



## Packet-over-SONET Interface Commands

This module provides command line interface (CLI) commands for configuring Packet-over-SONET/SDH (POS) on the Cisco ASR 9000 Series Router.

To use commands of this module, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using any command, contact your AAA administrator for assistance.

This module describes the Cisco IOS XR commands used to configure, monitor, and troubleshoot Packet-over-SONET/SDH (POS).

POS provides a method for efficiently carrying data packets in SONET or Synchronous Digital Hierarchy (SDH) frames. High-bandwidth capacity and efficient link utilization are characteristics that make POS largely preferred for building the core of data networks. POS uses PPP in High-Level Data Link Control (HDLC)-like framing for data encapsulation at Layer 2 (data link) of the Open System Interconnection (OSI) stack. This method provides efficient packet delineation and error control.

In addition to high-bandwidth efficiency, POS offers secure and reliable transmission for data. Reliable data transfer depends on timing integrity.

The real-time POS functionality is performed in hardware, according to the hardware configuration setup. Configured hardware events are detected by the framer application-specific integrated circuits (ASICs) and the control is passed to the software. The generic POS driver is responsible for providing a mechanism to configure the hardware on a per-interface basis, to handle interface state transitions, and to collect POS-related statistics.

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## crc (POS)

To set the length of the cyclic redundancy check (CRC) on a Packet-over-SONET/SDH (POS) interface, use the **crc** command in POS configuration mode. To return the CRC setting on a POS interface to the 32-bit default setting, use the **no** form of this command.

```
crc {16 | 32}
```

<b>Syntax Description</b>	<b>16</b> Sets 16-bit CRC mode.
	<b>32</b> Sets 32-bit CRC mode. The default is 32 bits.

<b>Command Default</b>	The default CRC mode is 32 bits.
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<b>Command Modes</b>	POS configuration
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<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	Release 4.0.0	This command was introduced.

<b>Usage Guidelines</b>	CRC is an error-checking technique that uses a calculated numeric value to detect errors in transmitted data. The designators 16 and 32 indicate the length (in bits) of the frame check sequence (FCS). A CRC of 32 bits provides more powerful error detection, but adds overhead. Both the sender and receiver must use the same setting.
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CRC-16, the most widely used error checking method throughout the United States and Europe, is used extensively with WANs. CRC-32 is specified by IEEE standard 802 and as an option by some point-to-point transmission standards. It is often used on Switched Multimegabit Data Service (SMDS) networks and LANs.

<b>Task ID</b>	<b>Task ID</b>	<b>Operations</b>
	pos-dpt	read, write

<b>Examples</b>	In this example, the 32-bit CRC on POS interface 0/1/0/2 is enabled:
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```
rack/slot/module(config)# interface POS 0/1/0/2
rack/slot/module(config-if)# POS
rack/slot/module(config-if-pos)# crc 32
```

<b>Related Commands</b>	<b>Command</b>	<b>Description</b>
	<a href="#">transmit-delay, on page 13</a>	Specifies a number of flag sequences to be inserted between the packets.

## encapsulation (POS)

To set the Layer 2 encapsulation of an interface, use the **encapsulation** command in interface configuration mode. To restore the system to the default encapsulation, use the **no** form of this command.

```
encapsulation {hdlc | ppp | frame-relay [ietf] }
```

Syntax Description	Keyword	Description
	<b>hdlc</b>	Enables Cisco High-Level Data Link Control (cHDLC) encapsulation on the interface. This is the default encapsulation type.
	<b>ppp</b>	Enables Point-to-Point Protocol (PPP) encapsulation on the interface.
	<b>frame-relay</b>	Enables Frame Relay encapsulation on the interface.
	<b>ietf</b>	(Optional) Enables RFC1490/RFC2427 encapsulation.

**Command Default** For Packet-over-SONET/SDH (POS) interfaces, the default encapsulation is HDLC.

**Command Modes** Interface configuration

Command History	Release	Modification
	Release 4.0.0	This command was introduced.

**Usage Guidelines** The task ID **hdlc** (r,w) is required for use of the keyword **hdlc**. The task ID **ppp**(r,w) is required for use of the keyword **ppp**. The task ID **fr**(r,w) is required for use of the keyword **frame-relay**.

Task ID	Task ID	Operations
	hdlc OR ppp OR fr	read, write
	interface	read, write

### Examples

In this example, PPP encapsulation is set on POS interface 0/3/0/1:

```
RP/0/RSP0/CPU0:router(config)# interface POS 0/3/0/1
RP/0/RSP0/CPU0:router(config-if)# encapsulation ppp
```

Related Commands	Command	Description
	<a href="#">show interfaces pos, on page 10</a>	Displays information about a POS interface.

# interface pos

To enter interface or subinterface configuration mode for a POS interface or subinterface, use the **interface pos** command in Global Configuration mode. To delete a POS configuration, use the **no** form of this command.

```
interface pos interface-path-id[.subinterface {l2 transport | point-to-point}]
```

Syntax Description	
<i>interface-path-id</i> [ <i>.subinterface</i> ]	Physical interface or virtual interface followed by the optional subinterface path ID. Naming notation is <i>interface-path-id.subinterface</i> . The period in front of the subinterface value is required as part of the notation.  For more information about the syntax for the router, use the question mark (?) online help function.
<b>l2transport</b>	(Optional) Configures the interface to function as an attachment circuit (AC) on one endpoint of a Layer 2 link.
<b>point-to-point</b>	(Optional) Configures interface to function as one endpoint of a point-to-point link.

**Command Default** No default behavior or values

**Command Modes** Global Configuration mode

Command History	Release	Modification
	Release 4.0.0	This command was introduced.

**Usage Guidelines** Subinterfaces of a POS interface can only be configured using the **l2transport** keyword, if Frame Relay encapsulation is configured on the POS interface, using the **encapsulation frame-relay** command. Interfaces configured to use HDLC or PPP encapsulation cannot be configured using the **l2transport** keyword.

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*: Chassis number of the rack.
  - *slot*: Physical slot number of the line card.
  - *module*: Module number. A physical layer interface module (PLIM) is always 0.
  - *port*: Physical port number of the interface.
- If specifying a virtual interface, the number range varies, depending on interface type.

Task ID	Task ID	Operations
	interface	read, write

## Examples

The following example shows how to enter interface configuration mode for a POS interface:

```
RP/0/RSP0/CPU0:router(config)# interface pos 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)#
```

The following example shows how to create a subinterface on a POS interface in slot 1, subslot 1, port 2 and enter subinterface configuration mode:

```
RP/0/RSP0/CPU0:router(config)# interface pos 0/1/1/2.1
RP/0/RSP0/CPU0:router(config-subif)#
```

The following example shows how to configure frame-relay encapsulation on the main POS interface before being able to configure an AC subinterface:

```
RP/0/RSP0/CPU0:router# interface pos 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# encapsulation frame-relay
RP/0/RSP0/CPU0:router(config-if)# commit
RP/0/RSP0/CPU0:router(config-if)# exit
RP/0/RSP0/CPU0:router(config)# interface pos 0/1/0/0.1 12transport
RP/0/RSP0/CPU0:router(config-subif)# commit
```

## Related Commands

Command	Description
<a href="#">show interfaces pos, on page 10</a>	Displays information about a POS interface.

# keepalive (POS)

To set the keepalive timer for a specific interface, use the **keepalive** command in interface configuration mode. To reset the keepalive timer to the default of 10 seconds, use the **no** form of this command.

**keepalive** {*interval* [*retry*] | **disable**}

## Syntax Description

*interval* Number of seconds (from 1 to 30) between keepalive messages. The default is 10.

*retry* (Optional) Number of keepalive messages (from 1 to 255) that can be sent to a peer without a response before transitioning the link to the down state. The default is 5 for interfaces with PPP encapsulation, and 3 for interfaces with HDLC encapsulation.

**disable** Turns off the keepalive timer.

## Command Default

The default interval is 10 seconds between keepalive messages. The default number of retry keepalive messages that can be sent without a response is 5 for interfaces with PPP encapsulation, and 3 for interfaces with HDLC encapsulation. However, when more than 5 (or 3) keepalive messages are sent to a peer without a response, the link transitions to the down state.

## Command Modes

Interface configuration

## Command History

Release	Modification
Release 4.0.0	This command was introduced.

## Usage Guidelines

HDLC keepalives require that the **keepalive** command is configured the same way on both routers. The two connected routers have no way of negotiating the keepalive value, because there is no way for the routers to tell each other what their configured values are. The keepalive value configured on each router (local and partner) sets the rate at which the Cisco IOS XR software sends packets. It also sets the rate at which the local end expects to receive incoming packets.

To set the keepalive value to the default value, use the **keepalive** command without specifying a value for the *seconds* argument.

If three keepalives are sent to the peer and no response is received from the peer, then the link makes the transition to the down state.

## Task ID

Task ID	Operations
hdlc	read, write
ppp	read,write

## Examples

This example shows how to configure keepalives for 3 seconds on POS interface 0/7/0/1:

```
RP/0/RSP0/CPU0:router(config)# interface POS 0/7/0/1  
RP/0/RSP0/CPU0:router(config-if)# keepalive 3
```

# pos

To access the POS configuration submode, use the **pos** command in interface configuration mode.

## pos

<b>Command Default</b>	No default behavior or values
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<b>Command Modes</b>	Interface configuration
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<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	Release 4.0.0	This command was introduced.

<b>Usage Guidelines</b>	When you issue the <b>pos</b> command in interface configuration mode for a POS interface, the CLI prompt changes to “config-if-pos” indicating that you have entered POS configuration submode. In the following sample output, the question mark (?) online help function displays all the commands available under POS configuration submode:
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```
RP/0/RSP0/CPU0:router(config)# interface POS 0/1/0/2
RP/0/RSP0/CPU0:router(config-if)# POS
RP/0/RSP0/CPU0:router(config-if-pos)# ?

    commit          Commit the configuration changes to running
    crc             Set the CRC on a POS interface
    describe        Describe a command without taking real actions
    do              Run an exec command
    exit            Exit from this submode
    no              Negate a command or set its defaults
    show            Show contents of configuration
    transmit-delay  Set POS transmit delay on an interface
```

<b>Task ID</b>	<b>Task ID</b>	<b>Operations</b>
	pos-dpt	read, write

## Examples

The following example shows how to access the POS configuration submode from the POS configuration mode:

```
RP/0/RSP0/CPU0:router(config)# interface POS 0/1/0/2
RP/0/RSP0/CPU0:router(config-if)# POS
RP/0/RSP0/CPU0:router(config-if-pos)#
```



Related Commands	Command	Description
	<a href="#">crc (POS), on page 2</a>	Sets the length of the CRC on a Packet-over-SONET/SDH (POS) interface.
	<a href="#">transmit-delay, on page 13</a>	Specifies a number of flag sequences to be inserted between the packets.

# show interfaces pos

To display information about a POS interface, use the **show interfaces pos** command in EXEC mode .

**show interfaces pos** *interface-path-id* [{**accounting** [**rates**] | **brief** | **description** | **detail**}] [**location** *node-id*]

## Syntax Description

*interface-path-id* (Optional) Physical interface or virtual interface.

**Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router.

For more information about the syntax for the router, use the question mark (?) online help function.

**accounting** (Optional) Displays accounting information for all POS interfaces on the router, for a specific POS interface instance, or for all POS interfaces on a specific node.

**rates** (Optional) Displays interface accounting rates for all POS interfaces on the router, for a specific POS interface instance, or for all POS interfaces on a specific node.

**brief** (Optional) Displays brief output for all POS interfaces on the router, for a specific POS interface instance, or for all POS interfaces on a specific node.

**description** Displays descriptive output for all POS interfaces on the router, for a specific POS interface instance, or for all POS interfaces on a specific node.

**detail** (Optional) Displays detailed output for all POS interfaces on the router, for a specific POS interface instance, or for all POS interfaces on a specific node.

**location** *node-id* (Optional) Displays detailed POS information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

## Command Default

Enter the **show interfaces pos** command without including any of the optional keywords or arguments to display detailed information about all POS interfaces configured on the router.

## Command Modes

EXEC mode

## Command History

Release	Modification
Release 4.0.0	This command was introduced.

## Usage Guidelines

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*: Chassis number of the rack.
  - *slot*: Physical slot number of the line card.
  - *module*: Module number. A physical layer interface module (PLIM) is always 0.

- *port*: Physical port number of the interface.
- If specifying a virtual interface, the number range varies, depending on interface type.

**Task ID**

**Task ID Operations**

interface read

**Examples**

The following example shows how to display summarized information for a POS interface on a specific node:

```
RP/0/RSP0/CPU0:router# show interfaces pos summary location 0/1/CPU0

Interface Type          Total    UP      Down    Admin Down
-----
ALL TYPES                4        1       1        2
-----
IFT_POS                  4        1       1        2
```

**Table 1: show interfaces pos summary Field Descriptions**

Field	Description
Intf Type	Type of interface described in the display.
Total	Total number of configured interfaces of the specified type.
Up	Number of interfaces of the specified type that are in the “Up” state.
Down	Number of interfaces of the specified type that are in the “Down” state.
Admin Down	Number of interfaces of the specified type that are in the “Admin Down” state.

The following example shows how to display brief information for a specific POS interface:

```
RP/0/RSP0/CPU0:router# show interfaces pos 0/2/0/0 brief

          Intf      Intf      LineP      Encap  MTU      BW
          Name      State     State     Type  (byte)  (Kbps)
-----
          PO0/2/0/0  admin-down  admin-down  HDLC  4474    2488320
```

**Table 2: show interfaces pos Field Descriptions**

Field	Description
Intf Name	Interface identifier, in the <i>type*rack/slot/module/port</i> notation.
Intf State	Indicates whether the interface is in the admin-up or admin down state.
LineP State	Line protocol state.

 show interfaces pos

Field	Description
Encap Type	Encapsulation type for the specified interface. Can be HDLC or PPP.
MTU (byte)	Maximum transmission unit (MTU) value configured for the specified interface, in bytes.
BW (Kbps)	Bandwidth of the interface, in kbps.

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**Related Commands**

Command	Description
<a href="#">show controllers pos</a>	Displays information on the POS controllers.
<a href="#">show controllers sonet</a>	Displays information about the operational status of SONET layers.

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# transmit-delay

To specify a number of flag sequences to be inserted between the packets, use the **transmit-delay** command in POS configuration mode. To restore the default, use the **no** form of this command.

**transmit-delay** *microseconds*

<b>Syntax Description</b>	<i>microseconds</i> Number of microseconds of minimum delay after sending a packet. Range is from 0 to 1023. Default is 0 (disabled).
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<b>Command Default</b>	<i>microseconds</i> = 0 (disabled)
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<b>Command Modes</b>	POS configuration
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<b>Command History</b>	<b>Releases</b>	<b>Modifications</b>
	Release 4.0.0	This command was introduced.

<b>Usage Guidelines</b>	No specific guidelines impact the use of this command.
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Task ID	Task	Operations
	pos-dpt	read, write

## Examples

In the following example, a delay of 2 microseconds is specified on POS interface 0/1/0/2:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface POS 0/1/0/2
RP/0/RSP0/CPU0:router(config-if)# pos
RP/0/RSP0/CPU0:router(config-if-pos)# transmit-delay 2
```

In the following example, the transmit delay on POS interface 0/1/0/2 is disabled:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface POS 0/1/0/2
RP/0/RSP0/CPU0:router(config-if)# pos
RP/0/RSP0/CPU0:router(config-if-pos)# no transmit-delay
```

Related Commands	Command	Description
	show interfaces	

transmit-delay