

Configuring ISDN Backup With Floating Static Routes

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Introduction

Prerequisites

Requirements

Components Used

Conventions

Configure

Network Diagram

Configurations

Verify

Troubleshoot

Troubleshooting Commands

Sample Troubleshooting Output

Related Information

Introduction

This document provides a sample configuration for implementing an ISDN backup with floating static routes, and provides basic troubleshooting information for this type of configuration.

For information on the most common implementations of ISDN backup, and comparisons between these, refer to the following document: [Evaluating Backup Interfaces, Floating Static Routes, and Dialer Watch for DDR Backup](#).

Prerequisites

Requirements

There are no specific requirements for this document.

Components Used

The information in this document is based on the software and hardware versions below.

- Two Cisco 2500 routers running Cisco IOS® Software Releases 12.2(3) and 12.2(5)

The information presented in this document was created from devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If you are working in a live network, ensure that you understand the potential impact of any command before using it.

Conventions

For more information on document conventions, see the [Cisco Technical Tips Conventions](#).

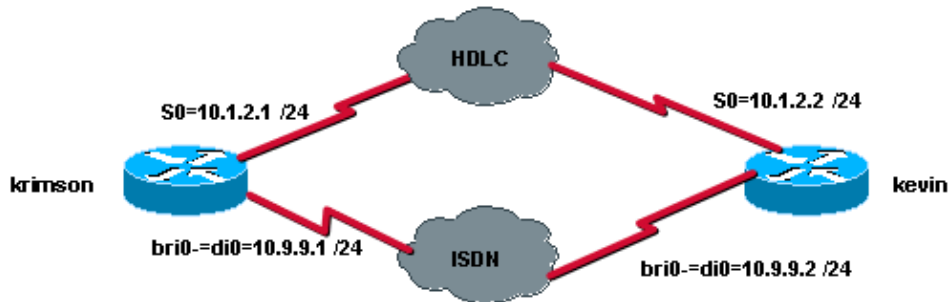
Configure

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

Note: To find additional information on the commands used in this document, use the Command Lookup tool (registered customers only).

Network Diagram

This document uses the network setup shown in the diagram below.



Configurations

This document uses the configurations shown below.

- krimson (Cisco 2500 Router)
- kevin (Cisco 2500 Router)

```
krimson (Cisco 2500 Router)
krimson#show running-config
Building configuration...

!
version 12.2
service timestamps debug datetime msec
service timestamps log datetime msec
!
hostname krimson
!
username kevin password 0 <password>
!
isdn switch-type basic-net3
!
!
interface Loopback0
ip address 10.7.7.1 255.255.255.0
!
interface Serial0
ip address 10.1.2.1 255.255.255.0
!
interface BRI0
no ip address
encapsulation ppp
no ip route-cache
no ip mroute-cache
load-interval 30
dialer pool-member 1
```

```

isdn switch-type basic-net3
no fair-queue
no cdp enable
ppp authentication chap
!
interface Dialer0
ip address 10.9.9.1 255.255.255.0
encapsulation ppp
no ip route-cache
no ip mroute-cache
dialer pool 1
dialer remote-name kevin

dialer string 8114
dialer-group 1
no cdp enable
ppp authentication chap
!
ip classless
ip route 10.8.8.0 255.255.255.0 10.1.2.2
ip route 10.8.8.0 255.255.255.0 10.9.9.2 180
no ip http server
!
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 <password> login
!
end

```

kevin (Cisco 2500 Router)

```

kevin#show running-config
Building configuration...

Current configuration : 1205 bytes
!
version 12.2
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname kevin
!
username krimson password 0 <password>
!
isdn switch-type basic-net3
!
!
!
interface Loopback0
ip address 10.8.8.1 255.255.255.0
!
interface Serial0
ip address 10.1.2.2 255.255.255.0
clockrate 2000000
!
interface Serial1
no ip address

```

```
shutdown
!
interface BRI0
no ip address
encapsulation ppp
dialer pool-member 1
isdn switch-type basic-net3
no cdp enable
ppp authentication chap
!
interface Dialer0
ip address 10.9.9.2 255.255.255.0
encapsulation ppp
dialer pool 1
dialer remote-name krimson
dialer string 8113
dialer-group 1
no cdp enable
ppp authentication chap
!
!
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 <password> login
!
end
```

Verify

This section provides information you can use to confirm your configuration is working properly.

Certain **show** commands are supported by the Output Interpreter tool (registered customers only) , which allows you to view an analysis of **show** command output.

- **show ip route** – Displays IP routing table entries.
- **show interfaces** – Displays statistics for all interfaces configured on the router or access server.

Troubleshoot

This section provides information you can use to troubleshoot your configuration.

Troubleshooting Commands

Certain **show** commands are supported by the Output Interpreter tool (registered customers only) , which allows you to view an analysis of **show** command output.

Note: Before issuing **debug** commands, please see Important Information on Debug Commands.

- **debug isdn q931** – Displays information about call setup and teardown of ISDN network connections (Layer 3) between the local router (user side) and the network.
- **debug isdn events** – Displays ISDN events occurring on the user side (on the router) of the ISDN interface. The ISDN events that can be displayed are Q.931 events (call setup and teardown of ISDN

network connections).

- **debug dialer** – Displays debugging information about the packets or events on a dialer interface.
- **debug ppp negotiation** – Causes the **debug ppp** command to display PPP packets transmitted during PPP startup, where PPP options are negotiated.
- **debug ppp authentication** – Causes the **debug ppp** command to display authentication protocol messages, including Challenge Authentication Protocol (CHAP) packet exchanges and Password Authentication Protocol (PAP) exchanges.

Sample Troubleshooting Output

Here, we can test the backup functionality by using the **shutdown** and **no shutdown** commands on the serial interface on the remote side. This consequently leads to the disappearance of the primary ip route to the destination network in question.

Let's first look at the initial state of the primary interface and the ip routing table:

Calling Side:

```
krimson#show interface serial 0
Serial0 is up, line protocol is up
Hardware is HD64570
Internet address is 10.1.2.1/24
MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec,
reliability 255/255, txload 1/255, rxload 1/255
Encapsulation HDLC, loopback not set
Keepalive set (10 sec)
Last input 00:00:07, output 00:00:07, output hang never
Last clearing of "show interface" counters never
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 1158 kilobits/sec
5 minute input rate 1000 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
92 packets input, 7599 bytes, 0 no buffer
Received 62 broadcasts, 0 runts, 0 giants, 0 throttles
0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
99 packets output, 8991 bytes, 0 underruns
0 output errors, 0 collisions, 12 interface resets
0 output buffer failures, 0 output buffers swapped out
4 carrier transitions
DCD=up DSR=up DTR=up RTS=up CTS=up

krimson#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter
area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is 10.48.74.1 to network 0.0.0.0

10.0.0.0/8 is variably subnetted, 5 subnets, 2 masks
C 10.1.2.0/24 is directly connected, Serial0
S 10.8.8.0/24 [1/0] via 10.1.2.2
```

!--- The IP route for the destination network points to the primary link.

```
C 10.9.9.0/24 is directly connected, Dialer0
C 10.7.7.0/24 is directly connected, Loopback0
C 10.48.74.0/23 is directly connected, Ethernet0
S* 0.0.0.0/0 [254/0] via 10.48.74.1
```

Called Side:

```
kevin#show interface serial 0
Serial0 is up, line protocol is up
Hardware is HD64570
Internet address is 10.1.2.2/24
MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec,
reliability 255/255, txload 1/255, rxload 1/255
Encapsulation HDLC, loopback not set
Keepalive set (10 sec)
Last input 00:00:00, output 00:00:08, output hang never
Last clearing of "show interface" counters never
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 1158 kilobits/sec
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
106 packets input, 9432 bytes, 0 no buffer
Received 71 broadcasts, 0 runts, 0 giants, 0 throttles
0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
98 packets output, 8016 bytes, 0 underruns
0 output errors, 0 collisions, 4 interface resets
0 output buffer failures, 0 output buffers swapped out
1 carrier transitions
DCD=up DSR=up DTR=up RTS=up CTS=up

kevin#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter
area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is 10.48.74.1 to network 0.0.0.0

10.0.0.0/8 is variably subnetted, 4 subnets, 2 masks
C 10.1.2.0/24 is directly connected, Serial0
C 10.9.9.0/24 is directly connected, Dialer0
C 10.8.8.0/24 is directly connected, Loopback0
C 10.48.74.0/23 is directly connected, Ethernet0
S* 0.0.0.0/0 [254/0] via 10.48.74.1
kevin#
```

Now we can simulate the link failure by using the **shutdown** command on the remote serial interface:

```
krimson#
*Mar 4 15:25:18.302: %LINK-3-UPDOWN: Interface Serial0, changed state to
down
*Mar 4 15:25:19.302: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Serial0, changed state to down
```

We can see here that the primary link has gone down.

```

krimson#show interface serial 0
Serial0 is down, line protocol is down
Hardware is HD64570
Internet address is 10.1.2.1/24
MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec,
reliability 255/255, txload 1/255, rxload 1/255
Encapsulation HDLC, loopback not set
Keepalive set (10 sec)
Last input 00:00:22, output 00:00:32, output hang never
Last clearing of "show interface" counters never
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 1158 kilobits/sec
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
108 packets input, 8526 bytes, 0 no buffer
Received 78 broadcasts, 0 runts, 0 giants, 0 throttles
0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
114 packets output, 9895 bytes, 0 underruns
0 output errors, 0 collisions, 12 interface resets
0 output buffer failures, 0 output buffers swapped out
5 carrier transitions
DCD=down DSR=down DTR=up RTS=up CTS=down
krimson#

```

The routing table details now show that the floating static route is installed in the routing table:

```

krimson#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter
area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is 10.48.74.1 to network 0.0.0.0

10.0.0.0/8 is variably subnetted, 4 subnets, 2 masks
S 10.8.8.0/24 [180/0] via 10.9.9.2
C 10.9.9.0/24 is directly connected, Dialer0
C 10.7.7.0/24 is directly connected, Loopback0
C 10.48.74.0/23 is directly connected, Ethernet0
S* 0.0.0.0/0 [254/0] via 10.48.74.1
krimson#

```

On the called router, we can simulate the primary link failure simulated by using the **shutdown** command on the local serial 0 interface:

```

kevin#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
kevin(config)#interface serial 0
kevin(config-if)#shutdown

*Mar 4 15:32:00.250: %LINK-5-CHANGED: Interface Serial0, changed state to
administratively down
*Mar 4 15:32:01.250: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Serial0, changed state to down
*Mar 4 15:32:03.742: %SYS-5-CONFIG_I: Configured from console by console

```

Now we can see that the primary link goes down:

```
kevin#show interface serial 0
Serial0 is administratively down, line protocol is down
Hardware is HD64570
Internet address is 10.1.2.2/24
MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec,
reliability 255/255, txload 1/255, rxload 1/255
Encapsulation HDLC, loopback not set
Keepalive set (10 sec)
Last input 00:01:28, output 00:01:18, output hang never
Last clearing of "show interface" counters never
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 1158 kilobits/sec
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
114 packets input, 9895 bytes, 0 no buffer
Received 79 broadcasts, 0 runts, 0 giants, 0 throttles
0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
108 packets output, 8526 bytes, 0 underruns
0 output errors, 0 collisions, 4 interface resets
0 output buffer failures, 0 output buffers swapped out
1 carrier transitions
DCD=down DSR=down DTR=up RTS=up CTS=down
```

The ping traffic that is defined as interesting traffic initiates the outgoing call via the backup dialer 0 interface.

```
krimson#ping 10.8.8.1
```

```
Type escape sequence to abort.
```

```
Sending 5, 100-byte ICMP Echos to 10.8.8.1, timeout is 2 seconds:
```

```
*Mar 4 15:27:39.618: BR0 DDR: rotor dialout [priority]
*Mar 4 15:27:39.622: BR0 DDR: Dialing cause ip (s=10.9.9.1, d=10.8.8.1)
*Mar 4 15:27:39.626: BR0 DDR: Attempting to dial 8114
*Mar 4 15:27:39.642: ISDN BR0: TX -> SETUP pd = 8 callref = 0x09
*Mar 4 15:27:39.646: Bearer Capability i = 0x8890
*Mar 4 15:27:39.654: Channel ID i = 0x83
*Mar 4 15:27:39.658: Called Party Number i = 0x80, '8114',
Plan:Unknown, Type:Unknown
*Mar 4 15:27:39.718: ISDN BR0: RX <- CALL_PROC pd = 8 callref = 0x89
*Mar 4 15:27:39.722: Channel ID i = 0x89
*Mar 4 15:27:39.974: ISDN BR0: RX <- CONNECT pd = 8 callref = 0x89
*Mar 4 15:27:39.990: %LINK-3-UPDOWN: Interface BRI0:1, changed state to up
*Mar 4 15:27:39.998: %DIALER-6-BIND: Interface BR0:1 bound to profile Di0
*Mar 4 15:27:40.010: BR0:1 PPP: Treating connection as a callout
*Mar 4 15:27:40.010: BR0:1 PPP: Phase is ESTABLISHING, Active Open [0 sess, 0 load]
*Mar 4 15:27:40.014: BR0:1 LCP: O .!!!CONFREQ [Closed] id 19 len 15
*Mar 4 15:27:40.018: BR0:1 LCP: AuthProto CHAP (0x0305C22305)
*Mar 4 15:27:40.022: BR0:1 LCP: MagicNumber 0x12D0A490 (0x050612D0A490)
*Mar 4 15:27:40.030: ISDN BR0: TX -> CONNECT_ACK pd = 8 callref = 0x09
*Mar 4 15:27:40.054: BR0:1 LCP: I CONFREQ [REQsent] id 9 len 15
*Mar 4 15:27:40.058: BR0:1 LCP: AuthProto CHAP (0x0305C22305)
*Mar 4 15:27:40.062: BR0:1 LCP: MagicNumber 0x12D6B638 (0x050612D6B638)
*Mar 4 15:27:40.066: BR0:1 LCP: O CONFACK [REQsent] id 9 len 15
*Mar 4 15:27:40.066: BR0:1 LCP: AuthProto CHAP (0x0305C22305)
*Mar 4 15:27:40.070: BR0:1 LCP: MagicNumber 0x12D6B638 (0x050612D6B638)
*Mar 4 15:27:40.074: BR0:1 LCP: I CONFACK [ACKsent] id 19 len 15
*Mar 4 15:27:40.078: BR0:1 LCP: AuthProto CHAP (0x0305C22305)
*Mar 4 15:27:40.082: BR0:1 LCP: MagicNumber 0x12D0A490 (0x050612D0A490)
*Mar 4 15:27:40.082: BR0:1 LCP: State is Open
```

```

*Mar 4 15:27:40.086: BR0:1 PPP: Phase is AUTHENTICATING, by both [0 sess, 0 load]
*Mar 4 !
Suc15:27:40.090: BR0:1 CHAP: O CHALLENGE id 7 len 28 from "krimson"
*Mar 4 15:27:40.106: BR0:1 CHAP: I CHALLENGE id 7 len 26 from "kevin"
*Mar 4 15:27:40.110: BR0:1 CHAP: O RESPONSE id 7 len 28 from "krimson"
*Mar 4 15:27:40.138: BR0:1 CHAP: I SUCCESS id 7 len 4
*Mar 4 15:27:40.150: BR0:1 CHAP: O RESPONSE id 7 len 26 from "kevin"
*Mar 4 15:27:40.158: BR0:1 CHAP: O SUCCESS id 7 len 4
*Mar 4 15:27:40.162: BR0:1 PPP: Phase is UP [0 sess, 0 load]
*Mar 4 15:27:40.166: BR0:1 IPCP: O CONFREQ [Not negotiated] id 2 len 10
*Mar 4 15:27:40.170: BR0:1 IPCP: Address 10.9.9.1 (0x03060A090901)
*Mar 4 15:27:40.186: BR0:1 IPCP: I CONFREQ [REQsent] id 2 len 10
*Mar 4 15:27:40.190: BR0:1 IPCP: Address 10.9.9.2 (0x03060A090902)
*Mar 4 15:27:40.190: BR0:1 IPCP: O CONFACK [REQsent] id 2 len 10
*Mar 4 15:27:40.194: BR0:1 IPCP: Address 10.9.9.2 (0x03060A090902)
*Mar 4 15:27:40.202: BR0:1 IPCP: I CONFACK [ACKsent] id 2 len 10
*Mar 4 15:27:40.206: BR0:1 IPCP: Address 10.9.9.1 (0x03060A090901)
*Mar 4 15:27:40.206: BR0:1 IPCP: State is Open
*Mar 4 15:27:40.214: BR0:1 DDR: dialer protocol up
*Mar 4 15:27:40.218: Di0 IPCP: Install route to 10.9.9.2
*Mar 4 15:27:41.162: %LINEPROTO-5-UPDOWN: Line protocol on Interface BRI0:1,
changed state to upcss rate is 80 percent (4/5), round-trip min/avg/max =
36/47/76 ms
krimson#

```

At the same time, the **debugs** running on the called side show the following output for this same call:

```

kevin#
*Mar 4 15:34:21.698: ISDN BR0: RX <- SETUP pd = 8 callref = 0x07
*Mar 4 15:34:21.706: Bearer Capability i = 0x8890
*Mar 4 15:34:21.714: Channel ID i = 0x89
*Mar 4 15:34:21.718: Calling Party Number i = 0xA1, '8113',
Plan:ISDN, Type:National
*Mar 4 15:34:21.734: Called Party Number i = 0xC1, '8114',
Plan:ISDN, Type:Subscriber(local)
*Mar 4 15:34:21.762: ISDN BR0: Event: Received a DATA call from 8113 on B1
at 64 Kb/s
*Mar 4 15:34:21.762: ISDN BR0: Event: Accepting the call id 0xC
*Mar 4 15:34:21.766: BR0:1: interface must be fifo queue, force fifo
*Mar 4 15:34:21.774: %DIALER-6-BIND: Interface BR0:1 bound to profile Di0
*Mar 4 15:34:21.786: %LINK-3-UPDOWN: Interface BRI0:1, changed state to up
*Mar 4 15:34:21.798: BR0:1 PPP: Treating connection as a callin
*Mar 4 15:34:21.802: BR0:1 PPP: Phase is ESTABLISHING, Passive Open [0 sess,
0 load]
*Mar 4 15:34:21.806: BR0:1 LCP: State is Listen
*Mar 4 15:34:21.818: ISDN BR0: TX -> CALL_PROC pd = 8 callref = 0x87
*Mar 4 15:34:21.826: Channel ID i = 0x89
*Mar 4 15:34:21.854: ISDN BR0: TX -> CONNECT pd = 8 callref = 0x87
*Mar 4 15:34:21.918: ISDN BR0: RX <- CONNECT_ACK pd = 8 callref = 0x07
*Mar 4 15:34:21.926: Channel ID i = 0x89
*Mar 4 15:34:21.978: BR0:1 LCP: I CONFREQ [Listen] id 19 len 15
*Mar 4 15:34:21.982: BR0:1 LCP: AuthProto CHAP (0x0305C22305)
*Mar 4 15:34:21.986: BR0:1 LCP: MagicNumber 0x12D0A490 (0x050612D0A490)
*Mar 4 15:34:21.990: BR0:1 LCP: O CONFREQ [Listen] id 9 len 15
*Mar 4 15:34:21.994: BR0:1 LCP: AuthProto CHAP (0x0305C22305)
*Mar 4 15:34:21.994: BR0:1 LCP: MagicNumber 0x12D6B638 (0x050612D6B638)
*Mar 4 15:34:21.998: BR0:1 LCP: O CONFACK [Listen] id 19 len 15
*Mar 4 15:34:22.002: BR0:1 LCP: AuthProto CHAP (0x0305C22305)
*Mar 4 15:34:22.006: BR0:1 LCP: MagicNumber 0x12D0A490 (0x050612D0A490)
*Mar 4 15:34:22.030: BR0:1 LCP: I CONFACK [ACKsent] id 9 len 15
*Mar 4 15:34:22.034: BR0:1 LCP: AuthProto CHAP (0x0305C22305)
*Mar 4 15:34:22.034: BR0:1 LCP: MagicNumber 0x12D6B638 (0x050612D6B638)
*Mar 4 15:34:22.038: BR0:1 LCP: State is Open
*Mar 4 15:34:22.042: BR0:1 PPP: Phase is AUTHENTICATING, by both [0 sess, 0
load]
*Mar 4 15:34:22.046: BR0:1 CHAP: O CHALLENGE id 7 len 26 from "kevin"

```

```

*Mar 4 15:34:22.050: BR0:1 CHAP: I CHALLENGE id 7 len 28 from "krimson"
*Mar 4 15:34:22.054: BR0:1 CHAP: Waiting for peer to authenticate first
*Mar 4 15:34:22.070: BR0:1 CHAP: I RESPONSE id 7 len 28 from "krimson"
*Mar 4 15:34:22.078: BR0:1 CHAP: O SUCCESS id 7 len 4
*Mar 4 15:34:22.082: BR0:1 CHAP: Processing saved Challenge, id 7
*Mar 4 15:34:22.090: BR0:1 CHAP: O RESPONSE id 7 len 26 from "kevin"
*Mar 4 15:34:22.114: BR0:1 CHAP: I SUCCESS id 7 len 4
*Mar 4 15:34:22.118: BR0:1 PPP: Phase is UP [0 sess, 0 load]
*Mar 4 15:34:22.122: BR0:1 IPCP: O CONFREQ [Not negotiated] id 2 len 10
*Mar 4 15:34:22.126: BR0:1 IPCP: Address 10.9.9.2 (0x03060A090902)
*Mar 4 15:34:22.130: BR0:1 IPCP: I CONFREQ [REQsent] id 2 len 10
*Mar 4 15:34:22.134: BR0:1 IPCP: Address 10.9.9.1 (0x03060A090901)
*Mar 4 15:34:22.138: BR0:1 IPCP: O CONFACK [REQsent] id 2 len 10
*Mar 4 15:34:22.142: BR0:1 IPCP: Address 10.9.9.1 (0x03060A090901)
*Mar 4 15:34:22.226: BR0:1 IPCP: I CONFACK [ACKsent] id 2 len 10
*Mar 4 15:34:22.230: BR0:1 IPCP: Address 10.9.9.2 (0x03060A090902)
*Mar 4 15:34:22.230: BR0:1 IPCP: State is Open
*Mar 4 15:34:22.242: BR0:1 DDR: dialer protocol up
*Mar 4 15:34:22.250: Di0 IPCP: Install route to 10.9.9.1
*Mar 4 15:34:23.114: %LINEPROTO-5-UPDOWN: Line protocol on Interface BRI0:1,
changed state to up
*Mar 4 15:34:27.794: %ISDN-6-CONNECT: Interface BRI0:1 is now connected to
8113 krimson

```

The state after the backup is "up":

```

krimson#show interface dialer 0
Dialer0 is up, line protocol is up (spoofing)
Hardware is Unknown
Internet address is 10.9.9.1/24
MTU 1500 bytes, BW 56 Kbit, DLY 20000 usec,
reliability 255/255, txload 1/255, rxload 1/255
Encapsulation PPP, loopback not set
DTR is pulsed for 1 seconds on reset
Interface is bound to BR0:1
Last input never, output never, output hang never
Last clearing of "show interface" counters 00:13:26
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 0/1/16 (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
36 packets input, 2160 bytes
36 packets output, 2160 bytes
Bound to:
BRI0:1 is up, line protocol is up
Hardware is BRI
MTU 1500 bytes, BW 64 Kbit, DLY 20000 usec,
reliability 255/255, txload 1/255, rxload 1/255
Encapsulation PPP, loopback not set
Keepalive set (10 sec)
Time to interface disconnect: idle 00:01:33
Interface is bound to Di0 (Encapsulation PPP)
LCP Open
Open: IPCP
Last input 00:00:26, output 00:00:01, output hang never
Last clearing of "show interface" counters never
Queueing strategy: fifo
Output queue 0/40, 0 drops; input queue 0/75, 0 drops
30 second input rate 0 bits/sec, 0 packets/sec
30 second output rate 0 bits/sec, 0 packets/sec
126 packets input, 3664 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
131 packets output, 3777 bytes, 0 underruns
0 output errors, 0 collisions, 15 interface resets
0 output buffer failures, 0 output buffers swapped out
28 carrier transitions
```

```
krimson#show ip route
```

```
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter
area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route
```

```
Gateway of last resort is 10.48.74.1 to network 0.0.0.0
```

```
10.0.0.0/8 is variably subnetted, 5 subnets, 3 masks
C 10.9.9.2/32 is directly connected, Dialer0
S 10.8.8.0/24 [180/0] via 10.9.9.2
C 10.9.9.0/24 is directly connected, Dialer0
C 10.7.7.0/24 is directly connected, Loopback0
C 10.48.74.0/23 is directly connected, Ethernet0
S* 0.0.0.0/0 [254/0] via 10.48.74.1
```

On Called Side:

The state after the backup is "up".

```
kevin#show interface dialer 0
```

```
Dialer0 is up, line protocol is up (spoofing)
Hardware is Unknown
Internet address is 10.9.9.2/24
MTU 1500 bytes, BW 56 Kbit, DLY 20000 usec,
reliability 255/255, txload 1/255, rxload 1/255
Encapsulation PPP, loopback not set
DTR is pulsed for 1 seconds on reset
Interface is bound to BR0:1
Last input never, output never, output hang never
Last clearing of "show interface" counters 00:16:18
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 0/1/16 (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
40 packets input, 2224 bytes
40 packets output, 2224 bytes
Bound to:
BRI0:1 is up, line protocol is up
Hardware is BRI
MTU 1500 bytes, BW 64 Kbit, DLY 20000 usec,
reliability 255/255, txload 1/255, rxload 1/255
Encapsulation PPP, loopback not set
Keepalive set (10 sec)
Time to interface disconnect: idle 00:01:11
Interface is bound to Di0 (Encapsulation PPP)
LCP Open
Open: IPCP
Last input 00:00:48, output 00:00:00, output hang never
Last clearing of "show interface" counters never
Queueing strategy: fifo
```

```
Output queue 0/40, 0 drops; input queue 0/75, 0 drops
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
136 packets input, 3857 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
131 packets output, 3744 bytes, 0 underruns
0 output errors, 0 collisions, 12 interface resets
0 output buffer failures, 0 output buffers swapped out
35 carrier transitions
```

```
kevin#show ip route
```

```
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter
area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route
```

```
Gateway of last resort is 10.48.74.1 to network 0.0.0.0
```

```
10.0.0.0/8 is variably subnetted, 4 subnets, 3 masks
C 10.9.9.0/24 is directly connected, Dialer0
C 10.8.8.0/24 is directly connected, Loopback0
C 10.9.9.1/32 is directly connected, Dialer0
C 10.48.74.0/23 is directly connected, Ethernet0
S* 0.0.0.0/0 [254/0] via 10.48.74.1
```

Here, we simulate the recovery of the primary link by using the **no shutdown** command on the remote serial interface:

```
krimson#
*Mar 4 15:28:58.726: %LINK-3-UPDOWN: Interface Serial0, changed state to up
*Mar 4 15:28:59.730: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Serial0, changed state to up
```

The backup is disconnected after the idle timeout.

```
krimson#show isdn active
```

```
-----
ISDN ACTIVE CALLS
-----
```

```
Call Calling Called Remote Seconds Seconds Seconds Charges
Type Number Number Name Used Left Idle
Units/Currency
```

```
-----
Out 8114 kevin 120 1 118 0
-----
```

```
krimson#
*Mar 4 15:29:41.738: BR0:1 DDR: idle timeout
*Mar 4 15:29:41.742: BR0 DDR: has total 0 call(s), dial_out 0, dial_in 0
*Mar 4 15:29:41.746: BR0:1 PPP: Treating connection as a callout
*Mar 4 15:29:41.750: %DIALER-6-UNBIND: Interface BR0:1 unbound from profile
Di0
*Mar 4 15:29:41.754: BR0:1 DDR: disconnecting call
*Mar 4 15:29:41.758: %ISDN-6-DISCONNECT: Interface BRI0:1 disconnected from
8114 kevin, call lasted 121 seconds
*Mar 4 15:29:41.774: ISDN BR0: TX -> DISCONNECT pd = 8 callref = 0x09
*Mar 4 15:29:41.782: Cause i = 0x8090 - Normal call clearing
```

```
*Mar 4 15:29:41.790: Di0 IPCP: Remove route to 10.9.9.2
*Mar 4 15:29:41.862: ISDN BR0: RX <- RELEASE pd = 8 callref = 0x89
*Mar 4 15:29:41.886: %LINK-3-UPDOWN: Interface BRI0:1, changed state to down
*Mar 4 15:29:41.894: BR0:1 IPCP: State is Closed
*Mar 4 15:29:41.894: BR0:1 PPP: Phase is TERMINATING [0 sess, 0 load]
*Mar 4 15:29:41.898: BR0:1 LCP: State is Closed
*Mar 4 15:29:41.898: BR0:1 PPP: Phase is DOWN [0 sess, 0 load]
*Mar 4 15:29:41.902: BR0:1 DDR: disconnecting call
*Mar 4 15:29:41.910: ISDN BR0: TX -> RELEASE_COMP pd = 8 callref = 0x09
*Mar 4 15:29:42.886: %LINEPROTO-5-UPDOWN: Line protocol on Interface BRI0:1,
changed state to down
```

The initial state is now restored.

```
krimson#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter
area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is 10.48.74.1 to network 0.0.0.0

10.0.0.0/8 is variably subnetted, 5 subnets, 2 masks
C 10.1.2.0/24 is directly connected, Serial0
S 10.8.8.0/24 [1/0] via 10.1.2.2
C 10.9.9.0/24 is directly connected, Dialer0
C 10.7.7.0/24 is directly connected, Loopback0
C 10.48.74.0/23 is directly connected, Ethernet0
S* 0.0.0.0/0 [254/0] via 10.48.74.1
```

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