

# Troubleshooting ISDN BRI Layer 1

[TAC Notice: What's Changing on TAC Web](#)

## Contents

- [Introduction](#)
- [Prerequisites](#)
  - [Requirements](#)
  - [Components Used](#)
  - [Conventions](#)
- [Layer 1 Status: DEACTIVATED](#)
- [Layer 1 Status: ACTIVATED](#)
- [Other Layer 1 States](#)
- [Advanced Reference](#)
- [NetPro Discussion Forums - Featured Conversations](#)
- [Related Information](#)

## Introduction

The **show isdn status** command displays the status of all ISDN interfaces or of a specific ISDN interface. When you are troubleshooting ISDN BRIs, you must first determine if the router can properly communicate with the telco ISDN switch. Once you have verified communication, you can proceed to higher-level troubleshooting, such as issues with dialer interfaces, interesting traffic definitions, PPP failures, and so forth.

## Prerequisites

### Requirements

This document assumes you have used the **show isdn status** command and have determined that Layer 1 (L1) is the cause of your problem.

This is an example of Layer 1 `DEACTIVATED` status:

```
maui-nas-01# show isdn status

The current ISDN Switchtype = basic-n11
ISDN BRI0 interface Layer 1 Status:
DEACTIVATED

!--- This shows ACTIVE or DEACTIVATED.
!--- Output suppressed.
```

For more information on the **show isdn status** command, refer to [Using the show isdn status Command for BRI Troubleshooting](#).

## Components Used

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

The information presented in this document was created from devices in a specific lab environment. All of

7/15/2005

Help us help you.

Please rate this document.

- Excellent
- Good
- Average
- Fair
- Poor

This document solved my problem.

- Yes
- No
- Just browsing

Suggestions for improvement:

(256 character limit)

Send

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.

## Conventions

For more information on document conventions, refer to the [Cisco Technical Tips Conventions](#).

## Layer 1 Status: DEACTIVATED

If the **show isdn status** command indicates that Layer 1 status is deactivated, then the router is not establishing a Layer 1 connection to the telco ISDN switch.

Perform the steps in this section and, after each step, issue the **show isdn status** command to check if Layer 1 is up (ACTIVE). If Layer 1 is active, proceed to [Troubleshooting BRI Layer 2](#).

1. Issue the **shutdown** then the **no shutdown** command on the BRI interface in question.

This ensures that the BRI interface is not administratively down. You can also issue the **clear interface bri number** command to reset the interface.

2. Verify that the **backup interface** command is not configured under the BRI interface.

That command deactivates the BRI interface until the backup is initiated. If necessary, issue the **no backup interface interface\_type interface\_number** command to remove it. For more information on how to properly configure backups, refer to [Configuring and Troubleshooting DDR Backup](#).

3. Issue the **show isdn status** command to check that the switch type for the interface is correctly configured. If the switch type is either not configured or incorrectly configured, then configure it on the interface.

This sample output shows that the switch type is not configured:

```
maui-soho-01# show isdn status

**** No Global ISDN Switchtype currently defined ****
ISDN BRI0 interface
dsl 0, interface
ISDN Switchtype = none
Layer 1 Status:
ACTIVE
Layer 2 Status:
Layer 2 NOT Activated

!-- An invalid switch type can be displayed as a Layer 1 or Layer 2 problem.

Layer 3 Status:
0 Active Layer 3 Call(s)
Activated dsl 0 CCBs = 0
The Free Channel Mask: 0x80000003
Total Allocated ISDN CCBs = 0
```

**Tip:** The telco should explicitly indicate the switchtype that needs to be configured. Occasionally (especially in North America), the telco may indicate that the switchtype is `custom` or `national`. In such cases, use these guidelines to determine the switchtype configuration:

- o `custom`—If the telco indicates that their switchtype is `custom`, then configure the switchtype on the router as one of these:
  - `basic-5ess`—BRI with 5ESS switch
  - `primary-5ess`—PRI with 5ESS switch

- `basic-dms`—BRI with DMS switch
- `primary-dms`—PRI with DMS switch
- `national`—Switchtype conforming to the National ISDN-1 (NI1) standard for BRI and NI-2 standard for PRI. If the telco informs you that the switchtype is `national`, then the Cisco router configuration should be `basic-ni` (for BRI) or `primary-ni` (for PRI).

**Note:** For Cisco IOS® Software Releases up to 11.2, the configured ISDN switch type is a global command, which means that you can not use BRI and PRI cards in the same Cisco chassis with Cisco IOS Software Release 11.2 and earlier. Cisco IOS Software Release 11.3T or later supports multiple switch types in a single Cisco IOS chassis.

Contact your telco to determine your switchtype. Then issue the **isdn switch-type** command to configure it on the router:

```
maui-soho-01# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
maui-soho-01(config)# isdn switch-type basic-5ess
maui-soho-01(config)# exit
```

4. In certain situations, you must configure **isdn tei-negotiation first-call** under the BRI interface, so that terminal endpoint identifier (TEI) negotiation can occur when the first ISDN call is placed or received.

Typically, you use this setting for ISDN service offerings in Europe and for connections to DMS100 switches that are designed to initiate TEI negotiation. The router is assigned the TEI by the ISDN switch during power-up. Sometimes (notably in Europe), switches may deactivate Layers 1 or 2 when there are no active calls.

```
maui-soho-01(config)# interface bri 0
maui-soho-01(config-if)# isdn tei-negotiation first-call
```

In this case, you may have to initiate a dial-out or receive a call, for the TEI negotiation to occur. For dial-out, ensure that your DDR configuration is correct.

5. Issue the **show interface bri number** or the **show version** command, to determine the type of BRI interface on the router.

These examples show a router with a U interface:

```
maui-soho-01# show interfaces bri 0
BRI0 is up, line protocol is up (spoofing)
Hardware is BRI with U interface and external S bus interface

!--- Output suppressed.

maui-soho-01# show version

!--- Output suppressed.

cisco 1604 (68360) processor (revision C)
with 3072K/1024K bytes of memory.
Processor board ID 09895320, with hardware revision 00972006 Bridging software.
X.25 software, Version 3.0.0.
Basic Rate ISDN software, Version 1.1.
1 Ethernet/IEEE 802.3 interface(s)
1 Serial(sync/async) network interface(s)
1 ISDN Basic Rate interface(s)
U interface with external S bus interface for ISDN Basic Rate interface.
System/IO memory with parity disabled
```

*!--- Output suppressed.*

Due to variations in ISDN implementation, regions around the world differ in the customer equipment necessary for the circuit. Use this table to properly connect the router to the telco jack:

Router Interface Type	In North America	In the Rest of the World
U Interface	Connect directly to the telco jack.	Can not be used.
S/T Interface	Connect to an external Network Termination 1 (NT-1), which then connects to the telco jack.	Connect directly to the telco jack.

- In North America, if the router's BRI interface is a U interface, it can be directly connected to the telco jack. In the rest of the world, where the NT-1 is built into the telco network, the router S/T interface is directly connected to the telco jack. Refer to the telco documentation to ensure that you have the appropriate BRI interface, cables, and additional equipment.
- In North America, if you have a BRI S/T interface, check the status lights on the required external NT-1.

Refer to the hardware documentation for the NT-1 for information on how to interpret the status lights.

If the NT-1 status lights do not indicate a problem, check the NT-1 for a switch to set the termination resistance (ohms). If the switch is present, set it to 100 ohms. Power cycle the external NT-1 at this time. Ensure that the router is connected to the S/T port on the NT-1, while the U port on the NT-1 must be connected to the ISDN jack.

For a BRI WAN interface card (WIC), refer to the documentation of the WIC for information on how to read the various LEDs.

- Replace the cable from the router to the ISDN jack.

For a U interface, the cable should be straight-through RJ-45 and should contain the middle two pins (pins 4 and 5). An S/T interface, on the other hand, uses pins 3, 4, 5, and 6. To check whether the cable is straight-through, hold the RJ-45 cable ends side by side and check that pins are in the same order. Use a cable tester to ensure that there is an end-to-end continuity on those pins. Also, the preferred cable length is less than 23 feet (7 meters) and should not exceed 32.8 feet (10 meters).

These tables list the pinouts for both the U and S/T interfaces:

#### ISDN BRI S/T Port Pinout

RJ-45 8-Pin <sup>1</sup>	TE1/TA	NT	Polarity
3	Transmit	Receive	+
4	Receive	Transmit	+
5	Receive	Transmit	-
6	Transmit	Receive	-

<sup>1</sup> Pins 1, 2, 7, and 8 are not used.

For more information, refer to [Integrated Services Digital Network](#).

**ISDN BRI U Port Pinout**

RJ-45 8-Pin <sup>1</sup>	Function
4	U interface network connection (Tip)
5	U interface network connection (Ring)

<sup>1</sup> Pins 1, 2, 3, 6, 7, and 8 are not used.

9. Get a regular analog phone and plug it into the ISDN jack. You should hear either a clicking noise, white noise, or light static. If you do not hear any of these then it is not an active ISDN line; verify that the circuit is installed and that you are connecting to the correct drop point.
10. Reload the router.

## Layer 1 Status: ACTIVATED

This indicates that Layer 1 is up and that you have a connection to the telco. If you are still having problems with your ISDN, proceed to [Using the show isdn status Command for BRI Troubleshooting](#).

## Other Layer 1 States

These are the other possible Layer 1 states:

- GOINGDOWN
- INIT
- TESTING
- RESET
- DELETED (though misspelled, this is how it appears in output)
- SHUTDOWN
- ACTIVATING
- ACTIVE\_ErrorInd

Most of those states are temporary, and you can clear them with the **clear interface bri *number*** command or with a router reload. If those states persist for extended periods, contact the telco for further troubleshooting. You should also verify the cabling and other hardware, as described in the [Layer 1 Status: DEACTIVATED](#) section.

## Advanced Reference

If you are an advanced user, use this reference section to isolate ISDN Layer 1 issues.

**Note:** ISDN Layer 1 is defined in the [ITU-T I.430](#) standard. You should refer to I.430 for detailed information on ISDN Layer 1 states and signals.

For advanced ISDN Layer 1 troubleshooting, issue the **show controller bri *number*** command.

For example, consider this Layer 1 status:

```
router# show isdn status bri 1/5
```

```
The current ISDN Switchtype = basic-net3
ISDN BRI1/5 interface
  Layer 1 Status:
    ACTIVE_ErrorInd
  Layer 2 Status:
    Layer 2 NOT Activated
  Layer 3 Status:
    0 Active Layer 3 Call(s)
  Activated dsl 13 CCBs = 0
  Total Allocated ISDN CCBs = 7
```

Because the Layer 1 state is neither `ACTIVE` nor `DEACTIVATED`, you must issue the **show controller bri** command to proceed further. The **show controller bri *number*** displays information about the BRI controller, including activation status for Layer 1.

```
router# show controller bri 1/5

BRI slot 1 interface 5
Layer 1 is PENDING ACTIVATION. (ISDN L1 State F6)
Master clock for slot 1 is bri interface 1.
Total chip configuration successes: 2522, failures: 0, timeouts: 0
D Channel Information:

!--- Output suppressed.
```

Note that Layer 1 is `PENDING ACTIVATION` and L1 State is `F6`. Use this table to interpret the L1 State.

#### L1 State Definitions

L1 State	L1 State Name	L1 State Description
F1	Inactive	In this inactive (powered-off) state, the terminal equipment (TE) <sup>1</sup> is not transmitting and can not detect the presence of any input signals.
F2	Sensing	This state is entered after the TE has been powered on but has not determined the type of signal (if any) that the TE is receiving. When in this state, a TE may go into a low power consumption mode.
F3	Deactivated	This is the deactivated state of the physical protocol. Neither the network termination (NT) <sup>2</sup> nor the TE is transmitting. When in this state, a TE may go to a low power consumption mode.
F4	Awaiting Signal	When the TE wishes to initiate activation, it sends an Activation signal to the NT and awaits a response.
F5	Identifying Input	At first receipt of any signal from the NT, the TE stops sending Activation signals and awaits the activation signal or synchronized frame from the NT.
F6	Synchronized	When the TE has received an activation signal from the NT, it responds with a synchronized frame and is awaiting a synchronized frame from the NT.
F7	Activated	This is the normal active state, with the protocol activated in both directions. Both the NT and the TE are transmitting normal frames. State F7 is the only state

		where B-channel and D-channel contain operational data.
F8	Lost Framing	This is the condition when the TE has lost frame synchronization and is awaiting re-synchronization.

<sup>1</sup> Terminal equipment refers to terminating Layer 1 aspects of TE1, TA, and NT-2 functional groups.

<sup>2</sup> Network termination refers to network terminating Layer 1 aspects of NT-1 and NT-2 functional groups.

For more information, refer to [Integrated Services Digital Network](#).

Most of the L1 states are temporary, and you can clear them with the **clear interface bri *number*** command or with a router reload. If those states persist for extended periods, contact the telco for further troubleshooting. You should also verify the cabling and other hardware, as described in the [Layer 1 Status: DEACTIVATED](#) section.

**Note:** For more information on the Layer 1 states described in this section, refer to Section 6.2 in the [ITU-T I.430](#) specification.

## NetPro Discussion Forums - Featured Conversations

Networking Professionals Connection is a forum for networking professionals to share questions, suggestions, and information about networking solutions, products, and technologies. The featured links are some of the most recent conversations available in this technology.

NetPro Discussion Forums - Featured Conversations for Access
Network Infrastructure: Remote Access
<a href="#">Remote office vpn connection</a> - Jul 15, 2005
<a href="#">Problems with ISDN PRI connection</a> - Jul 15, 2005
<a href="#">As5300 - invalid checksum file removal from flash:</a> - Jul 15, 2005
<a href="#">Configuring remote access</a> - Jul 15, 2005
<a href="#">Router to Router Backup Dial-UP connection</a> - Jul 14, 2005

## Related Information

- [Using the show isdn status Command for BRI Troubleshooting](#)
- [Troubleshooting BRI Layer 2](#)
- [Troubleshooting ISDN BRI SPIDs](#)
- [Troubleshooting ISDN BRI Layer 3 Using the debug isdn q931 Command](#)
- [Dialup Technology: Troubleshooting Techniques](#)
- [Universal Gateways and Access Servers Product Support](#)
- [Dial - Access Technology Support](#)
- [Technical Support & Documentation - Cisco Systems](#)

<a href="#">Home</a>	<a href="#">How to Buy</a>	<a href="#">Login</a>	<a href="#">Profile</a>	<a href="#">Feedback</a>	<a href="#">Site Map</a>	<a href="#">Help</a>
----------------------	----------------------------	-----------------------	-------------------------	--------------------------	--------------------------	----------------------

All contents are Copyright © 1992-2005 Cisco Systems, Inc. All rights reserved. [Important Notices](#) and [Privacy Statement](#).