IP SLAs UDP Jitter Operation

Feature History for IP SLAs - UDP Jitter Operation

This table provides release and platform support information for the features explained in this module.

These features are available in all the releases subsequent to the one they were introduced in, unless noted otherwise.

Release	Feature Name and Description	Supported Platform
Cisco IOS XE 17.18.1	IP SLAs - UDP Jitter Operation: This operation assesses whether a network is suitable for real-time traffic applications such as Voice over IP (VoIP), video over IP, or real-time conferencing	Cisco C9350 Series Smart Switches Cisco C9610 Series Smart Switches

IP SLAs UDP jitter

The IP Service Level Agreements (SLAs) UDP jitter operation is designed to assess whether a network is suitable for real-time traffic applications such as Voice over IP (VoIP), video over IP, or real-time conferencing. By measuring variations in packet delay and other performance metrics, this operation helps ensure that the network can support the quality requirements necessary for seamless, real-time communication.

Jitter

Jitter refers to the variation in delay between packets as they travel from the source to the destination. For instance, if packets are sent every 10 milliseconds from the source, an ideal network would deliver them to the destination exactly 10 milliseconds apart. However, network factors such as queuing or routing changes

can cause packets to arrive with more or less delay than expected. If a packet arrives 12 milliseconds after the previous one, the positive jitter is 2 milliseconds; if it arrives 8 milliseconds after, the negative jitter is 2 milliseconds. For applications that are sensitive to delays, like VoIP, positive jitter is problematic because it disrupts the steady flow of data, while a jitter value of zero is considered optimal for smooth, real-time communication.

How IP SLAs UDP jitter works

Summary

The UDP jitter operation works by generating synthetic, or simulated, UDP traffic between network devices. This operation supports asymmetric probes, allowing different packet sizes to be sent in each direction—for example, request packets from the source device to the destination device can be a different size than response packets traveling back. During the test, the source device sends a specified number (N) of UDP packets, each with a defined size (S), spaced T milliseconds apart, and this test is repeated at a set frequency (F). The destination device responds with UDP packets of another specified size (P). By default, the operation sends ten UDP packets (N), each with a 10-byte payload (S), every 10 milliseconds (T), and repeats the entire process every 60 seconds (F). All these parameters are customizable, allowing you to closely simulate the real IP services and traffic patterns you want to monitor in your network.

Table 1: UDP Jitter Operation Parameters

UDP jitter operation parameter	Default	Configuration commands
Number of packets (N)	10 packets	**udp-jitter num-packets**
Payload size per request packet (S)	10 bytes	**request-data-size**
Payload size per response packet (P)	The default response data size varies depending on the type of IP SLAs operation configured. **Note** If the **response-data-size** command is not configured, then the response data size value is the same as the request data size value.	**response-data-size**
Time between packets, in milliseconds (T)	10 ms	**udp-jitter interval**
Elapsed time before the operation repeats, in seconds (F)	60 seconds	**frequency** (IP SLA)

IP SLAs operations work by generating synthetic, or simulated, network traffic to test and monitor network performance. Each IP SLA operation, such as operation 10, is configured to run repeatedly at a specified frequency for as long as the operation is active. This ongoing process allows continuous monitoring and helps ensure that network performance is consistently measured over time.

Benefits of IP SLAs UDP jitter

The IP SLAs UDP jitter operation is not limited to simply monitoring jitter; it serves as a versatile data-gathering tool for network performance. The UDP jitter operation collects detailed information by including packet sequence numbers and sending and receiving time stamps for both the source and the operational target. This allows it to measure several important metrics, such as per-direction jitter (in both directions), per-direction packet loss, per-direction delay (one-way delay), and round-trip delay (average round-trip time). Since network paths can be asymmetric—with data taking different routes in each direction—having per-direction statistics helps network administrators pinpoint exactly where congestion or other issues are occurring within the network.

Guidelines to configure IP SLAs UDP jitter

- Time synchronization, such as that provided by the Network Time Protocol (NTP), is required between the source and target device to provide accurate one-way delay (latency) measurements.
- Time synchronization is not required for one-way jitter and packet loss measurements. If time is not synchronized between source and target devices, one-way jitter and packet loss data are still returned, but the one-way delay measurements provided by the UDP jitter operation will have a value of "0".
- Before configuring any IP Service Level Agreements (SLAs) application, use the **show ip sla application** command to verify that the operation type is supported on the software image.
- Multiple SLA probes configured with the same source and destination IP addresses and port numbers should not be run simultaneously.
- The IP SLAs UDP jitter operation does not support the IP SLAs History feature due to the large volume of data involved. As a result, the commands **history buckets-kept**, **history filter**, **history lives-kept**, **samples-of-history-kept**, and **show ip sla history** are not supported for UDP jitter operations.
- The MIB used by IP SLAs (CISCO-RTTMON-MIB) restricts the hours-of-statistics kept for the UDP jitter operation to a maximum of two hours. Configuring a higher value with the **history hours-of-statistics** *hours* command does not extend this limit. However, historical data for the operation can be collected using the Data Collection MIB. For more details, refer to the CISCO-DATA-COLLECTION-MIB.
- If the IP SLAs operation is not running and not generating statistics, adding the **verify-data** command in IP SLA configuration mode enables data verification. With data verification enabled, each operation response is checked for corruption. However, the **verify-data command** should be used with caution during normal operations, as it can generate unnecessary overhead.
- Use the **debug ip sla trace** and **debug ip sla error** commands to help troubleshoot issues with an IP SLAs operation.

Configure and schedule a UDP jitter operation on a source device

Follow the steps in each of these tasks to configure and schedule a UDP jitter operation on a source device.

Procedure

Step 1 Perform any one of these tasks:

- Configure a basic UDP jitter operation on a source device
- ConfigConfigure a UDP jitter operation with additional characteristics, on page 5

Step 2 Schedule IP SLAs operations

Configure a basic UDP jitter operation on a source device

Perform this task to configure a basic UDP jitter operation on a source device.

Procedure

Step 1 **enable**

Example:

```
Device> enable
```

Enables privileged EXEC mode.

Enter your password, if prompted.

Step 2 **configure terminal**

Example:

```
Device# configure terminal
```

Enters global configuration mode.

Step 3 **ip sla** *operation-number*

Example:

```
Device(config)# ip sla 10
```

Starts configuring an IP SLAs operation and enters IP SLA configuration mode.

Step 4 **udp-jitter** {*destination-ip-addres* | *destination-hostname*} *destination-port* [**source-ip** {*ip-address* | *hostname*}] [**source-port** *port-number*] [**control** {**enable** | **disable**}] [**num-packets** *number-of-packets*] [**interval** *interpacket-interval*]

Example:

```
Device(config-ip-sla)# udp-jitter 192.0.2.135 5000
```

Configures the IP SLAs operation as a UDP jitter operation and enters UDP jitter configuration mode.

- *destination-ip-address* | *destination-hostname*: Specifies the IP address or hostname of the target device for the UDP Jitter operation.
- *destination-port*: The UDP port number on the target device that will receive the packets.

- **source-ip** {*ip-address* | *hostname*}: (Optional) Specifies the source IP address or hostname from which packets will be sent.
- **source-port** *port-number*: (Optional) Specifies the UDP source port number for the test packets.
- **control** {**enable** | **disable**}: (Optional) Enables or disables the control protocol, which is used to notify the responder on the target device about the test.

  Use the **control disable** keyword combination only if you disable the IP SLAs control protocol on both source and destination devices.
- **num-packets** *number-of-packets*: (Optional) Sets the number of UDP packets to send in each test.
- **interval** *interpacket-interval*: (Optional) Sets the interval (in milliseconds) between sending each packet.

Step 5 **frequency** *seconds*

Example:

```
Device(config-ip-sla)# frequency 30
```

(Optional) Sets the rate at which a specified IP SLAs operation repeats.

Step 6 **end**

Example:

```
Device(config-ip-sla)# end
```

Exits UDP Jitter configuration mode and returns to privileged EXEC mode.

Step 7 **show ip sla configuration** [*operation-number*]

Example:

```
Device# show ip sla configuration 10
```

(Optional) Displays configuration values including all

defaults for all IP SLAs operations or a specified operation.

Configure a UDP jitter operation with additional characteristics

Before you begin

Before configuring a UDP jitter operation on a source device, the IP SLAs Responder must be enabled on the target device (the operational target). The IP SLAs Responder is available only on Cisco software-based devices.

Perform this task to configure a UDP jitter operation with additional characteristics.

Procedure

Step 1 **enable**

Example:

```
Device> enable
```

Enables privileged EXEC mode.

Enter your password, if prompted.

Step 2 **configure terminal**

Example:

```
Device# configure terminal
```

Enters global configuration mode.

Step 3 **ip sla** *operation-number*

Example:

```
Device(config)# ip sla 10
```

Begins configuration for an IP SLAs operation and enters IP SLA configuration mode.

Step 4 **udp-jitter** {*destination-ip-addres* | *destination-hostname*} *destination-port* [**source-ip** {*ip-address* | *hostname*}] [**source-port** *port-number*] [**control** {**enable** | **disable**}] [**num-packets** *number-of-packets*] [**interval** *interpacket-interval*]

Example:

```
Device(config-ip-sla)# udp jitter 192.0.2.134 5000
```

Configures the IP SLAs operation as a UDP jitter operation and enters UDP jitter configuration mode.

- *destination-ip-address* | *destination-hostname*: Specifies the IP address or hostname of the target device for the UDP Jitter operation.
- *destination-port*: The UDP port number on the target device that will receive the packets.
- **source-ip** {*ip-address* | *hostname*}: (Optional) Specifies the source IP address or hostname from which packets will be sent.
- **source-port** *port-number*: (Optional) Specifies the UDP source port number for the test packets.
- **control** {**enable** | **disable**}: (Optional) Enables or disables the control protocol, which is used to notify the responder on the target device about the test.

  Use the **control disable** keyword combination only if you disable the IP SLAs control protocol on both source and destination devices.
- **num-packets** *number-of-packets*: (Optional) Sets the number of UDP packets to send in each test.
- **interval** *interpacket-interval*: (Optional) Sets the interval (in milliseconds) between sending each packet.

Step 5 **history distributions-of-statistics-kept** *size*

Example:

```
Device(config-ip-sla-jitter)# history distributions-of-statistics-kept 5
```

(Optional) Sets the number of statistics distributions kept per hop for an IP SLAs operation.

size: The range is from 1 to 20.

Step 6 **history enhanced** [**interval** *seconds*] [**buckets** *number-of-buckets*]

Example:

```
Device(config-ip-sla-jitter)# history enhanced interval 900 buckets 100
```

(Optional) Enables enhanced history gathering for an IP SLAs operation.

- **interval** *seconds*: (Optional) The interval, in seconds, at which to collect and store enhanced statistics. The range is from 1 to 3600 seconds.
- **buckets** *number-of-buckets*: (Optional) The number of enhanced history buckets to retain. The range is from 1 to 100.

Step 7 **frequency** *seconds*

Example:

```
Device(config-ip-sla-jitter)# frequency 30
```

(Optional) Sets the rate at which a specified IP SLAs operation repeats.

Step 8 **history hours-of-statistics-kept** *hours*

Example:

```
Device(config-ip-sla-jitter)# history hours-of-statistics-kept 4
```

(Optional) Sets the number of hours for which statistics are maintained for an IP SLAs operation.

The range is from 0 to 25.

Step 9 **owner** *owner-id*

Example:

```
Device(config-ip-sla-jitter)# owner admin
```

(Optional) Configures the SNMP owner of an IP SLAs operation.

Step 10 **request-data-size** *bytes*

Example:

```
Device(config-ip-sla-jitter)# request-data-size 64
```

(Optional) Sets the protocol data size in the payload of an IP SLAs operation request packet.

bytes: The range is from 0 to 5000.

Step 11 **response-data-size** *bytes*

Example:

```
Device(config-ip-sla-jitter)# response-data-size 25
```

(Optional) Sets the protocol data size in the payload of an IP SLAs operation response packet.

bytes: The range is from 0 to 5000.

Step 12 **history statistics-distribution-interval***milliseconds*

Example:

```
Device(config-ip-sla-jitter)# history statistics-distribution-interval 10
```

(Optional) Sets the time interval for each statistics distribution kept for an IP SLAs operation.

Step 13 **tag** *text*

Example:

```
Device(config-ip-sla-jitter)# tag TelnetPollServer1
```

(Optional) Creates a user-specified identifier for an IP SLAs operation.

Step 14 **threshold** *milliseconds*

Example:

```
Device(config-ip-sla-jitter)# threshold 1000
```

(Optional) Sets the upper threshold value for calculating network monitoring statistics created by an IP SLAs operation.

Step 15 **timeout** *milliseconds*

Example:

```
Device(config-ip-sla-jitter)# timeout 1000
```

(Optional) Sets the amount of time an IP SLAs operation waits for a response from its request packet.

Step 16 Choose one of the following:

- **tos** *number*
- **traffic-class** *number*

Example:

```
Device(config-ip-sla-jitter)# tos 160
OR
Device(config-ip-sla-jitter)# traffic-class 160
```

(Optional) Defines the type of byte in the IPv4 header of an IP SLAs operation.

- **tos** *number*: Defines the ToS byte in the IPv4 header of an IP SLAs operation.
- **traffic-class** *number*: Defines the traffic class byte in the IPv6 header for a supported IP SLAs operation.

Step 17 **flow-label** *number*

Example:

```
Device(config-ip-sla-jitter)# flow-label 112233
```

(Optional) Defines the flow label field in the IPv6 header for a supported IP SLAs operation.

Step 18 **verify-data**

Example:

```
Device(config-ip-sla-jitter)# verify-data
```

(Optional) Causes an IP SLAs operation to check each reply packet for data corruption.

Step 19 **vrf** *vrf-name*

Example:

```
Device(config-ip-sla-jitter)# vrf vpn-A
```

(Optional) Allows monitoring within MPLS VPNs using IP SLAs operations.

Step 20 **end**

Example:

```
Device(config-ip-sla-jitter)# end
```

Exits UDP jitter configuration mode and returns to privileged EXEC mode.

Step 21 **show ip sla configuration** [*operation-number*]

Example:

```
Device# how ip sla configuration 10
```

(Optional) Displays configuration values including all defaults for all IP SLAs operations or a specified operation.

What to do next

To configure the percentile option for your operation, see the "Configuring the IP SLAs—Percentile Support for Filtering Outliers" module.

Schedule IP SLAs operations

Perform this task to schedule IP SLAs operations.

Before you begin

- All IP 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 (,).

Procedure

Step 1 **enable**

Example:

```
Device> enable
```

Enables privileged EXEC mode.

Enter your password, if prompted.

Step 2 **configure terminal**

Example:

```
Device# configure terminal
```

Enters global configuration mode.

Step 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**]

Example:

```
Device(config)# ip sla schedule 10 life forever start-time
OR
Device(config)# ip sla schedule 1 3,4,6-9 schedule-period 50 frequency range 80-100
```

(Optional) Configures the scheduling parameters for an individual IP SLAs operation.

- *operation-number*: The IP SLA operation number to schedule (must match a previously created IP SLA operation).

  The range is from 1 to 2147483647.

- **life** {**forever** | *seconds*}: How long the operation will run.
  - **forever**: Runs the operation continuously until manually stopped.
  - *seconds*: Number of seconds the operation should run.

    The range is from 1 to 2147483647 seconds.

- **start-time** {[*hh:mm:ss*] [*month day* | *day month*] | **pending** | **now** | **after** *hh:mm:ss*}: Specifies when to start the operation.
  - *hh:mm:ss* [*month day* | *day month*]: Specific time and date.
  - **pending**: Waits for a manual start.
  - **now**: Starts immediately.
  - **after** *hh:mm:ss*: Starts after the specified amount of time.

- **ageout** *seconds*: Time (in seconds) after which the operation is automatically deleted.

  The range is from 0 to 2147483647 seconds.

- **recurring**: Makes the operation run repeatedly according to its frequency settin

Step 4 **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:

```
Device(config)# ip sla group schedule 10 schedule-period frequency
OR
Device(config)# ip sla group schedule 1 3,4,6-9 life forever start-time now
```

(Optional) Specifies an IP SLAs operation group number and the range of operation numbers for a multioperation scheduler.

- *group-operation-number*: The number assigned to the group operation (must be unique).

  The range is from 1 to 2147483647.

- *operation-id-numbers*: List of individual IP SLA operation numbers to be included in the group.

  The range is from 1 to 2147483647 (can be a series separated by spaces).

- **schedule-period** *schedule-period-range*: Schedules each operation in the group with a specified time period between them.

  The range is from 1 to 604800 (seconds; up to 7 days).

- **schedule-together**: Starts all operations in the group at the same time.
- **frequency** *group-operation-frequency*: How often (in seconds) the group operation runs.

  The range is from 1 to 604800 seconds.

Step 5 **end**

Example:

```
Device(config)# end
```

Exits global configuration mode and returns to privileged EXEC mode.

Verify IP SLAs UDP jitter operations

Command	Purpose
show ip sla configuration	Displays the current configuration details of all IP SLA operations on a Cisco device. This command provides information such as the operation type, target addresses, frequency, timeout values, and other parameters set for each IP SLA operation.
show ip sla group schedule	Displays the scheduling details and status of all IP SLA group operations configured on a Cisco device This includes information such as the group operation number, the member operation IDs included in each group, the scheduling method (such as schedule-together or with a period), start time, frequency, operation life, and current state (active, pending, etc.).
show ip sla statistics	Displays real-time statistical data for all configured IP SLA operations on a Cisco device. This output includes key performance metrics such as operation type, round-trip time (RTT), packet loss, success or failure counts, and the time of the last operation.
show ip sla statistics 2 details	Displays detailed, real-time statistical information for IP SLA operation number 2 on a Cisco device This detailed output includes metrics such as operation type, destination address, round-trip time (RTT), packet loss, jitter, number of successful and failed operations, return codes, and the exact time of the last operation