



# VRF-Aware H.323 and SIP for Voice Gateways

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Virtual route forwarding (VRF) divides a physical router into multiple logical routers, each having its own set of interfaces and routing and forwarding tables. Adding VRF-awareness to voice gateways allows a voice gateway to exist in the same router as a customer edge (CE) or provider edge (PE) WAN router.

The VRF-Aware H.323 and SIP for Voice Gateways feature adds single voice VRF support to session-initiated protocol (SIP), H.323, and IP-to-IP gateways and to Cisco Survivable Remote Site Telephony routers.

## Finding Feature Information in This Module

Your Cisco IOS software release may not support all of the features documented in this module. To reach links to specific feature documentation in this module and to see a list of the releases in which each feature is supported, use the [“Feature Information for VRF-Aware H.323 and SIP”](#) section on page 11.

## Finding Support Information for Platforms and Cisco IOS and Catalyst OS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS and Catalyst OS software image support. To access Cisco Feature Navigator, go to <http://www.cisco.com/go/cfn>. An account on Cisco.com is not required.

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**Corporate Headquarters**

**Cisco Systems, Inc., 170 West Tasman Drive, San Jose, CA 95134-1706 USA**

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## Prerequisites for VRF-Aware H.323 and SIP for Voice Gateways

Before you configure VRF-aware H.323 and SIP for voice gateways, you must do the following:

- Be sure that you have the correct platform to support this feature. VRF-aware H.323 and SIP is supported on the following platforms:
  - For TDM-to-IP calls—Cisco 2600XM, 2691, 3700, 2800, 2801, 3800, 7200, AS5350XM, and AS5400XM
  - For IP-to-IP calls—Cisco 2600XM, 2691, 3700, 2800, 2801, 3800, 7301, 7200, AS5350XM, and AS5400XM
- VRF support requires Cisco Express Forwarding switching to be enabled on the router. The above listed platforms all support Cisco Express Forwarding switching. However, customer edge (CE) or provider edge (PE) routers configured as voice gateways might require installation of additional voice interface cards and DSP modules.

## Restrictions for VRF-Aware H.323 and SIP for Voice Gateways

Configuration restrictions for VRF-aware H.323 and SIP for voice gateways are as follows:

- SIP proxy and registrar must be in the same VRF.

The following call types are not supported for voice VRF:

- An IP-to-IP gateway and gatekeeper configured on the same router.
- An IP-to-IP gateway with a VRF configured on one call leg and not on another call leg.
- An IP-to-IP gateway with one VRF configured for the H.323 call leg and a different VRF configured for the SIP call leg.
- Skinny Client Control Protocol (SCCP) on Cisco SRST routers.
- SCCP on Cisco Unified Communications Manager Express (Cisco Unified CME) routers.
- SIP on Cisco Unified CME routers.
- Call that involve transcoding, including both internal and external transcoders.
- SIP calls support both TCP and UDP signaling. However, for H.323 calls, only TCP is supported. H.323 UDP signaling is not supported.

The following features are not supported by VRF-aware H.323 and SIP:

- Call-fallback and RSVP features.
- H.323 Annex E calls.
- AAA and DNS components in voice-capable access routers. These routers communicate with AAA and DNS using the default routing table.

# Information About VRF-Aware H.323 and SIP

Typically, service providers use a VRF between PE and CE routers to provide VPN support for customers. VRF is also used to segment data and voice traffic for improved traffic management, and VRF can be configured on an interface to process incoming packets according to the assigned VRF.

By configuring VRF-awareness on voice gateways you can specify a VRF for the voice traffic that is generated from within the gateway. The voice VRF is added to the VoIP service provider interface (SPI) of the gateway to send and receive signaling and media packets in the configured VRF. The SPI can send signaling and media packets only in the configured VRF, and receive signaling and media packets only from the configured VRF.

## How to Configure VRF-Aware H.323 and SIP for Voice Gateways

To configure a voice VRF, you must shut down voice services on the gateway, assign a previously defined VPN VRF to the VoIP SPI, and then restart voice services.

This section describes the tasks required to configure VRF-aware H.323 and SIP for voice gateways.

**Note**

If a voice VRF is not configured, signaling and media packets are sent using the default routing table.

### Prerequisites

Be sure to check the following prerequisites before configuring a voice VRF:

- To ensure there are no active calls on the voice gateway during a VRF change, you must shut down the voice gateway before you configure or make changes to a voice VRF.
- If your configuration uses address binding, use the **h323-gateway voip bind srcaddr *ip-address*** command to bind the gateway to an interface that belongs to the voice VRF.
- If the voice gateway configuration has H.323 RAS enabled, use the **h323-gateway voip interface** command to configure RAS on the interface that belongs to the voice VRF.

### Restrictions

Restrictions for configuring VRF-aware H.323 and SIP are as follows:

- If the voice gateway configuration has H.323 RAS enabled, the gatekeeper must be accessible to the gateway in the configured voice VRF.
- When voice VRF is configured, the H.323 gateway and gatekeeper cannot communicate with each other if they are running on same router.

Voice VRF supports only the following call types:

- A single VRF for SIP-to-SIP calls
- A single VRF for H323-to-SIP calls
- A single VRF for H323-to-H323 calls
- A single VRF in IP-to-IP gateway call with a gatekeeper involved, but the gatekeeper is not on the same router.
- A SIP SRST call

## SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip vrf** *vrfname*
4. **rd** *route-distinguisher*
5. **route-target** {**import** | **export** | **both**} *route-target-ext-community*
6. **exit**
7. **voice service voip**
8. **shutdown**
9. **exit**
10. **voice vrf** *vrfname*
11. **voice service voip**
12. **no shutdown**
13. **end**

## DETAILED STEPS

|        | Command or Action                                                                         | Purpose                                                                                                                                                                                                   |
|--------|-------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | <b>enable</b><br><br><b>Example:</b><br>Router> enable                                    | Enables privileged EXEC mode.<br><ul style="list-style-type: none"> <li>Enter your password if prompted.</li> </ul>                                                                                       |
| Step 2 | <b>configure terminal</b><br><br><b>Example:</b><br>Router# configure terminal            | Enters global configuration mode.                                                                                                                                                                         |
| Step 3 | <b>ip vrf</b> <i>vrfname</i><br><br><b>Example:</b><br>Router(config)# ip vrf vrf1        | Defines a Virtual Private Network (VPN) routing/forwarding (VRF) instance and enters VRF configuration mode.<br><ul style="list-style-type: none"> <li><i>vrfname</i>—Identifier for the VRF.</li> </ul>  |
| Step 4 | <b>rd</b> <i>route-distinguisher</i><br><br><b>Example:</b><br>Router(config-vrf)# rd 1:1 | Creates a routing and forwarding table for a VPN VRF.<br><ul style="list-style-type: none"> <li><i>route-distinguisher</i>—Adds an 8-byte value to an IPv4 prefix to create a VPN IPv4 prefix.</li> </ul> |

|         | Command or Action                                                                                                                                                              | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 5  | <b>route-target</b> { <b>import</b>   <b>export</b>   <b>both</b> }<br><i>route-target-ext-community</i><br><br><b>Example:</b><br>Router(config-vrf)# route-target export 1:2 | Creates a list of import or export route target communities for the specified VRF. <ul style="list-style-type: none"> <li>• <b>import</b>—Imports routing information from the target VPN extended community.</li> <li>• <b>export</b>—Exports routing information to the target VPN extended community.</li> <li>• <b>both</b>—Imports both import and export routing information to the target VPN extended community.</li> <li>• <i>route-target-ext-community</i>—Adds the route-target extended community attributes to the VRF's list of import, export, or both (import and export) route-target extended communities.</li> </ul> |
| Step 6  | <b>exit</b><br><br><b>Example:</b><br>Router(config-vrf)# exit                                                                                                                 | Exits VRF configuration mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Step 7  | <b>voice service voip</b><br><br><b>Example:</b><br>Router(config)# voice service voip                                                                                         | Enters voice-service configuration mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Step 8  | <b>shutdown</b><br><br><b>Example:</b><br>Router(config-voi-serv)# shutdown                                                                                                    | Shuts down voice services.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Step 9  | <b>exit</b><br><br><b>Example:</b><br>Router(config-voi-serv)# exit                                                                                                            | Exits voice-service configuration mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Step 10 | <b>voice vrf vrfname</b><br><br><b>Example:</b><br>Router(config)# voice vrf vrf1                                                                                              | Assigns a predefined VRF to voice services. <ul style="list-style-type: none"> <li>• <i>vrfname</i>—Identifier for the VRF.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Step 11 | <b>voice service voip</b><br><br><b>Example:</b><br>Router(config)# voice service voip                                                                                         | Enters voice-service configuration mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Step 12 | <b>no shutdown</b><br><br><b>Example:</b><br>Router(config-voi-serv)# no shutdown                                                                                              | Restarts voice services.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Step 13 | <b>end</b><br><br><b>Example:</b><br>Router(config-voi-serv)# end                                                                                                              | Returns to privileged EXEC mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

## Examples

```
!
ip vrf vrf1
  rd 1:1
  route-target export 1:2
  route-target import 1:2
!
voice vrf vrf1
!
voice service voip
!!
```

# Configuration Examples for VRF-Aware H.323 and SIP

This section provides an example configuration for a voice VRF configured on a voice gateway.

## VRF-Aware Voice Gateway: Example

```
Router# show running config

Building configuration...

Current configuration : 1332 bytes
!
version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname Router1
!
boot-start-marker
boot-end-marker
!
card type e1 4 0
card type t1 4 1
no logging buffered
no logging console
!
no aaa new-model
!
resource policy
!
no network-clock-participate slot 2
no network-clock-participate slot 4
ip cef
!
ip vrf stork-vrf
  rd 1:1
  route-target export 1:2
  route-target import 1:2
!
no ip domain lookup
!
voice-card 0
  no dspfarm
!
```

```
voice-card 2
  no dspfarm
!
voice-card 4
  no dspfarm
!
voice vrf stork-vrf
!
voice service voip
!
controller T1 4/0
  framing esf
  linecode b8zs
!
controller T1 4/1
  shutdown
  framing esf
  linecode b8zs
!
controller E1 4/0/0
  shutdown
!
controller E1 4/0/1
  shutdown
!
interface GigabitEthernet0/0
  no ip address
  no ip proxy-arp
  shutdown
  duplex auto
  speed auto
  media-type rj45
  negotiation auto
!
interface GigabitEthernet0/1
  no ip address
  shutdown
  duplex auto
  speed auto
  media-type rj45
  negotiation auto
!
ip route 0.0.0.0 0.0.0.0 9.13.32.1
!
ip http server
!
control-plane
!
voice-port 2/0/0
voice-port 2/0/1
!
gateway
!
line con 0
  exec-timeout 0 0
  stopbits 1
line aux 0
  stopbits 1
line vty 0 4
  login
!
scheduler allocate 20000 1000
!
end
```

# Additional References

The following sections provide references related to VRF-Aware H.323 and SIP for Voice Gateways.

## Related Documents

| Related Topic                                                                                                                                                                 | Document Title                                                                                                                                                                                                    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Troubleshooting VRF-aware services                                                                                                                                            | <a href="#">VRF-Aware System Message Logging</a>                                                                                                                                                                  |
| IP Application Services Configuration                                                                                                                                         | <a href="#">Cisco IOS IP Application Services Configuration Guide 12.4</a>                                                                                                                                        |
| IP Application Services Command Reference                                                                                                                                     | <a href="#">Cisco IOS IP Application Services Command Reference 12.4</a>                                                                                                                                          |
| MPLS VPNs                                                                                                                                                                     | <a href="#">MPLS Virtual Private Networks Configuration Guide 12.0(5)T</a>                                                                                                                                        |
| MPLS Command Reference                                                                                                                                                        | <a href="#">Cisco IOS Multiprotocol Label Switching Command Reference 12.4</a>                                                                                                                                    |
| All other Cisco IOS Command Reference guides                                                                                                                                  | Various titles located at <a href="http://www.cisco.com/en/US/customer/products/ps6350/prod_command_reference_list.html">http://www.cisco.com/en/US/customer/products/ps6350/prod_command_reference_list.html</a> |
| VRF-lite                                                                                                                                                                      | <a href="#">Catalyst 4500 Series Switch Cisco IOS Software Configuration Guide, 12.2(25)SG, Configuring VRF-Lite</a>                                                                                              |
| Routers Support Resources                                                                                                                                                     | <a href="#">Technical Support and Documentation for Routers</a>                                                                                                                                                   |
| Information on Obtaining Documentation, Documentation Feedback, Cisco Product Security, Obtaining Technical Assistance, and Obtaining Additional Publications and Information | <a href="#">What's New</a> publication, which lists all new and revised Cisco technical documentation.                                                                                                            |

## Standards

| Standard      | Title                                                           |
|---------------|-----------------------------------------------------------------|
| H.323 Annex E | Multiplexed call signaling over UDP (within H.323v4 and later). |

## MIBs

| MIB                                                                                         | MIBs Link                                                                                                                                                                                                              |
|---------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No new or modified MIBs are supported, and support for existing MIBs has not been modified. | To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL:<br><a href="http://www.cisco.com/go/mibs">http://www.cisco.com/go/mibs</a> |

## RFCs

| RFC                                                                                         | Title |
|---------------------------------------------------------------------------------------------|-------|
| No new or modified RFCs are supported, and support for existing RFCs has not been modified. | —     |

## Technical Assistance

| Description                                                                                                                                                                                                                                                                                                  | Link                                                                            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| The Cisco Technical Support & Documentation website contains thousands of pages of searchable technical content, including links to products, technologies, solutions, technical tips, tools, and technical documentation. Registered Cisco.com users can log in from this page to access even more content. | <a href="http://www.cisco.com/techsupport">http://www.cisco.com/techsupport</a> |

## Command Reference

This section documents new commands only.

### New Command

- [voice vrf](#)

# voice vrf

To configure a voice VRF, use the **voice vrf** command in global configuration mode. To remove the voice VRF configuration, use the **no** form of this command.

**voice vrf** *vrfname*

**no voice vrf** *vrfname*

## Syntax Description

|                |                                   |
|----------------|-----------------------------------|
| <i>vrfname</i> | A name assigned to the voice vrf. |
|----------------|-----------------------------------|

## Command Default

No voice VRF is configured.

## Command Modes

Global configuration

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.4(11)XJ | This command was introduced. |

## Usage Guidelines

You must create a VRF using the **ip vrf** *vrfname* command before you can configure it as a voice VRF. To ensure there are no active calls on the voice gateway during a VRF change, voices services must be shut down on the voice gateway before you configure or make changes to a voice VRF.

## Examples

The following example shows that a VRF called *vrf1* was created and then configured as a voice VRF:

```
ip vrf vrf1
 rd 1:1
 route-target export 1:2
 route-target import 1:2
!
voice vrf vrf1
!
voice service voip
```

## Related Commands

| Command       | Description                                                   |
|---------------|---------------------------------------------------------------|
| <b>ip vrf</b> | Defines a VPN VRF instance and enters VRF configuration mode. |

# Glossary

VRF—Virtual route forwarding.



## Note

See [Internetworking Terms and Acronyms](#) for terms not included in this glossary.

## Feature Information for VRF-Aware H.323 and SIP

[Table 1](#) lists the release history for this feature.

Not all commands may be available in your Cisco IOS software release. For release information about a specific command, see the command reference documentation.

Use Cisco Feature Navigator to find information about platform support and software image support. Cisco Feature Navigator enables you to determine which Cisco IOS and Catalyst OS software images support a specific software release, feature set, or platform. To access Cisco Feature Navigator, go to <http://www.cisco.com/go/cfn>. An account on Cisco.com is not required.



## Note

[Table 1](#) lists only the Cisco IOS software release that introduced support for a given feature in a given Cisco IOS software release train. Unless noted otherwise, subsequent releases of that Cisco IOS software release train also support that feature.

**Table 1** Feature Information for VRF-Aware H.323 and SIP

| Feature Name            | Releases   | Feature Information                                                                                                                                                                                                                                    |
|-------------------------|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VRF-Aware H.323 and SIP | 12.4(11)XJ | VRF awareness in voice stack of H.323 and SIP enables voice in TDM gateways and Session Border Controllers (SBC) to be in its own single VRF in VRF-lite and MPLS networks. Cisco SIP SRST is also available for the phones that are in the voice VRF. |

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