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# Configuring Cisco IOS IP SLAs UDP Echo Operations

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This module describes how to configure a Cisco IOS IP Service Level Agreements (SLAs) User Datagram Protocol (UDP) Echo operation to monitor end-to-end response time between a Cisco router and devices using IPv4 or IPv6. UDP echo accuracy is enhanced by using the IP SLAs Responder at the destination Cisco router. This module also demonstrates how the results of the UDP echo operation can be displayed and analyzed to determine how a UDP application is performing.

## Finding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see 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 for the IP SLAs UDP Echo Operation](#)” section on page 14.

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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# Restrictions for IP SLAs UDP Echo Operations

We recommend using a Cisco networking device as the destination device, although any networking device that supports RFC 862, *Echo Protocol*, can be used.

## Information About IP SLAs UDP Echo Operations

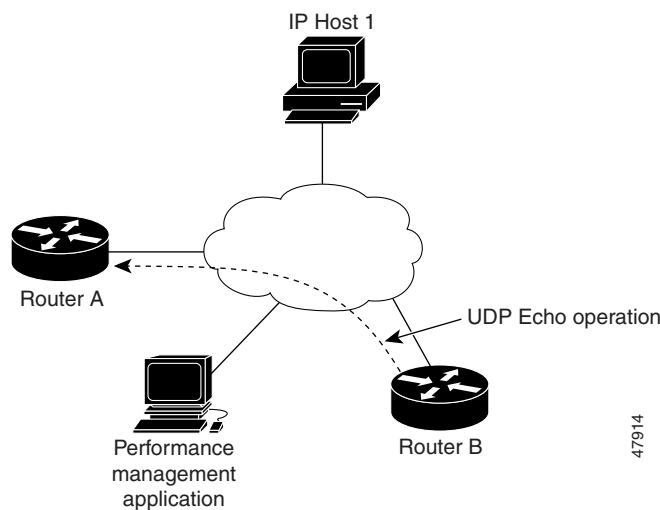
- [UDP Echo Operation, page 2](#)

## UDP Echo Operation

The UDP echo operation measures end-to-end response time between a Cisco router and devices using IP. UDP is a transport layer (Layer 4) Internet protocol that is used for many IP services. UDP echo is used to measure response times and test end-to-end connectivity.

In [Figure 1](#) Router A has been configured as an IP SLAs Responder and Router B is configured as the source IP SLAs device.

**Figure 1**      **UDP Echo Operation**



Response time (round-trip time) is computed by measuring the time taken between sending a UDP echo request message from Router B to the destination router—Router A—and receiving a UDP echo reply from Router A. UDP echo accuracy is enhanced by using the IP SLAs Responder at Router A, the destination Cisco router. If the destination router is a Cisco router, then IP SLAs sends a UDP datagram to any port number that you specified. Using the IP SLAs Responder is optional for a UDP echo operation when using Cisco devices. The IP SLAs Responder cannot be configured on non-Cisco devices.

The results of a UDP echo operation can be useful in troubleshooting issues with business-critical applications by determining the round-trip delay times and testing connectivity to both Cisco and non-Cisco devices.

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# How to Configure IP SLAs UDP Echo Operations

- [Configuring the IP SLAs Responder on the Destination Device, page 3](#) (optional)
- [Configuring a UDP Echo Operation on the Source Device, page 4](#) (required)
- [Scheduling IP SLAs Operations, page 9](#) (required)

## Configuring the IP SLAs Responder on the Destination Device

### Prerequisites

If you are using the IP SLAs Responder, ensure that the networking device to be used as the responder is a Cisco device and that you have connectivity to that device through the network.

### SUMMARY STEPS

1. `enable`
2. `configure terminal`
3. `ip sla responder`  
or  
`ip sla responder udp-echo ipaddress ip-address port port-number`
4. `exit`

### 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>
Step 2	<code>configure terminal</code>  <b>Example:</b> Router# <code>configure terminal</code>	Enters global configuration mode.

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	Command or Action	Purpose
Step 3	<pre>ip sla responder or ip sla responder udp-echo ipaddress ip-address port port</pre> <p><b>Example:</b> Router(config)# ip sla responder or</p> <p><b>Example:</b> Router(config)# ip sla responder udp-echo ipaddress 172.29.139.132 port 5000 </p>	<p>(Optional) Temporarily enables IP SLAs Responder functionality on a Cisco device in response to control messages from source.</p> <p>or</p> <p>(Optional) Required only if protocol control is disabled on source. Permanently enables IP SLAs Responder functionality on specified IP address and port.</p> <ul style="list-style-type: none"> <li>Control is enabled by default.</li> </ul>
Step 4	<pre>exit</pre> <p><b>Example:</b> Router(config)# exit </p>	<p>(Optional) Exits global configuration mode and returns to privileged EXEC mode.</p>

## Configuring a UDP Echo Operation on the Source Device

Perform only one of the following tasks:

- [Configuring a Basic UDP Echo Operation on the Source Device, page 4](#)
- [Configuring a UDP Echo Operation with Optional Parameters on the Source Device, page 5](#)

### Configuring a Basic UDP Echo Operation on the Source Device

#### Prerequisites

If you are using the IP SLAs Responder, ensure that you have completed the “[Configuring the IP SLAs Responder on the Destination Device](#)” section on page 3 before you start this task.

#### Restrictions

If an IP SLAs Responder is permanently enabled on the destination IP Address and port, use the **control disable** keywords with the **udp-echo** command to disable control messages.

#### SUMMARY STEPS

- enable**
- configure terminal**
- ip sla operation-number**
- udp-echo** {destination-ip-address | destination-hostname} destination-port [source-ip {ip-address | hostname} source-port port-number] [control {enable | disable}]
- frequency seconds**
- exit**

**EFT REVIEW DRAFT – CISCO CONFIDENTIAL****DETAILED STEPS**

	<b>Command or Action</b>	<b>Purpose</b>
<b>Step 1</b>	<b>enable</b>  <b>Example:</b> Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"><li>Enter your password if prompted.</li></ul>
<b>Step 2</b>	<b>configure terminal</b>  <b>Example:</b> Router# configure terminal	Enters global configuration mode.
<b>Step 3</b>	<b>ip sla operation-number</b>  <b>Example:</b> Router(config)# ip sla 10	Begins configuration for an IP SLAs operation and enters IP SLA configuration mode.
<b>Step 4</b>	<b>udp-echo</b> {destination-ip-address   destination-hostname} destination-port [source-ip {ip-address   hostname} source-port port-number] [control {enable   disable}]  <b>Example:</b> Router(config-ip-sla)# udp-echo 172.29.139.134 5000	Defines a UDP echo operation and enters IP SLA UDP configuration mode. <ul style="list-style-type: none"><li>Use the <b>control disable</b> keyword combination only if you disable the IP SLAs control protocol on both the source and target routers.</li></ul>
<b>Step 5</b>	<b>frequency seconds</b>  <b>Example:</b> Router(config-ip-sla-udp)# frequency 30	(Optional) Sets the rate at which a specified IP SLAs operation repeats.
<b>Step 6</b>	<b>exit</b>  <b>Example:</b> Router(config-ip-sla-udp)# exit	Exits IP SLA UDP configuration mode and returns to global configuration mode.

**Configuring a UDP Echo Operation with Optional Parameters on the Source Device****Prerequisites**

If you are using the IP SLAs Responder, ensure that you have completed the [“Configuring the IP SLAs Responder on the Destination Device”](#) section on page 3 before you start this task.

**Restrictions**

If an IP SLAs Responder is permanently enabled on the destination IP Address and port, use the **control disable** keywords with the **udp-echo** command to disable control messages.

**SUMMARY STEPS**

- enable**
- configure terminal**

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3. **ip sla** *operation-number*
4. **udp-echo** { *destination-ip-address* | *destination-hostname* } *destination-port* [**source-ip** { *ip-address* | *hostname* } **source-port** *port-number*] [**control** { **enable** | **disable** }]
5. **history buckets-kept** *size*
6. **data-pattern** *hex-pattern*
7. **history distributions-of-statistics-kept** *size*
8. **history enhanced** [**interval** *seconds*] [**buckets** *number-of-buckets*]
9. **history filter** { **none** | **all** | **overThreshold** | **failures** }
10. **frequency** *seconds*
11. **history hours-of-statistics-kept** *hours*
12. **history lives-kept** *lives*
13. **owner** *owner-id*
14. **request-data-size** *bytes*
15. **history statistics-distribution-interval** *milliseconds*
16. **tag** *text*
17. **threshold** *milliseconds*
18. **timeout** *milliseconds*
19. **tos** *number*  
or  
**traffic-class** *number*
20. **flow-label** *number*
21. **verify-data**
22. **exit**

**DETAILED STEPS**

	<b>Command or Action</b>	<b>Purpose</b>
<b>Step 1</b>	<b>enable</b>  <b>Example:</b> Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"><li>• Enter your password if prompted.</li></ul>
<b>Step 2</b>	<b>configure terminal</b>  <b>Example:</b> Router# configure terminal	Enters global configuration mode.
<b>Step 3</b>	<b>ip sla</b> <i>operation-number</i>  <b>Example:</b> Router(config)# ip sla 10	Begins configuration for an IP SLAs operation and enters IP SLA configuration mode.

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	<b>Command or Action</b>	<b>Purpose</b>
<b>Step 4</b>	<pre>udp-echo {destination-ip-address   destination-hostname} destination-port [source-ip {ip-address   hostname} source-port port-number] [control {enable   disable}]</pre> <p><b>Example:</b> Router(config-ip-sla)# udp-echo 172.29.139.134 5000</p>	<p>Defines a UDP echo operation and enters IP SLA UDP configuration mode.</p> <ul style="list-style-type: none"> <li>Use the <b>control disable</b> keyword combination only if you disable the IP SLAs control protocol on both the source and target routers.</li> </ul>
<b>Step 5</b>	<pre>history buckets-kept size</pre> <p><b>Example:</b> Router(config-ip-sla-udp)# history buckets-kept 25</p>	(Optional) Sets the number of history buckets that are kept during the lifetime of an IP SLAs operation.
<b>Step 6</b>	<pre>data-pattern hex-pattern</pre> <p><b>Example:</b> Router(config-ip-sla-udp)# data-pattern</p>	(Optional) Specifies the data pattern in an IP SLAs operation to test for data corruption.
<b>Step 7</b>	<pre>history distributions-of-statistics-kept size</pre> <p><b>Example:</b> Router(config-ip-sla-udp)# history distributions-of-statistics-kept 5</p>	(Optional) Sets the number of statistics distributions kept per hop during an IP SLAs operation.
<b>Step 8</b>	<pre>history enhanced [interval seconds] [buckets number-of-buckets]</pre> <p><b>Example:</b> Router(config-ip-sla-udp)# history enhanced interval 900 buckets 100</p>	(Optional) Enables enhanced history gathering for an IP SLAs operation.
<b>Step 9</b>	<pre>history filter {none   all   overThreshold   failures}</pre> <p><b>Example:</b> Router(config-ip-sla-udp)# history filter failures</p>	(Optional) Defines the type of information kept in the history table for an IP SLAs operation.
<b>Step 10</b>	<pre>frequency seconds</pre> <p><b>Example:</b> Router(config-ip-sla-udp)# frequency 30</p>	(Optional) Sets the rate at which a specified IP SLAs operation repeats.
<b>Step 11</b>	<pre>history hours-of-statistics-kept hours</pre> <p><b>Example:</b> Router(config-ip-sla-udp)# history hours-of-statistics-kept 4</p>	(Optional) Sets the number of hours for which statistics are maintained for an IP SLAs operation.
<b>Step 12</b>	<pre>history lives-kept lives</pre> <p><b>Example:</b> Router(config-ip-sla-udp)# history lives-kept 5</p>	(Optional) Sets the number of lives maintained in the history table for an IP SLAs operation.

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	<b>Command or Action</b>	<b>Purpose</b>
<b>Step 13</b>	<b>owner</b> <i>owner-id</i>  <b>Example:</b> Router(config-ip-sla-udp)# owner admin	(Optional) Configures the Simple Network Management Protocol (SNMP) owner of an IP SLAs operation.
<b>Step 14</b>	<b>request-data-size</b> <i>bytes</i>  <b>Example:</b> Router(config-ip-sla-udp)# request-data-size 64	(Optional) Sets the protocol data size in the payload of an IP SLAs operation's request packet.
<b>Step 15</b>	<b>history statistics-distribution-interval</b> <i>milliseconds</i>  <b>Example:</b> Router(config-ip-sla-udp)# history statistics-distribution-interval 10	(Optional) Sets the time interval for each statistics distribution kept for an IP SLAs operation.
<b>Step 16</b>	<b>tag</b> <i>text</i>  <b>Example:</b> Router(config-ip-sla-udp)# tag TelnetPollServer1	(Optional) Creates a user-specified identifier for an IP SLAs operation.
<b>Step 17</b>	<b>threshold</b> <i>milliseconds</i>  <b>Example:</b> Router(config-ip-sla-udp)# threshold 10000	(Optional) Sets the upper threshold value for calculating network monitoring statistics created by an IP SLAs operation.
<b>Step 18</b>	<b>timeout</b> <i>milliseconds</i>  <b>Example:</b> Router(config-ip-sla-udp)# timeout 10000	(Optional) Sets the amount of time an IP SLAs operation waits for a response from its request packet.
<b>Step 19</b>	<b>tos</b> <i>number</i> or <b>traffic-class</b> <i>number</i>  <b>Example:</b> Router(config-ip-sla-jitter)# tos 160 or  <b>Example:</b> Router(config-ip-sla-jitter)# traffic-class 160	(Optional) In an IPv4 network only, defines the ToS byte in the IPv4 header of an IP SLAs operation.  or (Optional) In an IPv6 network only, defines the traffic class byte in the IPv6 header for a supported IP SLAs operation.
<b>Step 20</b>	<b>flow-label</b> <i>number</i>  <b>Example:</b> Router(config-ip-sla-udp)# flow-label 112233	(Optional) In an IPv6 network only, defines the flow label field in the IPv6 header for a supported IP SLAs operation.



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	<b>Command or Action</b>	<b>Purpose</b>
<b>Step 21</b>	<b>verify-data</b>  <b>Example:</b> Router(config-ip-sla-udp)# verify-data	(Optional) Causes an IP SLAs operation to check each reply packet for data corruption.
<b>Step 22</b>	<b>exit</b>  <b>Example:</b> Router(config-ip-sla-udp)# exit	Exits UDP configuration submode and returns to global configuration mode.

## Scheduling IP SLAs Operations

### Restrictions

- All IP SLAs operations to be scheduled must be already configured.
- The frequency of all operations scheduled in an operation group must be the same unless you are enabling the random scheduler option for a multioperation scheduler.

### SUMMARY STEPS

1. **enable**

2. **configure terminal**

For individual IP SLAs operations only:

3. **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**]

For multioperation scheduler only:

4. **ip sla group schedule** *group-operation-number* *operation-id-numbers* **schedule-period** *schedule-period-range* [**ageout** *seconds*] [**frequency** *group-operation-frequency*] [**life** {**forever** | *seconds*}] [**start-time** {*hh:mm[:ss]* [*month day* | *day month*] | **pending** | **now** | **after** *hh:mm:ss*}]

5. **exit**

6. **show ip sla group schedule**

7. **show ip sla configuration**

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	<b>Command or Action</b>	<b>Purpose</b>
<b>Step 1</b>	<b>enable</b>  <b>Example:</b> Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>Enter your password if prompted.</li> </ul>
<b>Step 2</b>	<b>configure terminal</b>  <b>Example:</b> Router# configure terminal	Enters global configuration mode.
<b>Step 3</b>	<b>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]</b>  <b>Example:</b> Router(config)# ip sla schedule 10 start-time now life forever	For individual IP SLAs operations only: Configures the scheduling parameters for an individual IP SLAs operation.
<b>Step 4</b>	<b>ip sla group schedule group-operation-number operation-id-numbers schedule-period schedule-period-range [ageout seconds] [frequency group-operation-frequency] [life {forever   seconds}] [start-time {hh:mm[:ss] [month day   day month]   pending   now   after hh:mm:ss}]</b>  <b>Example:</b> Router(config)# ip sla group schedule 1 3,4,6-9	For multioperation scheduler only: Specifies an IP SLAs operation group number and the range of operation numbers to be scheduled in global configuration mode. <ul style="list-style-type: none"> <li>The operation ID numbers are limited to a maximum of 125 characters. Do not use large integer values as operation ID numbers.</li> </ul>
<b>Step 5</b>	<b>exit</b>  <b>Example:</b> Router(config)# exit	Exits to privileged EXEC mode.
<b>Step 6</b>	<b>show ip sla group schedule</b>  <b>Example:</b> Router# show ip sla group schedule	(Optional) Displays the IP SLAs group schedule details.
<b>Step 7</b>	<b>show ip sla configuration</b>  <b>Example:</b> Router# show ip sla configuration	(Optional) Displays the IP SLAs configuration details.

**Examples**

The following sample output shows the configuration of all the IP SLAs parameters (including defaults) for the UDP echo operation number 10.

```
Router# show ip sla configuration 10
```

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```
Complete configuration Table (includes defaults)
Entry number: 10
Owner: jdoe
Tag: FLL-RO
Type of operation to perform: udpEcho
Target address: 172.29.139.134
Source address: 0.0.0.0
Target port: 5000
Source port: 0
Request size (ARR data portion): 160
Operation timeout (milliseconds): 1000
Type Of Service parameters: 128
Verify data: No
Data pattern:
Vrf Name:
Control Packets: enabled
Operation frequency (seconds): 30
Next Scheduled Start Time: Start Time already passed
Group Scheduled: FALSE
Life (seconds): Forever
Entry Ageout (seconds): never
Recurring (Starting Everyday): FALSE
Status of entry (SNMP RowStatus): Active
Threshold (milliseconds): 5000
Number of statistic hours kept: 2
Number of statistic distribution buckets kept: 1
Statistic distribution interval (milliseconds): 20
Enhanced History:
Aggregation Interval:60 Buckets:2
Number of history Lives kept: 0
Number of history Buckets kept: 15
History Filter Type: None
```

## 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 configuration 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 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.

# Configuration Examples for the IP SLAs UDP Echo Operation

- [Example: Configuring a UDP Echo Operation, page 12](#)

**EFT REVIEW DRAFT – CISCO CONFIDENTIAL****Example: Configuring a UDP Echo Operation**

The following example configures an IP SLAs operation type of UDP echo that will start immediately and run indefinitely.

```
ip sla 5
  udp-echo 172.29.139.134 5000
  frequency 30
  request-data-size 160
  tos 128
  timeout 1000
  tag FLL-RO
ip sla schedule 5 life forever start-time now
```

**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	<a href="#">Cisco IOS IP SLAs Command Reference</a>

**Standards**

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

**MIBs**

MIBs	MIBs Link
<ul style="list-style-type: none"> <li>CISCO-RTTMON-MIB</li> <li>IPV6-FLOW-LABEL-MIB</li> </ul>	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**

RFCs	Title
RFC 862	Echo Protocol

**EFT REVIEW DRAFT – CISCO CONFIDENTIAL****Technical Assistance**

<b>Description</b>	<b>Link</b>
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>

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# Feature Information for the IP SLAs UDP Echo Operation

Table 1 lists the features in this module and provides links to specific configuration information.

Use Cisco Feature Navigator to find information about platform support and software image support. Cisco Feature Navigator enables you to determine which 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 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.

**Table 1** Feature Information for the IP SLAs UDP Echo Operation

Feature Name	Releases	Feature Information
IP SLAs UDP Jitter Operation	12.2(31)SB2 12.2(33)SRB1 12.2(33)SXH 12.2(32)SY 12.3(14)T 15.0(1)S Cisco IOS XE 3.1.0SG	The Cisco IOS IP SLAs User Datagram Protocol (UDP) jitter operation allows you to measure round-trip delay, one-way delay, one-way jitter, one-way packet loss, and connectivity in networks that carry UDP traffic.
IPv6 - IP SLAs (UDP Jitter, UDP Echo, ICMP Echo, TCP Connect)	12.2(33)SRC 12.2(33)SB 12.4(20)T Cisco IOS XE 3.1.0SG 12.2(32)SY	Support was added for operability in IPv6 networks.

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