Configuring IP SLAs ICMP Echo Operations

This module describes how to configure an IP Service Level Agreements (SLAs) Internet Control Message Protocol (ICMP) Echo operation to monitor end-to-end response time between two devices using IPv4 . ICMP Echo is useful for troubleshooting network connectivity issues. This module also demonstrates how the results of the ICMP Echo operation can be displayed and analyzed to determine how the network IP connections are performing.

This chapter includes the following sections:

ICMP Echo Operation

The Internet Control Message Protocol (ICMP) Echo operation measures the end-to-end response time between two devices that use IP. The response time is computed by measuring the time taken between sending an ICMP Echo request message to the destination and receiving an ICMP Echo reply. An ICMP Echo is useful for troubleshooting network connectivity issues. The results of the ICMP Echo operation can be displayed and analyzed to determine how the network IP connections are performing.

In the following figure, the ICMP Echo operation uses the ping test to measure the response time between the source IP SLAs device and the destination IP device. Many customers use IP SLAs ICMP-based operations, in-house ping testing, or ping-based dedicated probes for response time measurements.

Figure 1: ICMP Echo Operation
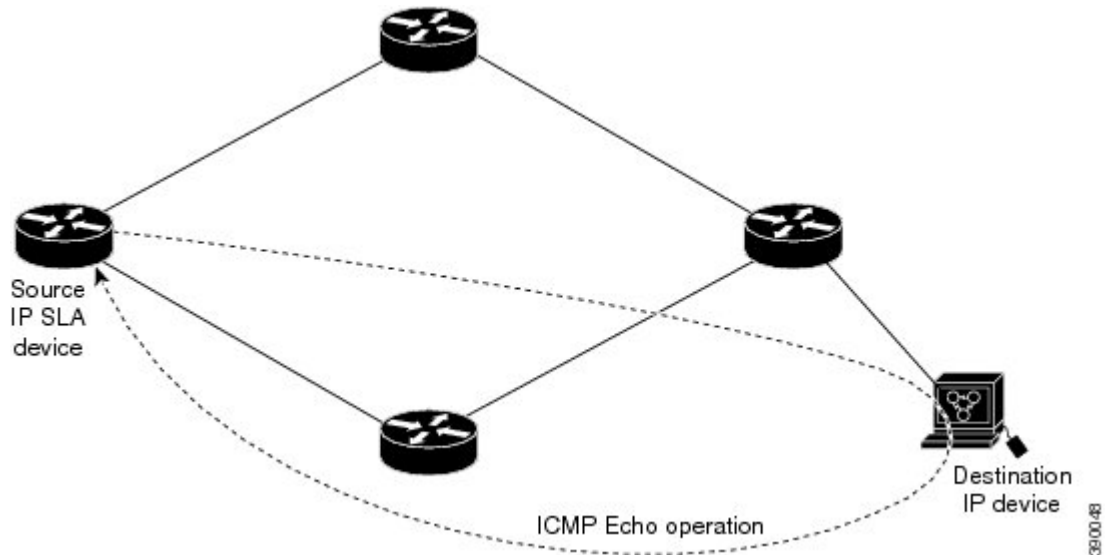
The IP SLAs ICMP Echo operation conforms to the same IETF specifications for ICMP ping testing and the two methods result in the same response times.

Guidelines and Limitations for IP SLAs ICMP Echo Operations

We recommend that you use a Cisco networking device as the destination device although you can use any networking device that supports RFC 862, the Echo protocol.

Configuring an ICMP Echo Operation

Note You do not need to configure an IP SLAs Responder on the destination device.

Perform one of the following tasks:

- Configuring a basic ICMP Echo operation on the source device
- Configuring an ICMP Echo operation with optional parameters

Configuring a Basic ICMP Echo Operation on a Source Device

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `switch# configure terminal`	Enters global configuration mode.
Step 2	**feature sla sender** **Example:** `switch(config)# feature sla sender`	Enables the IP SLAs operation feature.
Step 3	**ip sla** *operation-number* **Example:** `switch(config)# ip sla 6`	Begins configuration for an IP SLAs operation and enters IP SLA configuration mode.

Step 4	**icmp-echo** {*destination-ipv4-address* | *destination-ipv6-address* | *destination-hostname*} [**source-ip** {*ipv4-address* | *ipv6-address* | *hostname*} | **source-interface** *interface-name*]
	
	Example:
	`switch(config-ip-sla)# icmp-echo 192.0.2.134`
	
	Example:
	`switch(config-ip-sla)# icmp-echo 2016:1:1:1::2`
		Defines an ICMP Echo operation and enters IP SLA ICMP Echo configuration mode.
		
		Note IPv6 is available only from Cisco NX-OS Release 8.0 onwards.

Step 5	**end** **Example:** `switch(config-ip-sla-echo)# end`	Exits IP SLA ICMP Echo configuration mode and returns to privileged EXEC mode.

Configuring an ICMP Echo Operation with Optional Parameters

Before You Begin

Perform this task on the source device.

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `switch# configure terminal`	Enters global configuration mode.
Step 2	**feature sla sender** **Example:** `switch(config)# feature sla sender`	Enables the IP SLAs operation feature.
Step 3	**ip sla** *operation-number* **Example:** `switch(config)# ip sla 6`	Begins configuration for an IP SLAs operation and enters IP SLA configuration mode.

Step 4	**icmp-echo** {*destination-ipv4-address* | *destination-ipv6-address* | *destination-hostname*} [**source-ip** {*ipv4-address* | *ipv6-address* | *hostname*} | **source-interface** *interface-name*]
	
	Example:
	`switch(config-ip-sla)# icmp-echo 192.0.2.134 source-ip 192.0.2.132`
	
	Example:
	`switch(config-ip-sla)# icmp-echo 2016:1:1:1::2 source-ip 2016:1:1:1::2`
		Defines an Echo operation and enters IP SLA Echo configuration mode.
		
		Note IPv6 is available only from Cisco NX-OS Release 8.0 onwards.

Step 5	**history buckets-kept** *size* **Example:** `switch(config-ip-sla-echo)# history buckets-kept 25`	(Optional) Sets the number of history buckets that are kept during the lifetime of an IP SLAs operation.
Step 6	**history distributions-of-statistics-kept** *size* **Example:** `switch(config-ip-sla-echo)# history distributions-of-statistics-kept 5`	(Optional) Sets the number of statistics distributions that are kept per hop during an IP SLAs operation.
Step 7	**history enhanced** [**interval** *seconds*] [**buckets** *number-of-buckets* **Example:** `switch(config-ip-sla-echo)# history enhanced interval 900 buckets 100`	(Optional) Enables enhanced history gathering for an IP SLAs operation.

	Command or Action	Purpose
Step 8	**history filter {none	all	overThreshold	failures}** **Example:** `switch(config-ip-sla-echo)# history filter failures`	(Optional) Defines the type of information kept in the history table for an IP SLAs operation.
Step 9	**frequency** *seconds* **Example:** `switch(config-ip-sla-echo)# frequency 30`	(Optional) Sets the rate at which a specified IP SLAs operation repeats.
Step 10	**history hours-of-statistics-kept** *hours* **Example:** `switch(config-ip-sla-echo)# history hours-of-statistics-kept 4`	(Optional) Sets the number of hours for which statistics are maintained for an IP SLAs operation.
Step 11	**history lives-kept** *lives* **Example:** `switch(config-ip-sla-echo)# history lives-kept 5`	(Optional) Sets the number of lives maintained in the history table for an IP SLAs operation.
Step 12	**owner** *owner-id* **Example:** `switch(config-ip-sla-echo)# owner admin`	(Optional) Configures the Simple Network Management Protocol (SNMP) owner of an IP SLAs operation.
Step 13	**request-data-size** *bytes* **Example:** `switch(config-ip-sla-echo)# request-data-size 64`	(Optional) Sets the protocol data size in the payload of an IP SLAs operation's request packet.
Step 14	**history statistics-distribution-interval** *milliseconds* **Example:** `switch(config-ip-sla-echo)# history statistics-distribution-interval 10`	(Optional) Sets the time interval for each statistics distribution kept for an IP SLAs operation.
Step 15	**tag** *text* **Example:** `switch(config-ip-sla-echo)# tag TelnetPollServer1`	(Optional) Creates a user-specified identifier for an IP SLAs operation.
Step 16	**threshold** *milliseconds* **Example:** `switch(config-ip-sla-echo)# threshold 10000`	(Optional) Sets the upper threshold value for calculating network monitoring statistics created by an IP SLAs operation.

	Command or Action	Purpose
Step 17	**timeout** *milliseconds* **Example:** `switch(config-ip-sla-echo)# timeout 10000`	(Optional) Sets the amount of time an IP SLAs operation waits for a response from its request packet.

Step 18	Depending on the IP version you are using, use one of the following commands:
	
	   • **tos** *number*
	
	   • **traffic-class** *number*
	
	Example:
	`switch(config-ip-sla-echo)# tos 160`
	
	Example:
	`switch(config-ip-sla-echo)# traffic-class 160`
		(Optional)
		In an IPv4 network, defines the ToS byte in the IPv4 header of an IP SLA operation.
		
		or
		
		In an IPv6 network, defines the traffic class byte in the IPv6 header for a supported IP SLA operation.
		
		Note IPv6 is available only from Cisco NX-OS Release 8.0 onwards.

Step 19	**verify-data** **Example:** `switch(config-ip-sla-echo)# verify-data`	(Optional) Causes an IP SLAs operation to check each reply packet for data corruption.
Step 20	**vrf** {*vrf-name* | **default** | **management**} **Example:** `switch(config-ip-sla-echo)# vrf vpn-A`	(Optional) Allows monitoring within Multiprotocol Label Switching (MPLS) Virtual Private Networks (VPNs) using IP SLAs operations.
Step 21	**end** **Example:** `switch(config-ip-sla-echo)# end`	Exits IP SLA Echo configuration mode and returns to privileged EXEC mode.

Scheduling IP SLAs Operations

Note

- All IP SLAs operations that you want to be scheduled must be already configured.

- The frequency of all operations scheduled in a multioperation group must be the same.

- The list of one or more operation ID numbers to be added to a multioperation group is limited to a maximum of 125 characters in length, including commas (,).

Procedure

	Command or Action	**Purpose**
Step 1	**configure terminal** **Example:** `switch# configure terminal`	Enters global configuration mode.

Step 2	Perform one of the following tasks:
	
	• **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*]
	
	• **ip sla group schedule** *group-operation-number operation-id-numbers* {**schedule-period** *schedule-period-range* | **schedule-together**} [**ageout** *seconds*] [**frequency** *group-operation-frequency*] [**life** {**forever** | *seconds*}] [**start-time** {*hh:mm*[*:ss*] [*month day* | *day month*] | **pending** | **now** | **after** *hh:mm*[*:ss*]}]
	
	Example:
	`switch(config)# ip sla schedule 10 life forever start-time now`
	
	Example:
	`switch(config)# ip sla group schedule 1 3,4,6-9 life forever start-time now`
		Configures the scheduling parameters for an individual IP SLAs operation.
		
		Specifies an IP SLAs operation group number and the range of operation numbers for a multioperation scheduler.

Step 3	**exit** **Example:** `switch(config)# exit`	Exits global configuration mode and returns to privileged EXEC mode.
Step 4	**show ip sla group schedule** **Example:** `switch# show ip sla group schedule`	Displays IP SLAs group schedule details.
Step 5	**show ip sla configuration** **Example:** `switch# show ip sla configuration`	Displays IP SLAs configuration details.

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 to an IP Service Level Agreements (SLAs) operation for the purpose of generating traps or for starting another operation, see the "Configuring Proactive Threshold Monitoring" section in the "Configuring Proactive Threshold Monitoring for IP SLAs Operations" chapter.

Configuration Examples for IP SLA ICMP Echo Operations

Note IPv6 is available only from Cisco NX-OS Release 8.0 onwards.

Example: Configuring a Basic ICMP Echo Operation on a Source Device

This example shows how to configure a basic ICMP Echo operation on a source device using IPv4:

```
switch# configure terminal
switch(config)# feature sla sender
switch(config)# ip sla 6
switch(config-ip-sla)# icmp-echo 192.0.2.134 source-ip 192.0.2.132
switch(config-ip-sla-echo)# end
```
This example shows how to configure a basic ICMP Echo Operation on a source device using IPv6:

```
switch# configure terminal
switch(config)# feature sla sender
switch(config)# ip sla 6
switch(config-ip-sla)# icmp-echo 2016:1:1:1::2 source-ip 2016:1:1:1::2
switch(config-ip-sla-echo)# end
```

Example: Configuring an ICMP Echo Operation with Optional Parameters

This example shows how to configure an IP SLAs operation type of ICMP Echo using IPv4 that will start immediately and run indefinitely:

```
switch# configure terminal
switch(config)# feature sla sender
switch(config)# ip sla 6
switch(config-ip-sla)# icmp-echo 192.0.2.134 source-ip 192.0.2.132
switch(config-ip-sla-echo)# frequency 300
switch(config-ip-sla-echo)# request-data-size 38
switch(config-ip-sla-echo)# tos 160
switch(config-ip-sla-echo)# timeout 6000
switch(config-ip-sla-echo)# tag SFO-RO
```

```
switch(config-ip-sla-echo)# end
```

This example shows how to configure an IP SLA operation type of ICMP Echo using IPv6 that will start immediately and run indefinitely:

```
switch# configure terminal
switch(config)# feature sla sender
switch(config)# ip sla 6
switch(config-ip-sla)# icmp-echo 2016:1:1:1::2 source-ip 2016:1:1:1::2
switch(config-ip-sla-echo)# frequency 300
switch(config-ip-sla-echo)# request-data-size 38
switch(config-ip-sla-echo)# traffic-class 160
switch(config-ip-sla-echo)# timeout 6000
switch(config-ip-sla-echo)# tag SFO-RO
switch(config-ip-sla-echo)# end
```

Example: Scheduling IP SLAs Operations

This example shows how to schedule an IP SLAs operation that is already configured:

```
switch# configure terminal
switch(config)# ip sla schedule 6 life forever start-time now
switch(config)# exit
```

Additional References for IP SLAs ICMP Echo Operations

Related Documents

Related Topic	Document Title
Cisco Nexus commands	Cisco Nexus 7000 Series Command Reference Master Index

Standards and RFCs

Standard/RFC	Title
RFC 862	Echo Protocol

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/support

Feature History for IP SLAs ICMP Echo Operations

Table 1: Feature History for IP SLAs ICMP Echo Operations

Feature Name	Releases	Feature Information
IP SLAs ICMP Echo Operation	6.2(2)	The Cisco IP SLAs ICMP echo operation allows you to measure the end-to-end network response time between two devices using IPv4.