

# Backup Bridging over ISDN

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## Introduction

### Prerequisites

- Requirements
- Components Used
- Related Products
- Conventions

### Configure

- Network Diagram
- Configurations

### Verify

- show Commands on ROUTER1 when Serial0 Is Up
- show Commands on ROUTER1 when Serial0 Is Down

### Troubleshoot

- Troubleshooting Resources
- Troubleshooting Commands
- debug Output on ROUTER1 when Serial0 Goes Down and ISDN Picks Up
- debug Output on ROUTER1 when Serial0 Comes Back Again and ISDN Drops the Call

### NetPro Discussion Forums – Featured Conversations

### Related Information

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## Introduction

This document explains and provides an example of how to configure backup bridging with ISDN. This configuration uses the backup interface method to recognize that the primary link is down. For more information on backup, see [Configuring and Troubleshooting DDR Backup](#).

In bridged WAN environments, the only dial-on-demand routing (DDR) backup solution available is the use of ISDN, as bridging over async is not supported.

Be aware that bridging on an ISDN connection tends to keep the connection active for very long periods, if not permanently. If the telephone company (Telco) charges for ISDN based on connection time and the serial link that is tracked is down for a very long time, this can result in a very large bill.

**Note:** This configuration is for one site and one B channel. For more than one B channel, you must use dialer profiles. (Refer to the [Configuring Dialer Profiles to Bridge using ISDN configuration](#).)

For information on bridging configuration in a non-backup environment, see [Bridging Across ISDN](#).

## Prerequisites

### Requirements

Before you attempt this configuration, ensure that you meet these requirements:

- Possess a basic knowledge of ISDN.

## Components Used

The information in this document is based on these software and hardware versions:

- Cisco 2500 series routers with one WAN serial interface and one BRI interface each.
- Cisco IOS® Software Release 12.2(7b).

**Note:** This configuration can be used with any router that has a WAN (serial) link and a BRI port.

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.

## Related Products

This configuration can be used with any two routers that run Cisco IOS Software and each have at least one WAN serial interface and one BRI interface.

## Conventions

For more information on document conventions, refer to Cisco Technical Tips Conventions.

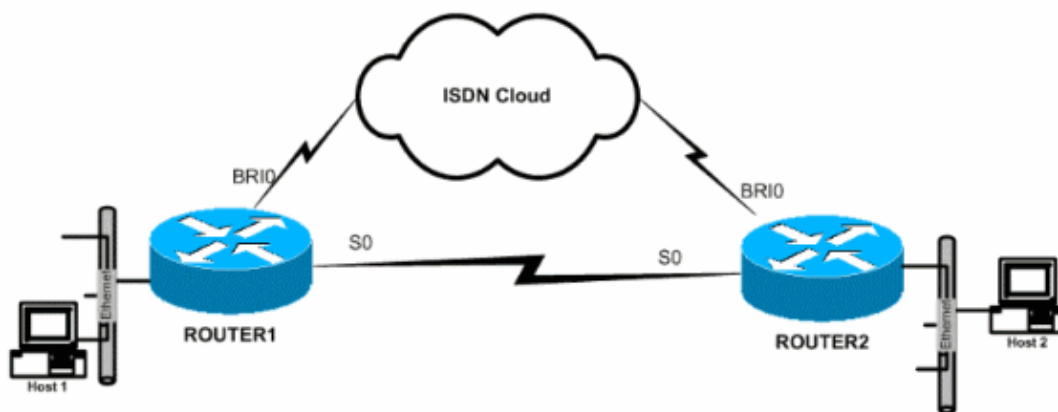
## Configure

In this section, you are presented with the information to configure the features described in this document.

**Note:** To find additional information on the commands used in this document, use the Command Lookup Tool (registered customers only).

## Network Diagram

This document uses this network setup:



## Configurations

This document uses these configurations:

- Router1

- Router2

### Router1

```
!  
hostname ROUTER1  
!  
!  
username ROUTER2 password 0 same  
  
!--- This is required for PPP Challenge Handshake Authentication Protocol  
!--- (CHAP) authentication during dial backup.  
  
!  
!  
isdn switch-type basic-5ess  
  
!--- The ISDN switch type for this circuit.  
!--- Obtain this information from the Telco.  
!--- This ISDN switch type is specific to the United States,  
!--- and could change based on the requirements of the country and Telco.  
  
!  
interface Ethernet0  
 ip address 172.16.55.33 255.255.255.240  
 no ip directed-broadcast  
 no ip mroute-cache  
 bridge-group 1  
  
!--- Assign this interface to bridge-group 1.  
!--- Frames are bridged only among interfaces in the same group.  
!--- Note that the BRI interface and serial interface are also  
!--- in this bridge-group 1.  
  
!  
interface Serial0  
 description Serial link to ROUTER2  
 backup interface BRI0  
  
!--- This defines the backup interface.  
!--- Cisco IOS Software tracks the Serial0 interface, and  
!--- uses BRI0 if Serial0 fails.  
  
 ip address 172.16.54.1 255.255.255.0  
 no ip directed-broadcast  
 no ip mroute-cache  
 no fair-queue  
 bridge-group 1  
  
!--- Enable bridging on Serial0 for normal operation.  
  
!  
interface BRI0  
 description ISDN to ROUTER2  
 ip address 172.16.53.19 255.255.255.240  
 no ip directed-broadcast  
 encapsulation ppp  
 no ip mroute-cache  
 dialer map bridge name ROUTER2 broadcast 5552000  
  
!--- The broadcast keyword is required to initiate the ISDN call.  
!--- Dialer map bridge to the remote router. The statement includes  
!--- the name of the remote router and the phone number to be dialed.  
!--- Note that this dialer map statement includes the keyword bridge,  
!--- and does not include the IP address of the peer, as required for  
!--- IP routing-based dialer maps.
```

```

dialer-group 1

!--- Defines the interesting traffic as configured in the dialer-list.

isdn switch-type basic-5ess

!--- Check with your Telco for the correct values.

ppp authentication chap
bridge-group 1

!--- Enable bridging on BRI0.

!
dialer-list 1 protocol bridge permit

!--- Defines the interesting traffic. In this case, all bridged traffic.

bridge 1 protocol ieee

!--- Defines the type of Spanning Tree Protocol (STP) used for the
!--- interface in bridge-group 1. Here, the IEEE STP is used.
!--- The IEEE 802.1D STP is the preferred way to run the bridge.

!

```

## Router2

```

hostname router2
!
!
username ROUTER1 password 0 same

!--- Required for PPP CHAP Authentication during dial backup.

!
isdn switch-type basic-5ess

!--- Check with your Telco at the Router2 side for the correct values.

!
interface Ethernet0
ip address 172.16.55.2 255.255.255.240
bridge-group 1

!--- Enable bridging on Ethernet0.

!
interface Serial0
description Serial link to ROUTER1

!--- The backup interface bri0 command is not required on this side,
!--- because it is sufficient if one side tracks the serial interface.

ip address 172.16.54.2 255.255.255.0
no fair-queue
bridge-group 1

!--- Enable bridging on Serial0 for normal operation.

interface BRI0
description ISDN to ROUTER1
ip address 172.16.53.17 255.255.255.240
encapsulation ppp

```

```

no ip mroute-cache
dialer map bridge name ROUTER1 broadcast 5551000

!--- The broadcast keyword is required to initiate the ISDN call.

dialer-group 1

!--- Defines the interesting traffic as configured in the dialer-list.

isdn switch-type basic-5ess

!--- Check with your Telco at the Router2 side for the correct values.

ppp authentication chap
bridge-group 1

!--- Enable bridging on BRI0.

!
dialer-list 1 protocol bridge permit

!--- Defines the interesting traffic. In this case, all bridged traffic.

bridge 1 protocol ieee

!--- Defines the type of STP used for the interface in
!--- bridge-group 1. Here the IEEE STP is used.
!--- The IEEE 802.1D STP is the preferred way to run the bridge.

!

```

## Verify

This section provides information you can use to confirm your configuration works properly.

Certain **show** commands are supported by the Output Interpreter Tool ( registered customers only) , which allows you to view an analysis of **show** command output.

- **show isdn status** displays the Layer 1 (L1), Layer 2 (L2), and Layer 3 (L3) status of the ISDN interfaces.
- **show dialer** displays the status of the dialer and the individual status of the ISDN channels.
- **show bridge** displays classes of entries in the bridge forwarding database.
- **show interface** displays the status of the various interfaces, such as the serial and BRI interfaces.
- **show spanning-tree** displays the spanning tree topology known to the router.

## show Commands on ROUTER1 when Serial0 Is Up

```

ROUTER1# show isdn status
Global ISDN Switchtype = basic-5ess
ISDN BRI0 interface
dsl 0, interface ISDN Switchtype = basic-5ess
Layer 1 Status:
DEACTIVATED
Layer 2 Status:
Layer 2 NOT Activated
Layer 3 Status:
0 Active Layer 3 Call(s)
Activated dsl 0 CCBs = 0
The Free Channel Mask: 0x80000003
Number of L2 Discards = 36, L2D_Task Discards = 35
Total Allocated ISDN CCBs = 0

```

```

ROUTER1# show dialer

BRI0 - dialer type = ISDN

Dial String Successes Failures Last DNIS Last status
5552000 29 977 00:45:08 successful
0 incoming call(s) have been screened.
0 incoming call(s) rejected for callback.

BRI0:1 - dialer type = ISDN
Idle timer (120 secs), Fast idle timer (20 secs)
Wait for carrier (30 secs), Re-enable (15 secs)
Dialer state is shutdown

BRI0:2 - dialer type = ISDN
Idle timer (120 secs), Fast idle timer (20 secs)
Wait for carrier (30 secs), Re-enable (15 secs)
Dialer state is shutdown

```

```

ROUTER1# show bridge

Total of 300 station blocks, 298 free
Codes: P - permanent, S - self

Bridge Group 1:

Address Action Interface Age RX count TX count
0000.0c76.2882 forward Serial0 0 5 4

!--- Bridging traffic goes through Serial0.

00d0.58ad.ae13 forward Ethernet0 0 42 5

```

## show Commands on ROUTER1 when Serial0 Is Down

```

ROUTER1# show isdn status
Global ISDN Switchtype = basic-5ess
ISDN BRI0 interface
dsl 0, interface ISDN Switchtype = basic-5ess
Layer 1 Status:
ACTIVE
Layer 2 Status:
TEI = 114, Ces = 1, SAPI = 0, State = MULTIPLE_FRAME_ESTABLISHED

!--- ISDN L1 and L2 will be up (when Serial0 fails)
!--- even if interesting traffic is not present.

Layer 3 Status:
1 Active Layer 3 Call(s)
Activated dsl 0 CCBs = 1
CCB:callid=8484, sapi=0, ces=1, B-chan=1, calltype=DATA
The Free Channel Mask: 0x80000002
Total Allocated ISDN CCBs = 1

ROUTER1# show dialer

BRI0 - dialer type = ISDN

Dial String Successes Failures Last DNIS Last status
5552000 30 977 00:00:16 successful
0 incoming call(s) have been screened.
0 incoming call(s) rejected for callback.

BRI0:1 - dialer type = ISDN

```

```

Idle timer (120 secs), Fast idle timer (20 secs)
Wait for carrier (30 secs), Re-enable (15 secs)
Dialer state is data link layer up
Dial reason: bridge (0xFFFF)
Time until disconnect 106 secs
Connected to 5552000 (ROUTER2)

BRI0:2 - dialer type = ISDN
Idle timer (120 secs), Fast idle timer (20 secs)
Wait for carrier (30 secs), Re-enable (15 secs)
Dialer state is idle

ROUTER1# show bridge

Total of 300 station blocks, 298 free
Codes: P - permanent, S - self

Bridge Group 1:

Address Action Interface Age RX count TX count
0000.0c76.2882 forward BRI0 0 5 4

!--- Bridging traffic now goes through BRI0.

00d0.58ad.ae13 forward Ethernet0 0 5 5

```

## Troubleshoot

This section provides information you can use to troubleshoot your configuration.

## Troubleshooting Resources

Use these resources as required:

- ISDN Technology Support
- Troubleshooting Serial Lines
- HDLC Back-to-Back Connections

## Troubleshooting Commands

Certain **show** commands are supported by the Output Interpreter Tool ( registered customers only) , which allows you to view an analysis of **show** command output.

**Note:** Before you issue **debug** commands, refer to Important Information on Debug Commands.

- **debug dialer** provides information about dialer interface events.
- **debug isdn event** displays debug messages related to ISDN activity that occurs on the user side of the ISDN interface.
- **debug isdn q931** provides information about call setup and teardown of ISDN network connections (L3) between the local router (user side) and the network.
- **debug isdn q921** displays debug messages related to the data link layer (L2) access procedures that take place at the router on the D-channel (LAPD) of its ISDN interface.
- **debug ppp negotiation** displays debug messages related to the negotiation of PPP options and Network Control Protocol (NCP) parameters.
- **debug ppp authentication** Displays debug messages related to the exchange of CHAP and Password Authentication Protocol (PAP) packets.

## debug Output on ROUTER1 when Serial0 Goes Down and ISDN Picks Up

```
ROUTER1# show debug
  Dial on demand:
  Dial on demand events debugging is on
  PPP:
  PPP authentication debugging is on
  PPP protocol negotiation debugging is on
  ISDN:
  ISDN events debugging is on
  ISDN Q921 packets debugging is on
  ISDN Q931 packets debugging is on

ROUTER1#

!--- Interface serial0 goes down.

ROUTER1#
00:56:53: %LINK-3-UPDOWN: Interface Serial0, changed state to down
*Mar  1 00:56:53.103: ISDN BR0 EVENT: isdn_sw_cstate: State = 0,
  Old State = 6
00:56:53: %LINK-3-UPDOWN: Interface BRI0:1, changed state to down
*Mar  1 00:56:53.107: BR0:1 LCP: State is Closed
*Mar  1 00:56:53.111: BR0:1 DDR: disconnecting call
00:56:53: %LINK-3-UPDOWN: Interface BRI0:2, changed state to down
*Mar  1 00:56:53.119: BR0:2 LCP: State is Closed
*Mar  1 00:56:53.119: BR0:2 DDR: disconnecting call
*Mar  1 00:56:53.127: ISDN BR0 EVENT: isdn_sw_cstate: State = 4,
  Old State = 6
*Mar  1 00:56:53.135: ISDN BR0 EVENT: isdn_sw_cstate: State = 4,
  Old State = 6
*Mar  1 00:56:53.567: ISDN BR0: RX <- IDCKRQ ri=0 ai=127
*Mar  1 00:56:53.567: ISDN Recvd L1 prim 3 dsl 0 state 3 ctrl_state 0
*Mar  1 00:56:53.571: ISDN BR0: L1 persistent Deactivated
*Mar  1 00:56:53.571: ISDN Recvd L1 prim 7 dsl 0 state 3 ctrl_state 0
*Mar  1 00:56:53.575: ISDN BR0: Recvd MPH_IIC_IND from L1
*Mar  1 00:56:53.575: ISDN Recvd L1 prim 7 dsl 0 state 3 ctrl_state 0
*Mar  1 00:56:53.579: ISDN BR0: Recvd MPH_IIC_IND from L1
*Mar  1 00:56:53.579: ISDN Recvd L1 prim 1 dsl 0 state 3 ctrl_state 0
*Mar  1 00:56:53.583: ISDN BR0: L1 is IF_ACTIVE
*Mar  1 00:56:53.583: ISDN BR0 EVENT: isdn_sw_cstate: State = 4,
  Old State = 6
*Mar  1 00:56:53.587: ISDN BR0: L2-TERM: ces/tei=1/0
  AWAIT_ESTABLISH->TERM_DOWN
*Mar  1 00:56:53.591: ISDN BR0: Incoming call id = 0x0010, dsl 0
*Mar  1 00:56:53.595: ISDN BR0: L2-TERM: ces/tei=1/0
  TERM_DOWN->AWAIT_ESTABLISH
00:56:53: %LINK-3-UPDOWN: Interface BRI0, changed state to up
*Mar  1 00:56:53.631: ISDN BR0 EVENT: isdn_sw_cstate: State = 4,
  Old State = 6
*Mar  1 00:56:53.655: ISDN BR0: TX -> IDREQ ri=48769 ai=127
00:56:54: %LINEPROTO-5-UPDOWN:
Line protocol on Interface Serial0, changed state to down
*Mar  1 00:56:54.387: ISDN BR0: RX <- IDCKRQ ri=0 ai=127
*Mar  1 00:56:55.655: ISDN BR0: TX -> IDREQ ri=42642 ai=127
*Mar  1 00:56:55.699: ISDN BR0: RX <- IDASSN ri=42642 ai=68
*Mar  1 00:56:55.791: ISDN BR0: TX -> SABMEp c/r=0 sapi=0 tei=68
*Mar  1 00:56:55.823: ISDN BR0: RX <- Uaf c/r=0 sapi=0 tei=68
00:56:55: %ISDN-6-LAYER2UP: Layer 2 for Interface BR0,
TEI 68 changed to up
*Mar  1 00:56:55.831: ISDN BR0: L2-TERM: ces/tei=1/68
  AWAIT_ESTABLISH->ESTABLISHED

!--- Interesting traffic has not arrived yet from Host1,
!--- but ISDN L1 and L2 are up now.
```

```

ROUTER1# show isdn stat
Global ISDN Switchtype = basic-5ess
ISDN BRI0 interface
    dsl 0, interface ISDN Switchtype = basic-5ess
    Layer 1 Status:
        ACTIVE
    Layer 2 Status:
        TEI = 68, Ces = 1, SAPI = 0, State = MULTIPLE_FRAME_ESTABLISHED
        I_Queue_Len 0, UI_Queue_Len 0
    Layer 3 Status:
        0 Active Layer 3 Call(s)
    Active dsl 0 CCBs = 0
    The Free Channel Mask: 0x80000003
    Number of L2 Discards = 0, L2 Session ID = 34
    Total Allocated ISDN CCBs = 0
ROUTER1#
*Mar 1 00:57:25.839: ISDN BR0: TX -> RRp sapi=0 tei=68 nr=0
*Mar 1 00:57:25.871: ISDN BR0: RX <- RRf sapi=0 tei=68 nr=0
ROUTER1#

```

```

!--- Interesting traffic arrives now,
!--- which triggers ISDN Dialup (see below).

```

```

*Mar 1 00:57:32.519: BR0 DDR: Dialing cause bridge (0xFFFF)
*Mar 1 00:57:32.519: BR0 DDR: Attempting to dial 5552000
*Mar 1 00:57:32.523: ISDN BR0: Outgoing call id = 0x800E, dsl 0
*Mar 1 00:57:32.527: ISDN BR0: Event: Call to 5552000 at 64 Kb/s
*Mar 1 00:57:32.527: ISDN BR0: process_bri_call(): call id 0x800E,
called_number 5552000, speed 64, call type DATA
*Mar 1 00:57:32.531: CCBRI_Go Fr Host InPkgInfo (Len=22) :
*Mar 1 00:57:32.535: 1 0 1 80 E 0 4 2 88 90 18
1 83 2C 7 35 35 35 32 30 30 30
*Mar 1 00:57:32.543:
*Mar 1 00:57:32.547: CC_CHAN_GetIdleChanbri: dsl 0
*Mar 1 00:57:32.547: Found idle channel B1
*Mar 1 00:57:32.563: ISDN BR0: TX -> INFOc sapi=0 tei=68 ns=0 nr=0
i=0x08010E05040288901801832C0735353532303030
*Mar 1 00:57:32.583: SETUP pd = 8 callref = 0x0E
*Mar 1 00:57:32.591: Bearer Capability i = 0x8890
*Mar 1 00:57:32.599: Channel ID i = 0x83
*Mar 1 00:57:32.603: Keypad Facility i = '5552000'
*Mar 1 00:57:32.867: ISDN BR0: RX <- INFOc sapi=0 tei=68 ns=0 nr=1
i=0x08018E02180189
*Mar 1 00:57:32.875: CALL_PROC pd = 8 callref = 0x8E
*Mar 1 00:57:32.883: Channel ID i = 0x89
*Mar 1 00:57:32.899: ISDN BR0: TX -> RRr sapi=0 tei=68 nr=1
*Mar 1 00:57:32.907: CCBRI_Go Fr L3 pkt (Len=7) :
*Mar 1 00:57:32.907: 2 1 E 98 18 1 89
*Mar 1 00:57:32.911:
*Mar 1 00:57:32.915: ISDN BR0: LIF_EVENT: ces/callid 1/0x800E
HOST_PROCEEDING
*Mar 1 00:57:32.919: ISDN BR0: HOST_PROCEEDING
*Mar 1 00:57:32.919: ISDN BR0: HOST_MORE_INFO
*Mar 1 00:57:33.159: ISDN BR0: RX <- INFOc sapi=0 tei=68 ns=1
nr=1 i=0x08018E07
*Mar 1 00:57:33.167: CONNECT pd = 8 callref = 0x8E
*Mar 1 00:57:33.183: ISDN BR0: TX -> RRr sapi=0 tei=68 nr=2
*Mar 1 00:57:33.191: CCBRI_Go Fr L3 pkt (Len=4) :
*Mar 1 00:57:33.191: 7 1 E 91
*Mar 1 00:57:33.195:
*Mar 1 00:57:33.199: ISDN BR0: LIF_EVENT: ces/callid 1/0x800E
HOST_CONNECT
00:57:33: %LINK-3-UPDOWN: Interface BRI0:1, changed state to up
*Mar 1 00:57:33.215: ISDN: get_isdn_service_state():
idb 0x19F4D8 bchan 2 is_isdn 1 Not a Pri

```

```
*Mar 1 00:57:33.215: BR0:1 PPP: Treating connection as a callout
*Mar 1 00:57:33.219: BR0:1 PPP: Phase is ESTABLISHING,
Active Open [0 sess, 1 load]
*Mar 1 00:57:33.223: BR0:1 LCP: O CONFREQ [Closed] id 27 len 15
*Mar 1 00:57:33.227: BR0:1 LCP: AuthProto CHAP
(0x0305C22305)
*Mar 1 00:57:33.231: BR0:1 LCP: MagicNumber 0x6091A5F6
(0x05066091A5F6)
*Mar 1 00:57:33.235: ISDN BR0: Event: Connected to 5552000
on B1 at 64 Kb/s
*Mar 1 00:57:33.247: ISDN BR0: TX -> INFOc sapi=0 tei=68 ns=1 nr=2
i=0x08010E0F
*Mar 1 00:57:33.251: CONNECT_ACK pd = 8 callref = 0x0E
*Mar 1 00:57:33.267: BR0:1 LCP: I CONFREQ [REQsent] id 4 len 15
*Mar 1 00:57:33.271: BR0:1 LCP: AuthProto CHAP
(0x0305C22305)
*Mar 1 00:57:33.275: BR0:1 LCP: MagicNumber 0x6062D6EA
(0x05066062D6EA)
*Mar 1 00:57:33.279: BR0:1 LCP: O CONFACK [REQsent] id 4 len 15
*Mar 1 00:57:33.283: BR0:1 LCP: AuthProto CHAP
(0x0305C22305)
*Mar 1 00:57:33.287: BR0:1 LCP: MagicNumber 0x6062D6EA
(0x05066062D6EA)
*Mar 1 00:57:33.291: BR0:1 LCP: I CONFACK [ACKsent] id 27 len 15
*Mar 1 00:57:33.291: BR0:1 LCP: AuthProto CHAP
(0x0305C22305)
*Mar 1 00:57:33.295: BR0:1 LCP: MagicNumber 0x6091A5F6
(0x05066091A5F6)
*Mar 1 00:57:33.299: BR0:1 LCP: State is Open
*Mar 1 00:57:33.303: BR0:1 PPP: Phase is AUTHENTICATING,
by both [0 sess, 1 load]
*Mar 1 00:57:33.307: BR0:1 CHAP: O CHALLENGE id 14
len 28 from "ROUTER1"
*Mar 1 00:57:33.319: BR0:1 CHAP: I CHALLENGE id 4
len 28 from "ROUTER2"
*Mar 1 00:57:33.327: BR0:1 CHAP: O RESPONSE id 4
len 28 from "ROUTER1"
*Mar 1 00:57:33.335: ISDN BR0: RX <- RRr sapi=0
tei=68 nr=2
*Mar 1 00:57:33.351: BR0:1 CHAP: I SUCCESS id 4
len 4
*Mar 1 00:57:33.367: BR0:1 CHAP: I RESPONSE id 14
len 28 from "ROUTER2"
*Mar 1 00:57:33.371: BR0:1 CHAP: O SUCCESS id 14
len 4
*Mar 1 00:57:33.375: BR0:1 PPP: Phase is UP [0 sess, 0 load]
*Mar 1 00:57:33.379: BR0:1 BNCP: O CONFREQ [Closed] id 14
len 4
*Mar 1 00:57:33.387: BR0:1 CDPCP: O CONFREQ [Closed] id 14
len 4
*Mar 1 00:57:33.395: BR0:1 BNCP: I CONFREQ [REQsent] id 4
len 4
*Mar 1 00:57:33.399: BR0:1 BNCP: O CONFACK [REQsent] id 4
len 4
*Mar 1 00:57:33.403: BR0:1 IPCP: I CONFREQ [Not negotiated] id 4
len 10
*Mar 1 00:57:33.407: BR0:1 IPCP: Address 172.16.53.17
(0x0306AC103511)
*Mar 1 00:57:33.415: BR0:1 LCP: O PROTREJ [Open] id 28
len 16 protocol IPCP
(0x80210104000A0306AC103511)
*Mar 1 00:57:33.419: BR0:1 CDPCP: I CONFREQ [REQsent] id 4
len 4
*Mar 1 00:57:33.423: BR0:1 CDPCP: O CONFACK [REQsent] id 4
len 4
*Mar 1 00:57:33.427: BR0:1 BNCP: I CONFACK [ACKsent] id 14
```

```
len 4
*Mar 1 00:57:33.431: BR0:1 BNCP: State is Open
*Mar 1 00:57:33.435: BR0:1 CDPCP: I CONFACK [ACKsent] id 14
len 4
*Mar 1 00:57:33.439: BR0:1 CDPCP: State is Open
*Mar 1 00:57:33.443: BR0:1 DDR: dialer protocol up
00:57:34: %LINEPROTO-5-UPDOWN:
Line protocol on Interface BRI0:1, changed state to up
00:57:39: %ISDN-6-CONNECT: Interface BRI0:1 is now connected
to 5552000 ROUTER2
ROUTER1#
```

```
ROUTER1# show isdn status
Global ISDN Switchtype = basic-5ess
ISDN BRI0 interface
    dsl 0, interface ISDN Switchtype = basic-5ess
    Layer 1 Status:
        ACTIVE
    Layer 2 Status:
        TEI = 68, Ces = 1, SAPI = 0, State = MULTIPLE_FRAME_ESTABLISHED
        I_Queue_Len 0, UI_Queue_Len 0
    Layer 3 Status:
        1 Active Layer 3 Call(s)
        CCB:callid=800E, sapi=0, ces=1, B-chan=1, calltype=DATA
    Active dsl 0 CCBs = 1
    The Free Channel Mask: 0x80000002
    Number of L2 Discards = 0, L2 Session ID = 34
    Total Allocated ISDN CCBs = 1
*Mar 1 00:58:03.343: ISDN BR0: TX -> RRp sapi=0 tei=68 nr=2
*Mar 1 00:58:03.379: ISDN BR0: RX <- RRf sapi=0 tei=68 nr=2pann
ROUTER1# show spanning-tree
```

```
Bridge group 1 is executing the ieee compatible Spanning Tree protocol
Bridge Identifier has priority 32768, address 0060.5cf4.a9a8
Configured hello time 2, max age 20, forward delay 15
Current root has priority 32768, address 0060.5cf4.a955
Root port is 3 (BRI0), cost of root path is 15625
Topology change flag set, detected flag not set
Number of topology changes 10 last change occurred 00:01:15 ago
from Serial0
Times: hold 1, topology change 35, notification 2
hello 2, max age 20, forward delay 15
Timers: hello 0, topology change 0, notification 0, aging 15
```

```
Port 2 (Ethernet0) of Bridge group 1 is forwarding
Port path cost 100, Port priority 128, Port Identifier 128.2.
Designated root has priority 32768, address 0060.5cf4.a955
Designated bridge has priority 32768, address 0060.5cf4.a9a8
Designated port id is 128.2, designated path cost 15625
Timers: message age 0, forward delay 0, hold 0
Number of transitions to forwarding state: 2
BPDU: sent 751, received 0
```

**Port 3 (BRI0) of Bridge group 1 is forwarding**

*!--- BRI Interface forwards the bridged traffic now.*

```
Port path cost 15625, Port priority 128, Port Identifier 128.3.
Designated root has priority 32768, address 0060.5cf4.a955
Designated bridge has priority 32768, address 0060.5cf4.a955
Designated port id is 128.3, designated path cost 0
Timers: message age 2, forward delay 0, hold 0
Number of transitions to forwarding state: 3
BPDU: sent 1014, received 608
```

Port 6 (Serial0) of **Bridge group 1 is down**

```
Port path cost 647, Port priority 128, Port Identifier 128.6.
Designated root has priority 32768, address 0060.5cf4.a955
Designated bridge has priority 32768, address 0060.5cf4.a9a8
Designated port id is 128.6, designated path cost 15625
Timers: message age 0, forward delay 0, hold 0
Number of transitions to forwarding state: 1
BPDU: sent 15, received 27
```

```
ROUTER1#
```

```
*Mar 1 00:58:33.387: ISDN BR0: TX -> RRp sapi=0 tei=68 nr=2
*Mar 1 00:58:33.423: ISDN BR0: RX <- RRf sapi=0 tei=68 nr=2
```

## debug Output on ROUTER1 when Serial0 Comes Back Again and ISDN Drops the Call

```
00:58:37: %LINK-3-UPDOWN: Interface Serial0, changed state to up
*Mar 1 00:58:37.671: BR0:1 DDR: disconnecting call
*Mar 1 00:58:37.675: BR0:2 DDR: disconnecting call
*Mar 1 00:58:37.675: ISDN BR0: Event: Hangup call to call id 0x800E
*Mar 1 00:58:37.679: ISDN BR0: process_disconnect(): call id 0x800E,
call type is DATA, b_idb 0x19F4D8, ces 1, cause Normal call
clearing(0x10)
00:58:37: %ISDN-6-DISCONNECT: Interface BRI0:1 disconnected from
5552000 ROUTER2, call lasted 64 seconds
*Mar 1 00:58:37.691: ISDN: get_isdn_service_state(): idb 0x19F4D8
bchan 2 is_isdn 1 Not a Pri
*Mar 1 00:58:37.695: CCBRI_Go Fr Host InPkgInfo (Len=13) :
*Mar 1 00:58:37.699: 5 0 1 80 E 3 8 1 90 8 2 80 90
*Mar 1 00:58:37.703:
*Mar 1 00:58:37.719: ISDN BR0: TX -> INFOc sapi=0 tei=68 ns=2 nr=2
i=0x08010E4508028090
*Mar 1 00:58:37.727: DISCONNECT pd = 8 callref = 0x0E
*Mar 1 00:58:37.735: Cause i = 0x8090 - Normal call clearing
*Mar 1 00:58:37.743: ISDN BR0 EVENT: isdn_sw_cs!!!!!!!!!!!!!!!!!!!!tate:
State = 6, Old State = 4
00:58:37: %LINK-3-UPDOWN: Interface BRI0:1, changed state to down
*Mar 1 00:58:37.751: BR0:1 BNCP: State is Closed
*Mar 1 00:58:37.755: BR0:1 CDPCP: State is Closed
*Mar 1 00:58:37.755: BR0:1 PPP: Phase is TERMINATING [0 sess, 1 load]
*Mar 1 00:58:37.759: BR0:1 LCP: State is Closed
*Mar 1 00:58:37.763: BR0:1 PPP: Phase is DOWN [0 sess, 1 load]
*Mar 1 00:58:37.763: BR0:1 DDR: disconnecting call
*Mar 1 00:58:37.775: ISDN Recvd L1 prim 3 dsl 0 state 1 ctrl_state 0
*Mar 1 00:58:37.779: ISDN BR0: Physical layer is IF_DOWN
*Mar 1 00:58:37.783: ISDN BR0: Shutting down ME
00:58:37: %ISDN-6-LAYER2DOWN: Layer 2 for Interface BRI0,
TEI 68 changed to down
*Mar 1 00:58:37.791: ISDN BR0: L2-TERM: ces/tei=1/68
ESTABLISHED->TERM_DOWN
*Mar 1 00:58:37.795: ISDN BR0: LIF_EVENT: ces/callid 1/0x800E
HOST_DISCONNECT_ACK
*Mar 1 00:58:37.803: ISDN: get_isdn_service_state(): idb 0x19F4D8
bchan 2 is_isdn 1 Not a Pri
*Mar 1 00:58:37.807: ISDN BR0: HOST_DISCONNECT_ACK: call type is DATA
00:58:37: %LINK-3-UPDOWN: Interface BRI0:1, changed state to down
*Mar 1 00:58:37.815: BR0:1 LCP: State is Closed
*Mar 1 00:58:37.815: BR0:1 DDR: disconnecting call
*Mar 1 00:58:37.819: ISDN BR0: Shutting down ISDN Layer 3
00:58:37: %ISDN-6-LAYER2DOWN: Layer 2 for Interface BR0,
TEI 68 changed to down
00:58:37: %LINK-5-CHANGED: Interface BRI0, changed state to standby mode
*Mar 1 00:58:37.847: ISDN BR0 EVENT: isdn_sw_cstate: State = 6,
Old State = 4
00:58:37: %LINK-3-UPDOWN: Interface BRI0:2, changed state to down
*Mar 1 00:58:37.855: BR0:2 LCP: State is Closed
```

```
*Mar 1 00:58:37.855: BR0:2 DDR: disconnecting call
*Mar 1 00:58:37.895: ISDN BR0: Incoming call id = 0x0011, dsl 0
*Mar 1 00:58:37.895: ISDN BR0: L2-TERM: ces/tei=1/0
  TERM_DOWN->AWAIT_ESTABLISH
*Mar 1 00:58:37.935: ISDN BR0: Activating
00:58:38: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0,
changed state to up
00:58:38: %LINEPROTO-5-UPDOWN: Line protocol on Interface BRI0:1,
changed state to down
*Mar 1 00:58:39.939: ISDN BR0: Could not bring up interface
*Mar 1 00:58:39.943: ISDN BR0: Shutting down ISDN Layer 3
*Mar 1 00:58:39.963: ISDN BR0: Activating
*Mar 1 00:58:41.943: ISDN BR0: Could not bring up interface
*Mar 1 00:58:41.947: ISDN BR0: Shutting down ISDN Layer 3
*Mar 1 00:58:41.947: ISDN BR0: Activating
ROUTER1#
```

```
ROUTER1# show isdn status
Global ISDN Switchtype = basic-5ess
ISDN BRI0 interface
dsl 0, interface ISDN Switchtype = basic-5ess
Layer 1 Status:
DEACTIVATED
Layer 2 Status:
Layer 2 NOT Activated
```

*!--- ISDN L1 and L2 are back to the deactivated state.*

```
Layer 3 Status:
0 Active Layer 3 Call(s)
Active dsl 0 CCBs = 0
The Free Channel Mask: 0x80000003
Number of L2 Discards = 0, L2 Session ID = 39
Total Allocated ISDN CCBs = 0
ROUTER1#
*Mar 1 00:58:49.951: ISDN BR0: Could not bring up interface
*Mar 1 00:58:49.951: ISDN BR0: Shutting down ISDN Layer 3
ROUTER1#
```

```
ROUTER1# show spanning-tree
```

```
Bridge group 1 is executing the ieee compatible Spanning Tree protocol
Bridge Identifier has priority 32768, address 0060.5cf4.a9a8
Configured hello time 2, max age 20, forward delay 15
Current root has priority 32768, address 0060.5cf4.a955
Root port is 6 (Serial0), cost of root path is 647
Topology change flag not set, detected flag not set
Number of topology changes 13 last change occurred 00:28:23 ago
from Serial0
Times: hold 1, topology change 35, notification 2
hello 2, max age 20, forward delay 15
Timers: hello 0, topology change 0, notification 0, aging 300
```

```
Port 2 (Ethernet0) of Bridge group 1 is forwarding
Port path cost 100, Port priority 128, Port Identifier 128.2.
Designated root has priority 32768, address 0060.5cf4.a955
Designated bridge has priority 32768, address 0060.5cf4.a9a8
Designated port id is 128.2, designated path cost 647
Timers: message age 0, forward delay 0, hold 0
Number of transitions to forwarding state: 2
BPDU: sent 1633, received 0
```

```
Port 3 (BRI0) of Bridge group 1 is down
```

*!--- BRI0 is in the down state when Serial 0 is up.*

```
Port path cost 15625, Port priority 128, Port Identifier 128.3.  
Designated root has priority 32768, address 0060.5cf4.a955  
Designated bridge has priority 32768, address 0060.5cf4.a9a8  
Designated port id is 128.3, designated path cost 647  
Timers: message age 0, forward delay 0, hold 0  
Number of transitions to forwarding state: 3  
BPDU: sent 1014, received 622
```

Port 6 (Serial0) of **Bridge group 1 is forwarding**

*!--- Serial0 forwards the bridged traffic now.*

```
Port path cost 647, Port priority 128, Port Identifier 128.6.  
Designated root has priority 32768, address 0060.5cf4.a955  
Designated bridge has priority 32768, address 0060.5cf4.a955  
Designated port id is 128.6, designated path cost 0  
Timers: message age 1, forward delay 0, hold 0  
Number of transitions to forwarding state: 2  
BPDU: sent 18, received 896
```

ROUTER1#

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- **Bridging Across ISDN**
- **BRI ISDN Backup With Backup Interface**
- **Configuring BRI Multilink ISDN Backup With Dialer Watch**
- **Configuring BRI ISDN Backup With Dialer Watch**
- **Configuring ISDN Backup With Floating Static Routes**
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