



IP SLAs—Analyzing VoIP Service Levels Using the 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 14.

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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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 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, page 2](#)

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 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, page 3](#)
- [Configuring the Terminating Gateway Using the IP SLAs VoIP Responder Application, page 8](#)

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 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** *operation-number*
11. **voip delay post-dial** [**detect-point** {**alert-ringing** | **connect-ok**}] **destination** *tag*
12. **history buckets-kept** *size*
13. **history distributions-of-statistics-kept** *size*
14. **history enhanced** [**interval** *seconds*] [**buckets** *number-of-buckets*]
15. **history filter** {**none** | **all** | **overThreshold** | **failures**}
16. **frequency** *seconds*
17. **history hours-of-statistics-kept** *hours*
18. **history lives-kept** *lives*
19. **owner** *owner-id*
20. **history statistics-distribution-interval** *milliseconds*
21. **tag** *text*
22. **threshold** *milliseconds*
23. **timeout** *milliseconds*
24. **exit**
25. **ip sla 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 configuration** [*operation-number*]

DETAILED STEPS

	Command or Action	Purpose
Step 1	<p>enable</p> <p>Example: Router> enable</p>	<p>Enables privileged EXEC mode.</p> <ul style="list-style-type: none"> Enter your password if prompted.
Step 2	<p>show call application voice [<i>name</i> summary]</p> <p>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.</p>	<p>(Optional) Displays information about configured voice applications.</p> <ul style="list-style-type: none"> 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	<p>call application session start <i>instance-name</i> [<i>application-name</i>]</p> <p>Example: Router# call application session start ipsla-testcall ipsla-testcall</p>	<p>Starts a new session of the Cisco IOS IP SLAs VoIP test-call application.</p>
Step 4	<p>configure terminal</p> <p>Example: Router# configure terminal</p>	<p>Enters global configuration mode.</p>
Step 5	<p>dial-peer voice <i>tag</i> voip</p> <p>Example: Router(config)# dial-peer voice 6789 voip</p>	<p>Defines a particular dial peer, specifies the method of voice encapsulation, and enters dial-peer configuration mode.</p> <ul style="list-style-type: none"> The <i>tag</i> 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	<p>destination-pattern [+]<i> string</i> [T]</p> <p>Example: Router(config-dial-peer)# destination-pattern 6789</p>	<p>Specifies either the prefix or the full E.164 telephone number to be used for a dial peer.</p>

How to Configure the IP SLAs VoIP Call Setup Monitoring Operation

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

	Command or Action	Purpose
Step 15	<p>history filter {none all overThreshold failures}</p> <p>Example: Router(config-ip-sla-voip)# history filter failures</p>	(Optional) Defines the type of information kept in the history table for an IP SLAs operation.
Step 16	<p>frequency seconds</p> <p>Example: Router(config-ip-sla-voip)# frequency 30</p>	(Optional) Sets the rate at which a specified IP SLAs operation repeats.
Step 17	<p>history hours-of-statistics-kept hours</p> <p>Example: Router(config-ip-sla-voip)# history hours-of-statistics-kept 4</p>	(Optional) Sets the number of hours for which statistics are maintained for an IP SLAs operation.
Step 18	<p>history lives-kept lives</p> <p>Example: Router(config-ip-sla-voip)# history lives-kept 5</p>	(Optional) Sets the number of lives maintained in the history table for an IP SLAs operation.
Step 19	<p>owner owner-id</p> <p>Example: Router(config-ip-sla-voip)# owner admin</p>	(Optional) Configures the Simple Network Management Protocol (SNMP) owner of an IP SLAs operation.
Step 20	<p>history statistics-distribution-interval milliseconds</p> <p>Example: Router(config-ip-sla-voip)# history statistics-distribution-interval 10</p>	(Optional) Sets the time interval for each statistics distribution kept for an IP SLAs operation.
Step 21	<p>tag text</p> <p>Example: Router(config-ip-sla-voip)# tag TelnetPollServer1</p>	(Optional) Creates a user-specified identifier for an IP SLAs operation.
Step 22	<p>threshold milliseconds</p> <p>Example: Router(config-ip-sla-voip)# threshold 10000</p>	(Optional) Sets the upper threshold value for calculating network monitoring statistics created by an IP SLAs operation.
Step 23	<p>timeout milliseconds</p> <p>Example: Router(config-ip-sla-voip)# timeout 10000</p>	(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-ip-sla-voip)# exit	Exits VoIP configuration submode and returns to global configuration mode.
Step 25	ip sla 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 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 configuration [operation-number] Example: Router# show ip sla 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 trace** and **debug ip sla 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 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 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	<p>enable</p> <p>Example: Router> enable</p>	<p>Enables privileged EXEC mode.</p> <ul style="list-style-type: none"> Enter your password if prompted.
Step 2	<p>show call application voice [<i>name</i> summary]</p> <p>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.</p>	<p>(Optional) Displays information about configured voice applications.</p> <ul style="list-style-type: none"> 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	<p>configure terminal</p> <p>Example: Router# configure terminal</p>	<p>Enters global configuration mode.</p>
Step 4	<p>dial-peer voice <i>tag</i> voip</p> <p>Example: Router(config)# dial-peer voice 6789 voip</p>	<p>Defines a particular dial peer, specifies the method of voice encapsulation, and enters dial-peer configuration mode.</p> <ul style="list-style-type: none"> The <i>tag</i> 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 5	<p>incoming called-number <i>tag</i></p> <p>Example: Router(config-dial-peer)# incoming called-number 6789</p>	<p>Specifies a digit string that can be matched by an incoming call to associate the call with a dial peer.</p>
Step 6	<p>application <i>application-name</i></p> <p>Example: Router(config-dial-peer)# application ipsla-responder</p>	<p>Enables a specific application on a dial peer.</p> <ul style="list-style-type: none"> To enable the Cisco IOS IP SLAs VoIP Responder application, enter ipsla-responder as the <i>application-name</i> argument.

	Command or Action	Purpose
Step 7	<pre>session protocol sipv2</pre> <p>Example: Router(config-dial-peer)# session protocol sipv2</p>	<p>(Optional) Specifies SIP as the session protocol for the VoIP dial peer.</p> <p>Note Perform this step only if configuring a SIP call.</p>
Step 8	<pre>exit</pre> <p>Example: Router(config-dial-peer)# exit</p>	<p>Exits dial-peer configuration mode and returns to global configuration mode.</p>

Configuration Examples for the IP SLAs VoIP Call Setup Monitoring Operation

This section contains the following configuration examples:

- [Configuring the Originating Gateway: Example, page 11](#)
- [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 1
 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

For information about other types of IP SLAs operations and IP SLAs features, see the [Cisco IOS IP SLAs Features Roadmap](#).

Additional References

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

Related Documents

Related Topic	Document Title
Cisco IOS IP SLAs command-line interface enhancements	Cisco IOS IP Service Level Agreements Command Line Interface , Cisco white paper
Cisco IOS IP SLAs commands	Cisco IOS IP SLAs Command Reference

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 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 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.

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