ISDN上的备份桥接

目录

简介

本文档说明并提供如何使用 ISDN 配置备份桥接的示例。此配置使用备用接口方法认为主链路发生故障。关于备份的更多信息，请参阅DDR备份的配置与故障排除。

在桥接的广域网环境，因为不支持在异步上的桥接，唯一可用的的按需拨号路由(DDR)备份解决方案是使用ISDN。

注意桥接在ISDN连接倾向于保持连接活动在非常长时间，如果不永久。如果电信公司按照连接时间收取ISDN费用而被跟踪的串行链路长时间发生故障时，将会导致极高的费用。

注意： 此配置是为一个站点和一条B信道。要配置一条以上的B信道，您必须使用拨号程序文件(dialer profiles)。(参考桥接的配置的拨号配置文件使用ISDN配置。)

关于在无备份环境的桥接配置的信息，请参阅ISDN上的桥接。

先决条件

要求

尝试进行此配置之前，请确保满足以下要求：

- 拥有ISDN基础知识。

使用的组件

本文档中的信息基于以下软件和硬件版本：

- Cisco 2500系列路由器，每台有一个WAN串行接口和一个BRI接口。
- Cisco IOS软件版本12.2(7b)。

注意： 任何有WAN（串行）链路和BRI端口的路由器均可使用本配置。

本文档中的信息都是基于特定实验室环境中的设备编写的。本文档中使用的所有设备最初均采用原始（默认）配置。如果您使用的是真实网络，请确保您已经了解所有命令的潜在影响。

相关产品

本配置可在任意两台运行Cisco IOS软件的路由器上使用，每台路由器至少应有一个WAN串行接口和一个BRI接口。

规则

有关文档规则的详细信息，请参阅 Cisco 技术提示规则。

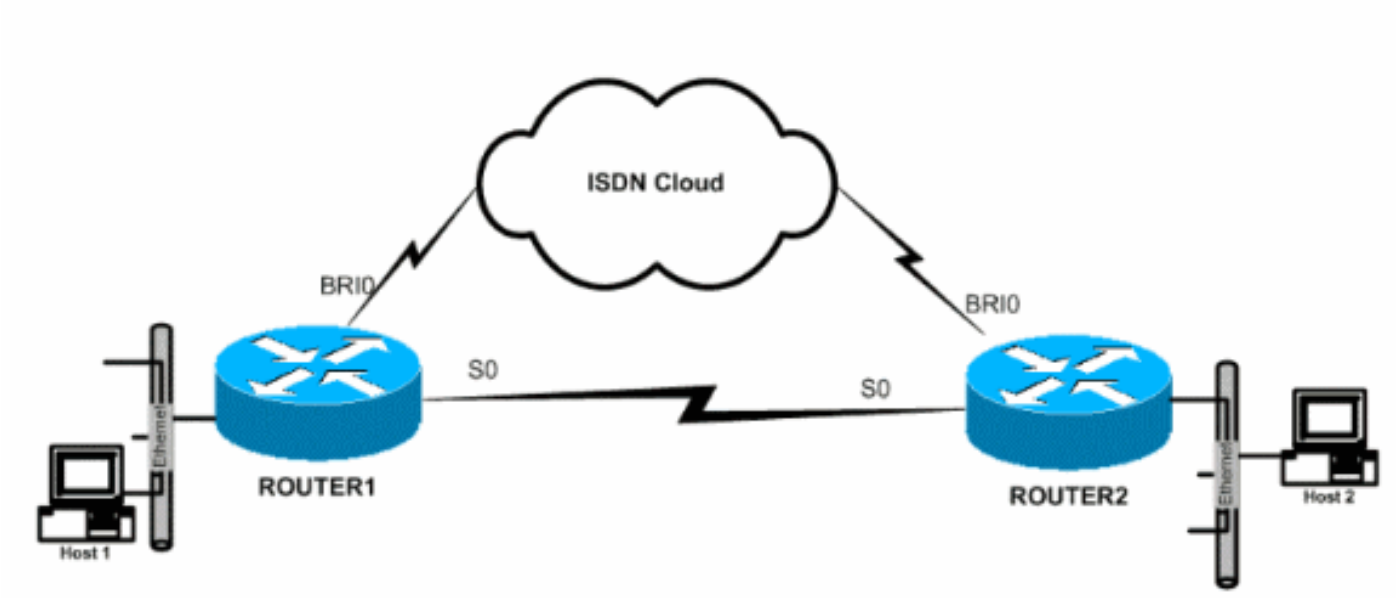
配置

本部分提供有关如何配置本文档所述功能的信息。

注意： 要查找本文档所用命令的其他信息，请使用命令查找工具（仅限注册用户）。

网络图

本文档使用以下网络设置：



配置

本文档使用以下配置：

- 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. !
```

验证

本部分提供的信息可帮助您确认您的配置是否可正常运行。

命令输出解释程序工具（仅限注册用户）支持某些 **show** 命令，使用此工具可以查看对 show 命令输出的分析。

- **show isdn status** —显示ISDN接口的第1层(L1)， Layer2 (L2)和第3层(L3)状况。
- **show dialer** —显示拨号程序的状态和ISDN信道的单个状况。
- **show bridge** —显示条目类在网桥转发数据库的。
- **show interface** —显示多种接口的状况，例如序列和BRI接口。
- **show spanning-tree**—显示路由器所知的生成树拓扑。

Serial0工作时路由器1上的show命令

```
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
```

Serial0停止工作时路由器1上的show命令

```
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
```

故障排除

本部分提供的信息可用于对配置进行故障排除。

故障排除资源

请使用这些资源如所需求：

- ISDN 技术 支持
- 排除串行线路故障
- HDLC 背对背连接

故障排除命令

命令输出解释程序工具（仅限注册用户）支持某些 **show** 命令，使用此工具可以查看对 show 命令输出的分析。

注意： 在发出 **debug** 命令之前，请参阅有关 debug 命令的重要信息。

- **debug dialer**—提供关于拨号接口事件的信息。
- **debug isdn event**—显示debug消息，关于在ISDN接口的用户端发生的ISDN活动。
- **debug isdn q931**—提供关于呼叫建立及本地路由器(用户端)和网络之间的ISDN网络连接(L3)拆卸的信息。
- **debug isdn q921**—显示关于数据链路层(L2)接入过程的debug消息，发生在ISDN接口的D-channel(LAPD)的路由器上。
- **debug ppp negotiation**—显示debug消息关于PPP选项和网络控制协议(NCP)参数的协商。
- **debug ppp authentication**—显示debug消息关于CHAP和密码认证协议(PAP)数据包交换。

Serial0停止工作而ISDN开始工作时路由器1上的Debug命令输出

```
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=0x08010E0504028890180 1832C0735353532303030
*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
```

Serial0重新开始工作且ISDN丢弃呼叫时路由器1上的调试输出

```
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#
```

相关信息

- ISDN 上的桥接
- 使用备份接口的 BRI ISDN 备份
- 使用Dialer Watch配置BRI 多链路ISDN备份
- 使用Dialer Watch配置BRI ISDN 备份
- 用浮动静态路由配置 ISDN 备份
- 使用 BRI 和 Backup Interface 命令实现 DDR 备份
- 配置使用Dialer Profile的 BRI备份接口
- 使用 BRI 与 Dialer Watch 配置 DDR 备份
- 使用浮动静态路由为广域网链路配置ISDN备份
- 配置帧中继备份
- 配置串行线路的拨号备份
- Cisco IOS Dial Services 命令
- 拨号和接入技术支持
- 技术支持和文档 - Cisco Systems