



Configuring the POS SPAs

This chapter provides information about configuring the Packet over SONET (POS) shared port adapters (SPAs) on the Cisco ASR 1000 Series Aggregation Services Routers. This chapter includes the following sections:

For information about managing your system images and configuration files, refer to the [Cisco IOS XE Configuration Fundamentals Configuration Guide, Release 2](#) and [Cisco IOS Configuration Fundamentals Command Reference](#) publications that correspond to your Cisco IOS XE software release.

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Configuration Tasks

This section describes how to configure POS SPAs and includes information about verifying the configuration. It includes the following topics:

Specifying the Interface Address on a SPA

SPA interface ports begin numbering with “0” from left to right. Single-port SPAs use only the port number 0. To configure or monitor SPA interfaces, you need to specify the physical location of the SIP, SPA, and interface in the CLI. The interface address format is *slot/subslot/port*, where:

- *slot*—Specifies the chassis slot number in the Cisco ASR 1000 Series Router where the SIP is installed.
- *subslot*—Specifies the secondary slot of the SIP where the SPA is installed.
- *port*—Specifies the number of the individual interface port on a SPA.

The following example shows how to specify the first interface (0) on a SPA installed in the first subslot of a SIP (0) installed in chassis slot 2:

```
Router(config)# interface serial 2/0/0
```

This command shows a serial SPA as a representative example, however the same *slot/subslot/port* format is similarly used for other SPAs (such as ATM and POS) and other non-channelized SPAs.

For more information about identifying slots and subslots, see the [Configuring the Encapsulation Type](#), on page 8.

Modifying the Interface MTU Size

The Cisco IOS software supports three different types of configurable maximum transmission unit (MTU) options at different levels of the protocol stack:

- **Interface MTU**—Checked by the SPA on traffic coming in from the network. Different interface types support different interface MTU sizes and defaults. The interface MTU defines the maximum packet size allowable (in bytes) for an interface before drops occur. If the frame is smaller than the interface MTU size, but is not smaller than three bytes of payload size, then the frame continues to process.
- **IP MTU**—Can be configured on a subinterface and is used by the Cisco IOS software to determine whether fragmentation of a packet takes place. If an IP packet exceeds the IP MTU size, then the packet is fragmented.
- **Tag or Multiprotocol Label Switching (MPLS) MTU**—Can be configured on a subinterface and allows up to six different labels, or tag headers, to be attached to a packet. The maximum number of labels is dependent on your Cisco IOS software release.

Different encapsulation methods and the number of MPLS MTU labels add additional overhead to a packet. For example, for an Ethernet packet, SNAP encapsulation adds an 8-byte header, dot1q encapsulation adds a 2-byte header, and each MPLS label adds a 4-byte header (n labels \times 4 bytes).



Note

In the Cisco ASR 1000 Series Route Processor 1 (RP1), 2RU and 2RU-Fixed chassis, the MTU size for the Management Ethernet interface (interface gigabitethernet 0) is limited to 2370 bytes.

Interface MTU Configuration Guidelines

When configuring the interface MTU size on the POS SPAs, consider the following guidelines:

- If you are also using MPLS, be sure that the **mpls mtu** command is configured for a value less than or equal to the interface MTU.
- If you change the interface MTU size, the giant counter increments when the interface receives a packet that exceeds the MTU size that you configured, plus an additional 24 bytes for overhead, and an additional 2 or 4 bytes for the configured cyclic redundancy check (CRC).

For example, with a maximum MTU size of 9216 bytes, the giant counter increments:

- ◦ For a 16-bit CRC (or FCS), when receiving packets larger than 9242 bytes ($9216 + 24 + 2$).
- ◦ For a 32-bit CRC, when receiving packets larger than 9244 bytes ($9216 + 24 + 4$).
- The Frame Relay Local Management Interface (LMI) protocol requires that all permanent virtual circuit (PVC) status reports fit into a single packet. Using the default MTU of 4470 bytes, this limits the number

of data-link connection identifiers (DLCIs) to 890. The following formula demonstrates how to determine the maximum DLCIs for a configured interface MTU:

- Maximum DLCIs = (MTU bytes – 20)/(5 bytes per DLCI)
- Maximum DLCIs for the default MTU = (4470 – 20)/5 = 890 DLCIs per interface

Interface MTU Configuration Task

To modify the MTU size on an interface, use the following command in interface configuration mode:

Command	Purpose
Router(config-if)# mtu bytes	Configures the maximum packet size for an interface, where: <ul style="list-style-type: none"> • <i>bytes</i>— Specifies the maximum number of bytes for a packet. The default is 4470 bytes.

To return to the default MTU size, use the **no** form of the command.

Verifying the MTU Size

To verify the MTU size for an interface, use the **show interfaces pos** privileged EXEC command and observe the value shown in the “MTU” field.

The following example shows an MTU size of 4470 bytes for interface port 0 (the first port) on the SPA installed in subslot 1 of the SIP that is located in slot 2 of the Cisco ASR 1000 Series Routers:

```
Router# show interfaces pos 2/1/0

POS2/1/0 is up, line protocol is up
  Hardware is Packet over Sonet
  Internet address is 10.1.1.1/24
  MTU 4470 bytes
  , BW 155000 Kbit, DLY 100 usec,
  reliability 255/255, txload 1/255, rxload 1/255.
```

Modifying the POS Framing

POS framing can be specified as SONET (Synchronous Optical Network) or SDH (Synchronous Digital Hierarchy). SONET and SDH are a set of related standards for synchronous data transmission over fiber-optic networks. SONET is the United States version of the standard published by the American National Standards Institute (ANSI). SDH is the international version of the standard published by the International Telecommunications Union (ITU).

To modify the POS framing, use the following command in interface configuration mode:

Command	Purpose
Router(config-if)# pos framing {sonet sdh}	<p>Specifies the POS framing type, where:</p> <ul style="list-style-type: none"> • sonet—Enables Synchronous Optical Network framing for optical carrier (OC) rates. This is the default. • sdh—Enables Synchronous Digital Hierarchy framing for synchronous transfer mode (STM) rates. <p>The POS framing type must be configured to be the same on both ends of the POS link.</p>

To return to the default, use the **no** form of the command.

Verifying the POS Framing

To verify the POS framing, use the **show controllers pos** privileged EXEC command and observe the value shown in the “Framing” field. The following example shows that POS framing mode is set to SONET for the first interface (0) on the POS SPA installed in subslot 2 of a SIP installed in chassis slot 3:

```
Router# show controllers pos 3/2/0
POS3/2/0
SECTION
LOF = 0 LOS = 0 BIP(B1) = 0
LINE
AIS = 0 RDI = 0 FEBE = 0 BIP(B2) = 0
PATH
AIS = 0 RDI = 0 FEBE = 0 BIP(B3) = 0
PLM = 0 UNEQ = 0 TIM = 0 TIU = 0
LOP = 0 NEWPTR = 0 PSE = 0 NSE = 0
Active Defects: None
Active Alarms: None
Alarm reporting enabled for: SF SLOS SLOF B1-TCA B2-TCA PLOP B3-TCA
Framing: SONET
APS
COAPS = 0 PSBF = 0
State: PSBF_state = False
Rx(K1/K2): 00/00 Tx(K1/K2): 00/00
Rx Synchronization Status S1 = 00
S1S0 = 00, C2 = CF
Remote aps status (none); Reflected local aps status (none)
CLOCK RECOVERY
RDOOL = 0
State: RDOOL_state = False
PATH TRACE BUFFER: STABLE
Remote hostname: sip-sw-7600-2
Remote interface: POS3/2/1
Remote IP addr: 0.0.0.0
Remote Rx(K1/K2): 00/00 Tx(K1/K2): 00/00
BER thresholds: SF = 10e-3 SD = 10e-6
TCA thresholds: B1 = 10e-6 B2 = 10e-6 B3 = 10e-6
Clock source: internal
```

Modifying the Keepalive Interval

When the keepalive feature is enabled, a keepalive packet is sent at the specified time interval to keep the interface active. The keepalive interval *must* be configured to be the same on both ends of the POS link.

To modify the keepalive interval, use the following command in interface configuration mode:

Command	Purpose
Router(config-if)# keepalive [<i>period</i> [<i>retries</i>]]	<p>Specifies the frequency at which the Cisco IOS software sends messages to the other end of the link, to ensure that a network interface is alive, where:</p> <ul style="list-style-type: none"> • <i>period</i>— Specifies the time interval in seconds for sending keepalive packets. The default is 10 seconds. • <i>retries</i>— Specifies the number of times that the device will continue to send keepalive packets without response before bringing the interface down. The default is 5 retries.

To disable keepalive packets, use the **no** form of this command.



Note

If keepalives are enabled and you are trying to configure line loopback on a POS interface, the keepalive protocol will fail and periodically reset the interface based on the keepalive timeout and cause Layer 1 errors on the other end of the link that is trying to do the loopbacks. You can avoid this by using the **no keepalive** command on the POS interface that is configured for line loopback. The side that is not in line loopback detects that its keepalive is being looped back and functions properly. An interface configured for internal loopback also functions properly with keepalives enabled.

Verifying the Keepalive Interval

To verify the keepalive interval, use the **show interfaces pos** privileged EXEC command and observe the value shown in the “Keepalive” field.

The following example shows that keepalive is enabled for interface port 0 on the POS SPA installed in subslot 0 of the SIP that is located in chassis slot 2 of the Cisco ASR 1000 Series Router:

```
Router# show interfaces pos 2/0/0
  POS2/0/0 is up, line protocol is up
  Hardware is Packet over SonetInternet address is 10.1.1.1.2MTU 9216 bytes, BW 622000 Kbit,
  DLY 100 usec, reliability 255/255, txload 1/255, rxload 1/255
  Keepalive set (10 sec.)
```

Modifying the CRC Size

CRC is an error-checking technique that uses a calculated numeric value to detect errors in transmitted data. The CRC size indicates the length in bits of the FCS.

The CRC size *must* be configured to be the same on both ends of the POS link.

To modify the CRC size, use the following command in interface configuration mode:

Command	Purpose
Router(config-if)# crc [16 32]	<p>(As Required) Specifies the length of the cyclic redundancy check (CRC), where:</p> <ul style="list-style-type: none"> • 16— Specifies a 16-bit length CRC. This is the default. • 32— Specifies a 32-bit length CRC. <p>The CRC size must be configured to be the same on both ends of the POS link.</p>

To return to the default CRC size, use the **no** form of the command.

Verifying the CRC Size

To verify the CRC size, use the **show interfaces pos** privileged EXEC command and observe the value shown in the “CRC” field.

The following example shows that the CRC size is 16 for interface port 0 on the POS SPA installed in subslot 0 of the SIP that is located in chassis slot 2 of the Cisco ASR 1000 Series Router:

```
Router# show interfaces pos 2/0/0
Hardware is Packet over SonetInternet address is 10.1.1.2.1MTU 9216 bytes, BW 622000 Kbit,
  DLY 100 usec reliability 255/255, txload 1/255, rxload 1/255
Encapsulation HDLC, crc 16
, loopback not set
```

Modifying the Clock Source

A clock source of **internal** specifies that the interface clocks its transmitted data from its internal clock. A clock source of **line** specifies that the interface clocks its transmitted data from a clock recovered from the line’s receive data stream.

For information about the recommended clock source settings for POS router interfaces, refer to *Configuring Clock Settings on POS Router Interfaces* at the following URL:

http://www.cisco.com/en/US/tech/tk482/tk607/technologies_tech_note09186a0080094bb9.shtml

To modify the clock source, use the following command in interface configuration mode:

Command	Purpose
Router(config-if)# clock source {line internal}	Specifies the clock source for the POS link, where: <ul style="list-style-type: none"> • line— The link uses the recovered clock from the line. This is the default. • internal—The link uses the internal clock source.

To return to the default clock source, use the **no** form of this command.

Verifying the Clock Source

To verify the clock source, use the **show controllers pos** privileged EXEC command and observe the value shown in the “Clock source” field.

The following example shows that the clock source is internal for interface port 0 on the POS SPA installed in subslot 0 of the SIP that is located in slot 2 of the Cisco ASR 1000 Series Routers:

```
Router# show controllers pos 2/0/0
POS2/0/0SECTIONLOF = 0 LOS = 1 BIP(B1) = 7LINEAIS = 0 RDI = 1 FEBE = 20 BIP(B2) = 9PATHAIS
= 0 RDI = 0 FEBE = 0 BIP(B3) = 5PLM = 0 UNEQ = 0 TIM = 0 TIU = 0LOP = 0 NEWPTR = 0 PSE =
0 NSE = 0Active Defects: NoneActive Alarms: None
Alarm reporting enabled for: SF SLOS SLOF B1-TCA LAIS LRDI B2-TCA PAIS PLOP PRDI PUNEQ
B3-TCA RDOOL APSCOAPS = 2 PSBF = 0 State: PSBF_state = FalseRx(K1/K2): 00/00 Tx(K1/K2):
00/00Rx Synchronization Status S1 = 00S1S0 = 02, C2 = CFCLOCK RECOVERYRDOOL = 0 State:
RDOOL_state = FalsePATH TRACE BUFFER: STABLERemote hostname: RouterTester. Port 102/1 Remote
interface: Remote IP addr: Remote Rx(K1/K2): / Tx(K1/K2): / BER thresholds: SF = 10e-5 SD
= 10e-6TCA thresholds: B1 = 10e-6 B2 = 10e-6 B3 = 10e-6Clock source: internal
```

Modifying SONET Payload Scrambling

SONET payload scrambling applies a self-synchronous scrambler (x43+1) to the Synchronous Payload Envelope (SPE) of the interface to ensure sufficient bit transition density.

The default configuration is SONET payload scrambling disabled.

SONET payload scrambling *must* be configured to be the same on both ends of the POS link.

To modify SONET payload scrambling, use the following command in interface configuration mode:

Command	Purpose
Router(config-if)# pos scramble-atm	Enables SONET payload scrambling.

To disable SONET payload scrambling, use the **no** form of this command.

Verifying SONET Payload Scrambling

To verify SONET payload scrambling, use the **show interfaces pos** privileged EXEC command and observe the value shown in the “Scramble” field.

The following example shows that SONET payload scrambling is disabled for interface port 0 on the POS SPA installed in subslot 0 of the SIP that is located in slot 2 of the Cisco ASR 1000 Series Routers:

```
Router# show interfaces pos 2/0/0
Hardware is Packet over Sonet Internet address is 10.0.0.1/24 MTU 9216 bytes, BW 622000
Kbit, DLY 100 usec, reliability 255/255, txload 1/255, rxload 1/255 Encapsulation HDLC,
crc 16, loopback not set Keepalive not set Scramble disabled
```

Configuring the Encapsulation Type

By default, the POS interfaces support High-Level Data Link Control (HDLC) encapsulation. The encapsulation method can be specified as HDLC, Point-to-Point Protocol (PPP), or Frame Relay. The encapsulation type *must* be configured to be the same on both ends of the POS link.

To modify the encapsulation method, use the following command in interface configuration mode:

Command	Purpose
Router(config-if)# encapsulation <i>encapsulation-type</i>	Specifies the encapsulation method used by the interface, where: <ul style="list-style-type: none"> <i>encapsulation-type</i>— Can be HDLC, PPP, or Frame Relay. The default is HDLC.

Verifying the Encapsulation Type

To verify the encapsulation type, use the **show interfaces pos** privileged EXEC command and observe the value shown in the “Encapsulation” field.

The following example shows the encapsulation type is HDLC for port 0 on the POS SPA installed in subslot 0 of the SIP that is located in slot 2 of the Cisco ASR 1000 Series Router:

```
Router# show interfaces pos 2/0/0
Hardware is Packet over Sonet Internet address is 10.0.0.1/24 MTU 9216 bytes, BW 622000
Kbit, DLY 100 usec, reliability 255/255, txload 1/255, rxload 1/255 Encapsulation HDLC
, crc 16, loopback not set Keepalive not set Scramble disabled
```

Configuring POS Alarm Trigger Delays

A trigger is an alarm that, when activated, causes the line protocol to go down. The POS alarm trigger delay helps to ensure uptime of a POS interface by preventing intermittent problems from disabling the line protocol. The POS alarm trigger delay feature delays the setting of the line protocol to down when trigger alarms are received. If the trigger alarm was sent because of an intermittent problem, the POS alarm trigger delay can prevent the line protocol from going down when the line protocol is functional.

Path-Level Triggers

You can issue the **pos delay triggers path** command to configure various path alarms as triggers and to specify an activation delay between 0 and 10000 milliseconds. The default delay value is 100 milliseconds.

The following path alarms are not triggers by default. You can configure these path alarms as triggers and also specify a delay:

- Path alarm indication signal (PAIS)
- Path remote defect indication (PRDI)
- Path loss of pointer (PLOP)

The **pos delay triggers path** command can also bring down the line protocol when the higher of the B2 and B3 error rates is compared with the signal failure (SF) threshold. If the SF threshold is crossed, the line protocol of the interface goes down.

To configure POS path-level triggers, use the following command in interface configuration mode:

Command	Purpose
Router(config-if)# pos delay triggers path <i>ms</i>	Specifies that path-level alarms should act as triggers and specifies a delay for setting the line protocol to down when a path-level trigger alarm is received, where: <ul style="list-style-type: none"> • <i>ms</i> —Specifies the delay in milliseconds. The default delay is 100 milliseconds.

To disable path-level triggers, use the **no** form of this command.

Verifying POS Alarm Trigger Delays

To verify POS alarm trigger delays, use the **show controllers pos** privileged EXEC command and observe the values shown in the “Line alarm trigger delay” and “Path alarm trigger delay” fields.

The following example shows the POS alarm trigger delays for interface port 0 on the POS SPA installed in the SIP that is located in slot 2 of the Cisco ASR 1000 Series Router:

```
Router# show controllers pos 2/0/0 details
 POS2/0/0SECTIONLOF = 0 LOS = 1 BIP(B1) = 5LINEAIS = 0 RDI = 1 FEBE = 5790 BIP(B2) =
 945PATHAIS = 0 RDI = 0 FEBE = 0 BIP(B3) = 5PLM = 0 UNEQ = 0 TIM = 0 TIU = 0LOP = 1 NEWPTR
 = 0 PSE = 0 NSE = 0Active Defects: NoneActive Alarms: NoneAlarm reporting enabled for: SF
 SLOS SLOF B1-TCA B2-TCA PLOP B3-TCA Line alarm trigger delay = 100 msPath alarm trigger
 delay = 100 ms
```

Saving the Configuration

To save your running configuration to nonvolatile random-access memory (NVRAM), use the following command in privileged EXEC configuration mode:

Command	Purpose
Router# copy running-config startup-config	Writes the new configuration to NVRAM.

For more information about managing your system image and configuration files, refer to the [Cisco IOS XE Configuration Fundamentals Configuration Guide](#) and [Cisco IOS Configuration Fundamentals Command Reference](#) publications that correspond to your Cisco IOS XE software release.

Shutting Down and Restarting an Interface on a SPA

You can shut down and restart any of the interface ports on a SPA independently of each other. Shutting down an interface stops traffic and then enters the interface into an “administratively down” state.

If you are preparing for an OIR of a SPA, it is not necessary to independently shut down each of the interfaces prior to deactivation of the SPA. You do not need to independently restart any interfaces on a SPA after OIR of a SPA or SIP. For more information about performing an OIR for a SPA, see the [Configuring the Encapsulation Type](#), on page 8.

To shut down an interface on a SPA, use the following command in interface configuration mode:

Command	Purpose
Router(config-if)# shutdown	Disables an interface.

To restart an interface on a SPA, use the following command in interface configuration mode:

Command	Purpose
Router(config-if)# no shutdown	Restarts a disabled interface.

Verifying the Interface Configuration

Besides using the **show running-configuration** command to display your Cisco ASR 1000 Series Routers configuration settings, you can use the **show interfaces pos** and **show controllers pos** commands to get detailed information on a per-port basis for your POS SPAs.

Verifying Per-Port Interface Status

To find detailed interface information on a per-port basis for the POS SPAs, use the **show interfaces pos** command. For an example of the command output for a POS SPA at location 0/3/0, see the following:

```
router# show interfaces POS 0/3/0
POS0/3/0 is administratively down, line protocol is down
  Hardware is Packet over Sonet
  MTU 4470 bytes, BW 155000 Kbit, DLY 100 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation HDLC, crc 16, loopback not set
  Keepalive set (10 sec)
  Scramble disabled
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/375/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
```

```

5 minute output rate 0 bits/sec, 0 packets/sec
 0 packets input, 0 bytes, 0 no buffer
Received 0 broadcasts (0 IP multicasts)
0 runs, 0 giants, 0 throttles
 0 parity
0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
0 packets output, 0 bytes, 0 underruns
0 output errors, 0 applique, 1 interface resets
0 output buffer failures, 0 output buffers swapped out
0 carrier transitions

```

Monitoring Per-Port Interface Statistics

To find detailed alarm and error information on a per-port basis for the POS SPAs, use the **show controllers pos** command. For an example of the command output for a POS SPA at location 0/3/0, see the following:

```

router# show controllers pos
POS0/3/0
SECTION
  LOF = 0          LOS   = 0          BIP(B1) = 0
LINE
  AIS = 0          RDI   = 0          FEBE = 0          BIP(B2) = 0
PATH
  AIS = 0          RDI   = 0          FEBE = 0          BIP(B3) = 0
  PLM = 0          UNEQ  = 0          TIM  = 0          TIU   = 0
  LOP = 0          NEWPTR = 0        PSE  = 0          NSE   = 0
Active Defects: None
Active Alarms: None
Alarm reporting enabled for: SF SLOS SLOF B1-TCA B2-TCA PLOP B3-TCA
Framing: SONET
APS
  COAPS = 0        PSBF = 0
  State: PSBF_state = False
  Rx(K1/K2): 00/00 Tx(K1/K2): 00/00
  Rx Synchronization Status S1 = 00
  S1S0 = 00, C2 = 00
  Remote aps status (none); Reflected local aps status (none)
--More--
                                CLOCK RECOVERY
  RDOOL = 0
  State: RDOOL_state = False
PATH TRACE BUFFER: UNSTABLE
  Remote hostname :
  Remote interface:
  Remote IP addr  :
  Remote Rx(K1/K2): / Tx(K1/K2): /
BER thresholds: SF = 10e-3 SD = 10e-6
TCA thresholds: B1 = 10e-6 B2 = 10e-6 B3 = 10e-6
Clock source: line

```

Configuration Examples

This section includes the following examples for configuring a POS SPA installed in a Cisco ASR 1000 Series Router:

Basic Interface Configuration Example

The following example shows how to enter global configuration mode to specify the interface that you want to configure, configure an IP address for the interface, enable the interface, and save the configuration. This

example configures interface port 0 (the first port) of the SPA located in subslot 0 of the SIP that is installed in slot 2 of the Cisco ASR 1000 Series Router:

```
!Enter global configuration mode
!
Router# configure terminal
!
! Specify the interface address
!
Router(config)# interface pos 2/0/0
!
! Configure an IP address
!
Router(config-if)# ip address 192.168.50.1 192.255.255.0
!
! Enable the interface
!
Router(config-if)# no shutdown
!
! Save the configuration to NVRAM
!
Router(config-if)# exit
Router# copy running-config startup-config
```

MTU Configuration Example

The following example sets the MTU to 4470 bytes on interface port 1 (the second port) of the SPA located in the bottom subslot (1) of the SIP that is installed in slot 2 of the Cisco ASR 1000 Series Router:

```
!Enter global configuration mode
!
Router# configure terminal
!
```

```
! Specify the interface address
!
Router(config)# interface pos 2/1/1
!
! Configure MTU
!
Router(config-if)# mtu 4470
```

POS Framing Configuration Example

The following example shows how to change from the default POS framing of SONET to SDH:

```
!Enter global configuration mode
!
Router# configure terminal
!
! Specify the interface address
!
Router(config)# interface pos 2/1/1
! (The default pos framing is sonet)
!
!Modify the framing type
!
Router(config-if)# pos framing sdh
```

Keepalive Configuration Example

The following example shows how to change from the default keepalive period of 10 seconds to 20 seconds:

```
!Enter global configuration mode
!
Router# configure terminal
!
! Specify the interface address
!
Router(config)# interface pos 2/1/1
!
! Configure keepalive 20
!
Router(config-if)# keepalive 20
```

CRC Configuration Example

The following example shows how to change the CRC size from 32 bits to the default 16 bits for POS SPAs:

```
!Enter global configuration mode
!
Router# configure terminal
!
! Specify the interface address
!
Router(config)# interface pos 2/1/1
!
! Configure crc 16
!
Router(config-if)# crc 16
```

Clock Source Configuration Example

The following example shows how to change from the default clock source of internal to line:

```
!Enter global configuration mode
!
Router# configure terminal
!
! Specify the interface address
!
Router(config)# interface pos 2/1/1
!
! Configure the clock source
!
Router(config-if)# clock source line
```

SONET Payload Scrambling Configuration Example

The following example shows how to change from a default SONET payload scrambling of disabled to enabled:

```
!Enter global configuration mode
!
Router# configure terminal
!
! Specify the interface address
!
Router(config)# interface pos 2/1/1
!
! Configure the SONET payload scrambling
!
Router(config-if)# pos scramble-atm
```

Encapsulation Configuration Example

The following example shows how to change from the default encapsulation method of HDLC to PPP:

```
!Enter global configuration mode
!
Router# configure terminal

! Specify the interface address

Router(config)# interface pos 2/1/1
!
! Configure ppp
!
Router(config-if)# encapsulation ppp
```

POS Alarm Trigger Delays Configuration Example

The following example shows how to change POS line-level and path-level alarm trigger delays from the default of 100 milliseconds to 200 milliseconds:

```
!Enter global configuration mode
!
Router# configure terminal

! Specify the interface address

Router(config)# interface pos 2/1/1
!
Router(config-if)# pos delay triggers line 200
Router(config-if)# pos delay triggers path 200
```