

# BRI-to-PRI Connection Using Data Over Voice

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## Introduction

This document provides a sample configuration for TData over Voice (DOV), which allows data to be sent over a voice call with an ISDN line.

## Prerequisites

### Requirements

Ensure that you meet these requirements before you attempt this configuration:

- Cisco IOS Software Version 12.0
- Cisco 5300 with four Primary Rate Interfaces (PRIs)
- Cisco 2503 with a Basic Rate Interface (BRI)
- The hostname of each side
- A password for PPP authentication
- Phone numbers of the ISDN lines
- The IP addresses of the Ethernet interfaces on both sides

### Conventions

Refer to Cisco Technical Tips Conventions for more information on document conventions.

## Background Information

DOV allows data to be sent over a voice call with an ISDN line. An ISDN line can support both data calls and voice calls. Two routers that interconnect with ISDN lines typically use data calls (64 kbps or 56 kbps). Voice calls are expected to be generated by a telephone or fax. Voice calls can also be generated by a device connected to an analog modem, for example, a PC that dials up with a plain old telephone service (POTS) line.

In some circumstances, a user can connect two routers with voice calls with ISDN lines, especially when the price difference between a data call and a voice call is considered. ISDN lines commonly have per-call charges for all calls: local, long distance, and international. In some instances, the cost of voice calls is lower than the cost of data calls.

In order for routers to communicate with voice calls between two ISDN lines, careful configuration is necessary to make the routers aware that the calls need to be initiated as voice calls and that inbound voice calls must be handled as data calls. On the outbound (calling) side, use the **map-class** option to define calls as voice calls:

**map-class** *dialer name*

**dialer voice-call**

This **map-class** defines a behavior and must be applied to the ISDN interfaces where this behavior is needed. Here is an example of the **map-class** behavior on **dialer map** and **dialer string** commands:

**dialer map** *protocol address class map class name host name [broadcast] phone number*

**dialer string** *phone number class map class*

Refer to the Cisco IOS<sup>®</sup> Software documentation for the complete syntax of these two commands.

On the inbound (called) side, add the **isdn incoming-voice data** command under the Serial<n>:23 interface. Remember that all inbound voice calls are treated as data calls. If you also want to support modem calls on the same ISDN line, use the Resource Pool Manager (RPM) feature; otherwise, you can separate those two services into two different ISDN lines with different telephone numbers. Problems occur if the two lines have the same number; they are part of a hunt group. A particular interface can either handle voice calls as modem calls or voice calls as data-over-voice calls, but **not** both.

It is important to understand that DOV has limited reliability. A call between two ISDN lines is expected to supply an end-to-end digital path. The equipment, lines, and other resources that the telephone company uses to set up data and voice calls are usually the same, but they can be different. The transport of digital voice is more flexible than the transport of data. For ISDN data calls, the telephone network guarantees bit transport along a 64 kbps or 56 kbps digital path. For voice calls, the telephone network can route and manipulate the bit stream in different ways yet not affect voice quality. Since all data is corrupted when sent this way, DOV does not work with some ISDN lines.

## Configure

This configuration uses a Cisco 5300 with four Primary Rate Interfaces (PRIs) to terminate calls and a Cisco 2503 with a Basic Rate Interface (BRI) to initiate the calls. The Cisco 5300 provides support for 48 DOV calls, 48 modem calls, and 96 data calls. The first two PRIs are configured to handle voice calls as data, and the last two are configured to handle voice calls as modem calls. A username and password must be configured for each user who dials in. This configuration does not use Terminal Access Controller Access Control System (TACACS+) or Remote Authentication Dial-in User Service (RADIUS).

In this section, you are presented with the information to configure the features described in this document.

**Note:** Use the Command Lookup Tool (registered customers only) to find more information on the commands used in this document.

## Network Diagram

This document uses this network setup:



## Configurations

This document uses these configurations:

- Router 1
- Router 2

### Router 1

```
!  
version 12.0  
service timestamps debug datetime msec  
service timestamps log datetime msec  
!  
hostname Router1  
!  
aaa new-model  
AAA authentication login default local  
aaa authentication login CONSOLE none  
aaa authentication ppp default if-needed local  
enable password somethingSecret  
!  
username santiago password 0 letmein  
username Router2 password 0 open4me2  
ip subnet-zero  
no ip domain-lookup  
!  
isdn switch-type primary-5ess  
!  
controller T1 0  
framing esf  
clock source line primary  
linecode b8zs  
pri-group timeslots 1-24  
!  
controller T1 1  
framing esf  
clock source line secondary  
linecode b8zs  
pri-group timeslots 1-24  
!  
controller T1 2  
framing esf  
linecode b8zs  
pri-group timeslots 1-24  
!  
controller T1 3  
framing esf  
linecode b8zs  
pri-group timeslots 1-24  
!
```

```
interface Ethernet0
 ip address 10.10.1.1 255.255.255.0
 no ip directed-broadcast
!
interface Serial0:23
 ip unnumbered Ethernet0
 no ip directed-broadcast
 encapsulation ppp
 ip tcp header-compression passive
 dialer rotary-group 1
 dialer-group 1
 isdn switch-type primary-5ess
 isdn incoming-voice data
!
interface Serial1:23
 ip unnumbered Ethernet0
 no ip directed-broadcast
 encapsulation ppp
 ip tcp header-compression passive
 dialer rotary-group 1
 dialer-group 1
 isdn switch-type primary-5ess
 isdn incoming-voice data
!
interface Serial2:23
 ip unnumbered Ethernet0
 no ip directed-broadcast
 encapsulation ppp
 ip tcp header-compression passive
 dialer rotary-group 2
 dialer-group 1
 isdn switch-type primary-5ess
 isdn incoming-voice modem
!
interface Serial3:23
 ip unnumbered Ethernet0
 no ip directed-broadcast
 encapsulation ppp
 ip tcp header-compression passive
 dialer rotary-group 2
 dialer-group 1
 isdn switch-type primary-5ess
 isdn incoming-voice modem
!
interface FastEthernet0
 ip address 10.10.2.1 255.255.255.0
 no ip directed-broadcast
!
interface Group-Async1
 ip unnumbered Ethernet0
 no ip directed-broadcast
 encapsulation ppp
 async mode interactive
 ip tcp header-compression passive
 peer default ip address pool IPaddressPool
 no cdp enable
 ppp authentication chap
 group-range 1 48
!
interface Dialer1
 ip unnumbered Ethernet0
 no ip directed-broadcast
 encapsulation ppp
 ip tcp header-compression passive
 dialer-group 1
 ppp authentication chap
```

```

!
interface Dialer2
 ip unnumbered Ethernet0
 no ip directed-broadcast
 encapsulation ppp
 ip tcp header-compression passive
 dialer-group 1
 peer default ip address pool IPaddressPool
 ppp authentication chap
!
ip local pool IPaddressPool 10.10.10.1 10.10.10.254
ip classless
ip route 10.8.186.128 255.255.255.240
no ip http server
!
line con 0
 login authentication CONSOLE
 transport input none
line 1 48
 autoselect during-login
 autoselect ppp
 modem Dialin
line aux 0
line vty 0 4
!
end

```

## Router 2

```

!
version 12.0
service timestamps debug datetime msec
service timestamps log datetime msec
!
hostname Router2
!
aaa new-model
aaa authentication login default local
aaa authentication login CONSOLE none
aaa authentication ppp default local
enable password somethingSecret
!
username Router1 password 0 open4me2
ip subnet-zero
no ip domain-lookup
!
isdn switch-type basic-5ess
!
interface Ethernet0
 ip address 10.8.186.134 255.255.255.240
 no ip directed-broadcast
!
interface Serial0
 no ip address
 no ip directed-broadcast
 shutdown
!
interface Serial1
 no ip address
 no ip directed-broadcast
 shutdown
!
interface BRI0
 ip unnumbered Ethernet0
 no ip directed-broadcast

```

```

encapsulation ppp
dialer string 5555700 class DOV
dialer load-threshold 5 outbound
dialer-group 1
isdn switch-type basic-5ess
ppp authentication chap
!
ip classless
ip route 0.0.0.0 0.0.0.0 BRI0
no ip http server
!
!
map-class dialer DOV
dialer voice-call
dialer-list 1 protocol ip permit
!
line con 0
login authentication CONSOLE
transport input none
line aux 0
line vty 0 4
!
end

```

## Verify

There is currently no verification procedure available for this configuration.

## Troubleshoot

Use this section to troubleshoot your configuration.

## Troubleshooting Commands

The Output Interpreter Tool (registered customers only) (OIT) supports certain **show** commands. Use the OIT to view an analysis of **show** command output.

**Note:** Refer to Important Information on Debug Commands before you use **debug** commands.

- **debug dialer** Displays information that concerns the cause of any call
- **debug isdn q931** Checks ISDN connections as users dial in to see what happens with the ISDN call, for example, if the connection is dropped
- **debug ppp nego** Sees the details of the PPP negotiation
- **debug ppp chap** Checks authentication
- **show isdn status** The status must be this:

```

layer 1 = active
layer 2 = MULTIPLE_FRAMES_ESTABLISHED

```

If Layer 1 is not active, the wiring adapter or port can be bad or not plugged in. If Layer 2 is in a state of TEL\_Assign, the router does not talk to the switch.

- **show user** Displays async/sync users currently connected
- **show dialer map** After an ISDN connection is made, it sees if a dynamic dialer map was created. Without a dialer map, you cannot route packets.

## Modem Troubleshooting

- **debug modem** Sees if the router receives the right signals from the internal modem
- **debug modem csm** Enables the modem management the Call Switching Module (CSM) debug mode

## Related Information

- **Access Technology Support Pages**
  - **Technical Support & Documentation – Cisco Systems**
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