## APPENDIX B

# Provisioning the ISDN BRI Line for Cisco 700 Series Routers

This appendix describes how to order and configure the Integrated Service Digital Network (ISDN) Basic Rate Interface (BRI) line to operate with the Cisco 700 series routers.

Both the BRI line configuration and the router configuration are dependent on the BRI switch type being used for the BRI line. BRI switches that comply with the NI-1 standard provide the best performance with the Cisco 700 series routers voice priority feature. If possible, order this type of switch from your ISDN BRI service provider.

This chapter contains the following sections:

- Data and Voice Application over ISDN BRI
- U.S. ISDN BRI Switch Types
- National ISDN Capability Packages
- ISDN BRI Switch Provisioning Summaries
- Router Configuration Requirements
- International ISDN BRI Line Provisioning

# Data and Voice Application over ISDN BRI

The Cisco 753, Cisco 765, and Cisco 766 support data and voice applications. The voice applications on these three router models are implemented with ISDN BRI and through the analog telephone port on the router.

**Note** This appendix describes how to provision the ISDN line for both data and voice applications. Some ISDN service providers might charge a lower rate for an ISDN line that supports only data applications. If you do not require voice capability on your ISDN line, provision the line for data application support only.

The BRI line supports the following data and voice applications on the Cisco 753, Cisco 765, and Cisco 766:

- Caller ID, calling party identification
- Subaddressing

The BRI line supports the following voice-only applications for these models:

- Speech/3.1 kHz audio bearer capability
- Multiple subscriber numbers
- Call hold and retrieve
- Call waiting, also known as additional call offering (ACO)

**Note** There might be an additional charge for configuring the BRI line to support some of these features. Check with your service provider.

Table B-1 describes the data and voice application features supported by the ISDN BRI line.

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Feature	Description
Caller ID, calling party identification	Identifies the remote system that originated the call.
Subaddressing	Provides locally address terminals within a specific ISDN access area.
Speech/3.1 kHz audio bearer capability	Enables use of terminal equipment that supports voice applications. Examples of this type of equipment are ISDN telephones and terminal adapters, and the Cisco 753, Cisco 765, and Cisco 766.
Multiple subscriber numbers	Enables the use of multiple directory numbers on the same ISDN BRI line. Each piece of terminal equipment on the same BRI line can then be assigned its own directory number.
Call hold and retrieve	Enables a call in progress to be put on hold and then retrieved.
Call waiting, also known as additional call offering (ACO)	Enables the presentation of more calls than the number of ISDN BRI channels supported by the terminal equipment. The router can be configured to either ignore the additional calls or to disconnect a call in progress to accept the additional call.

Table B-1 ISDN BRI Data and Voice Applications—Description

# **U.S. ISDN BRI Switch Types**

The following section describes the BRI switch types that are compatible with the Cisco 700 series routers.

**Note** In the United States, telephone companies primarily provide BRI service with AT&T or Northern Telecom switches.

## National ISDN-1

National ISDN-1 (NI-1) BRI switches comply with established National ISDN standards. This type of line is supported by AT&T, Northern Telecom, and other manufacturers' switches.

**Note** Switches that comply with the NI-1 standard provide the best performance with the Cisco 700 series voice priority feature. If possible, order this type of BRI line from your service provider.

# AT&T 5ESS Custom

AT&T 5ESS switches can run in custom mode in addition to NI-1 mode.

Custom mode allows the switch to be configured to operate in either a point-to-point or a multipoint configuration. Point-to-point configuration supports one piece of terminal equipment on the BRI line and does not require Service Profile Identifiers (SPIDs). Multipoint configuration supports multiple pieces of terminal equipment on the same BRI line and requires SPIDs.

**Note** When ordering an AT&T 5ESS ISDN line to support multiple voice calls, provision the line for call appearances 1 and 2.

#### Northern Telecom DMS-100

Northern Telecom DMS-100 switches primarily follows the NI-1 specifications. This switch also supports a custom mode that is primarily used with older terminal equipment.

Note The NI-1 and DMS switch settings on the Cisco 700 series routers are equivalent.

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# National ISDN Capability Packages

The National ISDN User's Forum (NIUF) and Bellcore have established NI-1 capability packages for ISDN BRI line ordering. A capability package is a set of standardized BRI line features that can be ordered together in order to simplify the process of configuring an ISDN line. The capability package ordering codes described in this section apply on to NI-1 ISDN lines.

Not all service providers offer NI-1 capability packages. However, if the service provider in your area offers them, this section describes which package to order for your Cisco 700 series routers.

**Note** The Cisco 765 and the Cisco 766 require two SPIDs in order for the analog telephone ports to operate correctly.

### Capability Package M

The preferred NI-1 capability package for the Cisco 751, Cisco 752, Cisco 761, and Cisco 762 is package M. This package provides alternate voice and circuit-switched data on both B channels. The data and voice capabilities include calling number identification.

## Capability Package K

The preferred NI-1 capability package for the Cisco 753, Cisco 765, and Cisco 766 is package K. This package provides alternate voice and circuit-switched data on the first B channel and circuit-switched data only on the second B channel. Data capabilities include calling number identification.

Package K supports the Cisco 753, Cisco 765, and Cisco 766 routers' voice priority feature. Voice priority enables the user to prioritize analog phone calls when using one B channel for data/voice. Because only one directory number can be used for voice calls, voice priority must be configured on the data/voice B channel.

Package K provides the following non-EKTS voice features:

- Flexible calling
- Additional call offering
- Calling number identification

If your service provider does not offer NI-1 capability packages or if you are not using an NI-1 ISDN line, you must order your ISDN line configured as described in the appropriate section in this appendix.

# ISDN BRI Switch Provisioning Summaries

The following section contains provisioning summaries to use when you order your ISDN BRI line. Each summary is a list of codes used by the BRI service provider when installing and configuring your line. When you order your BRI line, photocopy the appropriate summary for your BRI switch type and attach it to your order form. This will help ensure that your BRI line is ordered correctly.

**Note** The term *provisioning* refers to the features that can be ordered and configured on the ISDN BRI line before terminal equipment, such as the router, can use the features.

We recommend using the BRI switch provisions listed in the following section to support voice priority on one BRI B channel.

Table B-2 lists the definitions of terms used when indicating line provisioning.

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Term	Definition	
CSD	Circuit-switched data—Number of B channels that can be simultaneously connected for circuit-switched data calls.	
CSD CHL	Circuit-switched data channel—B channel(s) that will be used for data calls.	
CSD LIMIT	Circuit-switched data limit—Number of data calls that can be made simultaneously.	
CSV	Circuit-switched voice—Number of B channels that can be simultaneously connected for voice calls.	
CSV ACO	Circuit-switched voice additional call offering—Indicates an additional call when the B channel is being used.	
CSV CHL	Circuit-switched voice channel—B channel(s) that will be used for voice calls.	
CSV LIMIT	Circuit-switched voice limit—Number of voice calls that can be made simultaneously.	
CSV NBLIMIT	Circuit-switched voice notification busy limit—Number of additional voice calls allowed.	
EKTS	Key system option—Whether or not a key system is being used. (A key system is a system in which multiple telephone numbers are shared across terminals.)	
MAXB CHL	Maximum B channels—Number of B channels that can be used simultaneously.	
MTERM	Maximum terminals—Number of terminals active on the BRI line.	
TERMTYP	Terminal type—Terminal type used on the BRI line. Valid types for NI-1 switches are Type A and Type C.	

 Table B-2
 ISDN BRI Line Provisioning Terms

# AT&T 5ESS NI-1 Provisioning Summary

Table B-3 lists the BRI provisioning summary for AT&T 5ESS NI-1 BRI switches.

Line Provision	Configuration	
2B1Q line code <sup>1</sup>	_2	
2B&D line	Standard	
B1	Alternate data and voice <sup>3</sup>	
B2	Alternate data and voice <sup>4</sup>	
D	Signaling only	
MTERM	At least 1	
MAXB CHNL	2	
TERMTYP	TYPEA	
CSV	1	
CSV CHL	ANY	
CSV ACO	U	
CSV LIMIT	3	
CSV NBLIMIT	1	
CSD	2	
CSD CHL	ANY	
CSD LIMIT	2	

Table B-3 AT&T 5ESS NI-1 Provisioning Summary

1. Order this line provision when connecting the router to the U interface.

2. Note: A blank cell indicates that the configuration option is not applicable to the line provision.

3. If you do not require voice capability on your line, provision B1 for data only.

4. If you do not require voice capability on your line, provision B2 for data only.

# AT&T 5ESS Custom Provisioning Summary

Table B-4 lists the BRI provisioning summary for AT&T 5ESS Custom BRI switches.

Line Provision	Configuration	
2B1Q line code <sup>1</sup>	_2	
2B&D line	_	
B1	Circuit-switched data or voice/data <sup>3</sup>	
B2	Circuit-switched data or voice/data <sup>4</sup>	
D	Signaling only	
MTERM	1	
MAXB CHNL	2	
ACT USR	Y	
CSD	2	
CSD CHL	ANY	
TERMTYP	TYPE A	
DISPLAY	Y	
CA PREF	1	

Table B-4 AT&T 5ESS Custom Provisioning Summary

1. Order this line provision when connecting the router to the U interface.

2. Note: A blank cell indicates that the configuration option is not applicable to the line provision.

3. If you do not require voice capability on your line, provision B1 for data only.

4. If you do not require voice capability on your line, provision B2 for data only.

Note Incoming voice priority is not available with AT&T 5ESS Custom BRI switches.

Following are additional features that you might require and can order with the AT&T 5ESS Custom switch:

- Caller identification
- Call forwarding
- Call pickup

## Northern Telecom DMS-100 Provisioning Summary

Table B-5 lists the BRI provisioning summary for Northern Telecom DMS-100 BRI switches.

Configuration
_2
-
_
_
DYNAMIC
Y
No
Key 1-ACOU 1 Key 2-AFC

 
 Table B-5
 Northern Telecom DMS-100 Provisioning Summary (ACOU Supported)

1. Order this line provision when connecting the router to the U interface.

2. Note: A blank cell indicates that the configuration option is not

applicable to the line provision.

Some BRI service providers do not support additional call offering U (ACOU) as a provisioning option. If your service provider does not support ACOU, use the provisioning summary listed in Table B-6.

Line Provision	Configuration	
2B1Q line code <sup>1</sup>	_2	
2B&D line	-	
Version to Functional Signaling	_	
Issue 2 (NI-1)	_	
TEI	DYNAMIC	
САСН	No	
CS	Y	
EKTS	Yes	
Set Option	2 call appearances	

#### Table B-6 Northern Telecom DMS-100 Provisioning Summary (ACOU Not Supported)

1. If connecting at U interface.

2. Note: A blank cell indicates that the configuration option is not applicable to the line provision.

After your BRI line is ordered and installed, you can use the configurations in the following section to configure your Cisco 700 series router to operate with the BRI switch type that your line uses.

# **Router Configuration Requirements**

This section is a list of configuration requirements for the Cisco 700 series router when using specific BRI switch types.

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# Configuration Requirements for AT&T 5ESS Custom Switch

This section describes the router configuration requirements when using the Cisco 700 series routers with an AT&T 5ESS Custom BRI switch.

#### Point-to-Point Configuration

Table B-7 lists the router configuration requirements when using an AT&T 5ESS Custom BRI switch in a point-to-point configuration.

Parameter	Configuration	Software Command
Router software	U.S. version	Note <sup>1</sup>
Switch type	5ESS	set switch
SPIDs	None required	set spid
Directory number	Optional	set directory number

#### Table B-7 AT&T 5ESS Custom Point-to-Point Configuration

1. Note: This parameter is not set with a software command.

#### **Multipoint Configuration**

Table B-8 lists the router configuration requirements when using an AT&T 5ESS Custom BRI switch in a multipoint configuration.

Table B-8	AT&T 5ESS	<b>Custom M</b>	ultipoint (	Configuration
				•••····g•··•••·

Parameter	Configuration	Software Command
Router software	U.S. version	Note <sup>1</sup>
Switch type	5ESS	set switch
SPIDs	At least one required <sup>2</sup>	set spid
Directory number	Optional	set directory number

1. Note: This parameter is not set with a software command.

2. The Cisco 765 and Cisco 766 require two SPIDs in order for the analog telephone ports to operate correctly.

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# Configuration Requirements for AT&T 5ESS NI-1

Table B-9 lists the router configuration requirements when using the Cisco 700 series routers with an AT&T 5ESS NI-1 BRI switch in a multipoint configuration.

**Note** The AT&T 5ESS NI-1 switch does not support a point-to-point configuration.

Parameter	Configuration	Software Command
Router software	U.S. version	Note <sup>1</sup>
Switch type	NI-1	set switch
SPIDs	At least one required <sup>2</sup>	set spid
Directory number	At least one required	set directory number

#### Table B-9 AT&T 5ESS Custom Multipoint Configuration

1. Note: This parameter is not set with a software command.

2. The Cisco 765 and Cisco 766 require two SPIDs in order for the analog telephone ports to operate correctly.

## Configuration Requirements for Northern Telecom DMS-100 Switch

This section describes the router configuration requirements when using the Cisco 700 series routers with a Northern Telecom DMS-100 BRI switch.

#### Configuration for Router Only on ISDN Line

Table B-10 lists the router configuration requirements when using the router only on a Northern Telecom DMS-100 BRI line.

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Parameter	Configuration	Software Command
Router software	U.S. version	Note <sup>1</sup>
Switch type	DMS	set switch
SPIDs	Two required	set spid
Directory number	Two required	set directory number

Table B-10 Northern Telecom DMS-100—Router Only

1. Note: This parameter is not set with a software command.

#### Configuration for Router and One Additional Device on ISDN Line

Table B-11 lists the router configuration requirements for using a Northern Telecom DMS-100 BRI switch when using the router and one additional device on the ISDN line.

Note In this configuration, the router can use only one B channel.

Parameter	Configuration	Software Command
Router software	U.S. version	Note <sup>1</sup>
Switch type	DMS	set switch
SPIDs	One required	set spid
Directory number	One required	set directory number

#### Table B-11 Northern Telecom DMS-100—Router and One Additional Device

1. Note: This parameter is not set with a software command.

# International ISDN BRI Line Provisioning

The Cisco 700 series routers support most international ISDN BRI lines.

International ISDN BRI lines generally use one of the following switch types:

- EURO-ISDN (also known as NET3)
- 1TR6
- TPH
- Nippon Telegraph and Telephone (NTT)

**Note** International ISDN BRI lines are not assigned SPIDs. The optional argument  $\langle spid \rangle$  that is offered in some of the software commands should be ignored or omitted if you are using one of the switch types listed.

## International Data and Voice Application Terminology

The data and voice applications described in the section "Data and Voice Application over ISDN BRI" earlier in this chapter might be referred to by different names depending on the service provider. The terms can differ even within the country. Some international service providers might use codes instead of names to refer to the data and voice applications.

Table B-12 lists the names and codes that might be used outside of the United States to refer to the data and voice applications described in the section "Data and Voice Application over ISDN BRI" earlier in this appendix.

U.S. Name	Other Names	Code
Caller ID, Calling party identification	Calling line identification presentation Identification d'appel <sup>1</sup>	CLIP
Call hold and retrieve	Call hold	CH HOLD
Call waiting	Anklopfen <sup>2</sup>	CW
Multiple subscriber numbers	Extended addressing Selection directe a l'arrive <sup>3</sup>	SDA MSN

# Table B-12ISDN BRI Data and Voice Applications—TermsUsed Outside the United States

1. France only

2. Germany only

3. France only

## EURO-ISDN ISDN BRI Switch Type

The EURO-ISDN switch type, also known as NET3, is used in Europe, including the United Kingdom, France, and Germany.

Use the **show version** command to verify that the software loaded on your Cisco 700 series routers is *ISDN Stack Revision NET3 2.10*. If the correct software is not loaded on your router, contact your customer service representative.

# 1TR6 ISDN BRI Switch Type

The 1TR6 switch type is used in Germany.

Use the **show version** command to verify that the software loaded on your Cisco 700 series router is *ISDN Stack Revision 1TR6 2.10*. If the correct software is not loaded on your router, contact your customer service representative.

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# Multiple Subscriber Numbers with 1TR6

The 1TR6 lines can be configured for multiple subscriber numbers, usually referred to as "extended addressing" in Germany. The line is usually assigned a group of eight sequential directory numbers that can be used for the different pieces of terminal equipment used on the BRI line. These numbers are also used for allocation to the analog telephone port and for call routing.

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