

进行环回呼叫以测试 BRI 电路

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简介

本文档提供有关如何执行环回以测试基本速率接口(BRI)电路的说明。

先决条件

要求

本文档的读者应掌握以下这些主题的相关知识：

- debug isdn q931和debug ppp negotiation命令的输出。
- 一般DDR拨号器配置文件配置概念。有关拨号程序配置文件的详细信息，请参阅[配置和故障排除拨号程序配置文件](#)。

在尝试此步骤之前，请从Telco获取以下信息：

- 要配置的交换机类型。
- 服务配置文件标识符(SPID)和本地目录号(LDN)。美国需要SPID和LDN。
- 两个B信道是否都在寻线组中。如果它们位于寻线组中，我们只需拨打一个号码即可到达任一B信道。
- BRI线路上的呼叫是需要在56k还是64k进行

使用的组件

本文档中的信息基于以下软件和硬件版本：

- 思科IOS软件版本12.0(3)T及更高版本。这是因为isdn call命令是在Cisco IOS软件版本

12.0(3)T中引入的。

本文档中的信息都是基于特定实验室环境中的设备创建的。本文档中使用的所有设备最初均采用原始（默认）配置。如果您是在真实网络上操作，请确保您在使用任何命令前已经了解其潜在影响。

规则

有关文档规则的详细信息，请参阅 [Cisco 技术提示规则](#)。

背景信息

在环回呼叫中，路由器会拨打其自身基本速率接口(BRI)的ISDN号。呼叫进入TELCO网云，电信公司将呼叫切换到第二条BRI信道。此呼叫被路由器看作第二条信道上的入呼叫。因此，路由器既发送又接收 ISDN 呼叫。

环回呼叫测试的是路由器发起和终止 ISDN 呼叫的能力。成功的环回呼叫可强烈表明到电信公司云的ISDN电路工作正常。

可以执行两种类型的环回呼叫来测试BRI电路：

- ISDN第3层环回呼叫\$1？您可以使用isdn call interface [命令进行配置](#)。此环回呼叫可帮助您验证ISDN第1层、第2层和第3层是否在路由器和本地ISDN交换机之间正常工作。此测试使用D信道，不测试B信道上的数据。这不涉及对路由器配置的更改。首先执行此测试。如果成功，请尝试数据环回呼叫测试。
- 数据环回呼叫\$1？测试B信道是否能够实际传递数据。这涉及路由器上的配置更改。

这些步骤仅允许您测试到本地交换机的BRI电路是否正常工作。它不测试端到端ISDN连接或与按需拨号路由(DDR)相关的问题。有关BRI故障排除的详细信息，请参阅以下文档：

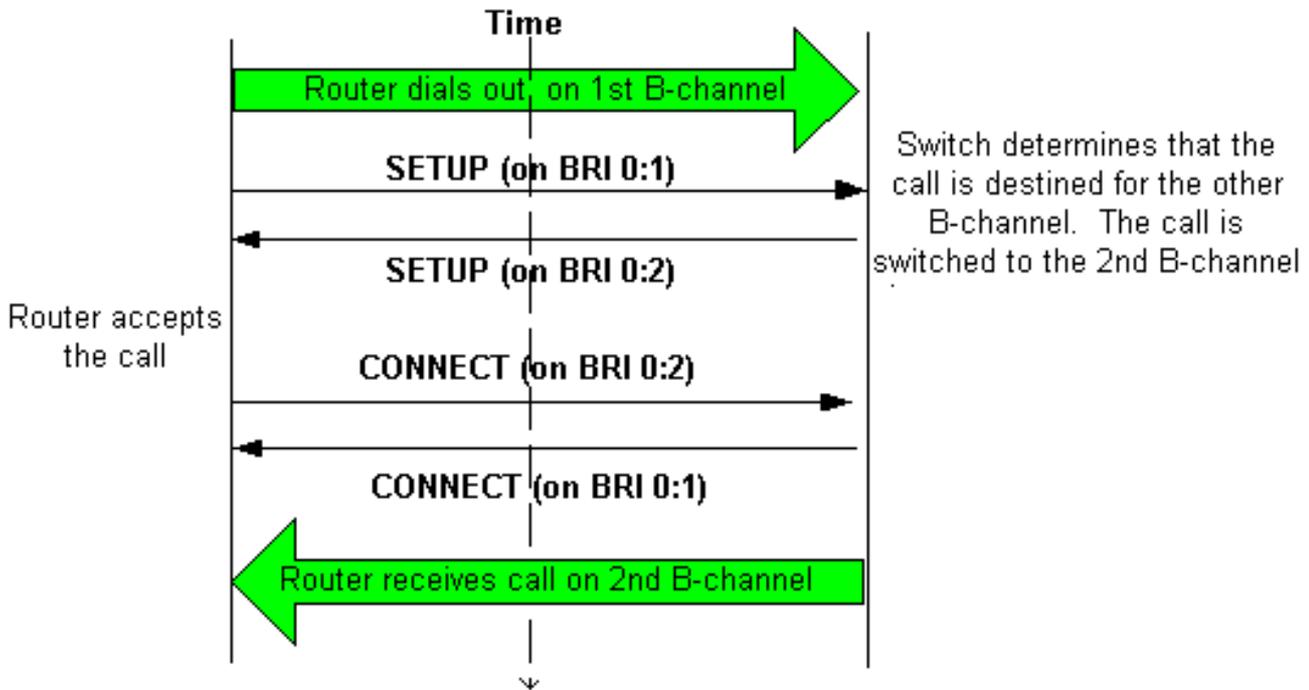
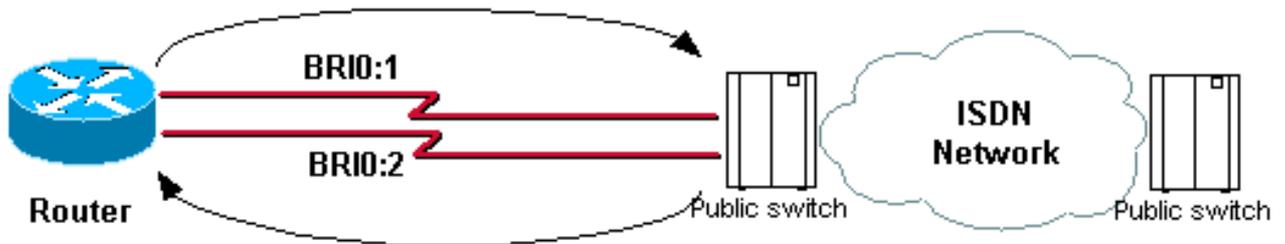
- [ISDN BRI 故障排除流程图](#)
- [使用debug isdn q931命令排除ISDN BRI第3层故障的方法](#)

执行ISDN第3层环回呼叫

本节提供成功ISDN第3层环回呼叫的示例。isdn call命令可启用传出ISDN呼叫，而无需DDR要求，如相关流量和路由。此命令只能用于测试ISDN电路，最高可达第3层，不能用于传递流量或替代适当的DDR配置。此命令可验证ISDN电路（尤其是第3层）是否正常工作。

[图1](#)显示了呼叫流和一些debug isdn q931消息：

图1 — 呼叫流和某些调试isdn q931消息



```

maui-soho-04#isdn call interface bri 0 5551111
!--- The router dials 5551111 (the ISDN number of the router's own BRI). !--- If the BRI circuit
has two different phone numbers for each B-channel, !--- use the number that belongs to the
second B-channel. !--- You can use this command to make calls at 56k, with the speed 56 option .
maui-soho-04# *Mar 1 17:55:08.344: ISDN BR0: TX -> SETUP pd = 8 callref = 0x09
!--- Q931 Setup message is Transmitted (TX) to the telco switch. *Mar 1 17:55:08.360: Bearer
Capability i = 0x8890 *Mar 1 17:55:08.360: Channel ID i = 0x83 *Mar 1 17:55:08.364: Keypad
Facility i = '5551111' *Mar 1 17:55:08.484: ISDN BR0: RX <- CALL_PROC pd = 8 callref = 0x89
!--- Call Proceeding message is Received (RX) from the telco switch. !--- The switch now
processes the call. *Mar 1 17:55:08.488: Channel ID i = 0x89 *Mar 1 17:55:08.516: ISDN BR0: RX
<- SETUP pd = 8 callref = 0x12
!--- A Setup message is Received (RX) from the switch. This message is for the !--- incoming
call. Remember that the router sent a Setup message (for the !--- outgoing call) and now
receives a SETUP message for the same call. *Mar 1 17:55:08.516: Bearer Capability i = 0x8890
*Mar 1 17:55:08.520: Channel ID i = 0x8A *Mar 1 17:55:08.520: Signal i = 0x40 - Alerting on -
pattern 0 *Mar 1 17:55:08.532: Called Party Number i = 0xC1, '5551111' *Mar 1 17:55:08.532:
Locking Shift to Codeset 5 *Mar 1 17:55:08.532: Codeset 5 IE 0x2A i = 0x808001038001118001, '<'
*Mar 1 17:55:08.564: ISDN BR0: Event: Received a DATA call from on B2 at 64 Kb/s *Mar 1
17:55:08.620: %DIALER-6-BIND: Interface BRI0:2 bound to profile Dialer1 *Mar 1 17:55:08.652:
ISDN BR0: TX -> CALL_PROC pd = 8 callref = 0x92
! --- Transmit (TX) a Call Proceeding message for the incoming call. *Mar 1 17:55:08.652:
Channel ID i = 0x8A *Mar 1 17:55:08.700: %LINK-3-UPDOWN: Interface BRI0:2, changed state to up
*Mar 1 17:55:08.988: ISDN BR0: TX -> CONNECT pd = 8 callref = 0x92
! --- Transmit (TX) a Connect message for the incoming call. *Mar 1 17:55:08.988: Channel ID i =
0x8A *Mar 1 17:55:09.040: ISDN BR0: RX <- CONNECT_ACK pd = 8 callref = 0x12
! --- Receive (RX) a Connect Acknowledgment for the incoming call. *Mar 1 17:55:09.040: Channel
ID i = 0x8A *Mar 1 17:55:09.040: Signal i = 0x4F - Alerting off *Mar 1 17:55:09.064: ISDN BR0:
RX <- CONNECT pd = 8 callref = 0x89
! --- Receive (RX) a Connect message for the outgoing call. *Mar 1 17:55:09.076: ISDN BR0: TX ->
CONNECT_ACK pd = 8 callref = 0x09
*Mar 1 17:55:09.080: %LINK-3-UPDOWN: Interface BRI0:1, changed state to up

```

```
*Mar 1 17:55:09.104: %DIALER-6-BIND: Interface BRI0:1 bound to profile BRI0
*Mar 1 17:55:09.112: %ISDN-6-CONNECT: Interface BRI0:1 is now connected to 5551111
! --- Call is now connected. Loopback call is successful.
```

注意：

- 在环回呼叫期间，路由器在不同B信道上同时充当被叫路由器和主叫路由器。在解释debug isdn q931输出时，必须跟踪这些“双重角色”。例如，路由器发送设置消息(TX -> SETUP)，并且也接收一个(RX <- SETUP)。当收到的SETUP消息与来电相关联时，传输的SETUP必须与去电相关联。
- 在上例中，拨打第一个B信道的号码。但是，电信公司发现第一个B信道正忙（因为它进行呼叫），并将呼叫切换到第二个B信道，并且连接成功完成。但是，Telco交换机中的错误配置可能导致环回呼叫失败。当交换机尝试将呼叫分配给第一个信道（正忙于进行呼叫）时，会发生这种情况。要求电信公司在寻线组中添加两个B信道。但是，为了进行本测试，我们可以在isdn call interface命令中指定第二个B信道号来解决此问题。
- 在另一台路由器上执行环回呼叫。
- 如果环回呼叫成功，并且到远程端的呼叫继续失败，您可以尝试数据环回呼叫以测试B通道数据完整性，如下一节所述。

有关如何排除任何问题的信息，请参阅以下文档：

- [ISDN BRI 故障排除流程图](#)
- [使用debug isdn q931命令排除ISDN BRI第3层故障](#)

执行数据环回呼叫

数据环回呼叫对测试B信道是否能正确传输数据非常有用。在许多情况下，debug ppp negotiation可能会持续失败。此测试可用于检查B通道上的数据完整性。

注意：此测试与上一测试不同，涉及对路由器进行配置更改。

在数据环回呼叫中，我们在路由器上配置两个拨号器接口。拨号器接口配置了必要的寻址、身份验证和DDR命令，以在BRI线路上成功拨出、接收传入呼叫、绑定到其他拨号器接口并成功连接。

创建拨号程序配置文件，以拨号同一路由器上的另一个拨号程序配置文件。

配置路由器

要为环回呼叫配置路由器，请完成以下步骤：

1. 在copy running-config startup-config命令的帮助下保存运行配置。执行此操作时，可以在测试完成后重新启动并将运行配置恢复为测试前版本。
2. 配置物理接口。**注意：**本部分假定您了解必要的ISDN相关信息，如交换机类型和SPID。

```
interface BRI0
  no ip address
  !--- Do not configure an IP address on the physical interface. !--- The IP address will be
  configured on the dialer. encapsulation ppp !--- physical interface uses PPP encapsulation
  dialer pool-member 1 !--- Assign BRI0 as member of dialer pool 1. !--- Dialer pool 1 is
  specified in interface Dialer 1, and !--- interface Dialer 2. isdn switch-type basic-ni
  isdn spid1 71355511110101 5551111 isdn spid2 71355511120101 5551112 !--- switch-type and
  SPID configuration. !--- Contact the telco for this information. ppp authentication chap
  callin !--- The physical interface uses CHAP authentication. !--- Authentication is
  required on the physical interface to bind the !--- incoming call to the right dialer
  profile.
```

3. 配置第一个拨号器接口：

```
interface Dialer1
 ip address 1.1.1.1 255.255.255.0
 !--- Assign an IP address to the dialer interface. !--- In this example, the IP addresses
 for both dialers !--- are in the same subnet. encapsulation ppp !--- The dialer interface
 uses PPP (same as the physical BRI interface). dialer pool 1 !--- his defines Dialer pool
 1. BRI 0 is a member of this pool. dialer remote-name dialer2 !--- This name must match the
 name used by the other dialer interface to !--- authenticate itself. Dialer string
 7135551112. !--- Phone number for the other B-channel. !--- If your connection only needs
 one number for both B-channels !--- (that is, they are in a hunt-group), use that number
 here. dialer-group 1 !--- Apply interesting traffic definition from dialer-list 1. ppp
 authentication chap callin !--- Use one-way CHAP authentication. This is sufficient for
 this test. ppp chap hostname dialer1 !--- CHAP hostname to be sent out for authentication.
 ppp chap password dialer1 !--- CHAP Password to be sent out for authentication.
```

4. 配置第二个拨号器接口：

```
interface Dialer2
 ip address 1.1.1.2 255.255.255.0
 !--- Assign an IP address to the dialer interface. !--- In this example, IP address for
 both dialers are in the same subnet. encapsulation ppp dialer pool 1 !--- This defines
 Dialer pool 1. !--- BRI 0 is a member of this pool. dialer remote-name dialer1 !--- This
 name must match the name used by the other dialer interface !--- (dialer1) to authenticate
 itself. Dialer string 7135551111. !--- Phone number for the other B-channel. !--- If your
 connection only has one number for both B-channels !--- (that is, they are in a hunt-
 group), use that number here. dialer-group 1 !--- Apply interesting traffic definition from
 dialer-list 1. ppp authentication chap callin ppp chap hostname dialer2 !--- CHAP hostname
 to be sent out for authentication. ppp chap password dialer2 !--- CHAP Password to be sent
 out for authentication.
```

5. 配置用于身份验证的用户名和密码：

```
username dialer1 password 0 dialer1
username dialer2 password 0 dialer2
```

用户名和口令与在每个拨号器接口下使用ppp chap hostname和ppp chap password 命令配置的用户名和口令相同。

6. 配置静态路由以便清楚：

```
ip route 1.1.1.1 255.255.255.255 Dialer1
 !--- Note that the route for 1.1.1.1 points to dialer1. ip route 1.1.1.2 255.255.255.255
 Dialer2 !--- Note that the route for 1.1.1.2 points to dialer2. !--- The routes are used to
 determine which dialer interface is !--- used for dialout.
```

提示：如果在单独的子网中配置接口Dialer 1（步骤3）和接口Dialer 2（步骤4）的IP地址，则不需要静态路由。

7. 配置相关流量定义。

```
dialer-list 1 protocol ip permit
```

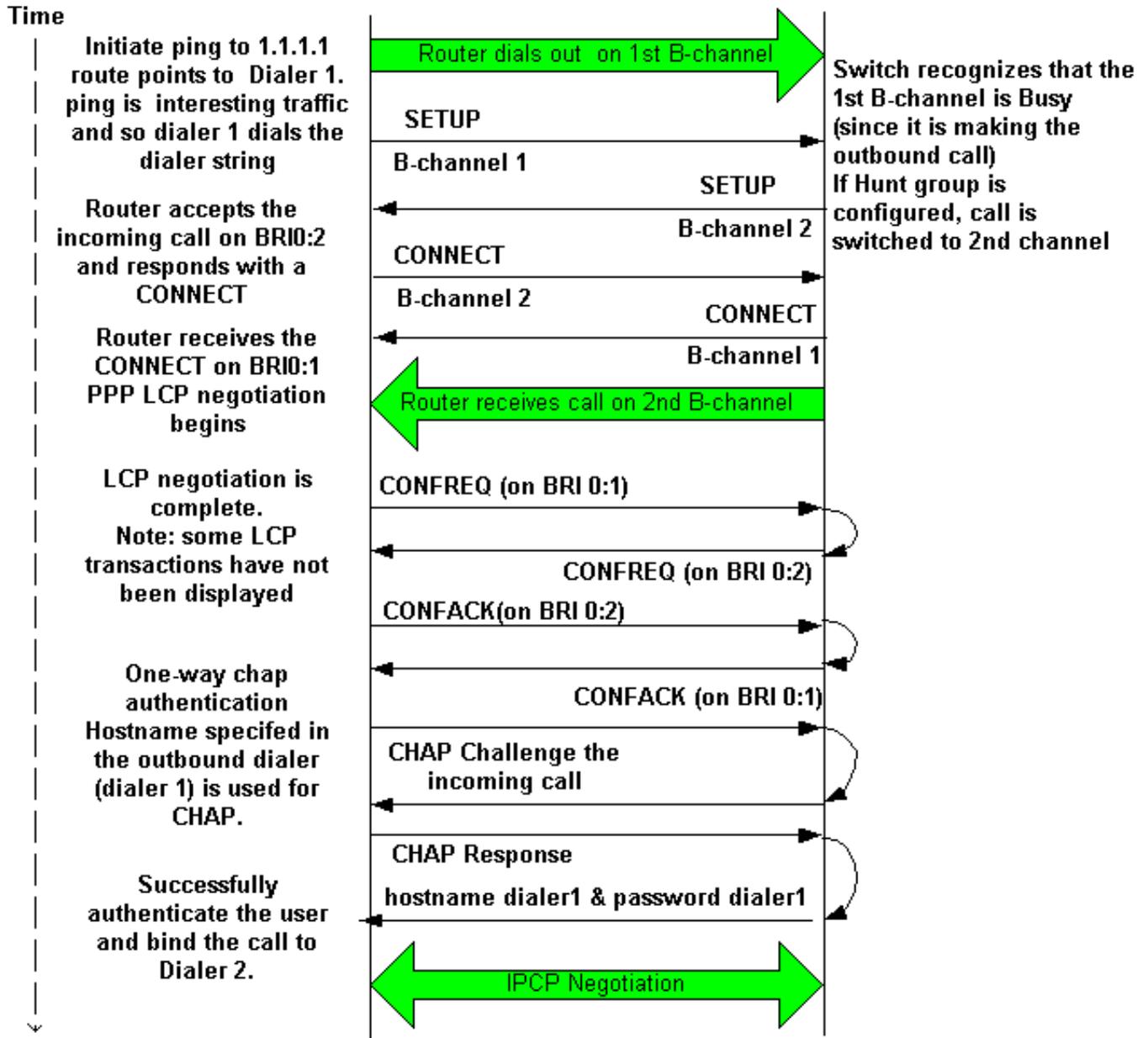
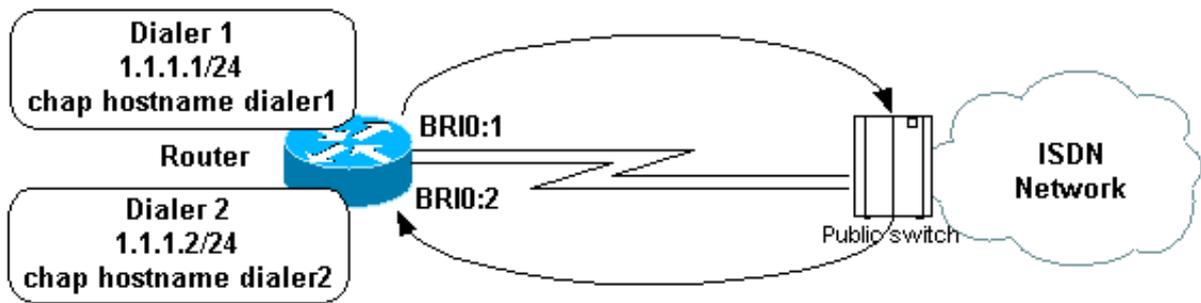
注意：拨号程序列表编号必须与拨号程序接口下拨号程序组中配置的拨号程序列表编号相同。在此示例中，请配置 dialer-list 1。

8. 测试完成后，重新加载路由器（不保存配置），以返回测试前使用的原始配置。

启动数据环回呼叫

现在，我们将启动数据环回呼叫，并查找PPP协商是否成功完成。PPP协商成功表示B信道可以正确传输数据。

图2 — 启动数据环回呼叫



激活以下调试：

- debug dialer
- debug isdn q931
- debug ppp negotiation
- debug ppp authentication (可选)

注意：当环回呼叫正在进行时，路由器在不同B信道上同时充当被叫路由器和主叫路由器。在解释 debug isdn q931和debug ppp negotiation命令的输出时，必须跟踪这些“双重角色”。例如，路由器发送设置消息(TX -> SETUP)，并且也接收一个(RX <- SETUP)。传输的SETUP必须与传出呼叫相关联，而收到的SETUP消息与传入呼叫相关联。

以下是背对背ISDN呼叫的调试：

```
router#show debug
```

```
Dial on demand:
```

```
Dial on demand events debugging is on
```

```
PPP:
```

```
PPP protocol negotiation debugging is on
```

```
ISDN:
```

```
ISDN Q931 packets debugging is on
```

```
ISDN Q931 packets debug DSLs. (On/Off/No DSL:1/0/-)
```

```
DSL 0 --> 1
```

```
1 -
```

```
router#ping 1.1.1.1
```

```
!--- Because of the static route entry shown in step 6 above, !--- the call is made out from dialer 1. Type escape sequence to abort. Sending 5, 100-byte ICMP Echos to 1.1.1.1, timeout is 2 seconds: 03:40:41: BR0 DDR: rotor dialout [priority] 03:40:41: BR0 DDR: Dialing cause ip (s=1.1.1.1, d=1.1.1.1) 03:40:41: BR0 DDR: Attempting to dial 7135551112 03:40:41: ISDN BR0: TX -> SETUP pd = 8 callref = 0x08 !--- Outgoing SETUP message. 03:40:41: Bearer Capability i = 0x8890 03:40:41: Channel ID i = 0x83 03:40:41: Keypad Facility i = '7135551112' 03:40:41: ISDN BR0: RX <- CALL_PROC pd = 8 callref = 0x88 03:40:41: Channel ID i = 0x89 03:40:41: ISDN BR0: RX <- SETUP pd = 8 callref = 0x2A !--- Incoming SETUP message on the other B-channel. 03:40:41: Bearer Capability i = 0x8890 03:40:41: Channel ID i = 0x8A 03:40:41: Signal i = 0x40 - Alerting on - pattern 0 03:40:41: Called Party Number i = 0xC1, '5551112', Plan:ISDN, Type:Subscriber(local) 03:40:41: Locking Shift to Codeset 5 03:40:41: Codeset 5 IE 0x2A i = 0x808001038001118001, '<' 03:40:42: ISDN BR0: Event: Received a DATA call from on B2 at 64 Kb/s !--- Note that the call comes in on the second B-channel (BRI0:2). !--- Hence the outgoing call must have been on BRI0:1. 03:40:42: ISDN BR0: Event: Accepting the call id 0xB 03:40:42: %LINK-3-UPDOWN: Interface BRI0:2, changed state to up. 03:40:42: BR0:2 PPP: Treating connection as a callin 03:40:42: BR0:2 PPP: Phase is ESTABLISHING, Passive Open [0 sess, 0 load] 03:40:42: BR0:2 LCP: State is Listen !--- PPP LCP negotiations begin. 03:40:42: ISDN BR0: TX -> CALL_PROC pd = 8 callref = 0xAA 03:40:42: Channel ID i = 0x8A 03:40:42: ISDN BR0: TX -> CONNECT pd = 8 callref = 0xAA 03:40:42: Channel ID i = 0x8A 03:40:42: ISDN BR0: RX <- CONNECT_ACK pd = 8 callref = 0x2A 03:40:42: Channel ID i = 0x8A 03:40:42: Signal i = 0x4F - Alerting off 03:40:42: ISDN BR0: RX <- CONNECT pd = 8 callref = 0x88 03:40:42: %LINK-3-UPDOWN: Interface BRI0:1, changed state to up 03:40:42: BR0:1: interface must be fifo queue, force fifo 03:40:42: %DIALER-6-BIND: Interface BR0:1 bound to profile Di1 03:40:42: BR0:1 PPP: Treating connection as a callout 03:40:42: BR0:1 PPP: Phase is ESTABLISHING, Active Open [0 sess, 0 load] 03:40:42: BR0:1 PPP: No remote authentication for call-out !--- One-way authentication (configured with PPP authentication CHAP callin). 03:40:42: BR0:1 LCP: O CONFREQ [Closed] id 11 len 10 03:40:42: BR0:1 LCP: MagicNumber 0x513D7870 (0x0506513D7870) 03:40:42: ISDN BR0: TX -> CONNECT_ACK pd = 8 callref = 0x08 03:40:42: BR0:2 LCP: I CONFREQ [Listen] id 11 Len 10 03:40:42: BR0:2 LCP: MagicNumber 0x513D7870 (0x0506513D7870) 03:40:42: BR0:2 LCP: O CONFREQ [Listen] id 11 Len 15 03:40:42: BR0:2 LCP: AuthProto CHAP (0x0305C22305) 03:40:42: BR0:2 LCP: MagicNumber 0x513D7A45 (0x0506513D7A45) 03:40:42: BR0:2 LCP: O CONFACK [Listen] id 11 Len 10 03:40:42: BR0:2 LCP: MagicNumber 0x513D7870 (0x0506513D7870) 03:40:42: BR0:1 LCP: I CONFREQ [REQsent] id 11 Len 15 03:40:42: BR0:1 LCP: AuthProto CHAP (0x0305C22305) 03:40:42: BR0:1 LCP: MagicNumber 0x513D7A45 (0x0506513D7A45) 03:40:42: BR0:1 LCP: O CONFACK [REQsent] id 11 Len 15 03:40:42: BR0:1 LCP: AuthProto CHAP (0x0305C22305) 03:40:42: BR0:1 LCP: MagicNumber 0x513D7A45 (0x0506513D7A45) 03:40:42: BR0:1 LCP: I CONFACK [ACKsent] id 11 Len 10 03:40:42: BR0:1 LCP: MagicNumber 0x513D7870 (0x0506513D7870) 03:40:42: BR0:1 LCP: State is Open 03:40:42: BR0:1 PPP: Phase is AUTHENTICATING, by the peer [0 sess, 1 load] 03:40:43: BR0:2 LCP: I CONFACK [ACKsent] id 11 Len 15 03:40:43: BR0:2 LCP: AuthProto CHAP (0x0305C22305) 03:40:43: BR0:2 LCP: MagicNumber 0x513D7A45 (0x0506513D7A45) 03:40:43: BR0:2 LCP: State is Open 03:40:43: BR0:2 PPP: Phase is AUTHENTICATING, by this end [0 sess, 1 load] !--- Authentication begins. 03:40:43: BR0:2 CHAP: O CHALLENGE id 7 Len 26 from "router" 03:40:43: BR0:1 CHAP: I CHALLENGE id 7 Len 26 from "router" 03:40:43: BR0:1 CHAP: Using alternate hostname dialer1 !--- Use the alternate hostname specified with PPP CHAP hostname !--- under int Dialer 1. 03:40:43: BR0:1 CHAP: Username router not found 03:40:43: BR0:1 CHAP: Using default password 03:40:43: BR0:1 CHAP: O RESPONSE id 7 Len 28 from "dialer1" !--- Outgoing CHAP response sent on B-channel 1. 03:40:43: BR0:2 CHAP: I RESPONSE id 7 Len 28 from "dialer1" !--- Incoming CHAP response seen on B-channel 2. 03:40:43: BR0:2 CHAP: O SUCCESS id 7 Len 4 !--- Authentication is successful 03:40:43: BR0:2: interface must be fifo queue, force FIFO 03:40:43:
```

%DIALER-6-BIND: Interface BR0:2 bound to profile Di2 *!--- Call (from Dialer 1) is bound to int Dialer 2. !--- This is because the dialer remote-name dialer1 command is !--- configured under int dialer 2. Binding fails when the dialer remote-name !--- command is omitted, or is incorrect, .*

```
03:40:43: BR0:2 PPP: Phase is UP [0 sess, 0 load]
!--- IPCP negotiation begins. 03:40:43: BR0:2 IPCP: O CONFREQ [Not negotiated] id 1 Len 10
03:40:43: BR0:2 IPCP: Address 1.1.1.2 (0x030601010102) 03:40:43: BR0:2 CDPCP: O CONFREQ [Closed]
id 1 Len 4 03:40:43: BR0:1 CHAP: I SUCCESS id 7 Len 4 03:40:43: BR0:1 PPP: Phase is UP [0 sess,
1 load] 03:40:43: BR0:1 IPCP: O CONFREQ [Not negotiated] id 1 Len 10 03:40:43: BR0:1 IPCP:
Address 1.1.1.1 (0x030601010101) 03:40:43: BR0:1 CDPCP: O CONFREQ [Closed] id 1 Len 4 03:40:43:
BR0:1 IPCP: I CONFREQ [REQsent] id 1 Len 10 03:40:43: BR0:1 IPCP: Address 1.1.1.2
(0x030601010102) 03:40:43: BR0:1 IPCP: O CONFACK [REQsent] id 1 Len 10 03:40:43: BR0:1 IPCP:
Address 1.1.1.2 (0x030601010102) 03:40:43: BR0:1 CDPCP: I CONFREQ [REQsent] id 1 Len 4 03:40:43:
BR0:1 CDPCP: O CONFACK [REQsent] id 1 Len 4 03:40:43: BR0:2 IPCP: I CONFREQ [REQsent] id 1 Len
10 03:40:43: BR0:2 IPCP: Address 1.1.1.1 (0x030601010101) 03:40:43: BR0:2 IPCP: O CONFACK
[REQsent] id 1 Len 10 03:40:43: BR0:2 IPCP: Address 1.1.1.1 (0x030601010101) 03:40:43: BR0:2
CDPCP: I CONFREQ [REQsent] id 1 Len 4 03:40:43: BR0:2 CDPCP: O CONFACK [REQsent] id 1 Len 4
03:40:43: BR0:2 IPCP: I CONFACK [ACKsent] id 1 Len 10 03:40:43: BR0:2 IPCP: Address 1.1.1.2
(0x030601010102) 03:40:43: BR0:2 IPCP: State is Open !--- IPCP on B-channel 2 is Open. 03:40:43:
BR0:1 IPCP: I CONFACK [ACKsent] id 1 Len 10 03:40:43: BR0:1 IPCP: Address 1.1.1.1
(0x030601010101) 03:40:43: BR0:1 IPCP: State is Open !--- IPCP on B-channel 1 is Open. 03:40:43:
BR0:2 DDR: dialer protocol up 03:40:43: BR0:1 DDR: dialer protocol up 03:40:43: Di2 IPCP:
Install route to 1.1.1.1 03:40:43: Di1 IPCP: Install route to 1.1.1.2 03:40:44: %LINEPROTO-5-
UPDOWN: Line protocol on Interface BRI0:2, changed state to up 03:40:44: %LINEPROTO-5-UPDOWN:
Line protocol on Interface BRI0:1, changed state to up !--- Both B-channels are up. ... Success
rate is 0 percent (0/5) router#
```

注意：ping操作可能因与路由相关的问题而失败。你可以期待。成功的PPP协商是B信道是否能在链路上正确传递数据的真正测试。如果呼叫失败，请联系电信公司了解有关如何排除线路故障的详细信息。

[相关信息](#)

- [ISDN BRI 故障排除流程图](#)
- [使用debug isdn q931命令排除ISDN BRI第3层故障](#)
- [拨号程序配置文件的配置与故障排除](#)
- [使用 ppp chap hostname 和 ppp authentication chap callin 命令的 PPP 认证](#)
- [拨号和接入技术支持](#)
- [技术支持和文档 - Cisco Systems](#)