

# E1 PRI Troubleshooting

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## Introduction

When troubleshooting a Primary Rate Interface (PRI), ensure that the E1 is running properly on both ends. If Layer 1 problems have been resolved, look for problems on Layers 2 and 3. Use the **show controller e1** command to verify that the configuration of the line matches that of the remote end. Ensure that the framing, line coding, and clock source are configured correctly. Refer to the E1 Alarm Troubleshooting and E1 Error Events Troubleshooting documents for more information. Contact your Service Provider for the correct settings.

## Before You Begin

### Conventions

For more information on document conventions, see the Cisco Technical Tips Conventions.

### Prerequisites

There are no specific prerequisites for this document.

### Components Used

The information in this document is based on the software and hardware versions below.

- Cisco IOS® Software Release 12.0

The information presented in this document was created from devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If you are working in a live network, ensure that you understand the potential impact of any command before using it.

## Using the `show isdn status` Command

The **show isdn status** command displays a summary of all ISDN interfaces. It also displays the status of Layers 1, 2, and 3. Complete the following steps to check the status of the layers:

1. Verify that Layer 1 is in the ACTIVE state. The status of Layer 1 should always be ACTIVE unless the E1 is down.

If the **show isdn status** command output indicates that Layer 1 is DEACTIVATED, then there is a problem with the physical connectivity of the E1 line. If the line is administratively down, use the **no shutdown** command to restart the interface.

2. Ensure that Layer 2 is in the MULTIPLE\_FRAME\_ESTABLISHED state. This is the desired state for Layer 2, indicating that Layer 2 frames are being exchanged and Layer 2 initialization has finished.

If Layer 2 is not in the MULTIPLE\_FRAME\_ESTABLISHED state, use the **show controller e1 EXEC** command to diagnose the problem. For more information, see the E1 Alarm Troubleshooting document.

Since the **show isdn status** command displays a summary of the current status, it is possible that Layer 2 is bouncing up and down despite indicating a MULTIPLE\_FRAME\_ESTABLISHED state. Use the **debug isdn q921** command to verify that Layer 2 is stable.

Following is an example of **show isdn status** output:

```
bru-nas-03#show isdn status
Global ISDN Switchtype = primary-net5
ISDN Serial0:15 interface
    dsl 0, interface ISDN Switchtype = primary-net5
    Layer 1 Status:
        ACTIVE
    Layer 2 Status:
        TEI = 0, Ces = 1, SAPI = 0, State = MULTIPLE_FRAME_ESTABLISHED
    Layer 3 Status:
        5 Active Layer 3 Call(s)
    Activated dsl 0 CCBs = 5
        CCB:callid=7D5, sapi=0, ces=0, B-chan=9, calltype=DATA
        CCB:callid=7D6, sapi=0, ces=0, B-chan=10, calltype=DATA
        CCB:callid=7DA, sapi=0, ces=0, B-chan=11, calltype=DATA
        CCB:callid=7DE, sapi=0, ces=0, B-chan=1, calltype=DATA
        CCB:callid=7DF, sapi=0, ces=0, B-chan=2, calltype=DATA
    The Free Channel Mask: 0xFFFF78FC
ISDN Serial1:15 interface
    dsl 1, interface ISDN Switchtype = primary-net5
    Layer 1 Status:
        ACTIVE
    Layer 2 Status:
        TEI = 0, Ces = 1, SAPI = 0, State = TEI_ASSIGNED
    Layer 3 Status:
        0 Active Layer 3 Call(s)
    Activated dsl 1 CCBs = 0
    The Free Channel Mask: 0xFFFF7FFF
    Total Allocated ISDN CCBs = 5
```

Notice that E1 0 (whose D-channel is Serial 0:15) has Layer 1 as ACTIVE and Layer 2 as MULTIPLE\_FRAME\_ESTABLISHED indicating that the signaling channel is functioning correctly and is exchanging Layer 2 frames with the Telco switch. The D-channel (Serial1:15) for E1 1 has Layer 1 ACTIVE, but Layer 2 is TEI\_ASSIGNED. This indicates that the PRI is not exchanging Layer 2 frames with the switch. Use the **show controller e1 x** command to troubleshoot. Refer to the E1 Troubleshooting flowchart for more information.

## Using the debug q921 Command

The **debug isdn q921** command displays data link layer (Layer 2) access procedures that are occurring at the router on the D-channel.

Ensure you are configured to view debug messages by using the **logging console** or **terminal monitor** command.

**Note:** In a production environment, verify that console logging is disabled by using the **show logging** command. If logging is enabled, the access server might intermittently stop working when the console port is overloaded with log messages. Enter the **no logging** console command to disable logging.

**Note:** If **debug isdn q921** is turned on and you do not receive any debug outputs, place a call or reset the controller to get **debug** outputs.

Complete the following steps to ensure that the data link layer access procedures are occurring at the router on the D-channel:

1. Verify that Layer 2 is stable by looking for messages in the **debug** output. If the line is bouncing up and down, output similar to the following will appear:

```
Mar 20 10:06:07.882: %ISDN-6-LAYER2DOWN: Layer 2 for Interface Se0:15, TEI 0 changed to down
Mar 20 10:06:09.882: %LINK-3-UPDOWN: Interface Serial0:15, changed state to down
Mar 20 10:06:21.274: %DSX1-6-CLOCK_CHANGE: Controller 0 clock is now selected as clock source
Mar 20 10:06:21.702: %ISDN-6-LAYER2UP: Layer 2 for Interface Se0:15, TEI 0 changed to up
Mar 20 10:06:22.494: %CONTROLLER-5-UPDOWN: Controller E1 0, changed state to up
Mar 20 10:06:24.494: %LINK-3-UPDOWN: Interface Serial0:15, changed state to up
```

If Layer 2 does not appear to be stable, refer to the E1 Error Events Troubleshooting document.

2. Verify that only service access point identifier (SAPI) messages appear on both the transmit (TX) and receive (RX) sides. For example:

```
Mar 20 10:06:52.505: ISDN Se0:15: TX -> RRf sapi = 0 tei = 0 nr = 0
Mar 20 10:06:52.505: ISDN Se0:15: RX <- RRf sapi = 0 tei = 0 NR = 0
Mar 20 10:07:22.505: ISDN Se0:15: TX -> RRp sapi = 0 tei = 0 NR = 0
Mar 20 10:07:22.509: ISDN Se0:15: RX <- RRp sapi = 0 tei = 0 NR = 0
Mar 20 10:07:22.509: ISDN Se0:15: TX -> RRf sapi = 0 tei = 0 NR = 0
Mar 20 10:07:22.509: ISDN Se0:15: RX <- RRf sapi = 0 tei = 0 NR = 0
```

3. Verify that asynchronous balanced mode extended (SABME) messages do not appear. These messages indicate that Layer 2 is trying to reinitialize. The messages usually appear when poll requests (RRp) are transmitted and there is no response from the switch (RRf), or vice versa. Following are examples of SABME messages:

```
Mar 20 10:06:21.702: ISDN Se0:15: RX <- SABMEp sapi = 0 tei = 0
Mar 20 10:06:22.494: ISDN Se0:15: TX -> SABMEp sapi = 0 tei = 0
```

If SABME messages appear, complete the following steps:

- a. Use the **show running-config** command to ensure that **isdn switch-type** and **pri-group timeslots** are configured correctly. Contact your Service Provider for the correct values.
- b. To change the **isdn switch-type** and **pri-group** settings, enter the following commands:

```
bru-nas-03#configure terminal
bru-nas-03(config)#isdn switch-type primary-net5
bru-nas-03(config)#controller e1 0
bru-nas-03(config-controller)#pri-group timeslots 1-31
```

4. Ensure the D-channel is up using the **show interfaces serial number:15** command, where the *number* is the interface number.

If the D-channel is not up, use the no shutdown command to bring it up. For example:

```
bru-nas-03(config)#interface serial 0:15  
bru-nas-03(config-if)#no shutdown
```

5. Ensure encapsulation is PPP. If not, use the **encapsulation ppp** command to set encapsulation. For example:

```
bru-nas-03(config-if)#encapsulation ppp
```

6. Ensure the interface is in loopback mode. Loopback should be set only for testing purposes. Use the **no loopback** command to remove loopbacks. For example:

```
bru-nas-03(config-if)#no loopback
```

7. Power cycle the router.

If the problem persists, contact your Service Provider or the Cisco Technical Assistance Center (TAC).

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## Related Information

- [E1 Alarm Troubleshooting](#)
- [Hard Plug Loopback Tests for E1 Lines](#)
- [E1 Error Events Troubleshooting](#)
- [T1/E1 Controller Commands](#)
- [Serial Port and T1/E1 Trunk Configuration](#)
- [Configuring Channelized E1 and Channelized T1](#)
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