ISDN BCAC and Round-Robin Channel Selection Enhancements

The ISDN BCAC and Round-Robin Channel Selection Enhancements feature allows more dynamic control of the ISDN B channels by providing additional B-Channel Availability Control (BCAC) functionality for configuring message signaling, and an enhanced channel selection scheme that adds round-robin configuration to the existing ascending and descending channel selection schemes already available.

Feature Specifications for the ISDN BCAC Enhancements

Feature History	
Release	**Modification**
12.3(1)	This feature was introduced.
Supported Platforms	
Cisco AS5300, Cisco AS5350, Cisco AS5400, Cisco AS5800, Cisco AS5850, Cisco 2600 series, Cisco 3640, Cisco 3660	

Finding Support Information for Platforms and Cisco IOS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at http://www.cisco.com/go/fn. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel** at the login dialog box and follow the instructions that appear.

Contents

Prerequisites for ISDN BCAC Enhancements

You need to need to be familiar with the BCAC service message signaling procedure and configuring ISDN PRI before configuring the commands described in this document. See the "Standards" section on page 10 for a list of references.

Information About the ISDN BCAC and Round-Robin Channel Selection Enhancements

The following functionality is introduced in the ISDN BCAC and Round-Robin Channel Selection Enhancements:

BCAC Enhancements

BCAC is a service message signaling procedure used to control the availability of ISDN B channels. BCAC provides a coordinated capability between both ends of a PRI to simultaneously preclude selection of specified B channels for outgoing calls, and reject calls (if channel negotiation is employed, calls may go on another channel) for those same channels. The basic BCAC functionality for the handling of SERV and SERV ACK messages already exists on Cisco routers. In Cisco IOS Release 12.3(1), the software has been enhanced with the following BCAC functionality:

- Processing of SERV and SERV ACK messages. Even though these messages are already handled in the Cisco IOS software, their processing has been enhanced to more closely align with the behavior described in the standards.
- Provides a mechanism to allow the retransmission of SERV messages.
- Handles SERV message collision cases.
- Provides service status audits for various audit triggers.
- Provides an option that when set triggers the exchange of service messages on all channels of the interface when the router is rebooted and when the signaling link comes up.
- Provides a mechanism so that if there is a flood of service messages that need to be sent, the service messages can be throttled to avoid losing them.
- Initializes B-channel service status upon provisioning.

Round-Robin Selection Scheme for ISDN B Channels

ISDN enhancements introduced in Cisco IOS Release 12.3(1) enable you to select a B channel on a PRI or a Non-Facility Associated Signaling (NFAS) interface in a round-robin fashion. This option is in addition to the ascending or descending channel selection schemes already available.

Logging of ISDN Events

ISDN enhancements introduced in Cisco IOS Release 12.3(1) support syslog logging of the following ISDN events:

- ISDN Layer 2 Up and Down events at severity 3.
- ISDN SERV, SERV ACK, RESTART, RESTART ACK, and STATUS ENQ messages at severity 4.
- ISDN SERV status audit messages for various triggers at different severities.

Additional ISDN Switch Types Supported for Network Emulation

ISDN enhancements introduced in Cisco IOS Release 12.3(1) extend network emulation capability to the Lucent 4ESS, 5ESS, and Nortel DMS-100 ISDN switch types. These switch types can be configured as network, but no additional changes were made and not all network-side features are supported.

How to Configure the ISDN Enhancements

This section contains the following procedures. Each procedure is optional and depends upon the settings required for your network.

- Configuring BCAC Service Audit Triggers, page 3 (optional)
- Configuring BCAC Service State Triggers, page 5 (optional)
- Configuring BCAC Message Retransmission, page 6 (optional)
- Configuring B-Channel Selection Order, page 7 (optional)
- Configuring ISDN Syslog Messages, page 8 (optional)

Configuring BCAC Service Audit Triggers

Perform this task to configure BCAC service audit triggers:

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface serial** *port*:*channel*
4. **isdn bcac service audit**
5. **isdn bcac service audit trigger** *number*
6. **isdn bcac service audit interface**

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 serial** *port:channel* **Example:** `Router(config)# interface serial 2:23`	Enters interface configuration mode on the specified serial port and channel.
Step 4	**isdn bcac service audit** **Example:** `Router(config-if)# isdn bcac service audit`	Enables BCAC service audits.
Step 5	**isdn bcac service audit trigger** *number* **Example:** `Router(config-if)# isdn bcac service audit trigger 2`	Enables individual BCAC service audit triggers.
Step 6	**isdn bcac service audit interface** **Example:** `Router(config-if)# isdn bcac service audit interface`	Specifies that BCAC service audits need to be triggered on the entire interface.

Examples

The following example shows how to enable service audits on serial interface 4:23:

```
interface serial 4:23
 isdn bcac service audit
```

The following example shows how to disable service trigger 4 on serial interface 4:23:

```
interface serial 4:23
 no isdn bcac service audit trigger 4
```

See the command page for the **isdn bcac service audit trigger** command for a list of the triggers that are set.

The following example shows how to configure service audits on the entire interface:

```
interface serial 4:23
 isdn bcac service audit interface
```

Configuring BCAC Service State Triggers

Perform this task to configure BCAC service state triggers:

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface serial** *port*:*channel*
4. **isdn bcac service update provision**
5. **isdn bcac service update linkup**

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 serial** *port*:*channel* **Example:** `Router(config)# interface serial 2:23`	Enters interface configuration mode on the specified serial port and channel.
Step 4	**isdn bcac service update provision** **Example:** `Router(config-if)# isdn bcac service update provision`	Enables BCAC service status functionality for provisioning the B channels.
Step 5	**isdn bcac service update linkup** **Example:** `Router(config-if)# isdn bcac service update linkup`	Triggers updates of the BCAC service states between peer nodes through exchange of SERV and SERV ACK messages.

Examples

The following example shows how to enable the SERV status message for provisioning the B channels on serial interface 4:23:

```
interface serial 4:23
 isdn bcac service update provision
```

The following example shows how to trigger service state updates on serial interface 4:23:

```
interface serial 4:23
 isdn bcac service update linkup
```

Configuring BCAC Message Retransmission

Perform this task to configure retransmission of BCAC service messages:

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface serial** *port*:*channel*
4. **isdn bcac service timer** *timer-value*
5. **isdn bcac service retry max** *retries*
6. **isdn bcac service retry in-serv-on-fail**

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 serial** *port*:*channel* **Example:** `Router(config)# interface serial 2:23`	Enters interface configuration mode on the specified serial port and channel.
Step 4	**isdn bcac service timer** *timer-value* **Example:** `Router(config-if)# isdn bcac service timer 600`	Changes the value of the BCAC T3M1 or T323 service message timer. • Valid range is from 500 to 120000 ms, and the default is 120000 ms.

	Command or Action	Purpose
Step 5	**isdn bcac service retry max** *retries* **Example:** `Router(config-if)# isdn bcac service retry max retries`	Specifies the maximum number of times a BCAC service message can be retransmitted when unacknowledged. • The default is 2 attempts, and you can enter a number from 0 to 127.
Step 6	**isdn bcac service retry in-serv-on-fail** **Example:** `Router(config-if)# isdn bcac service retry in-serv-on-fail`	Specifies that the BCAC service state of the channel needs to be changed to In-Service, because no acknowledgment message was received.

Examples

The following example shows how to configure an option whereby, on service message exchange failure, the service state of the concerned channel or channels will be set to In-Service:

```
interface serial 2:23
 isdn bcac service retry in-serv-on-fail
```

The following example shows how to set the maximum number of service message retransmissions on serial interface 2:23 to 50:

```
interface serial 2:23
 isdn bcac service retry max 50
```

The following example shows how to change the service timers to 600 ms on serial interface 2:23:

```
interface serial 2:23
 isdn bcac service timer 600
```

Configuring B-Channel Selection Order

Perform this task to configure selection order of the ISDN B channels:

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface serial** *port*:*channel*
4. **isdn bchan-number-order** {**ascending** | **descending**} [**round-robin**]

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 serial** *port*:*channel* **Example:** `Router(config)# interface serial 2:23`	Enters interface configuration mode on the specified serial port and channel.
Step 4	**isdn bchan-number-order** {**ascending** | **descending**} [**round-robin**] **Example:** `Router(config-if)# isdn bchan-number-order ascending round-robin`	Configures an ISDN PRI interface to make outgoing call selection in ascending or descending order. • The optional **round-robin** keyword adds round-robin selection functionality to the selection order.

Examples

The following example configures the outgoing B channel selection order on a PRI interface to be round-robin in ascending order:

```
interface serial 5:10
 isdn bchan-number-order ascending round-robin
```

Configuring ISDN Syslog Messages

Perform this task to configure logging of ISDN syslog messages:

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **isdn logging**

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 logging`
	
	Example:
	`Router(config)# isdn logging`
		Enables logging of ISDN syslog messages.

Examples

The following example shows how to configure ISDN syslog logging:

```
isdn logging
```

Configuration Examples for ISDN BCAC and Round-Robin Channel Selection Enhancements

See the examples following each task in the preceding sections, for ideas about how the ISDN CBAC enhancements and other new ISDN features can be introduced into your network.

Additional References

For additional information related to the ISDN enhancements, see the following sections:

- Related Documents, page 10
- Standards, page 10
- MIBs, page 10
- RFCs, page 10
- Technical Assistance, page 11

Related Documents

Related Topic	Document Title
ISDN PRI configuration	Refer to the "Configuring ISDN PRI" chapter in the "Signaling Configuration" part of the *Cisco IOS Dial Technologies Configuration Guide*, Release 12.3.
ISDN PRI configuration commands	*Cisco IOS Dial Technologies Command Reference*, Release 12.3.
ISDN PRI configuration for voice, video, and fax	Refer to the chapter "Configuring ISDN Interfaces for Voice " in the *Cisco IOS Voice, Video, and Fax Configuration Guide*, Release 12.3.
ISDN PRI voice, video, and fax configuration commands	*Cisco IOS Voice, Video, and Fax Command Reference*, Release 12.3

Standards

Standards[1]	Title
AT&T PRI	Technical Report 41459–*AT&T ISDN Primary Rate Interface and Special Application Specification*; "User Network Interface Description," 1999.
National ISDN Council (NIC) PRI	SR (Special Report)-NWT-002343–*ISDN Primary Rate Interface Generic Guidelines for Customer Premises Equipment*, June 1993. SR-3887–*National ISDN Primary Rate Interface Customer Premises Equipment Generic Guidelines*, 1996.
Nortel PRI	NIS (Network Interface Specification)-A211-1–*DMS100 ISDN Primary Rate Network User Interface*, 1993.

1. Not all supported standards are listed.

MIBs

MIBs	MIBs Link
None	To obtain lists of supported MIBs by platform and Cisco IOS release, and to download MIB modules, go to the Cisco MIB website on Cisco.com at the following URL: http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml

RFCs

RFCs	Title
None	—

Technical Assistance

Description	Link
Technical Assistance Center (TAC) home page, containing 30,000 pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content.	http://www.cisco.com/public/support/tac/home.shtml

Command Reference

This section documents the following new and modified commands. All other commands used with this feature are documented in the Cisco IOS Release 12.3 command reference publications.

New Commands

- **isdn bcac service audit**
- **isdn bcac service audit interface**
- **isdn bcac service audit trigger**
- **isdn bcac service retry in-serv-on-fail**
- **isdn bcac service retry max**
- **isdn bcac service timer**
- **isdn bcac service update linkup**
- **isdn bcac service update provision**
- **isdn logging**

Modified Commands

- **isdn bchan-number-order**
- **isdn protocol-emulate (dial)**

isdn bcac service audit

To enable service audits on an interface configured for B-Channel Availability Control (BCAC), use the **isdn bcac service audit** command in interface configuration mode. To disable service audits, use the **no** form of this command.

isdn bcac service audit

no isdn bcac service audit

Syntax Description

This command has no arguments or keywords.

Defaults

This command is disabled by default.

Command Modes

Interface configuration

Command History

Release	Modification
12.3(1)	This command was introduced.

Usage Guidelines

This commands starts service audits for all triggers. Use the **isdn bcac service audit trigger** command to selectively enable and disable audit triggers.

Examples

The following example shows how to configure service audits on serial interface 2:23:

```
interface serial 2:23
 isdn bcac service audit
```

Related Commands

Command	Description
isdn bcac service audit interface	Specifies that the BCAC service audit needs to be triggered on the entire interface.
isdn bcac service audit trigger	Enables individual BCAC service triggers.
isdn bcac service retry in-serv-on-fail	Specifies that the BCAC service state of the channel needs to be changed to In-Service because no acknowledgment was received.
isdn bcac service retry max	Specifies the maximum number of times a BCAC service message can be retransmitted when unacknowledged.
isdn bcac service timer	Changes the value of the BCAC T3M1 or T323 service message timer.
isdn bcac service update linkup	Triggers updates of the BCAC service states between peer nodes through exchange of SERV and SERV ACK messages.
isdn bcac service update provision	Enables the functionality of service status for provisioning ISDN PRI B channels.

isdn bcac service audit interface

To specify that B-Channel Availability Control (BCAC) service audit needs to be triggered on the entire interface, use the **isdn bcac service audit interface** command in interface configuration mode. To change or remove the specification, use the **no** form of this command.

isdn bcac service audit interface

no isdn bcac service audit interface

Syntax Description

This command has no arguments or keywords.

Defaults

The default can be to trigger audits on a single channel, a group of channels, or the entire interface, depending upon the type of trigger set. See the "Usage Guidelines" section for the **isdn bcac service audit trigger** command for the list of triggers.

Command Modes

Interface configuration

Command History

Release	Modification
12.3(1)	This command was introduced.

Usage Guidelines

Use this command when the service audit needs to be triggered on the entire interface when a condition to trigger the service audit is triggered for any channel.

Examples

The following example shows how to configure service audits on serial interface 2:23:

```
interface serial 2:23
 isdn bcac service audit interface
```

Related Commands

Command	Description
isdn bcac service audit	Enables service audits on an interface configured for BCAC.
isdn bcac service audit trigger	Enables individual BCAC service triggers.
isdn bcac service retry in-serv-on-fail	Specifies that the BCAC service state of the channel needs to be changed to In-Service because no acknowledgment was received.
isdn bcac service retry max	Specifies the maximum number of times a BCAC service message can be retransmitted when unacknowledged.
isdn bcac service timer	Changes the value of the BCAC T3M1 or T323 service message timer.

Command	Description
isdn bcac service update linkup	Triggers updates of the BCAC service states between peer nodes through exchange of SERV and SERV ACK messages.
isdn bcac service update provision	Enables the functionality of service status for provisioning ISDN PRI B channels.

isdn bcac service audit trigger

To re-enable individual B-Channel Availability Control (BCAC) service triggers, use the **isdn bcac service audit trigger** command in interface configuration mode. To disable individual service triggers, use the **no** form of this command.

isdn bcac service audit trigger *number*

no isdn bcac service audit trigger *number*

Syntax Description

number	A number from 1 to 6 that disables specific service triggers; see a list of these triggers in the "Usage Guidelines" section.

Defaults

All triggers are configured.

Command Modes

Interface configuration

Command History

Release	Modification
12.3(1)	This command was introduced.

Usage Guidelines

The service audit procedure can be used by the either the user or network side to bring both ends of the interface into agreement about the service status through an exchange of SERV and SERV ACK messages.

Following is the list of triggers with the conditions that cause them. Triggers 1 through 4 are triggered by single-channel audits. Trigger 5 occurs on the entire interface. Trigger 6 applies to a group of channels, which in some cases may apply to the entire interface.

- Trigger 1: Upon receiving an incoming call indicating a channel that is in the out-of-service (OOS) or Maint (maintenance) state.
- Trigger 2: Upon receiving an unsolicited SERV ACK message when the received service status differs from the current status.
- Trigger 3: Upon receiving an unallowed response to a SERV message. An unallowed response means a SERV ACK message, which indicates a higher availability than was sent in the SERV message.
- Trigger 4: Upon receiving an ISDN call clearing message with cause code 44 (requested channel not available) when this message is not caused by "glare," which is a SETUP message collision requesting the same channel.
- Trigger 5: Once every 24 hours on all channels.
- Trigger 6: Once every hour on all channels that are in the OOS or Far-end state.

Examples

The following example shows how to disable service trigger 4 on serial interface 2:23:

```
interface serial 2:23
 no isdn bcac service audit trigger 4
```

Related Commands

Command	Description
isdn bcac service audit	Enables service audits on an interface configured for BCAC.
isdn bcac service audit interface	Specifies that the BCAC service audit needs to be triggered on the entire interface.
isdn bcac service retry in-serv-on-fail	Specifies that the BCAC service state of the channel needs to be changed to In-Service because no acknowledgment was received.
isdn bcac service retry max	Specifies the maximum number of times a BCAC service message can be retransmitted when unacknowledged.
isdn bcac service timer	Changes the value of the BCAC T3M1 or T323 service message timer.
isdn bcac service update linkup	Triggers updates of the BCAC service states between peer nodes through exchange of SERV and SERV ACK messages.
isdn bcac service update provision	Enables the functionality of service status for provisioning ISDN PRI B channels.

isdn bcac service retry in-serv-on-fail

To specify that the B-Channel Availability Control (BCAC) service state of the channel needs to be changed to In-Service because no acknowledgment was received, use the **isdn bcac service retry in-serv-on-fail** command in interface configuration mode. To change or remove this specification, use the **no** form of this command.

isdn bcac service retry in-serv-on-fail

no isdn bcac service retry in-serv-on-fail

Syntax Description

This command has no arguments or keywords.

Defaults

Original service state is maintained.

Command Modes

Interface configuration

Command History

Release	Modification
12.3(1)	This command was introduced.

Usage Guidelines

Use this command when there is a need to change the service state of a channel to In-Service when no acknowledgment is received, even after retransmitting the service message the maximum number of allowed times. If this command is not configured, the original service state is maintained.

Examples

The following example shows how to configure an option whereby, on service message exchange failure, the service state of the concerned channel or channels will be set to In-Service:

```
interface serial 2:23
 isdn bcac service retry in-serv-on-fail
```

Related Commands

Command	Description
isdn bcac service audit	Enables service audits on an interface configured for BCAC.
isdn bcac service audit interface	Specifies that the BCAC service audit needs to be triggered on the entire interface.
isdn bcac service audit trigger	Enables individual BCAC service triggers.
isdn bcac service retry max	Specifies the maximum number of times a BCAC service message can be retransmitted when unacknowledged.
isdn bcac service timer	Changes the value of the BCAC T3M1 or T323 service message timer.

Command	Description
isdn bcac service update linkup	Triggers updates of the BCAC service states between peer nodes through exchange of SERV and SERV ACK messages.
isdn bcac service update provision	Enables the functionality of service status for provisioning ISDN PRI B channels.

isdn bcac service retry max

To specify the maximum number of times a B-Channel Availability Control (BCAC) service message can be retransmitted when unacknowledged, use the **isdn bcac service retry max** command in interface configuration mode. To remove or change the specification, use the **no** form of this command.

isdn bcac service retry max *retries*

no isdn bcac service retry max *retries*

Syntax Description

retries	A number from 0 to 127 that determines the maximum number of times that a service message can be retransmitted when unacknowledged. Default is 2.

Defaults

Maximum retransmissions is 2.

Command Modes

Interface configuration

Command History

Release	Modification
12.3(1)	This command was introduced.

Usage Guidelines

When a SERV message is sent to the far side, SERV message timer T3M1 or T323 is started. If no SERV ACK message is received before these timers expire, the SERV message is retransmitted. This command determines how many times retransmission occurs.

Examples

The following example shows how to set the maximum service message retransmissions on serial interface 2:23 to 50:

```
interface serial 2:23
 isdn bcac service retry max 50
```

Related Commands

Command	Description
isdn bcac service audit	Enables service audits on an interface configured for BCAC.
isdn bcac service audit interface	Specifies that the BCAC service audit needs to be triggered on the entire interface.
isdn bcac service audit trigger	Enables individual BCAC service triggers.
isdn bcac service retry in-serv-on-fail	Specifies that the BCAC service state of the channel needs to be changed to In-Service because no acknowledgment was received.
isdn bcac service timer	Changes the value of the BCAC T3M1 or T323 service message timer.

Command	Description
isdn bcac service update linkup	Triggers updates of the BCAC service states between peer nodes through exchange of SERV and SERV ACK messages.
isdn bcac service update provision	Enables the functionality of service status for provisioning ISDN PRI B channels.

isdn bcac service timer

To change the value of the B-Channel Availability Control (BCAC) T3M1 or T323 service message timer, use the **isdn bcac service timer** command in interface configuration mode. To change the timer value, use the **no** form of this command.

isdn bcac service timer *timer-value*

no isdn bcac service timer *timer-value*

Syntax Description

timer-value	Length, in milliseconds (ms), of the T3M1 or T323 service message timer. Valid range is from 500 to 120000 ms; default is 120000 ms.

Defaults

The T3M1 or T323 service message timer defaults to 120000 ms.

Command Modes

Interface configuration

Command History

Release	Modification
12.3(1)	This command was introduced.

Usage Guidelines

The T3M1 or T323 service message timer is started when a SERV message is sent to the far side.

Examples

The following example shows how to change the service timers to 600 ms on serial interface 2:23:

```
interface serial 2:23
 isdn bcac service timer 600
```

Related Commands

Command	Description
isdn bcac service audit	Enables service audits on an interface configured for BCAC.
isdn bcac service audit interface	Specifies that the BCAC service audit needs to be triggered on the entire interface.
isdn bcac service audit trigger	Enables individual BCAC service triggers.
isdn bcac service retry in-serv-on-fail	Specifies that the BCAC service state of the channel needs to be changed to In-Service because no acknowledgment was received.
isdn bcac service retry max	Specifies the maximum number of times a BCAC service message can be retransmitted when unacknowledged.

Command	Description
isdn bcac service update linkup	Triggers updates of the BCAC service states between peer nodes through exchange of SERV and SERV ACK messages.
isdn bcac service update provision	Enables the functionality of service status for provisioning ISDN PRI B channels.

isdn bcac service update linkup

To trigger updates of the B-Channel Availability Control (BCAC) service states between peer nodes through exchange of SERV and SERV ACK messages, use the **isdn bcac service update linkup** command in interface configuration mode. To disable triggering of updates, use the **no** form of this command.

isdn bcac service update linkup

no isdn bcac service update linkup

Syntax Description

This command has no arguments or keywords.

Defaults

This command is disabled by default.

Command Modes

Interface configuration

Command History

Release	Modification
12.3(1)	This command was introduced.

Usage Guidelines

This command updates the service states of *all* the channels to the far side of the interface by exchanging SERV and SERV ACK messages whenever Layer 2 comes up.

Examples

The following example shows how to trigger service state updates on serial interface 2:23:

```
interface serial 2:23
 isdn bcac service update linkup
```

Related Commands

Command	Description
isdn bcac service audit	Enables service audits on an interface configured for BCAC.
isdn bcac service audit interface	Specifies that the BCAC service audit needs to be triggered on the entire interface.
isdn bcac service audit trigger	Enables individual BCAC service triggers.
isdn bcac service retry in-serv-on-fail	Specifies that the BCAC service state of the channel needs to be changed to In-Service because no acknowledgment was received.
isdn bcac service retry max	Specifies the maximum number of times a BCAC service message can be retransmitted when unacknowledged.
isdn bcac service timer	Changes the value of the BCAC T3M1 or T323 service message timer.
isdn bcac service update provision	Enables the functionality of service status for provisioning ISDN PRI B channels.

isdn bcac service update provision

To enable functionality of service status for provisioning the ISDN B channels, use the **isdn bcac service update provision** command in interface configuration mode. To disable provisioning, use the **no** form of this command.

isdn bcac service update provision

no isdn bcac service update provision

Syntax Description

This command has no arguments or keywords.

Defaults

This command is disabled by default.

Command Modes

Interface configuration

Command History

Release	Modification
12.3(1)	This command was introduced.

Usage Guidelines

This command enables functionality of service status for provisioning the B channels, which for the Cisco implementation happens only on reboot.

Examples

The following example shows how to enable the service service status for provisioning the B channels on serial interface 2:23:

```
interface serial 2:23
 isdn bcac service update provision
```

Related Commands

Command	Description
isdn bcac service audit	Enables service audits on an interface configured for BCAC.
isdn bcac service audit interface	Specifies that the BCAC service audit needs to be triggered on the entire interface.
isdn bcac service audit trigger	Enables individual BCAC service triggers.
isdn bcac service retry in-serv-on-fail	Specifies that the BCAC service state of the channel needs to be changed to In-Service because no acknowledgment was received.
isdn bcac service retry max	Specifies the maximum number of times a BCAC service message can be retransmitted when unacknowledged.
isdn bcac service timer	Changes the value of the BCAC T3M1 or T323 service message timer.
isdn bcac service update linkup	Triggers updates of the BCAC service states between peer nodes through exchange of SERV and SERV ACK messages.

isdn bchan-number-order

To configure an ISDN PRI interface to make outgoing call selection in ascending descending, or round-robin order, use the **isdn bchan-number-order** command in interface configuration mode. To restore the default, use the **no** form of this command or reconfigure the interface with the new value.

isdn bchan-number-order {**ascending** | **descending**} [**round-robin**]

no isdn bchan-number-order

Syntax Description

ascending	Makes the outgoing B-channel selection in ascending order as follows: • Channels 1 to 24 for a T1 controller • Channels 1 to 31 for an E1 controller
descending	Makes the outgoing B-channel selection in descending order as follows: • Channels 24 to 1 for a T1 controller • Channels 31 to 1 for an E1 controller
round-robin	(Optional) Enables a round-robin B-channel selection scheme.

Defaults

Selection default is ascending for the network side; descending for the user side.

Command Modes

Interface configuration

Command History

Release	Modification
11.3 T	This command was introduced.
12.3(1)	The **round-robin** keyword was added.

Usage Guidelines

This command supports ascending, descending, and round-robin B-channel selection schemes. This command is for PRI configuration only.

This command supports ascending and descending B-channel selection by instructing the router to select the lowest or highest available B channel starting at either channel B1 (ascending) or channel B23 for a T1 and channel B31 for an E1 (descending).

In the ascending B-channel selection scheme, for example, if the channel selected for the last call was channel 14, then if channel *x*, where *x* is any channel number less than or equal to 14, becomes available by the time a channel is selected for the next call, that channel will be selected for the call.

In the round-robin B-channel selection scheme, the next channel selected is the current channel number *x* plus 1 for ascending, or current channel number *x* minus 1 for descending configuration.

When the channel selection software routine reaches channel 1 (the bottom for descending) or channel 23 for T1 and channel 31 for E1 (the top for ascending), the software routine wraps around. An example for a descending configuration: After reaching channel 1, the routine goes back to channel 31 or 23 and then decrements the count from there.

Examples

The following example configures the outgoing B-channel order on a PRI interface to be in ascending order. The router will select the lowest available B channel beginning with channel B1.

```
interface serial 5:10
 isdn bchan-number-order ascending
```

The following example configures the outgoing B-channel order on a PRI interface to be round-robin in ascending order.

```
interface serial 4:23
 isdn bchan-number-order ascending round-robin
```

isdn logging

To enable logging of ISDN syslog messages, use the **isdn logging** command in global configuration mode. To disable logging, use the **no** form of this command.

isdn logging

no isdn logging

Syntax Description

This command has no arguments or keywords.

Defaults

This command is disabled by default.

Command Modes

Global configuration

Command History

Release	Modification
12.3(1)	This command was introduced.

Usage Guidelines

This command supports syslog logging of the following ISDN events:

- ISDN Layer 2 Up and Down events at severity 3.
- ISDN SERV, SERV ACK, RESTART, RESTART ACK, and STATUS ENQ messages at severity 4.
- ISDN SERV status audit messages for various triggers at different severities.

Examples

The following example shows how to configure ISDN syslog logging:

```
isdn logging
```

Related Commands

Command	Description
isdn bchan-number-order	Configures an ISDN PRI interface to make outgoing call selection in ascending, descending, or round-robin order.
isdn protocol-emulate	Configures an ISDN data or voice port to emulate network or user functionality.

isdn protocol-emulate (dial)

To configure the Layer 2 and Layer 3 port protocol of a BRI voice port or a PRI interface to emulate NT (network) or TE (user) functionality, use the **isdn protocol-emulate** command in interface configuration mode. To restore the default (user), use the **no** form of this command.

isdn protocol-emulate {**user** | **network**}

no isdn protocol-emulate

Syntax Description

user	Specifies Layer 2 and Layer 3 port protocol operation as TE (port functions as QSIG slave).
network	Specifies Layer 2 and Layer 3 port protocol operation as NT (port functions as QSIG master).

Defaults

The port functions as QSIG slave.

Command Modes

Interface configuration

Command History

Release	Modification
12.0(3)XG	This command was introduced on the following platforms: Cisco 2600 series, Cisco 3600 series, and Cisco MC3810 concentrator.
12.3	This command was enhanced to support network emulation capability on the Lucent 4ESS, 5ESS, and Nortel DMS-100 ISDN switch types. These switch types can be configured as network, but no additional changes were made and not all network side features are supported.

Usage Guidelines

You can use this command to configure the Cisco AS5300 PRI interface to serve as either the primary QSIG slave or the primary QSIG master. To disable QSIG signaling, use the **no** form of this command.

If you use the **no isdn protocol-emulate** command, the Layer 2 and Layer 3 protocol emulation defaults to user.

Examples

The following example configures the Layer 2 and Layer 3 function of T1 PRI interface 23 to act as the QSIG master (NT):

```
interface serial 1:23
 isdn protocol-emulate network
```

The following example configures the Layer 2 and Layer 3 function of a BRI voice port to operate as QSIG slave (TE):

```
interface bri 1
 isdn protocol-emulate user
```

The following example configures the Layer 2 and Layer 3 function of an E1 PRI interface to operate as QSIG slave (TE):

```
interface serial 4:23
 isdn protocol-emulate user
```

Related Commands

Command	Description
isdn bchan-number-order	Configures an ISDN PRI interface to make outgoing call selection in ascending, descending, or round-robin order.
isdn logging	Enables logging of ISDN syslog messages.
isdn switch-type (PRI)	Specifies the central office switch type on the ISDN PRI interface.
network-clock-priority	Specifies the clock-recovery priority for the BRI voice ports in a BVM.
pri-group nec-fusion	Configures the NEC PBX to support FCCS.
show cdapi	Displays the CDAPI.
show rawmsg	Displays the raw messages owned by the required component.

Glossary

PBX—private branch exchange.

RESTART—restart message.

RESTART ACK—restart acknowledge message.

STATUS ENQ—status enquiry message.

SERV—service message.

SERV ACK—service acknowledge message.

Note Refer to the *Internetworking Terms and Acronyms* for terms not included in this glossary.