IP SLAs—VoIP Gatekeeper Registration Delay Operation

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

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 Gatekeeper Registration Delay Operation" section on page 13.

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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Restrictions for the IP SLAs VoIP Gatekeeper Registration Delay Operation

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

Information About the IP SLAs VoIP Gatekeeper Registration Delay Operation

To configure the IP SLAs VoIP gateway registration delay operation, you should understand the following concepts:

H.323, Gatekeepers, and Gateways

H.232 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 on page 13 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 (part of the *Cisco IOS Voice, Video, and Fax Configuration Guide*, Release 12.2) [http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122cgcr/fvvfax_c/index.htm].

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.

For further information on these functions, see the *Cisco IOS IP SLAs Monitoring Technology Configuration Guide*.

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 the IP SLAs VoIP Gatekeeper Registration Delay Operation

This section contains the following procedures:

- Configuring the VoIP H.323 Gateway, page 3
- Configuring and Scheduling the IP SLAs VoIP Gatekeeper Registration Delay Operation, page 6

Configuring the VoIP H.323 Gateway

Check the registration status of the gateway to a gatekeeper using the **show gateway** command. If the gateway is not registered, perform the task described in this section.

Prerequisites

Prior to configuring the IP SLAs VoIP gatekeeper registration delay operation, the gatekeeper must be enabled and the gateway must be preregistered. As a best practice, you should confirm the gatekeeper and gateway status first.

If the gateway is not registered, select an interface and configure the gatekeeper in the 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**}[**priority** *number*]
9. **h323-gateway voip h323-id** *interface-id*
10. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**gateway** **Example:** `Router(config)# gateway`	Enables the H.323 VoIP gateway and enters gateway configuration mode.
Step 4	**exit** **Example:** `Router(config-gateway)# exit`	Exits gateway configuration mode and returns to global configuration mode.
Step 5	**interface** *interface-id* **Example:** `Router(config)# interface Ethernet1/1`	Specifies an interface and enters interface configuration mode.
Step 6	**ip address** *ip-address subnet-mask* **Example:** `Router(config-if)# ip address 172.29.129.123 255.255.255.0`	Configures the IP address of the interface.
Step 7	**h323-gateway voip interface** **Example:** `Router(config-if)# h323-gateway voip interface`	Configures the interface as an H.323 gateway interface.

Step 8	**h323-gateway voip id** *gatekeeper-id* {**ipaddr** *ip-address* [*port-number*] | **multicast**} [**priority** *number*]
	
	Example:
	`Router(config-if)# h323-gateway voip id zone1 ipaddr 172.29.129.124 1719`
	`Router(config-if)# h323-gateway voip id saagk ipaddr 172.29.129.28 1719`
		Defines the name and location of the gatekeeper for a specific gateway.
		• Repeat as needed for multiple IDs (see example).

	Command or Action	Purpose
Step 9	**h323-gateway voip h323-id** *interface-id* **Example:** `Router(config-if)# h323-gateway voip h323-id GWZ`	Configures the H.323 name of the gateway that identifies this gateway to its associated gatekeeper.
Step 10	**exit** **Example:** `Router(config-if)# exit`	(Optional) Exits interface configuration mode and returns to privileged EXEC mode.

Examples

Use the **show gateway** command to verify the registration status of the gateway to a gatekeeper.

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

If there appears to be registration issues, see the *Troubleshooting Gatekeeper Registration Issues* technical assistance document for suggestions on resolving the issue.

http://www.cisco.com/warp/public/788/voip/gk-reg-issues.html

What to Do Next

Configure and schedule the IP SLAs VoIP gatekeeper registration delay operation.

Configuring and Scheduling the IP SLAs VoIP Gatekeeper Registration Delay Operation

Perform this task to begin gathering IP SLAs VoIP gatekeeper registration delay data.

Prerequisites

Prior to configuring the IP SLAs VoIP gatekeeper registration delay operation, the gatekeeper must be enabled and the gateway must be preregistered. As a best practice, you should confirm the gatekeeper and gateway status first.

If the gateway is not registered, select an interface and configure the gatekeeper in the gateway.

SUMMARY STEPS

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

	Command or Action	Purpose
Step 4	**type voip delay gatekeeper registration** **Example:** `Router(config-sla-monitor)# type voip delay gatekeeper registration`	Configures the IP SLAs operation as a VoIP gatekeeper registration delay operation and enters IP SLA monitor VoIP configuration mode. • 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!`
Step 5	**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 6	**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 7	**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.
Step 8	**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 9	**frequency** *seconds* **Example:** `Router(config-sla-monitor-voip)# frequency 30`	(Optional) Sets the rate at which a specified IP SLAs operation repeats.
Step 10	**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 11	**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.

	Command or Action	Purpose
Step 12	**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 13	**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 14	**tag** *text* **Example:** `Router(config-sla-monitor-voip)# tag TelnetPollServer1`	(Optional) Creates a user-specified identifier for an IP SLAs operation.
Step 15	**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 16	**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.
Step 17	**verify-data** **Example:** `Router(config-sla-monitor-jitter)# verify-data`	(Optional) Causes an IP SLAs operation to check each reply packet for data corruption.
Step 18	**exit** **Example:** `Router(config-sla-monitor-voip)# exit`	Exits VoIP configuration submode and returns to global configuration mode.
Step 19	**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 20	**exit** **Example:** `Router(config)# exit`	(Optional) Exits global configuration mode and returns to privileged EXEC mode.
Step 21	**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

- If the IP SLAs operation is not running and generating statistics, add the **verify-data** command to the configuration of the operation (while configuring in IP SLA monitor mode) to enable data verification. When 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 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.

Configuration Examples for the IP SLAs VoIP Gatekeeper Registration Delay Operation

This section contains the following configuration example:

- Configuring the IP SLAs VoIP gatekeeper registration delay operation: Example, page 10

Configuring the IP SLAs VoIP gatekeeper registration delay operation: Example

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 monitor 1
Router(config-sla-monitor)# type voip delay gatekeeper registration
Router(config-sla-monitor-voip)# exit

Router(config)# ip sla schedule 1 start-time now life forever
```

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 gatekeeper registration delay operation.

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
Gateway and gatekeeper configuration using Cisco IOS Release 12.3 and later releases	*Cisco IOS Voice Configuration Library* http://www.cisco.com/univercd/cc/td/doc/product/software/ios123/123cgcr/vcl.htm
Troubleshooting gatekeeper configurations	*Troubleshooting Gatekeeper Registration Issues* (Tech Note document) http://www.cisco.com/warp/public/788/voip/gk-reg-issues.html

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

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.

Note See *Internetworking Terms and Acronyms* for terms not included in this glossary.

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

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.