS interface on slot 5, adapter 0, port 0 of an E320 router.

```
host1(config)#interface pos 5/0/0
```

For more information about supported interface types and specifiers on E-series routers, see *Interface Types and Specifiers* in *JUNOS Command Reference Guide, About This Guide*.

References

For more information about POS interfaces, consult the following resources:

- RFC 1662—PPP in HDLC-like Framing (July 1994)
- RFC 2615—PPP over SONET/SDH (June 1999)
- RFC 2427—Multiprotocol Interconnect over Frame Relay (September 1998)

Before You Configure POS

Before you configure a POS interface, verify that you have correctly installed the required module. For information about installing modules in ERX-7xx models, ERX-14xx models, and ERX-310 routers, see *ERX Hardware Guide, Chapter 4, Installing Modules*. For information about installing modules in the E120 router and the E320 router, see *E120 and E320 Hardware Guide, Chapter 4, Installing Modules*. Then verify that no ATM interfaces are defined on the physical port.

Also have the following information available:

- Interfaces specifiers for the POS interfaces that you want to create

For more information about specifying POS interfaces on E-series routers, see *Interface Types and Specifiers* in *JUNOS Command Reference Guide, About This Guide*.

- IP addresses and subnet mask assignments for IP interfaces

Configuration Tasks

To configure a POS interface:

1. Configure a physical interface.

```
host1(config)#interface pos 0/1
```

2. (Optional) Assign a text description or an alias to the interface.

```
host1(config-if)#pos description austin01 pos interface
```

3. Configure the encapsulation method.

```
host1(config-if)#encapsulation ppp
```

4. (Optional) Configure the internal clock source.

```
host1(config-if)#clock source internal module
```

5. (Optional) Set the size of the CRC.

```
host1(config-if)#crc 32
```

6. (Optional) Set the time interval at which the router calculates bit and packet rate counters.

```
host1(config-if)#load-interval 90
```

7. (Optional) Set the type of loopback mode.

```
host1(config-if)#loopback line
```

8. (Optional) Set the MRU size.

```
host1(config-if)#mrp 1000
```

9. (Optional) Set the MTU size.

```
host1(config-if)#mtu 1000
```

10. (Optional) Set the type of framing.

```
host1(config-if)#pos framing sdh
```

11. Disable payload scrambling.

```
host1(config-if)#no pos scramble-atm
```

12. (Optional) Disable an interface.

```
host1(config-if)#shutdown
```

clock source

- Use to set the clock source.
- You can set **internal** or **line** clocking.
- Internal clocking has two options:
 - **module**—Uses internal clock from the line module
 - **chassis**—Uses the configured router clock
- Example
host1(config-if)#**clock source internal module**
- Use the **no** version to restore the default value, **line**.

crc

- Use to set the number of bits used for CRC checking.
- CRC is an error-checking technique that uses a calculated numeric value to detect errors in transmitted data; 16 and 32 indicate the number of check digits per frame that are used to calculate the frame check sequence (FCS). Both the sender and receiver must use the same setting.
- Example
host1(config-if)#**crc 32**
- Use the **no** version to restore the default value, 16.

encapsulation frame-relay ietf

- Use to specify Frame Relay as the encapsulation method for the interface.
- The router uses IETF format (RFC 2427 encapsulation).
- Example
host1(config-if)#**encapsulation frame-relay ietf**
- Use the **no** version to remove the Frame Relay configuration from an interface.

encapsulation ppp

- Use to specify PPP as the encapsulation method for the interface.
- Example
host1(config-if)#**encapsulation ppp**
- Use the **no** version to remove the PPP configuration from an interface.

interface pos

- Use to configure a POS interface.
- To specify a POS interface for ERX-7xx models, ERX-14xx models, and ERX-310 routers, use the *slot/port[.subinterface]* format.
 - *slot*—Number of the chassis slot
 - *port*—Port number on the I/O module
 - *subinterface*—Number of the subinterface
- To specify a POS interface for E120 and E320 routers, use the *slot/adapter/port* format.
 - *slot*—Number of the chassis slot
 - *adapter*—Identifier for the IOA within the E320 chassis, either 0 or 1, where:
 - 0 indicates that the IOA is installed in the right IOA bay (E120 router) or the upper IOA bay (E320 router).
 - 1 indicates that the IOA is installed in the left IOA bay (E120 router) or the lower IOA bay (E320 router).
 - *port*—Port number on the IOA
- For more information about modules that support POS interfaces, see *JUNOS Physical Layer Configuration Guide, Chapter 3, Configuring Unchannelized OCx/STMx Interfaces*.
- Examples


```
host1(config-if)#interface pos 0/1
host1(config-if)#interface pos 5/0/0
```
- Use the **no** version to remove the POS interface.

load-interval

- Use to set the time interval at which the router calculates bit and packet rate counters.
- You can choose a multiple of 30 seconds, in the range 30–300 seconds.
- Example


```
host1(config-if)#load-interval 90
```
- Use the **no** version to restore the default value, 300.

loopback

- Use to specify the type of loopback for a POS interface.
 - **internal**—Connects the local transmitted signal to the local received signal.
 - **line**—Connects the received network signal directly to the transmit network signal. When configured in line loopback mode, the router never receives data from the network.

- Example
host1(config-if)#**loopback line**
- Use the **no** version to clear the loopback.

mru

- Use to set the maximum allowable size of the MRU.
- Specify a value in the range 1–9996 bytes.
- Example
host1(config-if)#**mru 1000**
- Use the **no** version to restore the default value, 4470.

mtu

- Use to set the maximum allowable size of the MTU.
- Specify a value in the range 1–9996 bytes.
- Example
host1(config-if)#**mtu 1000**
- Use the **no** version to restore the default value, 4470.

pos description

- Use to assign a text description or an alias to a POS HDLC interface.
- You can use this command to help you identify the interface and keep track of interface connections.
- The description or alias can be a maximum of 80 characters.
- Use the **show interfaces pos** command to display the text description.
- Example
host1(config-if)#**pos description austin01 pos interface**
- Use the **no** version to remove the text description or alias.

pos framing

- Use to set the type of framing for a POS interface.
 - **sdh**—Uses SDH framing format
 - **sonet**—Uses SONET framing format (the default)
- Example
host1(config-if)#**pos framing sdh**
- Use the **no** version to restore the default value, **sonet**.

pos scramble-atm

- Use to enable payload scrambling on a POS interface.
- Payload scrambling is enabled by default. When enabled, both sides of the connection must be using the scrambling algorithm. The router uses a 43rd-order synchronous scrambler to scramble the output data.
- Example
host1(config-if)#**pos scramble-atm**
- Use the **no** version to disable scrambling on the POS interface.

shutdown

- Use to disable a POS interface.
- Example
host1(config-if)#**shutdown**
- Use the **no** version to restart a disabled interface.

Monitoring POS

Use the **show interfaces pos** command to display information about the POS interface. You can set a statistics baseline for POS interfaces using the **baseline interface pos** command.

You can use the output filtering feature of the **show** command to include or exclude lines of output based on a text string you specify. See *show Commands in JUNOS System Basics Configuration Guide, Chapter 2, Command-Line Interface*, for details.



NOTE: The E120 router and E320 router output for **monitor** and **show** commands is identical to output from other E-series routers, except that the E120 and E320 router output also includes information about the adapter identifier in the interface specifier (*slot/adapter/port*).

baseline interface pos

- Use to set a statistics baseline for POS interfaces. The router implements the baseline by reading and storing the statistics at the time the baseline is set and then subtracting this baseline whenever baseline-relative statistics are retrieved.
- Example
host1#**baseline interface pos 8/0**
- There is no **no** version.

show interfaces pos

- Use to display the configuration, state, and statistics for a POS interface.
- To specify a POS interface for ERX-7xx models, ERX-14xx models, and ERX-310 routers, use the *slot/port[.subinterface]* format.
 - *slot*—Number of the chassis slot
 - *port*—Port number on the I/O module
 - *subinterface*—Number of the subinterface
- To specify a POS interface for E120 and E320 routers, use the *slot/adapter/port* format.
 - *slot*—Number of the chassis slot
 - *adapter*—Identifier for the IOA within the E320 chassis, either 0 or 1, where:
 - 0 indicates that the IOA is installed in the right IOA bay (E120 router) or the upper IOA bay (E320 router).
 - 1 indicates that the IOA is installed in the left IOA bay (E120 router) or the lower IOA bay (E320 router).
 - *port*—Port number on the IOA
- You can include the following keywords:
 - **delta**—Specifies that baselined statistics are to be shown
 - **brief**—Displays the operational status of all configured interfaces
- Field descriptions
 - POS interface status—State of the physical interface: up, down
 - Description—Text description or alias if configured for the interface
 - snmp trap link-status—SNMP trap status: disabled: up, down
 - Encapsulation—Layer 2 encapsulation display; options: ppp, frame-relay ietf, mlppp, mlframe-relay ietf, hdlc
 - SONET path operational status—State of the SONET path: up, down, lowerLayerDown
 - time since last status change—Last reported change to the SONET path operational status
 - SONET operational status—State of SONET operation: up, down, lowerLayerDown
 - time since last status change—Last reported change to the SONET operational status
 - loopback—Loopback status for the physical interface: enabled, disabled
 - timing source—Clocking source for the physical interface
 - framing type—Framing type for the physical interface
 - Crc type checking—Number of bits used for CRC checking: crc16, crc32, none
 - Hdlc mru—MRU size allowed on the interface
 - Hdlc mtu—MTU size allowed on the interface

- Hdlc interface speed—Line speed of the interface
- Hdlc scrambling—Status of payload scrambling on the interface: on, off
- 5 minute input rate—Data rates based on the traffic received in the last five minutes
- 5 minute output rate—Data rates based on the traffic sent in the last five minutes
- Packets received—Number of incoming packets received on this interface
- Bytes received—Number of incoming bytes received on this interface
- Errored packets received—Number of incoming errors received on this interface
- Packets sent—Number of outgoing packets transmitted on this interface
- Bytes sent—Number of outgoing bytes transmitted on this interface
- Errored packets sent—Number of outgoing errors on this interface

■ Example

```

host1#show interfaces pos 8/0
Packet over SONET interface 8/0 is ifOperUp
Description: houston80 pos interface
snmp trap link-status = disabled
Encapsulation ppp
SONET path operational status: up
    time since last status change: 00:20:37
SONET operational status:      up
    time since last status change: 00:20:37
Loopback not set
timing source is loop timing
framing type is SONET
Crc type checking - CRC32
Hdlc mru = 4470
Hdlc mtu = 4470
Hdlc interface speed = 155520000
Hdlc scrambling is off
5 minute input rate 24910848 bits/sec, 1023242 packets/sec
5 minute output rate 24905728 bits/sec, 1023233 packets/sec

Interface statistics
Packets received          1066995954
Bytes received            3836558195
Errored packets received   0
Packets sent              1055275550
Bytes send                 3039550548
Errored packets sent       0

```

