# Bridging Across ISDN

## Document ID: 16120



# Introduction

This document provides a sample configuration to bridge over ISDN with examples of basic **debug** and **show** commands used to troubleshoot the connection. In addition, we have implemented PPP Multilink in this example. However, this is optional and the same configuration can be used without multilink.

# Prerequisites

## Requirements

Remember that, in order that the bridge over ISDN functions properly, the underlying dial−on−demand routing (DDR) connection must be functional. Hence, you should configure, test, verify and, if necessary, troubleshoot the ISDN DDR connection (without bridging) before you add the transparent bridging feature. This can help to troubleshoot any problems you encounter eventually. More detail is included in the Troubleshoot section later in this document.

Also verify that the ISDN Layers 1, 2 and 3 are functional. For more information, see:

- Using the **show isdn status** Command for Basic Rate Interface (BRI) Troubleshooting
- Troubleshooting ISDN BRI Layer 3 using the **debug isdn q931** Command

## Components Used

The information in this document is based on these software and hardware versions:

- Two Cisco 2500 series routers with Cisco IOS® Software Release 12.2(5)

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 is not specific to Cisco 2500 series routers. Because you can configure a bridge over ISDN between any two routers with BRI circuits, it is not platform dependent. You can apply this configuration to any router with a BRI interface. This includes the Cisco 800 and 1600 series, as well as routers with BRI Network Modules or WICs (for example, the Cisco 2600 and 3600).

### Conventions

For more information on document conventions, see the Cisco Technical Tips Conventions.

## Background Information

Both routers are configured to dial each other as required, and IP routing is disabled. Routers krimson and kevin act as transparent bridges. For more information about transparent bridging operation, see Transparent Bridging and Configuring Transparent Bridging.

Most of the bridging parameters used in this configuration are the default values. For example, spanning tree is active, there is default bridge priority, and so on. However, we have changed the bridge priority on router krimson, merely to illustrate how root bridge selection can be influenced, and how a desired bridge can be forced to be the root bridge. In a simple setup like this, without physical loops in the topology, you can choose to disable spanning tree. For more information on how spanning tree works, see Configuring Spanning Tree and IOS STP Enhancement. IP addresses are put on the interfaces to manage routers remotely and to troubleshoot issues.

**Note:** Be aware that bridging on an ISDN connection tends to keep the connection active for very long periods of time, if not permanently (due to frequent keepalive packets). If your Telco or provider charges for ISDN based on the connection time, this can result in a very large usage bill. Consequently, bridging over ISDN is recommended only for those who have ISDN circuits that are not billed based on the time the circuit is up.

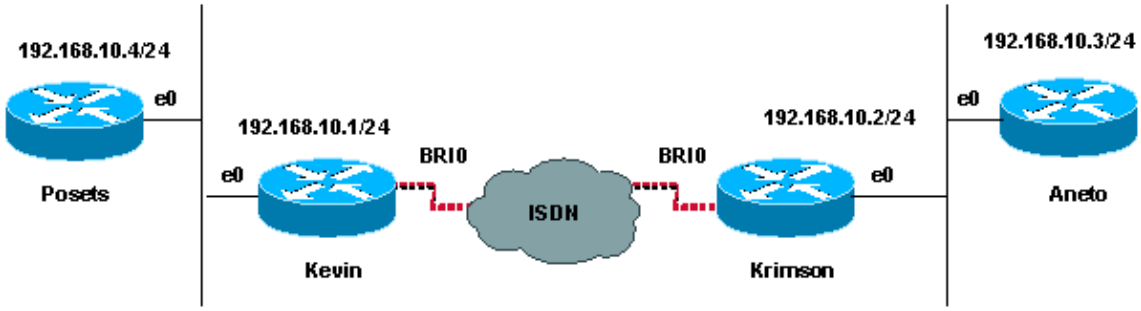
**Note:** You can configure the same IP address on both the BRI and the Ethernet interfaces of each router. You configure IP address so that you can use the **telnet** command on the router for management purposes, or so you can ping the interface to troubleshoot issues.

## Configure

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

### Network Diagram

This document uses this network setup:




## Configurations

This document uses these configurations:

- Kevin
- Krimson

Kevin

```
Current configuration : 1779 bytes
!
version 12.2
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname Kevin
!
enable password <deleted>
!
username krimson password

!--- To establish a username-based authentication system.
!--- (In this example, it is used for PPP CHAP authentication).

username Kevin password <password>

clock timezone CET 1
clock summer-time CEST recurring last Sun Mar 2:00 last Sun Oct 3:00
ip subnet-zero
no ip routing

!--- Disable IP routing (IP routing is on by default).
!--- This is required to bridge IP packets.

ip domain-name cisco.com
!
isdn switch-type basic-net3
!
!
!
interface Loopback0
 ip address 10.8.8.1 255.255.255.0
 no ip route-cache
!
interface Ethernet0
 ip address 192.168.10.1 255.255.255.0
 no ip route-cache
 bridge-group 1

!--- Assign this interface to Bridge Group 1.
```

```
!--- Frames are bridged only among interfaces in the same group.
!--- Note: the BRI interface is also in this bridge-group 1.

!
interface Serial0
 ip address 10.1.2.2 255.255.255.0
 no ip route-cache
 clockrate 2000000
!
interface Serial1
 no ip address
 encapsulation frame-relay
 no ip route-cache
 shutdown
!
interface BRI0
 ip address 192.168.10.1 255.255.255.0
 encapsulation ppp
 no ip route-cache
 no ip mroute-cache
 dialer idle-timeout 9999
 dialer map bridge name krimson broadcast 8103

!--- Dialer map bridge to the remote router. The statement includes
!--- the name of the remote router and phone number to be dialed.
!--- Note: this dialer map statement includes the keyword "bridge", and
!--- does not include the IP address of the peer, as needed for ip routing
!--- based dialer maps.

 dialer load-threshold 2 outbound
 dialer-group 1
 isdn switch-type basic-net3

!--- The ISDN switchtype for this circuit.
!--- Obtain this information from the Telco.
!--- This ISDN switch type is Europe-specific and can be changed based on
!--- the requirements of the country and Telco.

 no cdp enable
 ppp authentication chap
 ppp multilink

!--- PPP multilink is permitted (optional for this configuration).

 bridge-group 1

!--- Assign this interface to Bridge Group 1.
!--- Frames are bridged only among interfaces in the same group.
!--- Note: the Ethernet interface is also in this bridge-group 1.

!
ip classless
no ip http server
ip pim bidir-enable
!
dialer-list 1 protocol bridge permit

!--- All bridge traffic is defined as interesting traffic.

!
bridge 1 protocol ieee

!--- Define the type of Spanning-Tree Protocol used for the interface in
!--- bridge-group 1.
!--- Here we use the IEEE spanning tree protocol. The IEEE 802.1D
!--- Spanning-Tree Protocol is the preferred way to run the bridge.
```

```
!
line con 0
 exec-timeout 0 0
 login
line aux 0
line vty 0 4
 exec-timeout 0 0
 password <password> login
!
ntp server 10.200.20.134
end
```

Krimson

```
Current configuration : 1727 bytes
!
version 12.2
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname krimson
!
enable password <password>
!
username Kevin password <password>

!--- To establish a username-based authentication system.
!--- (In this example, it is used for PPP CHAP authentication).

username krimson password <password>
clock timezone CET 1
clock summertime CEST recurring last Sun Mar 2:00 last Sun Oct 3:00
ip subnet-zero
no ip routing

!--- Disable IP routing (IP routing is on by default).
!--- This is required to bridge IP packets.

!
isdn switch-type basic-net3
!
!
!
interface Loopback0
 ip address 10.7.7.1 255.255.255.0
 no ip route-cache
!
interface Ethernet0
 ip address 192.168.10.2 255.255.255.0
 no ip route-cache
 bridge-group 1

!--- Assign this interface to Bridge Group 1. Frames are bridged only among
!--- interfaces in the same group.
!--- Note: the BRI interface is also in bridge-group 1.

!
interface Serial0
 ip address 10.1.2.1 255.255.255.0
 no ip route-cache
 shutdown
!
interface Serial1
```

```
 no ip address
 no ip route-cache
 shutdown
!
interface BRI0
 ip address 192.168.10.2 255.255.255.0
 encapsulation ppp
 no ip route-cache
 no ip mroute-cache
 load-interval 30
 dialer idle-timeout 99999
 dialer map bridge name Kevin broadcast 8104

!--- Dialer map bridge to the remote router. The statement includes
!--- the name

of the remote router and phone number to be dialed.
!--- Note: This dialer map statement includes the keyword "bridge",
!--- and does not include the IP address of the peer,
!--- as required for IP routing based dialer maps.

 Dialer load-threshold 1 outbound
 dialer-group 1
 isdn switch-type basic-net3

!--- The ISDN switchtype for this circuit. Obtain this information
!--- from the Telco.
!--- This ISDN switch type is Europe-specific, and can be changed
!--- based on the requirements of the country and Telco.

 fair-queue
 no cdp enable
 ppp authentication chap callin
 ppp multilink

!--- PPP multilink used (optional).

 bridge-group 1

!--- Assign this interface to Bridge Group 1.
!--- Frames are bridged only among interfaces in the same group.
!--- Note: The Ethernet interface is also in this bridge-group 1.

!
ip classless
no ip http server
!
dialer-list 1 protocol bridge permit

!--- All bridge traffic is defined as interesting traffic.

!
bridge 1 protocol IEEE

!--- IEEE spanning tree protocol has been used for bridge-group 1.
!--- If you bridge multpile bridge-groups select the spanning.

tree protocol for each bridge-group
bridge 1 priority 1

!--- Set the bridge priority to be the minimum (1).

This makes the device be the root bridge

!--- The router with the highest bridge priority
!--- (and the lowest numerical priority value).
```

```
is elected as the root device. If all routers are configured

!--- With the default priority (32768), the router
!--- with the lowest MAC address.

In the Layer 2 network becomes the root device.
!
Line con 0
 exec-timeout 0 0
line aux 0
line vty 0 4
 exec-timeout 0 0
 password <password> login
!
ntp server 10.200.20.134
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 arp** a privileged EXEC command that displays the entries in the Address Resolution Protocol (ARP) table.

  When the connection is up **show arp** on routers must show ARP entry for remote peer like in following example:

```
aneto#show arp
Protocol  Address          Age (min)  Hardware Addr   Type   Interface
Internet  10.48.92.61              -   0000.0c07.ac0b  ARPA
Internet  192.168.10.2            14   0000.0c42.333e  ARPA   Ethernet0
Internet  192.168.10.3             -   0000.0c4a.4314  ARPA   Ethernet0
Internet  192.168.10.4            43   00e0.1e68.9cdf  ARPA   Ethernet0

!--- ARP entry for remote host posets.
!--- (Note poset's Ethernet interface IP address).

Internet  10.48.74.1             312   00e0.1e68.9cdf  HDLC   Serial0
aneto#

posets#show arp
Protocol     Address      Age  (min)  Hardware Addr   Type   Interface
Internet     10.48.92.61          -   0000.0c07.ac0b  ARPA
Internet     192.168.10.3        43   0000.0c4a.4314  ARPA   Ethernet0

!--- ARP entry for remote host aneto.
!--- (Note the Ethernet interface IP address of aneto)

Internet      192.168.10.1      13   0000.0c31.a599  ARPA   Ethernet0
Internet      192.168.10.4       -   00e0.1e68.9cdf  ARPA   Ethernet0
```

- **show spanning-tree** displays the spanning-tree topology known to the router. With the connection up, when you use the **show span** command on both routers used as a bridges, the output looks like this:

```
krimson#show spanning-tree
  Bridge group 1 is executing the IEEE compatible Spanning Tree protocol
```

```
!--- This is specified through the bridge 1 protocol IEEE command.

 Bridge Identifier has priority 1, address 0000.0c42.333e
 Configured hello time 2, max age 20, forward delay 15
 We are the root of the spanning tree

!--- Note that this router is the root of the spanning tree, as
!--- root priority has been changed to 1.
!--- This is specified through the bridge 1 priority 1.command.

 Topology change flag not set, detected flag not set
   Number of topology changes 14 last change occurred 02:45:39 ago
           from BRI0
   Times:  hold 1, topology change 35, notification 2
           hello 2,          max age 20, forward delay 15
   Timers: hello 1, topology change 0, notification 0, aging 300

Port 2 (Ethernet0) of Bridge group 1 is forwarding

!--- As there are no loops, all ports are forwarding.

  Port path cost 100, Port priority 128, Port Identifier 128.2.
  Designated root has priority 1, address 0000.0c42.333e
  Designated bridge has priority 1, address 0000.0c42.333e
  Designated port id is 128.2, designated path cost 0
  Timers: message age 0, forward delay 0, hold 0
  Number of transitions to forwarding state: 2
  BPDU: sent 9250, received 1

Port 3 (BRI0) of Bridge group 1 is forwarding

!--- As there are no loops, all ports are forwarding.

  Port path cost 15625, Port priority 128, Port Identifier 128.2.
  Designated root has priority 1, address 0000.0c42.333e
  Designated bridge has priority 1, address 0000.0c42.333e
  Designated port id is 128.3, designated path cost 0
  Timers: message age 0, forward delay 0, hold 0
  Number of transitions to forwarding state: 1
  BPDU: sent 8457, received 18

Kevin#show spanning-tree

 Bridge group 1 is executing the IEEE compatible Spanning Tree protocol
  Bridge Identifier has priority 32768, address 0000.0c31.a599

 !--- The root priority has not been changed
 !--- and the default 32768 has been used.

  Configured hello time 2, max age 20, forward delay  15
  Current root has priority 1, address 0000.0c42.333e
  Root port is 3 (BRI0), cost of root path is 15625
  Topology change flag not set, detected flag not set
  Number of topology changes 22 last change occurred 00:05:42 ago
          from BRI0
  Times:  hold 1, topology change 35, notification 2
          hello 2, max age 20, forward delay 15
  Timers: hello 0, topology change 0, notification 0, aging 300

 Port 2 (Ethernet0) of Bridge group 1 is forwarding

 !--- As there are no loops, all ports are forwarding.

   Port path cost 100, Port priority 128, Port Identifier 128.2.
   Designated root has priority 1, address 0000.0c42.333e
   Designated bridge has priority 32768, address 0000.0c31.a599
```

```
    Designated port id is 128.2, designated path cost 15625
    Timers: message age 0, forward delay 0, hold 0
    Number of transitions to forwarding state: 1
    BPDU: sent 8761, received 36

Port 3 (BRI0) of Bridge group 1 is forwarding

!--- Since there are no loops, all ports are forwarding.

    Port path cost 15625, Port priority 128, Port Identifier 128.3.
    Designated root has priority 1, address 0000.0c42.333e
    Designated bridge has priority 1, address 0000.0c42.333e
    Designated port id is 128.3, designated path cost 0
    Timers: message age 2, forward delay 0, hold 0
    Number of transitions to forwarding state: 2
    BPDU: sent 198, received 8293
```

**Note:** As this configuration does not contain any loops, all used ports are in FORWARDING state.

- **show bridge** This command is used to view classes of entries in the bridge forwarding database.
- **show interface bri** This command is used to display information about the BRI D−channel or about one or more B−channels.
- **show interface virtual−access** This command is useful in a setup with PPP multilink configured, as a dynamically created virtual access interface is the master of the PPP multilink bundle. For a functional connection, the output looks like this:

```
krimson#show interface virtual−access 1
Virtual−Access1 is up, line protocol is up
   Hardware is Virtual Access interface
   MTU 1500 bytes, BW 128 Kbit, DLY 100000 usec,
      reliability 255/255, txload 1/255, rxload 7/255
   Encapsulation PPP, loopback not set
   Keepalive set (10 sec)
   DTR is pulsed for 5 seconds on reset
   Time to interface disconnect: idle 1d03h
   LCP Open, multilink Open
          Open: BRIDGECP, IPCP

   !--- Bridge control protocol has been negotiated during PPP
   !--- negotiation (BRIDGECP status must be OPEN for successful
   !--- transfer of bridged traffic).

Last input 00:00:00, output never, output hang never
   Last clearing of "show interface" counters 00:03:13
   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 96 kilobits/sec
      30 second input rate 4000 bits/sec, 2 packets/sec
      30 second output rate 0 bits/sec, 0 packets/sec
      657 packets input, 111861 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
      111 packets output, 4813 bytes, 0 underruns
      0  output errors, 0 collisions, 0 interface resets
      0 output buffer failures, 0 output buffers swapped out
      0 carrier transitions
```

- **show ppp multilink** This command displays bundle information for the Multilink PPP bundles. For example:

```
krimson# show ppp multilink

Virtual−Access1, bundle name is Kevin
```

```
!--- Bundle name used to identify the multilink connection.

Bundle up for 00:03:04
Dialer interface is BRI0
0 lost fragments, 2 reordered, 0 unassigned
0 discarded, 0 lost received, 1/255 load
   0x30F received sequence, 0x70 sent sequence
   Member links: 2 (max not set, min not set)
     BRI0:1, since 00:03:04, last rcvd seq 00030E
     BRI0:2, since 00:03:03, last rcvd seq 00030D
```

# Troubleshoot

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

## Troubleshooting Procedure

Troubleshooting procedures for incoming and outgoing ISDN calls are explained in Dialup Technology: Troubleshooting Techniques. Additional information on how to troubleshoot ISDN layer 1, layer 2 and layer 3 issues is provided in Using the **show isdn status** Command for BRI Troubleshooting and Troubleshooting ISDN BRI Layer 3 using the **debug isdn q931** Command.

Here are some outputs of **debug** commands that show normal establishment of ISDN connection with bridged traffic.

**Note:** All bridge traffic is defined as an interesting traffic and bridge protocol data unit (BPDU) exchange initiates the call. Both routers are configured for dial out and ppp multilink. That is the reason why debugs show two consecutive ISDN calls:

```
*Mar  2 02:07:32.997: ISDN BR0: RX <-  SETUP pd = 8  callref = 0x05
*Mar  2 02:07:33.001:                  Bearer Capability i = 0x8890
*Mar  2 02:07:33.009:                  Channel ID i = 0x89
*Mar  2 02:07:33.013:                  Calling Party Number i = 0xA1,
'8104', Plan:ISDN, Type:National
*Mar  2 02:07:33.025:                  Called Party Number i = 0xC1,
'8103', Plan:ISDN, Type:Subscriber(local)
*Mar  2 02:07:33.249: CCBRI_Go Fr L3 pkt (Len=25) :
*Mar  2 02:07:33.253: 5 1 85 90 4 2 88 90 18 1 89 6C 5 A1 38 31 30
34 70 5 C1 38 31 30 33
*Mar  2 02:07:33.261:
*Mar  2 02:07:33.261: ISDN BR0: Incoming call id = 0x000D, dsl 0
*Mar  2 02:07:33.265: ISDN BR0: LIF_EVENT: ces/callid 1/0xD HOST_INCOMING_CALL
*Mar  2 02:07:33.269: ISDN BR0: HOST_INCOMING_CALL: (non-POTS) DATA
*Mar  2 02:07:33.273: ISDN BR0: HOST_INCOMING_CALL: (1) call_type = DATA
*Mar  2 02:07:33.277: ISDN BR0: HOST_INCOMING_CALL: voice_answer_data
= FALSE call type is DATA
*Mar  2 02:07:33.277: ISDN BR0: Event: Received a DATA call from
8104 on B1 at 64 Kb/s
*Mar  2 02:07:33.281: ISDN BR0: Event: Accepting the call id 0xD
*Mar  2 02:07:33.281: ISDN BR0: RM returned call_type 0 resource
type 0 response 1
*Mar  2 02:07:33.285: CCBRI_Go Fr Host InPkgInfo (Len=9) :
*Mar  2 02:07:33.289: 7 0 1 0 D 3 18 1 89
*Mar  2 02:07:33.293:
*Mar  2 02:07:33.301: ISDN BR0: isdn_send_connect(): msg 4, call
id 0xD, ces 1 bchan 0, call type DATA
*Mar  2 02:07:33.305: %LINK-3-UPDOWN: Interface BRI0:1, changed state
to up
*Mar  2 02:07:33.309: BR0:1 DDR: dialer_in_call_connected()
*Mar  2 02:07:33.309: BR0 DDR: Increment call, 0
```

```
*Mar  2 02:07:33.317: ISDN: get_isdn_service_state(): idb 0x221E1C
bchan 2 is_isdn 1 Not a Pri
*Mar  2 02:07:33.321: isdn_call_connect: Calling lineaction of BRI0:1
*Mar  2 02:07:33.321: BR0:1 PPP: Treating connection as a callin
*Mar  2 02:07:33.325: BR0:1 PPP: Phase is ESTABLISHING, Passive Open
[0 sess, 0 load]
*Mar  2 02:07:33.329: BR0:1 LCP: State is Listen
*Mar  2 02:07:33.329: CCBRI_Go Fr Host InPkgInfo (Len=6) :
*Mar  2 02:07:33.333: 4 0 1 0 D 0
*Mar  2 02:07:33.333:
*Mar  2 02:07:33.345: ISDN BR0: TX ->  CALL_PROC pd = 8
callref = 0x85
*Mar  2 02:07:33.349:                  Channel ID i = 0x89
*Mar  2 02:07:33.433: ISDN BR0: TX ->  CONNECT pd = 8
callref = 0x85
*Mar  2 02:07:33.453: %LINEPROTO-5-UPDOWN: Line protocol on Interface
BRI0:2, changed state to down
*Mar  2 02:07:33.473: %LINEPROTO-5-UPDOWN: Line protocol on Interface
BRI0:1, changed state to down
*Mar  2 02:07:33.517: ISDN BR0: RX <-  CONNECT_ACK pd = 8
callref = 0x05
*Mar  2 02:07:33.521:                  Channel ID i = 0x89
*Mar  2 02:07:33.537: CCBRI_Go Fr L3 pkt (Len=7) :
*Mar  2 02:07:33.537: F 1 85 92 18 1 89
*Mar  2 02:07:33.541:
*Mar  2 02:07:33.545: ISDN BR0: LIF_EVENT: ces/callid 1/0xD HOST_CONNECT
*Mar  2 02:07:33.549: ISDN BR0: Event: Connected to 8104 on B1 at 64 Kb/s
*Mar  2 02:07:33.593: BR0:1 LCP: I CONFREQ [Listen] id 28 len 27
*Mar  2 02:07:33.597: BR0:1 LCP:    AuthProto CHAP  (0x0305C22305)
*Mar  2 02:07:33.601: BR0:1 LCP:    MagicNumber 0x61ADC4BC (0x050661ADC4BC)
*Mar  2 02:07:33.601: BR0:1 LCP:    MRRU 1524 (0x110405F4)
*Mar  2 02:07:33.605: BR0:1 LCP:    EndpointDisc 1  Kevin (0x1308016B6576696E)
*Mar  2 02:07:33.609: BR0:1 LCP: O CONFREQ [Listen] id 138 Len 29
*Mar  2 02:07:33.613: BR0:1 LCP:    AuthProto CHAP (0x0305C22305)
*Mar  2 02:07:33.617: BR0:1 LCP:    MagicNumber 0x05A7881E (0x050605A7881E)
*Mar  2 02:07:33.617: BR0:1 LCP:    MRRU 1524 (0x110405F4)
*Mar  2 02:07:33.621: BR0:1 LCP:    EndpointDisc 1
krimson (0x130A016B72696D736F6E)
*Mar  2 02:07:33.629: BR0:1 LCP: O CONFACK [Listen] id 28 Len 27
*Mar  2 02:07:33.633: BR0:1 LCP:    AuthProto CHAP  (0x0305C22305)
*Mar  2 02:07:33.633: BR0:1 LCP:    MagicNumber 0x61ADC4BC (0x050661ADC4BC)
*Mar  2 02:07:33.637: BR0:1 LCP:    MRRU 1524 (0x110405F4)
*Mar  2 02:07:33.641: BR0:1 LCP:    EndpointDisc 1  Kevin (0x1308016B6576696E)
*Mar  2 02:07:33.717: BR0:1 LCP: I CONFACK [ACKsent] id 138 Len 29
*Mar  2 02:07:33.721: BR0:1 LCP:    AuthProto CHAP (0x0305C22305)
*Mar  2 02:07:33.721: BR0:1 LCP:    MagicNumber 0x05A7881E (0x050605A7881E)
*Mar  2 02:07:33.725: BR0:1 LCP:    MRRU 1524 (0x110405F4)
*Mar  2 02:07:33.729: BR0:1 LCP:    EndpointDisc 1
krimson (0x130A016B72696D736F6E)
*Mar  2 02:07:33.733: BR0:1 LCP: State is Open
*Mar  2 02:07:33.733: BR0:1 PPP: Phase is AUTHENTICATING,
by both [0 sess, 0 load]
*Mar  2 02:07:33.737: BR0:1 CHAP: O CHALLENGE id 18 Len 28 from "krimson"
*Mar  2 02:07:33.741: BR0:1 CHAP: I CHALLENGE id 25 Len 26 from "Kevin"
*Mar  2 02:07:33.745: BR0:1 CHAP: Waiting for peer to authenticate first
*Mar  2 02:07:33.765: BR0:1 CHAP: I RESPONSE id 18 Len 26 from "Kevin"
*Mar  2 02:07:33.773: BR0:1 CHAP: O SUCCESS id 18 Len 4

!--- Authentication is successful.

*Mar  2 02:07:33.777: BR0:1 CHAP: Processing saved Challenge, id 25
*Mar  2 02:07:33.777: BR0:1 DDR: dialer_remote_name() for Kevin
*Mar  2 02:07:33.785: BR0:1 CHAP: O RESPONSE id 25 Len 28 from "krimson"
*Mar  2 02:07:33.809: BR0:1 CHAP: I SUCCESS id 25 Len 4
*Mar  2 02:07:33.813: BR0:1 PPP: Phase is VIRTUALIZED [0 sess, 0 load]
*Mar  2 02:07:33.817: Vi1 PPP: Phase is DOWN, Setup [0 sess, 0 load]
```

```
!--- Virtual-access interface has been created as PPP multilink is used.

*Mar  2 02:07:33.825: DDR: Build stack low 15 high 1
*Mar  2 02:07:33.833: %LINK-3-UPDOWN: Interface Virtual-Access1,
changed state to up

!--- Virtual-access interface is now up.

*Mar  2 02:07:33.837: Vi1 DDR: dialer_statechange(), state=4
*Mar  2 02:07:33.837: Vi1 DDR: dialer_in_call_connected()
*Mar  2 02:07:33.841: Vi1 PPP: Treating connection as a callin
*Mar  2 02:07:33.845: Vi1 PPP: Phase is ESTABLISHING,
Passive Open [0 sess, 0 load]
*Mar  2 02:07:33.845: Vi1 LCP: State is Listen
*Mar  2 02:07:33.849: %LINEPROTO-5-UPDOWN: Line protocol on
Interface Virtual-Access1, changed state to down
*Mar  2 02:07:33.857: Vi1 PPP: Phase is UP [0 sess, 0 load]
*Mar  2 02:07:33.857: Vi1 BNCP: O CONFREQ [Closed] id 1 Len 4

!--- Bridge control protocol negotiation start.

*Mar  2 02:07:33.865: Vi1 IPCP: O CONFREQ [Closed] id 1 Len 10
*Mar  2 02:07:33.869: Vi1 IPCP:    Address 192.168.10.2
(0x0306C0A80A02)
*Mar  2 02:07:33.873: Vi1 MLP: Added first link BR0:1 to bundle Kevin
*Mar  2 02:07:33.881: Vi1 BNCP: I CONFREQ [REQsent] id 1 Len 4
*Mar  2 02:07:33.885: Vi1 BNCP: O CONFACK [REQsent] id 1 Len 4
*Mar  2 02:07:33.893: Vi1 IPCP: I CONFREQ [REQsent] id 1 Len 10
*Mar  2 02:07:33.897: Vi1 IPCP:    Address 192.168.10.1
(0x0306C0A80A01)
*Mar  2 02:07:33.897: Vi1 IPCP: O CONFACK [REQsent] id 1 Len 10
*Mar  2 02:07:33.901: Vi1 IPCP:    Address 192.168.10.1
(0x0306C0A80A01)
*Mar  2 02:07:33.909: Vi1 BNCP: I CONFACK [ACKsent] id 1 Len 4
*Mar  2 02:07:33.909: Vi1 BNCP: State is Open

!--- Bridge control protocol successfully negotiated.

*Mar  2 02:07:33.929: Vi1 IPCP: I CONFACK [ACKsent] id 1 Len 10
*Mar  2 02:07:33.933: Vi1 IPCP:    Address 192.168.10.2
(0x0306C0A80A02)
*Mar  2 02:07:33.937: Vi1 IPCP: State is Open
*Mar  2 02:07:33.945: BR0 IPCP: Install route to 192.168.10.1

!--- IPCP route to the peer is installed.

*Mar  2 02:07:34.245: Kevin DDR: BR0:1, dynamic 0, ghost 0
*Mar  2 02:07:34.245: BRI0:  2 total links, 1 active links
*Mar  2 02:07:34.249: BR0 DDR:Active dialin > reserved
*Mar  2 02:07:34.253: ISDN BR0: Outgoing call id = 0x8321, dsl 0
*Mar  2 02:07:34.253: BR0 DDR: Increment call, 1
*Mar  2 02:07:34.261: ISDN BR0: Event: Call to 8104 at 64 Kb/s
*Mar  2 02:07:34.261: ISDN BR0: process_bri_call(): call id 0x8321,
called_number 8104, speed 64, call type DATA
*Mar  2 02:07:34.269: CCBRI_Go Fr Host InPkgInfo (Len=20) :
*Mar  2 02:07:34.269: 1 0 1 83 21 0 4 2 88 90 18 1 83 70 5 80 38 31 30 34
*Mar  2 02:07:34.277:
*Mar  2 02:07:34.281: CC_CHAN_GetIdleChanbri: dsl 0
*Mar  2 02:07:34.281:     Found idle channel B2
*Mar  2 02:07:34.293: ISDN BR0: TX ->  SETUP pd = 8 callref = 0x27

--- Second link connects.

*Mar  2 02:07:34.297:                  Bearer Capability i = 0x8890
*Mar  2 02:07:34.305:                  Channel ID i = 0x83
```

```
*Mar  2 02:07:34.309:                  Called Party Number i = 0x80,
'8104', Plan:Unknown, Type:Unknown
*Mar  2 02:07:34.365: ISDN BR0: RX <-  CALL_PROC pd = 8 callref = 0xA7
*Mar  2 02:07:34.373:                  Channel ID i = 0x8A
*Mar  2 02:07:34.385: CCBRI_Go Fr L3 pkt (Len=7) :
*Mar  2 02:07:34.389: 2 1 27 98 18 1 8A
*Mar  2 02:07:34.393:
*Mar  2 02:07:34.393: ISDN BR0: LIF_EVENT: ces/callid 1/0x8321 HOST_PROCEEDING
*Mar  2 02:07:34.397: ISDN BR0: HOST_PROCEEDING
*Mar  2 02:07:34.397: ISDN BR0: HOST_MORE_INFO
*Mar  2 02:07:34.669: ISDN BR0: RX <-  CONNECT pd = 8 callref = 0xA7
*Mar  2 02:07:34.685: CCBRI_Go Fr L3 pkt (Len=4) :
*Mar  2 02:07:34.689: 7 1 27 91
*Mar  2 02:07:34.689:
*Mar  2 02:07:34.693: ISDN BR0: LIF_EVENT: ces/callid 1/0x8321 HOST_CONNECT
*Mar  2 02:07:34.693: %LINK-3-UPDOWN: Interface BRI0:2, changed state to up
*Mar  2 02:07:34.697: BR0:2 DDR: dialer_out_call_connected()
*Mar  2 02:07:34.709: %ISDN-6-CONNECT: Interface BRI0:1
is now connected to 8104 Kevin
*Mar  2 02:07:34.713: ISDN: get_isdn_service_state():
idb 0x2257C8 bchan 3 is_isdn 1 Not a Pri
*Mar  2 02:07:34.717: isdn_call_connect: Calling lineaction of BRI0:2
*Mar  2 02:07:34.717: BR0:2 PPP: Treating connection as a callout
*Mar  2 02:07:34.721: BR0:2 PPP: Phase is ESTABLISHING,
Active Open [0 sess, 0 load]
*Mar  2 02:07:34.725: BR0:2 PPP: No remote authentication for call-out
*Mar  2 02:07:34.729: BR0:2 LCP: O CONFREQ [Closed] id 9 Len 24
*Mar  2 02:07:34.729: BR0:2 LCP:    MagicNumber 0x05A78C7D
(0x050605A78C7D)
*Mar  2 02:07:34.733: BR0:2 LCP:    MRRU 1524 (0x110405F4)
*Mar  2 02:07:34.737: BR0:2 LCP:    EndpointDisc 1 krimson
(0x130A016B72696D736F6E)
*Mar  2 02:07:34.741: ISDN BR0: Event: Connected to 8104 on B2 at 64 Kb/s
*Mar  2 02:07:34.749: ISDN BR0: TX ->  CONNECT_ACK pd = 8 callref = 0x27
*Mar  2 02:07:34.789: BR0:2 LCP: I CONFREQ [REQsent] id 7 Len 27
*Mar  2 02:07:34.793: BR0:2 LCP:    AuthProto CHAP (0x0305C22305)
*Mar  2 02:07:34.797: BR0:2 LCP:    MagicNumber 0x61ADC967
(0x050661ADC967)
*Mar  2 02:07:34.797: BR0:2 LCP:    MRRU 1524 (0x110405F4)
*Mar  2 02:07:34.801: BR0:2 LCP:    EndpointDisc 1 Kevin
(0x1308016B6576696E)
*Mar  2 02:07:34.805: BR0:2 LCP: O CONFACK [REQsent] id 7 Len 27
*Mar  2 02:07:34.809: BR0:2 LCP:    AuthProto CHAP (0x0305C22305)
*Mar  2 02:07:34.813: BR0:2 LCP:    MagicNumber 0x61ADC967
(0x050661ADC967)
*Mar  2 02:07:34.817: BR0:2 LCP:    MRRU 1524 (0x110405F4)
*Mar  2 02:07:34.817: BR0:2 LCP:    EndpointDisc 1 Kevin
(0x1308016B6576696E)
*Mar  2 02:07:34.825: BR0:2 LCP: I CONFACK [ACKsent] id 9 Len 24
*Mar  2 02:07:34.825: BR0:2 LCP:    MagicNumber 0x05A78C7D
(0x050605A78C7D)
*Mar  2 02:07:34.829: BR0:2 LCP:    MRRU 1524 (0x110405F4)
*Mar  2 02:07:34.833: BR0:2 LCP:    EndpointDisc 1 krimson
(0x130A016B72696D736F6E)
*Mar  2 02:07:34.837: BR0:2 LCP: State is Open
*Mar  2 02:07:34.837: BR0:2 PPP: Phase is AUTHENTICATING,
by the peer [0 sess, 0 load]
*Mar  2 02:07:34.841: %LINEPROTO-5-UPDOWN: Line protocol on
Interface BRI0:1, changed state to up
*Mar  2 02:07:34.857: %LINEPROTO-5-UPDOWN: Line protocol on
Interface Virtual-Access1, changed state to up
*Mar  2 02:07:34.861: BR0:2 CHAP: I CHALLENGE id 7 Len 26 from "Kevin"
*Mar  2 02:07:34.873: BR0:2 CHAP: O RESPONSE id 7 Len 28 from "krimson"
*Mar  2 02:07:34.901: BR0:2 CHAP: I SUCCESS id 7 Len 4

!--- CHAP authentication is successful.
```

```
*Mar  2 02:07:34.905: BR0:2 PPP: Phase is VIRTUALIZED [0 sess, 0 load]
*Mar  2 02:07:34.909: Vi1 MLP: Added link BR0:2 to bundle Kevin
*Mar  2 02:07:35.905: %LINEPROTO-5-UPDOWN: Line protocol on Interface BRI0:2,
changed state to up
*Mar  2 02:07:40.709: %ISDN-6-CONNECT:
Interface BRI0:2 is now connected to 8104 Kevin

!--- The second link is now connected.
```

Debugs on the remote router show similar output. After the connection has been established, issue these **show** commands.

```
krimson#show spanning-tree

Bridge group 1 is executing the IEEE compatible Spanning Tree protocol
           Bridge Identifier has priority 1, address 0000.0c42.333e
           Configured hello time 2, max age 20, forward delay 15
           We are the root of the spanning tree

!--- Note that this router is the root of the spanning tree,
!--- because root priority has been changed to 1.
!--- This was specified through bridge 1 priority 1 command.

           Topology change flag not set, detected flag not set
           Number of topology changes 14 last change occurred 02:45:39 ago
                   from BRI0
           Times:  hold 1, topology change 35, notification 2
                   hello 2, max age 20, forward delay 15
           Timers: hello 1, topology change 0, notification 0, aging 300

 Port 2 (Ethernet0) of Bridge group 1 is forwarding
   Port path cost 100, Port priority 128, Port Identifier 128.2.
   Designated root has priority 1, address 0000.0c42.333e
   Designated bridge has priority 1, address 0000.0c42.333e
   Designated port id is 128.2, designated path cost 0
   Timers: message age 0, forward delay 0, hold 0
   Number of transitions to forwarding state: 2
   BPDU: sent 9250, received 1

 Port 3 (BRI0) of Bridge group 1 is forwarding
          Port path cost 15625, Port priority 128, Port Identifier 128.2.
   Designated root has priority 1, address 0000.0c42.333e
   Designated bridge has priority 1, address 0000.0c42.333e
   Designated port id is 128.3, designated path cost 0
   Timers: message age 0, forward delay 0, hold 0
   Number of transitions to forwarding state: 1
   BPDU: sent 8457, received 18

krimson#show arp
Protocol      Address        Age    (min)  Hardware Addr   Type   Interface
Internet      192.168.10.2             -   0000.0c42.333e  ARPA   Ethernet0

!--- ARP entry for the Ethernet 0 interface of krimson.

Internet      192.168.10.3             0   0000.0c4a.4314  ARPA   Ethernet0

!---  ARP entry for the Ethernet 0 interface of aneto.
```

At the same time, **show** commands on remote router show this output:

```
Kevin#show spanning-tree
  Bridge group 1 is executing the IEEE compatible Spanning Tree  protocol
```

```
   Bridge Identifier has priority 32768, address 0000.0c31.a599

!--- Root priority has not been changed and the default 32768 has been used.

   Configured hello time 2, max age 20, forward delay 15
   Current root has priority 1, address 0000.0c42.333e
   Root port is 3 (BRI0), cost of root path is 15625
   Topology change flag not set, detected flag not set
   Number of topology changes 22 last change occurred 00:05:42 ago
           from BRI0
   Times:  hold 1, topology change 35, notification 2
           hello 2, max age 20, forward delay 15
   Timers: hello 0, topology change 0, notification 0, aging 300

Port 2 (Ethernet0) of Bridge group 1 is forwarding

!--- Since there are no loops, all ports are forwarding.

Port path cost 100, Port priority 128, Port Identifier 128.2.
    Designated root has priority 1, address 0000.0c42.333e
    Designated bridge has priority 32768, address 0000.0c31.a599
    Designated  id is 128.2, designated path cost 15625
           Timers: message age 0, forward delay 0, hold 0
           Number of transitions to forwarding state: 1
    BPDU: sent 8761, received 36

Port 3 (BRI0) of Bridge group 1 is forwarding

!--- Since there are no loops all ports are forwarding.

Port path cost 15625, Port priority 128, Port Identifier 128.3.
    Designated root has priority 1, address 0000.0c42.333e
    Designated bridge has priority 1, address 0000.0c42.333e
    Designated port id is 128.3, designated path cost 0
    Timers: message age 2, forward delay 0, hold 0
    Number of transitions to forwarding state: 2
    BPDU: sent 198, received 8293

Kevin#show interface virtual-access 1
Virtual-Access1 is up, line protocol is up
  Hardware is Virtual Access interface
  MTU 1500 bytes, BW 128 Kbit, DLY 100000 usec,
  reliability 255/255, txload 5/255, rxload 1/255
  Encapsulation PPP, loopback not set
  Keepalive set (10 sec)
  DTR is pulsed for 5 seconds on reset
  Time to interface disconnect:  idle 02:46:38
  LCP Open, multilink Open
  Open: BRIDGECP, IPCP

!--- Bridge control protocol has been negotiated during PPP negotiation.

  Last input 00:00:00, output never, output hang never
  Last clearing of "show interface" counters 00:02:40
  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  0/11/16 (active/max active/max total)
     Reserved Conversations 0/0 (allocated/max allocated)
     Available Bandwidth 96 kilobits/sec
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 3000 bits/sec, 3 packets/sec
     91 packets input, 4303 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
     553 packets output, 91967 bytes, 0 underruns
```

```
     0 output errors, 0 collisions, 0 interface resets
     0 output buffer failures, 0 output buffers swapped out
     0 carrier transitions

Kevin#show arp
Protocol      Address        Age    (min)  Hardware Addr   Type   Interface
Internet      192.168.10.1             -   0000.0c31.a599  ARPA   Ethernet0

!--- ARP entry for the Ethernet 0 interface of Kevin.

Internet      192.168.10.4             0   00e0.1e68.9cdf  ARPA   Ethernet0

!---  ARP entry for the Ethernet 0 interface of posets.
```

On posets and aneto, issue these **show** commands:

```
aneto#show spanning-tree

Bridge group 1 is executing the IEEE compatible Spanning Tree protocol
  Bridge Identifier has priority 1, address 0000.0c4a.4314
  Configured hello time 2, max age 20, forward delay 15
  Current root has priority 1, address 0000.0c42.333e
  Root port is 2 (Ethernet0), cost of root path is 100
  Port Number size is 9
  Topology change flag not set, detected flag not set
  Times:  hold 1, topology change 35, notification 2
  hello 2, max age 20, forward delay 15
  Timers: hello 0, topology change 0, notification 0
  bridge aging time 300

Port 2 (Ethernet0) of Bridge group 1 is forwarding

!--- Ethernet port is forwarding.

   Port path cost 100, Port priority 128
   Designated root has priority 1, address 0000.0c42.333e
   Designated bridge has priority 1, address 0000.0c42.333e
   Designated port is 2, path cost 0
   Timers: message age 2, forward delay 0, hold 0
   BPDU: sent 78, received 9756

aneto# show arp
Protocol      Address        Age    (min)  Hardware Addr   Type   Interface
Internet      10.48.92.61              -   0000.0c07.ac0b  ARPA
Internet      192.168.10.2            14   0000.0c42.333e  ARPA   Ethernet0
Internet      192.168.10.3             -   0000.0c4a.4314  ARPA   Ethernet0
Internet      192.168.10.4            43   00e0.1e68.9cdf  ARPA   Ethernet0

!--- ARP entry for remote host posets.

Internet      10.48.74.1              312   00e0.1e68.9cdf  HDLC   Serial0
aneto#

posets#show arp
Protocol      Address        Age    (min)  Hardware Addr   Type   Interface
Internet      10.48.92.61              -   0000.0c07.ac0b  ARPA
Internet      192.168.10.3            43   0000.0c4a.4314  ARPA   Ethernet0

!--- ARP entry for remote host aneto.

Internet      192.168.10.1            13   0000.0c31.a599  ARPA   Ethernet0
Internet      192.168.10.4             -   00e0.1e68.9cdf  ARPA   Ethernet0
Internet      10.48.74.1               0   Incomplete      PPP

posets#show spanning-tree
```

```
Bridge group 1 is executing the IEEE compatible Spanning Tree protocol
  Bridge Identifier has priority 32768, address 00e0.1e68.9cdf
  Configured hello time 2, max age 20, forward delay 15
  Current root has priority 1, address 0000.0c42.333e
  Root port is 2 (Ethernet0), cost of root path is 15725
  Port Number size is 9
  Topology change flag not set, detected flag not set
  Times:  hold 1, topology change 35, notification 2
          hello 2, max age 20, forward delay 15
  Timers: hello 0, topology change 0, notification 0
  bridge aging time 300

Port 2 (Ethernet0) of Bridge group 1 is forwarding

!--- Ethernet port is forwarding.

   Port path cost 100, Port priority 128
   Designated root has priority 1, address 0000.0c42.333e
   Designated bridge has priority 32768, address 0000.0c31.a599
   Designated port is 2, path cost 15625
   Timers: message age 4, forward delay 0, hold 0
   BPDU: sent 2, received 9260
```

## Troubleshooting Commands

In addition to these **show** commands, (useful also for debugging purposes) use these **debug** commands to troubleshoot:

- **debug spanning−tree** enables you to debug spanning tree activities.
- **debug spanning−tree events** enables you to debug spanning tree activities, and to enable ternary content addressable memory (TCAM) event debugging.
- **debug ppp negotiation** enables you to check whether a connection successfully negotiates Link Control Protocol (LCP) and the applicable Network Control Protocols (for example, IP control protocol (IPCP), IPX control protocol (IPXCP), BridgeCP).
- **debug ppp authentication** enables you to check whether PPP authentication passes successfully. If you use a Cisco IOS Software Release prior to 11.2, use the **debug ppp chap** command.
- **debug ppp error** displays protocol errors and error statistics associated with PPP connection negotiation and operation.

# Related Information

- **Configuring Dialer Profiles to Bridge using ISDN**
- **Configuring Spanning Tree**
- **Transparent Bridging**
- **Access Products Support Pages**
- **Dial Technology Support Pages**
- **Technical Support − Cisco Systems**



Updated: Feb 04, 2010 Document ID: 16120