Performance Routing Traceroute Reporting

Performance Routing (PfR) support for traceroute reporting allows you to monitor prefix performance on a hop-by-hop basis. Delay, loss, and reachability measurements are gathered for each hop from the probe source (border router) to the target prefix.

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 Table at the end of this document.

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Information About Performance Routing Traceroute Reporting

PfR Logging and Reporting

Cisco IOS PfR supports standard syslog functions. The notice level of syslog is enabled by default. System logging is enabled and configured in Cisco IOS software under global configuration mode. The **logging**(PfR)

command in PfR master controller or PfR border router configuration mode is used only to enable or disable system logging under PfR. PfR system logging supports the following message types:

- Error Messages--These messages indicate PfR operational failures and communication problems that can impact normal PfR operation.

- Debug Messages--These messages are used to monitor detailed PfR operations to diagnose operational or software problems.

- Notification Messages--These messages indicate that PfR is performing a normal operation.

- Warning Messages--These messages indicate that PfR is functioning properly but an event outside of PfR may be impacting normal PfR operation.

Note With CSCtx06699, PfR syslog levels are added to minimize the number of messages displayed, and a syslog notice is added to display when 30 percent of the traffic classes are out-of-policy.

Note With CSCts74631, PfR syslog levels are added to minimize the number of messages displayed, a syslog notice is added to display when 30 percent of the traffic classes are out-of-policy, and new syslog alerts are added for a PfR version mismatch, an MC-BR authentication error, and when minimum PfR requirements are not met and the master controller is disabled because there are less than two operational external interfaces.

To modify system, terminal, destination, and other system global logging parameters, use the logging commands in global configuration mode. For more information about global system logging configuration, see to the "Troubleshooting, Logging, and Fault Management" section of the *Cisco IOS Network Management Configuration Guide*.

PfR Troubleshooting Using Traceroute Reporting

Although PfR provides the ability to diagnose issues using **syslog** and **debug** command-line interface (CLI) commands, support for traceroute reporting was introduced in the OER Support for Cost-Based Optimization and Traceoute Reporting feature. Using traceroute reporting, PfR reports traffic class performance by determining the delay on a hop-by-hop basis using traceroute probes.

Prior to traceroute reporting there was no method for measuring the delay per hop for situations such as an unexpected round trip delay value being reported for a traffic class on an exit link. PfR uses UDP traceroutes to collect per-hop delay statistics. A traceroute is defined as tracing the route to the device with the given IP address or the hostname and is useful in detecting the location of a problem that exists in the path to the device. Although traditional UDP-based traceroutes are used by default, PfR can be configured to send TCP SYN packets to specific ports that may be permitted through a firewall.

Traceroute reporting is configured on the master controller. Traceroute probes are sourced from the border router exit. This feature allows you to monitor traffic class performance on a hop-by-hop basis. When traceroute reporting is enabled, the autonomous system number, the IP address, and delay measurements are gathered for each hop from the probe source to the target prefix. By default, traceroute probes are sent only when the traffic class goes OOP. TCP-based traceroutes can be configured manually and the time interval between traceroute probes can be modified. By default, per-hop delay reporting is not enabled.

Traceroute probes are configured using the following methods:

• Periodic--A traceroute probe is triggered for each new probe cycle. The probe is sourced from the current exit of the traffic class when the option to probe only one exit is selected. If the option to probe all exits is selected, the traceroute probe is sourced from all available exits.

• Policy based--A traceroute probe is triggered automatically when a traffic class goes into an out-of-policy state. Traceroute reporting can be enabled for all traffic classes specified in the match clause of an PfR map. Policy based traceroute reporting stops when the traffic class returns to an in-policy state.

• On demand--A trace route probe can be triggered on an on demand basis when periodic traceroute reporting is not required, or the per-hop statistics are not required for all paths. Using optional keywords and arguments of the **show pfr master prefix** command, you can start traceroute reporting for a specific traffic class on a specific path, or all paths.

How to Configure Performance Routing Traceroute Reporting

Configuring PfR Traceroute Reporting

Perform this task at the master controller to configure traceroute reporting. When using a PfR active probe there are situations when a host address does not respond to the PfR probe message. The reason for no response to the probe message may be due to a firewall or other network issue but PfR assumes the host address to be unreachable and releases control of the prefix. Prior to traceroute reporting there was no method for measuring the delay per hop for situations such as an unexpected round trip delay value being reported for a traffic class on an exit link. The solution for both the non-responding target address and the lack of per-hop delay information involves using UDP, and optionally TCP, traceroutes. Traceroute reporting is configured on a master controller, but the traceroute probes are sourced from the border router exits.

In this task, the three methods of configuring traceroute probes are used. Periodic and policy-based traceroute reporting are configured with the **set traceroute reporting** (PfR) command using a PfR map. On-demand traceroute probes are triggered by entering the **show pfr master prefix** command with certain parameters. This task also shows to modify the time interval between traceroute probes using the **traceroute probe-delay** (PfR) command.

When traceroute reporting is enabled, the default time interval between traceroute probes is 1000 milliseconds.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **pfr master**
4. **traceroute probe-delay** *milliseconds*
5. **exit**
6. **pfr-map** *map-name sequence-number*
7. **match pfr learn** {**delay** | **throughput**}
8. **set traceroute reporting** [**policy** {**delay** | **loss** | **unreachable**}]
9. **end**
10. **show pfr master prefix** [**detail** | **learned** [**delay** | **throughput**] | *prefix* [**detail** | **policy** | **traceroute** [*exit-id* | *border-address* | **current**] [**now**]]]

DETAILED STEPS

	Command or Action	**Purpose**
Step 1	**enable** **Example:** Router> enable	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** Router# configure terminal	Enters global configuration mode.
Step 3	**pfr master** **Example:** Router(config)# pfr master	Enters PfR master controller configuration mode to configure a router as a master controller and to configure global operations and policies.
Step 4	**traceroute probe-delay** *milliseconds* **Example:** Router(config-pfr-mc)# traceroute probe-delay 500	Sets the time interval between traceroute probe cycles. • The default time interval between traceroute probes is 1000 milliseconds. • The example sets the probe interval to a 500 milliseconds.
Step 5	**exit** **Example:** Router(config-pfr-mc)# exit	Exits PfR master controller configuration mode, and returns to global configuration mode.
Step 6	**pfr-map** *map-name sequence-number* **Example:** Router(config)# pfr-map TRACEROUTE 10	Enters PfR map configuration mode to configure a PfR map to apply policies to selected IP prefixes. • Only one match clause can be configured for each PfR map sequence. • The example creates a PfR map named TRACEROUTE.
Step 7	**match pfr learn** {**delay** | **throughput**} **Example:** Router(config-pfr-map)# match pfr learn delay	Creates a match clause entry in a PfR map to match learned prefixes. • Can be configured to learn prefixes based on highest delay or highest outbound throughput. • Only a single match clause can be configured for each PfR map sequence. • The example creates a match clause entry that matches traffic learned based on highest delay.

	Command or Action	Purpose
Step 8	**set traceroute reporting** [**policy** {**delay**	**loss**	**unreachable**}] **Example:** `Router(config-pfr-map)# set traceroute reporting`	Enables traceroute reporting. • Monitored prefixes must be included in a PfR map. These can be learned or manually selected prefixes. • Entering this command with no keywords enables continuous monitoring. • Entering this command with the policy keyword enables policy-based trace route reporting.
Step 9	**end** **Example:** `Router(config-pfr-map)# end`	Exits PfR master controller configuration mode, and returns to privileged EXEC mode.
Step 10	**show pfr master prefix** [**detail**	**learned** [**delay**	**throughput**]	*prefix* [**detail**	**policy**	**traceroute** [*exit-id*	*border-address*	**current**] [**now**]]] **Example:** `Router# show pfr master prefix 10.5.5.5 traceroute now`	Displays the status of monitored prefixes. • An on-demand traceroute probe is initiated by entering the **current** and **now** keywords. • The **current** keyword displays the results of the most recent traceroute probe for the current exit. • Traceroute probe results can be displayed for the specified border router exit by entering the *exit-id* or *border-address*argument. • The example initiates an on-demand traceroute probe for the 10.5.5.55 prefix.

Configuration Examples for Performance Routing Traceroute Reporting

Example Configuring PfR Traceroute Reporting

The following example, starting in global configuration mode, configures continuous traceroute reporting for traffic classes learned on the basis of delay:

```
Router(config)# pfr master

Router(config-pfr-mc)# traceroute probe-delay 10000

Router(config-pfr-mc)# exit

Router(config)# pfr-map TRACE 10
```

```
Router(config-pfr-map)# match pfr learn delay
Router(config-pfr-map)# set traceroute reporting
Router(config-pfr-map)# end
```
The following example, starting in privileged EXEC mode, initiates an on-demand traceroute probe for the 10.5.5.5 prefix:

```
Router# show pfr master prefix 10.5.5.55 traceroute current now

Path for Prefix: 10.5.5.0/24        Target: 10.5.5.5
Exit ID: 2, Border: 10.1.1.3        External Interface: Et1/0
Status: DONE, How Recent: 00:00:08 minutes old
Hop  Host           Time(ms) BGP
1    10.1.4.2        8        0
2    10.1.3.2        8        300
3    10.5.5.5        20       50
```

Where to Go Next

For information about other Performance Routing features or general conceptual material, see the documents in the "Related Documents" section.

Additional References

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Command List, All Releases
Cisco PfR commands: complete command syntax, command mode, command history, defaults, usage guidelines and examples	Cisco IOS Performance Routing Command Reference
Basic PfR configuration	"Configuring Basic Performance Routing" module
Concepts required to understand the Performance Routing operational phases	"Understanding Performance Routing" module
Advanced PfR configuration	"Configuring Advanced Performance Routing" module
IP SLAs overview	*IP SLAs Configuration Guide*
PfR home page with links to PfR-related content on our DocWiki collaborative environment	PfR:Home

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 Performance Routing Traceroute Reporting

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.

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Table 1: Feature Information for Performance Routing Traceroute Reporting

Feature Name	Releases	Feature Information
OER Support for Cost-Based Optimization and Traceroute Reporting	12.3(14)T, 12.2(33)SRB	Performance Routing support for traceroute reporting allows you to monitor prefix performance on a hop-by-hop basis. Delay, loss, and reachability measurements are gathered for each hop from the probe source (border router) to the target prefix. The following commands were introduced or modified by this feature: **set traceroute reporting (PfR)**, **traceroute probe-delay (PfR)**, and **show pfr master prefix**.