# Performance Routing Version 3 Based Network Monitoring

## Performance Routing

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:

- Master Controller—The master controller is a policy decision point at which policies are defined and applied to various traffic classes that traverse the border router systems. The master 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 master controller to manage user traffic.

## Getting 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:

**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.**

Text Part Number:

**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**.


# 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.

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

*Table 16-1      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. |
| Changing Settings | Click the settings icon at the top right corner of the PfR monitoring page. The PfR Settings pop-up window will appear.<br><br>You can select your preferences for the following:<br><br>• **Global settings > Virtual Routing Forwarding (VRF)**.<br>• PfR Events tab<br>• Site to Site tab<br>• Compare WAN Links tab<br><br>To enable advanced troubleshooting settings, contact Cisco support. |
| 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 that shows traffic corresponding to different DSCPs. For more information see Viewing Site to Site PfR Topology.<br><br>Choose the VRF for which you want to see the topology, from the **VRF** drop-down list.<br><br>The VRFs listed corresponds to the site pair you have chosen. |
| View border router or link metrics | Click a link or border router in the Live topology to view the metrics details at the bottom. |

*Table 16-1        PfR Monitoring Page Tasks (continued)*

| Tasks | Description |
|-------|-------------|
| 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 Viewing Site to Site PfR Topology, for more information. |

**Related Topics**

- Configuring and Monitoring IWAN
- Getting Access to PfR Monitoring for a User Group
- Site to Site PfR Events Table
- PfR Filter Panel
- Service Provider View and DSCP View Charts
- Viewing Site to Site PfR Topology
- Comparing WAN Interfaces

# Site to Site PfR Events Table

The Site to Site PfR events table displays sites (Hub, Branch and Transit sites) and the events including Threshold Crossing Alert (TCA), Route change (RC) and Immitigable event (IME). The PfR events that occurred over last 72 hours are displayed, by default.

The events are represented by red and blue dots in the Site to Site PfR events table. The metric violations that could not be corrected by the PfR are classified as IME and indicated as red dots in the table. The degraded network performance that are identified and corrected by PfR are indicated by blue dots.

The events in the table are sorted such that the site combinations 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. You can view the site hierarchy by hovering the mouse over the source and destination sites.

**Related Topics**

- PfR Monitoring Page
- PfR Filter Panel
- Viewing Site to Site PfR Topology
- Time Slider

# PfR Filter Panel

The PfR Filter Panel allows you to filter the events based on various filters listed in the Table 16-1. The Metrics panel and the Site to Site PfR Events table display the details based on the selected filter options.

***Table 16-2*** **Filter Options**

| Filter Options | Description |
| --- | --- |
| Time Filter | • The default filter time is 72 hours. You can choose any of the preset filter time.<br><br>• The **Custom** option allows you to select the **From** and **To** dates and time. You cannot select a time which is less than one hour in the Custom option. |
| VRF Filter | • Allows you to select the VRF discovered by the border routers.<br><br>• Only the VRFs participating in the PfR controlled network are listed under this filter. |
| Location Group filter | • Allows you to select the **From Site** and **To Site.**<br><br>• You can select either a parent site or a child site. If you select a parent site, the PfR events table will display the details of the parent and all its children. |
| Events Filter | You can choose one or more of the following events:<br><br>• TCA—Generated by the master controller whenever there is a violation of the metrics such as Unreachability, Delay, Jitter and Packet loss, based on the DSCP. You can also choose one of the TCA metrics.<br><br>   The selection of the metrics affects only Events table, but not the Metrics Panel.<br><br>• RC—Generated by the master controller whenever there is a route change to rectify a TCA.<br><br>• IME— Generated by the master controller whenever an RC fails and the traffic violation could not be corrected. |
| DSCP Filter | You can choose from one of the DSCPs that are identified by the PfR. |
| Service Provider Filter | • Displays the list of service providers based on the border router NetFlow data and allows to select one or more service provider. |

You can view the selected filter options in the top of the filter panel. You can click **more** to view all the selected filter options.

**Related Topics**

- PfR Monitoring Page
- Site to Site PfR Events Table
- Time Slider

# Service Provider View and DSCP View 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 new charts—Click the add icon. In the **Add components** dialog box, choose the required components and click **Save**.

**Related Topics**

- PfR Monitoring Page
- Site to Site PfR Events Table
- Time Slider

## 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**

- PfR Monitoring Page
- Viewing Site to Site PfR Topology
- Service Provider View and DSCP View Charts
- Site to Site PfR Events Table

# Viewing Site to Site PfR Topology

From the **Services > Application Visibility & Control > PfR Monitoring** page, you can view various Site-to Site details as described in Table 16-3.

*Table 16-3*        *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.<br><br>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.<br><br>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.<br><br>The topology includes legends representing border router, master 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.<br><br>The Border router and the corresponding links are dimmed and you cannot click them for the following reasons:<br><br>• If the inventory collection has failed for the border router.<br><br>• If the border router is not managed.<br><br>• If you are not authorized to access the border router (as per Role Based Access Control).<br><br>Choose the VRF for which you want to see the topology, from the **VRF** drop-down list. |
| View device metrics | Click a border router or Master controller in the topology to view the device metrics pop-up window.<br><br>You can also click **Launch Device Dashboard** in the device metrics pop-up window to view the Device dashlets in the Performance dashboard. See Performance Dashboard in Related Topics. |
| View device details | Click **Analyze** in the device metrics pop-up window to view the device context tab. You can see:<br><br>• 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.<br><br>• 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 Prime Infrastructure for this WAN link.<br><br>• Click the Expand arrow adjacent to the DSCP to drill-down to further details. |

*Table 16-3*        *Site to Site Topology Tasks  (continued)*

| Tasks | Description |
|---|---|
| View Link Metrics | Click an egress or ingress link in the topology, to view a **Link Metrics** pop-up window.<br><br>You can click **Launch Interface Dashboard** in the **Link Metrics** pop-up window to view the Interface dashlets in the Performance dashboard. |
| View link details | Click **Analyze** in the **Link Metrics** pop-up window to view the link context tab. You can see:<br><br>• 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.<br><br>• WAN Link Usage and Performance—Displays a table that shows WAN Link Usage and Performance with respect to DSCP markings, for the WAN interface.<br><br>• Click the Expand arrow adjacent to the DSCP to drill-down to further details. |

**Related Topics**

- PfR Monitoring Page
- Comparing WAN Interfaces
- Performance Dashboards
- Viewing Site to Site PfR Topology

# Troubleshooting the Topology Diagram

If the topology is not loaded, check the following:

- Availability of any one of the border router, master controller or service provider.
- Availability of PfR Bandwidth between the sites for the selected time Interval.
- There is no inventory failure in the protocol endpoint.
- The Interfaces are managed by Prime Infrastructure.
- Availability of WAN links.
- Whether you have logged in as *root* user and have access to the required devices.

**Related Topics**

- PfR Monitoring Page
- Viewing Site to Site PfR Topology

# Comparing WAN Interfaces

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

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

**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.

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.

**Related Topics**

- PfR Monitoring Page
- Viewing Site to Site PfR Topology