Configuring ISDN BRI

First Published: February 26, 2003
Last Updated: November 24, 2010

This module describes tasks that are required to use an Integrated Services Digital Network (ISDN) Basic Rate Interface (BRI) line. It provides an overview of the ISDN technologies currently available and describes features that you can configure in an ISDN BRI circuit-switched internetworking environment.

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the "Feature Information for Configuring ISDN BRI" section on page 41.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

Contents

Americas Headquarters:
Cisco Systems, Inc., 170 West Tasman Drive, San Jose, CA 95134-1706 USA

Information About ISDN BRI

The Cisco IOS software provides an enhanced Multiple ISDN Switch Types feature that allows you to apply an ISDN switch type to a specific ISDN interface and configure more than one ISDN switch type per router. This feature allows both ISDN BRI and ISDN PRI to run simultaneously on platforms that support both interface types. Cisco IOS software supports both the ISDN BRI and the ISDN PRI.

ISDN BRI provides two bearer (B) channels, each capable of transferring voice or data at 64 kb/s, and one 16 kb/s data (D) signaling channel, which is used by the telephone network to carry instructions about how to handle each of the B channels. ISDN BRI (also referred to as 2 B + D) provides a maximum transmission speed of 128 kb/s, but many users use only half the available bandwidth. This section covers the following topics:

Requesting BRI Line and Switch Configuration from a Telco Service Provider

Before configuring ISDN BRI on your Cisco router, you must order a correctly configured ISDN line from your telecommunications service provider. This process varies from provider to provider on a national and international basis. However, some general guidelines follow:

- Ask for two channels to be called by one number.
- Ask for delivery of calling line identification. Providers sometimes call this CLI or automatic number identification (ANI).
- Ask for a point-to-point service and a data-only line if the router will be the only device attached to the BRI.
- Ask for point-to-multipoint service (subaddressing is required) and a voice-and-data line if the router will be attached to an ISDN bus (to which other ISDN devices might be attached).

When you order ISDN service for switches used in North America, request the BRI switch configuration attributes specified in Table 1.

Table 1 North American ISDN BRI Switch Type Configuration Information

Switch Type	Configuration
DMS-100 BRI Custom	2 B channels for voice and data. 2 directory numbers assigned by service provider. 2 service profile identifiers (SPIDs) required; assigned by service provider. Functional signaling. Dynamic terminal endpoint identifier (TEI) assignment. Maximum number of keys = 64. Release key = no, or key number = no. Ringing indicator = no. EKTS = no. PVC = 2. Request delivery of calling line ID on Centrex lines. Set speed for ISDN calls to 56 kb/s outside local exchange. Directory number 1 can hunt to directory number 2.

Table 1 North American ISDN BRI Switch Type Configuration Information (continued)

Switch Type	Configuration
5ESS Custom BRI	**For Data Only** 2 B channels for data. Point to point. Terminal type = E. 1 directory number (DN) assigned by service provider. MTERM = 1. Request delivery of calling line ID on Centrex lines. Set speed for ISDN calls to 56 kb/s outside local exchange. **For Voice and Data** (Use these values only if you have an ISDN telephone connected.) 2 B channels for voice or data. Multipoint. Terminal type = D. 2 directory numbers assigned by service provider. 2 SPIDs required; assigned by service provider. MTERM = 2. Number of call appearances = 1. Display = No. Ringing/idle call appearances = idle. Autohold = no. Onetouch = no. Request delivery of calling line ID on Centrex lines. Set speed for ISDN calls to 56 kb/s outside local exchange. Directory number 1 can hunt to directory number 2.
5ESS National ISDN (NI) BRI	Terminal type = A. 2 B channels for voice and data. 2 directory numbers assigned by service provider. 2 SPIDs required; assigned by service provider. Set speed for ISDN calls to 56 kb/s outside local exchange. Directory number 1 can hunt to directory number 2.
EZ-ISDN 1	**For Voice and Data** • ISDN Ordering Code for Cisco 766/776 Series = Capability S • ISDN Ordering Code for Cisco 1604 Series = Capability R 2 B channels featuring alternate voice and circuit-switched data. Non-EKTS voice features include the following: • Flexible Calling • Call Forwarding Variable • Additional Call Offering • Calling Number Identification (includes Redirecting Number Delivery)

Interface Configuration

The Cisco IOS software also provides custom features for configuring the ISDN BRI interface. The interface provides capabilities like call screening, called party-number verification, and ISDN default cause code override. For European and Australian customers, the interface provides Dialed Number Identification Service (DNIS)-plus-ISDN-subaddress binding to allow multiple binds between a dialer profile and an ISDN B channel.

Multiple ISDN Switch Types Feature

The Cisco IOS software provides an enhanced Multiple ISDN Switch Types feature that allows you to apply an ISDN switch type to a specific ISDN interface and configure more than one ISDN switch type per router. This feature allows both ISDN BRI and ISDN PRI to run simultaneously on platforms that support both interface types.

This section covers the following topics:

Dynamic Multiple Encapsulations

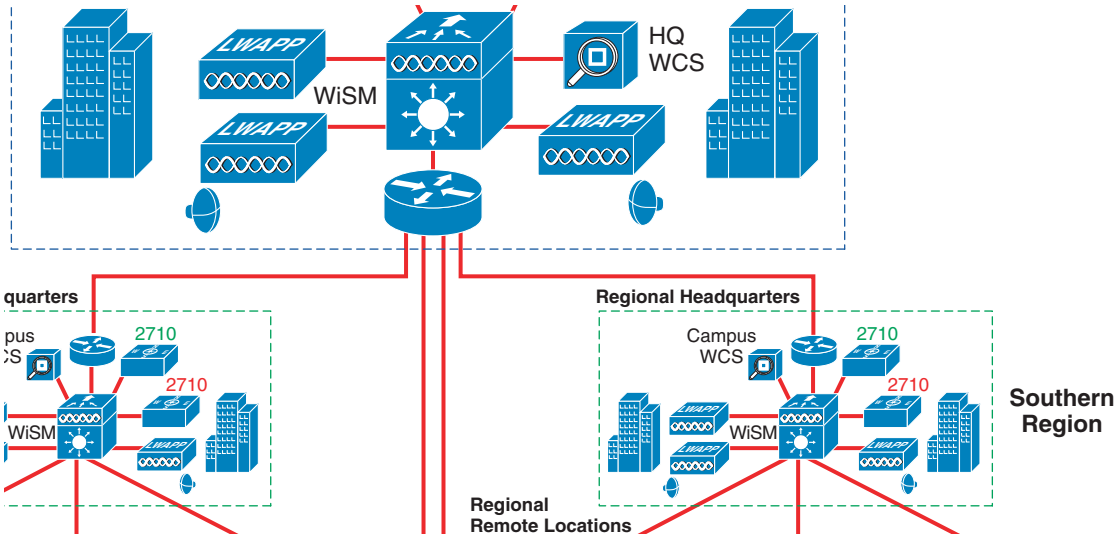
Prior to Cisco IOS Release 12.1, encapsulation techniques such as Frame Relay, High-Level Data Link Control (HDLC), Link Access Procedure, Balanced-Terminal Adapter (LAPB-TA), and X.25 could support only one ISDN B-channel connection over the entire link. HDLC and PPP could support multiple B channels, but the entire ISDN link needed to use the same encapsulation. The Dynamic Multiple Encapsulations feature introduced in Cisco IOS Release 12.1 allows various encapsulation types and per-user configurations on the same ISDN B channel at different times depending on the type of incoming call.

With the Dynamic Multiple Encapsulations feature, once calling line identification (CLID) binding is completed, the topmost interface is always used for all configuration and data structures. The ISDN B channel becomes a forwarding device, and the configuration on the D channel is ignored, thereby allowing the different encapsulation types and per-user configurations. Dynamic multiple encapsulations provide support for packet assembler/disassembler (PAD) traffic and X.25 encapsulated and switched packets. For X.25 encapsulations, the configurations reside on the dialer profile.

Dynamic multiple encapsulation is especially important in Europe, where ISDN is relatively expensive and the maximum use of all the 30 B channels on the same ISDN link is desirable. Further, the feature removes the need to statically dedicate channels to a particular encapsulation and configuration type, and improves channel usage.

Figure 1 shows a typical configuration for an X.25 network in Europe. The Dynamic Multiple Encapsulations feature allows the use of all the 30 B channels, and supports calls that originate in diverse areas of the network and converge on the same ISDN PRI.

Figure 1 European X.25 Network



Interface Configuration Options

You can also optionally configure the snapshot routing for the ISDN interfaces. Snapshot routing is a method of dynamically learning remote routes and keeping the routes available for a specified period of time, even though routing updates are not exchanged during that period.

To place calls on an ISDN interface, you must configure the interface with dial-on-demand routing (DDR). For configuration information about ISDN by using DDR, see the "Dial-on-Demand Routing Configuration" part of this publication. For command information, refer to the *Cisco IOS Dial Technologies Command Reference*.

To configure the bandwidth on demand, see the modules "Configuring Legacy DDR Spokes" or "Configuring Legacy DDR Hubs" in the *Cisco IOS Dial Solutions Configuration Guide*.

ISDN Cause Codes

A cause code is an information element (IE) that indicates why an ISDN call failed or was disconnected. When the originating gateway receives a Release Complete message, it generates a tone corresponding to the cause code in the message.

Table 2 lists the default cause codes that the VoIP (Voice over IP) gateway sends to the switch when a call fails at the gateway, and the corresponding tones that it generates.

Table 2 Cause Codes Generated by the Cisco VoIP Gateway

Cause Code	Description	Explanation	Tone
1	Unallocated (unassigned) number	The ISDN number is not assigned to any destination equipment.	Reorder
3	No route to destination	The call was routed through an intermediate network that does not serve the destination address.	Reorder
16	Normal call clearing	Normal call clearing has occurred.	Dial

Table 2 Cause Codes Generated by the Cisco VoIP Gateway (continued)

Cause Code	Description	Explanation	Tone
17	User busy	The called system acknowledged the connection request but was unable to accept the call because all B channels were in use.	Busy
19	No answer from user (user alerted)	The destination responded to the connection request but failed to complete the connection within the prescribed time. The problem is at the remote end of the connection.	Reorder
28	Invalid number format	The connection could not be established because the destination address was presented in an unrecognizable format or because the destination address was incomplete.	Reorder
34	No circuit/channel available	The connection could not be established because no appropriate channel was available to take the call.	Reorder

For a complete list of ISDN cause codes that are generated by the switch, refer to "Appendix B: ISDN Switch Types, Codes and Values" in the *Cisco IOS Debug Command Reference*.

Although the VoIP gateway generates the cause codes listed in Table 2 by default, there are commands introduced in previous Cisco IOS releases that can override these defaults, thereby allowing the gateway to send different cause codes to the switch. The following commands override the default cause codes:

- **isdn disconnect-cause**—Sends the specified cause code to the switch when a call is disconnected.
- **isdn network-failure-cause**—Sends the specified cause code to the switch when a call fails because of internal network failures.
- **isdn voice-call-failure**—Sends the specified cause code to the switch when an inbound voice call fails with no specific cause code.

When you implement these commands, the configured cause codes are sent to the switch; otherwise, the default cause codes of the voice application are sent. For a complete description of these commands, refer to the *Cisco IOS Dial Technologies Command Reference*.

How to Configure ISDN BRI

To configure ISDN lines and interfaces, perform the following tasks:

- Configuring the ISDN BRI Switch, page 7 (required)
- Specifying Interface Characteristics for an ISDN BRI, page 10 (required)
- Configuring ISDN Semipermanent Connections, page 29 (required)
- Configuring ISDN BRI for Leased-Line Service, page 31 (required)
- Monitoring and Maintaining ISDN Interfaces, page 33 (optional)
- Troubleshooting ISDN Interfaces, page 34 (optional)

See the Monitoring and Maintaining ISDN Interfaces sections on page 452 and the "Troubleshooting ISDN Interfaces" section on page 453 in this module for tips on maintaining your network. See the section "Configuration Examples for Configuring ISDN BRI" section on page 455 for sample configurations.

To configure ISDN BRI for voice, video, and fax applications, refer to the *Cisco IOS Voice, Video, and Fax Applications Configuration Guide*.

Configuring the ISDN BRI Switch

To configure the ISDN switch type, perform the following tasks:

- Configuring the Switch Type, page 7 (required)
- Checking and Setting the Buffers, page 8 (required)
- Configuring Buffers and MTU Size, page 9 (required)

Configuring the Switch Type

Perform this task to configure the switch type.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **isdn switch-type** *switch-type*
4. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**isdn switch-type** *switch-type* **Example:** `Router(config)# isdn switch-type basic-ni`	Selects the service provider switch type. See Table 3 for valid switch type keywords.
Step 4	**end** **Example:** `Router(config# end`	Exits global configuration mode.

The "Example: Configuring a Global ISDN and BRI Interface Switch Type" section on page 454 provides an example of configuring the ISDN BRI switch.

Table 3 lists the ISDN BRI service provider switch type keywords.

Table 3 ISDN Service Provider BRI Switch Types

Switch Type Keywords	Description/Use	Central Office (CO) Switch Type?
Voice/PBX Systems		
basic-qsig	PINX (PBX) switch with QSIG signaling per Q.931	
Australia, Europe, and UK		
basic-1tr6	German 1TR6 ISDN switch	Yes
basic-net3	NET3 ISDN BRI for Norway NET3, Australia NET3, and New Zealand NET3 switches; covers ETSI-compliant Euro-ISDN E-DSS1 signaling system	Yes
vn3	French VN3 ISDN BRI switch	Yes
Japan		
ntt	Japanese NTT ISDN BRI switch	
North America		
basic-5ess	Lucent (AT&T) basic rate 5ESS switch	Yes
basic-dms100	Nortel basic rate DMS-100 switch	Yes
basic-ni	National ISDN switch	Yes
All Users		
none	No switch defined	

Note The command parser will still accept the following switch type keywords: **basic-nwnet3**, **vn2**, and **basic-net3**; however, when viewing the NVRAM configuration, the **basic-net3** and **vn3** switch type keywords are displayed respectively.

Checking and Setting the Buffers

When configuring a BRI interface, after the system starts up, make sure that the free list of the buffer pool has enough buffers that match the maximum transmission unit (MTU) of your BRI interface. If not, you must reconfigure buffers in order for the BRI interfaces to function properly.

Perform this task to check the MTU size and buffers.

SUMMARY STEPS

1. **enable**
2. **show interfaces bri** *number*
3. **show buffers**
4. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router# enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**show interfaces bri** *number* **Example:** `Router# show interfaces bri 0`	Displays the MTU size.
Step 3	**show buffers** **Example:** `Router# show buffers`	Displays the free buffers.
Step 4	**end** **Example:** `Router# end`	Exits privileged EXEC configuration mode.

Configuring Buffers and MTU Size

Perform this task to configure the buffers and the MTU size.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **buffers** {{**header** | **fastswitching** | *interface number* | **small** | **middle** | **big** | **verybig** | **large** | **huge** {**initial** | **max-free** | **min-free** | **permanent**} **buffers**} | **particle-clone** *particle-clones* | **element** {**minimum** | **permanent**} **elements**}
4. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**buffers** {{**header** | **fastswitching** | *interface number* | **small** | **middle** | **big** | **verybig** | **large** | **huge** {**initial** | **max-free** | **min-free** | **permanent**} **buffers**} | **particle-clone** *particle-clones* | **element** {**minimum** | **permanent**} **elements**} **Example:** `Router(config)# buffers big`	Configures the size of the buffer and the initial public buffer pool settings.
Step 4	**end** **Example:** `Router# end`	Exits global configuration mode.

Specifying Interface Characteristics for an ISDN BRI

Perform the following tasks to set interface characteristics for an ISDN BRI interface irrespective of whether it is the only BRI in a router or is one of many. Each of the BRIs can be configured separately.

Specifying the Interface and Its IP Address

Perform this task to enter interface configuration mode and specify an ISDN BRI.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** bri *number*
4. **ip address** *address mask*
5. **end**

DETAILED STEPS

	Command	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.

Step 3	**interface bri** *number*
	
	Example:
	`Router(config)# interface bri 0`
	
	Cisco 7200 series router only
	`Router(config)# interface bri slot/port`
		Specifies the interface and enters interface configuration mode.

Step 4	**ip address** *address mask* **Example:** `Router(config-if)# ip address ip 209.165.200.225 255.255.255.224`	Specifies an IP address for the interface.
Step 5	**end** **Example:** `Router# end`	Exits interface configuration mode.

Specifying ISDN SPIDs

Some service providers use service profile identifiers (SPIDs) to define the services subscribed to by the ISDN device that is accessing the ISDN service provider. The service provider assigns the ISDN device one or more SPIDs when you first subscribe to the service. If you are using a service provider that requires SPIDs, your ISDN device cannot place or receive calls until it sends a valid, assigned SPID to the service provider when accessing the switch to initialize the connection.

Currently, only the DMS-100 and NI switch types require SPIDs. The AT&T 5ESS switch type may support a SPID, but we recommend that you set up the ISDN service without SPIDs. In addition, SPIDs have significance only at the local access ISDN interface. Remote routers never receive the SPID.

A SPID is usually a seven-digit telephone number with some optional numbers. However, service providers may use different numbering schemes. The DMS-100 switch type has two SPIDs — one for each B channel.

The **isdn spid1** and **isdn spid2** commands enable the router to define the SPIDs and the local directory number (LDN) on the router.

SUMMARY STEPS

1. **enable**

2. **configure terminal**
3. **interface bri** *number*
4. **isdn spid1** *word*
5. **isdn spid2** *word*
6. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**interface bri** *number* **Example:** `Router(config)# interface BRI 0`	Specifies the interface and begins interface configuration mode.
Step 4	**isdn spid1** *word* **Example:** `Router(config-if)# isdn spid1 415988488201`	Specifies a SPID and a name for the B1 channel.
Step 5	**isdn spid2** *word* **Example:** `Router(config-if)# isdn spid2 415988488302`	Specifies a SPID and a name for the B2 channel.
Step 6	**end** **Example:** `Router# end`	Exits interface configuration mode and returns to global configuration mode.

The LDN is optional but might be necessary if the router is to answer calls made to the second directory number.

Configuring Encapsulation on ISDN BRI

Each ISDN B channel is treated as a synchronous serial line, and the default serial encapsulation is HDLC. The Dynamic Multiple Encapsulations feature allows incoming calls over ISDN to be assigned an encapsulation type such as Frame Relay, PPP, and X.25, based on CLID or DNIS. PPP encapsulation is configured for most ISDN communication.

Perform this task to configure encapsulation on the ISDN BRI.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface bri** *number*
4. **encapsulation** [**ppp** | **lapb** | **hdlc** | **x25**]
5. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**interface bri** *number* **Example:** `Router(config)# interface BRI 0`	Specifies the interface and enters interface configuration mode.
Step 4	**encapsulation** [**ppp** | **lapb** | **hdlc** | **x25**] **Example:** `Router(config-if)# encapsulation ppp`	Configures the encapsulation type.
Step 5	**end** **Example:** `Router(config-if)# end`	Exits interface configuration mode and returns to global configuration mode.

Verifying the Dynamic Multiple Encapsulations Feature

To verify dialer interfaces configured for binding and to see statistics on each physical interface bound to the dialer interface, use the **show interfaces** command.

The following example shows that the output under the B channel keeps all the hardware counts that are not displayed under any logical or virtual access interface. The line in the report that states “Interface is bound to Dialer0 (Encapsulation LAPB)” indicates that this B interface is bound to the dialer 0 interface and that the encapsulation running over this connection is LAPB, not PPP, which is the encapsulation configured on the D interface and inherited by the B channel.

```
Router# show interfaces :1

:1 is up, line protocol is up
  Hardware is BRI
  MTU 1500 bytes, BW 64 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation PPP, loopback not set, keepalive not set
  Interface is bound to Dialer0 (Encapsulation LAPB)
```

```
LCP Open, multilink Open
Last input 00:00:31, output 00:00:03, 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, 1 packets/sec
5 minute output rate 0 bits/sec, 1 packets/sec
   110 packets input, 13994 bytes, 0 no buffer
   Received 91 broadcasts, 0 runts, 0 giants, 0 throttles
   0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
   135 packets output, 14175 bytes, 0 underruns
   0 output errors, 0 collisions, 12 interface resets
   0 output buffer failures, 0 output buffers swapped out
   8 carrier transitions
```

Any protocol configuration and states should be displayed from the dialer interface 0.

Encapsulation Configuration Notes

The router might need to communicate with devices that require a different encapsulation protocol or the router might send traffic over a Frame Relay or X.25 network. The Dynamic Multiple Encapsulations feature provides bidirectional support of all serial encapsulations except Frame Relay.

To configure the router for automatic detection of encapsulation type on incoming calls, or to configure encapsulation for Cisco 700 and 800 series (formerly Combined) router compatibility, see the section "Configuring Automatic Detection of Encapsulation Type" in the module "Configuring ISDN Special Signaling" in this publication.

Configuring Network Addressing

Perform this task to configure network addressing.

This task supports the primary goals of network addressing:

- Define the packets that are interesting and those that will cause the router to make an outgoing call.
- Define the remote host where the calls are going.
- Specify whether broadcast messages will be sent.
- Specify the dialing string to be used in the call.

Intermediate steps that use shared argument values tie the host identification and dial string to the interesting packets to be sent to that host.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface bri** *number*
4. **dialer map** *protocol-keyword protocol-next-hop-address* **name** *hostname* **speed** [**56** | **64**] *dial-string*[**:***isdn-subaddress*]

   or

   dialer map *protocol next-hop-address* **name** *hostname* **spc** [**speed 56** | **64**] [**broadcast**] *dial-string*[**:***isdn-subaddress*]
5. **dialer-group** *group-number*

6. **exit**
7. **dialer-list** *dialer-group* **protocol** *protocol-name* {**permit** | **deny** | **list** *access-list-numbe*r | *access-group*}
8. **access-list** *access-list-number* {**deny** | **permit**} *protocol source address source-mask destination destination-mask*
9. end

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**interface bri** *number* **Example:** `Router(config)# interface BRI 0`	Specifies the interface and begins interface configuration mode.

Step 4	**dialer map** *protocol-keyword protocol-next-hop-address* **name** *hostname* **speed** [**56** | **64**] *dial-string*[**:***isdn-subaddress*]
	
	Example:
	`Router(config-if)# dialer map 172.19.1.8 name abc speed 64 zzz 14155550134`
	
	or
	
	dialer map *protocol next-hop-address* **name** *hostname* **spc** [**speed 56** | **64**] [**broadcast**] *dial-string*[**:***isdn-subaddress*]
	
	Example:
	`Router(config-if)# dialer map ip 172.16.0.0 name user1 spc 64 broadcast zzz 14155550134`
	
	or
	
	Example:
	`Router (config-if)# dialer map ip 172.16.0.0 name user2 spc 64 broadcast yyyy 14155550134`
		(Most locations) Configures a serial interface or ISDN interface to call one or multiple sites or to receive calls from multiple sites.
		
		(Germany) Uses the command keyword that enables ISDN semipermanent connections.

Step 5	**dialer-group** *group-number* **Example:** `Router(config-if)# dialer-group 1`	Assigns the interface to a dialer group to control access to the interface.
Step 6	**exit** **Example:** `Router(config-if)# exit`	Exits to global configuration mode.

	Command or Action	Purpose
Step 7	**dialer-list** *dialer-group* **protocol** *protocol-name* {**permit** | **deny** | **list** *access-list-number* |*access-group*} **Example:** `Router(config)# dialer-list 1 protocol ip list 101`	Defines a dial-on-demand routing (DDR) dialer list for dialing by protocol or by a combination of a protocol and an access list.
Step 8	**access-list** *access-list-number* {**deny** | **permit**} *protocol source address source-mask destination destination-mask* **Example:** `Router(config)# access-list 202 deny ip 192.0.2.0 255.255.255.224 192.0.2.3 255.255.255.224`	Defines an access list permitting or denying access to specified protocols, sources, or destinations. Permitted packets cause the router to place a call to the destination protocol address.
Step 9	**exit** **Example:** `Router(config)# exit`	Exits global configuration mode.

German networks allow semipermanent connections between customer routers with BRIs and the 1TR6 basic rate switches in the exchange. Semipermanent connections are less expensive than leased lines.

Note The access list reference in Step 8 of this task is an example of the **access-list** commands allowed by different protocols. Some protocols might require a different command form or might require multiple commands. Refer to the relevant protocol module in the network protocol configuration guide (the *Cisco IOS Novell IPX Configuration Guide*, for example) for more information about setting up access lists for a protocol.

For more information about defining outgoing call numbers, see the modules "Configuring Legacy DDR Hubs" and "Configuring Legacy DDR Spokes" in the *Cisco IOS Dial Solutions Configuration Guide*.

Configuring TEI Negotiation Timing

Perform this task to configure terminal endpoint identifier (TEI) negotiation timing.

The **isdn tei** command enables the router to apply the TEI negotiation to a specific BRI interface.

You can configure the ISDN TEI negotiation on individual ISDN interfaces. The TEI negotiation is useful for switches that may deactivate Layers 1 or 2 when there are no active calls. Typically, this setting is used for ISDN service offerings in Europe and connections to DMS-100 switches that are designed to initiate the TEI negotiation.

By default, TEI negotiation occurs when the router is powered up. The TEI negotiation value configured on an interface overrides the default or global TEI value. For example, if you configure **isdn tei first-call** globally and **isdn tei powerup** on BRI interface 0, then the TEI negotiation **powerup** is the value applied to BRI interface 0. It is not necessary to configure TEI negotiation unless you wish to override the default value (**isdn tei powerup**).

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface bri** *number*
4. **isdn tei** [**first-call** | **powerup** | **preserve** | **remove**]
5. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**interface bri** *number* **Example:** `Router(config)# interface BRI 0`	Specifies the interface and begins interface configuration mode.
Step 4	**isdn tei** [**first-call** | **powerup** | **preserve** | **remove**] **Example:** `Router(config-if)# isdn tei first-call`	Determines when ISDN TEI negotiation occurs.
Step 5	**end** **Example:** `Router(config-if)# exit`	Exits interface configuration mode and returns to global configuration mode.

Configuring CLI Screening

Perform this task to configure CLI screening.

CLI screening adds a level of security by allowing you to screen incoming calls. You can verify that the calling line ID is from an expected origin. CLI screening requires a local switch that is capable of delivering the CLI to the router.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface bri** *number*
4. **isdn caller** *word*

5. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**interface bri** number Example: `Router(config)# interface BRI 0`	Specifies the interface and enters interface configuration mode.
Step 4	**isdn caller** *word* **Example:** `Router(config-if)# isdn caller 415988488201`	Configures caller ID screening.
Step 5	**end** **Example:** `Router(config-if)# end`	Exits interface configuration mode and returns to global configuration mode.

Note If caller ID screening is configured and the local switch does not deliver caller IDs, the router rejects all calls.

Note In releases prior to Cisco IOS Release 12.1, ISDN accepted all synchronous calls and performed some minimal CLI screening before accepting or rejecting a call. Beginning with Cisco IOS Release 12.1, DDR provides a separate process that screens for the profile of the caller. The new screening process also checks that enough resources are available to accept the call and that the call conforms to predetermined rules. When the call is found acceptable, the screening process searches for a matching profile for the caller. The call is accepted only when there is a matching profile.

Configuring Called-Party Number Verification

Perform this task to configure called-party number verification.

When multiple devices are attached to an ISDN BRI, you can ensure that only a single device answers an incoming call by verifying the number or subaddress in the incoming call against the configured number or subaddress or both of the device.

You can specify that the router verifies the called-party number or subaddress number in the incoming setup message for ISDN BRI calls, if the number is delivered by the switch. You can do so by configuring the number that is allowed.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface bri** *number*
4. **isdn answer1** [*called-party-number*] [**:***subaddress*]
5. **isdn answer2** [*called-party-number*] [**:***subaddress*]
6. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**interface bri** *number* **Example:** `Router(config)# interface BRI 0`	Specifies the interface and begins interface configuration mode.
Step 4	**isdn answer1** [*called-party-number*] [**:***subaddress*] **Example:** `Router(config-if)# isdn answer1 [123][:56789]`	Specifies that the router verify a called-party number or subaddress number in the incoming setup message.
Step 5	**isdn answer2** [*called-party-number*] [**:***subaddress*] **Example:** `Router(config-if)# isdn answer2 [567][:45903]`	Specifies that the router verify a second called-party number or subaddress number in the incoming setup message.
Step 6	**end** **Example:** `Router(config-if)# end`	Exits interface configuration mode and returns to global configuration mode.

Verifying the called-party number ensures that only the desired router responds to an incoming call. If you want to allow an additional number for the router, you can configure it, too.

Configuring ISDN Calling Number Identification

A router with an ISDN BRI interface might need to supply the ISDN network with a billing number for outgoing calls. Some networks offer better pricing on calls that display the number. When configured, this information is included in the outgoing call Setup message.

Perform this task to configure the interface to identify the billing number.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface bri** *number*
4. **isdn calling-number** *word*
5. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**interface bri** *number* **Example:** `Router(config)# interface BRI 0`	Specifies the interface and enters interface configuration mode.
Step 4	**isdn calling-number** *word* **Example:** `Router(config-if)# isdn calling-number 415988488201`	Specifies the calling party number.
Step 5	**end** **Example:** `Router(config-if)# end`	Exits interface configuration mode and returns to global configuration mode.

The **isdn calling-number** command can be used with all switch types except German 1TR6 ISDN BRI switches.

Configuring the Line Speed for Calls Not ISDN End to End

Perform this task to configure the line speed for calls that are not ISDN from end to end.

When calls are made at 56 kb/s but delivered by the ISDN network at 64 kb/s, the incoming data can get corrupted. However, on ISDN calls, if the receiving side is informed that the call is not an ISDN call from end to end, the ISDN network can set the line speed for the incoming call.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface bri** *number*
4. **isdn not-end-to-end** {**56** | **64**}
5. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**interface bri** *number* **Example:** `Router(config)# interface BRI 0`	Specifies the interface and enters interface configuration mode.
Step 4	**isdn not-end-to-end** {**56** | **64**} **Example:** `Router(config-if)# isdn not-end-to-end 56`	Sets the speed to be used for incoming calls recognized as not ISDN end to end.
Step 5	**end** **Example:** `Router(config-if)# end`	Exits interface configuration mode and returns to global configuration mode.

Configuring a Fast Rollover Delay

Perform this task to configure a fast rollover delay.

Sometimes a router attempts to dial a call on an ISDN B channel before the previous call is completely torn down. The fast rollover fails because the second call is made to a different number before the B channel is released from the unsuccessful call. This failure might occur in the following ISDN configurations:

- The two B channels of the BRI are not configured as a hunt group, but have separate numbers defined.
- The B channel is not released by the ISDN switch until after Release Complete signal is processed.

You need to configure this delay if a BRI on a remote peer has two phone numbers configured one for each B channel you are dialing into this BRI. You also need to configure this delay if you have a dialer map for each phone number and the first call succeeds but a second call fails with no channel available.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface bri** *number*
4. **isdn fast-rollover-delay** *seconds*
5. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**interface bri** *number* **Example:** `Router(config)# interface BRI 0`	Specifies the interface and begins interface configuration mode.
Step 4	**isdn fast-rollover-delay** *seconds* **Example:** `Router(config-if)# isdn fast-rollover-delay 56`	Defines a fast rollover delay.
Step 5	**end** **Example:** `Router(config-if)# end`	Exits interface configuration mode and returns to global configuration mode.

A delay of 5 seconds should cover most cases. Configure sufficient delay to ensure the ISDN RELEASE_COMPLETE message has been sent or received before making the fast rollover call. Use the **debug isdn q931** command to display this information. This pattern of failed second calls is a rare occurrence.

Overriding ISDN Application Default Cause Codes

Perform this task to override ISDN application default cause codes.

The ISDN Cause Code Override function is useful for overriding the default cause code of ISDN applications. When this feature is implemented, the configured cause code is sent to the switch; otherwise, default cause codes of the application are sent.

SUMMARY STEPS

1. **enable**

2. **configure terminal**
3. **interface bri** *number*
4. **isdn disconnect-cause** {*cause-code-number* | **busy** | **not-available**}
5. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**interface bri** *number* **Example:** `Router(config)# interface BRI 0`	Specifies the interface and begins interface configuration mode.
Step 4	**isdn disconnect-cause** {*cause-code-number* | **busy** | **not-available**} **Example:** `Router(config-if)# isdn disconnect-cause not-available`	Specifies the ISDN cause code to be sent to the switch.
Step 5	**end** **Example:** `Router(config-if)# end`	Exits interface configuration mode and returns to global configuration mode.

Examples

The following example sends a BUSY cause code to the switch when an application fails to complete the call:

```
interface serial 0:23
 isdn disconnect-cause busy
```

Verifying ISDN Cause Code Override

To verify that the ISDN Cause Code Override feature is operating correctly, enter the **debug q931** command. The **debug q931** command displays a report of any configuration irregularities.

Configuring Inclusion of the Sending Complete Information Element

Perform this task to configure inclusion of the sending complete information element. In some geographic locations, such as Hong Kong and Taiwan, ISDN switches require that the Sending Complete information element be included in the outgoing Setup message to indicate that the entire number is included. This information element is generally not required in other locations.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface bri** *number*
4. **isdn sending-complete**
5. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**interface bri** *number* **Example:** `Router(config)# interface BRI 0`	Specifies the interface and enters interface configuration mode.
Step 4	**isdn sending-complete** **Example:** `Router(config-if)# isdn sending-complete`	Includes the Sending Complete information element in the outgoing call Setup message.
Step 5	**end** **Example:** `Router(config-if)# end`	Exits interface configuration mode and returns to global configuration mode.

Configuring DNIS-plus-ISDN-Subaddress Binding

Perform this task to configure DNIS-plus-ISDN-subaddress binding.

SUMMARY STEPS

1. **enable**
2. **configure terminal**

3. **dialer called** *dnis*:*subaddress*
4. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**dialer called** *dnis*:*subaddress* **Example:** `Router(config)# dialer called 12345:6789`	Binds a DNIS to an ISDN subaddress.
Step 4	**end** **Example:** `Router(config)# end`	Exits global configuration mode.

Note The **dialer called** command allows multiple binds between a dialer profile and an ISDN B channel. The configuration requires an ISDN subaddress, which is used in Europe and Australia.

See the section "Example: DNIS-plus-ISDN-Subaddress Binding" on page 458 in this module for a configuration example.

Screening Incoming V.110 Modem Calls

Perform this task to screen incoming V.110 modem calls. You can screen incoming V.110 modem calls and reject calls that do not have the communications settings configured according to the network.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface bri** *number*
4. **isdn v110 only** [**databits** {**5** | **7** | **8**}] [**parity** {**even** | **mark** | **none** | **odd** | **space**}] [**stopbits** {**1** | **1.5** | **2**}]
5. **end**

DETAIL ED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**interface bri** *number* **Example:** `Router(config)# interface BRI 0`	Specifies the interface and enters interface configuration mode.
Step 4	**isdn v110 only** [**databits** {**5** | **7** | **8**}] [**parity** {**even** | **mark** | **none** | **odd** | **space**}] [**stopbits** {**1** | **1.5** | **2**}] **Example:** `Router(config-if)# isdn v110 only databits 8 parity none stopbits 1`	Selectively accepts incoming V.110 calls based on data bit, parity, and stop bit modem communication settings.
Step 5	**end** **Example:** `Router(config)# end`	Exits global configuration mode.

Disabling V.110 Padding

Perform this task to disable V.110 padding. In networks with devices such as terminal adapters (TAs) and global system for mobile communication (GSM) handsets that do not fully conform to the V.110 modem standard, you will need to disable V.110 padding.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface bri** *number*
4. **no isdn v110 padding**
5. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**interface bri** *number* **Example:** `Router(config)# interface BRI 0`	Specifies the interface and enters interface configuration mode.
Step 4	**no isdn v110 padding** **Example:** `Router(config-if)# no isdn v110 padding`	Disables the padded modem speed report required by the V.110 modem standard.
Step 5	**end** **Example:** `Router(config)# end`	Exits interface configuration mode and returns to global configuration mode.

Configuring ISDN Semipermanent Connections

German networks allow semipermanent connections between customer routers with BRI interfaces and the 1TR6 basic rate switches in the exchange. Australian networks allow semipermanent connections between ISDN PRI interfaces and the TS-014 primary rate switches in the exchange. Semipermanent connections are better priced than leased lines.

Configuring BRI interfaces for semipermanent connection requires only a keyword that indicates the semipermanent connections when you are setting up network addressing as described in the previous section of this module.

To configure a BRI for semipermanent connections, follow this procedure:

Step 1 Set up the ISDN lines and ports as described in the sections "Configuring the ISDN BRI Switch" and "Specifying Interface Characteristics for an ISDN BRI". For ISDN PRI, see the section "How to Configure ISDN PRI" in the module "Configuring ISDN PRI".

Step 2 Configure DDR on a selected interface, as described in the "Dial-on-Demand Routing Configuration" part of this publication.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface bri** *number*

4. **dialer map** *protocol next-hop-address* **name** *hostname* **spc** [**speed 56** | **64**] [**broadcast**] *dial-string*[**:***isdn-subaddress*]
5. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**interface bri** *number* **Example:** `Router(config)# interface BRI 0`	Specifies the interface and begins interface configuration mode.
Step 4	**dialer map** *protocol next-hop-address* **name** *hostname* **spc [speed 56 | 64]** [**broadcast**] *dial-string*[**:***isdn-subaddress*] **Example:** `Router(config-if)# dialer map ip 172.19.1.8 name user1 spc 64 [broadcast] zzz 14155550134`	Defines the remote recipient's protocol address, host name, and dialing string; indicates semipermanent connections; optionally, provides the ISDN subaddress; and sets the dialer speed to 56 or 64 kb/s, as needed.
Step 5	**end** **Example:** `Router(config)# end`	Exits interface configuration mode and returns to global configuration mode.

Configuring ISDN BRI for Leased-Line Service

To configure ISDN BRI for leased-line service, perform the tasks in one of the following sections as needed and available:

- Configuring Leased-Line Service at Normal Speeds (Available in Japan and Germany)
- Configuring Leased-Line Service at 128 Kb/s (Available only in Japan)

Note When an ISDN BRI interface is configured for access over leased lines, it is no longer a dialer interface, and signaling over the D channel no longer applies. Although the interface is called **interface bri** *n*, it is configured as a synchronous serial interface having the default High-Level Data Link (HDLC) encapsulation. However, the Cisco IOS commands that set the physical characteristics of a serial interface (such as the pulse time) do not apply to this interface.

Configuring Leased-Line Service at Normal Speeds

This service is offered in Japan and Germany and no call setup or teardown is involved. Data is placed on the ISDN interface similar to the way data is placed on a leased line connected to a serial port.

The **isdn leased-line bri** command enable the router to configure the BRI to use the ISDN connection as a leased-line service. The **no isdn leased-line bri command** removes the leased-line configuration from a specified ISDN BRI interface.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **isdn leased-line bri** *number number* [**128** | **144**]
4. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**isdn leased-line bri** *number number* [**128** | **144**] **Example:** `Router(config)# isdn leased-line BRI 0 123 [128 | 144]`	Specifies the combined B1 and B2 channels leased lines.
Step 4	**end** **Example:** `Router(config)# end`	Exits global configuration mode.

Configuring Leased-Line Service at 128 Kb/s

The Cisco IOS software supports leased-line service at 128 kb/s via ISDN BRI. This service combines two B channels into a single pipe. This feature requires one or more ISDN BRI hardware interfaces that support channel aggregation, and service provider support for ISDN channel aggregation at 128 kb/s. When this software first became available, service providers offered support for ISDN channel aggregation at 128 kb/s only in Japan.

The **isdn leased-line bri** commands enable the router to configure the BRI to use the ISDN connection as a leased-line service at 128kb/s.

Note This feature is not supported on the Cisco 2500 series router because its BRI hardware does not support channel aggregation.

The **no isdn leased-line bri command** command removes the leased-line configuration from a specified ISDN BRI interface.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **isdn leased-line bri** *number* **128**
4. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**isdn leased-line bri** *number* **128** **Example:** `Router(config)# isdn leased-line BRI 0 128`	Configures a specified BRI for access over leased lines.
Step 4	**end** **Example:** `Router(config)# end`	Exits global configuration mode.

To complete the configuration of the interface, see the module "Configure Synchronous Serial Ports" in this module.

Monitoring and Maintaining ISDN Interfaces

The **show interfaces**, **show controllers**, **show isdn,** and the **show dialer interface bri** commands enable the router to monitor and maintain ISDN interfaces, use the following commands in EXEC mode as needed:

SUMMARY STEPS

1. **enable**
2. **show interfaces bri** *number*
3. **show controllers bri** *number*
4. **show isdn** {**active** | **history** | **memory** | **status** | **timers**}
5. **show dialer interface bri** *number*
6. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.

Step 2	**show interfaces** ***bri*** *number*
	
	Cisco 7200 series routers only
	show interfaces bri slot/port
	
	Example:
	`show interfaces bri 0`
	
	Cisco 7200 series routers only
	`Router> show interfaces bri slot/port`
		Displays information about the physical attributes of the ISDN BRI B and D channels.

Step 3	**show controllers bri** *number* **Cisco 7200 series routers only** **show controllers bri** *slot/port* **Example:** `Router> show controllers bri 0` **Cisco 7200 series routers only** `Router> show controllers bri 0`	Displays protocol information about the ISDN B and D channels.
Step 4	**show isdn** {**active** | **history** | **memory** | **status** | **timers**} **Example:** `Router> show isdn active`	Displays information about calls, history, memory, status, and Layer 2 and Layer 3 timers.
Step 5	**show dialer interface bri** *number* **Example:** `Router> show dialer interface bri 0`	Obtains general diagnostic information about the specified interface.
Step 6	**end** **Example:** `Router(config)# end`	Exits global configuration mode.

Troubleshooting ISDN Interfaces

The following commands can help verify the ISDN configuration of the router:

- **show controllers bri** *number*—Checks Layer 1 (physical layer) of the BRI.
- **debug q921**—Checks Layer 2 (data link layer).
- **debug isdn events**—Checks the network layer.
- **debug q931**—Checks the network layer.

- **debug dialer**—Checks the network layer.
- **show dialer**—Checks the network layer.

Refer to the *Cisco IOS Debug Command Reference* for more information about the **debug** commands.

Configuration Examples for Configuring ISDN BRI

This section provides the following ISDN BRI configuration examples:

Example: Configuring a Global ISDN and BRI Interface Switch Type

The following example shows to configure a global National ISDN switch type (keyword **basic-ni**) and an interface-level NET3 ISDN switch type (keyword **basic-net3**). The **basic-net3** keyword is applied to BRI interface 0 and overrides the global switch setting.

```
isdn switch-type basic-ni
!
interface bri 0
 isdn switch-type basic-net3
```

Example: Configuring a BRI Connected to a PBX

The following example provides a simple partial configuration of a BRI interface that is connected to a PBX. This interface is connected to a switch that uses SPID numbers.

```
interface bri 0
 description connected to pbx line 61885
 ip address 10.1.1.3 255.255.255.0
 encapsulation ppp
 isdn spid1 123
 dialer map ip 10.1.1.1 name mutter 61886
 dialer map ip 10.1.1.2 name rudder 61884
 dialer map ip 10.1.1.4 name flutter 61888
 dialer-group 1
 no fair-queue
 ppp authentication chap
```

Example: Configuring Multilink PPP on a BRI Interface

The following example shows how to enable Multilink PPP on BRI interface 0:

```
interface bri 0
 description Enables PPP Multilink on BRI 0
 ip address 10.1.1.1 255.255.255.0
 encapsulation ppp
 dialer map ip 10.1.1.2 name coaster 14195291357
 dialer map ip 10.1.1.3 name roaster speed 56 14098759854
 ppp authentication chap
 ppp multilink
 dialer-group 1
```

Example: Configuring Dialer Rotary Groups

The following example shows how to configure BRI interfaces to connect into a rotary group (using the **dialer-group** command). It also shows how to configure a dialer interface for that dialer group. This configuration permits IP packets to trigger calls.

```
interface BRI 0
 description connected into a rotary group
 encapsulation ppp
 dialer rotary-group 1

interface BRI 1
 no ip address
 encapsulation ppp
 dialer rotary-group 1

interface BRI 2
 encapsulation ppp
 dialer rotary-group 1

interface BRI 3
 no ip address
 encapsulation ppp
 dialer rotary-group 1

interface BRI 4
 encapsulation ppp
 dialer rotary-group 1

interface Dialer 0
 description Dialer group controlling the BRIs
 ip address 10.1.1.1 255.255.255.0
 encapsulation ppp
 dialer map ip 10.1.1.2 name angus 14802616900
 dialer-group 1
 ppp authentication chap

dialer-list 1 protocol ip permit
```

Example: Configuring Predictor Compression

The following example shows how to enable predictor compression on BRI interface 0:

```
interface bri 0
 description Enables predictor compression on BRI 0
```

```
 ip address 10.1.1.1 255.255.255.0
 encapsulation ppp
 dialer map ip 10.1.1.2 name bon 14195291357
 compress predictor
 ppp authentication chap
 dialer-group 1
```

The following example shows how to enable stacker compression on BRI interface 0:

```
interface bri 0
 description Enables stac compression on BRI 0
 ip address 10.1.1.1 255.255.255.0
 encapsulation ppp
 dialer map ip 10.1.1.2 name malcom 14195291357
 compress stac
 ppp authentication chap
 dialer-group 1
```

Example: Configuring Multilink PPP and Compression

The following example shows how to enable Multilink PPP and stacker compression on BRI interface 0:

```
interface bri 0
 description Enables PPP Multilink and stac compression on BRI 0
 ip address 10.1.1.1 255.255.255.0
 encapsulation ppp
 dialer map ip 10.1.1.2 name rudd 14195291357
 ppp authentication chap
 compress stac
 ppp multilink
 dialer-group 1
```

Example: Configuring Voice over ISDN

The following example shows how to allow incoming voice calls to be answered on BRI interface 0:

```
interface bri 0
 description Allows incoming voice calls to be answered on BRI 0
 ip address 10.1.1.1 255.255.255.0
 encapsulation ppp
 isdn incoming-voice data
 dialer map ip 10.1.1.2 name starstruck 14038182344
 ppp authentication chap
 dialer-group 1
```

The following example shows how to allow outgoing voice calls on BRI interface 1:

```
interface bri1
 description Places an outgoing call as a voice call on BRI 1
 ip address 10.1.1.1 255.255.255.0
 encapsulation ppp
 dialer map ip 10.1.1.2 name angus class calltype 19091238877
 ppp authentication chap
 dialer-group 1

map-class dialer calltype
 dialer voice-call
```

For more configuration examples of voice calls over ISDN, refer to the *Cisco IOS Voice, Video, and Fax Configuration Guide*.

Example: DNIS-plus-ISDN-Subaddress Binding

The following example shows how to configure a dialer profile for a receiver with DNIS 12345 and ISDN subaddress 6789:

```
dialer called 12345:6789
```

For additional configuration examples, see the sections "Dynamic Multiple Encapsulations" and "Verifying the Dynamic Multiple Encapsulations Feature" in the module "Configuring Peer-to-Peer DDR with Dialer Profiles" of this publication.

Example: Screening Incoming V.110 Modem Calls

The following example shows to filter out all V.110 modem calls except those with communication settings of 8 data bits, no parity bit, and 1 stop bit:

```
interface serial 0:23
  isdn v110 only databits 8 parity none stopbits 1
```

Example: ISDN BRI Leased-Line Configuration

The following example shows how to configure BRI interface 0 for leased-line access at 128 kb/s. Because of the leased-line—not dialed—environment configuration of ISDN called and calling numbers are not needed and not used. BRI interface 0 is henceforth treated as a synchronous serial interface, with the default HDLC encapsulation.

```
isdn leased-line 128
```

Additional References

Related Documents

Related Topic	Document Title
Modem configuration commands: complete command syntax, command mode, command history, defaults, usage guidelines, and examples	*Cisco IOS Dial Technologies Command Reference*
Modem configuration and management	*Cisco IOS Dial Technologies Configuration Guide*

Standards

Standard	Title
None	—

MIBs

MIB	MIBs Link
No new or modified MIBs are supported, and support for existing MIBs has not been modified.	To locate and download MIBs for selected platforms, Cisco software releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFC	Title
No new or modified RFCs are supported, and support for existing RFCs has not been modified.	

Technical Assistance

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for Configuring ISDN BRI

Table 4 lists the release history for this feature.

Use Cisco Feature Navigator to find information about platform support and software image support. Cisco Feature Navigator enables you to determine which software images support a specific software release, feature set, or platform. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

Note Table 4 lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Table 4 Feature Information for Modem Signal and Line State

Feature Name	Releases	Feature Information
National ISDN Switch Types for BRI and PRI Interfaces	11.3(3)T 12.0(1) 12.0(1)T 12.1(14) 12.1(3)T 12.2(11)YT 12.2(11)YV 12.2(13)T 12.2(15)T 12.2(2)T 12.2(8)T 12.5 12.4T 12.2SR 15.1.(1)S	The National ISDN Switch Types for Basic Rate and Primary Rate Interfaces feature introduces changes to ISDN switch types for Primary Rate Interfaces (PRI) and BRI. These switches provide the ability to connect to multiple ISDN switch types (BRI and PRI) and the NI2 switch type. The following commands were introduced or modified: **dialer called**, **dialer map**, **isdn calling-number**, **isdn disconnect-cause**, **isdn fast-rollover-delay**, **isdn leased-line type**, **isdn not-end-to-end**, **isdn sending complete**, **isdn v10 only**, **no isdn v10 padding**, **show controllers show isdn**, **show dialer interface bri**, **show interfaces**.