Configuring Network Side ISDN PRI Signaling, Trunking, and Switching

This chapter describes the Network Side ISDN PRI Signaling, Trunking, and Switching feature. The following main sections are provided:

- Network Side ISDN PRI Signaling Overview
- How to Configure Network Side ISDN PRI
- Configuration Examples for Network Side ISDN PRI Signaling, Trunking, and Switching

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

To identify the hardware platform or software image information associated with a feature, use the Feature Navigator on Cisco.com to search for information about the feature or refer to the software release notes for a specific release. For more information, see the "Identifying Supported Platforms" section in the "Using Cisco IOS Software" chapter.

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

Network Side ISDN PRI Signaling Overview

The Network Side ISDN PRI Signaling, Trunking, and Switching feature enables Cisco IOS software to replicate the public switched network interface to a PBX that is compatible with the National ISDN (NI) switch types and European Telecommunications Standards Institute (ETSI) Net5 switch types.

Routers and PBXs are both traditionally customer premises equipment (CPE) devices with respect to the public switched network interfaces. However, for Voice over IP (VoIP) applications, it is desirable to interface access servers to PBXs with the access server representing the public switched network.

Enterprise organizations use the current VoIP features with Cisco products as a method to reduce costs for long distance phone calls within and outside their organizations. However, there are times that a call cannot go over VoIP and the call needs to be placed using the Public Switched Telephone Network (PSTN). The customer then must have two devices connected to a PBX to allow some calls to be placed

using VoIP and some calls to be placed over the PSTN. In contrast, this feature allows Cisco access servers to connect directly to user-side CPE devices such as PBXs and allows voice calls and data calls to be placed without requiring two different devices to be connected to the PBXs.

The Network Side ISDN PRI Signaling, Trunking, and Switching feature provides the following benefits:

- Allows you to bypass PSTN tariffed services such as trunking and administration, thus extending the cost savings of VoIP.

- Allows your PBXs to be connected directly to a Cisco access server, so PBX station calls can be routed automatically to the IP network without the need for special IP telephones.

- Provides flexibility in network design.

- Enables you to block calls selectively based on the called number or the calling number.

Call Switching Using Dial Peers

Call switching using dial peers enables Cisco VoIP gateways to switch both voice and data calls between different interfaces based on the dial peer matching. An incoming call is matched against configured dial peers, and based on the configured called number, the outgoing interface is selected. Any call that arrives from an ISDN PRI network side on a supported platform is either terminated on the access server, switched to an IP network, or switched to the PSTN, depending on the configuration.

Note An incoming call will be switched or processed as a voice call only if it matches a dial peer.

A dial peer is an addressable call endpoint identified, for example, by a phone number or a port number. In VoIP, there are two kinds of dial peers: plain old telephone service (POTS) and VoIP. Dial peers are defined from the perspective of the access server and are used for both inbound and outbound call legs. An *inbound* call leg originates outside the access server. An *outbound* call leg originates from the access server.

For inbound call legs, a dial peer might be associated with the calling number or the port designation. Outbound call legs always have a dial peer associated with them. The destination pattern (a defined initial part of a phone number) is used to identify the outbound dial peer. The call is associated with the outbound dial peer at setup time.

POTS dial peers associate a telephone number with a particular voice port so that incoming calls for that telephone number can be received and outgoing calls can be placed.

Additional information about dial peers can be found in the chapter "Configuring Dial Plans, Dial Peers, and Digit Manipulation" in the *Cisco IOS Voice, Video, and Fax Configuration Guide*, Release 12.2.

Trunk Group Resource Manager

The Trunk Group Resource Manager (TGRM) supports the logical grouping, configuration, and joint management of one or more PRI interfaces. The TGRM is used to store configuration information and to accept or select an interface from a trunk group when requested. A trunk group is provisioned as the target of a dial peer, and the TGRM transparently selects the specific PRI interface and channels to use for incoming or outgoing calls. Trunks are selected based on usage: The trunk that is least used is selected.

Using trunk groups simplifies the task of configuring dial peers and PRI interfaces, and also enables the dynamic selection of PRI interfaces as needed in the access server.

A trunk group can include any number of PRI interfaces, but all the interfaces in a trunk group must use the same type of signaling.

Class of Restrictions

The class of restrictions (COR) functionality provides the ability to deny certain call attempts based on the incoming and outgoing class of restrictions provisioned on the dial peers. This functionality provides flexibility in network design, allows users to block calls (for example, to 900 numbers), and applies different restrictions to call attempts from different originators.

COR is used to specify which incoming dial peer can use which outgoing dial peer to make a call. Each dial peer can be provisioned with an incoming and an outgoing COR list. The incoming COR list indicates the capability of the dial peer to initiate certain classes of calls. The outgoing COR list indicates the capability required for an incoming dial peer to deliver a call via this outgoing dial peer. If the capabilities of the incoming dial peer are not the same or a superset of the capabilities required by the outgoing dial peer, the call cannot be completed using this outgoing dial peer.

ISDN Disconnect Timers

A new disconnect timer, T306, has been added as part of the Internetworking Signaling Enhancements for H.323 and SIP VoIP feature. This timer allows in-band announcements and tones to be played before a call is disconnected. It is designed for routers that are configured as an ISDN network-side switch. The T306 timer starts when a router sends out a disconnect message with a progress indicator of 8. The voice path is cut-through in the backward direction, and the announcement or error tone is played until the timer expires. When the timer expires, the voice application disconnects the call. You can configure this timer by using the **isdn t306** command. The T306 timer is supported only on routers that are configured for network-side ISDN. The following switches support network-side ISDN:

- National ISDN
- NET3 BRI
- NET5
- QSIG

The T310 timer sets a limit for a call in the Call Proceeding state. The timer starts when the router receives a Call Proceeding message and stops when the call moves to another phase, typically Alerting, Connect, or Progress. If the timer expires while the call is in the Call Proceeding state, the router releases the call. You can configure this timer by using the **isdn t310** command.

How to Configure Network Side ISDN PRI

See the following sections for configuration tasks for the Network Side ISDN PRI Signaling, Trunking, and Switching feature. Each task is identified as required or optional.

- Configuring ISDN Network Side (Required)
- Configuring Global or Interface Trunk Groups (Optional)
- Configuring Classes of Restrictions (Optional)
- Configuring ISDN T306 and T310 Timers (Optional)

- Verifying Network Side ISDN PRI Signaling, Trunking, and Switching (Optional)

The sections "Monitoring Network Side ISDN PRI" and "Monitoring TGRM" list commands that you can use to monitor network side ISDN PRI signaling.

Configuring ISDN Network Side

Before you begin to configure the Network Side ISDN PRI Signaling, Trunking, and Switching feature, ensure that the selected access server is in the following condition:

- The T1 or E1 controllers are operational and configured for ISDN PRI.
- The D-channel interfaces are operational and configured for ISDN PRI.
- Each D-channel interface is configured with the **isdn incoming-voice modem** command.

For example, the selected PRI interfaces might have a configuration similar to the following:

```
interface Serial1/0/0:23
 no ip address
 no ip directed-broadcast
 isdn switch-type primary-ni
 isdn protocol-emulate network
 isdn incoming-voice modem
 no cdp enable
```

Also keep the following restrictions in mind as you configure network side ISDN PRI signaling, trunking, and switching:

- You can configure Cisco access server and access routers for either Network Side ISDN PRI for NI or Net5 switches.
- The trunking and COR parts of the Network Side ISDN PRI Signaling, Trunking, and Switching feature are available only on the Cisco AS5800 access server. In addition, call hairpinning without the need of a Voice Feature Card (and its digital signal processor) is available only on the Cisco AS5800 and Cisco AS5400. The remainder of the feature is platform-independent.
- The Cisco AS5800 and Cisco AS5400 switch both voice and data calls. The Cisco As5300 switches only data calls.
- On the Cisco AS5800, direct-inward-dial (DID) switched calls can work without a Voice Feature Card, if the appropriate modem is present. Refer to the AS5800 hardware and software installation manuals for more information.
- On the Cisco AS5400, direct-inward-dial (DID) switched calls can work with only Trunk Feature Cards present. No Voice Feature Card or Modem Feature card are required.
- An interface that is a member of a Non-Facility Associated Signaling (NFAS) group cannot belong to a trunk group.
- The Cisco AS5400 supports Network Side ISDN PRI Signaling and Calling Switching Using Dial Peers. It does not support Trunk Group Resource Manager and Class of Restrictions.
- The Network Side ISDN PRI part of this feature runs on any ISDN-capable platform with PRI interfaces. The trunking and class of restrictions parts of this feature require the Cisco AS5800.

Note To identify the hardware platform or software image information associated with a feature, use the Feature Navigator on Cisco.com to search for information about the feature. For more information, see the "Identifying Supported Platforms" section in the "Using Cisco IOS Software" chapter.

Configuring ISDN Network Side for the National ISDN Switch Type

To configure Network Side ISDN PRI, use the following commands beginning in global configuration mode:

	Command	Purpose
Step 1	`Router(config)# `**`isdn switch-type `**`type`	Sets the global ISDN switch type. Two types are supported:
		• **primary-ni** for NI on a T1 line
	or	• **primary-net5** for ETSI Net5 on an E1 line
	`Router(config-if)# `**`interface serial0/0/`**`n`	Specifies the D-channel interface. For *n*, the D-channel number, use:
		0:23 on a T1 PRI
		0:15 on an E1 PRI
	and	
	`Router(config-if)# `**`switch-type primary-ni`**	Sets the switch type on the interface.
Step 2	`Router(config-if)# `**`isdn protocol-emulate network`**	Enables network-side support on the PRI interface.

If you choose to configure Network Side ISDN PRI on individual interfaces in Step 1, repeat the configuration on the additional PRI interfaces.

Configuring ISDN Network Side for ETSI Net5 PRI

To configure a Cisco access router for ISDN Network Side for ETSI Net5 PRI, you can configure the **primary-net5** switch type globally or you can configure the **primary-net5** switch type on selected PRI interfaces. To configure ISDN Network Side for Net5, use the following commands beginning in global configuration mode:

	Command	Purpose
Step 1	`Router(config)# `**`isdn switch-type primary-net5`**	Sets the **primary-net5** global ISDN switch type.
	or	or
	`Router(config-if)# `**`interface serial0/0/0:15`**	Specifies a D-channel interface to configure for ISDN Network Side for ETSI Net5 PRI.
	`Router(config-if)# `**`switch-type primary-net5`**	Sets the **primary-net5** switch type on the interface.
Step 2	`Router(config-if)# `**`isdn protocol-emulate network`**	Enables network side support on the interface.

Repeat the configuration steps on all the additional PRI D-channel interfaces you want to configure for ISDN Network Side for ETSI Net5 PRI.

Configuring Global or Interface Trunk Groups

You can create trunk groups globally (using the one-command version of Step 1) or on each interface (using the two-command version of Step 1). To configure trunk groups, use the following commands beginning in global configuration mode:

	Command	Purpose
Step 1	Router(config)# **trunk group** *group-number*	Defines the trunk group globally.
	or	
	Router(config-if)# **interface serial0/0/***n*	Specifies the PRI D-channel. For *n*, the D-channel number, use: • **0:23** on a T1 PRI • **0:15** on an E1 PRI
	and	
	Router(config-if)# **trunk-group** *group-number*	Adds the interface to a trunk group. If the trunk group has not been defined globally, it will be created now.
Step 2	Router(config-if)# **max-calls** {**voice**│**data**│**any**} **number**│[**direction in**│**out**]	Applies a maximum number of calls restriction to the trunk group. This command can be repeated to apply a maximum number to different types of calls and, optionally, to specify whether the maximum applies to incoming or outgoing calls. **Note** Repeat Step 1 and Step 2 to create additional trunk groups and specify their restrictions, as needed for your traffic.
Step 3	Router(config)# **dial-peer voice** *tag* **pots**	Enters dial-peer configuration mode and defines a remote dial peer.
Step 4	Router(config-dial-peer)# **trunkgroup** *group-number*	Specifies the trunk group to be used for outgoing calls to the destination phone number.

Configuring Classes of Restrictions

To configure COR for dial peers, use the following commands beginning in global configuration mode:

	Command	Purpose
Step 1	Router(config)# **dial-peer cor custom**	Specifies that named classes of restrictions apply to dial peers and changes the command mode to COR configuration.
Step 2	Router(config-cor)# **name** *class-name*	Provides a name for a custom class of restrictions. **Note** Repeat this step for additional class names, as needed. These class names are used in various combinations to define the lists in Step 3 and Step 4.
Step 3	Router(config)# **dial-peer cor list** *list-name*	Provides a name for a list of restrictions.
Step 4	Router(config-cor)# **member** *class-name*	Adds a COR class to this list of restrictions. The member is a class named in Step 2. **Note** Repeat Step 3 and Step 4 to define another list and its membership, as needed.
Step 5	Router(config)# **dial-peer voice** *tag* **pots**	Enters dial-peer configuration mode and defines a remote dial peer.
Step 6	Router(config-dial-peer)# **corlist incoming** *cor-list-name*	Specifies the COR list to be used when this is the incoming dial peer.
Step 7	Router(config-dial-peer)# **corlist outgoing** *cor-list-name*	Specifies the COR list to be used when this is the outgoing dial peer. **Note** Repeat Step 5 through Step 7 for additional dial peers, as needed.

Configuring ISDN T306 and T310 Timers

To configure the T306 and T310 timers, use the following commands beginning in global configuration mode:

	Command	Purpose
Step 1	Router(config)# **interface serial** *controller:timeslot*	Enters interface configuration mode for a D-channel serial interface.
Step 2	Router(config-if)# **isdn t306** *milliseconds*	Sets the number of milliseconds that the gateway waits before clearing a call after the router sends out a disconnect message with a progress indicator of 8.
Step 3	Router(config-if)# **isdn t310** *milliseconds*	Sets the number of milliseconds that the gateway waits before clearing a call after it receives a Call Proceeding message.

To verify that the T306 timer is configured and operating correctly, perform the following steps:

Step 1   Display the running configuration file with the **show running-config** privileged EXEC command. Verify that the configuration is accurate for the T306 timer. See the "T306/T310 Timer Configuration Example" section for a sample configuration.

Step 2   Enable the **debug isdn q931** privileged EXEC command to trace the ISDN messages.

Step 3   Place a call to the gateway. Disconnect the call and allow the far end to play its error message until the T306 timer expires. When the timer expires, the gateway should disconnect the call.

Verifying Network Side ISDN PRI Signaling, Trunking, and Switching

To learn whether the Network Side ISDN PRI Signaling, Trunking, and Switching feature is configured successfully, perform the following steps:

Step 1   Enter the **show isdn status** command to learn whether an appropriate switch type is specified either globally or on the D-channel interface:

```
Router# show isdn status serial 0:15

Global ISDN Switchtype = primary-net5
ISDN Serial0:15 interface
        ******* Network side configuration *******
        dsl 0, interface ISDN Switchtype = primary-net5
```

Step 2   Enter the **show dial-peer voice** command to learn whether the trunk group COR list and permission fields are set as desired on a dial peer:

```
Router# show dial-peer voice

VoiceEncapPeer210
        information type = voice,
        tag = 210, destination-pattern = `221',
        answer-address = `', preference=0,
        numbering Type = `unknown'
        group = 210, Admin state is up, Operation state is up,
        incoming called-number = `221', connections/maximum = 4/unlimited,
        DTMF Relay = disabled,
        Modem = system passthrough ,
        huntstop = disabled,
        application associated:
        permission :both
        incoming COR list:listA
        outgoing COR list:minimum requirement
        type = pots, prefix = `221',
        forward-digits default
        session-target = `', voice-port = `1/0/8:D',
        direct-inward-dial = enabled,
        digit_strip = enabled,
```

✎

Note   The above output is for a dial peer configured with incoming COR list "listA" and without an outgoing COR list configured. When no outgoing COR list is configured, the **show dial-peer voice** command displays "minimum requirement" in the outgoing COR list output. When no incoming COR list is configured, the **show dial-peer voice** command displays "maximum capability" in the incoming COR list output.

Step 3   Enter the **show dial-peer cor** command to display the COR names and lists you defined. For example, if you configured COR as shown in the following sample display, the **show dial-peer cor** command output reflects that configuration.

Sample Configuration

```
dial-peer cor custom
 name 900block
 name 800_call
 name Catchall
!
dial-peer cor list list1
 member 900block
 member 800_call
!
dial-peer cor list list2
 member 900block
!
dial-peer cor list list3
 member 900block
 member 800_call
 member Catchall
```

Verification

```
Router# show dial-peer cor

Class of Restriction
  name:900block
  name:800_call
  name:Catchall

COR list <list1>
  member:900block
  member:800_call

COR list <list2>
  member:900block

COR list <list3>
  member:900block
  member:800_call
  member:Catchall
```

Step 4   Enter the **show tgrm** command to verify the trunk group configuration. For example, if you configured trunk groups as shown in the following sample display, the **show tgrm** command output reflects that configuration.

Sample Configuration

```
interface Serial1/0/8:15
 no ip address
 ip mroute-cache
 no keepalive
 isdn switch-type primary-net5
 isdn protocol-emulate network
 isdn incoming-voice modem
 trunk-group 2
 no cdp enable
```

Verification

```
Router# show tgrm

     Trunk   Any in  Vce in   Data in
    Group #  Any out Vce out  Data out

      2        65535   65535   65535
               65535   65535   65535
               0 Retries
               Interface Se1/0/1:15    Data = 0, Voice = 0, Free = 30
               Interface Se1/0/8:15    Data = 2, Voice = 0, Free = 28

Total calls for trunk group:Data = 2, Voice = 0, Free = 58
               Selected Voice Interface :Se1/0/1:15
               Selected Data Interface  :Se1/0/1:15
```

Step 5   Enter the **show isdn status** command to display the status of both Network Side ISDN PRI and call switching:

```
Router# show isdn status

Global ISDN Switchtype = primary-net5
ISDN Serial1/0/0:15 interface
        ******* Network side configuration *******
        dsl 0, interface ISDN Switchtype = primary-net5
    Layer 1 Status:
        ACTIVE
    Layer 2 Status:
        TEI = 0, Ces = 1, SAPI = 0, State = MULTIPLE_FRAME_ESTABLISHED
    Layer 3 Status:
        2 Active Layer 3 Call(s)
    Activated dsl 0 CCBs = 2
        CCB:callid=3C71, sapi=0, ces=0, B-chan=31, calltype=data
        CCB:callid=3C72, sapi=0, ces=0, B-chan=30, calltype=data
    The Free Channel Mask: 0x9FFF7FFF
ISDN Serial1/0/1:15 interface
/1/0/8
filtering...
ISDN Serial1/0/8:15 interface
        ******* Network side configuration *******
        dsl 8, interface ISDN Switchtype = primary-net5
    Layer 1 Status:
        ACTIVE
    Layer 2 Status:
        TEI = 0, Ces = 1, SAPI = 0, State = MULTIPLE_FRAME_ESTABLISHED
    Layer 3 Status:
        2 Active Layer 3 Call(s)
    Activated dsl 8 CCBs = 2
        CCB:callid=BB40, sapi=0, ces=0, B-chan=1, calltype=DATA
        CCB:callid=BB41, sapi=0, ces=0, B-chan=2, calltype=DATA
    The Free Channel Mask: 0xFFFF7FFC
```

Monitoring Network Side ISDN PRI

To monitor Network Side ISDN PRI, use the following commands in EXEC mode as needed:

Command	Purpose
Router# **show controllers e1** *slot*/*port*	Checks Layer 1 (physical layer) of the PRI over E1.
Router# **show controllers e1** *number* **call-counters**	Displays the number of calls and call durations on an E1 controller.
Router# **show interfaces serial** *slot*/*port* **bchannel** *channel-number*	Displays information about the physical attributes of the ISDN PRI over channelized E1 B and D channels.
Router# **show isdn** {**active** | **history** | **memory** | **services** | **status** [*dsl* | *interface-type number*] | **timers**}	Displays information about memory, Layer 2 and Layer 3 timers, and the status of PRI channels.

Monitoring TGRM

To monitor and maintain the Trunk Group Resource Manager, use the following command in EXEC mode:

Command	Purpose
`Router# show tgrm`	Displays TGRM information for debugging purposes.

Configuration Examples for Network Side ISDN PRI Signaling, Trunking, and Switching

This section provides the following configuration examples:

- Call Switching and Dial Peers Configuration on T1/T3 Example
- Trunk Group Configuration Example
- COR for Dial Peer Configuration Example
- COR Based on Outgoing Dial Peers Example
- Dial Peers and Trunk Groups for Special Numbers Examples
- ISDN Network Side for ETSI Net5 PRI Configuration on E1 Example
- T306/T310 Timer Configuration Example

Call Switching and Dial Peers Configuration on T1/T3 Example

The following example enables Network Side ISDN PRI, call switching, and dial peers:

```
isdn switch-type primary-ni
!
controller T1 1/0/0
 framing esf
 linecode b8zs
 pri-group timeslots 1-24
!
interface Serial1/0/0:23
 no ip address
 no ip directed-broadcast
 isdn switch-type primary-ni
 isdn protocol-emulate network
 isdn incoming-voice modem
 no cdp enable
!
dial-peer voice 11 pots
 incoming called-number 222
 destination-pattern 222
 direct-inward-dial
 port 1/0/0:D
 prefix 555
```

Trunk Group Configuration Example

The following trunk group allows only voice calls:

```
trunk group 1
max-calls data 0
!
```

The following trunk group allows a maximum of 20 outgoing voice calls:

```
trunk group 2
max-calls voice 20 direction out
!
```

The following trunk group allows a maximum of 50 incoming calls:

```
trunk group 3
max-calls any 50 direction in
!
```

The following trunk group allows a maximum of 100 calls, 30 of which can be voice (incoming or outgoing), and 60 of which can be incoming data (the remaining 10 will be unused):

```
trunk group 4
max-calls any 100
max-calls voice 30
max-calls data 60 direction in
```

COR for Dial Peer Configuration Example

The following example defines trunk group 101, establishes Network Side ISDN PRI on two PRI interfaces, and assigns both interfaces to trunk group 101. In addition, it establishes three COR lists, and specifies which incoming dial peers can make calls to 800 and which can make calls to 900 area codes. This example adopts a useful mnemonic pattern: the **dial-peer voice** tags for incoming calls correspond to the answer address (the phone number being called) and the **dial-peer voice** tags for outgoing calls correspond to the destination pattern.

```
trunk group 101
!
interface Serial1/0/0:23
 no ip address
 no ip directed-broadcast
 isdn switch-type primary-ni
 isdn protocol-emulate network
 isdn incoming-voice modem
 no cdp enable
 trunk-group 101
!
interface Serial1/0/1:23
 no ip address
 no ip directed-broadcast
 isdn switch-type primary-ni
 isdn protocol-emulate network
 isdn incoming-voice modem
 no cdp enable
 trunk-group 101
!
dial-peer cor custom
 name 900_call
 name 800_call
!
dial-peer cor list list1
 member 900_call
!
```

```
dial-peer cor list list2
 member 800_call
!
dial-peer cor list list3
 member 900_csll
 member 800_call
!
dial-peer voice 525 pots
 answer-address 408525....
 corlist incoming list3
 direct-inward-dial
!
dial-peer voice 526 pots
 answer-address 408526....
 corlist incoming list2
 direct-inward-dial
!
dial-peer voice 900 pots
 destination-pattern 1900.......
 direct-inward-dial
 trunkgroup 101
 prefix 333
 corlist outgoing list1
!
dial-peer voice 12345 pots
 destination-pattern .T
 direct-inward-dial
 trunkgroup 202
!
```

COR Based on Outgoing Dial Peers Example

A typical application of COR is to define a COR name for the number that an outgoing dial peer serves, then define a list that contains only that COR name, and assign that list as **corlist outgoing** for this outgoing dial peer. For example, dial peer with destination pattern 5x can have a **corlist outgoing** that contains COR 5x.

The next step, in the typical application, is to determine how many call permission groups are needed, and define a COR list for each group. For example, group A is allowed to call 5x and 6x, and group B is allowed to call 5x, 6x, and 1900x. Then, for each incoming dial peer, we can assign a group for it, which defines what number an incoming dial peer can call. Assigning a group means assigning a **corlist incoming** to this incoming dial peer.

```
config terminal
 dial-peer cor custom
 name 5x
 name 6x
 name 1900x
!
dial-peer cor list listA
 member 5x
 member 6x
!
dial-peer cor list listB
 member 5x
 member 6x
 member 1900x
!
dial-peer cor list list5x
 member 5x
!
```

```
dial-peer cor list list6x
 member 6x
!
dial-peer cor list list1900x
 member 1900x

! outgoing dialpeer 100, 200, 300
dial-peer voice 100 pots
 destination-pattern 5T
 corlist outgoing list5x
dial-peer voice 200 pots
 destination-pattern 6T
 corlist outgoing list6x
dial-peer voice 300 pots
 destination-pattern 1900T
 corlist outgoing list1900x
!
! incoming dialpeer 400, 500
dial-peer voice 400 pots
 answer-address 525....
 corlist incoming listA
dial-peer voice 500 pots
 answer-address 526
 corlist incoming listB
```

In this example, calls from 525xxxx are not able to use dial peer 300, which means they will not be able to make 1900 calls (long distance calls to the 900 area code). But calls from 526xxxx can make 1900 calls.

Dial Peers and Trunk Groups for Special Numbers Examples

The following partial examples show setups for handling special numbers such as the 911 emergency number, the 0 local operator number, the 00 long-distance operator number, and so forth. "T" in these examples stands for the "interdigital timeout." Calls to emergency numbers should not wait for this timeout, so 911 is used as the destination pattern, not 911T.

This partial example sets up a trunk group to handle calls going to the operator (0):

```
dial-peer voice 100 pots
 destination-pattern 0T
 trunkgroup 203
!
```

The following partial example sets up a trunk group to handle calls to the long distance operator (00):

```
dial-peer voice 200 pots
 destination-pattern 00T
 trunkgroup 205
!
```

The following partial example sets up a trunk group to handle calls to the international direct dial (011):

```
dial-peer voice 300 pots
 destination-pattern 011T
 trunkgroup 207
!
```

The following partial example sets up a trunk group to handle street line calls (calls that get a dial tone for an outside line):

```
disl-peer voice 400 pots
 destination-pattern 9T
 trunkgroup 209
!
```

The following partial example sets up a trunk group to handle calls for directory assistance:

```
dial-peer voice 500 pots
 destination-pattern 411
 trunkgroup 211
!
```

The following partial example sets up a trunk group to handle calls to the 911 emergency number. Emergency calls will not require a wait for the interdigital timeout to expire. They will be completed immediately.

```
dial-peer voice 600 pots
 destination pattern 911
 trunkgroup 333
```

ISDN Network Side for ETSI Net5 PRI Configuration on E1 Example

The following example enables the ISDN Network Side for ETSI Net5 PRI feature on an access server on which ISDN PRI is already configured and operational. In this example, the Net5 PRI switch type is set on the D-channel interface, and the global interface type is not shown.

```
controller e1 0
 pri-group timeslots 1-31
 exit
!
interface serial0:15
 no ip address
 no ip directed-broadcast
 ip mroute-cache
 isdn switch-type primary-net5
 isdn protocol-emulate networK
```

T306/T310 Timer Configuration Example

The following example configures the T306 and T310 disconnect timers:

```
interface Serial0:23
 no ip address
 no ip directed-broadcast
 encapsulation ppp
 dialer rotary-group 0
 isdn switch-type primary-5ess
 isdn incoming-voice modem
 isdn t306 60000
 isdn t310 40000
```