

How to use RPM for Analog, ISDN and DoV Dial-in Calls on the same PRI

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Introduction

This document provides a sample configuration for RPM to be used for analog, ISDN and DoV dial-in calls on the same PRI.

Prerequisites

Requirements

Before you attempt this configuration, ensure that you meet these requirements:

- Set up NAS correctly to accept normal async and ISDN calls. Refer to [Configuring an Access Server with PRIs for incoming Async and ISDN Calls](#) for more information. Verify the configuration. For this, you must initiate a call to the NAS, and check whether the call connects successfully. If the call fails, troubleshoot the problem before you implement RPM and DoV.
- Correctly configure the client to initiate a DoV call. Use the samples provided in these documents:
 - ◆ [Configuring Data Over Voice \(DoV\) using isdn incoming-voice data and dialer voice-call](#)
 - ◆ [BRI-to-PRI Connection Using Data Over Voice](#)

Components Used

The information in this document is based on these software and hardware versions:

- Cisco IOS® Software Release 12.1(5)XM3
- Cisco AS5350 with 2 E1/PRI Ports and 60 NextPort Digital Modems

Note: Resource Pool Management requires Cisco IOS Version 12.0(4)XI or later. Use the Feature Navigator Tool (registered customers only) to select the IOS version and feature set appropriate for your needs.

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

Related Products

This configuration can also be used on any Access Server, because RPM is a software feature in IOS, and is not platform dependent. This configuration is not restricted to the AS5350

Conventions

For more information on document conventions, refer to the Cisco Technical Tips Conventions .

Background Information

DoV

Data over Voice (DoV) enables you to send data calls as voice calls over an ISDN line. Two routers that interconnect with ISDN lines typically use data calls (64 kbps or 56 kbps). Voice calls, on the other hand, are usually generated by telephone, fax, and analog modems.

The greatest advantage of DoV is a reduction in costs. In certain parts of the world, telcos offer lower per-call rates for voice calls. Therefore, it is beneficial to connect two ISDN routers with voice rather than data. DoV provides routers with the ability to connect to each other with voice calls.

With DoV, the bearer capability of the call is voice. The telco network and the receiving router treat the call as a voice call. The receiving router must recognize that the incoming call is DoV, and handle it appropriately.

Drawbacks

- **DoV has limited reliability:** A call between two ISDN lines is expected to supply an end-to-end digital path. The telco can use different equipment, lines, and other resources to set up data and voice calls. 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 with the assurance that voice quality is not affected. However, data is corrupted if you use bit transport along a 64 kbps or 56 kbps digital path. Therefore, DoV does not work with some ISDN lines.



Caution: Verify whether your telco can handle DoV calls before you configure this feature.

Otherwise, the call setup can succeed but the data can be corrupted.

- Cisco routers usually handle incoming voice calls on a particular circuit as either modem calls or as

DoV calls, but not both. In order to handle both modem and DoV calls on the same chassis, use separate circuits, one for DoV and one for modem calls. See the DoV Operation section for more information.

DoV Operation

For an incoming call, the network access server (NAS) checks the bearer capability to verify whether it is a voice call. The NAS then looks for the **isdn incoming-voice** command under the physical interface configuration of the circuit. If you have configured the **isdn incoming-voice modem** command, the NAS treats the voice call as a voice call and sends the call to the modem. If, on the other hand, you have configured the **isdn incoming-voice data** command, the NAS terminates the voice call on the ISDN Interface, and establishes a DoV call. The NAS can successfully detect that both of these call types are "voice". However, the NAS can only send all voice calls to the modems (for example, analog) or send all voice calls to the ISDN ports (for example, DoV), but NOT both. Here are the configuration options (on the D-channel) for Voice calls:

```
interface Serial3/0:15
  isdn incoming-voice modem

!--- Send all voice calls through to the modems
!--- to allow analog calls to work. This breaks DoV.
```

Or

```
interface Serial3/0:15
  isdn incoming-voice data

!--- Send all voice calls through to the ISDN ports
!--- to allow DoV calls to work. This breaks analog.
```

Note: The interface number in this sample output (interface Serial3/0:15) is only an example. Replace the interface number with the number of the D-channel interface you want to configure.

In order to support DoV and Modem calls on the same interface, configure the NAS with Resource Pool Management (RPM).

DoV with RPM

Resource Pools enable you to define how to handle incoming calls based on various criteria (for example, username, dialed number information service (DNIS), and caller-ID). Use a DNIS-based resource pool to handle DoV, ISDN, and analog calls on the same interface. With DNIS-based resource pools, the NAS decides what to do with the call based on the DNIS digits (Called Number information) that the telco delivers. For example, if the number 52731601 is set aside for DoV, The NAS handles all analog calls delivered with those DNIS digits as DoV calls, and handles analog calls to 52731600 as modem calls.

Note: The telco must set up the circuit to switch calls for all the telephone numbers that you want to use on that circuit. In this example, the telco must switch calls for 52731600 and 52731601 to the same circuit.

Configure Resource Pools

Here are some components of resource pools:

- **Resource-groups:** Resource-groups define the physical resources on the Cisco router that can be

used to terminate the calls (for example, a modem or an ISDN port).

- **DNIS–Groups:** A DNIS group is a configured list of DNIS called party numbers that correspond to the numbers dialed for particular customer service offerings. In effect, a DNIS–Group defines a list of DNIS phone numbers that you must watch for (see the Configurations section of this document).
- **Customer–Profiles:** Customer profiles enable you to process calls differently based on the call type and DNIS combination. Profiles allow you to specify the rules that define how the NAS handles calls. The profiles contain rules that use this logic : *"For a call that matches this DNIS group, look at what type of call it is (voice or data), and then send the call through to the specified resource–group."*
- For more information, refer to Configuring Resource Pool Management.

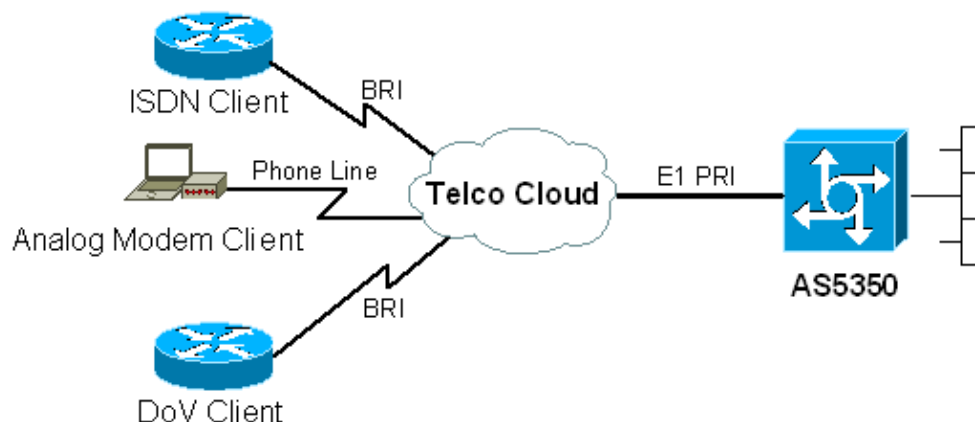
Configure

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

Note: To find additional information on the commands used in this document, use the Command Lookup Tool (registered customers only) .

Network Diagram

This document uses this network setup:



Configurations

This document uses this configuration:

- NAS

Complete these steps to configure RPM in order to enable an Access Server to accept analog, ISDN and DoV calls on the same PRI:

1. Issue the **resource–pool enable** command to enable Resource Pool Management on the Cisco NAS.
2. Define the resources–groups available. In order to do so, you must use the **resource–pool group resource name** command, which creates two resource–groups, one for modems and one for ISDN ports.

```
NAS
resource-pool group resource RESOURCE-ISDNPORTS
!--- Allocate all the ISDN ports to this group.
```

```

!--- This AS5350 has 2 * E1 PRI's = 60 lines).

range limit 60

resource-pool group resource RESOURCE-SPEMODEMS

!--- Allocate all the modem ports to this group.
!--- This AS5350 has a 60 port modem card installed in slot 1.

range port 1/0 1/59

!--- Note the use of modem port numbers instead of the number of
!--- b-channels as in the resource-group "RESOURCE-ISDNPORTS".

```

3. Create the required DNIS-groups. This documents shows the creation of two groups:

- ◆ One group for the number that accepts analog and ISDN calls.
- ◆ Another group that accepts DoV calls.

Use the **dialer dnis group** *name* command.

NAS
<pre> dialer dnis group DNIS-ALL-BUT-DOV !--- Listen for calls that arrive on 52731600. !--- This number is used for ISDN and analog. number 52731600 dialer dnis group DNIS-DOV !--- Listen for calls that arrive on 52731601 !--- This number is used for DoV. number 52731601 </pre>

4. Create the required customer-profiles.

Create a customer profile for DoV users, and one for normal analog and ISDN users. If you have other DNIS numbers available you also create a default customer profile to handle DNIS numbers which are not assigned to a group. Use the **resource-pool profile customer** *name* command as shown here:

NAS
<pre> resource-pool profile customer CUSTOMER-ALL-BUT-DOV dnis group DNIS-ALL-BUT-DOV !--- Accept calls made to the number defined in !--- the DNIS-group "DNIS-ALL-BUT-DOV". This profile accepts calls !--- for 52731600. resource RESOURCE-SPEMODEMS speech !--- Speech(Voice)calls will use the resource-group "RESOURCE-SPEMODEMS" ! -- defined previously. Therefore, all voice calls are switched to modems. resource RESOURCE-ISDNPORTS digital !--- Digital(ISDN)calls will use the resource-group "RESOURCE-ISDNPORTS" !--- defined previously. Therefore, all ISDN calls are sent to ISDN ports. </pre>

```

resource-pool profile customer CUSTOMER-DOV
  dnis group DNIS-DOV

  !--- Accept calls made to the number defined in the DNIS-group "DNIS-DOV".
  !--- Therefore, this profile accepts calls for 52731601,
  !--- which is designated for DoV.

  resource RESOURCE-ISDNPORTS speech

  !--- Speech(Voice) calls use the resource-group "RESOURCE-ISDNPORTS".
  !--- Therefore, all voice calls (DoV) are switched to the ISDN ports.
  !--- DoV calls are now processed by the ISDN ports.

resource-pool profile customer CUSTOMER-DEFAULT

  !--- Calls that do not match the defined DNIS groups end up here.
  !--- The circuit is configured to accept calls for DNIS 52731602
  !--- through 52731699. Without this default profile, NAS rejects calls to
  !--- those numbers. Set up a default profile also.

  dnis group default

  !--- Allows this profile to accept all DNIS numbers that come into the
  !--- Access Server. DNIS numbers that are not listed in any profile pass
  !--- through the default DNIS group.

  resource RESOURCE-SPEMODEMS speech

  !--- Speech(Voice)calls use the resource-group "RESOURCE-SPEMODEMS".
  !--- All voice calls are switched to the modems.
  !--- Therefore, DoV Calls that use the DNIS numbers specified fail.

  resource RESOURCE-ISDNPORTS digital
  !--- Digital(ISDN)calls will use the resource-group "RESOURCE-ISDNPORTS"
  !--- Hence, all ISDN calls will be sent to the ISDN ports

```

5. Configure the D-channel to accept calls with speech bearer capability. Use the **isdn incoming-voice modem** command in interface configuration mode

```

interface Serial3/0:15
  isdn incoming-voice modem

```

Verify

This section provides information you can use to confirm your configuration is working properly.

Certain **show** commands are supported by the Output Interpreter Tool (registered customers only), which allows you to view an analysis of **show** command output.

- **show resource-pool call** provides the details for all current calls, including the customer profile and resource group that is currently used and the matched DNIS group.
- **show resource-pool resource** provides the call counters for a given resource group. These counters include historical data, and you can clear them.
- **show dialer dnis** provides the call counters for a given DNIS group.
- **clear resource-pool** clears the call counters.

Sample show Command Outputs

Here are some sample outputs from **show** commands:

```
as5350-1#show resource-pool resource
List of Resources:
  RESOURCE-ISDNPORTS
  RESOURCE-SPEMODEMS

!--- Resource-groups configured on this router.
```

```
as5350-1#show dialer dnis group
List of DNIS Groups:
  default
  DNIS-ALL-BUT-DOV
  DNIS-DOV

!--- DNIS-Groups configured on this router.
```

```
as5350-1#show dialer dnis number
List of Numbers:
Number default
  52731601
  52731606
  52731617
  ... ..!--- Output omitted
  ...
  52731695
  52731698
  52731699
Number 52731600
Number 52731601

!--- DNIS number statistics.
```

Troubleshoot

This section provides information you can use to troubleshoot your configuration.

Troubleshooting Commands

Certain **show** commands are supported by the Output Interpreter Tool (registered customers only) , which allows you to view an analysis of **show** command output.

Note: Before you issue **debug** commands, refer to Important Information on Debug Commands.

- **debug resource-pool** displays resource pool management activity. This command is sufficient to troubleshoot most RPM-related issues.
- **debug aaa authorization** enables you to troubleshoot service problems.

Sample debug Command Output

Here is the debug output for an analog modem call. Notice when the router recognizes the DNIS digits, identifies the correct customer profile, and allocates the appropriate resource as specified in the resource group.

```
debug resource-pool
13w0d: RM0/0 state:RM_IDLE event:DIALER_INCALL/0 DS0:0:3:0:17

!--- Incoming Modem Call.

13w0d: RM DNIS: 52731600 CLID: 352212140 Call-Type: speech

!--- DNIS 52721600 and call type is speech.

13w0d: RM1/0 state:RM_DNIS_AUTHOR event:RM_DNIS_RPM_REQUEST/0
DS0:0:3:0:17
13w0d: RM:RPM event incoming call
13w0d: RPM profile CUSTOMER-ALL-BUT-DOV found

!--- The Customer Profile appropriate for this call is found.

13w0d: RM2/0 state:RM_RPM_RES_AUTHOR event:RM_RPM_RES_AUTHOR_SUCCESS/0
DS0:0:3:0:17
13w0d: Allocated resource from res_group RESOURCE-SPEMODEMS
13w0d: RM:RPM profile "CUSTOMER-ALL-BUT-DOV", allocated resource
"RESOURCE-SPEMODEMS" successfully

!--- Resource was allocated from RESOURCE-SPEMODEMS.

13w0d: RM3/0 state:RM_RPM_RES_ALLOCATING event:RM_RPM_RES_ALLOC_SUCCESS/0
DS0:0:3:0:17
13w0d: RM:RPM:Alloc Success:269:1002:627299D0
13w0d: %ISDN-6-CONNECT: Interface Serial3/0:17 is now connected to 352212140
13w0d: RM/AAA: modem connect speeds for tty 269 is tx: 46667, rx: 26400
13w0d: As1/53 AAA/ACCT/RM: doing resource-update (local)
CUSTOMER-ALL-BUT-DOV (nothing to do)
13w0d: %LINK-3-UPDOWN: Interface Async1/53, changed state to up
```

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 - [Cisco Resource Pool Manager CLID/DNIS Call Discriminator](#)
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