



# Configuring Cisco IOS IP SLAs DLSw+ Operations

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This module describes how to configure the Cisco IOS IP Service Level Agreements (SLAs) Data Link Switching Plus (DLSw+) operation to measure and analyze the DLSw+ protocol stack and network response time between DLSw+ peers.

## Finding Feature Information in This Module

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 Cisco IOS IP SLAs DLSw+ Operations”](#) section on page 11.

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

## Contents

- [Information About Cisco IOS IP SLAs DLSw+ Operations](#), page 2
- [How to Configure Cisco IOS IP SLAs DLSw+ Operations](#), page 2
- [Configuration Examples for Cisco IOS IP SLAs DLSw+ Operations](#), page 8
- [Additional References](#), page 9
- [Feature Information for Cisco IOS IP SLAs DLSw+ Operations](#)

## Prerequisites

A connected DLSw+ peer between the source and destination networking devices must be configured.



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# Information About Cisco IOS IP SLAs DLSw+ Operations

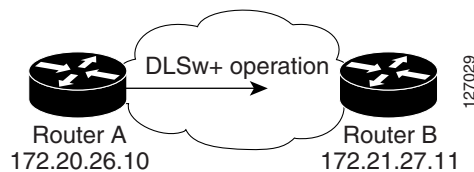
- [DLSw+ Operation, page 2](#)

## DLSw+ Operation

The Cisco IOS IP SLAs DLSw+ operation measures the DLSw+ protocol stack and network response time between DLSw+ peers. DLSw+ is the enhanced Cisco version of RFC 1795. DLSw+ tunnels non-routable Layer 2 traffic such as Systems Network Architecture (SNA) traffic over IP backbones via TCP. The networking devices performing the tunneling of non-routable traffic into TCP/IP are referred to as DLSw+ peers. DLSw+ peers normally communicate through TCP port 2065. The destination networking device does not have to be a Cisco router if it supports RFC 1795.

In [Figure 1](#), Router A is configured as the source IP SLAs device and a DLSw+ operation is configured with Router B as the remote DLSw+ peer. Router A and Router B are configured as connected DLSw+ peers. The peer (destination device) does not have to run a Cisco IOS IP SLA-capable image.

**Figure 1** DLSw+ Operation



Network response time is computed by measuring the round-trip time (RTT) taken to connect to the remote DLSw+ peer using TCP. This operation does not use the IP SLAs Responder.

## How to Configure Cisco IOS IP SLAs DLSw+ Operations

- [Configuring IP SLAs DLSw+ Operations, page 2](#) (required)
- [Scheduling IP SLAs Operations, page 6](#)

## Configuring IP SLAs DLSw+ Operations



### Note

There is no need to configure an IP SLAs responder on the destination device.

Perform one of the following tasks:

- [Configuring a Basic DLSw+ Operation on the Source Device, page 3](#)
- [Configuring an IP SLAs DLSw+ Operation with Optional Parameters on the Source Device, page 3](#)

## Configuring a Basic DLSw+ Operation on the Source Device

### SUMMARY STEPS

1. `enable`
2. `configure terminal`
3. `ip sla operation-number`
4. `dlsw peer-ipaddr ip-address`
5. `frequency seconds`
6. `end`

### DETAILED STEPS

	Command or Action	Purpose
Step 1	<code>enable</code>  <b>Example:</b> Router> enable	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# configure terminal	Enters global configuration mode.
Step 3	<code>ip sla operation-number</code>  <b>Example:</b> Router(config)# ip sla 10	Begins configuration for an IP SLAs operation and enters IP SLA configuration mode.
Step 4	<code>dlsw peer-ipaddr ip-address</code>  <b>Example:</b> Router(config-ip-sla)# dlsw peer-ipaddr 172.21.27.11	Defines a DLSw+ operation and enters IP SLA DLSw+ configuration mode.
Step 5	<code>frequency seconds</code>  <b>Example:</b> Router(config-ip-sla-dlsw)# frequency 30	(Optional) Sets the rate at which a specified IP SLAs operation repeats.
Step 6	<code>end</code>  <b>Example:</b> Router(config-ip-sla-dlsw)# end	Exits to privileged EXEC mode.

## Configuring an IP SLAs DLSw+ Operation with Optional Parameters on the Source Device

### SUMMARY STEPS

1. `enable`

2. **configure terminal**
3. **ip sla** *operation-number*
4. **dlsw peer-ipaddr** *ip-address*
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. **request-data-size** *bytes*
14. **history statistics-distribution-interval** *milliseconds*
15. **tag** *text*
16. **threshold** *milliseconds*
17. **timeout** *milliseconds*
18. **end**

## DETAILED STEPS

	Command or Action	Purpose
Step 1	<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>
Step 2	<b>configure terminal</b>  <b>Example:</b> Router# configure terminal	Enters global configuration mode.
Step 3	<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.
Step 4	<b>dlsw peer-ipaddr</b> <i>ip-address</i>  <b>Example:</b> Router(config-ip-sla)# dlsw peer-ipaddr 172.21.27.11	Defines a DLSw+ operation and enters IP SLA DLSw configuration mode.
Step 5	<b>history buckets-kept</b> <i>size</i>  <b>Example:</b> Router(config-ip-sla-dlsw)# history buckets-kept 25	(Optional) Sets the number of history buckets that are kept during the lifetime of an IP SLAs operation.

	Command or Action	Purpose
Step 6	<p><b>history distributions-of-statistics-kept</b> <i>size</i></p> <p><b>Example:</b> Router(config-ip-sla-dlsw)# history distributions-of-statistics-kept 5</p>	(Optional) Sets the number of statistics distributions kept per hop during an IP SLAs operation.
Step 7	<p><b>history enhanced</b> [<i>interval seconds</i>] [<i>buckets number-of-buckets</i>]</p> <p><b>Example:</b> Router(config-ip-sla-dlsw)# history enhanced interval 900 buckets 100</p>	(Optional) Enables enhanced history gathering for an IP SLAs operation.
Step 8	<p><b>history filter</b> {<i>none</i>   <i>all</i>   <i>overThreshold</i>   <i>failures</i>}</p> <p><b>Example:</b> Router(config-ip-sla-dlsw)# history filter failures</p>	(Optional) Defines the type of information kept in the history table for an IP SLAs operation.
Step 9	<p><b>frequency</b> <i>seconds</i></p> <p><b>Example:</b> Router(config-ip-sla-dlsw)# frequency 30</p>	(Optional) Sets the rate at which a specified IP SLAs operation repeats.
Step 10	<p><b>history hours-of-statistics-kept</b> <i>hours</i></p> <p><b>Example:</b> Router(config-ip-sla-dlsw)# hours-of-statistics-kept 4</p>	(Optional) Sets the number of hours for which statistics are maintained for an IP SLAs operation.
Step 11	<p><b>history lives-kept</b> <i>lives</i></p> <p><b>Example:</b> Router(config-ip-sla-dlsw)# history lives-kept 5</p>	(Optional) Sets the number of lives maintained in the history table for an IP SLAs operation.
Step 12	<p><b>owner</b> <i>owner-id</i></p> <p><b>Example:</b> Router(config-ip-sla-dlsw)# owner admin</p>	(Optional) Configures the Simple Network Management Protocol (SNMP) owner of an IP SLAs operation.
Step 13	<p><b>request-data-size</b> <i>bytes</i></p> <p><b>Example:</b> Router(config-ip-sla-dlsw)# request-data-size 64</p>	(Optional) Sets the protocol data size in the payload of an IP SLAs operation's request packet.
Step 14	<p><b>history statistics-distribution-interval</b> <i>milliseconds</i></p> <p><b>Example:</b> Router(config-ip-sla-dlsw)# history statistics-distribution-interval 10</p>	(Optional) Sets the time interval for each statistics distribution kept for an IP SLAs operation.

	Command or Action	Purpose
Step 15	<b>tag</b> <i>text</i>  <b>Example:</b> Router(config-ip-sla-dlsw)# tag TelnetPollServer1	(Optional) Creates a user-specified identifier for an IP SLAs operation.
Step 16	<b>threshold</b> <i>milliseconds</i>  <b>Example:</b> Router(config-ip-sla-dlsw)# threshold 10000	(Optional) Sets the upper threshold value for calculating network monitoring statistics created by an IP SLAs operation.
Step 17	<b>timeout</b> <i>milliseconds</i>  <b>Example:</b> Router(config-ip-sla-dlsw)# timeout 10000	(Optional) Sets the amount of time an IP SLAs operation waits for a response from its request packet.
Step 18	<b>end</b>  <b>Example:</b> Router(config-ip-sla-dlsw)# exit	Exits to privileged EXEC mode.

## Scheduling IP SLAs Operations

### Restrictions

- The frequency of all operations scheduled in a multioperation group must be the same.
- Operation ID numbers are limited to a maximum of 125 characters. Do not give large integer values as operation ID numbers.

### 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**

**DETAILED STEPS**

	<b>Command or Action</b>	<b>Purpose</b>
<b>Step 1</b>	<p><b>enable</b></p> <p><b>Example:</b> Router&gt; enable</p>	<p>Enables privileged EXEC mode.</p> <ul style="list-style-type: none"> <li>Enter your password if prompted.</li> </ul>
<b>Step 2</b>	<p><b>configure terminal</b></p> <p><b>Example:</b> Router# configure terminal</p>	<p>Enters global configuration mode.</p>
<b>Step 3</b>	<p><b>ip sla schedule operation-number</b> [<b>life</b> {<b>forever</b>   <b>seconds</b>}] [<b>start-time</b> {<b>hh:mm[:ss]</b> [<b>month day</b>   <b>day month</b>]   <b>pending</b>   <b>now</b>   <b>after hh:mm:ss</b>}] [<b>ageout seconds</b>] [<b>recurring</b>]</p> <p><b>Example:</b> Router(config)# ip sla schedule 1 start-time now life forever</p>	<p>For individual IP SLAs operations only:</p> <p>Configures the scheduling parameters for an individual IP SLAs operation.</p>
<b>Step 4</b>	<p><b>ip sla group schedule group-operation-number operation-id-numbers</b> <b>schedule-period schedule-period-range</b> [<b>ageout seconds</b>] [<b>frequency group-operation-frequency</b>] [<b>life</b> {<b>forever</b>   <b>seconds</b>}] [<b>start-time</b> {<b>hh:mm[:ss]</b> [<b>month day</b>   <b>day month</b>]   <b>pending</b>   <b>now</b>   <b>after hh:mm:ss</b>}]</p> <p><b>Example:</b> Router(config)# ip sla group schedule 1 3,4,6-9</p>	<p>For multioperation scheduler only:</p> <p>Specifies an IP SLAs operation group number and the range of operation numbers to be scheduled in global configuration mode.</p> <ul style="list-style-type: none"> <li>The frequency of all operations scheduled in the operation group should be the same.</li> <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>	<p><b>exit</b></p> <p><b>Example:</b> Router(config)# exit</p>	<p>Exits to privileged EXEC mode.</p>
<b>Step 6</b>	<p><b>show ip sla group schedule</b></p> <p><b>Example:</b> Router# show ip sla group schedule</p>	<p>(Optional) Displays the IP SLAs group schedule details.</p>
<b>Step 7</b>	<p><b>show ip sla configuration</b></p> <p><b>Example:</b> Router# show ip sla configuration</p>	<p>(Optional) Displays the IP SLAs configuration details.</p>

**Examples**

The following sample output shows the configuration of all the IP SLAs parameters (including defaults) for DLSw+ operation number 14.

```
Router# show ip sla configuration 14
```

```

Complete Configuration Table (includes defaults)
Entry number: 14
Owner:
Tag: DLSw-Test
Type of operation to perform: dlsw
Peer address: 172.21.27.11
Request size (ARR data portion): 0
Operation timeout (milliseconds): 50000
Operation frequency (seconds): 50
Next Scheduled Start Time: Start Time already passed
Group Scheduled: FALSE
Life (seconds): 50
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
Number of history Lives kept: 0
Number of history Buckets kept: 15
History Filter Type: None

```

## 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 add proactive threshold conditions and reactive triggering for generating traps, or for starting another operation, to an IP SLAs operation, see [Configuring Proactive Threshold Monitoring](#).

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 Cisco IOS IP SLAs DLSw+ Operations

- [Example: IP SLAs DLSw+ Operation Configuration, page 8](#)

## Example: IP SLAs DLSw+ Operation Configuration

The following example shows the configuration for a DLSw+ operation from Router A to Router B, a remote DLSw+ peer. Router B is configured as a DLSw+ peer and Router A is specified as the remote (connected) DLSw+ peer. Router A is then configured as a DLSw+ peer with Router B as the connected DLSw+ peer, and the IP SLAs DLSw+ operation parameters are configured. The operation is scheduled to start immediately and run for 7200 seconds (2 hours).

### Router B Configuration

```
configure terminal
```

```
dlsw local-peer peer-id 172.21.27.11
dlsw remote-peer 0 tcp 172.20.26.10
```

#### Router A Configuration

```
dlsw local-peer peer-id 172.20.26.10
dlsw remote-peer 0 tcp 172.21.27.11
ip sla 14
  dlsw peer-ipaddr 172.21.27.11
  frequency 50
  timeout 50000
  tag DLSw-Test
  exit
ip sla schedule 14 life 7200 start-time now
```

## Additional References

### Related Documents

Related Topic	Document Title
Cisco IOS commands	<i>Cisco IOS Master Commands List, All Releases</i>
Cisco IOS IP SLAs commands	<i>Cisco IOS IP SLAs Command Reference</i>
Cisco IOS IP SLAs: general information	“Cisco IOS IP SLAs Overview” chapter of the <i>Cisco IP SLAs Configuration Guide</i> .

### 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
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

RFCs	Title
RFC 1795	Data Link Switching: Switch-to-Switch Protocol

## 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 Cisco IOS IP SLAs DLSw+ Operations

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 Cisco IOS IP SLAs DLSw+ Operations

Feature Name	Releases	Feature Information
IP SLAs DLSw+ Operation	12.3(14)T 15.0(1)S	The Cisco IOS IP SLAs Data Link Switching Plus (DLSw+) operation allows you to schedule and measure the DLSw+ protocol stack and network response time between DLSw+ peers

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