



# Configuring VoIP Gatekeeper Registration Delay Operations

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This document describes how to configure an Cisco IOS IP Service Level Agreements (SLAs) Voice over IP (VoIP) gatekeeper registration delay operation to determine the average, median, or aggregated response time (delay) of registration attempts from a VoIP gateway to a VoIP gatekeeper device.

To measure VoIP gatekeeper registration response time, the gatekeeper registration delay operation functions by sending a lightweight Registration Request (RRQ) from an H.323 gateway (GW) to an H.323 gatekeeper (GK), and recording the amount of time taken to receive the Registration Confirmation (RCF) back from the gatekeeper.

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## Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see [Bug Search Tool](#) and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to [www.cisco.com/go/cfn](http://www.cisco.com/go/cfn). An account on Cisco.com is not required.

# Restrictions for IP SLAs VoIP Gatekeeper Registration Delay Operations

You cannot configure the IP SLAs VoIP gatekeeper registration delay operation if the gatekeeper has already been registered with the gateway.

## Information About IP SLAs VoIP Gatekeeper Registration Delay Operations

### H.323 Gatekeepers and Gateways

H.323 is the ITU-T protocol standard used for managing and facilitating packetized voice and video over local-area networks (LANs, particularly intranets) and over the Internet. H.323 consists of several component standards; see the “Glossary” section of this chapter for details on these standardized protocols.

H.323 is considered an “umbrella protocol” because it defines all aspects of call transmission, from call establishment to capabilities exchange to network resource availability. H.323 defines Registration, Admission, and Status (RAS) protocols for call routing, H.225 protocols for call setup, and H.245 protocols for capabilities exchange. The IP SLAs VoIP Gatekeeper Registration Delay Monitoring feature focuses on the function of the call control H.323 stack.

For an in-depth discussion of H.323, including gatekeeper and gateway functionality, see the “H.323 Applications” chapter of the *Cisco IOS Voice, Video, and Fax Configuration Guide*.

### Gateway-to-Gatekeeper Registration Delay Time Monitoring

The IP SLAs VoIP gatekeeper registration delay operation provides statistical data on the amount of time taken to register a gateway to a gatekeeper. IP SLAs was designed to gather information over time, at intervals you specify, so that statistics can be provided on key metrics often used in Service Level Agreements (SLAs). Aggregated totals, median, or average data can be viewed using the Cisco IOS command-line interface (CLI) on the device running IP SLAs, or retrieved from the device by external applications using SNMP.

Cisco IOS IP SLAs also provides notification options based on performance thresholds and reaction triggering. These notification options allow for proactive monitoring in an environment where IT departments can be alerted to potential network problems, rather than having to manually examine data.

This operation will measure time from when the RRQ message is sent and when RCF message is received. A timeout may be required if a response is not received in a certain timeframe.

# How to Configure IP SLAs VoIP Gatekeeper Registration Delay Operations

## Configuring the VoIP H.323 Gateway

### SUMMARY STEPS

1. `enable`
2. `configure terminal`
3. `gateway`
4. `exit`
5. `interface interface-id`
6. `ip address ip-address subnet-mask`
7. `h323-gateway voip interface`
8. `h323-gateway voip id gatekeeper-id {ipaddr ip-address [port-number] | multicast}`
9. `h323-gateway voip h323-id interface-id`
10. `exit`

### DETAILED STEPS

	Command or Action	Purpose
Step 1	<p><code>enable</code></p> <p><b>Example:</b></p> <pre>Router&gt; enable</pre>	<p>Enables privileged EXEC mode.</p> <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>
Step 2	<p><code>configure terminal</code></p> <p><b>Example:</b></p> <pre>Router# configure terminal</pre>	<p>Enters global configuration mode.</p>
Step 3	<p><code>gateway</code></p> <p><b>Example:</b></p> <pre>Router(config)# gateway</pre>	<p>Enables the H.323 VoIP gateway and enters gateway configuration mode.</p>
Step 4	<p><code>exit</code></p> <p><b>Example:</b></p> <pre>Router(config-gateway)# exit</pre>	<p>Exits gateway configuration mode and returns to global configuration mode.</p>

	Command or Action	Purpose
<b>Step 5</b>	<b>interface</b> <i>interface-id</i>  <b>Example:</b> <pre>Router(config)# interface Ethernet1/1</pre>	Specifies an interface and enters interface configuration mode.
<b>Step 6</b>	<b>ip address</b> <i>ip-address subnet-mask</i>  <b>Example:</b> <pre>Router(config-if)# ip address 172.29.129.123 255.255.255.0</pre>	Configures the IP address of the interface.
<b>Step 7</b>	<b>h323-gateway voip interface</b>  <b>Example:</b> <pre>Router(config-if)# h323-gateway voip interface</pre>	Configures the interface as an H.323 gateway interface.
<b>Step 8</b>	<b>h323-gateway voip id</b> <i>gatekeeper-id</i> { <b>ipaddr</b> <i>ip-address</i> [ <i>port-number</i> ]   <b>multicast</b> }  <b>Example:</b> <p>[<b>priority</b> <i>number</i>]</p> <b>Example:</b> <pre>Router(config-if)# h323-gateway voip id zone1 ipaddr 172.29.129.124 1719</pre> <b>Example:</b> <pre>Router(config-if)# h323-gateway voip id saagk ipaddr 172.29.129.28 1719</pre>	Defines the name and location of the gatekeeper for a specific gateway. <ul style="list-style-type: none"> <li>• Repeat this step for each ID (see example).</li> </ul>
<b>Step 9</b>	<b>h323-gateway voip h323-id</b> <i>interface-id</i>  <b>Example:</b> <pre>Router(config-if)# h323-gateway voip h323-id GWZ</pre>	Configures the H.323 name of the gateway that identifies this gateway to its associated gatekeeper.
<b>Step 10</b>	<b>exit</b>  <b>Example:</b> <pre>Router(config-if)# exit</pre>	(Optional) Exits interface configuration mode and returns to privileged EXEC mode.

**Example**

The following example shows sample output from the **show gateway** command if the gateway (named GW3) is registered to a gatekeeper (named slagk):

```
Router# show gateway
H.323 ITU-T Version: 4.0   H323 Stack Version: 0.1
  H.323 service is up
  Gateway GW3 is registered to Gatekeeper slagk
  Alias list (CLI configured)
    E164-ID 2073418
    E164-ID 5251212
    H323-ID GW3
  Alias list (last RCF)
    E164-ID 2073418
    E164-ID 5251212
    H323-ID GW3
  H323 resource thresholding is Disabled
```

The following example shows sample output for the **show gateway** command if the gateway is not registered to a gatekeeper:

```
Router# show gateway
Gateway gw3 is not registered to any gatekeeper
  Alias list (CLI configured)
    E164-ID 2073418
    E164-ID 5251212
    H323-ID gw3/ww
  Alias list (last RCF)
    H323 resource thresholding is Disabled
```

Use the **show gatekeeper endpoint** command to verify the endpoint's registration status to the gatekeeper. The following example shows the common output of this command if an endpoint is registered:

```
Router# show gatekeeper endpoint
GATEKEEPER ENDPOINT REGISTRATION
=====
CallSignalAddr  Port  RASSignalAddr  Port  Zone Name  Type  Flags
-----
172.16.13.35    1720  172.16.13.35  50890  gk         VOIP-GW
    E164-ID: 2073418
    E164-ID: 5251212
    H323-ID: gw3
  Total number of active registrations = 1
```

The following example shows the common output of the **show gatekeeper endpoint** command if an endpoint is not registered:

```
Router# show gatekeeper endpoint
GATEKEEPER ENDPOINT REGISTRATION
=====
CallSignalAddr  Port  RASSignalAddr  Port  Zone Name  Type  Flags
-----
  Total number of active registrations = 0
```

The following configuration example shows a properly configured gateway:

```
gateway
interface Ethernet1/1
 ip address 172.29.129.123 255.255.255.0
 h323-gateway voip interface
 h323-gateway voip id zone1 ipaddr 172.29.129.124 1719
 h323-gateway voip id saagk ipaddr 172.29.129.28 1719
 h323-gateway voip h323-id GWZ
```

## Troubleshooting Tips

Use the `debug ip sla trace` and `debug ip sla error` commands to help troubleshoot issues with an individual IP SLAs LSP ping or LSP traceroute operation.

# Configuring and Scheduling a VoIP Gatekeeper Registration Delay Operation

## Before You Begin

### SUMMARY STEPS

1. `enable`
2. `configure terminal`
3. `ip sla operation-number`
4. `voip delay gatekeeper-registration`
5. `history buckets-kept size`
6. `history distributions-of-statistics-kept size`
7. `history enhanced [interval seconds] [buckets number-of-buckets]`
8. `history filter {none | all | overThreshold | failures}`
9. `frequency seconds`
10. `history hours-of-statistics-kept hours`
11. `history lives-kept lives`
12. `owner owner-id`
13. `history statistics-distribution-interval milliseconds`
14. `tag text`
15. `threshold milliseconds`
16. `timeout milliseconds`
17. `verify-data`
18. `exit`
19. `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]`
20. `exit`
21. `show ip sla configuration [operation-number]`

### DETAILED STEPS

	Command or Action	Purpose
Step 1	<code>enable</code>  <b>Example:</b> Router> <code>enable</code>	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>

	Command or Action	Purpose
<b>Step 2</b>	<b>configure terminal</b>  <b>Example:</b> <pre>Router# configure terminal</pre>	Enters global configuration mode.
<b>Step 3</b>	<b>ip sla <i>operation-number</i></b>  <b>Example:</b> <pre>Router(config)# ip sla 10</pre>	Begins configuration for an IP SLAs operation and enters IP SLA configuration mode.
<b>Step 4</b>	<b>voip delay gatekeeper-registration</b>  <b>Example:</b> <pre>Router(config-ip-sla)# voip delay gatekeeper-registration</pre>	Configures the IP SLAs operation as a VoIP gatekeeper registration delay operation and enters IP SLA VoIP configuration mode. <ul style="list-style-type: none"> <li>If the gatekeeper has not been registered with the gateway prior to entering this command, the following error message will be displayed:  No gatekeeper has been registered!</li> </ul>
<b>Step 5</b>	<b>history buckets-kept <i>size</i></b>  <b>Example:</b> <pre>Router(config-ip-sla-voip)# history buckets-kept 25</pre>	(Optional) Sets the number of history buckets that are kept during the lifetime of an IP SLAs operation.
<b>Step 6</b>	<b>history distributions-of-statistics-kept <i>size</i></b>  <b>Example:</b> <pre>Router(config-ip-sla-voip)# history distributions-of-statistics-kept 5</pre>	(Optional) Sets the number of statistics distributions kept per hop during an IP SLAs operation.
<b>Step 7</b>	<b>history enhanced [<i>interval seconds</i>] [<i>buckets number-of-buckets</i>]</b>  <b>Example:</b> <pre>Router(config-ip-sla-voip)# history enhanced interval 900 buckets 100</pre>	(Optional) Enables enhanced history gathering for an IP SLAs operation.
<b>Step 8</b>	<b>history filter {none   all   overThreshold   failures}</b>  <b>Example:</b> <pre>Router(config-ip-sla-voip)# history filter failures</pre>	(Optional) Defines the type of information kept in the history table for an IP SLAs operation.

	Command or Action	Purpose
<b>Step 9</b>	<b>frequency</b> <i>seconds</i>  <b>Example:</b> Router(config-ip-sla-voip)# frequency 30	(Optional) Sets the rate at which a specified IP SLAs operation repeats.
<b>Step 10</b>	<b>history hours-of-statistics-kept</b> <i>hours</i>  <b>Example:</b> Router(config-ip-sla-voip)# history hours-of-statistics-kept 4	(Optional) Sets the number of hours for which statistics are maintained for an IP SLAs operation.
<b>Step 11</b>	<b>history lives-kept</b> <i>lives</i>  <b>Example:</b> Router(config-ip-sla-voip)# history lives-kept 5	(Optional) Sets the number of lives maintained in the history table for an IP SLAs operation.
<b>Step 12</b>	<b>owner</b> <i>owner-id</i>  <b>Example:</b> Router(config-ip-sla-voip)# owner admin	(Optional) Configures the Simple Network Management Protocol (SNMP) owner of an IP SLAs operation.
<b>Step 13</b>	<b>history statistics-distribution-interval</b> <i>milliseconds</i>  <b>Example:</b> Router(config-ip-sla-voip)# history statistics-distribution-interval 10	(Optional) Sets the time interval for each statistics distribution kept for an IP SLAs operation.
<b>Step 14</b>	<b>tag</b> <i>text</i>  <b>Example:</b> Router(config-ip-sla-voip)# tag TelnetPollServer1	(Optional) Creates a user-specified identifier for an IP SLAs operation.
<b>Step 15</b>	<b>threshold</b> <i>milliseconds</i>  <b>Example:</b> Router(config-ip-sla-voip)# threshold 10000	(Optional) Sets the upper threshold value for calculating network monitoring statistics created by an IP SLAs operation.
<b>Step 16</b>	<b>timeout</b> <i>milliseconds</i>  <b>Example:</b> Router(config-ip-sla-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
<b>Step 17</b>	<b>verify-data</b>  <b>Example:</b> <pre>Router(config-ip-sla-voip)# verify-data</pre>	(Optional) Causes an IP SLAs operation to check each reply packet for data corruption.
<b>Step 18</b>	<b>exit</b>  <b>Example:</b> <pre>Router(config-ip-sla-voip)# exit</pre>	Exits VoIP configuration submode and returns to global configuration mode.
<b>Step 19</b>	<b>ip sla schedule</b> <i>operation-number</i> [ <b>life</b> { <b>forever</b>   <i>seconds</i> }] [ <b>start-time</b> { <i>hh:mm:ss</i> } [ <i>month day</i>   <i>day month</i> ]   <b>pending</b>   <b>now</b>   <b>after</b> <i>hh:mm:ss</i> ] [ <b>ageout</b> <i>seconds</i> ] [ <b>recurring</b> ]  <b>Example:</b>  <b>Example:</b> <pre>Router(config)# ip sla schedule 5 start-time now life forever</pre>	Configures the scheduling parameters for an individual IP SLAs operation.
<b>Step 20</b>	<b>exit</b>  <b>Example:</b> <pre>Router(config)# exit</pre>	(Optional) Exits global configuration mode and returns to privileged EXEC mode.
<b>Step 21</b>	<b>show ip sla configuration</b> [ <i>operation-number</i> ]  <b>Example:</b> <pre>Router# show ip sla configuration 10</pre>	(Optional) Displays configuration values including all defaults for all IP SLAs operations or a specified operation.

## Troubleshooting Tips

- If the IP SLAs operation is not running and not generating statistics, add the **verify-data** command to the configuration of the operation (while configuring in IP SLA configuration mode) to enable data verification. When data verification is enabled, each operation response is checked for corruption. Use the **verify-data** command with caution during normal operations because it generates unnecessary overhead.
- 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 add proactive threshold conditions and reactive triggering for generating traps (or for starting another operation) to an IP SLAs operation, see the “Configuring Proactive Threshold Monitoring” section.

operation)

To display and interpret the results of an IP SLAs operation, use the **show ip sla statistics** command. Check the output for fields that correspond to criteria in your service level agreement to determine whether the service metrics are acceptable.

# Configuration Examples for IP SLAs VoIP Gatekeeper Registration Delay Operations

## Example Configuring the IP SLAs VoIP gatekeeper registration delay operation

In the following example, a VoIP gatekeeper registration delay operation is configured and scheduled to start immediately. This example assumes the gateway to gatekeeper relationship has already been configured.

```
Router# configure terminal
Router(config)# ip sla 1
Router(config-ip-sla)# voip delay gatekeeper-registration
Router(config-ip-sla-voip)# exit
Router(config)# ip sla schedule 1 start-time now life forever
```

## Additional References

### Related Documents

Related Topic	Document Title
Cisco IOS commands	<a href="#">Cisco IOS Master Commands List, All Releases</a>
Cisco IOS IP SLAs commands	<i>Cisco IOS IP SLAs Command Reference</i>
Gateway and gatekeeper configuration using Cisco IOS Release 12.3 and later releases	<i>Cisco IOS Voice Configuration Library</i>
Troubleshooting gatekeeper configurations	<a href="#">Troubleshooting Gatekeeper Registration Issues</a>

**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: <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 by this feature, and support for existing RFCs has not been modified by this feature.	--

**Technical Assistance**

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	<a href="http://www.cisco.com/cisco/web/support/index.html">http://www.cisco.com/cisco/web/support/index.html</a>

# Feature Information for the IP SLAs VoIP Gatekeeper Registration Delay Operation

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to [www.cisco.com/go/cfn](http://www.cisco.com/go/cfn). An account on Cisco.com is not required.

**Table 1: Feature Information for IP SLAs VoIP Gatekeeper Registration Delay Operations**

Feature Name	Releases	Feature Information
IP SLAs VoIP Gatekeeper Delay Monitoring	12.3(14)T	The Cisco IOS IP SLAs Voice over IP (VoIP) gatekeeper registration delay operation allows you to measure the average, median, or aggregated network response time of registration attempts from a VoIP gateway to a VoIP gatekeeper device.

## Glossary

**Gatekeepers** --Network devices that help to facilitate and control H.323-based voice and video communications across networks. Gatekeepers are responsible for providing address translation between LAN aliases and IP addresses, call control and routing services to H.323 endpoints, system management, and security policies. These services provided by the gatekeeper in communicating between H.323 endpoints are defined in RAS.

**Gateways** --Network devices that provide translation between circuit-switched networks (particularly, H.320 ISDN) and packet-based networks (for example, H.323 LANs), allowing endpoints in networks with different transmission formats, codecs, and protocols to communicate.

**H.225.0** --Protocol standard that defines the establishment and disconnection of H.323 calls.

**H.225.0 RAS** --H.225.0 Registration/Admission/Status. Standard that facilitates communication between H.323 gateways (endpoints) and H.323 gatekeepers.

**H.235** --Protocol standard that defines security solutions for H.323 protocols (Q.931, H.245, RAS, Streams). H.235 was formerly called H.SECURE.

**H.245** --Protocol standard that defines connection management and negotiation capabilities between H.323 devices on the network once the call is established by Q.931.

**H.323** --An ITU protocol standard for the transmission of real-time audio (Voice/VoIP), video (for example, videoconferencing), and data information over packet switching-based networks. Such networks include IP-based (including the Internet) networks, Internet packet exchange-based local-area networks (LANs), enterprise networks and metropolitan and wide-area networks (WANs). H.323 can also be applied to multipoint

multimedia communications. H.323 defines a distributed architecture for IP telephony applications, including multimedia, video conferencing, video over the Internet, and VoIP.

**Q.931** --Protocol standard that defines the establishment and disconnection of H.323 calls.

**RTP/RTCP** --Real-time Protocol/Real-Time Control Protocol serves as the standardized means for transmitting and receiving audio and video streams across the network once the call is established.

**VoIP** --Voice or Video over Internet Protocol. Sometimes used to refer to all IP telephony applications.

