Troubleshooting NEWPTR Errors on POS Interfaces

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Introduction

This document explains the conditions under which a Cisco Packet Over SONET (POS) router interface increases the New Pointer (NEWPTR) event error counter, as displayed in the **show controller pos** command output.

A NEWPTR event defines the number of times a SONET framer validates a new pointer value, as indicated in the H1 and H2 bytes of the SONET overhead. This document explains how the SONET protocol uses pointers and the H1 and H2 bytes to allow payload to float inside the SONET frame.

Prerequisites

Requirements

Cisco recommends that you have knowledge of these topics:

- Path, section and line layers of the SONET transport hierarchy. Refer to A Brief Overview of SONET Technology for more information.
- Structure of a SONET frame, including the location of the Synchronous Payload Envelope (SPE). Refer to Understanding Concatenated and Channelized SONET Interfaces on Cisco Routers for more information.

Components Used

This document is not restricted to specific software and hardware versions.

Conventions

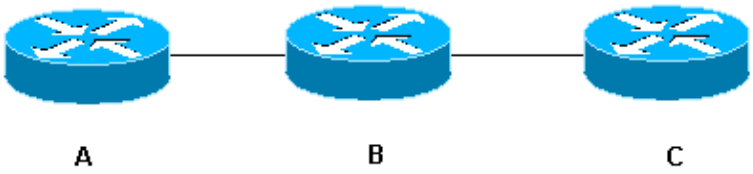
Refer to the Cisco Technical Tips Conventions for more information on document conventions.

Why Use Pointers?

SONET interfaces send one frame every 125 microseconds. Each frame contains 810 bytes. Therefore, the SONET Synchronous Transport Signal (STS)−1 bit rate is calculated as shown here:

```
810 bytes/frame x 8000 frames/second = ~51,840,000 bits/second
```

With such high bit rates, a pointer provides a key benefit. Here is a simple network diagram to illustrate this benefit:



In this scenario, router A needs to transmit data to router C. Frames arrive from A some time in the middle of the 125−microsecond period of a frame. B needs to forward the data that A sends. B forwards the data from the input port attached to A to the output port attached to C. B now has two choices:

- B can buffer the frame from A, and wait for the next 125−microsecond interval. B can then align the start of the frame from A with the first payload byte of the SONET frame.
- Alternatively, B can immediately send the frame from A in the current interval. In this case, B must use a pointer in order to indicate the byte position in which the frame from A actually starts. Therefore, the data starts anywhere inside the payload envelope. This concept is called floating payload.

Typically, SONET devices employ floating payload, although some providers choose to buffer incoming frames. Here are the benefits of a floating payload:

- You can avoid an increase in transmission delay.
- You do not need to purchase devices with large amounts of packet buffers in order to store the pending frames.

A pointer fundamentally allows asynchronous operations to be serviced within a synchronous environment. Actual payload is generated asynchronously, but the SONET frame is sent synchronously. The SONET frame is always transmitted at a fixed and constant rate, and contains either real data or a filler.

What is a NEWPTR?

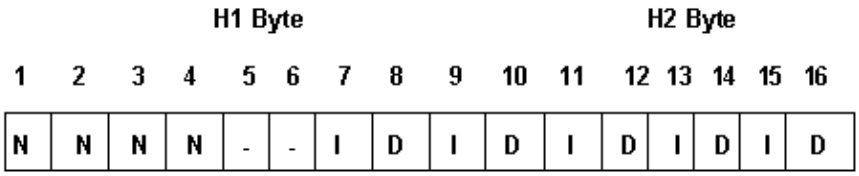
When a Cisco POS interface validates a new SONET pointer, the interface increases the NEWPTR counter. The binary value in the H1 and H2 bytes of the line overhead section indicates the increase in the NEWPTR counter.

This table illustrates the overhead bytes of each of the three layers of SONET, and the location of the H1 and H2 bytes in the line overhead:

				Path Overhead
Section Overhead	A1 Framing	A2 Framing	A3 Framing	J1 Trace
	B1 BIP−8	E1 Orderwire	E1 User	B3 BIP−8
	D1 Data Com	D2 Data Com	D3 Data Com	C2 Signal Label

Line Overhead	H1 Pointer	H2 Pointer	H3 Pointer Action	G1 Path Status
	B2 BIP−8	K1	K2	F2 User Channel
	D4 Data Com	D5 Data Com	D5 Data Com	H4 Indicator
	D7 Data Com	D8 Data Com	D9 Data Com	Z3 Growth
	D10 Data Com	D11 Data Com	D12 Data Com	Z4 Growth
	S1/Z1 Sync Status/Growth	M0 or M1/Z2 REI−L Growth	E2 Orderwire	Z5 Tandem Connection

The H1 and H2 bytes form a 16−bit field, as illustrated here:



This table explains how these bit positions are defined.

Bit Position	Definition	Explanation
Bits 1 − 4	New Data Flag (NDF)	• Set to 0110 during normal operation. A value of 0110 indicates that the value of the Pointer field is valid. • Set to 1001 (the inverse of 0110) to indicate that the previous pointer value is no longer valid, and that the Pointer field now has the correct, new value. • All other values are undefined.
Bits 5 − 6	Reserved	• Set to 00 during normal operation.
Bit 7 − 16	10−Bit pointer	• Set to zero in order to indicate that the SPE starts in row 4, column 4, immediately after the H3 byte. • Set to 87 in order to indicate

		that the SPE starts in row 5, column 4, immediately after the K2 overhead byte. • Set to 522 with Cisco POS router interfaces.

Note: A concatenated frame (for example, an STS−3c signal) uses the pointer bits of the first STS−1 frame only. The second and third sets of H1 and H2 bytes contain concatenation indicator values of 10010011 and 11111111.

A SONET framer validates a new H1 or H2 pointer value under these conditions:

- The NDF bits are inverted.
- The link initializes.
- The interface exits an alarm condition.
- Configuration changes reset some portion of the framer.

Troubleshoot NEWPTRs

When a Cisco POS interface detects an invalid pointer value or an excess number of NDF enabled indications, the interface declares a Path Loss of Pointer (PLOP) alarm.

```
router#show controller pos 3/1
POS3/1
  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
    LOP = 0           NEWPTR = 768        PSE  = 0     NSE= 1009
Active Defects: None
Active Alarms:  None
Alarm reporting enabled for: SF SLOS SLOF B1−TCA B2−TCA PLOP B3−TCA
```

The Bellcore GR−253 specification defines the SONET protocol. It specifies that SONET links must tolerate 2000 pointer adjustments per second without Loss of Pointer (LOP) alarms. This value is selected to match the recommendations of the Institute of Electrical and Electronics Engineers (IEEE) document on Digital Network Synchronization.

Pointer adjustments indicate that the SONET network is not synchronized. A rapid and constant increase in the value points to persistent timing issues. In order to troubleshoot this problem, evaluate the clock distribution tree and the accuracy of the supplied clocks with your provider.

In addition, ensure that your router endpoints have the correct clock settings. This table provides more information:

Clock Settings	Back to Back With Dark Fiber or Dense Wavelength Division Multiplexing (DWDM)	Telco Network with Add−Drop Multiplexer (ADM) or MUX
internal − internal	Yes	No
	Yes	No

internal − line		
line − internal	Yes	No
line − line	No	Yes

Also refer to Configuring Clock Settings on POS Router Interfaces for additional information.

When a Cisco POS interface connects to a remote Cisco POS interface over a SONET network, the interface can report an increase in the NEWPTRs. In this configuration, set the clock source to **line**. When the clock source is **line**, the transmission of the Cisco POS interface must be in phase with the transmission of the network. Therefore, the network does not need to compensate for differences in frequency with the signal from the endpoint. Pointer adjustments indicate a problem with a network device. Typically, the need to compensate for off−frequency signals that the ADMs pass through the SONET network causes these pointer adjustments.

The Negative Stuff Event (NSE) counter increases when pointer adjustments are needed for an internally generated clock source, as is used with back−to−back topologies. As noted previously, Cisco POS router interfaces transmit a fixed pointer value of 522. Therefore, in this topology, your router reports few, if any, NEWPTRs.

Related Information

- **A Brief Overview of SONET Technology**
- **Understanding Concatenated and Channelized SONET Interfaces on Cisco Routers**
- **Configuring Clock Settings on POS Router Interfaces**
- **Institute of Electrical and Electronics Engineers**
- **Technical Support & Documentation − Cisco Systems**

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