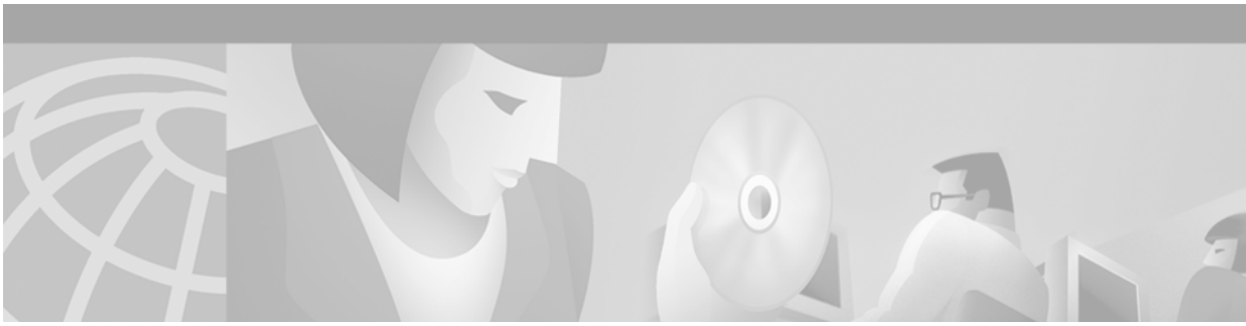

Q.931 User-Side and Network-Side Switch Support

This document describes enhancements to ISDN Q.931 PRI functionality for Cisco 2600 series and Cisco 3600 series routers and includes the following sections:

- Feature Overview
- Supported Platforms
- Supported Standards, MIBs and RFCs
- Configuration Tasks
- Configuration Examples
- Command Reference

Feature Overview

Cisco platforms support Q.931 user- and network-side switch types for ISDN call processing. User-side PRI enables the Cisco platform to provide a standard ISDN PRI user-side interface to the Public Switched Telephone Network (PSTN). Network-side PRI enables the Cisco platform to provide a standard Digital T1/E1 Packet Voice Trunk Network Modules on Cisco 2600 series and Cisco 3600 series routers

For complete VoIP configuration instructions, see Cisco IOS Release 12.1 *Multiservice Applications Configuration Guide*. For a description of the commands used to configure VoIP, see the "Voice-Related Commands" chapter in the *Multiservice Applications Command Reference*.

Benefits

The Q.931 ISDN enhancements provide support for the Q.931 user- and network-side switch types for several Cisco platforms, including the Cisco 2600 series, Cisco 3600 series, and Cisco 7200 series routers. Previously, this functionality was available only on Cisco AS5300 switches.

Related Documents

- Cisco IOS Release 12.1 *Multiservice Applications Configuration Guide*
- Cisco IOS Release 12.1 *Multiservice Applications Command Reference*

- Cisco IOS Release 12.1 *Dial Services Configuration Guide: Terminal Services*
- *Voice over IP for the Cisco 3600 and Cisco 2600 Series Software Configuration Guide*

Supported Platforms

This feature is supported on the following platforms:

- Cisco 2600 series routers
- Cisco 3600 series routers
- Cisco 7200 series routers

Supported Standards, MIBs and RFCs

None.

Configuration Tasks

The following configuration tasks are described:

- Configuring Switch Types for ISDN PRI Q.931 Support
- Configuring Protocol Emulation for ISDN PRI Support

Configuring Switch Types for ISDN PRI Q.931 Support

To configure QSIG signaling support on the Cisco 2600 or 3600 series router, complete the following steps beginning in global configuration mode:

	Command	Purpose
Step 1	`Router(config)# isdn switch-type primary-net5`	(Optional; see note.) Selects a service provider switch type that accommodates PRI. **Note** You can configure the ISDN switch type in either global or interface configuration mode. If you configure it here in Step 1, specify the switch type for all PRI ports. If you configure it in Step 4, specify the switch type for a single interface. The switch type specified in Step 4 for any individual interface overrides the globally specified switch type.
Step 2	`Router(config)# controller {T1 | E1} slot/port`	Enters controller configuration mode for the controller at the specified slot/port location. Valid values for slot and port are 0 and 1.
Step 3	`Router(config-if)# pri-group [timeslots range]`	Configures the PRI group for either T1 or E1 to carry voice traffic. For T1, available time slots are from 1 through 23; for E1, available time slots are from 1 through 31. You can configure the PRI group to include all available time slots, or you can configure a select group of time slots for the PRI group.
Step 4	`Router(config-if)# isdn protocol-emulate {user | network}`	Configure the ISDN interface to serve as either the primary slave or the primary master. For this command, **user** specifies slave and **network** specifies master.
Step 5	`Router(config-if)# [no] line-power`	Turns on or turns off the power supplied from an NT-configured port to a TE device. The default is **no line-power**.
Step 6	`Router(config-if)# incoming-voice voice`	Routes incoming ISDN voice calls to the voice module.
Step 7	Exit from the interface configuration mode and repeat Step 2 through Step 6 for each remaining PRI voice port.	

Configuring Protocol Emulation for ISDN PRI Support

Routers and PBXs are both traditionally CPE with respect to the PSTN interfaces. For Voice-over-IP (VoIP) applications, it is desirable to interface access servers to PBXs with the access server representing the PSTN.

This feature enables the access server to provide a standard ISDN PRI network-side and user-side interface to the PBXs and to mimic the behavior of legacy phone switches. To a PBX, the access server functions as a Net5 PRI switch. No change in PBX capability or behavior is required.

To configure ISDN PRI network-side and user-side support on Cisco routers, complete the following steps beginning in global configuration mode:

	Command	Purpose
Step 1	`Router(config)# controller T1 slot/port`	Enter controller configuration mode for the T1 controller at the specified *slot/port* location. Valid values for *slot* and *port* are 0 and 1.
Step 2	`Router(config-controller)# pri-group timeslot range`	Specify ISDN Primary Rate Interface (PRI) on a channelized T1 or E1 controller. Enter a single range of values from 1 through 23 for channelized T1 and from 1 through 31 for channelized E1.
Step 3	`Router(config-controller)# interface serial0/0:n`	Specify the D-channel interface. For *n*, the D-channel number, use: • **0:23** on a T1 PRI • **0:15** on an E1 PRI
Step 4	`Router(config-controller)# isdn protocol-emulate {user | network}`	Configure the Layer 2 and Layer 3 port protocol emulation: • Enter **user** to configure the port as a slave. This is the default. • Enter **network** to configure the port as a master.
Step 5	Exit from the interface configuration mode and repeat Step 1 throughStep 4 for each remaining PRI port.	

Configuration Examples

The example below shows how a Cisco 3660 router can be configured for E1 and PRI with network-side support using VoIP.

```
.
hostname router3660
!
!
memory-size iomem 20
voice-card 5
!
voice-card 6
!
ip subnet-zero
!
isdn switch-type primary-net5
isdn voice-call-failure 0
!
controller E1 3/0
 pri-group timeslots 1-5,16
!
controller E1 3/1
 pri-group timeslots 1-31
!
controller E1 4/0
 pri-group timeslots 1-31
!
controller E1 4/1
 pri-group timeslots 1-31
!
interface FastEthernet0/0
 ip address 10.7.72.9 255.255.255.0
 speed auto
 half-duplex
!
interface FastEthernet0/1
 ip address 10.100.100.7 255.255.255.0
 no keepalive
 duplex auto
 speed auto
 hold-queue 1000 in
!
interface Serial2/0
 no ip address
 shutdown
!
interface Serial2/1
 no ip address
 shutdown
!
interface Serial2/2
 no ip address
 shutdown
!
interface Serial2/3
 no ip address
 shutdown
!
interface Serial5/0:15
 no ip address
 ip mroute-cache
 no logging event link-status
```

```
 isdn switch-type primary-qsig
 isdn overlap-receiving
 isdn incoming-voice voice
 isdn protocol-emulate network
 no cdp enable
!
interface Serial5/1:15
 no ip address
 ip mroute-cache
 no logging event link-status
 isdn switch-type primary-qsig
 isdn incoming-voice voice
 fair-queue 64 256 0
 no cdp enable
!
interface Serial6/0:15
 no ip address
 ip mroute-cache
 no logging event link-status
 isdn switch-type primary-qsig
 isdn incoming-voice voice
 fair-queue 64 256 0
 isdn protocol-emulate network
 no cdp enable
!
interface Serial6/1:15
 no ip address
 ip mroute-cache
 no logging event link-status
 isdn switch-type primary-qsig
 isdn incoming-voice voice
 fair-queue 64 256 0
 no cdp enable
!
ip classless
ip route 223.255.254.254 255.255.255.255 FastEthernet0/0
no ip http server
!
!
voice-port 1/0/0
timing hookflash-in 0
!
voice-port 1/0/1
timing hookflash-in 0
!
voice-port 5/0:15
 compand-type a-law
!
voice-port 5/1:15
 compand-type a-law
 cptone DE
!
voice-port 6/0:15
 compand-type a-law
 cptone DE
!
voice-port 6/1:15
 no echo-cancel enable
 compand-type a-law
 cptone DE
!
dial-peer voice 1 pots
 shutdown
 destination-pattern 21...
```

```
direct-inward-dial
!
dial-peer voice 51 voip
 shutdown
 destination-pattern 6504007
session target ipv4:100.100.100.3
!
dial-peer voice 2 pots
 shutdown
 destination-pattern 21...
direct-inward-dial
 port 5/1:15
!
dial-peer voice 3 voip
 shutdown
 destination-pattern 22...
session target ipv4:100.100.100.6
!
dial-peer voice 5 pots
 shutdown
 destination-pattern 22...
 modem passthrough system
 direct-inward-dial
 prefix 4006
!
dial-peer voice 13 pots
 shutdown
 destination-pattern 21...
direct-inward-dial
 port 6/0:15
!
dial-peer voice 6 pots
 destination-pattern 21...
direct-inward-dial
 port 6/1:15
!
dial-peer voice 20 pots
 incoming called-number 4...
 destination-pattern 4007
direct-inward-dial
 port 5/0:15
 prefix 4007
!
dial-peer voice 21 pots
 destination-pattern 4006
direct-inward-dial
 port 5/0:15
 prefix 4006
!
!
line con 0
 transport input none
line aux 0
line vty 0 4
 login
!
end
```

Command Reference

All commands used with this feature are documented in the Cisco IOS Release 12.1 command references. The following command is revised for configuration of Q.931 PRI signaling:

- **isdn protocol-emulate**

isdn protocol-emulate

To configure the router PRI interface to serve as either the primary slave or the primary master, enter the **isdn protocol-emulate** command. Enter the **no** form of this command to disable the setting.

isdn protocol-emulate [*user* | *network*]
no isdn protocol-emulate [*user* | *network*]

Syntax Description

user	Use the user option to designate the slave.
network	Use the network option to designate the master.

Defaults

The switch types default to user.

Command Modes

Interface configuration mode

Command History

Release	Modification
Cisco IOS Release 12.0(3)XG	This command was introduced.
Cisco IOS Release12.1(2)XH and 12.1(3)T	This command was modified to support the Cisco 2600, 3600, and 7200 series routers

Note You can enter this command either in the global configuration mode or in the interface configuration mode. Settings entered in the global configuration mode apply to the entire router. Settings entered in the interface configuration mode apply only to the T1/E1 interface specified. The interface configuration mode setting overrides the global configuration setting.

Usage Guidelines

Specify a slave and a master according to the Q.931 configuration for your router.

Examples

See the following example to configure the router to act as the Q.931 master:

```
isdn protocol-emulate network
```

See the following example to configure T1 interface 23 on the router to act as the Q.931 master:

```
interface serial 0/1:23
 isdn protocol-emulate network
```