ISDN DDR 使用 HDLC 封装

目录

简介

在ISDN上使用高级数据链路控制(HDLC)有两种不同的方法：

- 定义要运行HDLC的物理接口。换句话说，由于HDLC是Cisco IOS®软件使用的默认封装，因此未定义封装。这是使用按需拨号路由(DDR)配置HDLC的原始方法，本文档将对此进行讨论。
- 使用拨号器接口将所需协议（在本例中为HDLC）绑定到特定拨号器。这是较新的方法，允许特定物理接口处理多个协议（例如，点对点协议[PPP]和HDLC）。 由于协议是在拨号器接口上配置的，因此不限制物理接口。此方法称为动态多封装，在ISDN DDR中使用带动态多封装的HDLC封装进行讨论。

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：

- 路由器分类和goya是2500系列路由器，用于实验室环境，配置已清除。
- 两台路由器上都使用Cisco IOS软件版本11.2(22)。

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。

规则

有关文档规则的详细信息，请参阅 Cisco 技术提示规则。

为什么使用 HDLC？

用户在ISDN上需要HDLC的原因并不明显，因为它与PPP相比有很多缺点。唯一的目的是简化配置。但是，它也简化了任何黑客对路由器的访问。HDLC不支持任何类型的身份验证，因此最好的保护是在接口上使用**isdn caller**命令验证主叫号码。有关其他信息，请参阅配置CLI屏蔽或ISDN身份验证和回叫。基于主叫线路ID(CLID)的身份验证假设您的电信公司在ISDN设置消息中提供主叫号码。但是，由于许多Telco不提供CLID，因此在配置基于CLID的筛选之前，请先与Telco进行验证。如果Telco不提供CLID，则进入路由器的所有来电都会失败。

HDLC的另一个缺点是路由器不安装动态映射。因此，需要为HDLC对等体配置拨号器映射（在每端）。

注意：如果只有一端发出呼叫（例如，一台路由器始终接受呼叫而不拨出），请确保在接收端的拨号器映射语句中包含远程对等体的名称。但是，该名称可能是假名，因为路由器无法验证对等体名称以确定其是否与拨号器映射名称匹配。

例如，这是说明，此ISDN编号为8130。

```
  ip address 172.16.1.6 255.255.255.252
  isdn caller 8129
!--- This is to accept only calls from 8129.   dialer map ip 172.16.1.5 name
bogus_to_accept_command
!--- This is a dialer-map with a fake name. dialer-group 1
```

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

网络图

本文档使用此图所示的网络设置。

配置

戈亚

```
Current configuration:
!
version 11.2
service timestamps debug datetime msec
service timestamps log datetime msec
!
hostname goya
!

isdn switch-type basic-net3
```
!--- The switch-type used is basic-net3. If you are in the United States, !--- configure the correct switch-type (for example !--- **isdn switch-type basic-5ess)**. In the US, you also need to !--- configure the spids under the Basic Rate Interface (BRI) interface.

```
!
interface Ethernet0
 ip address 10.1.1.1 255.255.255.0
 no ip redirects
!
interface BRI0
```
!--- If you are in the US do not forget the SPID !--- (for example isdn spid1 01555.....) description This ISDN number is 8129 ip address 172.16.1.5 255.255.255.252 dialer idle-timeout 60 *!--- The idle is set to 60 seconds.* isdn caller 8130 *!--- Verify the incoming number since there is no authentication on HDLC.* dialer map ip 172.16.1.6 8130 *!--- This side is making the call to 8130.* dialer-group 1 ! ip classless ip route 0.0.0.0 0.0.0.0 172.16.1.6 access-list 105 permit icmp any any *!--- This access-list is to debug ICMP only.* dialer-list 1 protocol ip permit ! line con 0 exec-timeout 0 0 transport input none line aux 0 line vty 0 4 exec-timeout 0 0 no login ! end

traxbol

```
Current configuration:
!
version 11.2
service timestamps debug datetime msec
service timestamps log datetime msec
!
hostname traxbol
!

isdn switch-type basic-net3
```
!--- The switch-type used here is basic-net3. If you are in the United States, !--- configure the correct switch-type (for example !--- isdn switch-type basic-5ess). In the United States, you also need to !--- configure the SPIDs under the BRI interface. ! Interface Ethernet0 ip address 10.1.2.1 255.255.255.0 no ip redirects ! interface BRI0 *!--- If you are in the United States, do not forget the SPID !--- (for example* **isdn spid1 01555.....).**

```
 description This ISDN number is 8130
 ip address 172.16.1.6 255.255.255.252
 isdn caller 8129
!--- Verify the incoming number since there is no
authentication on HDLC. dialer map ip 172.16.1.5 name
goya !--- This side will not make any calls, but "name
goya" is added to complete the !--- command. This is
because a static dialer map is necessary. dialer-group 1
! ip classless ip route 0.0.0.0 0.0.0.0 172.16.1.5
access-list 105 permit icmp any any !--- This access-
list is to debug ICMP only. dialer-list 1 protocol ip
permit ! line con 0 exec-timeout 0 0 line aux 0 line vty
0 4 exec-timeout 0 0 password ww login ! end
```

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 interfaces bri *number* — 仅指定该编号显示该BRI接口的D通道。

配置中未定义封装，因此默认为HDLC。如下所示，可使用show interface命令来验证这一点：

```
goya#show interfaces bri 0
 BRI0 is up, line protocol is up (spoofing)
  Hardware is BRI
  Description: This ISDN number is 8129
  Internet address is 172.16.1.5/30
  MTU 1500 bytes, BW 64 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set
  !--- HDLC is configured automatically Last input 00:00:00, output 00:00:00, output hang never
Last clearing of "show interface" counters never Input queue: 0/75/0 (size/max/drops); Total
output drops: 0 Queueing strategy: weighted fair Output queue: 0/1000/64/0 (size/max
total/threshold/drops) Conversations 0/1/256 (active/max active/max total) Reserved
Conversations 0/0 (allocated/max allocated) 5 minute input rate 0 bits/sec, 0 packets/sec 5
minute output rate 0 bits/sec, 0 packets/sec 3933 packets input, 20462 bytes, 0 no buffer
Received 15 broadcasts, 0 runts, 0 giants, 0 throttles 0 input errors, 0 CRC, 0 frame, 0
overrun, 0 ignored, 0 abort 3926 packets output, 26100 bytes, 0 underruns 0 output errors, 0
collisions, 10 interface resets 0 output buffer failures, 0 output buffers swapped out 7 carrier
transitions
```

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
- debug ip packet detail 105 — 用于调试仅为ICMP的IP数据包（请参阅配置中的access-list 105）。
- debug isdn q931 — 用于查看ISDN Q.931事件和数据包。

- **debug serial interface** — 用于调试HDLC。

两台路由器的调试示例如下所示：

goya的输出：

```
goya#debug dialer
Dial on demand events debugging is on
goya#debug ip packet detail 105
IP packet debugging is on (detailed) for access list 105
goya#debug isdn q931
ISDN Q931 packets debugging is on
!--- Verify that the map is correctly configured. goya#show dialer map
Static dialer map ip 172.16.1.6 name traxbol (8130) on BRI0
goya#ping? 172.16.1.6
!--- Ping to the remote destination. Type escape sequence to abort. Sending 5, 100-byte ICMP
Echos to 172.16.1.6, timeout is 2 seconds: *Mar? 1 05:40:07.230: IP: s=172.16.1.5 (local),
d=172.16.1.6 (BRI0), len 100, sending !--- The Ping attempts to leave the router. *Mar? 1
05:40:07.234:???? ICMP type=8, code=0 *Mar? 1 05:40:07.238: BRI0: Dialing cause ip
(s=172.16.1.5, d=172.16.1.6) *Mar? 1 05:40:07.238: BRI0: Attempting to dial 8130 !--- The dialer
attempts the call. *Mar? 1 05:40:07.242: IP: s=172.16.1.5 (local), d=172.16.1.6 (BRI0), Len 100,
encapsulation failed !--- This is because the HDLC is not ready. !--- Therefore, the
encapsulation failed. *Mar? 1 05:40:07.246:???? ICMP type=8, code=0 *Mar? 1 05:40:07.258: ISDN
BR0: TX ->? SETUP pd = 8? callref = 0x37 *Mar? 1 05:40:07.258:???????? Bearer Capability i =
0x8890 *Mar? 1 05:40:07.262:???????? Channel ID i = 0x83 *Mar? 1 05:40:07.266:???????? Called
Party Number i = 0x80, '8130' *Mar? 1 05:40:07.318: ISDN BR0: RX <-? CALL_PROC pd = 8? callref =
0xB7 *Mar? 1 05:40:07.322:???????? Channel ID i = 0x89 *Mar? 1 05:40:07.470: ISDN BR0: RX <-?
CONNECT pd = 8? callref = 0xB7 *Mar? 1 05:40:07.486: %LINK-3-UPDOWN: Interface BRI0:1, changed
state to up *Mar? 1 05:40:07.514: ISDN BR0: TX ->? CONNECT_ACK pd = 8? callref = 0x37 !--- The
call is made. *Mar? 1 05:40:07.!!!! !--- One ping packet was lost because the encapsulation was
not ready. Success rate is 80 percent (4/5), round-trip min/avg/max = 52/58/76 ms goya#.518:
dialer Protocol up for BR0:1 *Mar? 1 05:40:07.526: %LINEPROTO-5-UPDOWN: Line protocol on
Interface BRI0:1, changed state to up *Mar? 1 05:40:09.230: IP: s=172.16.1.5 (local),
d=172.16.1.6 (BRI0), Len 100, sending *Mar? 1 05:40:09.234:???? ICMP type=8, code=0 *Mar? 1
05:40:09.278: IP: s=172.16.1.6 (BRI0), d=172.16.1.5 (BRI0), Len 100, rcvd 3 *Mar? 1
05:40:09.278:???? ICMP type=0, code=0 *Mar? 1 05:40:09.282: IP: s=172.16.1.5 (local),
d=172.16.1.6 (BRI0), Len 100, sending *Mar? 1 05:40:09.286:???? ICMP type=8, code=0 *Mar? 1
05:40:09.330: IP: s=172.16.1.6 (BRI0), d=172.16.1.5 (BRI0), Len 100, rcvd 3 *Mar? 1
05:40:09.334:???? ICMP type=0, code=0 *Mar? 1 05:40:09.338: IP: s=172.16.1.5 (local),
d=172.16.1.6 (BRI0), Len 100, sending *Mar? 1 05:40:09.338:???? ICMP type=8, code=0 *Mar? 1
05:40:09.406: IP: s=172.16.1.6 (BRI0), d=172.16.1.5 (BRI0), Len 100, rcvd 3 *Mar? 1
05:40:09.410:???? ICMP type=0, code=0 *Mar? 1 05:40:09.414: IP: s=172.16.1.5 (local),
d=172.16.1.6 (BRI0), Len 100, sending *Mar? 1 05:40:09.418:???? ICMP type=8, code=0 *Mar? 1
05:40:09.462: IP: s=172.16.1.6 (BRI0), d=172.16.1.5 (BRI0), Len 100, rcvd 3 !--- Other four ping
packets are successful. *Mar? 1 05:40:09.466:???? ICMP type=0, code=0 goya# *Mar? 1
05:40:13.674: %ISDN-6-CONNECT: Interface BRI0:1 is now connected to 8130 traxbol !? !--- View
the dialer. ! goya#show dialer
```

```
BRI0 - dialer type = ISDN
Dial String????? Successes?? Failures??? Last called?? Last status
8130????????????????????? 299???????? 10??? 00:00:11?????? successful
0 incoming call(s) have been screened.
BRI0:1 - dialer type = ISDN
Idle timer (60 secs), Fast idle timer (20 secs)
Wait for carrier (30 secs), Re-enable (15 secs)
Dialer state is data link layer up
!--- The next two lines tell who triggered the call !--- and the time remaining before
disconnect. Dial reason: ip (s=172.16.1.5, d=172.16.1.6) Time until disconnect 50 secs Connected
to 8130 (traxbol) BRI0:2 - dialer type = ISDN Idle timer (60 secs), Fast idle timer (20 secs)
Wait for carrier (30 secs), Re-enable (15 secs) Dialer state is idle goya# ! !--- View the HDLC.
! goya#debug serial interface?
Serial network interface debugging is on
```

```
goya#ping 172.16.1.6
 Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.16.1.6, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 32/93/328 ms
goya#
*Mar? 1 06:35:03.266: %LINK-3-UPDOWN: Interface BRI0:1, changed state to up
*Mar? 1 06:35:03.814: %LINEPROTO-5-UPDOWN: Line protocol on Interface BRI0:1,
   changed state to up
*Mar? 1 06:35:04.822: BRI0:1: HDLC myseq 0, mineseen 0, yourseen 0, line up?
*Mar? 1 06:35:09.846: %ISDN-6-CONNECT: Interface BRI0:1 is now connected to 8130
   traxbol
*Mar? 1 06:35:14.826: BRI0:1: HDLC myseq 1, mineseen 1*, yourseen 1, line up?
*Mar? 1 06:35:24.838: BRI0:1: HDLC myseq 2, mineseen 2*, yourseen 2, line up?
*Mar? 1 06:35:34.842: BRI0:1: HDLC myseq 3, mineseen 3*, yourseen 3, line up?
*Mar? 1 06:35:44.846: BRI0:1: HDLC myseq 4, mineseen 4*, yourseen 4, line up?
*Mar? 1 06:35:54.850: BRI0:1: HDLC myseq 5, mineseen 5*, yourseen 5, line up?
*Mar? 1 06:36:03.862: %ISDN-6-DISCONNECT: Interface BRI0:1? disconnected from
   8130 traxbol, call lasted 60 seconds
*Mar? 1 06:36:03.974: %LINK-3-UPDOWN: Interface BRI0:1, changed state to down
*Mar? 1 06:36:04.858: %LINEPROTO-5-UPDOWN: Line protocol on Interface BRI0:1,
   changed state to down
goya#undebug all
All possible debugging has been turned off
goya#
```

traxbol的输出：

```
traxbol#debug dialer
Dial on demand events debugging is on
traxbol#debug ip packet detail 105
IP packet debugging is on (detailed) for access list 105
traxbol#debug isdn q931
ISDN Q931 packets debugging is on
```
!--- Verify that the map is correctly configured. `traxbol#show dialer map`
```
Static dialer map ip 172.16.1.5 name goya (8129) on BRI0
traxbol#
```
!--- A call is received, notice that the calling party !--- matches the ISDN caller configuration. `*Mar? 1 05:40:30.898: ISDN BR0: RX <-? SETUP pd = 8? callref = 0x15 *Mar? 1 05:40:30.898:???????? Bearer Capability i = 0x8890 *Mar? 1 05:40:30.902:???????? Channel ID i = 0x89 *Mar? 1 05:40:30.906:???????? Calling Party Number i = 0xA1, '8129' *Mar? 1 05:40:30.906:???????? Called Party Number i = 0xC1, '8130' *Mar? 1 05:40:30.918: %LINK-3-UPDOWN: Interface BRI0:1, changed state to up *Mar? 1 05:40:30.954: ISDN BR0: TX ->? CONNECT pd = 8? callref = 0x95 *Mar? 1 05:40:30.958: dialer Protocol up for BR0:1 *Mar? 1 05:40:31.014: ISDN BR0: RX <-? CONNECT_ACK pd = 8? callref = 0x15 *Mar? 1 05:40:31.018:???????? Channel ID i = 0x89 *Mar? 1 05:40:31.862: %LINEPROTO-5-UPDOWN: Line protocol on Interface BRI0:1, changed state to up` *!--- debug ip packet detail 105 shows the ICMPs on this router.* `*Mar? 1 05:40:32.794: IP: s=172.16.1.5 (BRI0), d=172.16.1.6 (BRI0), Len 100, rcvd 3 *Mar? 1 05:40:32.798:???? ICMP type=8, code=0 *Mar? 1 05:40:32.802: IP: s=172.16.1.6 (local), d=172.16.1.5 (BRI0), Len 100, sending *Mar? 1 05:40:32.802:???? ICMP type=0, code=0 *Mar? 1 05:40:32.850: IP: s=172.16.1.5 (BRI0), d=172.16.1.6 (BRI0), Len 100, rcvd 3 *Mar? 1 05:40:32.854:???? ICMP type=8, code=0 *Mar? 1 05:40:32.854: IP: s=172.16.1.6 (local), d=172.16.1.5 (BRI0), Len 100, sending *Mar? 1 05:40:32.858:???? ICMP type=0, code=0 *Mar? 1 05:40:32.926: IP: s=172.16.1.5 (BRI0), d=172.16.1.6 (BRI0), Len 100, rcvd 3 *Mar? 1 05:40:32.930:???? ICMP type=8, code=0 *Mar? 1 05:40:32.930: IP: s=172.16.1.6 (local), d=172.16.1.5 (BRI0), Len 100, sending *Mar? 1 05:40:32.934:???? ICMP type=0, code=0 *Mar? 1 05:40:32.982: IP: s=172.16.1.5 (BRI0), d=172.16.1.6 (BRI0), Len 100, rcvd 3 *Mar? 1 05:40:32.982:???? ICMP type=8, code=0 *Mar? 1 05:40:32.986: IP: s=172.16.1.6 (local), d=172.16.1.5 (BRI0), Len 100, sending *Mar? 1 05:40:32.990:???? ICMP type=0, code=0 *Mar? 1 05:40:36.994: %ISDN-6-CONNECT: Interface BRI0:1 is now connected to 8129 goya !` *!--- On the dialer, the call is received. !--- There is no dial reason. However, the idle has been using the !--- default 120 seconds since nothing was configured. !--- The router GOYA closes !--- the call earlier because the idle is set to 60 seconds on that side.* `! traxbol#show dialer`

```
BRI0 - dialer type = ISDN

Dial String????? Successes?? Failures??? Last called?? Last status
8129????????????????????? 0????????? 0??? never????????????????? -
10 incoming call(s) have been screened.

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
Time until disconnect 103 secs
Connected to 8129 (goya)

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
traxbol#
!
```
!--- View the HDLC. ! traxbol#**debug serial interface**
```
Serial network interface debugging is on
traxbol#
*Mar? 1 06:35:26.674: %LINK-3-UPDOWN: Interface BRI0:1, changed state to up
*Mar? 1 06:35:26.698: Ser-Autodetect BR0:1: no autodetect configuration
*Mar? 1 06:35:27.534: %LINEPROTO-5-UPDOWN: Line protocol on Interface BRI0:1,
   changed state to up
*Mar? 1 06:35:31.554: BRI0:1: HDLC myseq 0, mineseen 0*, yourseen 1, line up?
*Mar? 1 06:35:33.578: %ISDN-6-CONNECT: Interface BRI0:1 is now connected to 8129
   goya
*Mar? 1 06:35:41.598: BRI0:1: HDLC myseq 1, mineseen 1*, yourseen 2, line up?
*Mar? 1 06:35:51.702: BRI0:1: HDLC myseq 2, mineseen 2*, yourseen 3, line up?
*Mar? 1 06:36:01.746: BRI0:1: HDLC myseq 3, mineseen 3*, yourseen 4, line up?
*Mar? 1 06:36:11.790: BRI0:1: HDLC myseq 4, mineseen 4*, yourseen 5, line up?
*Mar? 1 06:36:21.894: BRI0:1: HDLC myseq 5, mineseen 5*, yourseen 6, line up?
*Mar? 1 06:36:27.510: %ISDN-6-DISCONNECT: Interface BRI0:1? disconnected from 8129
   goya, call lasted 60 seconds
*Mar? 1 06:36:27.514: %LINK-3-UPDOWN: Interface BRI0:1, changed state to down
*Mar? 1 06:36:27.922: %LINEPROTO-5-UPDOWN: Line protocol on Interface BRI0:1,
   changed state to down
traxbol#undebug all
All possible debugging has been turned off
traxbol#
```

相关信息

- [利用 Dialer Profiles 来配置 ISDN DDR](#)
- [通过 DDR 拨号映射配置 BRI 之间的拨号](#)
- [技术支持 - Cisco Systems](#)