Application Performance Monitoring Overview

Cisco© Prime Infrastructure 3.1
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Basics

Overview

Introduction

Monitoring whether applications are performing to expected levels of service helps you to:

- Ensure a consistent, end-user experience across the enterprise.
- Evaluate whether applications are performing and using resources optimally.
- Identify applications for which optimization might improve processing performance and provide a better, more consistent user experience.
- Mitigate or avoid business disruption or downtime.

You monitor application health and performance on dashboards and on the service health reporting tool.

Important Note: Prime Infrastructure collects application-related data by using the NetFlow network protocol. To start NetFlow-related data collection, system users must:

- Enable NetFlow on the switches and routers for which you need the system to collect and report application data.
- Configure the NetFlow-enabled devices to export the NetFlow data to Prime Infrastructure.

For more information on enabling NetFlow, refer to the Cisco Prime Infrastructure 3.1 User Guide.
System users or administrators also can apply a business critical status to applications that are key to enterprise operations. The system can report specifically on business-critical applications, which can help you to recognize situations that involve those applications more easily and to respond more quickly to changing conditions that might disrupt business operations.

This job aid introduces you to the Cisco® Prime Infrastructure tools that you can use to monitor application behavior and performance, including business critical applications.
**Application KPI Reporting Thresholds**

Prime Infrastructure defines service health rules, which apply standard deviation values for the application key performance indicators (KPIs) on which the system reports. System users or administrators can configure the values above the standard deviation values that indicate warning or critical health conditions.

By applying service health rules, the system calculates the baseline values against critical and warning threshold values to help determine abnormal deviations in the application health metrics.

When a health metric exceeds either a warning or critical threshold value, monitoring tools display color-coded severity level indicators in:
- **The Service Health feature.**
- **The Network Health dashboard.**

Warning thresholds icons display a yellow indicator 🟢; red thresholds display a red indicator 🟥.

**Notes:** For detailed information on how the system calculates and reports health conditions, refer to the Cisco Prime Infrastructure 3.1 User Guide. For more information on monitoring business applications by using the Network Health dashboard, refer to the Network Health Monitoring Overview job aid.
Skills

Network Operator

To monitor applications effectively, you need the following experience.

**Proficient**

- Prime Infrastructure user interface navigation and behaviors
- Networking concepts
- Practical networking experience
- NetFlow network protocol concepts and practical NetFlow data collection experience

Terms

**Business Critical Applications**

Those applications that system users or administrators have identified in Prime Infrastructure as essential to business operations

System users or administrators indicate business critical applications when adding applications and services on the **Services | Application Visibility & Control | Application and Services** page.

Applications and Services

The application uses the terms ‘applications’ and ‘services’ interchangeably.
Application Health Threshold Values and Experience Levels

When configuring health rules, system users define the threshold values that trigger warning and critical health indicators in application health reporting.

When monitoring application health on the Service Health page, the system refers to these thresholds as experience levels.

Sites and Location Groups

The application uses the terms ‘sites’ and ‘location groups’ interchangeably.

Both terms refer to the network device location groups that system users can configure on the Network Devices and Network Device Groups pages.
Monitoring Application Usage and Traffic

Application Summary and Aggregate Data

Overview

Summary dashboard dashlets report aggregated application-related data.

Note: For an overview of general dashboard and dashlet functions, refer to the Network Summary Dashboards topic in the Wired Network Summary Data Overview job aid.

The Performance | Application dashboard consolidates application-related dashlets, so that you can see aggregated application-related data on a single page.

Note: This job aid addresses key application-related dashlets that you can add to Performance or custom dashboard tabs. Please refer to the application Settings menu to see all of the dashlets available to you.
The dashboard provides a series of filters so that you can monitor data by specific applications, by whether applications are running on the wired or wireless portion of the network (network aware), or by site.

When a filter is applied, the icon beside the filter field below the tabs also appears in the dashlet.

The screenshots below illustrate filter icons. In this example, the **Application Traffic Analysis** dashlet data is filtered by a specific application, time frame, network awareness (NetFlow data coming from the wired or wireless portion of the network), and site.

These icons help remind you that you are looking at filtered data, which is important when you are making determinations about application behavior.

Tip: When you are monitoring application behaviors, ensure that the filter settings include the data that you need to see.
You also can apply filters to exclude extraneous data.

Some dashlets also provide timeline slider controls for more targeted data evaluation.
To change the time period that the dashlet is reporting:

- Move each slider control to the time position that you want.

Most dashlets that use charts also provide the data in a table format, which you can display by clicking the applicable button.

To change dashlet reporting settings:

- On the dashlet toolbar, click **Dashlet Options**.

The dashlet expands to display its associated settings, which vary based on the dashlet. Reporting settings can include such items as:

- The number of applications that the dashlet reporting, up to 15.
- Data refresh settings.
- The device location group, referred to as a site, or all sites.
- Whether to see all traffic, or inbound or outbound traffic only.
- The Differentiated Services Code Point (DSCP) traffic classification.
- Whether the information is reported by data source or by interface.
The screenshot below is an example of the types of settings that you can change to meet your monitoring needs.
Application Dashlet Data

Application Traffic Rates and Volumes

Refer to the Top N Applications or Top N Application Groups dashlet to see aggregated application traffic rate and volume metrics for a specific application or application category.

Note: The Top N Applications dashlet is available on the Network Summary and Overview dashboards, also.

By reviewing application traffic rates and volumes, you can gain insight into applications that are using the most network bandwidth. That way, you can evaluate whether applications consistently consuming bandwidth excessively might need optimization, which can improve application performance.

Or, if you see an application that you do not normally see, you can determine whether it should be running on the network and take appropriate action.
In the Top N Applications dashlet, to see additional summary information related to a specific application:

- Click a chart element.

The system navigates to the Performance | Application dashboard and filters the page to report the data for that application only.
Clients and Users Accessing Applications Most Often

Refer to the Top N Clients dashlet to see application usage rate and volume by client and by user.

This information provides insight into those clients that are generating the most network traffic and client traffic trends over time.
When you see a client with excessive or consistently high application traffic rates, you can evaluate the end user’s detailed network usage information, such as the applications that the user is consuming, detailed traffic rates, and conversation metrics.

To review the end user’s experience on the network:

- Click the associated client’s IP address chart element.

The system navigates to the Performance | End User Experience dashboard, filtered to report usage and experience metrics for the IP address that you indicated.
Application Traffic Bandwidth Consumption

Refer to the Application Traffic Analysis dashlet to see application traffic bandwidth consumption by rate or by volume.

This information provides insight into application usage trends and help you to identify unusual usage patterns, such as steadily increasing usage trends or sudden usage peaks that are outside of typical usage metrics.

This way, you can manage network traffic or take action when unusual usage patterns occur.
Servers or Interfaces Handling the Most Application Traffic

Refer to the **Top N Servers** dashlet to see the servers or interfaces that are handling the most application traffic by rate or volume.

This information provides insight into application traffic patterns at a server or interface level, which helps you to recognize common usage trends and to identify unusual traffic patterns, such as steadily increasing traffic or sudden traffic peaks that are outside of typical usage metrics.

This way, you can control server or interface traffic or take action when unusual patterns occur.
When you see a client with excessive or consistently high application traffic rates, you can evaluate the end user’s detailed network usage information, such as the applications that the user is consuming, detailed traffic rates, and conversation metrics.

**To review the end user’s experience on the network:**

- Click the client’s associated IP address chart element.

The system navigates to the **Performance | End User Experience** dashboard, filtered to report usage and experience metrics for the IP address that you indicated.
Sites or Clients Experiencing the Slowest Application Response Time (ART) Metrics

Refer to the Worst N Sites by ART Metrics dashlet to see the sites experiencing the slowest application response times and the application that is responding the most slowly, including the slowest (maximum) and average transaction times.

**Important Note:** When reviewing the Worst N Sites by ART Metrics dashlet, ensure that the dashboard level filter includes all of the sites for which you want the dashlet to report data.

**Tip:** This dashlet is particularly helpful when you filter it to evaluate the response metrics at a site level for a business critical application. This way, you can determine if a site is having problems with the application and take proactive action to mitigate disruption or downtime.
Refer to the **Worst N Clients by ART Metrics** dashlet to see the clients experiencing the slowest application response times and the application that is responding most slowly, including the slowest (maximum) and average transaction times.

<table>
<thead>
<tr>
<th>Client</th>
<th>T...</th>
<th>User</th>
<th>Application</th>
<th>Maximum</th>
<th>Average</th>
<th>Art Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.197.10...</td>
<td>ssh</td>
<td>74</td>
<td>74</td>
<td>Show Analy...</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.60.14...</td>
<td>ssh</td>
<td>72</td>
<td>38</td>
<td>Show Analy...</td>
<td></td>
<td></td>
</tr>
<tr>
<td>192.168.1...</td>
<td>ssh</td>
<td>18</td>
<td>18</td>
<td>Show Analy...</td>
<td></td>
<td></td>
</tr>
<tr>
<td>192.168.1...</td>
<td>ssh</td>
<td>17</td>
<td>15</td>
<td>Show Analy...</td>
<td></td>
<td></td>
</tr>
<tr>
<td>192.168.1...</td>
<td>telnct</td>
<td>19</td>
<td>12</td>
<td>Show Analy...</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In each dashlet, you can monitor the following ART metrics:

- **Transaction Time**
  Indicates the total amount of time that it takes for a request to travel from the client to the server through to the client receiving the final response packet from the server. Transaction time comprises the network delay and server response times.

- **Server Response Time**
  Indicates the amount of time that it takes for a server, on receiving a client request, to find the associated data and send the first data packet to the client.

- **Network Delay** (also referred to as total network time)
  Indicates the combined client network and server network times.
Each dashlet indicates the metric that it is monitoring currently below the dashlet title.

To update the Application dashboard to report on an application exhibiting slow response times:

- On either dashlet, in the Application column, click the application name link.

The system updates the Application dashboard Application filter to apply reporting for the specific application and refreshes all of dashlet data to report on that application only.

When evaluating clients’ application response times, you can see an immediate analysis of all of the ART statistics on which the system reports.

To review the analysis, on the Worst N Clients by ART Metrics dashlet:

- In the Art Analysis column for the client of interest, click Show Analysis.
The **Analysis** dialog box opens and reports the detailed application response time data, in which you can apply a reporting time interval, as needed.
Correlated Application Response Time (ART) Metrics

To evaluate the relationship among various ART metrics for the applications that you select on the dashboard, refer to the Application ART Analysis dashlet.

This information can provide insight into an area of the network that might be experiencing an issue. For example, a server time metric exhibiting excessive peaks in usage might indicate that the server hosting the applications has an issue that requires attention.

**Tip:** Evaluating the ART metrics for a single application is the most effective way to identify and respond to application activity on the network.

**To monitor a single application:**
- In the dashboard filters, in the Applications drop-down list, select the application for which you want to see correlated ART metrics.

You also can monitor a single application metric by selecting it in the dashlet options.

The metrics that this dashlet correlates include:

- **Client Network Time**
  Indicates the time that it takes for the first data packet of a client request to travel to the network router

- **Server Network Time**
  Indicates the time that it takes for the first data packet of a client request to travel from the network router to the server
 **Server Response Time**
   Indicates the amount of time that that it takes for a server, on receiving a client request, to find the associated data and send the first data packet to the client

 **Transaction Time**
   Indicates the total amount of time that it takes for a request to travel from the client to the server through to the client receiving the final response packet from the server

 **Data Time**
   Indicates the total time that it takes for all of the data that comprises a client request to travel from the server to the client

**Concurrent Client Connections to Applications**

Refer to the **Number of Active Connections** dashlet to see how many clients connect to an application or applications over the selected time period.

This information provides insight into applications that are experiencing consistently high levels of activity and might require more attention. For example, an ongoing demand for an application over time might indicate that additional servers could be necessary to support increasing client use efficiently.
Client Application Usage and Application Traffic Rate

Refer to the Client Conversations dashlet to see the applications that clients are using and the traffic rate from the client to the server or from the server to the client.

Recognizing the applications that a specific client is using is particularly helpful in troubleshooting situations. For example, when responding to a user who indicates slow application response, you can refer to this dashlet to determine if an active conversation is occurring between the user’s client and the application and take appropriate action.

Note: When system users have associated system user names or IDs with client addresses by using the Clients and Users, the user ID appears in the From User or To User column.
Summary Video Application and Telephony Data

On the Voice/Video dashboard, you can monitor video application and telephony information, such as real-time protocol, or RTP, streams transporting the most traffic and experiencing the most jitter and packet loss, and those sites reporting the worst voice experience based on the mean opinion score, or MOS.
Business Critical Application Health Monitoring

Overview

You can monitor the health of business critical applications on the Service Health page. The page reports application health, referred to as experience levels, which system users define in the health rules for the KPIs that the system monitors.

You can review the health summary, which lists each business critical application that you have selected and that is reporting metrics, organized by site.

You can toggle to the health timeline, which lists each application that you have selected and the health status of each application is reporting data over time, based on the experience levels that you indicate.
When values exceed the operational thresholds defined in the health rules, the health summary and health timeline views apply the associated color code to alert you of changing conditions.

To select applications, sites, and experience levels:

- Below the **Auto refresh** check box, click the filter button.

The **Filter Elements** drop-down menu opens, in which you can expand and select the sites, applications, and experience levels that you want to monitor.
Below the **Site-Application Health** heading, the page indicates the items that the page is reporting.

The **Service Health** page also provide access so that you can:

- Configure or change the threshold values of the health metrics in the health rules.
- Indicate the applications that you want the system to recognize as business critical.
Application Health Reported By Site

The Health Summary view lists each business-critical application by site, and displays color-coded indicators to identify the highest threshold severity levels, referred to as experience levels, that the applications are exhibiting based on the health rules and on the items that you selected to monitor.

The page lists the sites and reports the severest health experience level that is occurring at the site, when you have more than one experience level selected.

Note: The site names in the list are links. When you click a site name link, the page refreshes to display that site only. To see other sites, you need to select them in the Filter Elements drop-down menu.
To see more detail on the application health metrics at a site:
   ✓ For the site and application of interest, click the color-coded indicator.

This action opens a pop-up window that presents application performance metrics in charts.
To see application health metrics at more granular levels, you can:

- See the metrics that all data sources are reporting or select a specific data source.

  ![Data Sources Reporting Data](image1)

- See all charts or a larger view of each one individually.

  ![Traffic Chart](image2)

- See the metric experience level for a specific time by pointing at the metric health indicator bar.

  ![Metric Experience](image3)

- See the metric value by pointing at the chart line.

  ![Metric Value](image4)
Application Health Reported Over Time

The Health Timeline view lists each business-critical application individually, and displays color-coded indicators to identify the highest threshold severity levels, referred to as experience levels, that the applications are exhibiting based on the health rules and on the items that you selected to monitor.

The page lists the sites and reports the severest threshold experience level, when you have more than one experience level selected, over the time period indicated.

The timeline reports up to 6 hours of historical data, which you can change by using the timeline controls. When the page is reporting a time period longer than an hour, you can use the timeline slider to reduce the time period.

On the timeline, you can open and review granular details for the application health metrics as you can in the health summary.
Links

To Product Information

Visit the Cisco Web site to learn more about Cisco© Prime Infrastructure.

Visit the Cisco Web site to review or download technical documentation.

To Training

For more information on monitoring business applications by using the Network Health dashboard, refer to the Network Health Monitoring Overview job aid.

Visit the Cisco Web site to access other Cisco© Prime Infrastructure learning opportunities.

Visit the Cisco Web site to access learning opportunities for other Cisco products.

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Send us a message with questions or comments about this job aid.