E3 Error Events Troubleshooting

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Introduction

This document describes the different E3 error events and outlines how to identify and troubleshoot them. A section is also provided on Hard Plug Loopback Tests.

Prerequisites

Requirements

There are no specific requirements for this document.

Components Used

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

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

Conventions

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

Identify the Error Event

The type of port adapter that you use determines which of the various Cisco IOS® software commands display the E3 error events.

The PA−E3 Port Adapter

Use the **show controllers serial** command in order to view the E3 error events on a PA−E3 port adapter.

```
dodi#show controllers serial 5/0
  M1T−E3 pa: show controller:
  ...
  Data in current interval (798 seconds elapsed):
  0 Line Code Violations, 0 P−bit Coding Violation
  0 C−bit Coding Violation
  0 P−bit Err Secs, 0 P−bit Sev Err Secs
  0 Sev Err Framing Secs, 0 Unavailable Secs
  0 Line Errored Secs, 0 C−bit Errored Secs, 0 C−bit Sev Err Secs
```

The PA−MC−E3 Port Adapter

Use the **show controllers e3** command in order to view the E3 error events on a PA−MC−E3 port adapter.

```
dodi#show controllers e3 4/0
  E3 4/0 is up.
  ...
  Data in current interval (81 seconds elapsed):
  0 Line Code Violations, 0 P−bit Coding Violation
  0 C−bit Coding Violation
  0 P−bit Err Secs, 0 P−bit Severely Err Secs
  0 Severely Err Framing Secs, 0 Unavailable Secs
  0 Line Errored Secs, 0 C−bit Errored Secs, 0 C−bit Severely Errored
```

Error Event Definitions

These are the definitions for the E3 error events, regardless of which port adapter you use:

- **Line Code Violations** This reports the number of received Bipolar Violations (BPV) that are in the HDB3 line code.
- **P−bit and C−bit Coding Violations and all derived Err Secs** These are always zero, because these errors are only defined for T3.
- **Severely Err Framing Secs** This reports the number of one second intervals in which either a Remote Alarm Indication is received or a Loss Of Frame condition occurs.
- **Unavailable Secs** This reports the number of one second intervals in which the controller fails.
- **Line Errored Secs** This reports the number of one second intervals in which a Line Code Violation occurs.

Troubleshoot the Error Events

This section describes the various error events that occur on the E3 lines and provides information on how to fix them.

Line Code Violations and Line Code Error Secs Increase

Complete these steps in order to resolve these errors:

1. Ensure that the equipment on the remote end of the 75 ohms coaxial cable sends an E3 signal with the HDB3 line code.
2. Check the integrity of the 75 ohms coaxial cable. Look for breaks or other physical abnormalities in the cable. Replace the cable if necessary.
3. Insert an external loopback cable into the port. Refer to Hard Plug Loopback Tests for E3 Lines for more information.

Severely Err Framing Secs and Unavailable Secs Increase

Complete these steps in order to resolve these errors:

1. Ensure that the local interface port configuration corresponds with the far−end equipment configuration.
2. Try to identify the alarm on the local end, and complete the steps suggested in E3 Alarm Troubleshooting.
3. Insert an external loopback cable into the port. Refer to Hard Plug Loopback Tests for E3 Lines for more information.

Hard Plug Loopback Tests for E3 Lines

Hard plug loopback tests determine if the router hardware has any faults. If a router passes a hard plug loopback test, the problem lies elsewhere on the E3 line.

Set a Hard Cable Loopback on a BNC Connector

In order to set a hard plug loopback, you need a 75 ohms coaxial cable with a male bayonet Neill−Concelman (BNC) connector at each end. Use this coaxial cable in order to connect the transmit (Tx) port on the port adapter to its receive (Rx) port. You also need to configure the **clock source internal** command on the E3 serial interface/controller and on all E1 controllers. This is only for the PA−MC−E3 port adapter.

Verify the Hard Plug Loopback

The type of port adapter determines whether you must verify the hard loopback by means of extended pings, for the PA−E3 port adapter, or an E1 Bit Error Rate Test (BERT), for the PA−MC−E3 port adapter.

PA−E3: Prepare for the Extended Ping Test

Complete these steps in order to prepare for the extended ping test on the PA−E3 port adapter:

1. Use the **write memory** command in order to save your router configuration.
2. Set the encapsulation for the interface serial to High−Level Data Link Control (HDLC) in the interface configuration mode.
3. Use the **show running−config** command in order to see if the interface has a unique IP address. If the serial interface does not have an IP address, obtain a unique address, and assign it to the interface with a subnet mask of 255.255.255.0.
4. Clear the interface counters with the **clear counters** command.

PA−E3: Perform the Extended Ping Tests

Complete these steps in order to perform serial line ping tests on the PA−E3 port adapter:

1. Complete these steps in order to perform the extended ping test:

    a. Choose **ping ip** as the Type.
    b. Enter the IP address of the interface to which the IP address is assigned as the Target address.
    c. Choose **1000** as the Repeat count.
    d. Choose **1500** as the Datagram size.
    e. When prompted for Timeout, press **Enter**.
    f. Choose **yes** for Extended cmds.
    g. When prompted for the Source Address, press **Enter**.
    h. When prompted for the Type of service, press **Enter**.
    i. When prompted to Set Df bit in ip header, press **Enter**.
    j. When prompted to Validate reply data, press **Enter**.
    k. Choose **0x0000** as the Data Pattern.
    l. Press **Enter** three times.

   Notice that the ping packet size is 1500 bytes, and that you perform an all zeros ping, 0x0000. Also, the ping count specification is set to 1000. Therefore, in this case, one thousand 1500−byte ping packets are sent.
2. Examine the **show interfaces serial** command output and determine whether input errors increase. If input errors do not increase, the local hardware, such as the cable and the router interface card, is probably in good condition.
3. Perform additional extended pings with different data patterns. For example:

    - Repeat step one, but use a Data Pattern of 0x1111.
    - Repeat step one, but use a Data Pattern of 0xffff.
    - Repeat step one, but use a Data Pattern of 0xaaaa.
4. Verify that all of the extended ping tests are 100 percent successful.
5. Enter the **show interfaces serial** command. Your E3 serial interface must not contain any cyclic redundancy check (CRC), frame, input, or other errors. Look at the fifth and sixth lines from the end of the **show interfaces serial** command output in order to verify this.

   If all of the pings are 100 percent successful and no errors occur, the hardware is probably good. The problem is either a cable or telephone company issue.
6. Remove the loopback cable from the interface, and plug the E3 line back into the port.
7. On the router, enter the **copy startup−config running−config** EXEC command in order to erase any changes made to the running−config during the extended ping test. When prompted for a destination filename, press **Enter**.

PA−MC−E3: Prepare for the BERT on an E1 Line

The BERT circuitry is built into the PA−MC−E3 port adapter. You can configure any E1 line, but not the E3 line, in order to connect to the onboard BERT circuitry.

Two categories of test patterns can be generated by the onboard BERT circuitry:

- **pseudorandom** exponential numbers that conform to ITU−T O.151 and O.153
- **repetitive** zeros or ones or an alternation of zeros and ones

In order to prepare for the BERT on an E1 line, clear the interface counters with the **clear counters** command.

PA−MC−E3: Perform a BERT on an E1 Line

Complete these steps in order to perform a BERT on an E1 line:

1. Send a BERT pattern on an E1 line with the **e1 <e1−line−number> bert pattern 2^23 interval 1** E3 controller configuration command where the e1−line−number value is 1−16.
2. After the BERT completes, examine the **show controllers e3** command output and determine if:

   - The Bits Received corresponds with the number of bits sent on the E1 line during the BERT interval.
   - The Bit Errors remains zero.

   If the Bit Errors do not increase, the local hardware, such as the cable and the router interface card, is probably in good condition.

   ```
   E3 4/0 E1 2
      No alarms detected.
      Framing is crc4, Clock Source is line, National bits are 0x1F.
      BERT test result (done)
      Test Pattern : 2^23, Status : Not Sync, Sync Detected : 1
      Interval : 1 minute(s), Time Remain : 0 minute(s)
      Bit Errors(Since BERT Started): 0 bits,
      Bits Received(Since BERT start): 111 Mbits
      Bit Errors(Since last sync): 0 bits
      Bits Received(Since last sync): 111 Mbits
   ```
3. Perform additional BERTs on other E1 lines.

   If all of the BERTs are 100 percent successful and there are no Bit Errors, the hardware is probably good. The problem is either a cable or telephone company issue.
4. Remove the loopback cable from the interface, and plug the E3 line back into the port.

   If you open a case, provide this information to Cisco Technical Support:

   - **show running interface e3 x/y**
   - **show controller**
   - **clear counters**
   - **show interfaces**
   - **ping with different pattern**

Related Information

- **PA−MC−E3 Multi−Channel E3 Port Adapter Installation and Configuration**
- **E3 Troubleshooting Flowchart**
- **E3 Alarm Troubleshooting**
- **PA−MC−E3 Multi−Channel E3 Synchronous Serial Port Adapter**
- **Multichannel E3 Port Adapters for Cisco 7200 and 7500 Routers**
- **Cisco Multichannel Serial Port Adapters**
- **Technical Support & Documentation − Cisco Systems**

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