Setting Up ISDN Basic Rate Service

This chapter describes tasks that are required to make an ISDN BRI line and interface operational, and it describes features involved in configuring ISDN in a circuit-switched internetworking environment.

This chapter does not address routing issues, dialer configuration, and dial backup. For information about those topics, see the "Dial-on-Demand Routing" part of this manual.

For hardware technical descriptions, and for information about installing the router interfaces, refer to the hardware installation and maintenance publication for your particular product.

For a complete description of the BRI commands in this chapter, refer to the *Dial Solutions Command Reference*. To locate documentation of other commands that appear in this chapter, use the command reference master index or search online.

ISDN BRI Task List

Perform the tasks in the following sections to configure ISDN lines and interfaces:

- Request BRI Line and Switch Configuration from a Telco Service Provider
- Check and Set the Buffers
- Configure Global Characteristics for ISDN BRI
- Specify Interface Characteristics for an ISDN BRI

You can also perform the following ISDN troubleshooting and maintenance tasks:

- Perform Configuration Self-Tests
- Monitor and Maintain ISDN Interfaces

You can also optionally configure *snapshot routing* for ISDN interfaces. Snapshot routing is a method of learning remote routes dynamically and keeping the routes available for a specified period of time, even though routing updates are not exchanged during that period. See the "Configuring Snapshot Routing" chapter in the "Cost-Control Solutions" part of this manual for detailed information about snapshot routing.

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

To configure bandwidth on demand, see the "Configuring Legacy DDR Spokes" chapter or the "Configuring Legacy DDR Hubs" chapter of this manual.

See the end of this chapter for the "ISDN BRI Configuration Examples" section.

Request BRI Line and Switch Configuration from a Telco Service Provider

Before configuring the ISDN interfaces on your Cisco router, it is necessary to order a correctly configured ISDN line from your telecommunications service provider.

This process varies dramatically from provider to provider on a national and international basis. However, some general guidelines follow:

- On a BRI, 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).
- If the router is going to be the only device attached to the BRI, ask for point-to-point service and a data-only line.
- If the router is going to be attached to an ISDN bus (to which other ISDN devices might be attached), ask for point-to-multipoint service (subaddressing is required) and a voice-and-data line.

When you order ISDN service, request the BRI switch configuration attributes specified in Table 21.

Table 21 ISDN BRI Switch Type Configuration Information

Switch Type	Configuration
DMS-100 BRI	2 B channels for voice and data. 2 directory numbers assigned by service provider. 2 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 kbps outside local exchange. Directory number 1 can hunt to directory number 2.

Table 21 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 kbps 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 service profile identifiers (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 kbps outside local exchange. Directory number 1 can hunt to directory number 2.
5ESS National ISDN (NI-1) 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 kbps outside local exchange. Directory number 1 can hunt to directory number 2.

Check and Set the Buffers

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

To check the MTU size and the buffers and, if necessary, to configure the buffers and the MTU size, use the following commands beginning in EXEC mode:

Command	Purpose
show interfaces bri *number*	Check the MTU size.
show buffers	Check the free buffers.
configure terminal	Configure the buffers.
buffers big permanent *number* **buffers big max-free** *number* **buffers big min-free** *number* **buffers big initial** *number*	

Configure Global Characteristics for ISDN BRI

To configure the ISDN global characteristics, complete the tasks in the following sections:

- Configure the Switch Type
- Configure TEI Negotiation Timing

Configure the Switch Type

To configure the switch type, use the following command in global configuration mode:

Command	Purpose
isdn switch-type *switch-type*	Select the service provider switch type.

Table 22 lists the switch types for ISDN BRI interfaces.

Table 22 ISDN Service Provider Switch Types

Keywords by Area	Switch Type
none	No switch defined
Australia and Europe	
basic-1tr6	German 1TR6 ISDN switches
basic-net3	NET3 ISDN, Norway NET3, Australia NET3, and New Zealand NET3 switches (covers the Euro-ISDN E-DSS1 signaling system and is ETSI-compliant)
vn3	French VN3 and VN4 ISDN BRI switches
Japan	
ntt	Japanese NTT ISDN switches
North America	
basic-5ess	AT&T basic rate switches
basic-dms100	Northern Telecom DMS-100 basic rate switches
basic-ni	National ISDN switches

Note Cisco IOS Release 11.3T introduced ISDN switch type changes. The command parser will still accept the following switch types: basic-nwnet3, vn2, and basic-net3; however, when viewing the NVRAM configuration, the basic-net3 or vn3 switch types are displayed respectively. For specific details about ISDN switch type changes, refer to the "National ISDN Switch Types for Basic Rate and Primary Rate Interfaces" document in Cisco IOS Release 11.3(3)T.

Configure TEI Negotiation Timing

You can specify when Layer 2 ISDN terminal endpoint identifier (TEI) negotiation occurs. TEI negotiation is useful in Europe and also useful for switches that might deactivate Layer 2 when no calls are active.

By default TEI negotiation occurs when the router is powered on. To define when TEI negotiation will occur, use the following command in global configuration mode:

Command	Purpose
isdn tei [**first-call** | **powerup**]	Determine when ISDN TEI negotiation occurs.

Specify Interface Characteristics for an ISDN BRI

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

- Specify the Interface and Its IP Address
- Configure Encapsulation
- Configure Network Addressing

In addition, you can configure the following optional interface characteristics on the BRI:

- Configure the Service Provider Switch Type
- Configure TEI Negotiation Timing
- Specify ISDN Service Profile Identifiers (SPIDs)
- Configure Calling Line Identification Screening
- Configure Called Party Number Verification
- Configure ISDN Calling Number Identification
- Configure the Line Speed for Calls Not ISDN End-To-End
- Configure a Fast Rollover Delay
- Configure Inclusion of the Sending Complete Information Element

Configure the Service Provider Switch Type

You can apply an ISDN switch type to a specific BRI interface and configure more than one ISDN switch type per router using the Multiple ISDN Switch Types feature, thus extending the existing global **isdn switch-type** command to the interface level. This allows Basic Rate Interfaces (BRI) and Primary Rate Interfaces (PRI) to run simultaneously on platforms that support both interface types.

A global ISDN switch type is required and must be configured on the router before you can configure a switch type on an interface. To configure a global ISDN switch type, use the following command in global configuration mode:

Command	Purpose
isdn switch-type *switch-type*	Apply a global ISDN switch type.

You must ensure that both global and interface level ISDN switch types are valid for the ISDN interfaces on the router. Table 22 lists valid ISDN switch types for ISDN BRI.

The following restrictions apply to Multiple ISDN Switch Types:

- You must configure a global ISDN switch type using the existing **isdn switch-type** global configuration command before you can configure the ISDN switch type on an interface. Since global commands are processed before interface level commands, the command parser will not accept the **isdn switch-type** command on an interface unless a switch type is first added globally. Using the **isdn switch-type** global command allows for backward compatibility.
- If an ISDN switch type is configured globally, but not at the interface level, then the global switch type value is applied to all ISDN interfaces.
- If an ISDN switch type is configured globally and on an interface, then the interface level switch type supersedes the global switch type at initial configuration. For example, if the global BRI switch type defined is basic-net3, and the interface level BRI switch type is basic-ni, then the basic-ni switch type is the value applied to that BRI interface.
- The ISDN global switch type value is only propagated to the interface level on initial configuration or router reload. If you reconfigure the global ISDN switch type, the new value is not applied to subsequent interfaces. Therefore, if you require a new switch type for a specific interface, you must configure that interface with the desired ISDN switch type.
- If an ISDN global switch type is not compatible with the interface type you are using, or you change the global switch type and it is not propagated to the interface level, as a safety mechanism, the router will apply a default value to the interface level. Table 23 lists the default values the router will apply based on the global switch type setting.

Table 23 Default ISDN Switch Type Values

Global Switch Type	BRI Interface	PRI Interface
basic-net3	basic-net3	primary-net5
primary-ts014	basic-ts013	primary-ts014
primary-ni	basic-ni	primary-ni

If, for example, you reconfigure the router to use global switch type basic-net3, the router will apply a primary-net5 switch type to PRI interfaces and basic-net3 to any BRI interfaces. You can override the default switch assignment by configuring a different ISDN switch type on the associated interface.

Configure TEI Negotiation Timing

You can configure ISDN terminal endpoint identifier (TEI) negotiation on individual ISDN interfaces. 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 dms100 switches that are designed to initiate TEI negotiation.

By default, TEI negotiation occurs when the router is powered on. 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 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)**. On PRI interfaces connecting to dms100 switches, the router will change the default TEI setting to **isdn tei first-call**. To apply TEI negotiation to a specific BRI interface, use the following command in interface configuration mode:

Command	Purpose
isdn tei [first-call | powerup]	Determine when ISDN TEI negotiation occurs.

Specify the Interface and Its IP Address

To specify an ISDN Basic Rate Interface (BRI) and enter interface configuration mode, use the following command in global configuration mode:

Command	Purpose
interface bri *number* **interface bri** *slot/port* (Cisco 7200 series)	Specify the interface and enter interface configuration mode.
ip address *address mask*	Specify an IP address for the interface.

Configure Encapsulation

PPP encapsulation is configured for most ISDN communication.

Each ISDN B channel is treated as a synchronous serial line and supports HDLC and PPP encapsulation. The default serial encapsulation is HDLC.To configure PPP encapsulation, use the following command in interface configuration mode:

Command	Purpose
encapsulation ppp	Configure PPP Encapsulation.

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. For more information, see the "Configuring Frame Relay on ISDN D and B Channels" and "Configuring X.25 on ISDN D and B Channels" chapters of this manual.

To configure the router for automatic detection of encapsulation type on incoming calls, or to configure encapsulation for Combinet compatibility, see the "Configuring Special ISDN Signaling" chapter of this manual.

Configuring Network Addressing

The steps in this section support the primary goals of network addressing:

- Define which packets are *interesting* and will thus 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 use 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.

To configure network addressing, use the following commands beginning in interface configuration mode:

Step	Command	Purpose
1	**dialer map** *protocol next-hop-address* **name** *hostname* **speed** [**56** | **64**] *dial-string*[**:***isdn-subaddress*]	(Most locations) Configures a serial interface or ISDN interface to call one or multiple sites or to receive calls from multiple sites.
	or **dialer map** *protocol next-hop-address* **name** hostname **spc** [**speed 56** | **64**] [**broadcast**] *dial-string*[**:***isdn-subaddress*]	(Germany) Uses the command keyword that enables ISDN semipermanent connections.
2	**dialer-group** *group-number*	Assign the interface to a dialer group to control access to the interface.
3	**exit**	Exits to global configuration mode.
4	**dialer-list** *dialer-group* **protocol** *protocol-name* {**permit** | **deny** | **list** *access-list-number* | *access-group*}	Defines a dial-on-demand routing (DDR) dialer list for dialing by protocol or by a combination of a protocol and an access list.
5	**access-list** *access-list-number* {**deny** | **permit**} *protocol source address source-mask destination destination-mask*	Define 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.

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 5 of this task list 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 chapter in the network protocol configuration guide (the *Cisco IOS AppleTalk and 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 chapters "Configuring Legacy DDR Hubs" and "Configuring Legacy DDR Spokes" later in this publication.

Specify ISDN Service Profile Identifiers (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-1 switch types require SPIDs. The AT&T 5ESS switch type may support a SPID, but we recommend that you set up that ISDN service without SPIDs. In addition, SPIDs have significance at the local access ISDN interface only. Remote routers are never sent the SPID.

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

To define the SPIDs and the local directory number (LDN) on the router, use the following commands in interface configuration mode:

Command	Purpose
isdn spid1 *spid-number* [*ldn*]	Specify a SPID and local directory number for the B1 channel.
isdn spid2 *spid-number* [*ldn*]	Specify a SPID and local directory number for the B2 channel.

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

Configure Calling Line Identification Screening

This task applies only to Cisco 2500 series, Cisco 3000 series, and Cisco 4000 series routers that have a BRI.

Calling line identification (CLI, also called *caller ID*) 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.

To configure caller ID screening, use the following command in interface configuration mode:

Command	Purpose
isdn caller *number*	Configure caller ID screening.

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

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 device's configured number or subaddress or both.

You can specify that the router verify a 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. To configure verification, use the following command in interface configuration mode:

Command	Purpose
isdn answer1 [*called-party-number*][**:***subaddress*]	Specify that the router verify a called-party number or subaddress number in the incoming setup message.

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.

To configure a second number to be allowed, use the following command in interface configuration mode:

Command	Purpose
isdn answer2 [*called-party-number*][**:***subaddress*]	Specify that the router verify a second called-party number or subaddress number in the incoming setup message.

Configure 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 in which the number is presented. When configured, this information is included in the outgoing call Setup message.

To configure the interface to identify the billing number, use the following command in interface configuration mode:

Command	Purpose
isdn calling-number *calling-number*	Specify the calling party number.

This command can be used with all switch types except German 1TR6 ISDN BRI switches.

Configure the Line Speed for Calls Not ISDN End-To-End

When calls are made at 56 kbps but delivered by the ISDN network at 64 kbps, the incoming data can be corrupted.

However, on ISDN calls, if the receiving side is informed that the call is not an ISDN call from end to end, it can set the line speed for the incoming call.

To set the speed for incoming calls recognized as not ISDN end-to-end, use the following command in interface configuration mode:

Command	Purpose
isdn not-end-to-end {**56** | **64**}	Set the speed to be used for incoming calls recognized as not ISDN end-to-end.

Configure a Fast Rollover Delay

Sometimes a router attempts to dial a call on an ISDN B channel before a previous, failed 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 might occur in ISDN configurations where:

- The two B-channels of the BRI are not configured as a hunt group, but have separate numbers defined, and
- 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 have a dialer map for each phone number, and the first call succeeds but a second call fails with no channel available.

To configure a fast rollover delay, use the following commands in interface configuration mode:

Command	Purpose
isdn fast-rollover-delay *seconds*	Define a fast rollover delay.

A delay of 5 seconds should cover most cases. Configure sufficient delay to make sure 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.

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 not required in other locations.

To configure the interface to include the Sending Complete information element in the outgoing call Setup message, use the following command in interface configuration mode:

Command	Purpose
isdn sending-complete	Include the Sending Complete information element in the outgoing call Setup message.

Perform Configuration Self-Tests

To test the router's ISDN configuration, we suggest that you use the following commands in EXEC mode:

Command	Purpose
show controllers bri *number*	Check Layer 1 (physical layer) of the BRI.
debug q921	Check Layer 2 (data link layer).
debug isdn events	Check Layer 3 (network layer).
debug q931	
debug dialer	
show dialer	

See the *Debug Command Reference* for information about the **debug** commands.

Monitor and Maintain ISDN Interfaces

Use the following commands to monitor and maintain ISDN interfaces:

Command	Purpose
show interfaces bri *number* **show interfaces bri** *slot/port* (Cisco 7200 series)	Display information about the physical attributes of the ISDN BRI B and D channels.
show controllers bri *number* **show controllers bri** *slot/port* (Cisco 7200 series)	Display protocol information about the ISDN B and D channels.
show isdn {**active** | **history** | **memory** | **status** | **timers**}	Display information about calls, history, memory, status, and Layer 2 and Layer 3 timers.
show dialer interface bri *number*	Obtain general diagnostic information about the specified interface.

ISDN BRI Configuration Examples

This section provides the following ISDN BRI configuration examples:

- Global ISDN and BRI Interface Switch Type Example
- Global ISDN, BRI, and PRI Switch Example
- Global ISDN and Multiple BRI and PRI Switch Using TEI Negotiation Example
- BRI Connected to a PBX Example
- Multilink PPP on a BRI Interface Example
- Dialer Rotary Groups Example
- Compression Examples
- Voice over ISDN Examples

Global ISDN and BRI Interface Switch Type Example

The following example shows the global ISDN switch type of basic-ni and an interface level switch type of basic-net3. ISDN switch type basic-net3 is applied to BRI interface 0 and overrides the global switch setting.

```
isdn switch-type basic-ni
!
interface BRI0
 isdn switch-type basic-net3
```

Global ISDN, BRI, and PRI Switch Example

The following example shows BRI interface 0 configured for a basic-net3 switch type that will override the basic-ni switch type configured globally. The PRI interface (channelized T1 controller), is configured for ISDN switch type primary-net5 and is applied only to the PRI.

```
isdn switch-type basic-ni
!
interface BRI0
 isdn switch-type basic-net3

interface serial0:23
! Apply the primary-net5 switch to this interface only
 isdn switch-type primary-net5
```

Global ISDN and Multiple BRI and PRI Switch Using TEI Negotiation Example

In the following example, the global ISDN switch type setting is basic-net3 and the PRI interface (channelized T1 controller) is configured to use **isdn switch-type primary-net5**. BRI interface 0 is configured for **isdn switch-type basic-ni** and **isdn tei first-call**. TEI first-call negotiation configured on BRI interface 0 overrides the default value (**isdn tei powerup**).

```
isdn switch-type basic-net
!
interface serial0:23
 isdn switch-type primary-net5
 ip address 172.21.24.85 255.255.255.0
!
interface BRI0
 isdn switch-type basic-ni
 isdn tei first-call
```

BRI Connected to a PBX Example

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 BRI0
 description connected to pbx line 61885
 ip address 7.1.1.3 255.255.255.0
 encapsulation ppp
 isdn spid1 123
 dialer map ip 7.1.1.1 name oldie 61886
 dialer map ip 7.1.1.2 name rudder 61884
 dialer map ip 7.1.1.4 name seinfeld 61888
 dialer-group 1
 no fair-queue
 ppp authentication chap
```

Multilink PPP on a BRI Interface Example

The following example enables Multilink PPP on BRI 0:

```
interface BRI0
 description Enables PPP Multilink on BRI 0
 ip address 7.1.1.1 255.255.255.0
 encapsulation ppp
 dialer map ip 7.1.1.2 name starbuck 14195291357
 dialer map ip 7.1.1.3 name roaster speed 56 14098759854
 ppp authentication chap
 ppp multilink
 dialer-group 1
```

Dialer Rotary Groups Example

The following example configures BRI interfaces to connect into a rotary group (dialer-group) and then configures 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 8.1.1.1 255.255.255.0
 encapsulation ppp
 dialer map ip 8.1.1.2 name angus 14802616900
 dialer-group 1
 ppp authentication chap

dialer-list 1 protocol ip permit
```

Compression Examples

The following example enables predictor compression on BRI 0:

```
interface BRI0
 description Enables predictor compression on BRI 0
 ip address 7.1.1.1 255.255.255.0
 encapsulation ppp
 dialer map ip 7.1.1.2 name starbuck 14195291357
 compress predictor
 ppp authentication chap
 dialer-group 1
```

The following example enables Stacker compression on BRI 0:

```
interface BRI0
 description Enables stac compression on BRI 0
 ip address 7.1.1.1 255.255.255.0
 encapsulation ppp
 dialer map ip 7.1.1.2 name starbuck 14195291357
 compress stac
 ppp authentication chap
 dialer-group 1
```

Multilink PPP and Compression Example

The following example enables PPP Multilink and Stacker compression on BRI 0:

```
interface BRI0
 description Enables PPP Multilink and stac compression on BRI 0
 ip address 7.1.1.1 255.255.255.0
 encapsulation ppp
 dialer map ip 7.1.1.2 name starbuck 14195291357
 ppp authentication chap
 compress stac
 ppp multilink
 dialer-group 1
```

Voice over ISDN Examples

The following example allows incoming voice calls to be answered on BRI 0:

```
interface bri0
 description Allows incoming voice calls to be answered on BRI 0
 ip address 7.1.1.1 255.255.255.0
 encapsulation ppp
 isdn incoming-voice data
 dialer map ip 7.1.1.2 name starstruck 14038182344
 ppp authentication chap
 dialer-group 1
```

The following example places an outgoing call as a voice call on BRI 1:

```
interface bri1
 description Places an outgoing call as a voice call on BRI 1
 ip address 9.1.1.1 255.255.255.0
 encapsulation ppp
 dialer map ip 9.1.1.2 name angus class calltype 19091238877
 ppp authentication chap
 dialer-group 1

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