Monitor Network Performance Using PfRv3 Monitoring

What is PfRv3?

Performance Routing Version 3 (PfRv3) represents the third generation of enhancement to the intelligent path control capabilities offered by Cisco. PfR monitors network performance and selects the best path for each application based upon advanced criteria such as reachability, delay, jitter and packet loss. PfR can evenly distribute traffic to maintain equivalent link utilization levels using an advanced load balancing technique.

PfRv3 is an intelligent path control of the IWAN initiative and provides a business-class WAN over Internet transports. PfR allows customers to protect critical applications from fluctuating WAN performance while intelligently load balancing traffic over all WAN paths.

PfR comprises two major Cisco IOS components:

- Primary Controller—The primary controller is a policy decision point at which policies are defined and applied to various traffic classes that traverse the border router systems. The primary controller can be configured to learn and control traffic classes on the network.

- Border Routers (BR)—The border routers are in the data forwarding path. The border router collects data from the Performance Monitor cache and from the smart probe results. The border router influences the packet forwarding path as directed by the primary controller to manage user traffic.

Related Topics

Get Access to PfR Monitoring for a User Group

PfR monitoring is enabled for the Prime Infrastructure root user group by default.

To access the PfR monitoring landing page by other user groups, do the following:

Procedure

Step 1	Choose **Administration > User, Roles & AAA > User**.
Step 2	Click **Users** in the left pane, and choose **Select a command > Add User**, then click **Go**.
Step 3	Enter the username and password, and then confirm the password, for the new user.
Step 4	Assign user group to the new user by selecting the check box next to each user group which has PfR Monitoring Access entry in its task list.
Step 5	Click **Save**.
Step 6	Log in to Prime Infrastructure using the new Username and Password.
Step 7	Choose **Services > Application Visibility & Control > PfR Monitoring**.
Step 8	If you do not see PfR Monitoring, go to **Administration > User, Roles & AAA > User Groups**.
Step 9	Click **Task List** corresponding to the assigned user group and check whether PfR Monitoring is available.
Step 10	If PfR Monitoring is not available in the task list, click the **Task Permissions** tab and check the **PfR Monitoring Access** check box under the **Network Monitoring** list.
Step 11	Click **Submit**.

Use the PfR Monitoring Page

You can launch the PfR monitoring page by choosing **Services** > **Application Visibility & Control** > **PfR Monitoring**. The PfR monitoring page has **PfR Events**tab including Site to Site PfR Events table, a filter panel, Metrics panel (Service Provider view and Differentiated Services Code Point (DSCP) View charts), time slider, and **Compare WAN Links** tab and **SP Health Trend** tab.

Site to Site PfR Events Table

The Site to Site PfR events table displays sites (Hub, Branch and Transit sites) and the following events:

Note   While creating location groups using **Inventory > Group Management > Network Device Groups**, enter proper description (such as Hub, Branch, Transit) for location groups, because the Hub, Branch or Transit icon displayed next to the site is populated based on the location group description.

- Threshold Crossing Alert (TCA) and Route change (RC) events—Represent the degraded network performance that are identified and corrected by PfR, and are indicated by blue dots.

- Immitigable event (IME)— Represents the metric violations that could not be corrected by the PfR, and are indicated as red dots.

Note	The PfR events that occurred over last 72 hours are displayed, by default.

The site combinations are sorted in the following ways:

- The site combination with maximum number of IMEs, is present at top row of the table.

- If two site combinations have equal number of IMEs, then the one with maximum number of events (including IME, TCA, and RC) is placed on the top of the table and indicated in red color.

PfR Filter Panel

The PfR Filter Panel allows you to filter the events based on various filters. The Metrics panel and the Site to Site PfR Events table display the details based on the selected filter options. You can view the selected filter options in the top of the filter panel. See the *Cisco Prime Infrastructure Reference Guide* for the descriptions of the filter options.

SP Health Trend Tab

The **SP Health Trend** tab displays the dashlets such as SP Carrying Uncorrected traffic, SP Unreachability Trend and SP Overall Health trend, plotted against time.You can toggle between chart view and table view.

You can export the dashlets in pdf or CSV format by clicking export icon. Click **Summary** in the dashlet to view the overall average of impaired traffic, link downtime or link health for all the Service Providers, in table format.

We recommend that you do not select a time range beyond 60 days, when you are filtering the dashlets using the time filter, because it will slow down the performance of the **SP Heath Trend** tab. Additionally, you can filter the data based on service providers by selecting a desired service provider in the **Service Provider Filter** field and then clicking the **Submit** button.

You can perform the following tasks in the PfR monitoring page:

Table 1: PfR Monitoring Page Tasks

Tasks	Description
Refresh the page	Click the Refresh icon ↻ at the top right corner of the PfR monitoring page, to manually refresh the PfR landing page.

Tasks	Description
Changing Settings	Click the settings icon at the top right corner of the PfR monitoring page. The PfR Settings pop-up window will appear.
	Select your preferences for the following:
	• **Global** —Choose the VRF and other common settings. Hover your mouse over info icon to see tool tip about each option.
	• **SP Health Trend Tab**—Choose your preference for the number of charts to be displayed per row in the SP Health Trend tab.
	• **PfR Events Tab**—Choose your preference for Auto Refresh, Events Table, Live Topolgy popup, Service Provider chart and DSCP chart.
	• **Site to Site Tab**—Choose required value for Top N settings for Charts.
	• **Compare WAN Links Tab**—Choose required value for Top N settings for Charts.
	• **FAQ Section**—Provides you detailed information on troubleshooting.
	Click **Save and Close** to save your settings.
View in-line help	Click the info icon at the top right corner of the PfR monitoring page, to view the in-line help for the respective page.
View live topology	Click the topology icon next to any site pair to view the live topology popup that shows traffic corresponding to different DSCPs. Click **Site to Site details** to go to site to site tab, for more information see View Details About Site to Site Events Using PfRv3, on page 5.
	Choose the VRF for which you want to see the topology, from the **VRF** drop-down list. The VRFs listed corresponds to the site pair you have chosen.
	Click on required time option to view the live topology plotted for that time.
	• Select **Auto refresh** check-box to refresh the topology for every 5 minutes.
	• You can also choose Custom time. Make sure to select the time range such that time different is not less than 5 minutes. Auto refresh will be disabled for this option.
	• Click **Live** to view the topology corresponding to the last one minute. When you select the Live option, the **Site to Site details** button will be disabled and the topology will be refreshed automatically every 30 seconds when **Auto Refresh** is selected.
View border router or link metrics	Click a link, primary controller icon or border router icon in the Live topology to view a list of options. Click on each option to view the respective details. See View Details About Site to Site Events Using PfRv3, on page 5 for more information.
Trace the application traffic path	Select the required application from the **Trace Application Path** drop-down list, to trace the application traffic path. These applications are auto-populated from the border router Egress NetFlow in the selected time interval.
View Site to Site topology	Click **Site to Site Details** in the Live topology to go to Site to Site details tab. See View Details About Site to Site Events Using PfRv3, on page 5 for more information.

Related Topics

View PfRv3 Service Provider and DSCP Charts

The Metrics panel displays Service provider View and DSCP View charts.

Service Provider View Chart—Displays the metrics gathered using the TCA. Each service provider is represented by a unique color in the chart. The charts available in this view are:

- Unreachability event count over time
- Maximum Delay over time
- Maximum Jitter over time
- Maximum Packet Loss% over time

DSCP View Chart—Displays six different metric charts with respect to different DSCPs. A maximum of five DSCPs can be viewed in the maximized view of the chart. You can also choose the required DSCP using the DSCP filter. The charts available in this view are:

- Service Provider (SP) Bandwidth (B/W) usage per DSCP
- DSCP vs TCAs
- DSCP vs Unreachable TCAs
- Maximum Delay Over time
- Maximum Jitter Over time
- Maximum Packet Loss% Over time

You can perform the following tasks in the Metrics Panel:

- Viewing different charts—Click the arrow icons in the metrics panel.
- Adding Charts—Click the add icon **Add components**. In the dialog box, choose the required components and click**Save**.

Time Slider

A time slider present at the bottom of the page, represents the time range selected using the filter. You can drag the slider and set a particular time range. The Metrics Panels and the Site to Site PfR events table change corresponding to the set time range.

Related Topics

View Details About Site to Site Events Using PfRv3

From the **Services** > **Application Visibility & Control** > **PfR Monitoring** you can view various Site-to Site details as described in the following table.

Table 2: Site to Site Topology Tasks

Tasks	Description
View detailed information about Site to Site events	Click a dot in the Site to Site events table. You can see a Site to Site pop-up window. The pop-up window displays the type of events occurred in the selected time range, along with the event details in a table format. You can expand this window to the required size. The violated metrics (Byte Lost%, Delay, Jitter, Packet Loss%) that cause IME are indicated within Square Brackets [].
View Site to Site topology	Click **Site to Site details** in the pop-up window to view the schematic Site to Site topology representation and **All Events** table including the details of all events. The topology includes legends representing border router, primary controller, service provider, and Internal and External links. The topology is plotted based on the data for a minimum of 72 hours, even if you select a time frame of less than 72 hours using the time filter. The Border router and the corresponding links are dimmed and you cannot click them for the following reasons: • If the inventory collection has failed for the border router. • If the border router is not managed. • If a user is not authorized to access the border router (as per Role Based Access Control). Choose the VRF for which you want to see the topology, from the **VRF** drop-down list.

Tasks	Description

View Device Utilization Metrics Using PfRv3	Click the Primary Controller icon and select one of the following options:
	
	• **Device Metrics**—Opens a device metrics pop-up window comprising CPU and Memory utilization.
	
	• **PfR Policy**—Opens a Policy window including policies configured in the Primary controller, for different VRFs. Click each VRF to view the respctive policy. Click **Sync with Device** to view the latest policy information.
	
	Click any of the Border Router icons and select one of the following options:
	
	• **Device Metrics**—A device metrics pop-up window comprising CPU and Memory utilization opens.
	
	• **Launch Device Dashboard**—Opens the Device dashlets in the Performance dashboard.
	
	• **Compare WAN Links**—Opens the **Compare WAN Links** tab. See Compare WAN Interfaces Usage Using PfRv3, on page 8. for more information.
	
	• **Analayze**—Opens a device context tab. You can view the following:
	
	   • Border router Metrics—Displays three charts in which the utilization of service provider Bandwidth, memory and CPU are plotted for the selected time range, and a chart in which Service Provider Usage is plotted against Traffic. Click the zoom icon to see the enlarged view of the chart. You can further enlarge the chart to view the data pattern in a specific time interval by moving the slider.
	
	   • WAN Link Usage and Performance—Displays a table that shows WAN link usage and performance with respect to DSCP markings, for the WAN interfaces of the selected border router. The data includes Egress Bandwidth (B/W) usage, number of TCAs, RCs and IMEs occurred and the number of applications associated to DSCP markings.The number of applications is visible only if AVC NetFlow is received by Cisco Prime Infrastructure for this WAN link.
	
	   • Click the Expand arrow adjacent to the DSCP to drill-down to further details.

View Link Utilization Metrics Using PfRv3	Click an egress or ingress link in the topology and select one of the options:
	
	• **Link Metrics**—Opens a **Link Metrics** pop-up window
	
	• **Launch Interface Dashboard**—Opens the the Interface dashlets in the Performance dashboard.
	
	• **Add to Compare**—Opens the **Compare WAN Links** tab. See Compare WAN Interfaces Usage Using PfRv3, on page 8. for more information.
	
	• **Analayze**—Opens a device context tab. You can view the following:
	
	   • WAN Link Metrics—Displays SP Usage Trend, Top 10 Application Traffic (In and Out), Top 10 Application Usage (Out), Top QOS Class Map Statistics Trend, SP Usage - Traffic between Source Site and All Sites, and Interface Availability Trend charts.
	
	   • WAN Link Usage and Performance—Displays a table that shows WAN Link Usage and Performance with respect to DSCP markings, for the WAN interface.
	
	   • Click the Expand arrow adjacent to the DSCP to drill-down to further details.

Troubleshooting the Topology Diagram

If the topology is not loaded, check the following:

- Availability of any one of the border router, primary controller or service provider.

- Availability of PfR Bandwidth and Egress between the sites for the selected time Interval.

- There is no inventory failure in the protocol endpoint.

- The Interfaces are managed by Cisco Prime Infrastructure.

- Availability of WAN links.

- Whether you have logged in as *root* user and have access to the required devices.

Related Topics

Compare WAN Interfaces Usage Using PfRv3

The **Compare WAN Links** tab shows a guided workflow for comparing the WAN link usage and performance of the selected WAN links.

Procedure

Step 1 Choose **Services** > **Application Visibility & Control** > **PfR Monitoring**.

You can also click **Compare WAN Links** in the device metrics pop-up window in the or click **Add To Compare** in the **Link Metrics** pop-up window to view the **Compare WAN Links** tab. The border router and WAN Interface details get automatically populated based on the device or link you clicked.

Step 2 Click **Compare WAN Links** tab.

Step 3 Click the filter icon to view the Time Filter, if required.

Step 4 Choose the required options from **PfR Controlled Site**, **Border Router** and **WAN Interface/SP** drop-down lists, in each WAN link you want to compare.

Step 5 Click **Compare** to compare the selected WAN links.

Step 6 If you want to add third WAN link for comparison click + icon and select the required options and click **Update**.

Step 7 Click the edit icon to change the previous selections.

You can view charts representing WAN link Utilization, Top N application, Top QOS Trend and Interface Availability of the select WAN links, and a table that compares the Egress Bandwidth (B/W) usage, number of TCAs, RCs and IMEs occurred and number of applications routed, for the selected WAN links.

Step 8 Click the required WAN link metrics to view the respective charts.

Related Topics