Configuring Dialin and Dialout on Switched 56k Lines

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Introduction

Many service providers offer switched 56k circuits for dialin and dialout. Switched 56k circuits are two or four wire 56 Kbps digital connections that are commonly used for dial−in remote access. In addition to offering the flexibility of access on demand, switched 56K applications include video conferencing, access to Frame Relay networks, file transfer, and LAN interconnection.

A router with a switched 56k circuit connected to it can perform inbound and outbound dialing and can use Dial−on−Demand Routing (DDR) to initiate the call.

Switched 56 operation at 56 kbps are governed by AT&T Publication 41458 and Sprint TS−0046.

This document shows a router with a WIC−1DSU−56K4 (four wire) and switched 56k circuit dialing out and receiving calls from a router with a Basic Rate Interface (BRI).

Prerequisites

Requirements

There are no specific requirements for this document.

Components Used

The configuration in this document was developed and tested using these software and hardware versions:

- A Cisco 3640 series router running Cisco IOS® Software Release 12.2(3)
- WIC−1DSU−56K4. For more information on this Wan Interface Card (WIC), refer to Understanding the 1−Port 4−Wire 56/64 Kpbs CSU/DSU WAN Interface Card (WIC−1DSU−56K4). This document includes information on which IOS versions and platforms support with WIC−1DSU−56K4.

- A Cisco 2500 series router with a BRI interface running Cisco IOS Software Release 12.0(7)T.

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

Related Products

This configuration works for any modular router that supports the WIC−1DSU−56K4. Refer to Understanding the 1−Port 4−Wire 56/64 Kpbs CSU/DSU WAN Interface Card (WIC−1DSU−56K4) for more information on the supported platforms.

Conventions

Refer to Cisco Technical Tips Conventions for more information on document conventions.

Configure

In this section, you are presented with the information to configure the features described in this document.

Note: Use the Command Lookup Tool (registered customers only) to find more information on the commands used in this document.

Prior Steps

On the Telco side, the switched 56 circuit was configured for immediate start signalling for all inbound calls and wink−start for all outbound calls.

Network Diagram

This document uses this network setup:

Configurations

Note: Only the relevant sections of the configurations are included.

R1 (Cisco 2500 Router)

```
hostname R1
!
username R2  password 0 cisco
!
interface BRI0
 ip address 172.31.1.65 255.255.255.252
 no ip directed-broadcast
 encapsulation ppp
```

```
 no ip route-cache
 load-interval 30
 dialer idle-timeout 200
 dialer string 14080000000 class 56K

!--- Use the map-class named "56k" (defined below) when dialing number 14080000000

 dialer load-threshold 2 either
 dialer-group 1
 isdn switch-type basic-5ess
 isdn not-end-to-end 56

!--- 56k speed to be used for incoming calls recognized as not ISDN end to end
!--- This command is only needed if the router accepts incoming calls (R1 does)

 no cdp enable
 ppp authentication chap callin
 ppp chap hostname R1
 ppp chap password 7 <deleted>
!
!
map-class dialer 56K

!--- map-class named "56k" that was used with the dialer string above

 dialer isdn speed 56

!--- Set the speed of the call to be 56k (default is 64k)
!--- This is neccessary since the remote site is 56k switched

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

R2 (Cisco 3640 Router)

```
hostname R2
!
username R1 password 0 cisco
!
interface Serial1/0
 bandwidth 56

!--- The bandwidth command is only used to modify the routing protocol metrics
!--- It does not affect the actual speed of the call

 no ip address
 encapsulation ppp
 no ip route-cache
 no ip mroute-cache
 dialer in-band

!--- The 56k CSU/DSUs use V.25bis commands to interface with the router,
!--- so the interface must be configured for dialer in-band

 dialer pool-member 1

!--- Assign Serial 1/0 as member of dialer pool 1.
!--- Dialer pool 1 is specified in interface Dialer 1

 pulse-time 1
 service-module 56k network-type switched

!--- Transmits packets in switched dial-up mode
```

```
!--- This is neccessary since we are doing switched rather than dds

 service-module 56k switched-carrier other

!--- Selects the service provider. The options are att, sprint or other
!--- Choose as appropriate

 no service-module 56k remote-loopback

!--- Prevents the local CSU/DSU from being placed into loopback
!--- by remote devices on the line

 ppp authentication chap
!
!
interface Dialer1
 description corp dial
 ip address 172.31.1.66 255.255.255.252
 encapsulation ppp
 no ip route-cache
 no ip mroute-cache
 dialer pool 1

!--- Defines Dialer pool 1
!--- Serial 1/0 is a member of this pool

 dialer remote-name R1

!--- Specifies remote router name
!--- This name must match that used by the remote router to authenticate itself

 dialer idle-timeout 1200 either

!--- Idle timeout is set to 1200 seconds
!--- The link is disconnected if there is no interesting traffic for 1200 seconds

 dialer string 14085551111

!--- Defines the destination routers phone number

 dialer-group 1

!--- Apply interesting traffic definition from dialer-list 1

 ppp authentication chap
 ppp chap hostname R2
 ppp chap password 7 <deleted>
!
 dialer-list 1 protocol ip permit

!--- All IP traffic is designated as interesting.
!--- This is applied to Interface Dialer 1 using dialer-group 1
```

Verify

Use this section to confirm that your configuration works properly.

The Output Interpreter Tool (registered customers only) (OIT) supports certain **show** commands. Use the OIT to view an analysis of **show** command output.

- **show service-module** Displays information about the channel service unit/data service unit (CSU/DSU) modules. This is the most important troubleshooting command for the CSU/DSU

modules.

- **show interface** Displays information specific to the interface in questions. Verify the status of the interface, line protocol, and so on.

These debugs show R2 prior to receiving the switched 56k call from R1. R2 should show no errors or problem while idle.

```
R2#show service-module
Module type is 4-wire Switched 56

!--- CSU/DSU module installed in the router

    Hardware revision is B, Software revision is 1.00,
    Image checksum is 0x42364436, Protocol revision is 1.0
Connection state: Idle
Receiver has no alarms.

!--- There are no alarms

CSU/DSU Status Flags
Current line rate is 56 Kbits/sec
Last user loopback performed:
    dte loopback
    duration 00:02:11

!--- Type and outcome of the last performed loopback

Last module self-test (done 2d23h): Passed

!--- Status of the last self test performed on an integrated CSU/DSU module

Last clearing of alarm counters 22:58:26
    oos/oof               :    0,
    loss of signal        :    0,
    loss of sealing curren:    0,
    loss of frame         :    0,
    rate adaptation attemp:    0,
R2#show interface serial 1/0
Serial1/0 is down, line protocol is down

!--- Interface and line protocol are down (since there is no call)

  Hardware is DSCC4 with 56k 4-wire CSU/DSU
  MTU 1500 bytes, BW 56 Kbit, DLY 20000 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation PPP, loopback not set
  Keepalive set (10 sec)
  DTR is pulsed for 1 seconds on reset
  LCP Closed
  Closed: CDPCP
  Last input 00:01:14, output 00:00:22, output hang never
  Last clearing of "show interface" counters 23:02:40
  Input queue: 0/75/0/0 (size/max/drops/flushes); 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)
     Available Bandwidth 42 kilobits/sec
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     1242 packets input, 29686 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
     13028 input errors, 1613 CRC, 11415 frame, 0 overrun, 0 ignored, 0 abort
     1265 packets output, 37911 bytes, 0 underruns
     0 output errors, 0 collisions, 56 interface resets
```

```
     0 output buffer failures, 0 output buffers swapped out
     30 carrier transitions
     DCD=down  DSR=down  DTR=up  RTS=up  CTS=up

!--- Notice that DCR and DSR are down. They will go "up" when the call is connected
```

This debug is from R2, after it has received an incoming switched 56k call from R1.

```
R2#
Serial1/0 is up, line protocol is up

!--- Interface and line protocol are up

  Hardware is DSCC4 with 56k 4-wire CSU/DSU
  MTU 1500 bytes, BW 56 Kbit, DLY 20000 usec,
      reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation PPP, loopback not set
  Keepalive set (10 sec)
  DTR is pulsed for 1 seconds on reset
  Time to interface disconnect:  idle 00:19:50
  Interface is bound to Di1 (Encapsulation PPP)

!--- Call is bound to interface Dialer 1(dialer profile)

  LCP Open
  Closed: CDPCP
  Open: IPCP

!--- LCP and IPCP are Open

  Last input 00:00:08, output 00:00:02, output hang never
  Last clearing of "show interface" counters 00:03:17
  Input queue: 0/75/0/0 (size/max/drops/flushes); 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)
     Available Bandwidth 42 kilobits/sec
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     38 packets input, 541 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     38 packets output, 625 bytes, 0 underruns
     0 output errors, 0 collisions, 8 interface resets
     0 output buffer failures, 0 output buffers swapped out
     5 carrier transitions
     DCD=up  DSR=up  DTR=up  RTS=up  CTS=up

!--- Notice that DCD and DSR are now "up"
```

This debug is from R2, after it has made an outgoing switched 56k call to R1.

```
R2#show interface serial 1/0
Serial1/0 is up, line protocol is up

!--- Interface and line protocol are up

  Hardware is DSCC4 with 56k 4-wire CSU/DSU
  MTU 1500 bytes, BW 56 Kbit, DLY 20000 usec,
      reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation PPP, loopback not set
  Keepalive set (10 sec)
```

```
  DTR is pulsed for 1 seconds on reset
  Time to interface disconnect:  idle 00:19:45
  Interface is bound to Di1 (Encapsulation PPP)
  LCP Open
  Closed: CDPCP
  Open: IPCP  Last input 00:00:14, output 00:00:02, output hang never
  Last clearing of "show interface" counters 23:07:50
  Input queue: 0/75/0/0 (size/max/drops/flushes); 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)
     Available Bandwidth 42 kilobits/sec
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     1274 packets input, 30616 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
     13028 input errors, 1613 CRC, 11415 frame, 0 overrun, 0 ignored, 0 abort
     1298 packets output, 38921 bytes, 0 underruns
     0 output errors, 0 collisions, 60 interface resets
     0 output buffer failures, 0 output buffers swapped out
     33 carrier transitions
     DCD=up  DSR=up  DTR=up  RTS=up  CTS=up

!--- Notice that DCD and DSR are now "up"
```

Troubleshoot

Use this section to troubleshoot your configuration.

Troubleshooting Commands

The Output Interpreter Tool (registered customers only) (OIT) supports certain **show** commands. Use the OIT to view an analysis of **show** command output.

Note: Refer to Important Information on Debug Commands before you use **debug** commands.

- **debug dialer** Displays DDR debugging information about the packets received on a dialer interface.
- **debug isdn q931** Shows call setup and tear down of the ISDN network connection (Layer 3).
- **debug ppp negotiation** Displays information on Point to Point Protocol (PPP) traffic and exchanges while negotiating the PPP components including Link Control Protocol (LCP), Authentication, and Network Control Program (NCP). A successful PPP negotiation will first open the LCP state, then authenticate, and finally negotiate NCP (usually IPCP).
- **debug ppp authentication** Displays the PPP authentication protocol messages, including Challenge Authentication Protocol (CHAP) packet exchanges and Password Authentication Protocol (PAP) exchanges.

Call from R1 (BRI) to R2 (Switched 56k)

These debugs are from R1 and R2 when a call is received on the switched 56K line. Hence the call is from R1 (which will make a 56k call from its BRI interface) to R2 (which will receive the call on the switched 56k line).

```
R1#ping  172.31.1.66
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.31.1.66, timeout is 2 seconds:

*Mar 18 03:42:35.585: BRI0 DDR: Dialing cause ip (s=172.31.1.65, d=172.31.1.66)
```

```
*Mar 18 03:42:35.589: BRI0 DDR: Attempting to dial 14080000000

!--- Outbound dial

*Mar 18 03:42:35.589: ISDN BR0: Outgoing call id = 0x80C9, dsl 0
*Mar 18 03:42:35.593: ISDN BR0: Event: Call to 14080000000 at 56 Kb/s

!--- The outbound call is 56k as specified with the map-class on R1

*Mar 18 03:42:35.597: ISDN BR0: process_bri_call(): call id 0x80C9,
called_number 14080000000, speed 56, call type DATA
*Mar 18 03:42:35.601: CC_CHAN_GetIdleChanbri: dsl 0
*Mar 18 03:42:35.605:     Found idle channel B1
*Mar 18 03:42:35.613: ISDN BR0: TX ->  SETUP pd = 8  callref = 0x15
*Mar 18 03:42:35.613:         Bearer Capability i = 0x8890218F
*Mar 18 03:42:35.617:         Channel ID i = 0x83
*Mar 18 03:42:35.621:         Keypad Facility i = '14080000000'
*Mar 18 03:42:35.721: ISDN BR0: RX <-  CALL_PROC pd = 8  callref = 0x95
*Mar 18 03:42:35.725:         Channel ID i = 0x89
*Mar 18 03:42:35.737: ISDN BR0: received HOST_PROCEEDING call_id 0x80C9
*Mar 18 03:42:36.445: ISDN BR0: RX <-  PROGRESS pd = .8  callref = 0x95
*Mar 18 03:42:36.449:         Progress Ind i = 0x8A81 - Call not
end-to-end ISDN, may have in-band info
*Mar 18 03:42:36.453:         Signal i = 0x01 - Ring back tone on
*Mar 18 03:42:36.469: ISDN BR0: received HOST_PROGRESS call_id 0x80C9
*Mar 18 03:42:36.469: ISDN BR0: received HOST_PROGRESS call_id 0xFFFFFFFF
*Mar 18 03:42:36.473: ISDN BR0: HOST_PROGRESS:
Got IE of INBAND or Not End-To-End....
Success rate is 0 percent (0/5)
*Mar 18 03:42:45.097: ISDN BR0: RX <-  CONNECT pd = 8  callref = 0x95
*Mar 18 03:42:45.109: ISDN BR0: TX ->  CONNECT_ACK pd = 8  callref = 0x15
*Mar 18 03:42:45.117: ISDN BR0: received HOST_CONNECT call_id 0x80C9
2w3d: %LINK-3-UPDOWN: Interface BRI0:1, changed state to up
2w3d: %ISDN-6-CONNECT: Interface BRI0:1 is now connected to 14080000000
*Mar 18 03:42:45.149: BR0:1 PPP: Treating connection as a callout
*Mar 18 03:42:45.149: BR0:1 PPP: Phase is ESTABLISHING, Active Open
*Mar 18 03:42:45.153: BR0:1 PPP: No remote authentication for call-out
*Mar 18 03:42:45.157: BR0:1 LCP: O CONFREQ [Closed] id 72 len 10
*Mar 18 03:42:45.161: BR0:1 LCP:    MagicNumber 0x3876C541 (0x05063876C541)
*Mar 18 03:42:45.165: ISDN BR0: Event: Connected to 14080000000 on B1 at 56 Kb/s
*Mar 18 03:42:47.157: BR0:1 LCP: TIMEout: State REQsent
*Mar 18 03:42:47.161: BR0:1 LCP: O CONFREQ [REQsent] id 73 len 10
*Mar 18 03:42:47.161: BR0:1 LCP:    MagicNumber 0x3876C541 (0x05063876C541)
*Mar 18 03:42:47.293: BR0:1 LCP: I CONFREQ [REQsent] id 146 len 15
*Mar 18 03:42:47.293: BR0:1 LCP:    AuthProto CHAP (0x0305C22305)
*Mar 18 03:42:47.297: BR0:1 LCP:    MagicNumber 0x230DCB33 (0x0506230DCB33)
*Mar 18 03:42:47.301: BR0:1 LCP: O CONFACK [REQsent] id 146 len 15
*Mar 18 03:42:47.305: BR0:1 LCP:    AuthProto CHAP (0x0305C22305)
*Mar 18 03:42:47.309: BR0:1 LCP:    MagicNumber 0x230DCB33 (0x0506230DCB33)
*Mar 18 03:42:47.313: BR0:1 LCP: I CONFACK [ACKsent] id 73 len 10
*Mar 18 03:42:47.317: BR0:1 LCP:    MagicNumber 0x3876C541 (0x05063876C541)
*Mar 18 03:42:47.317: BR0:1 LCP: State is Open
*Mar 18 03:42:47.321: BR0:1 PPP: Phase is AUTHENTICATING, by the peer
*Mar 18 03:42:47.437: BR0:1 CHAP: I CHALLENGE id 15 len 29 from "R2"
*Mar 18 03:42:47.441: BR0:1 CHAP: Using alternate hostname R1
*Mar 18 03:42:47.445: BR0:1 CHAP: O RESPONSE id 15 len 36 from "R1"
*Mar 18 03:42:47.577: BR0:1 CHAP: I SUCCESS id 15 len 4

!--- PPP CHAP authentication is successful

*Mar 18 03:42:47.581: BR0:1 PPP: Phase is UP
*Mar 18 03:42:47.585: BR0:1 IPCP: O CONFREQ [Closed] id 13 len 10
*Mar 18 03:42:47.585: BR0:1 IPCP:    Address 172.31.1.65 (0x0306AC1F0141)
*Mar 18 03:42:47.593: BR0:1 IPCP: I CONFREQ [REQsent] id 14 len 10
*Mar 18 03:42:47.597: BR0:1 IPCP:    Address 172.31.1.66 (0x0306AC1F0142)
*Mar 18 03:42:47.601: BR0:1 IPCP: O CONFACK [REQsent] id 14 len 10
```

```
*Mar 18 03:42:47.605: BR0:1 IPCP:    Address 172.31.1.66 (0x0306AC1F0142)
*Mar 18 03:42:47.609: BR0:1 CDPCP: I CONFREQ [Not negotiated] id 13 len 4
*Mar 18 03:42:47.613: BR0:1 LCP: O PROTREJ [Open] id 74 len 10 protocol
CDPCP (0x8207010D0004)
*Mar 18 03:42:47.713: BR0:1 IPCP: I CONFACK [ACKsent] id 13 len 10
*Mar 18 03:42:47.717: BR0:1 IPCP:    Address 172.31.1.65 (0x0306AC1F0141)
*Mar 18 03:42:47.721: BR0:1 IPCP: State is Open
*Mar 18 03:42:47.725: BRI0:1 DDR: dialer protocol up
*Mar 18 03:42:47.733: BR0 IPCP: Install route to 172.31.1.66
2w3d: %LINEPROTO-5-UPDOWN: Line protocol on Interface BRI0:1,
changed state to up
2w3d: %ISDN-6-CONNECT: Interface BRI0:1 is now connected to 14080000000

!--- The call is now connected
```

This debug shows that same call from R2's perspective:

```
R2#
*Mar  7 01:15:38.615: Dscc4(1/0): DCD is up.

!--- The call arrives and DCD on the line (int serial 1/0) is changed to "up"

*Mar  7 01:15:38.671: Serial1/0 DDR: Dialer result = rC
*Mar  7 01:15:40.391: Se1/0 LCP: I CONFREQ [Closed] id 76 len 10
*Mar  7 01:15:40.391: Se1/0 LCP:    MagicNumber 0x38778BA6 (0x050638778BA6)
*Mar  7 01:15:40.391: Se1/0 LCP: Lower layer not up, Fast Starting
*Mar  7 01:15:40.391: Se1/0 PPP: Treating connection as a callin
*Mar  7 01:15:40.391: Se1/0 PPP: Phase is ESTABLISHING, Passive Open
[0 sess, 0 load]
*Mar  7 01:15:40.391: Se1/0 LCP: State is Listen

!--- LCP negotiation begins

*Mar  7 01:15:40.391: Se1/0 LCP: O CONFREQ [Listen] id 147 len 15
*Mar  7 01:15:40.391: Se1/0 LCP:    AuthProto CHAP (0x0305C22305)
*Mar  7 01:15:40.391: Se1/0 LCP:    MagicNumber 0x230E9191 (0x0506230E9191)
*Mar  7 01:15:40.391: Se1/0 LCP: O CONFACK [Listen] id 76 len 10
*Mar  7 01:15:40.395: Se1/0 LCP:    MagicNumber 0x38778BA6 (0x050638778BA6)
6d01h: %LINK-3-UPDOWN: Interface Serial1/0, changed state to up
*Mar  7 01:15:40.399: Se1/0 DDR: Dialer statechange to up
6d01h: %DIALER-6-BIND: Interface Se1/0 bound to profile Di1
*Mar  7 01:15:40.535: Se1/0 LCP: I CONFACK [ACKsent] id 147 len 15
*Mar  7 01:15:40.535: Se1/0 LCP:    AuthProto CHAP (0x0305C22305)
*Mar  7 01:15:40.535: Se1/0 LCP:    MagicNumber 0x230E9191 (0x0506230E9191)
*Mar  7 01:15:40.535: Se1/0 LCP: State is Open
*Mar  7 01:15:40.539: Se1/0 PPP: Phase is AUTHENTICATING, by this end
[0 sess, 0 load]
*Mar  7 01:15:40.539: Se1/0 CHAP: Using alternate hostname R2
*Mar  7 01:15:40.539: Se1/0 CHAP: O CHALLENGE id 16 len 29 from "R2"
*Mar  7 01:15:40.679: Se1/0 CHAP: I RESPONSE id 16 len 36 from "R1"
*Mar  7 01:15:40.679: Se1/0 CHAP: O SUCCESS id 16 len 4

!--- Authentication is successful

*Mar  7 01:15:40.679: Se1/0 PPP: Phase is UP [0 sess, 0 load]
*Mar  7 01:15:40.679: Se1/0 IPCP: O CONFREQ [Not negotiated] id 15 len 10
*Mar  7 01:15:40.679: Se1/0 IPCP:    Address 172.31.1.66 (0x0306AC1F0142)
*Mar  7 01:15:40.683: Se1/0 CDPCP: O CONFREQ [Closed] id 14 len 4
*Mar  7 01:15:40.815: Se1/0 IPCP: I CONFREQ [REQsent] id 14 len 10
*Mar  7 01:15:40.815: Se1/0 IPCP:    Address 172.31.1.65 (0x0306AC1F0141)
*Mar  7 01:15:40.815: Se1/0 IPCP: O CONFACK [REQsent] id 14 len 10
*Mar  7 01:15:40.815: Se1/0 IPCP:    Address 172.31.1.65 (0x0306AC1F0141)
*Mar  7 01:15:40.831: Se1/0 IPCP: I CONFACK [ACKsent] id 15 len 10
*Mar  7 01:15:40.831: Se1/0 IPCP:    Address 172.31.1.66 (0x0306AC1F0142)
*Mar  7 01:15:40.831: Se1/0 IPCP: State is Open
```

```
*Mar  7 01:15:40.831: Se1/0 DDR: dialer protocol up
*Mar  7 01:15:40.835: Di1 IPCP: Install route to 172.31.1.65

!--- Call is connected

R2#
R2#ping 172.31.1.65

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.31.1.65, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 136/136/140 ms

!--- Ping is successful
```

Call from R2 (Switched 56k) to R1 (BRI)

These debugs are from both R1 and R2 when a call is made from the switched 56K line. Hence the call is from R2 (which makes the call on the switched 56k line) to R1 (which receives a 56k call from its BRI interface).

```
R2#ping 172.31.1.66
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.31.1.66, timeout is 2 seconds:

*Mar  7 01:10:07.679: Se1/0 DDR: rotor dialout [priority]
*Mar  7 01:10:07.679: Se1/0 DDR: Dialing cause ip (s=172.31.1.66, d=172.31.1.66)

!--- Outbound call is due to the ping

*Mar  7 01:10:07.679: Se1/0 DDR: Attempting to dial 14085551111.....
Success rate is 0 percent (0/5)
*Mar  7 01:10:27.007: Serial0/0: attempting to restart
*Mar  7 01:10:33.427: Dscc4(1/0): DCD is up.

!--- The router brigns up DCD on the serial interface

*Mar  7 01:10:33.447: SERVICE_MODULE(Serial1/0): detects call connect

!--- The interface detetcs the call has connected. PPP negotiation will begin

*Mar  7 01:10:33.483: Serial1/0 DDR: Dialer result = rC
*Mar  7 01:10:34.511: Se1/0 LCP: I CONFREQ [Closed] id 64 len 15
*Mar  7 01:10:34.511: Se1/0 LCP:    AuthProto CHAP (0x0305C22305)
*Mar  7 01:10:34.511: Se1/0 LCP:    MagicNumber 0x3872E0CB (0x05063872E0CB)
*Mar  7 01:10:34.511: Se1/0 LCP: Lower layer not up, Fast Starting
*Mar  7 01:10:34.511: Se1/0 PPP: Treating connection as a callout
*Mar  7 01:10:34.511: Se1/0 PPP: Phase is ESTABLISHING, Active Open
[0 sess, 0 load]
*Mar  7 01:10:34.511: Se1/0 LCP: O CONFREQ [Closed] id 143 len 15
*Mar  7 01:10:34.511: Se1/0 LCP:    AuthProto CHAP (0x0305C22305)
*Mar  7 01:10:34.511: Se1/0 LCP:    MagicNumber 0x2309E6B1 (0x05062309E6B1)
*Mar  7 01:10:34.511: Se1/0 LCP: O CONFACK [REQsent] id 64 len 15
*Mar  7 01:10:34.511: Se1/0 LCP:    AuthProto CHAP (0x0305C22305)
*Mar  7 01:10:34.511: Se1/0 LCP:    MagicNumber 0x3872E0CB (0x05063872E0CB)
6d01h: %LINK-3-UPDOWN: Interface Serial1/0, changed state to up
*Mar  7 01:10:34.519: Se1/0 DDR: Dialer statechange to up
6d01h: %DIALER-6-BIND: Interface Se1/0 bound to profile Di1
*Mar  7 01:10:34.519: Se1/0 DDR: Dialer call has been placed
*Mar  7 01:10:34.619: Se1/0 LCP: I CONFACK [ACKsent] id 143 len 15
*Mar  7 01:10:34.619: Se1/0 LCP:    AuthProto CHAP (0x0305C22305)
*Mar  7 01:10:34.619: Se1/0 LCP:    MagicNumber 0x2309E6B1 (0x05062309E6B1)
*Mar  7 01:10:34.619: Se1/0 LCP: State is Open
*Mar  7 01:10:34.619: Se1/0 PPP: Phase is AUTHENTICATING, by both
```

```
[0 sess, 0 load]
*Mar  7 01:10:34.619: Se1/0 CHAP: Using alternate hostname R2
*Mar  7 01:10:34.623: Se1/0 CHAP: O CHALLENGE id 12 len 29 from "R2"
*Mar  7 01:10:34.643: Se1/0 CHAP: I CHALLENGE id 2 len 36 from "R1"
*Mar  7 01:10:34.643: Se1/0 CHAP: Using alternate hostname R2
*Mar  7 01:10:34.643: Se1/0 CHAP: O RESPONSE id 2 len 29 from "R2"
*Mar  7 01:10:34.743:!Se1/0 CHAP: I SUCCESS id 2 len 4
*Mar  7 01:10:34.759: Se1/0 CHAP: I RESPONSE id 12 len 36 from "R1"
*Mar  7 01:10:34.763: Se1/0 CHAP: O SUCCESS id 12 len 4

!--- Authentication is successful

*Mar  7 01:10:34.763: Se1/0 PPP: Phase is UP [0 sess, 0 load]
*Mar  7 01:10:34.763: Se1/0 IPCP: O CONFREQ [Not negotiated] id 11 len 10
*Mar  7 01:10:34.763: Se1/0 IPCP:    Address 172.31.1.66 (0x0306AC1F0142)
*Mar  7 01:10:34.763: Se1/0 CDPCP: O CONFREQ [Closed] id 10 len 4
*Mar  7 01:10:34.863: Se1/0 IPCP: I CONFREQ [REQsent] id 10 len 10
*Mar  7 01:10:34.863: Se1/0 IPCP:    Address 172.31.1.65 (0x0306AC1F0141)
*Mar  7 01:10:34.863: Se1/0 IPCP: O CONFACK [REQsent] id 10 len 10
*Mar  7 01:10:34.863: Se1/0 IPCP:    Address 172.31.1.65 (0x0306AC1F0141)
*Mar  7 01:10:34.879: Se1/0 IPCP: I CONFACK [ACKsent] id 11 len 10
*Mar  7 01:10:34.879: Se1/0 IPCP:    Address 172.31.1.66 (0x0306AC1F0142)
*Mar  7 01:10:34.879: Se1/0 IPCP: State is Open
*Mar  7 01:10:34.879: Se1/0 DDR: dialer protocol up
*Mar  7 01:10:34.883: Di1 IPCP: Install route to 172.31.1.65
*Mar  7 01:10:34.887: Se1/0 LCP: I PROTREJ [Open] id 65 len 10 protocol
CDPCP (0x8207010A0004)
*Mar  7 01:10:34.887: Se1/0 CDPCP: State is Closed
6d01h: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/0,
changed state to up

!--- Call is connected
```

This debug shows that same call from the R1 (the receiving side) perspective:

```
R1#
*Mar 18 03:38:27.765: ISDN BR0: RX <-  SETUP pd = 8  callref = 0x75

!--- Incoming call

*Mar 18 03:38:27.769:         Bearer Capability i = 0x8890218F
*Mar 18 03:38:27.773:         Channel ID i = 0x89
*Mar 18 03:38:27.773:         Progress Ind i = 0x8281
- Call not end-to-end ISDN, may have in-band info

!--- The ISDN network notifies us that the call is not end-to-end ISDN
!--- Configure the command "isdn not-end-to-end 56" on R1

*Mar 18 03:38:27.777:         Signal i = 0x40 - Alerting on - pattern 0
*Mar 18 03:38:27.785:         Locking Shift to Codeset 6
*Mar 18 03:38:27.785:         Codeset 6 IE 0x3C  i = 0x110120, '0'
*Mar 18 03:38:27.789:         Codeset 6 IE 0x3C  i = 0x1103, 'INCOMING',
0x20, 'CALL'
*Mar 18 03:38:27.793:         Codeset 6 IE 0x3C  i = 0x1107, 'InX'
*Mar 18 03:38:27.797:         Codeset 6 IE 0x3C  i = 0x110A, '02-14',
0x20, '03:49pm'
*Mar 18 03:38:27.805: ISDN BR0: Incoming call id = 0x1F5, dsl 0
*Mar 18 03:38:27.813: ISDN BR0: received HOST_INCOMING_CALL call_id 0x1F5
*Mar 18 03:38:27.817: ISDN BR0: Event: Checking if call is not ISDN end to end
*Mar 18 03:38:27.817: ISDN BR0: Event: Adjusting speed to user selection 56K
*Mar 18 03:38:27.821: ISDN BR0: HOST_INCOMING_CALL: voice_answer_data = FALSE
*Mar 18 03:38:27.821: ISDN BR0: Event: Received a DATA call from  on B1 at 56 Kb/s
*Mar 18 03:38:27.825: ISDN BR0: RM returned call_type 0 resource type 0
*Mar 18 03:38:27.837: ISDN BR0: TX ->  CALL_PROC pd = 8  callref = 0xF5
*Mar 18 03:38:27.841:         Channel ID i = 0x89
```

```
*Mar 18 03:38:27.845: ISDN BR0: isdn_send_connect(): msg 4, call id 0x1F5,
ces 1 bchan 0, call typ
e DATA
2w3d: %LINK-3-UPDOWN: Interface BRI0:1, changed state to up
2w3d: %ISDN-6-CONNECT: Interface BRI0:1 is now connected to unknown

!--- Call is connected

*Mar 18 03:38:27.873: BR0:1 PPP: Treating connection as a callin
*Mar 18 03:38:27.877: BR0:1 PPP: Phase is ESTABLISHING, Passive Open
*Mar 18 03:38:27.877: BR0:1 LCP: State is Listen
*Mar 18 03:38:28.149: ISDN BR0: TX ->  CONNECT pd = 8  callref = 0xF5
*Mar 18 03:38:28.193: ISDN BR0: RX <-  CONNECT_ACK pd = 8  callref = 0x75
*Mar 18 03:38:28.197:         Signal i = 0x4F - Alerting off
*Mar 18 03:38:28.213: ISDN BR0: received HOST_CONNECT call_id 0x1F5
*Mar 18 03:38:28.213: ISDN BR0: Event: Connected to  on B1 at 56 Kb/s
*Mar 18 03:38:30.061: BR0:1 LCP: TIMEout: State Listen
*Mar 18 03:38:30.065: BR0:1 LCP: O CONFREQ [Listen] id 63 len 15
*Mar 18 03:38:30.069: BR0:1 LCP:    AuthProto CHAP (0x0305C22305)
*Mar 18 03:38:30.073: BR0:1 LCP:    MagicNumber 0x3872E0CB (0x05063872E0CB)
*Mar 18 03:38:32.065: BR0:1 LCP: TIMEout: State REQsent
*Mar 18 03:38:32.069: BR0:1 LCP: O CONFREQ [REQsent] id 64 len 15
*Mar 18 03:38:32.069: BR0:1 LCP:    AuthProto CHAP (0x0305C22305)
*Mar 18 03:38:32.073: BR0:1 LCP:    MagicNumber 0x3872E0CB (0x05063872E0CB)
*Mar 18 03:38:32.165: BR0:1 LCP: I CONFREQ [REQsent] id 143 len 15
*Mar 18 03:38:32.169: BR0:1 LCP:    AuthProto CHAP (0x0305C22305)
*Mar 18 03:38:32.173: BR0:1 LCP:    MagicNumber 0x2309E6B1 (0x05062309E6B1)
*Mar 18 03:38:32.177: BR0:1 LCP: O CONFACK [REQsent] id 143 len 15
*Mar 18 03:38:32.181: BR0:1 LCP:    AuthProto CHAP (0x0305C22305)
*Mar 18 03:38:32.185: BR0:1 LCP:    MagicNumber 0x2309E6B1 (0x05062309E6B1)
*Mar 18 03:38:32.189: BR0:1 LCP: I CONFACK [ACKsent] id 64 len 15
*Mar 18 03:38:32.189: BR0:1 LCP:    AuthProto CHAP (0x0305C22305)
*Mar 18 03:38:32.193: BR0:1 LCP:    MagicNumber 0x3872E0CB (0x05063872E0CB)
*Mar 18 03:38:32.197: BR0:1 LCP: State is Open
*Mar 18 03:38:32.197: BR0:1 PPP: Phase is AUTHENTICATING, by both
*Mar 18 03:38:32.201: BR0:1 CHAP: Using alternate hostname R1
*Mar 18 03:38:32.205: BR0:1 CHAP: O CHALLENGE id 2 len 36 from "R1"
*Mar 18 03:38:32.277: BR0:1 CHAP: I CHALLENGE id 12 len 29 from "R2"
*Mar 18 03:38:32.281: BR0:1 CHAP: Waiting for peer to authenticate first
*Mar 18 03:38:32.301: BR0:1 CHAP: I RESPONSE id 2 len 29 from "R2"
*Mar 18 03:38:32.305: BR0:1 CHAP: O SUCCESS id 2 len 4
*Mar 18 03:38:32.309: BR0:1 CHAP: Processing saved Challenge, id 12
*Mar 18 03:38:32.313: BRI0:1 DDR: Authenticated host R2 with no
matching dialer map
*Mar 18 03:38:32.317: BR0:1 CHAP: Using alternate hostname R1
*Mar 18 03:38:32.321: BR0:1 CHAP: O RESPONSE id 12 len 36 from "R1"
*Mar 18 03:38:32.413: BR0:1 CHAP: I SUCCESS id 12 len 4

!--- Authentication is successful

*Mar 18 03:38:32.417: BR0:1 PPP: Phase is UP
*Mar 18 03:38:32.421: BR0:1 IPCP: O CONFREQ [Closed] id 10 len 10
*Mar 18 03:38:32.425: BR0:1 IPCP:    Address 172.31.1.65 (0x0306AC1F0141)
*Mar 18 03:38:32.429: BR0:1 IPCP: I CONFREQ [REQsent] id 11 len 10
*Mar 18 03:38:32.437: BR0:1 IPCP:    Address 172.31.1.66 (0x0306AC1F0142)
*Mar 18 03:38:32.441: BR0:1 IPCP: O CONFACK [REQsent] id 11 len 10
*Mar 18 03:38:32.441: BR0:1 IPCP:    Address 172.31.1.66 (0x0306AC1F0142)
*Mar 18 03:38:32.449: BR0:1 CDPCP: I CONFREQ [Not negotiated] id 10 len 4
*Mar 18 03:38:32.453: BR0:1 LCP: O PROTREJ [Open] id 65 len 10 protocol
CDPCP (0x8207010A0004)
*Mar 18 03:38:32.517: BR0:1 IPCP: I CONFACK [ACKsent] id 10 len 10
*Mar 18 03:38:32.521: BR0:1 IPCP:    Address 172.31.1.65 (0x0306AC1F0141)
*Mar 18 03:38:32.525: BR0:1 IPCP: State is Open
*Mar 18 03:38:32.529: BRI0:1 DDR: dialer protocol up
*Mar 18 03:38:32.537: BR0 IPCP: Install route to 172.31.1.66
2w3d: %LINEPROTO-5-UPDOWN: Line protocol on Interface BRI0:1,
```

```
changed state to up
2w3d: %ISDN-6-CONNECT: Interface BRI0:1 is now connected to  R2

!--- Call is completely connected

R1#ping 172.31.1.66

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.31.1.66, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 148/161/180 ms
```

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