# Configuring IP SLAs DHCP Operations

This module describes how to configure an IP Service Level Agreements (SLAs) Dynamic Host Control Protocol (DHCP) probe to measure the response time between a Cisco device and a DHCP server to obtain an IP address.


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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. An account on Cisco.com is not required.

# Information About IP SLAs DHCP Operations

## DHCP Operation

DHCP provides a mechanism for allocating IP addresses dynamically so that addresses can be reused when hosts no longer need them. The DHCP operation measures the round-trip time (RTT) taken to discover a DHCP server and obtain a leased IP address from it. IP SLAs releases the leased IP address after the operation.

You can use the RTT information to determine DHCP performance levels.

There are two modes for the DHCP operation. By default, the DHCP operation sends discovery packets on every available IP interface on the device. If a specific server is configured on the device, discovery packets are sent only to the specified DHCP server.

# IP SLAs DHCP Relay Agent Options

A DHCP relay agent is any host that forwards DHCP packets between clients and servers. Relay agents are used to forward requests and replies between clients and servers when they are not on the same physical subnet. Relay agent forwarding is distinct from the normal forwarding of an IP device, where IP packets are switched between networks somewhat transparently. Relay agents receive DHCP messages and then generate a new DHCP message to send out on another interface.

# How to Configure IP SLAs DHCP Operations

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

## Configuring a DHCP Operation on the Source Device

Perform one of the following tasks:

### Configuring a Basic DHCP Operation

#### SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip sla** *operation-number*
4. **dhcp** {*destination-ip-address* | *destination-hostname*} [**source-ip** {*ip-address* | *hostname*}]
5. **frequency** *seconds*
6. **end**

#### DETAILED STEPS

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | **enable**<br>**Example:**<br>`Device> enable` | Enables privileged EXEC mode.<br>• Enter your password if prompted. |
| **Step 2** | **configure terminal**<br>**Example:**<br>`Device# configure terminal` | Enters global configuration mode. |
| **Step 3** | **ip sla** *operation-number*<br>**Example:**<br>`Device(config)# ip sla 10` | Begins configuration for an IP SLAs operation and enters IP SLA configuration mode. |

| | Command or Action | Purpose |
|---|---|---|
| **Step 4** | **dhcp** {*destination-ip-address* \| *destination-hostname*} [**source-ip** {*ip-address* \| *hostname*}]<br>**Example:**<br>`Device(config-ip-sla)# dhcp 10.10.10.3` | Defines a DHCP operation and enters IP SLA DHCP configuration mode. |
| **Step 5** | **frequency** *seconds*<br>**Example:**<br>`Device(config-ip-sla-dhcp)# frequency 30` | (Optional) Sets the rate at which a specified IP SLAs operation repeats. |
| **Step 6** | **end**<br>**Example:**<br>`Device(config-ip-sla-dhcp)# end` | Exits to privileged EXEC mode. |

## Configuring a DHCP Operation with Optional Parameters

### SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip sla** *operation-number*
4. **dhcp** {*destination-ip-address* | *destination-hostname*} [**source-ip** {*ip-address* | *hostname*}]
5. **history buckets-kept** *size*
6. **history distributions-of-statistics-kept** *size*
7. **history filter** {**none** | **all** | **overThreshold** | **failures**}
8. **frequency** *seconds*
9. **history hours-of-statistics-kept** *hours*
10. **history lives-kept** *lives*
11. **owner** *owner-id*
12. **history statistics-distribution-interval** *milliseconds*
13. **tag** *text*
14. **threshold** *milliseconds*
15. **timeout** *milliseconds*
16. **end**

### DETAILED STEPS

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | **enable**<br>**Example:**<br>`Device> enable` | Enables privileged EXEC mode.<br>• Enter your password if prompted. |

| | Command or Action | Purpose |
|---|---|---|
| **Step 2** | **configure terminal**<br>**Example:**<br>`Device# configure terminal` | Enters global configuration mode. |
| **Step 3** | **ip sla** *operation-number*<br>**Example:**<br>`Device(config)# ip sla 10` | Begins configuration for an IP SLAs operation and enters IP SLA configuration mode. |
| **Step 4** | **dhcp** {*destination-ip-address* \| *destination-hostname*} [**source-ip** {*ip-address* \| *hostname*}]<br>**Example:**<br>`Device(config-ip-sla)# dhcp 10.10.10.3` | Defines a DHCP operation and enters IP SLA DHCP configuration mode. |
| **Step 5** | **history buckets-kept** *size*<br>**Example:**<br>`Device(config-ip-sla-dhcp)# 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*<br>**Example:**<br>`Device(config-ip-sla-dhcp)# history distributions-of-statistics-kept 5` | (Optional) Sets the number of statistics distributions kept per hop during an IP SLAs operation. |
| **Step 7** | **history filter** {**none** \| **all** \| **overThreshold** \| **failures**}<br>**Example:**<br>`Device(config-ip-sla-dhcp)# history filter failures` | (Optional) Defines the type of information kept in the history table for an IP SLAs operation. |
| **Step 8** | **frequency** *seconds*<br>**Example:**<br>`Device(config-ip-sla-dhcp)# frequency 30` | (Optional) Sets the rate at which a specified IP SLAs operation repeats. |
| **Step 9** | **history hours-of-statistics-kept** *hours*<br>**Example:**<br>`Device(config-ip-sla-dhcp)# history hours-of-statistics-kept 4` | (Optional) Sets the number of hours for which statistics are maintained for an IP SLAs operation. |
| **Step 10** | **history lives-kept** *lives*<br>**Example:** | (Optional) Sets the number of lives maintained in the history table for an IP SLAs operation. |

| | Command or Action | Purpose |
|---|---|---|
| | `Device(config-ip-sla-dhcp)# history lives-kept 5` | |
| **Step 11** | **owner** *owner-id*<br>**Example:**<br>`Device(config-ip-sla-dhcp)# owner admin` | (Optional) Configures the Simple Network Management Protocol (SNMP) owner of an IP SLAs operation. |
| **Step 12** | **history statistics-distribution-interval** *milliseconds*<br>**Example:**<br>`Device(config-ip-sla-dhcp)# history statistics-distribution-interval 10` | (Optional) Sets the time interval for each statistics distribution kept for an IP SLAs operation. |
| **Step 13** | **tag** *text*<br>**Example:**<br>`Device(config-ip-sla-dhcp)# tag TelnetPollServer1` | (Optional) Creates a user-specified identifier for an IP SLAs operation. |
| **Step 14** | **threshold** *milliseconds*<br>**Example:**<br>`Device(config-ip-sla-dhcp)# threshold 10000` | (Optional) Sets the upper threshold value for calculating network monitoring statistics created by an IP SLAs operation. |
| **Step 15** | **timeout** *milliseconds*<br>**Example:**<br>`Device(config-ip-sla-dhcp)# timeout 10000` | (Optional) Sets the amount of time an IP SLAs operation waits for a response from its request packet. |
| **Step 16** | **end**<br>**Example:**<br>`Device(config-ip-sla-dhcp)# end` | Exits to privileged EXEC mode. |

# Scheduling IP SLAs Operations

### Before you begin

- All IP Service Level Agreements (SLAs) operations 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 must be limited to a maximum of 125 characters in length, including commas (,).

### SUMMARY STEPS

1. **enable**
2. **configure terminal**

3. Enter one of the following commands:
   - **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*]}]
4. **end**
5. **show ip sla group schedule**
6. **show ip sla configuration**

## DETAILED STEPS

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | **enable**<br>**Example:**<br>`Device> enable` | Enables privileged EXEC mode.<br>• Enter your password if prompted. |
| **Step 2** | **configure terminal**<br>**Example:**<br>`Device# configure terminal` | Enters global configuration mode. |
| **Step 3** | Enter one of the following commands:<br>• **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**]<br>• **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*]}]<br>**Example:**<br>`Device(config)# ip sla schedule 10 life forever start-time now`<br>`Device(config)# ip sla group schedule 10 schedule-period frequency`<br>`Device(config)# ip sla group schedule 1 3,4,6-9 life forever start-time now`<br>`Device(config)# ip sla schedule 1 3,4,6-9 schedule-period 50 frequency range 80-100` | • Configures the scheduling parameters for an individual IP SLAs operation.<br>• Specifies an IP SLAs operation group number and the range of operation numbers for a multioperation scheduler. |

| | Command or Action | Purpose |
|---|---|---|
| **Step 4** | **end**<br>**Example:**<br>`Device(config)# end` | Exits global configuration mode and returns to privileged EXEC mode. |
| **Step 5** | **show ip sla group schedule**<br>**Example:**<br>`Device# show ip sla group schedule` | (Optional) Displays IP SLAs group schedule details. |
| **Step 6** | **show ip sla configuration**<br>**Example:**<br>`Device# show ip sla configuration` | (Optional) Displays IP SLAs configuration details. |

## Troubleshooting Tips

- If the IP Service Level Agreements (SLAs) operation is not running and not generating statistics, add the **verify-data** command to the configuration (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 Service Level Agreements (SLAs) operation, see the “Configuring Proactive Threshold Monitoring” section.

# Configuration Examples for IP SLAs DHCP Operations

## Example Configuration for an IP SLAs DHCP Operation

In the following example, IP SLAs operation number 12 is configured as a DHCP operation enabled for DHCP server 172.16.20.3. Note that DHCP option 82 is used to specify the circuit ID.

### Device B Configuration

```
ip dhcp-server 172.16.20.3
!
ip sla 12
 dhcp 10.10.10.3
 frequency 30
```

```
 timeout 5000
 tag DHCP_Test
!
ip sla schedule 12 start-time now
```

# Additional References

### Related Documents

| Related Topic | Document Title |
|---|---|
| Cisco IOS commands | Cisco IOS Master Commands List, All Releases |
| Cisco IOS IP SLAs commands | Cisco IOS IP SLAs Command Reference, All Releases |
| Cisco IOS IP SLAs: general information | "Cisco IOS IP SLAs Overview" module of the *Cisco IOS IP SLAs Configuration Guide*. |
| Multioperation scheduling for IP SLAs | "Configuring Multioperation Scheduling of IP SLAs Operations" module of the *Cisco IOS P SLAs Configuration Guide* |
| Proactive threshold monitoring for IP SLAs | "Configuring Proactive Threshold Monitoring of IP SLAs Operations" module of the *Cisco IOS IP SLAs Configuration Guide* |

### 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:<br>http://www.cisco.com/go/mibs |

### 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. | http://www.cisco.com/cisco/web/support/index.html |

# Feature Information for IP SLAs DHCP Operations

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. An account on Cisco.com is not required.

***Table 1: Feature Information for IP SLAs DHCP Operations***

| Feature Name | Releases | Feature Information |
|---|---|---|
| IP SLAs DHCP Probe | | The IP SLAs Dynamic Host Control Protocol (DHCP) Probe feature allows you to schedule and measure the network response time between a Cisco device and a DHCP server to obtain an IP address. |