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

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:

```plaintext
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:

```plaintext
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® 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:

![Network Diagram]

Configurations

This document uses these configurations:

- Router 1
- Router 2

```conf
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