# 通过多个 BRI 接口配置多链路 PPP

## 目录

## 简介

本文档提供具有多个BRI接口的路由器的配置示例，该路由器通过多个BRI接口拨打另一台路由器，并建立多链路PPP(MPPP)连接。拨号的路由器必须确定远程BRI上没有更多可用的信道，然后拨打下一个远程BRI电话号码以建立其他信道。

两台路由器都使用拨号程序配置文件绑定物理BRI接口。您还可以使用拨号器循环组配置此设置，如使用循环组为多个BRI配置MPPP中所示。

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。

## 先决条件

### 要求

本文档没有任何特定的要求。

### 使用的组件

本文档中的信息基于以下软件和硬件版本：

- Cisco 3640，带有运行Cisco IOS的四端口BRI模块？软件版本12.1(4)。
- Cisco 4000，带有四个运行Cisco IOS软件版本12.1(4)的BRI接口。
- 每端有两条BRI电路。这些BRI未在寻线组中配置。

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。

## 配置

本部分提供有关如何配置本文档所述功能的信息。

注：要查找有关本文档中使用的命令的其他信息，请使用命令查找工具(仅限注册客户)

## 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：

- 梅兰妮（思科3640）
- 托里托(Cisco 4000)

**梅兰妮（思科3640）**

```
Current configuration:

 version 12.1
 service timestamps debug datetime msec
 service timestamps log datetime msec
 no service password-encryption
 !
hostname melanie
 !
enable password ww
 !
username torito password 0 ww
!--- Username for remote router (torito) and shared
```

```
secret (used for !--- Challenge Handshake Authentication
Protocol (CHAP) authentication). !--- Shared secret must
be the same on both sides. isdn switch-type basic-net3 !
interface Loopback0 ip address 10.10.10.1 255.255.255.0
! interface BRI0/0 no ip address shutdown ! interface
BRI2/0 no ip address shutdown ! interface BRI2/1 !---
First BRI interface. description ISDN number 6104 !---
Phone number of this BRI. no ip address encapsulation
ppp dialer pool-member 1 !--- Member of dialer pool 1.
isdn switch-type basic-net3 no cdp enable ppp
authentication chap !--- Use CHAP authentication. ppp
multilink !--- Enable multilink on the physical
interface. ! interface BRI2/2 !--- Second BRI interface.
description ISDN number 6103 !--- Phone number of this
BRI. no ip address encapsulation ppp dialer pool-member
1 !--- Member of dialer pool 1. isdn switch-type basic-
net3 no cdp enable ppp authentication chap !--- Use CHAP
authentication. ppp multilink !--- Enable multilink on
the physical interface. ! interface BRI2/3 no ip address
shutdown ! interface Dialer2 !--- Dialer interface used
for dialout. ip unnumbered Loopback0 !--- Use the
loopback0 address. !--- Static route on remote router
points to this Loopback0 address. encapsulation ppp
dialer pool 1 !--- Defines dialer pool 1. !--- BRI 2/1
and BRI 2/2 are members of this pool. dialer string 6113
!--- Dial 6113 first . dialer string 6114 !--- If 6113
fails, dial 6114 . !--- Both numbers are required.
Otherwise, the third call encounters a busy signal.
dialer load-threshold 1 either !--- Load level (in
either direction) for traffic at which additional !---
connections will be added to the MPPP bundle. !--- Load
level values range from 1 (unloaded) to 255 (fully
loaded). dialer-group 1 !--- Apply interesting traffic
definition from dialer-list 1. no cdp enable ppp
authentication chap !--- Use CHAP authentication. ppp
multilink !--- Allow MPPP for the four BRI channels. !
ip route 10.10.12.1 255.255.255.255 Dialer2 !--- Static
route to remote router. !--- All traffic destined for
the remote router must use int Dialer2 ! dialer-list 1
protocol ip permit !--- All IP traffic is designated as
interesting. !--- This is applied to interface dialer2
with the help of dialer-group 1. line con 0 transport
input none line 97 114 modem InOut transport input all
line aux 0 line vty 0 4 login ! end
```

请注意Cisco 3640(melanie)配置中的以下要点：

- 配置使用拨号程序配置文件。BRI接口是拨号程序池的成员。特定于目标的所有配置设置都在接口拨号器2配置中配置。
- 拨号器接口有两个拨号器字符串。请记住，远程路由器(torito)上有两个BRI接口。 由于这些BRI未由Telco在寻线组中配置，因此路由器melanie必须单独拨打每个BRI。使用多个拨号程序字符串时，始终拨打第一个电话号码。仅当该呼叫失败时，拨号程序接口才会尝试第二个拨号程序字符串。我们可以根据需要按顺序定义尽可能多的拨号程序字符串。
- MPPP的拨号器负载阈值设置为1，这是最小值。此值可以根据流量模式和要求进行更改。但是，如果定义了较高的负载阈值，则只有在负载超过该定义时才会添加附加链路。有关如何控制向多链路捆绑添加信道的详细信息，请参阅调整和可选命令部分。
- 远程路由器的静态主机路由指向接口拨号器2。然后流量从池的物理成员（BRI 2/1和BRI 2/2）转发出去。 为应使用多链路连接的目标流量创建静态路由（或使用路由协议）。

托里托(Cisco 4000)

```
Current configuration:
 !
 version 12.1
 service timestamps debug datetime msec
 service timestamps log datetime msec
 no service password-encryption
 !
 hostname torito
 !
 username melanie password 0 ww
```
*!--- Username for remote router (melanie) and shared secret !--- (used for CHAP authentication). !--- Shared secret must be the same on both sides.* ! isdn switch-type basic-net3 interface Loopback0 ip address 10.10.12.1 255.255.255.0 ! interface BRI0 no ip address shutdown ! interface BRI1 *!--- Phone number is 6113.* no ip address encapsulation ppp dialer pool-member 1 *!--- Member of dialer pool 1.* isdn switch-type basic-net3 ppp authentication chap *!--- Use CHAP authentication.* ppp multilink *!--- Enable multilink on the physical interface. !--- Unless you use CLID/DNIS based binding, this command is required. !--- See Configuring and Troubleshooting Dialer Profiles for more information.* ! interface BRI2 *!--- Phone number is 6114.* no ip address encapsulation ppp dialer pool-member 1 *!--- Member of dialer pool 1.* isdn switch-type basic-net3 ppp authentication chap *!--- Use CHAP authentication.* ppp multilink *!--- Enable multilink on the physical interface. !--- Unless you use CLID/DNIS based binding, this command is required. !--- See Configuring and Troubleshooting Dialer Profiles for more information.* ! interface BRI3 no ip address shutdown ! interface Dialer1 ip unnumbered Loopback0 *!--- Use the Loopback0 address. !--- The static route on remote router points to this Loopback0 address.* encapsulation ppp dialer pool 1 *!--- Defines Dialer pool 1. !--- BRI 1 and BRI 2 are members of this pool.* dialer remote-name melanie *!--- Specifies the name of the remote router. !--- This name matches the name used by the remote router to authenticate itself.* dialer-group 1 *!--- Apply interesting traffic definition from dialer-list 1.* ppp authentication chap *!--- Use CHAP authentication.* ppp multilink *!--- Allow MPPP for the 4 BRI channels.* ! ip route 10.10.10.1 255.255.255.255 Dialer1 *!--- Static route to remote router. !--- All traffic destined for the remote router must use int Dialer1.* dialer-list 1 protocol ip permit *!--- All IP traffic is designated as interesting. !--- This is applied to interface dialer2 using dialer-group 1.* line con 0 exec-timeout 0 0 transport input none line aux 0 exec-timeout 0 0 transport input all line vty 0 4 password ww login ! end

## 调整和可选命令

您可以使用本节中的命令调整MPPP连接的行为。您可以通过仔细调整这些参数来控制成本，这有助于避免数据链路的浪费和不必要的使用。这些命令必须在发起拨号的端实施。

- dialer load-threshold load[outbound |入站 |或]????您可以配置MPPP，以便在主信道建立后立即出现其他信道。在这种情况下，将dialer load-threshold *load命令中的*load threshold值设*置*为1。因此，将启动附加信道，并且它们继续保持工作状态（即它们不摆动）。 如果负载阈值被

设置为较高值，则多个信道可能会根据链路上的负载摆动。如果要根据需要添加附加信道，请根据流量将负载阈值设置为介于1和255之间的适当值。例如，如果附加信道要达到总容量的50%，则阈值应设置为128(0.50*255)。

- ppp timeout multilink link remove seconds*??*？？使用此命令可防止负载变化时多链路连接抖动。例如，如果负载阈值设置为15 (15/255 = 6%)，并且数据流超出阈值时，这时会出现其他线路。当流量低于阈值时，附加线路取消。在数据速率变化剧烈的情况中，多信道停留一段特定的时间则比较有益，即使负载阈值低于指定值。指定多链路超时低于控制所有链路超时的拨号程序空闲超时。
- **ppp timeout multilink link add seconds????使用此命令可防止向MP捆绑添加多个链路，直到在指定间隔内收到高流量。**这样可以防止突发 数据流引发额外的线路。
- **要为拨号程序配置文件指定到远程目标（可以在任何时候启用）的最大链路数，请在接口配置模式下使用dialer max-link命令。**在本例中，melanie上配置了两个BRI（或四个B信道），用于拨出。因此，默认情况下，所有四个信道都在MPPP连接中启动。但是，如果只希望启动三个B信道，则可以使用dialer max-link命令来限制链路数。

# 验证

本部分所提供的信息可用于确认您的配置是否正常工作。

## 显示命令

使用以下命令检验连接：

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**？？？表示路由器是否与ISDN交换机正确通信。在输出中，您需要验证第1 `ACTIVE`，并2= `MULTIPLE_FRAME_ESTABLISHED`。此指令也显示活动的呼叫的数量。有关详细信息，请参阅使用show isdn status命令进行BRI故障排除。
- **show ppp multilink**？？？显示有关处于活动状态的多链路捆绑的信息。使用此指令验证多链路连接。
- **show dialer [interface *type number*]**？？？显示为DDR配置的接口的常规诊断信息。如果拨号器正常启动，则必"启动"消息。如果显示为up，则表示线路协议已启用，但网络控制协议(NCP)未启用。启动拨号的数据包的源地址和目标地址显示在 `Dial reason line` 此**show命令也显示计时器的配置和连接超时前的时间。**
- **show caller user *username* detail**？？？显示特定用户的参数，如分配的IP地址、PPP和PPP捆绑参数等。如果您的Cisco IOS版本不支持此命令，请使用**show user**命令。

## show 命令输出

show ppp multilink命令显示链路连接后每台路由器上多链路捆绑的成员。请注意，在路由器melanie上，捆绑名称为torito，而在路由器上，捆绑名称为melanie。还指示属于捆绑的BRI接口和B信道。

```
melanie#show ppp multilink

   Dialer2, bundle name is torito
   0 lost fragments, 0 reordered, 0 unassigned
```

```
   0 discarded, 0 lost received, 1/255 load
   0x8 received sequence, 0x8 sent sequence
   Member links: 4 (max not set, min not set)
   BRI2/1:1
   BRI2/1:2
   BRI2/2:1
   BRI2/2:2

   torito#show ppp multilink
   Dialer1, bundle name is melanie
   0 lost fragments, 0 reordered, 0 unassigned
   0 discarded, 0 lost received, 1/255 load
   0x8 received sequence, 0x8 sent sequence
   Member links: 4 (max not set, min not set)
   BRI1:1
   BRI1:2
   BRI2:1
   BRI2:2
```

# 故障排除

本部分提供的信息可用于对配置进行故障排除。

## 故障排除命令

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???显示有关拨号器接口上收到的数据包的DDR调试信息。此信息有助于确保存在可以使用拨号器接口的相关流量。
- debug isdn q931???显示ISDN网络连接（第3层）的呼叫建立和断开。
- debug ppp negotiation??？显示PPP流量的信息，并在PPP流量协商链路控制协议(LCP)、身份验证和网络控制协议(NCP)时进行交换。成功的PPP协商将首先开放LCP状态，然后进行验证，最后进行NCP协商。当LCP协商进行时，会建立多链路参数，如最大接收重建单元(MRRU)。
- debug ppp authentication??显示PPP身份验证协议消息，包括CHAP数据包交换和密码身份验证协议(PAP)交换。
- debug ppp error???显示与PPP连接协商和操作相关的协议错误和错误统计信息。

## debug 命令的输出

有关如何按BRI排除多链路故障的信息，请参阅排除ISDN BRI链路上的第二个B信道呼叫故障。当您在1个BRI（2个b信道）上获得多链路功能时，可以将BRI添加到捆绑包。

启用故障排除命令部分中描述的调试，然后ping远程路由器的地址。ping必须启动拨号并连接到远程路由器。当每个附加链路启动时，会将其添加到MPPP捆绑包。

```
melanie#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 Q931 packets debugging is on
```

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

    melanie#ping 10.10.12.1
    Type escape sequence to abort.
    Sending 5, 100-byte ICMP Echos to 10.10.12.1, timeout is 2 seconds:
    *Mar 1 05:30:45.502: BR2/1 DDR: rotor dialout [priority]
```
*!--- Use BRI 2/1 to dial out.* `*Mar 1 05:30:45.502: BR2/1 DDR: Dialing cause ip (s=10.10.10.1, d=10.10.12.1)`
*!--- DDR dialing cause is a ping to the remote router.* `*Mar 1 05:30:45.502: BR2/1 DDR: Attempting to dial 6113`
*!--- Dial the first number (6113) configured with dialer string command. !--- This number corresponds to the first BRI on torito.* `*Mar 1 05:30:45.506: ISDN BR2/1: TX -> SETUP pd = 8 callref = 0x77 *Mar 1 05:30:45.506: Bearer Capability i = 0x8890 *Mar 1 05:30:45.506: Channel ID i = 0x83 *Mar 1 05:30:45.506: Called Party Number i = 0x80, '6113', Plan:Unknown, Type:Unknown *Mar 1 05:30:45.574: ISDN BR2/1: RX <- CALL_PROC pd = 8 callref = 0xF7 *Mar 1 05:30:45.574: Channel ID i = 0x89 *Mar 1 05:30:46.026: ISDN BR2/1: RX <- CONNECT pd = 8 callref = 0xF7 *Mar 1 05:30:46.030: ISDN BR2/1: TX -> CONNECT_ACK pd = 8 callref = 0x77`
*!--- Call connects.* `*Mar 1 05:30:46.030: %LINK-3-UPDOWN: Interface BRI2/1:1, changed state to up *Mar 1 05:30:46.034: BR2/1:1: interface must be fifo queue, force fifo *Mar 1 05:30:46.034: %DIALER-6-BIND: Interface BR2/1:1 bound to profile Di2` *!--- Call is bound to interface Dialer 2.* `*Mar 1 05:30:46.034: BR2/1:1 PPP: Treating connection as a callout *Mar 1 05:30:46.034: BR2/1:1 PPP: Phase is ESTABLISHING, Active Open` *!--- LCP negotiation begins.* `*Mar 1 05:30:46.034: BR2/1:1 LCP: O CONFREQ [Closed] id 116 len 29 *Mar 1 05:30:46.034: BR2/1:1 LCP: AuthProto CHAP (0x0305C22305) *Mar 1 05:30:46.034: BR2/1:1 LCP: MagicNumber 0x513DE606 (0x0506513DE606) *Mar 1 05:30:46.034: BR2/1:1 LCP: MRRU 1524 (0x110405F4) *Mar 1 05:30:46.034: BR2/1:1 LCP: EndpointDisc 1 Local (0x130A016D656C616E6965) *Mar 1 05:30:46.074: BR2/1:1 LCP: I CONFREQ [REQsent] id 11 len 28 *Mar 1 05:30:46.074: BR2/1:1 LCP: AuthProto CHAP (0x0305C22305) *Mar 1 05:30:46.074: BR2/1:1 LCP: MagicNumber 0x00B3729B (0x050600B3729B) *Mar 1 05:30:46.074: BR2/1:1 LCP: MRRU 1524 (0x110405F4) *Mar 1 05:30:46.074: BR2/1:1 LCP: EndpointDisc 1 Local (0x130901746F7269746F) *Mar 1 05:30:46.074: BR2/1:1 LCP: O CONFACK [REQsent] id 11 len 28 *Mar 1 05:30:46.074: BR2/1:1 LCP: AuthProto CHAP (0x0305C22305) *Mar 1 05:30:46.074: BR2/1:1 LCP: MagicNumber 0x00B3729B (0x050600B3729B) *Mar 1 05:30:46.074: BR2/1:1 LCP: MRRU 1524 (0x110405F4) *Mar 1 05:30:46.074: BR2/1:1 LCP: EndpointDisc 1 Local (0x130901746F7269746F) *Mar 1 05:30:46.086: BR2/1:1 LCP: I CONFACK [ACKsent] id 116 len 29 *Mar 1 05:30:46.086: BR2/1:1 LCP: AuthProto CHAP (0x0305C22305) *Mar 1 05:30:46.086: BR2/1:1 LCP: MagicNumber 0x513DE606 (0x0506513DE606) *Mar 1 05:30:46.086: BR2/1:1 LCP: MRRU 1524 (0x110405F4) *Mar 1 05:30:46.086: BR2/1:1 LCP: EndpointDisc 1 Local (0x130A016D656C616E6965) *Mar 1 05:30:46.086: BR2/1:1 LCP: State is Open`
*!--- LCP negotiation is complete.* `*Mar 1 05:30:46.090: BR2/1:1 PPP: Phase is AUTHENTICATING, by both`
*!--- PPP authentication by both sides begins.* `*Mar 1 05:30:46.090: BR2/1:1 CHAP: O CHALLENGE id 39 len 28 from "melanie" *Mar 1 05:30:46.110: BR2/1:1 CHAP: I CHALLENGE id 7 len 27 from "torito" *Mar 1 05:30:46.110: BR2/1:1 CHAP: O RESPONSE id 7 len 28 from "melanie" *Mar 1 05:30:46.126: BR2/1:1 CHAP: I SUCCESS id 7 len 4`
```
    *Mar 1 05:30:46.134: BR2/1:1 CHAP: I RESPONSE id 39 len 27 from "torito"
    *Mar 1 05:30:46.138: BR2/1:1 CHAP: O SUCCESS id 39 len 4
```
*!--- CHAP authentication is successful* `*Mar 1 05:30:46.138: BR2/1:1 PPP: Phase is VIRTUALIZED *Mar 1 05:30:46.138: Di2 PPP: Phase is UP *Mar 1 05:30:46.138: Di2 IPCP: O CONFREQ [Closed] id 14 len 10 *Mar 1 05:30:46.138: Di2 IPCP: Address 10.10.10.1 (0x03060A0A0A01) *Mar 1 05:30:46.142: BR2/1:1 MLP: torito, multilink up, first link *Mar 1 05:30:46.162: Di2 IPCP: I CONFREQ [REQsent] id 7 len 10 *Mar 1 05:30:46.162: Di2 IPCP: Address 10.10.12.1 (0x03060A0A0C01) *Mar 1 05:30:46.162: Di2 IPCP: O CONFACK [REQsent] id 7 len 10 *Mar 1 05:30:46.162: Di2 IPCP: Address 10.10.12.1 (0x03060A0A0C01) *Mar 1 05:30:46.166: Di2 CDPCP: I CONFREQ [Not negotiated] id 7 len 4 *Mar 1 05:30:46.166: Di2 LCP: O PROTREJ [Open] id 14 len 10 protocol CDPCP (0x820701070004) *Mar 1 05:30:46.182: Di2 IPCP: I CONFACK [ACKsent] id 14 len 10 *Mar 1 05:30:46.182: Di2 IPCP: Address 10.10.10.1 (0x03060A0A0A01) *Mar 1 05:30:46.182: Di2 IPCP: State is Open *Mar 1 05:30:46.182: Di2 DDR: dialer protocol up *Mar 1 05:30:46.182: Di2 IPCP: Install route to 10.10.12.1 *Mar 1 05:30:46.186: BR2/1 DDR: rotor dialout [priority] *Mar 1 05:30:46.186: BR2/1 DDR: Attempting to dial 6113`
*!--- Dial the first number (6113) configured with dialer string command. !--- This number corresponds to the first BRI on torito. !--- Remember there is one B-channel available on the remote BRI.* `*Mar 1 05:30:46.186: ISDN BR2/1: TX -> SETUP pd = 8 callref = 0x78 *Mar 1 05:30:46.186: Bearer Capability i = 0x8890 *Mar 1 05:30:46.190: Channel ID i = 0x83 *Mar 1 05:30:46.190: Called Party Number i = 0x80, '6113', Plan:Unknown, Type:Unknown *Mar 1 05:30:46.274: ISDN BR2/1: RX <- CALL_PROC pd = 8 callref = 0xF8 *Mar 1 05:30:46.274: Channel ID`

i = 0x8A *Mar 1 05:30:46.726: ISDN BR2/1: RX <- CONNECT pd = 8 callref = 0xF8 *Mar 1
05:30:46.730: ISDN BR2/1: TX -> CONNECT_ACK pd = 8 callref = 0x78 *Mar 1 05:30:46.730: %LINK-3-
UPDOWN: Interface **BRI2/1:2, changed state to up**

   *!--- Second B-channel is connected.* *Mar 1 05:30:46.730: BR2/1:2: interface must be fifo
queue, force fifo *Mar 1 05:30:46.734: %DIALER-6-BIND: Interface BR2/1:2 bound to profile Di2
*Mar 1 05:30:46.734: %ISDN-6-CONNECT: Interface BRI2/1:1 is now connected to 6113 torito *Mar 1
05:30:46.734: BR2/1:2 PPP: Treating connection as a callout *Mar 1 05:30:46.734: BR2/1:2 PPP:
Phase is ESTABLISHING, Active Open *Mar 1 05:30:46.734: BR2/1:2 LCP: O CONFREQ [Closed] id 31
len 29 *Mar 1 05:30:46.734: BR2/1:2 LCP: AuthProto CHAP (0x0305C22305) *Mar 1 05:30:46.734:
BR2/1:2 LCP: MagicNumber 0x513DE8C4 (0x0506513DE8C4) *Mar 1 05:30:46.734: BR2/1:2 LCP: MRRU 1524
(0x110405F4) *Mar 1 05:30:46.734: BR2/1:2 LCP: EndpointDisc 1 Local (0x130A016D656C616E6965)
*Mar 1 05:30:46.774: BR2/1:2 LCP: I CONFREQ [REQsent] id 12 len 28 *Mar 1 05:30:46.774: BR2/1:2
LCP: AuthProto CHAP (0x0305C22305) *Mar 1 05:30:46.774: BR2/1:2 LCP: MagicNumber 0x00B37556
(0x050600B37556) *Mar 1 05:30:46.774: BR2/1:2 LCP: MRRU 1524 (0x110405F4) *Mar 1 05:30:46.774:
BR2/1:2 LCP: EndpointDisc 1 Local (0x130901746F7269746F) *Mar 1 05:30:46.774: BR2/1:2 LCP: O
CONFACK [REQsent] id 12 len 28 *Mar 1 05:30:46.774: BR2/1:2 LCP: AuthProto CHAP (0x0305C22305)
*Mar 1 05:30:46.774: BR2/1:2 LCP: MagicNumber 0x00B37556 (0x050600B37556) *Mar 1 05:30:46.774:
BR2/1:2 LCP: MRRU 1524 (0x110405F4) *Mar 1 05:30:46.774: BR2/1:2 LCP: EndpointDisc 1 Local
(0x130901746F7269746F) *Mar 1 05:30:46.786: BR2/1:2 LCP: I CONFACK [ACKsent] id 31 len 29 *Mar 1
05:30:46.786: BR2/1:2 LCP: AuthProto CHAP (0x0305C22305) *Mar 1 05:30:46.786: BR2/1:2 LCP:
MagicNumber 0x513DE8C4 (0x0506513DE8C4) *Mar 1 05:30:46.786: BR2/1:2 LCP: MRRU 1524 (0x110405F4)
*Mar 1 05:30:46.786: BR2/1:2 LCP: EndpointDisc 1 Local (0x130A016D656C616E6965) *Mar 1
05:30:46.786: BR2/1:2 LCP: State is Open *Mar 1 05:30:46.786: BR2/1:2 PPP: Phase is
AUTHENTICATING, by both *Mar 1 05:30:46.786: BR2/1:2 CHAP: O CHALLENGE id 14 len 28 from
"melanie" *Mar 1 05:30:46.806: BR2/1:2 CHAP: I CHALLENGE id 7 len 27 from "torito" *Mar 1
05:30:46.806: BR2/1:2 CHAP: O RESPONSE id 7 len 28 from "melanie" *Mar 1 05:30:46.822: BR2/1:2
**CHAP: I SUCCESS** id 7 len 4

   *Mar 1 05:30:46.834: BR2/1:2 CHAP: I RESPONSE id 14 len 27 from "torito"

   *Mar 1 05:30:46.834: BR2/1:2 **CHAP: O SUCCESS** id 14 len 4

   *!--- PPP authentication is complete.* *Mar 1 05:30:46.834: BR2/1:2 PPP: Phase is VIRTUALIZED
*Mar 1 05:30:46.834: BR2/1:2 MLP: torito, multilink up *Mar 1 05:30:47.138: %LINEPROTO-5-UPDOWN:
Line protocol on Interface BRI2/1:1, changed state to up *Mar 1 05:30:47.834: %LINEPROTO-5-
UPDOWN: Line protocol on Interface BRI2/1:2, changed state to up *Mar 1 05:30:52.734: %ISDN-6-
CONNECT: Interface BRI2/1:2 is now connected to 6113 torito *!--- Both B-channels are up.*
melanie# *Mar 1 05:31:16.186: BR2/2 DDR: rotor dialout [priority] *!--- Dialout using BRI 2/2.*
*Mar 1 05:31:16.186: BR2/2 DDR: Attempting to dial 6113 *!--- Dial the first number (6113)
configured with dialer string command. !--- This number corresponds to the first BRI on torito.*
*!--- Remember there are no B-channels available on the remote BRI.* *Mar 1 05:31:16.186: ISDN
BR2/2: TX -> SETUP pd = 8 callref = 0x79 *Mar 1 05:31:16.186: Bearer Capability i = 0x8890 *Mar
1 05:31:16.186: Channel ID i = 0x83 *Mar 1 05:31:16.190: Called Party Number i = 0x80, '6113',
Plan:Unknown, Type:Unknown *Mar 1 05:31:16.274: ISDN BR2/2: RX <- CALL_PROC pd = 8 callref =
0xF9 *Mar 1 05:31:16.274: Channel ID i = 0x89 *Mar 1 05:31:16.298: ISDN BR2/2: RX <- PROGRESS pd
= 8 callref = 0xF9 *Mar 1 05:31:16.302: Progress Ind i = 0x8188 - In-band info or appropriate
now available *Mar 1 05:31:16.318: **ISDN BR2/2: RX <- DISCONNECT** pd = 8 callref = 0xF9

   *Mar 1 05:31:16.318: **Cause i = 0x8191 - User busy**

*!--- We receive a user busy signal, because there are no available !--- B-channels on that BRI,
and melanie must dial the next BRI on torito.* *Mar 1 05:31:16.322: BRI2/2: wait for isdn carrier
timeout, call id=0x8079 *Mar 1 05:31:16.322: BR2/2 DDR: Attempting to dial 6114 *!--- Dial the
second number (6114) configured with dialer string command. !--- This number corresponds to the
second BRI on torito. !--- Remember both B-channels are available on that remote BRI.* *Mar 1
05:31:16.326: ISDN BR2/2: TX -> RELEASE pd = 8 callref = 0x79 *Mar 1 05:31:16.326: Cause i =
0x8091 - User busy *!--- Release message from the previous failed call.* *Mar 1 05:31:16.346: ISDN
BR2/2: TX -> SETUP pd = 8 callref = 0x7A *!--- Setup message for next call.* *Mar 1 05:31:16.346:
Bearer Capability i = 0x8890 *Mar 1 05:31:16.346: Channel ID i = 0x83 *Mar 1 05:31:16.346:
Called Party Number i = 0x80, '6114', Plan:Unknown, Type:Unknown *Mar 1 05:31:16.362: ISDN
BR2/2: RX <- RELEASE_COMP pd = 8 callref = 0xF9 *!--- Release acknowledgement for previous failed
call.* *Mar 1 05:31:16.422: ISDN BR2/2: RX <- CALL_PROC pd = 8 callref = 0xFA *!--- ISDN call
progress message.* *Mar 1 05:31:16.426: Channel ID i = 0x89 *Mar 1 05:31:16.878: ISDN BR2/2: RX
<- CONNECT pd = 8 callref = 0xFA *Mar 1 05:31:16.882: ISDN BR2/2: TX -> CONNECT_ACK pd = 8
callref = 0x7A *Mar 1 05:31:16.882: %LINK-3-UPDOWN: **Interface BRI2/2:1, changed state to up**
*!--- Call is connected on BRI 2/2 B-channel 1.* *Mar 1 05:31:16.882: BR2/2:1: interface must be
fifo queue, force fifo *Mar 1 05:31:16.882: %DIALER-6-BIND: Interface BR2/2:1 bound to profile
Di2 *!--- Call is bound to interface Dialer 2.* *Mar 1 05:31:16.886: BR2/2:1 PPP: Treating
connection as a callout *Mar 1 05:31:16.886: BR2/2:1 PPP: Phase is ESTABLISHING, Active Open

*Mar 1 05:31:16.886: BR2/2:1 LCP: O CONFREQ [Closed] id 31 len 29 *Mar 1 05:31:16.886: BR2/2:1 LCP: AuthProto CHAP (0x0305C22305) *Mar 1 05:31:16.886: BR2/2:1 LCP: MagicNumber 0x513E5E8D (0x0506513E5E8D) *Mar 1 05:31:16.886: BR2/2:1 LCP: MRRU 1524 (0x110405F4) *Mar 1 05:31:16.886: BR2/2:1 LCP: EndpointDisc 1 Local (0x130A016D656C616E6965) *Mar 1 05:31:16.926: BR2/2:1 LCP: I CONFREQ [REQsent] id 11 len 28 *Mar 1 05:31:16.926: BR2/2:1 LCP: AuthProto CHAP (0x0305C22305) *Mar 1 05:31:16.926: BR2/2:1 LCP: MagicNumber 0x00B3EB20 (0x050600B3EB20) *Mar 1 05:31:16.926: BR2/2:1 LCP: MRRU 1524 (0x110405F4) *Mar 1 05:31:16.926: BR2/2:1 LCP: EndpointDisc 1 Local (0x130901746F7269746F) *Mar 1 05:31:16.926: BR2/2:1 LCP: O CONFACK [REQsent] id 11 len 28 *Mar 1 05:31:16.926: BR2/2:1 LCP: AuthProto CHAP (0x0305C22305) *Mar 1 05:31:16.926: BR2/2:1 LCP: MagicNumber 0x00B3EB20 (0x050600B3EB20) *Mar 1 05:31:16.926: BR2/2:1 LCP: MRRU 1524 (0x110405F4) *Mar 1 05:31:16.926: BR2/2:1 LCP: EndpointDisc 1 Local (0x130901746F7269746F) *Mar 1 05:31:16.938: BR2/2:1 LCP: I CONFACK [ACKsent] id 31 len 29 *Mar 1 05:31:16.938: BR2/2:1 LCP: AuthProto CHAP (0x0305C22305) *Mar 1 05:31:16.938: BR2/2:1 LCP: MagicNumber 0x513E5E8D (0x0506513E5E8D) *Mar 1 05:31:16.938: BR2/2:1 LCP: MRRU 1524 (0x110405F4) *Mar 1 05:31:16.938: BR2/2:1 LCP: EndpointDisc 1 Local (0x130A016D656C616E6965) *Mar 1 05:31:16.938: BR2/2:1 LCP: State is Open *Mar 1 05:31:16.938: BR2/2:1 PPP: Phase is AUTHENTICATING, by both *Mar 1 05:31:16.938: BR2/2:1 CHAP: O CHALLENGE id 14 len 28 from "melanie" *Mar 1 05:31:16.958: BR2/2:1 CHAP: I CHALLENGE id 6 len 27 from "torito" *Mar 1 05:31:16.958: BR2/2:1 CHAP: O RESPONSE id 6 len 28 from "melanie" *Mar 1 05:31:16.974: BR2/2:1 **CHAP: I SUCCESS** id 6 len 4

  *Mar 1 05:31:16.986: BR2/2:1 CHAP: I RESPONSE id 14 len 27 from "torito"
  *Mar 1 05:31:16.986: BR2/2:1 **CHAP: O SUCCESS** id 14 len 4

*!--- CHAP authentication is successful.* *Mar 1 05:31:16.986: BR2/2:1 PPP: Phase is VIRTUALIZED *Mar 1 05:31:16.990: BR2/2:1 MLP: torito, multilink up *Mar 1 05:31:17.986: %LINEPROTO-5-UPDOWN: Line protocol on Interface BRI2/2:1, changed state to up *Mar 1 05:31:22.886: %ISDN-6-CONNECT: **Interface BRI2/2:1 is now connected to**

  **6114 torito**

*!--- Call connection is complete.* melanie# *Mar 1 05:31:46.186: BR2/2 DDR: rotor dialout [priority] *Mar 1 05:31:46.186: BR2/2 DDR: **Attempting to dial 6113**

*!--- Dial the first number (6113) configured with dialer string command. !--- This number corresponds to the first BRI on torito. !--- Remember there are no B-channels available on the remote BRI.* *Mar 1 05:31:46.186: ISDN BR2/2: TX -> SETUP pd = 8 callref = 0x7B *Mar 1 05:31:46.186: Bearer Capability i = 0x8890 *Mar 1 05:31:46.186: Channel ID i = 0x83 *Mar 1 05:31:46.190: Called Party Number i = 0x80, '6113', Plan:Unknown, Type:Unknown *Mar 1 05:31:46.274: Channel ID i = 0x8A *Mar 1 05:31:46.302: ISDN BR2/2: RX <- PROGRESS pd = 8 callref = 0xFB *Mar 1 05:31:46.302: Progress Ind i = 0x8188 - In-band info or appropriate now available *Mar 1 05:31:46.318: **ISDN BR2/2: RX <- DISCONNECT** pd = 8 callref = 0xFB

  *Mar 1 05:31:46.322: **Cause i = 0x8191 - User busy**

*!--- We receive a user busy signal, since there are no available B-channels. !--- on that BRI melanie must dial the next BRI on torito.* *Mar 1 05:31:46.322: BRI2/2: wait for isdn carrier timeout, call id=0x807B *Mar 1 05:31:46.326: **BR2/2 DDR: Attempting to dial 6114**

  *!--- Dial the second number (6114) configured with dialer string command. !--- This number corresponds to the second BRI on torito. !--- Remember there is one B-channels available on that remote BRI.* *Mar 1 05:31:46.326: ISDN BR2/2: **TX -> RELEASE** pd = 8 callref = 0x7B

  *Mar 1 05:31:46.326: Cause i = 0x8091 - User busy

*!--- Release message from the previous failed call.* *Mar 1 05:31:46.346: ISDN BR2/2: TX -> SETUP pd = 8 callref = 0x7C *!--- Setup message for next call.* *Mar 1 05:31:46.346: Bearer Capability i = 0x8890 *Mar 1 05:31:46.346: Channel ID i = 0x83 *Mar 1 05:31:46.346: Called Party Number i = 0x80, '6114', Plan:Unknown, Type:Unknown *Mar 1 05:31:46.362: ISDN BR2/2: **RX <- RELEASE_COMP** pd = 8 callref = 0xFB

*!--- Release acknowledgement for previous failed call.* *Mar 1 05:31:46.422: ISDN BR2/2: RX <- CALL_PROC pd = 8 callref = 0xFC *Mar 1 05:31:46.426: Channel ID i = 0x8A *Mar 1 05:31:46.878: ISDN BR2/2: RX <- CONNECT pd = 8 callref = 0xFC *Mar 1 05:31:46.882: ISDN BR2/2: TX -> CONNECT_ACK pd = 8 callref = 0x7C *Mar 1 05:31:46.882: %LINK-3-UPDOWN: Interface **BRI2/2:2, changed state to up**

*!--- Call is connected on BRI 2/2 B-channel 2.* *Mar 1 05:31:46.882: BR2/2:2: interface must be fifo queue, force fifo *Mar 1 05:31:46.882: %DIALER-6-BIND: **Interface BR2/2:2 bound to profile Di2**

*!--- Call is bound to interface Dialer 2.* *Mar 1 05:31:46.886: BR2/2:2 PPP: Treating connection as a callout *Mar 1 05:31:46.886: BR2/2:2 PPP: Phase is ESTABLISHING, Active Open *Mar 1 05:31:46.886: BR2/2:2 LCP: O CONFREQ [Closed] id 24 len 29 *Mar 1 05:31:46.886: BR2/2:2 LCP: AuthProto CHAP (0x0305C22305) *Mar 1 05:31:46.886: BR2/2:2 LCP: MagicNumber 0x513ED3BF (0x0506513ED3BF) *Mar 1 05:31:46.886: BR2/2:2 LCP: MRRU 1524 (0x110405F4) *Mar 1 05:31:46.886: BR2/2:2 LCP: EndpointDisc 1 Local (0x130A016D656C616E6965) *Mar 1 05:31:46.922: BR2/2:2 LCP: I CONFREQ [REQsent] id 10 len 28 *Mar 1 05:31:46.922: BR2/2:2 LCP: AuthProto CHAP (0x0305C22305)

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*Mar 1 05:31:46.926: BR2/2:2 LCP: MagicNumber 0x00B46053 (0x050600B46053) *Mar 1 05:31:46.926:
BR2/2:2 LCP: MRRU 1524 (0x110405F4) *Mar 1 05:31:46.926: BR2/2:2 LCP: EndpointDisc 1 Local
(0x130901746F7269746F) *Mar 1 05:31:46.926: BR2/2:2 LCP: O CONFACK [REQsent] id 10 len 28 *Mar 1
05:31:46.926: BR2/2:2 LCP: AuthProto CHAP (0x0305C22305) *Mar 1 05:31:46.926: BR2/2:2 LCP:
MagicNumber 0x00B46053 (0x050600B46053) *Mar 1 05:31:46.926: BR2/2:2 LCP: MRRU 1524 (0x110405F4)
*Mar 1 05:31:46.926: BR2/2:2 LCP: EndpointDisc 1 Local (0x130901746F7269746F) *Mar 1
05:31:46.938: BR2/2:2 LCP: I CONFACK [ACKsent] id 24 len 29 *Mar 1 05:31:46.938: BR2/2:2 LCP:
AuthProto CHAP (0x0305C22305) *Mar 1 05:31:46.938: BR2/2:2 LCP: MagicNumber 0x513ED3BF
(0x0506513ED3BF) *Mar 1 05:31:46.938: BR2/2:2 LCP: MRRU 1524 (0x110405F4) *Mar 1 05:31:46.938:
BR2/2:2 LCP: EndpointDisc 1 Local (0x130A016D656C616E6965) *Mar 1 05:31:46.938: BR2/2:2 LCP:
State is Open *Mar 1 05:31:46.938: BR2/2:2 PPP: Phase is AUTHENTICATING, by both *Mar 1
05:31:46.938: BR2/2:2 CHAP: O CHALLENGE id 11 len 28 from "melanie" *Mar 1 05:31:46.958: BR2/2:2
CHAP: I CHALLENGE id 6 len 27 from "torito" *Mar 1 05:31:46.958: BR2/2:2 CHAP: O RESPONSE id 6
len 28 from "melanie" *Mar 1 05:31:46.974: BR2/2:2 CHAP: I SUCCESS id 6 len 4
   *Mar 1 05:31:46.982: BR2/2:2 CHAP: I RESPONSE id 11 len 27 from "torito"
   *Mar 1 05:31:46.986: BR2/2:2 CHAP: O SUCCESS id 11 len 4
   !--- CHAP authentication is successful. *Mar 1 05:31:46.986: BR2/2:2 PPP: Phase is
VIRTUALIZED *Mar 1 05:31:46.986: BR2/2:2 MLP: torito, multilink up *Mar 1 05:31:47.986:
%LINEPROTO-5-UPDOWN: Line protocol on Interface BRI2/2:2, changed state to up *Mar 1
05:31:52.886: %ISDN-6-CONNECT: Interface BRI2/2:2 is now connected to 6114 torito !--- Call
connection is complete. melanie#ping 10.10.12.1

   Type escape sequence to abort.
   Sending 5, 100-byte ICMP Echos to 10.10.12.1, timeout is 2 seconds:
   !!!!!
   Success rate is 100 percent (5/5), round-trip min/avg/max = 24/24/24 ms
   !--- Successful ping. melanie#
```

# 相关信息

- [DDR 多链路 PPP - 基本配置和验证](#)
- [用循环组为多个 BRI 配置 MPPP](#)
- [拨号程序配置文件的配置与故障排除](#)
- [ISDN BRI 链路上第二个 B 通道呼叫失败故障排除](#)
- [接入产品支持页面](#)
- [接入技术支持页](#)
- [技术支持 - Cisco Systems](#)