使用HDLC封裝的ISDN DDR

目錄

簡介

在ISDN上使用高階資料連結控制(HDLC)的方法有兩種：

- 定義運行HDLC的物理介面。換句話說，由於HDLC是Cisco IOS®軟體使用的預設封裝，因此未定義封裝。這是使用按需撥號路由(DDR)配置HDLC的原始方式，本文檔將對此進行討論。
- 使用撥號器介面將所需的協定（在本例中為HDLC）繫結到特定撥號器。這是較新的方法，允許特定實體介面處理多個通訊協定（例如點對點通訊協定[PPP]和HDLC）。 由於在撥號器介面上配置了協定，因此物理介面不受限制。此方法稱為動態多重封裝，在使用HDLC封裝和動態多重封裝的ISDN DDR中對此進行了討論。

必要條件

需求

本文件沒有特定需求。

採用元件

本文中的資訊係根據以下軟體和硬體版本：

- 路由器taxbol和goya是在實驗室環境中使用並已清除配置的2500系列路由器。
- 兩台路由器上都使用了Cisco IOS軟體版本11.2(22)。

本文中的資訊是根據特定實驗室環境內的裝置所建立。文中使用到的所有裝置皆從已清除（預設

）的組態來啟動。如果您的網路正在作用，請確保您已瞭解任何指令可能造成的影響。

慣例

如需文件慣例的詳細資訊，請參閱思科技術提示慣例。

為什麼要使用HDLC?

使用者在ISDN上需要HDLC的原因並不明顯，因為它與PPP相比有很多缺點。唯一的目的是簡化配置。但是，它還簡化了任何駭客對路由器的訪問。HDLC不支援任何型別的身份驗證，因此這裡的最佳保護是使用**isdn caller**命令在您的介面上驗證呼叫號碼。請參閱配置CLI遮蔽或ISDN身份驗證和回撥以瞭解其他資訊。基於呼叫線路ID(CLID)的身份驗證假定您的電信公司在ISDN設定消息中提供呼叫號碼。但是，由於許多Telcos不提供CLID，請在配置基於CLID的遮蔽之前與您的Telco進行驗證。如果CLID不是由Telco提供的，則所有進入路由器的呼叫都將失敗。

HDLC的另一個缺點是路由器不安裝動態對映。因此，需要為HDLC對等體配置撥號器對映（在每一端）。

註：如果只有一方發出呼叫(例如，一台路由器總是接受該呼叫，而不撥出)，請確保在接收方的撥號對映語句中包含遠端對等體的名稱。但是，該名稱可能是假名，因為路由器無法驗證對等體名稱以確定它是否與撥號器對映名稱匹配。

例如，這是一個說明，此ISDN編號為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
```

設定

本節提供用於設定本文件中所述功能的資訊。

注意：要查詢有關本文檔中使用的命令的其他資訊，請使用命令查詢工具

網路圖表

本檔案會使用下圖中所示的網路設定。

組態

戈亞

```
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

特克斯波爾

```
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
```

驗證

本節提供的資訊可用於確認您的組態是否正常運作。

輸出直譯器工具(僅供註冊客戶使用)支援某些show命令，此工具可讓您檢視show命令輸出的分析。

- **show interfaces bri** *number* — 僅指定數字會顯示該BRI介面的D通道。

配置中未定義封裝，因此預設情況下是HDLC。這可使用**show interface**命令驗證，如下所示：

```
 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
```

疑難排解

本節提供的資訊可用於對組態進行疑難排解。

疑難排解指令

注意：發出debug命令之前，請參閱有關Debug命令的重要資訊。

- **debug dialer**
- **debug ip packet detail 105** — 用於調試僅ICMP的IP資料包（請參閱配置中的access-list 105）。
- **debug isdn q931** — 用於檢視ISDN Q.931事件和資料包。
- **debug serial interface** — 用於調試HDLC。

兩台路由器的調試示例如下所示：

goya的輸出：

```
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的輸出：

```
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#
```

相關資訊

- [使用撥號程式配置檔案配置ISDN DDR](#)
- [使用DDR撥號器對映配置BRI到BRI撥號](#)
- [技術支援 - Cisco Systems](#)