Configuring IP SLAs for FabricPath Echo Operation

This module describes how to configure an IP Service Level Agreement (SLA) for FabricPath Echo operation to monitor end-to-end response time between two devices in the FabricPath network.

This chapter includes the following sections:

FabricPath Echo Operation Overview

FabricPath Echo operation measures end-to-end response time between two devices in the FabricPath network. The response time is computed by measuring the time taken between sending one FabricPath echo request message (packet) to the destination switch and receiving an echo reply. This provides the round-trip time (RTT) for the packet.

The illustrations in the following figures show the IP SLA FabricPath Echo operation between Virtual Device Contexts (VDCs) on the same device and between two devices, one configured as Sender and the other as Responder.

Figure 1: FabricPath Echo Operation
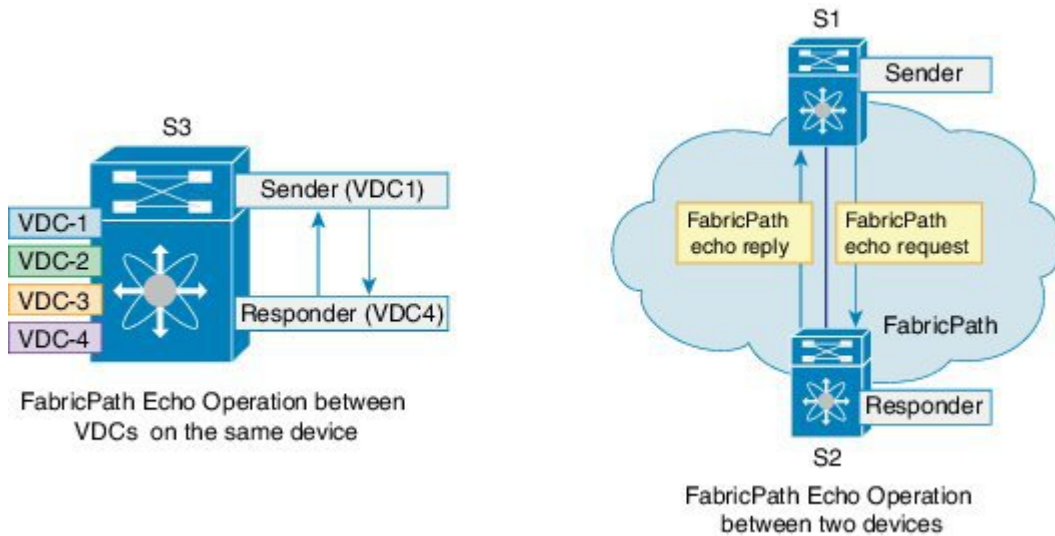
FabricPath Echo operations help network operators and administrators diagnose data plane failures in Transparent Interconnection of Lots of Links (TRILL) or FabricPath networks by measuring the active performance of the corresponding network and verifying the connectivity of the flow. Users can regularly send echo packets and monitor network performance using system logs and Simple Network Management Protocol (SNMP) traps.

Guidelines and Limitations for Configuring IP SLAs for a FabricPath Echo Operation

Currently, FabricPath Echo operations do not support the **history enhanced** command.

Configuring IP SLAs for FabricPath Echo Operation

Before You Begin

Enable the FabricPath feature set in the VDC.

Install the FabricPath feature set before you enable FabricPath on a device. Refer to the chapter "Configuring FabricPath Switching" in the Cisco Nexus 7000 Series NX-OS FabricPath Configuration Guide for information about installing and enabling the FabricPath feature set.

Procedure

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

	Command or Action	Purpose
Step 2	**feature sla sender** **Example:** `switch(config)# feature sla sender`	Enables the IP SLA Operation feature.
Step 3	**ip sla** *operation-number* **Example:** `switch(config)# ip sla 1`	Begins configuration for an IP SLA operation and enters IP SLA configuration mode. *Operation-number* is the identification numeral for the IP SLA operation.
Step 4	**fabric-path echo** *switch-id* [**profile** *profile-id* [**interface** *type number*]] **Example:** `switch(config-ip-sla)#fabric-path echo 1 profile 2 interface ethernet 1/0`	Sends a FabricPath echo request to the destination switch with the given profile and interface and enters FabricPath Echo configuration mode. **profile** and **interface** are optional parameters. If they are not specified, the operation takes the default profile and interface selected by the Fabric Operation, Administration, and Maintenance (OAM) process. **Note** If no interface is specified within the profile, the default interface is selected. When a profile has multiple interfaces listed, only the first interface in the list is chosen.
Step 5	**timeout** *milliseconds* **Example:** `switch(config-ip-sla-fabric)#timeout 5000`	(Optional) Configures the time period for which the IP SLA operation waits for a response from its destination device.
Step 6	**frequency** *seconds* **Example:** `switch(config-ip-sla-fabric)#frequency 60`	(Optional) Sets the rate at which the specified SLA operations are repeated. **Note** For an error-free operation, specify a frequency value that is greater than the timeout value.
Step 7	**threshold** *milliseconds* **Example:** `switch(config-ip-sla-fabric)#threshold 5000`	(Optional) Sets the upper threshold value for the RTT measurement. If the RTT exceeds the threshold value, but is less than the timeout value, it generates a reaction event. Default value is 5000 ms.
Step 8	**owner** *owner-id* **Example:** `switch(config-ip-sla-fabric)#owner admin`	(Optional) Configures the SNMP owner of an IP SLA operation.

	Command or Action	**Purpose**
Step 9	**tag** *text* **Example:** `switch(config-ip-sla-fabric)#tag TelnetPollServer1`	(Optional) Creates a user-specified identifier for an IP SLA operation.
Step 10	**history buckets-kept** *size* **Example:** `switch(config-ip-sla-fabric)# history buckets-kept 25`	(Optional) Sets the number of history buckets that are maintained during the lifetime of an IP SLA operation.
Step 11	**history distributions-of-statistics-kept** *size* **Example:** `switch(config-ip-sla-fabric)# history distributions-of-statistics-kept 5`	(Optional) Sets the number of statistics distributions maintained per hop during an IP SLA operation.
Step 12	**history lives-kept** *lives* **Example:** `switch(config-ip-sla-fabric)# history lives-kept 5`	(Optional) Sets the number of lives maintained in the history table for an IP SLA operation.
Step 13	**history hours-of-statistics-kept** *hours* **Example:** `switch(config-ip-sla-fabric)# history hours-of-statistics-kept 4`	(Optional) Sets the number of hours for which statistics is maintained for an IP SLA operation.
Step 14	**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:** `switch(config-ip-sla-fabric)# ip sla schedule 1 life 60 start-time now`	Configures the scheduling parameters for an individual IP SLA operation.
Step 15	**end** **Example:** `switch(config-ip-sla-fabric)# end`	Exits IP SLA FabricPath echo configuration mode and returns to EXEC mode.
Step 16	**show ip sla configuration** **Example:** `switch(config)# show ip sla configuration`	Displays IP SLA configuration status.
Step 17	**show ip sla statistics** **Example:** `switch(config)# show ip sla statistics`	Displays IP SLA operation statistics over the last one hour.

Configuring IP SLA Reaction Configuration for Performance Metrics

IP SLA reactions are configured to trigger when a monitored value exceeds or falls below a specified level, or when a monitored event, such as a timeout or connection loss, occurs. If IP SLAs measure too high or too low in a configured reaction, IP SLAs can generate a notification to a network management application or trigger another IP SLA operation to gather more data.

You can configure IP SLA reaction for FabricPath Echo operation to monitor the *timeout* and *rtt* values.

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `switch# configure terminal`	Enters global configuration mode.
Step 2	**ip sla reaction-configuration** *operation-number* **react** *monitored-element* [**threshold-type** {**average** | **consecutive** | **immediate** | **never** | **xofy**}] [**action-type** {**trapOnly** | **triggerOnly** | **trapAndTrigger** | **none**}] [**threshold-value** *upper-threshold lower-threshold*] **Example:** `switch(config)# ip sla reaction-configuration 1 react rtt action-type trapAndTrigger threshold-type immediate threshold-value 100 50`	Configures the action (SNMP trap or IP SLA trigger) that should occur based on violations of specified thresholds. This command enables you to monitor two elements, timeout and RTT.

IP SLA FabricPath Echo Operation Return Codes

A FabricPath Echo operation generates responses (return codes) depending on certain conditions of the operation. The following table lists the various responses from a FabriPath echo operation and the conditions under which they are generated.

Use the **show ip sla statistics** command to view the return codes of an echo operation.

IP SLA FabricPath Echo Operation Response	Explanation
OK	This response is generated under the following conditions: • Loopback operation is successful • RTT is less than timeout value • RTT is less than threshold value
Over Threshold	This response is generated under the following conditions: • loopback operation is successful • RTT is less than timeout value • RTT is greater than threshold value
Timeout	This response is generated when the replies to an echo request do not come at the expected time. This occurs under any of the following conditions: • Request is not sent • Request times out • Destination is unreachable • An unknown code is returned • VLAN does not exist • VLAN is in suspended state • Request is malformed • There is an unsupported TLVS • Cross-connect error occurs • RBridge nickname is unknown • There is no AF • There is an MTU mismatch • Interface is in forwarding state • Service tag is nonexistent • Service tag is in suspended state • Trace route is in progress to get hop count

IP SLA FabricPath Echo Operation Response	Explanation
Internal Error	This response is generated under the following conditions: • Memory allocation failure • Configured profile does not exist • Configured interface does not exist or is shut down

Configuration Examples for IP SLA FabricPath Echo

Example: Configuring an IP SLA FabricPath Echo Operation

The following example shows how to configure operation 6 as an IP SLA FabricPath Echo operation with basic parameters:

```
switch# configure terminal
switch(config)# feature sla sender
switch(config)# ip sla 6
switch(config-ip-sla)# fabric-path echo 1 profile 10 interface ethernet 1/0
switch(config-ip-sla-fabric)# exit
```

Example: Configuring IP SLA FabricPath Echo Operation with Optional Parameters

The following example shows how to configure operation 6 as an IP SLA FabricPath Echo operation with optional parameters:

```
switch# configure terminal
switch(config)# feature sla sender
switch(config)# ip sla 6
switch(config-ip-sla)# fabric-path echo 1 profile 10 interface ethernet 1/0
switch(config-ip-sla-fabric)# timeout 5000
switch(config-ip-sla-fabric)# frequency 60
switch(config-ip-sla-fabric)# owner my_owner
switch(config-ip-sla-fabric)# tag my_tag
switch(config-ip-sla-fabric)# threshold 5000
switch(config-ip-sla-fabric)# history buckets-kept 25
switch(config-ip-sla-fabric)# history distributions-of-statistics-kept 5
switch(config-ip-sla-fabric)# history lives-kept 5
switch(config-ip-sla-fabric)# history hours-of-statistics kept 4
```

Example: Scheduling an IP SLA FabricPath Echo Operation

The following example shows how to schedule an IP SLA FabricPath Echo operation that is already configured.

```
switch# configure terminal
switch(config)# ip sla schedule 6 start-time now life 60
switch(config)# exit
```

Example: Verifying IP SLA FabricPath Echo Operation

The following examples show how to verify a FabricPath Echo configuration using **show** commands:

```
switch# show ip sla statistics
IP SLA Latest Operation Statistics

IPSLA operation id: 6
 Latest RTT: 5 ms
Latest operation start time: 09:54:52 UTC Mon Aug 27 2012
Latest operation return code: OK
Number of successes: 1
Number of failures: 0
Operation time to live: 0 sec

switch# show ip sla statistics aggregated
IPSLAs Latest Operation Statistics

IPSLA operation id: 6
        Min/Max/Avg RTT: 5/5/5 ms

switch# show ip sla configuration
IP SLAs Infrastructure Engine-III
Entry number: 1
Owner:
Tag:
Operation timeout (milliseconds): 5000
Type of operation to perform: fabric-path-echo
Switch ID: 1
Profile ID: 10
Interface: Ethernet 1/0
Schedule:
   Operation frequency (seconds): 60
   Next Scheduled Start Time: Start Time already passed
   Group Scheduled : FALSE
   Randomly Scheduled : FALSE
   Life (seconds): 60
   Entry Ageout (seconds): never
   Recurring (Starting Everyday): FALSE
   Status of entry (SNMP RowStatus): Active
Threshold (milliseconds): 5000
Distribution Statistics:
   Number of statistic hours kept: 2
   Number of statistic distribution buckets kept: 1
   Statistic distribution interval (milliseconds): 20
History Statistics:
   Number of history Lives kept: 0
   Number of history Buckets kept: 15
   History Filter Type: None
```

Feature Information for Configuring IP SLAs for FabricPath Echo Operation

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 Configuring IP SLAs for FabricPath Echo

Feature Name	Release	Feature Information
IP SLA FabricPath Echo Operation	7.2(0)D1(1)	The Cisco IP SLA FabricPath Echo operation enables you to measure the end-to-end response time between two devices in a FabricPath network.