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—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.

**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 Landing Page

You can launch the PfR monitoring landing page by choosing Services > Application Visibility & Control > PfR Monitoring. The PfR landing page includes Site to Site PfR Events table, a filter panel, Metrics panel (Metrics Crossing Thresholds versus Service Provider(s)), and a time slider.

By default, Auto Refresh Enabled is selected so the PfR landing page is refreshed every five minutes. Hover your mouse over the Refresh icon next to the Auto Refresh Enabled check box to know the time till next refresh. You can also manually refresh the PfR landing page by clicking the Refresh icon at the top right corner of the PfR landing page.

Related Topics
- Site to Site PfR Events Table
- PfR Filter Panel
- Metrics Crossing Thresholds Vs Service Provider(s)
- Time Slider

Site to Site PfR Events Table

The Site to Site PfR events table displays site to site PfR 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. You can search the events based on the site name, RC or TCA or IME by entering the search criteria in the Search box.

Related Topics
- PfR Monitoring Landing Page
- Site to Site PfR Events Table
- Metrics Crossing Thresholds Vs Service Provider(s)
• Time Slider

PfR Filter Panel

The PfR Filter Panel allows you to filter events based on time filter, location group filter, event filter, and service provider filter. The Metrics panel and the Site to Site PfR Events table display the details based on the selected filter options.

Table 13-1 displays the filter options available in the Filter panel.

<table>
<thead>
<tr>
<th>Filter Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Filter</td>
<td>The default filter time is 72 hours. You can choose any of the preset filter time.</td>
</tr>
<tr>
<td></td>
<td>The <strong>Custom</strong> option allows you to select the <strong>From</strong> and <strong>To</strong> dates and time.</td>
</tr>
<tr>
<td></td>
<td>You can also use the <strong>Jump To</strong> option available adjacent to the filter icon, to set the filter time.</td>
</tr>
<tr>
<td>Location Group filter</td>
<td>Allows you to select the <strong>From Site</strong> and <strong>To Site</strong>.</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
<tr>
<td>Events Filter</td>
<td>You can choose one or more of the following events:</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>RC—Generated by the master controller whenever there is a route change to rectify a TCA.</td>
</tr>
<tr>
<td></td>
<td>IME—Generated by the master controller whenever an RC fails and the traffic violation could not be corrected.</td>
</tr>
<tr>
<td>Service Provider Filter</td>
<td>Displays the list of service providers based on the border router NetFlow data and allows to select one or more service provider.</td>
</tr>
</tbody>
</table>

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 Landing Page
- Metrics Crossing Thresholds Vs Service Provider(s)
- Site to Site PfR Events Table
- Time Slider

Metrics Crossing Thresholds Vs Service Provider(s)

The Metrics panel displays the metrics gathered using the TCA, as charts. Each service provider is represented by a unique color in the chart. The charts available in the Metrics panel are:

- Unreachability over time
- Maximum Delay over time


- Maximum Jitter over time
- Maximum Packet loss% over time

A particular service provider may not have TCA, but may have RC events occurring when a route changes from the other service provider to the selected service provider. The Metrics panel may not show any graphs for the particular service provider whereas the PfR events table shows the RC events of the service provider.

**Related Topics**
- PfR Monitoring Landing Page
- Site to Site PfR Events Table
- 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 Landing Page
- PfR Site To Site Details Page
- Metrics Crossing Thresholds Vs Service Provider(s)
- Site to Site PfR Events Table

**PfR Site To Site Details Page**

A PfR events pop-up window appears when you click an event (dot) in the Site to Site PfR Events table. The pop-up window displays the events occurred in the selected time range and the number of occurrences of each event.

Click the Click here for site to site details in the pop-up window to view the site to site details page that includes Site to Site Topology, Threshold Crossing Alert(s), Route Change Event(s), and Immitigable tabs.

Table 13-2 displays the details of the PfR Events.

**Table 13-2  PfR Events Details**

<table>
<thead>
<tr>
<th>Tabs</th>
<th>Details displayed under each tab</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site to Site Topology</td>
<td>The schematic representation of the site to site network topology monitored by PfR V3.</td>
</tr>
<tr>
<td>Threshold Crossing Alerts</td>
<td>Time at which the events occurred, Border Router, WAN Interface, Service Provider, DSCP, Byte Loss (%), Packet Loss (%), Delay (ms), Jitter (ms), and Reachability.</td>
</tr>
</tbody>
</table>
### PfR Events Details

<table>
<thead>
<tr>
<th>Tabs</th>
<th>Details displayed under each tab</th>
</tr>
</thead>
<tbody>
<tr>
<td>Route Change Events</td>
<td>Time at which the events occurred, Border Router, WAN Interface, Service Provider, DSCP, Application.</td>
</tr>
<tr>
<td>Immitigable Events</td>
<td>Time at which the events occurred, Service Provider, Number of Performance Violations, and Number of Bandwidth Violations.</td>
</tr>
</tbody>
</table>

### Site to Site PfR Topology

The site to site network monitored by PfR V3 is schematically represented by a topology diagram. 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 site to site topology consists of nodes representing border router, master controller, and service provider. The egress and ingress orange links represent the WAN link connectivity between border router and service provider, and blue links connect the border router and master controller. The color of the link does not indicate the link state or the bandwidth utilization.

If the inventory collection is not proper or if a user is not authorized to access the node (as per Role Based Access Control), the node is dimmed and you cannot click the node and the corresponding links.

Click a node to view the device metrics pop-up window from where you can navigate to the corresponding device context page. Click **Launch Device Dashboard** link in the device metrics pop-up window to view the Device dashlets in the Performance dashboard. See Performance Dashboard in Related Topics.

Similarly, click a link to view the link metrics pop-up window from where you can navigate to the link context page. Click **Launch Interface Dashboard** link in the **Link Metrics** pop-up window to view the Interface dashlets in the Performance dashboard.

### Viewing Device Context Page

The device context page displays the Border Router Metrics and WAN link Usage and Performance.

**Step 1** Click a node in the topology.
Step 2 Click Analyze in the device metrics pop-up window to view the device context page. You can see:

- **Border Router Metrics**—Displays three charts in which the utilization of service provider, memory and CPU are plotted for the selected time range. In the CPU and memory utilization charts, click the CPU and memory modules to know their utilization. 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 Prime Infrastructure for this WAN link.

Step 3 Click the Expand arrow adjacent to the Traffic Class in the WAN Link Usage and Performance table to view and compare the Egress Bandwidth Utilization over time and Top Application traffic over time for that traffic class.

---

**Related Topics**

- PfR Site To Site Details Page
- Site to Site PfR Events Table
- Viewing Link Context page
- Comparing WAN Interfaces

---

**Viewing Link Context page**

The link context page displays WAN Link Metrics and WAN Link Usage and Performance details.

Step 1 Click Egress orange link in the topology.

The **Link Metrics** pop-up window comprising Egress B/W utilization, Interface Tx/Rx utilization, Maximum one-way delay, Maximum packet loss%, and Maximum Jitter appears.

Step 2 Click Ingress orange link in the topology.

The **Link Metrics** pop-up window comprising Ingress B/W utilization and Interface Tx/Rx utilization appears.

Step 3 Click Analyze in the **Link Metrics** pop-up window to view the link context page. You can see:

- **WAN Link Metrics**—Displays WAN Link B/W Usage Over Time, Top 5 Application Traffic Over Time, and Top QOS Class Map Statistics Trend charts. Click the zoom icon to view 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 interface. 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.
Step 4 Click the Expand arrow adjacent to the Traffic Class in the WAN Link Usage and Performance table to view the Egress Bandwidth Utilization over time and Top Application traffic over time for that traffic class.

Related Topics
- PfR Site To Site Details Page
- Site to Site PfR Topology
- Viewing Device Context Page
- Comparing WAN Interfaces

Comparing WAN Interfaces

The Compare WAN Interfaces page shows the WAN link usage and performance of the selected WAN interfaces.

Step 1 Choose Services > Application Visibility & Control > PfR Monitoring.
Step 2 Click Compare WAN Interfaces in top right corner of the PfR Landing Page.
Step 3 In the Compare WAN Interfaces page, click the filter icon to view the Time Filter, if required.
Step 4 In the Compare WAN Interfaces page, choose the Source Site, Border Router and WAN Interface/Service Provider details and click Compare.

You can view the WAN Link Usage and Performance 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 Interfaces.

Step 5 Click Reset to reset an individual comparison group or click Reset All to reset all the three comparison groups, if required.

You can also click Compare WAN Links in the device metrics pop-up window in the topology to view the Compare WAN Interfaces page. The border router and WAN Interface details get automatically populated based on the device from which the page is launched.

Related Topics
- PfR Site To Site Details Page
- Site to Site PfR Topology
- Viewing Link Context Page