IP SLAs—VoIP Call Setup Operation

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The Cisco IOS IP Service Level Agreements (SLAs) VoIP Call Setup (Post-Dial Delay) Monitoring feature provides the ability to measure your network's response time for setting up a Voice over IP (VoIP) call. This document describes how to use the IP SLAs VoIP call setup operation to monitor the call setup performance of your VoIP network.

When using either H.323 or Session Initiation Protocol (SIP) , the IP SLAs VoIP call setup operation can measure the total time from when an originating gateway sends a call message (containing a call number) to when the originating gateway receives a message from the terminating gateway (destination) indicating that either the called number rang or the called party answered the call.

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 the IP SLAs VoIP Call Setup Operation" section on page 12.

Finding Support Information for Platforms and Cisco IOS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at http://www.cisco.com/go/fn. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel** at the login dialog box and follow the instructions that appear.

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Prerequisites for the IP SLAs VoIP Call Setup Monitoring Operation

In order to use the IP SLAs VoIP call setup functionality, your Cisco IOS software image must support the IP SLAs VoIP test-call application and IP SLAs VoIP Responder application. To determine if your Cisco IOS software image is configured with these applications, use the **show call application voice** command in EXEC mode.

Note The IP SLAs VoIP Responder application is different from the IP SLAs Responder (which is configured using the **ip sla monitor responder** command in global configuration mode).

Information About the IP SLAs VoIP Call Setup Monitoring Operation

To configure an IP SLAs VoIP call setup operation, you should understand the following concept:

IP SLAs VoIP Call Setup Monitoring Using H.323 or SIP

The Cisco IOS IP SLAs VoIP Call Setup Monitoring feature provides the ability to measure your network's response time for setting up a Voice over IP (VoIP) call. Prior to configuring the IP SLAs VoIP call setup operation, you must enable the IP SLAs VoIP test-call application on the originating gateway (source). With the IP SLAs VoIP test-call application enabled, H.323 or Session Initiation Protocol (SIP) call messages can be sent to and received by the originating and terminating gateways. The configuration for the IP SLAs VoIP call setup operation is essentially the same for both protocols.

When using either H.323 or SIP, the IP SLAs VoIP call setup operation can measure the total time from when an originating gateway sends a call message (containing a call number) to when the originating gateway receives a message from the terminating gateway (destination) indicating that either the called number rang or the called party answered the call. As with all Cisco IOS IP SLAs operations, you can configure the VoIP call setup operation to repeat at specified time intervals, for a specified number of repetitions, and over a specified duration of time.

Note If a gatekeeper (GK) or directory gatekeeper (DGK) is involved in the H.323 call signaling, additional messages are sent and received between the originating and terminating gateways before the call message (containing a call number) is actually sent. The additional time required for these messages is included in the IP SLAs VoIP call setup response time measurement. Likewise, if a proxy server or

redirection server is involved in the SIP call signaling, any additional time required for messages to be sent and received (prior to sending the call message) is included in the VoIP call setup response time measurement.

A plain old telephone service (POTS) IP phone can be set up at the terminating gateway to respond to an IP SLAs VoIP call setup test call. As a convenient alternative to an actual IP phone, you can enable the IP SLAs VoIP Responder application in the terminating gateway. The IP SLAs VoIP Responder application will respond to incoming call setup messages from the originating gateway using H.323 or SIP.

Note The IP SLAs VoIP Responder application is different from the IP SLAs Responder (which is configured using the **ip sla monitor responder** command in global configuration mode).

How to Configure the IP SLAs VoIP Call Setup Monitoring Operation

This section contains the following tasks:

Configuring the Originating Gateway

Perform this task on the originating gateway (source) in order to start the IP SLAs VoIP test-call application, set up the dial peer to route the test call, define the VoIP call setup operation, and schedule the VoIP call setup operation. The required configuration for setting up the dial peer will vary slightly depending on whether you are using H.323 or SIP.

Prerequisites

In order to use the IP SLAs VoIP call setup functionality, your Cisco IOS software image must support the IP SLAs VoIP test-call application and IP SLAs VoIP Responder application. To determine if your Cisco IOS software image is configured with these applications, use the **show call application voice** command in EXEC mode.

Note The IP SLAs VoIP Responder application is different from the IP SLAs Responder (which is configured using the **ip sla monitor responder** command in global configuration mode).

SUMMARY STEPS

1. **enable**
2. **show call application voice** [*name* | **summary**]
3. **call application session start** *instance-name* [*application-name*]
4. **configure terminal**

5. **dial-peer voice** *tag* **voip**
6. **destination-pattern** [**+**] *string* [**T**]
7. **session target** {**ipv4:***destination-address* | **dns:**[**s.** | **d.** | **e.** | **u.**] *host-name* | **enum:***table-num* | **loopback:rtp** | **ras** | **sip-server**}
8. **session protocol sipv2**
9. **exit**
10. **ip sla monitor** *operation-number*
11. **type voip delay post-dial** [**detect-point** {**alert-ringing** | **connect-ok**}] **destination** *tag*
12. **buckets-of-history-kept** *size*
13. **distributions-of-statistics-kept** *size*
14. **enhanced-history** [**interval** *seconds*] [**buckets** *number-of-buckets*]
15. **filter-for-history** {**none** | **all** | **overThreshold** | **failures**}
16. **frequency** *seconds*
17. **hours-of-statistics-kept** *hours*
18. **lives-of-history-kept** *lives*
19. **owner** *owner-id*
20. **statistics-distribution-interval** *milliseconds*
21. **tag** *text*
22. **threshold** *milliseconds*
23. **timeout** *milliseconds*
24. **exit**
25. **ip sla monitor schedule** *operation-number* [**life** {**forever** | *seconds*}] [**start-time** {*hh*:*mm*[:*ss*] [*month day* | *day month*] | **pending** | **now** | **after** *hh*:*mm*:*ss*] [**ageout** *seconds*] [**recurring**]
26. **exit**
27. **show ip sla monitor configuration** [*operation-number*]

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.

Step 2	**show call application voice** [*name* | **summary**]
	
	Example:
	`Router# show call application voice summary`
	`NAME DESCRIPTION`
	`...`
	`ipsla-testcall Basic app to place a simple call`
	`ipsla-responder Basic app to respond to a simple call`
	`...`
	
	`TCL Script Version 2.0 supported.`
	`Call Treatment Action Application - Version 1.`
		(Optional) Displays information about configured voice applications.
		• If the **summary** keyword is entered, the command output displays a one-line summary about each configured voice application.
		• If the Cisco IOS IP SLAs VoIP test-call application is configured on the currently loaded Cisco IOS software image, the ipsla-testcall name is displayed.

Step 3	**call application session start** *instance-name* [*application-name*] **Example:** `Router# call application session start ipsla-testcall ipsla-testcall`	Starts a new session of the Cisco IOS IP SLAs VoIP test-call application.
Step 4	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 5	**dial-peer voice** *tag* **voip** **Example:** `Router(config)# dial-peer voice 6789 voip`	Defines a particular dial peer, specifies the method of voice encapsulation, and enters dial-peer configuration mode. • The *tag* argument consists of one or more digits identifying the dial peer. Range is from 1 to 2147483647. • The **voip** keyword indicates a VoIP dial peer using voice encapsulation on an IP network.
Step 6	**destination-pattern** [**+**] *string* [**T**] **Example:** `Router(config-dial-peer)# destination-pattern 6789`	Specifies either the prefix or the full E.164 telephone number to be used for a dial peer.

	Command or Action	Purpose
Step 7	**session target** {**ipv4:***destination-address* | **dns:**[**s.** | **d.** | **e.** | **u.**] *host-name* | **enum:***table-num* | **loopback:rtp** | **ras** | **sip-server**} **Example:** `Router(config-dial-peer)# session target ipv4:172.29.129.123`	Designates a network-specific address to receive calls from a VoIP dial peer.
Step 8	**session protocol sipv2** **Example:** `Router(config-dial-peer)# session protocol sipv2`	(Optional) Specifies SIP as the session protocol for the VoIP dial peer. **Note** Perform this step only if configuring a SIP call.
Step 9	**exit** **Example:** `Router(config-dial-peer)# exit`	Exits dial-peer configuration mode and returns to global configuration mode.
Step 10	**ip sla monitor** *operation-number* **Example:** `Router(config)# ip sla monitor 10`	Begins configuration for an IP SLAs operation and enters IP SLA monitor configuration mode.
Step 11	**type voip delay post-dial** [**detect-point** {**alert-ringing** | **connect-ok**}] **destination** *tag* **Example:** `Router(config-sla-monitor)# type voip delay post-dial detect-point alert-ringing destination 6789`	Enters IP SLA monitor VoIP configuration mode and configures the operation as a VoIP call setup (post-dial delay) operation that will generate VoIP call setup response time measurements.
Step 12	**buckets-of-history-kept** *size* **Example:** `Router(config-sla-monitor-voip)# buckets-of-history-kept 25`	(Optional) Sets the number of history buckets that are kept during the lifetime of an IP SLAs operation.
Step 13	**distributions-of-statistics-kept** *size* **Example:** `Router(config-sla-monitor-voip)# distributions-of-statistics-kept 5`	(Optional) Sets the number of statistics distributions kept per hop during an IP SLAs operation.
Step 14	**enhanced-history** [**interval** *seconds*] [**buckets** *number-of-buckets*] **Example:** `Router(config-sla-monitor-voip)# enhanced-history interval 900 buckets 100`	(Optional) Enables enhanced history gathering for an IP SLAs operation.

	Command or Action	Purpose
Step 15	**filter-for-history** {**none** | **all** | **overThreshold** | **failures**} **Example:** `Router(config-sla-monitor-voip)# filter-for-history failures`	(Optional) Defines the type of information kept in the history table for an IP SLAs operation.
Step 16	**frequency** *seconds* **Example:** `Router(config-sla-monitor-voip)# frequency 30`	(Optional) Sets the rate at which a specified IP SLAs operation repeats.
Step 17	**hours-of-statistics-kept** *hours* **Example:** `Router(config-sla-monitor-voip)# hours-of-statistics-kept 4`	(Optional) Sets the number of hours for which statistics are maintained for an IP SLAs operation.
Step 18	**lives-of-history-kept** *lives* **Example:** `Router(config-sla-monitor-voip)# lives-of-history-kept 5`	(Optional) Sets the number of lives maintained in the history table for an IP SLAs operation.
Step 19	**owner** *owner-id* **Example:** `Router(config-sla-monitor-voip)# owner admin`	(Optional) Configures the Simple Network Management Protocol (SNMP) owner of an IP SLAs operation.
Step 20	**statistics-distribution-interval** *milliseconds* **Example:** `Router(config-sla-monitor-voip)# statistics-distribution-interval 10`	(Optional) Sets the time interval for each statistics distribution kept for an IP SLAs operation.
Step 21	**tag** *text* **Example:** `Router(config-sla-monitor-voip)# tag TelnetPollServer1`	(Optional) Creates a user-specified identifier for an IP SLAs operation.
Step 22	**threshold** *milliseconds* **Example:** `Router(config-sla-monitor-voip)# threshold 10000`	(Optional) Sets the upper threshold value for calculating network monitoring statistics created by an IP SLAs operation.
Step 23	**timeout** *milliseconds* **Example:** `Router(config-sla-monitor-voip)# timeout 10000`	(Optional) Sets the amount of time an IP SLAs operation waits for a response from its request packet.

	Command or Action	Purpose
Step 24	**exit** **Example:** `Router(config-sla-monitor-voip)# exit`	Exits VoIP configuration submode and returns to global configuration mode.
Step 25	**ip sla monitor schedule** *operation-number* [**life** {**forever** | *seconds*}] [**start-time** {*hh*:*mm*[:*ss*] [*month day* | *day month*] | **pending** | **now** | **after** *hh*:*mm*:*ss*] [**ageout** *seconds*] [**recurring**] `Router(config)# ip sla monitor schedule 5 start-time now life forever`	Configures the scheduling parameters for an individual IP SLAs operation.
Step 26	**exit** **Example:** `Router(config)# exit`	(Optional) Exits global configuration mode and returns to privileged EXEC mode.
Step 27	**show ip sla monitor configuration** [*operation-number*] **Example:** `Router# show ip sla monitor configuration 10`	(Optional) Displays configuration values including all defaults for all IP SLAs operations or a specified operation.

Troubleshooting Tips

Use the **debug ip sla monitor trace** and **debug ip sla monitor error** commands to help troubleshoot issues with an IP SLAs operation.

What to Do Next

To view and interpret the results of an IP SLAs operation use the **show ip sla monitor statistics** command. Checking the output for fields that correspond to criteria in your service level agreement will help you determine whether the service metrics are acceptable.

Configuring the Terminating Gateway Using the IP SLAs VoIP Responder Application

Perform this task on the terminating gateway (destination) in order to set up the dial peer and enable the IP SLAs VoIP Responder application to respond to the IP SLAs VoIP test call. The required configuration for setting up the dial peer will vary slightly depending on whether you are using H.323 or SIP.

Prerequisites

In order to use the IP SLAs VoIP call setup functionality, your Cisco IOS software image must support the IP SLAs VoIP test-call application and IP SLAs VoIP Responder application. To determine if your Cisco IOS software image is configured with these applications, use the **show call application voice** command in EXEC mode.

Note The IP SLAs VoIP Responder application is different from the IP SLAs Responder (which is configured using the **ip sla monitor responder** command in global configuration mode).

SUMMARY STEPS

1. **enable**
2. **show call application voice** [*name* | **summary**]
3. **configure terminal**
4. **dial-peer voice** *tag* **voip**
5. **incoming called-number** *tag*
6. **application** *application-name*
7. **session protocol sipv2**
8. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.

Step 2	**show call application voice** [*name* | **summary**]
	
	Example:
	`Router# show call application voice summary`
	`NAME DESCRIPTION`
	`...`
	`ipsla-testcall Basic app to place a simple call`
	`ipsla-responder Basic app to respond to a simple call`
	`...`
	
	`TCL Script Version 2.0 supported.`
	`Call Treatment Action Application - Version 1.`
		(Optional) Displays information about configured voice applications.
		• If the **summary** keyword is entered, the command output displays a one-line summary of each configured voice application.
		• If the Cisco IOS IP SLAs VoIP Responder application is configured on the currently loaded Cisco IOS software image, the ipsla-responder name is displayed.

Step 3	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 4	**dial-peer voice** *tag* **voip** **Example:** `Router(config)# dial-peer voice 6789 voip`	Defines a particular dial peer, specifies the method of voice encapsulation, and enters dial-peer configuration mode. • The *tag* argument consists of one or more digits identifying the dial peer. Range is from 1 to 2147483647. • The **voip** keyword indicates a VoIP dial peer using voice encapsulation on an IP network.

	Command or Action	Purpose
Step 5	**incoming called-number** *tag* **Example:** `Router(config-dial-peer)# incoming called-number 6789`	Specifies a digit string that can be matched by an incoming call to associate the call with a dial peer.
Step 6	**application** *application-name* **Example:** `Router(config-dial-peer)# application ipsla-responder`	Enables a specific application on a dial peer. • To enable the Cisco IOS IP SLAs VoIP Responder application, enter ipsla-responder as the *application-name* argument.
Step 7	**session protocol sipv2** **Example:** `Router(config-dial-peer)# session protocol sipv2`	(Optional) Specifies SIP as the session protocol for the VoIP dial peer. **Note** Perform this step only if configuring a SIP call.
Step 8	**exit** **Example:** `Router(config-dial-peer)# exit`	Exits dial-peer configuration mode and returns to global configuration mode.

Configuration Examples for the IP SLAs VoIP Call Setup Monitoring Operation

This section contains the following configuration examples:

- Configuring the Originating Gateway: Example, page 10
- Configuring the Terminating Gateway: Example, page 11

Configuring the Originating Gateway: Example

The following example shows how to configure an originating gateway to start the IP SLAs VoIP test-call application, set up the dial peer to route the test call, define the VoIP call setup operation, and schedule the VoIP call setup operation. In this example, test-call messages are generated using the Session Initiation Protocol (SIP).

```
call application session start ipsla-testcall ipsla-testcall
configure terminal
 dial-peer voice 6789 voip
  destination-pattern 6789
  session target ipv4:172.29.129.123
  session protocol sipv2
  exit
 ip sla monitor 1
  type voip delay post-dial detect-point alert-ringing destination 6789
  exit
 ip sla schedule 1 start-time now life forever
```

Configuring the Terminating Gateway: Example

The following example shows how to configure a terminating gateway to set up the dial peer and enable the IP SLAs VoIP Responder application to respond to the IP SLAs VoIP call setup test call. In this example, test-call messages are generated using the Session Initiation Protocol (SIP).

```
configure terminal
 dial-peer voice 6789 voip
 incoming called-number 6789
 application ipsla-responder
 session protocol sipv2
 exit
```

Where to Go Next

- If you want to configure multiple Cisco IOS IP SLAs operations at once, see the "IP SLAs—Multiple Operation Scheduling" chapter of the *Cisco IOS IP SLAs Configuration Guide*, Release 12.4.
- If you want to configure threshold parameters for an IP SLAs operation, see the "IP SLAs—Proactive Threshold Monitoring" chapter of the *Cisco IOS IP SLAs Configuration Guide*, Release 12.4.
- If you want to configure other types of IP SLAs operations, see the "Where to Go Next" section of the "Cisco IOS IP SLAs Overview" chapter of the *Cisco IOS IP SLAs Configuration Guide*, Release 12.4.

Additional References

The following sections provide references related to the IP SLAs VoIP Call Setup Monitoring feature.

Related Documents

Related Topic	Document Title
Overview of Cisco IOS IP SLAs	"Cisco IOS IP SLAs Overview" chapter of the *Cisco IOS IP SLAs Configuration Guide*, Release 12.4
Cisco IOS IP SLAs commands: complete command syntax, defaults, command mode, command history, usage guidelines, and examples	*Cisco IOS IP SLAs Command Reference*, Release 12.4

Standards

Standard	Title
No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature.	—

MIBs

MIB	MIBs Link
CISCO-RTTMON-MIB	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFC	Title
No new or modified RFCs are supported by this feature, and support for existing RFCs has not been modified by this feature.	—

Technical Assistance

Description	Link
The Cisco Technical Support website contains thousands of pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content.	http://www.cisco.com/techsupport

Feature Information for the IP SLAs VoIP Call Setup Operation

Table 1 lists the features in this module and provides links to specific configuration information. Only features that were introduced or modified in Cisco IOS Release 12.3(14)T or a later release appear in the table. *Not all features may be supported in your Cisco IOS software release*.

For information on a feature in this technology that is not documented here, see the "Cisco IOS IP SLAs Features Roadmap."

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

Cisco IOS software images are specific to a Cisco IOS software release, a feature set, and a platform. Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at http://www.cisco.com/go/fn. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel** at the login dialog box and follow the instructions that appear.

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 the IP SLAs VoIP Call Setup Operation

Feature Name	Releases	Feature Information
IP SLAs VoIP Call Setup (Post Dial Delay) Monitoring	12.3(14)T	The Cisco IOS IP SLAs Voice over IP (VoIP) call setup operation allows you to measure network response time for setting up a VoIP call.