



## Monitor Application Health

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- [About Application Experience and Application Visibility, on page 1](#)
- [Supported Platforms, on page 2](#)
- [Criteria for Enabling Application Telemetry on Devices, on page 3](#)
- [Application Health Prerequisites, on page 5](#)
- [Provision Application Telemetry Settings, on page 7](#)
- [View Application Experience of a Host, on page 8](#)
- [View Application Experience of a Network Device, on page 9](#)
- [Monitor the Health of All Applications, on page 10](#)
- [Monitor the Health of an Application, on page 17](#)
- [Configure Health Score Settings for Applications, on page 28](#)
- [Understand Application Health Score and KPI Metrics, on page 28](#)

## About Application Experience and Application Visibility

Assurance processes complex application data and presents the findings in Assurance health dashboards to provide insight into the performance of applications.

You can view the health data from a device perspective (**Device 360** window), from the user perspective (**Client 360** window), or from the application perspective (**Application 360** window).

Depending from where the data is collected, you can see some or all of the following:

- Application Name
- Throughput
- DSCP Markings
- Performance Metrics (Latency, Jitter, and Packet Loss)

Application Name and Throughput are collectively referred to as **Quantitative** metrics. Data for the Quantitative metrics comes from enabling **Application Visibility**.

DSCP Markings and Performance Metrics (Latency, Jitter, and Packet Loss) are collectively referred to as **Qualitative** metrics. Data for the Qualitative metrics comes from enabling **Application Experience**.

### Application Visibility

Application Visibility data is collected from switches running IOS-XE, and from wireless controllers running AireOS.

For switches running IOS-XE, Application Visibility data is collected using a predefined NBAR template that is applied bidirectionally (ingress and egress) to the physical layer access switch ports.

For wireless controllers running AireOS, Application Visibility data is collected at the wireless controller, and then streaming telemetry is used to transport this data to Cisco DNA Center.

### Application Experience

Application Experience data is collected from Cisco IOS-XE router platforms, specifically using the Cisco Performance Monitor (PerfMon) feature and the Cisco Application Response Time (ART) metrics.

Examples of router platforms include ASR 1000, ISR 4000, and CSR 1000v. For device compatibility with Cisco DNA Center, see the [Cisco DNA Center Compatibility Matrix](#).

To view the Cisco Performance Monitor feature availability, use the [Cisco Feature Navigator](#) tool. Click **Research Features**, and then add **Easy Performance Monitor Phase II** in the filter field.

### Optimized Application Performance Monitoring

Optimized Application Performance Monitoring (APM) is a feature on the device that reduces the overhead in collecting NetFlow data. APM is supported on Cisco IOS-XE routers, Cisco 9800 series wireless controllers, and the Cisco DNA Traffic Telemetry Appliance. For minimum software versions, see [Supported Platforms, on page 2](#).

## Supported Platforms

The following table lists the supported platforms, type of data collection, and software and license requirements.



**Note** For device compatibility with Cisco DNA Center, see the [Cisco DNA Center Compatibility Matrix](#).

Cisco Platform Support for Application Experience and Application Visibility in Cisco DNA Center		
Platform	Data Collection	Notes
Cisco IOS XE Routers	Application Experience data collection.	<ul style="list-style-type: none"> <li>Requires an active NBAR2 license.</li> <li>Cisco IOS XE 16.3 minimum software version.</li> <li>For Optimized APM: Cisco IOS XE 17.3 minimum software version.</li> </ul>

Cisco Platform Support for Application Experience and Application Visibility in Cisco DNA Center		
Platform	Data Collection	Notes
Catalyst 9000 Series Switches	Application Visibility data collection for 9200, 9300, 9400.	<ul style="list-style-type: none"> <li>• Requires a Cisco DNA Advantage license.</li> <li>• Cisco IOS XE 16.10.1 minimum software version.</li> <li>• IP routing must be enabled.</li> </ul>
Cisco AireOS Wireless Controllers	Application Visibility data collection.	<ul style="list-style-type: none"> <li>• Requires a Cisco DNA Advantage license.</li> <li>• Requires 8.8 MR2 software version 8.8.114.130 or later.</li> </ul>
Cisco 9800 Series Wireless Controller	<p>Application Visibility data collection for Flex/Fabric SSIDs.</p> <p>Application Experience data collection for central switching/local SSIDs, and Flex/Fabric SSIDs.</p>	<ul style="list-style-type: none"> <li>• Application Visibility for Optimized APM: Cisco IOS XE 16.12.1 minimum software version.</li> <li>• Application Experience for local mode: Cisco IOS XE 16.12.1 minimum software version.</li> </ul> <p>For flex/fabric mode: Cisco IOS XE 17.10.1 minimum software version.</p>
Cisco DNA Traffic Telemetry Appliance	Application Experience data collection.	<ul style="list-style-type: none"> <li>• Requires a Cisco DNA Advantage license.</li> <li>• For Optimized APM: Cisco IOS XE 17.3 minimum software version.</li> </ul>

## Criteria for Enabling Application Telemetry on Devices

Cisco DNA Center automatically enables application telemetry on all applicable interfaces or WLANs that are selected based on the new automatic interfaces or WLAN selection algorithm.



### Note

- The conventional tagging-based algorithm is supported and has precedence over the newer automatic interfaces or WLAN selection algorithm.
- If you want to switch over from the automatic selection algorithm to the tagging-based algorithm, you must disable telemetry before provisioning the tagged SSIDs to the devices.

The following table provides the criteria for selecting interfaces and WLANs based on the conventional tagging-based algorithm (with **lan** keyword) and the new automatic selection algorithm for all the supported platforms:

Platform	Conventional Tagging-Based Algorithm	Automatic Selection Algorithm
Router	<ul style="list-style-type: none"> <li>• Interface description has the <b>lan</b> keyword.<sup>12</sup></li> <li>• Interface has an IP address other than the management IP address.</li> </ul>	<ul style="list-style-type: none"> <li>• Interface has an IP address other than the management IP address.</li> <li>• Interface is not any of the following:               <ul style="list-style-type: none"> <li>• WAN                   <p data-bbox="1047 575 1477 999"><b>Note</b> An interface is treated as a WAN-facing interface if it has a public IP address, and if there is a route rule with a public IP address that routes through the interface.</p> <p data-bbox="1180 781 1477 999">In this context, a public IP address is not in a private range (for example, not in 192.168.x.x, 172.16.y.y, 10.z.z.z), or is an IP address that is not in the system's IP pools.</p> <p data-bbox="1180 1020 1477 1234">Route rules can be dynamically learned. In this context, the <b>show ip route</b> command does not show a route to a public IP address that goes through this interface.</p> </li> </ul> </li> <li>• Loopback.</li> <li>• Management interface: GIGABITETHERNET0, GIGABITETHERNET0/0, MGMT0, FASTETHERNET0, or FASTETHERNET1.</li> </ul>

Platform	Conventional Tagging-Based Algorithm	Automatic Selection Algorithm
Switch	<ul style="list-style-type: none"> <li>Interface description has the <b>lan</b> keyword.<sup>1, 2</sup></li> <li>Switch port is configured as an access port.</li> <li>Switch port is configured with the <b>switch-mode access</b> command.</li> </ul>	<ul style="list-style-type: none"> <li>Interface is a physical interface.</li> <li>Access port does not have neighbors.</li> <li>Interface is not any of the following: <ul style="list-style-type: none"> <li>Management interface: FASTETHERNET0, FASTETHERNET1, GIGABITETHERNET0/0, or MGMT0</li> <li>LOOPBACK0, Bluetooth, App Gigabit, WPAN, Cellular, or Async</li> <li>VSL interface.</li> </ul> </li> </ul>
Cisco AireOS Controller	WLAN profile name is tagged with the <b>lan</b> keyword. <sup>1, 2</sup>	If the SSIDs are mixed, that is Local mode, Flex mode, and Fabric mode, Wireless Service Assurance (WSA) processing is enabled. If all the SSIDs are in Local mode, NetFlow is enabled.
Cisco Catalyst 9800 Series Wireless Controller with Optimized Application Performance Monitoring (APM) profile and IOS 16.12.1 and later.	WLAN profile name is tagged with the <b>lan</b> keyword. <sup>1, 2</sup>	<p>If the SSIDs are mixed—that is, central switching, Flex mode, and Fabric mode—the Cisco Application Visibility and Control (AVC) basic record is configured. If all the SSIDs use central switching, the Optimized APM record is configured.</p> <p>For Cisco Catalyst 9800 Series Wireless Controllers with IOS 17.10 and later, Cisco DNA Center pushes the APM profile, not the AVC basic profile, for flex and fabric SSIDs.</p>
	<b>Note</b>	If you want to update the telemetry configuration, you must disable telemetry and then enable it after making the configuration changes.
Cisco DNA Traffic Telemetry Appliance with Optimized APM profile and IOS 17.3 and later.	<ul style="list-style-type: none"> <li>Interface description has the <b>lan</b> keyword.<sup>1, 2</sup></li> <li>Interface is a physical interface.</li> </ul>	<ul style="list-style-type: none"> <li>Interface is a physical interface.</li> <li>Interface is not a management interface: GIGABITETHERNET0, GIGABITETHERNET0/0, MGMT0, FASTETHERNET0, and FASTETHERNET1.</li> </ul>

<sup>1</sup> The **lan** keyword is case insensitive and can be separated by a space, hyphen, or underscore.

<sup>2</sup> Resynchronize the network device to read the **lan** interface description.

## Application Health Prerequisites

This topic provides the prerequisites relating to application health for routers, AireOS wireless controllers, and switches.

### Application Experience Prerequisites on Routers

- Requires Cisco IOS XE software with an active NBAR2 license.
- Application flows within the Layer 3 network are not visible.
- Traffic associated with the management interface is not part of Application Experience.
- Ports cannot be enabled for ETA.
- Clocks must be synchronized between Cisco DNA Center and the device for Assurance to display Application Health data.
- The conventional tagging-based algorithm (with keyword **lan**) is supported, but the newer automatic interface or WLAN selection algorithm allows you to enable Application Telemetry on interfaces or WLANs without tagging them with the keyword **lan**. For information about the criteria that is used, see [Criteria for Enabling Application Telemetry on Devices, on page 3](#).

### Application Visibility Prerequisites on Switches

- Requires Cisco IOS XE software.
- Requires a Cisco DNA Advantage license.
- Implemented only on access ports that contain the command **switchport mode access**.
- Support for L2 logical interfaces is not available.
- Limited visibility if the switch port is connected to an AP and configured with **switchport mode access**.
- Ports cannot be enabled for ETA.
- Only IPv4 flows are monitored.
- The following management interfaces cannot be used as a source interface of a NetFlow export:
  - GIGABITETHERNET0/0
  - MGMT0
  - FASTETHERNET0
  - FASTETHERNET1
  - GIGABITETHERNET0
- Clocks must be synchronized between Cisco DNA Center and the device for Assurance to display Application Health data.
- The conventional tagging-based algorithm (with keyword **lan**) is supported, but the newer automatic interface or WLAN selection algorithm allows you to enable Application Telemetry on interfaces or WLANs without tagging them with the keyword **lan**. For information about the criteria that is used, see [Criteria for Enabling Application Telemetry on Devices, on page 3](#).

### Application Visibility Prerequisites on AireOS Wireless Controllers

- Requires a Cisco DNA Advantage license.

- Supported only on wireless controllers that have AireOS software and not on wireless controllers that have IOS XE software.
- NetFlow must be enabled on the Cisco AireOS wireless controllers.
- Clocks must be synchronized between Cisco DNA Center and the device for Assurance to display Application Health data.
- Flexible NetFlow (FNF) flow monitors are not implemented. Instead, Application Visibility data is collected using streaming telemetry by subscribing to the Client-app-stat-events channel.
- The conventional tagging-based algorithm (with keyword **lan**) is supported, but the newer automatic interface or WLAN selection algorithm allows you to enable Application Telemetry on interfaces or WLANs without tagging them with the keyword **lan**. For information about the criteria that is used, see [Criteria for Enabling Application Telemetry on Devices, on page 3](#).

#### Application Visibility Prerequisites on Cisco 9800 Series Wireless Controller

- Requires IOS XE software for Optimized APM. See [Criteria for Enabling Application Telemetry on Devices, on page 3](#).
- Clocks must be synchronized between Cisco DNA Center and the device for Assurance to display Application Health data.

#### Application Experience Prerequisites on Cisco DNA Traffic Telemetry Appliance

- Requires a Cisco DNA Advantage license.
- Requires IOS XE software for Optimized APM. See [Criteria for Enabling Application Telemetry on Devices, on page 3](#).
- Clocks must be synchronized between Cisco DNA Center and the device for Assurance to display Application Health data.
- To enable visibility of CAPWAP-encapsulated wireless traffic, manually enter the **ip nbar classification tunneled-traffic CAPWAP** command on the Cisco DNA Traffic Telemetry Appliance.

## Provision Application Telemetry Settings

Configure global telemetry settings as described in [Configure Syslog, SNMP Traps, NetFlow Collector Servers, and Wired Client Data Collection Using Telemetry](#).

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- Step 1** From the top-left corner, click the menu icon and choose **Provision > Network Devices > Inventory**.
- The Inventory window displays the device information gathered during the discovery process. To view devices available in a particular site, expand the Global site in the left pane and select the site, building, or floor.
- Step 2** Choose the devices that you want to provision.
- Step 3** From the **Actions** drop-down list, choose **Telemetry** and do one of the following:
- Note** The **Enable Application Telemetry** and **Disable Application Telemetry** options are enabled only when the device supports application telemetry from Cisco DNA Center.

- a) **Enable Application Telemetry:** To configure application telemetry for the selected devices.
- b) **Disable Application Telemetry:** To remove the application telemetry configuration from the chosen devices.

**Step 4** Click **Apply**.

The **Application Telemetry** column shows the telemetry configuration status. If you don't see the **Application Telemetry** column in the default column setting, click the ellipsis icon (⋮) at the right end of the column headings and check the **Application Telemetry** check box.

## View Application Experience of a Host

Use this procedure to view the qualitative and quantitative metrics of the applications running on a host.

### Before you begin

- Make sure that the devices (routers, switches, wireless controllers, and access points) are discovered. See [Discover Your Network Using an IP Address Range or CIDR](#), [Discover Your Network Using CDP](#), or [Discover Your Network Using LLDP](#).
- Enable and configure Application Telemetry profile on network devices. See [Provision Application Telemetry Settings, on page 7](#).
- See [Application Health Prerequisites, on page 5](#).

**Step 1** From the **Client 360** window, expand the **Application Experience** category.

**Step 2** From the **Application Experience** category, you can do the following:

- a) View the Application Experience data in table format from a specific business relevance group by clicking its corresponding tab. The tabs are: **Business Relevant**, **Business Irrelevant**, or **Default**.

**Note** The displayed data is based on the time you selected from the drop-down menu in the **Client 360** window. Options are: **3 Hours**, **24 Hours**, and **7 Days**. Default is **24 Hours**.

- b) View Application Experience data in the table.

- **Name:** The application name.
- **Health:** The health score is calculated on the basis of a combination of metrics of packet loss, latency, and jitter. You can also include application delay for health score calculation. For more information, see [Individual Application Health Score, on page 28](#).
- **Usage Bytes:** The number of bytes transferred by the client for this application.
- **Average Throughput:** The rate of the application traffic (in Mbps) flowing between the client and the server.
- **DSCP:** The application's current (**Observed**) and default (**Expected**) DSCP value.

**Note** This metric is not available for Optimized APM.

- **Packet Loss:** The percentage (maximum and average) of packet loss.



- **Network Latency:** The network latency time (maximum and average) in milliseconds.
  - **Jitter:** The variance in time delay in milliseconds (maximum and average) between data packets over your network.
- c) To view the Application Experience metrics in chart format, click the radio button next to an application. The metrics are: **Throughput, Packet Loss, Jitter, Network Latency, Client Network Latency, Server Network Latency, and Application Server Latency.**
- Note** Application Visibility data that is exported by a Cisco Catalyst 9200 switch, Cisco Catalyst 9300 switch, or a Cisco AireOS wireless controller only provides data for Application Name, Usage, and Throughput.
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## View Application Experience of a Network Device

Use this procedure to view the qualitative and quantitative metrics of the applications running on a network device.

### Before you begin

- Make sure that the devices (routers, switches, wireless controllers, and access points) are discovered. See [Discover Your Network Using an IP Address Range or CIDR](#), [Discover Your Network Using CDP](#), or [Discover Your Network Using LLDP](#).
  - Enable and configure Application Telemetry profile on network devices. See [Provision Application Telemetry Settings, on page 7](#).
  - See [Application Health Prerequisites, on page 5](#).
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**Step 1** From the **Device 360** window, expand the **Application Experience** category.

**Step 2** From the **Application Experience** category, you can do the following:

- a) View the Application Experience data in table format from a specific business relevance group by clicking its corresponding tab: **Business Relevant**, **Business Irrelevant**, or **Default**.
- Note** The displayed data is based on the time you selected from the drop-down menu in the **Device 360** window. Options are **3 Hours**, **24 Hours** (the default), and **7 Days**.
- b) Filter the Application Experience data for a specific VRF or a specific router interface by using the appropriate filters: **All VRFs** and **All Interfaces**.
- Note** The **All VRFs** and **All Interfaces** filters are only available for routers.
- c) View Application Experience data in the table:
- **Name:** The application name.
  - **Health:** The health score is calculated on the basis of a combination of metrics of packet loss, latency, and jitter. You can also include application delay for health score calculation.

**Note** The health score is not available for Cisco Catalyst 9000 Series Switches and Cisco AireOS wireless controller. These devices do *not* poll the KPIs that are required to calculate a health score.

- **Usage Bytes:** The number of bytes transferred by the client for this application.
- **Average Throughput:** The rate of the application traffic (in Mbps) flowing between the client and the server.
- **DSCP:** The application's current (**Observed**) and default (**Expected**) DSCP value.

**Note** This metric is not available for Optimized APM.

- **Packet Loss:** The percentage (maximum and average) of packet loss.
- **Network Latency:** The network latency time (maximum and average) in milliseconds.
- **Jitter:** The variance in time delay in milliseconds (maximum and average) between data packets over your network.

- d) To view the Application Experience metrics in chart format, click the radio button next to an application. The metrics are **Throughput**, **Packet Loss**, **Jitter**, **Network Latency**, **Client Network Latency**, **Server Network Latency**, **Application Server Latency**, and **Application Response Time**.

**Note** Application Visibility data that is exported by a Cisco Catalyst 9200 switch, Cisco Catalyst 9300 switch, or a Cisco AireOS wireless controller only provides data for Application Name, Usage, and Throughput.

## Monitor the Health of All Applications

Use this procedure to get a global view of applications at a site.

### Before you begin

- Make sure that the devices (routers, switches, wireless controllers, and access points) are discovered. See [Discover Your Network Using an IP Address Range or CIDR](#), [Discover Your Network Using CDP](#), or [Discover Your Network Using LLDP](#).
- Enable and configure the Application Telemetry profile on network devices. See [Provision Application Telemetry Settings, on page 7](#).
- See [Application Health Prerequisites, on page 5](#).

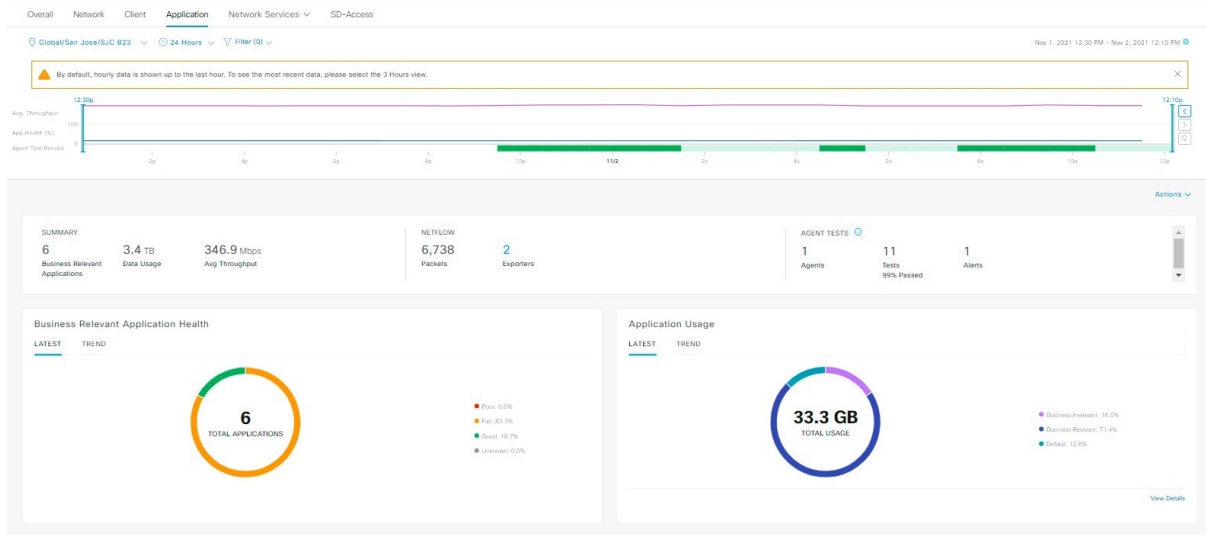
**Step 1** From the top-left corner, click the menu icon and choose **Assurance > Health**.

The **Overall** health dashboard is displayed.

**Step 2** Click the **Application** tab.

The **Application** health dashboard appears.

Figure 1: Application Health Dashboard



**Step 3** Use the **Application** health dashboard top-menu bar for the following functionality:

Application Health Dashboard Top-Menu Bar	
Item	Description
Global <b>Location</b> drop-down list	Click to display the location icon. Click the location icon to display the <b>Site List View</b> . To view the application information from a specific site or building, click <b>Go to Site</b> in the appropriate row. The information is refreshed in the dashboard based on your selection.
 <b>Time Range</b> setting	Enables you to display data within a specified time range on the dashboard. Do the following: <ol style="list-style-type: none"> <li>From the drop-down menu, choose the length of the range: <b>3 Hours</b>, <b>24 Hours</b>, or <b>7 Days</b>.</li> <li>Specify the <b>Start Date</b> and time; and the <b>End Date</b> and time.</li> <li>Click <b>Apply</b>.</li> </ol>
<b>Filter</b>	Choose the SSID from the drop-down list and then click <b>Apply</b> . Depending on your selection, the information in the dashboard is refreshed.
<b>Actions</b> drop-down list	Enables you to customize the dashboard display when you choose <b>Edit Dashboards</b> from the drop-down list. See <a href="#">Change the Position of a Dashlet</a> and <a href="#">Create a Custom Dashboard</a> .

Application Health Dashboard Top-Menu Bar	
Item	Description
<b>Application Health Timeline Slider</b>	<p>Enables you to view the healthy business-relevant application percentage, throughput, and agent test result for a more granular time range. Hover your cursor within the timeline to view the health score percentage at a specific time.</p> <p>You can click and drag the timeline boundary lines to specify the time range. This sets the context for application data that is displayed in the dashboard dashlets.</p> <p>You can use the arrow buttons on the right of the timeline to view data for up to 30 days.</p>

**Step 4** Use the **Summary** dashlet for the following functionality:

Summary Dashlet	
Item	Description
<b>Summary</b>	Displays the total number of business-relevant applications, data usage, and average throughput in your overall network or selected site.
<b>Netflow</b>	<p>Displays the total number of NetFlow packets.</p> <p>Displays the total number of exporters. Click an exporter to view a slide-in pane that displays a table that contains device name, packet count, record count, and rate limit drops.</p>
<b>ThousandEyes Tests</b>	<p>Displays the total number of ThousandEyes enterprise agents, tests, percentage of passed tests, and active alerts running on your supported Cisco Catalyst 9300 or 9400 Series switch.</p> <p>The following types of ThousandEyes agent tests are supported:</p> <ul style="list-style-type: none"> <li>• Network agent-to-server test: Collects network data, including jitter, packet loss, and latency.</li> <li>• Web HTTP server test: Collects HTTP server data, including response time.</li> <li>• Network agent-to-agent test: Collects network data, including jitter, packet loss and latency.</li> <li>• Voice RTP test: Collects Mean Opinion Score (MOS), packet loss, latency and Packet Delay Variation (PDV).</li> </ul> <p>To configure ThousandEyes Integration, see <i>Configure ThousandEyes Integration</i> in the <a href="#">Cisco DNA Center Administrator Guide</a>.</p>



**Step 5** Use the **Application Health** dashlet for the following functionality:

Application Health Dashlet	
Item	Description
<b>Business Relevant Application Health</b>	<p>Contains a health score for business-relevant applications. The health score is the percentage of healthy (good) business-relevant applications in your overall network, or selected site. See <a href="#">Understand Application Health Score and KPI Metrics, on page 28</a>.</p> <p>The following charts are displayed:</p> <ul style="list-style-type: none"> <li>• Application count distribution trend chart that shows the count of all business-relevant applications over time, which is shown as a stacked area chart based on their health scores.</li> <li>• Circle chart that shows the count of business-relevant applications categorized by the application's health score. You can click a category to show the list of applications with the lowest health score within the category.</li> </ul>
<b>Application Usage</b>	<ul style="list-style-type: none"> <li>• Circle chart: Shows the total application usage categorized by the application's business-relevance group. You can click a category to show the list of the top 10 applications by usage within the category.</li> </ul> <p><b>Note</b> The application usage is the taken from the application's bidirectional traffic.</p> <ul style="list-style-type: none"> <li>• <b>View Details:</b> Click <b>View Details</b> to open a slide-in pane with additional details. From the slide-in pane, you can: <ul style="list-style-type: none"> <li>• Click the <b>All Applications</b>, <b>Business Relevant</b>, <b>Business Irrelevant</b>, and <b>Default</b> tabs to display a chart with its application usage and the top 10 applications by usage.</li> <li>• Filter the chart by application group or traffic class with the drop-down list at the top right of the slide-in pane.</li> <li>• Click a category in the chart to display the applications and its detailed information in the <b>Application</b> table.</li> </ul> </li> </ul>
<b>Top Applications by Throughput</b>	Click <b>LATEST</b> and <b>TREND</b> tabs to view the top 5 applications by their average throughput values. Each application name is clickable and redirects to the relevant app360 page.
<b>Top Endpoints by Throughput</b>	Shows the top 5 endpoints by their average throughput values. Each endpoint identifier (ip address) is clickable and redirects to the relevant endpoint360 page.
<b>Worst Applications by Health</b>	<p>Click <b>LATEST</b> and <b>TREND</b> tabs to view the worst 5 application by their health score. Each application name is clickable and redirects to the relevant app360 page.</p> <p><b>View Details:</b> Click <b>View Details</b> to open a slide-in pane with additional details that displays the worst applications by different health kpis, such as packet loss, jitter and so on.</p>

**Step 6** Use the **Application** dashlet for the following functionality:

Application Dashlet	
Item	Description
Type	Filter the table based on the business-relevance groups. Options are <b>Business Relevant</b> , <b>Business Irrelevant</b> , <b>Default</b> , and <b>All</b> .
Health	Filter the table based on the application's health scores. Options are: <ul style="list-style-type: none"><li>• <b>Poor</b>: Applications with a health score range from 1 to 3.</li><li>• <b>Fair</b>: Applications with a health score range from 4 to 7.</li><li>• <b>Good</b>: Applications with a health score range from 8 to 10.</li><li>• <b>All</b>: All applications.</li><li>• <b>Unknown</b>: Applications are missing qualitative metrics for determining a health score.</li></ul>



Application Dashlet	
Item	Description
Application table	<p>View detailed application information in a table format. The application table displays the following information by default:</p> <ul style="list-style-type: none"> <li>• <b>Name:</b> Displays the application name. The names are based on the standard applications from Cisco Next Generation Network-Based Application Recognition (NBAR).</li> </ul> <p>Changing an application's name with the Application Policy package does not show the changed name in Application Experience. There is no integration between the Application Policy package and Application Experience.</p> <ul style="list-style-type: none"> <li>• If an application is not a standard application from the NBAR, its HTTP hostname or SSL common name is displayed, if available. These applications are assigned to the <b>Default</b> business-relevance group.</li> </ul> <p>You can click the name to display a 360° view of an application. See <a href="#">Monitor the Health of an Application, on page 17</a>.</p> <ul style="list-style-type: none"> <li>• Application table lists new applications as following: <ul style="list-style-type: none"> <li><b>ms-teams-video, ms-teams-app-sharing, ms-teams-audio, ms-teams-media</b> and <b>ms-teams</b> applications. These are grouped under <b>microsoft-teams</b>.</li> </ul> <p>Click <b>microsoft-teams</b> to display an MS Teams 360 view of Microsoft Teams applications. See <a href="#">Monitor and Troubleshoot the Health of a Microsoft Teams Application, on page 24</a>.</p> <p>webex-video, webex-audio, and webex-app-sharing. These are grouped under <b>webex</b>, where the data is collected from the NetFlow data.</p> <p>Click <b>webex</b> to display a Webex 360 view of Webex applications. See <a href="#">Monitor and Troubleshoot Health of a Webex Application, on page 21</a>.</p> </li> <li>• <b>Health:</b> Displays the health score of the application.</li> <li>• <b>Business Relevance:</b> Possible values are <b>All, Business Relevant, Business Irrelevant</b>, and <b>Default</b>.</li> <li>• <b>Usage Bytes:</b> The number of bytes transferred for this application.</li> <li>• <b>Average Throughput:</b> The rate of application traffic (in Mbps) flowing between the client and server.</li> <li>• <b>Packet Loss (%):</b> The percentage of packet loss.</li> <li>• <b>Network Latency:</b> The network latency time, in milliseconds, for Transmission Control Protocol (TCP)-based applications.</li> <li>• <b>Jitter:</b> The variance in time delay in milliseconds between data packets over your network. Jitter is for Real-time Transport Protocol (RTP)-based applications.</li> </ul>

Application Dashlet	
Item	Description
	<p>Customize the data that you want displayed in the table:</p> <ol style="list-style-type: none"> <li>From the <b>Table Appearance</b> tab, set the table density and striping.</li> <li>From the <b>Edit Table Columns</b> tab, check the check boxes for the data you want displayed in the table.</li> <li>Click <b>Apply</b>.</li> </ol>
 Export	Click <b>Export</b> to export the table data to a CSV file.

**Step 7** Use the **Enterprise Agent Tests** dashlet for the following functionality:


Enterprise Agent Tests	
Item	Description
<b>Enterprise Agent Tests</b> table	<p>View detailed <b>Enterprise Agent Tests</b> information in a table format. The agent table displays the following details:</p> <ul style="list-style-type: none"> <li>• <b>Test Name:</b> Displays the enterprise agent test name. Click the name to go to the ThousandEyes Agent page.</li> <li>• <b>Test Type:</b> Displays the name of the test type.</li> <li>• <b>Target:</b> Displays the target server used for the agent test.</li> <li>• <b>Device Name:</b> Displays the device name.</li> <li>• <b>Average Packet Loss (%):</b> The average percentage of packet loss during data collection between agents and servers.</li> <li>• <b>Average Jitter:</b> The variance in time delay in milliseconds between data packets over your network. Jitter is for RTP-based applications.</li> <li>• <b>Average Latency:</b> The network latency time, in milliseconds, for TCP-based applications.</li> <li>• <b># of Active Alerts:</b> Displays the number of active alerts during the agent test.</li> <li>• <b># of Alerts:</b> Displays the total number of alerts during the agent test.</li> <li>• <b># of Failed Tests:</b> Displays the number of failed agent tests.</li> <li>• <b>MOS:</b> Displays average and latest of mean opinion score.</li> <li>• <b>PDV (ms):</b> Displays average and latest score of packet delay variation.</li> </ul>



Enterprise Agent Tests	
Item	Description
	Customize the data that you want displayed in the table: <ol style="list-style-type: none"> <li>From the <b>Table Appearance</b> tab, set the table density and striping.</li> <li>From the <b>Edit Table Columns</b> tab, check the check boxes for the data you want displayed in the table.</li> <li>Click <b>Apply</b>.</li> </ol>
 Export	Click <b>Export</b> to export the table data to a CSV file.

## Monitor the Health of an Application

Use this procedure to view details about a specific application.

- 
- Step 1** From the top-left corner, click the menu icon and choose **Assurance > Health**.  
The **Overall** health dashboard is displayed.
- Step 2** Click the **Application** tab.  
The **Application** health dashboard appears.
- Step 3** In the **Application** table, click the name of an application.  
The **Application 360** window appears, which provides a 360° view of the application.
- Step 4** Click the time range setting () at the top-left corner to specify the time range for the data that you want displayed on the window:
- From the drop-down menu, choose a time range: **3 hours**, **24 hours**, or **7 days**.
  - Specify the **Start Date** and time; and the **End Date** and time.
  - Click **Apply**.
- Step 5** To display application information for a particular location, choose the location from the *Location* drop-down list.
- Step 6** From the **Filter** drop-down list, choose the SSID and click **Apply** to display the information for a particular SSID.
- Step 7** Use the application health timeline slider to view the application's health score for a more granular time range and to view the application quality information.  
Hover your cursor within the timeline to view the following information:
- Health Score:** The health score at a specific time is displayed. Metrics that are color-code in the Quality area contribute to the health score.
- Quality:** The Quality information area displays information about latency, jitter, and packet loss. For latency, the following aspects of delay between the client and the application are displayed:
- LAN delay: The delay in milliseconds between the client and router.

- WAN delay: The delay in milliseconds between the router and server.
- Application delay: The delay in milliseconds between the server and the application.

**Under Maintenance:** When a device is under maintenance mode during the specific time period, the specific device name is displayed below the Under Maintenance banner.

You can click and drag the timeline boundary lines to specify the time range. This sets the context for the application data that is displayed in the Application 360 window.

**Step 8**

Use the **Application Details** area, below the timeline, to view the following information:

Application Details	
Item	Description
<b>Health Score</b>	The health score of an application is calculated based on the weighted average of the application's qualitative metrics, which include packet loss, network latency, and jitter.  <b>Note</b> The health score is not available for Cisco Catalyst 9000 Series Switches and Cisco AireOS wireless controller. These devices do <i>not</i> poll the KPIs that are required to calculate a health score.
<b>Time and Date range</b>	Displays the time and date range for the data that is displayed in the <b>Application 360</b> window.
<b>Business Relevance</b> <b>Traffic Class</b> <b>Category</b>	Displays the application's Next Generation Network-Based Application Recognition (NBAR) classifying information.
<b>Issues tab</b>	Click to view the list of issues.
<b>Exporters tab</b>	Click to view the list of devices that send NetFlow traffic to Cisco DNA Center and other details.

**Step 9**

Click **Issues** to view the following information:

Issues
<p>Displays any issues that must be addressed. Issues are listed based on the timestamp. The most recent issue is listed first.</p> <p>Click an issue to open a slide-in pane to view the corresponding details, such as the description of the issue, impact, and suggested actions.</p> <p>From the slide-in pane, you can do the following:</p> <ul style="list-style-type: none"> <li>• To resolve an issue: <ul style="list-style-type: none"> <li>a. From the drop-down list, choose <b>Resolve</b>.</li> <li>b. To view the list of issues that have been resolved, click <b>Resolved Issues</b>.</li> </ul> </li> <li>• To ignore an issue: <ul style="list-style-type: none"> <li>a. From the drop-down list, choose <b>Ignore</b>.</li> <li>b. Set the number of hours to ignore the issue on the slider.</li> <li>c. Click <b>Confirm</b>.</li> <li>d. To view the list of issues that have been ignored, click <b>Ignored Issues</b>.</li> </ul> </li> </ul> <p>For information about the types of issues, see <a href="#">View and Manage Issues</a>.</p>

**Step 10**

Click **Exporters** to view the following information:

Exporters	
Item	Description
<b>Device</b>	<p>Displays the list of devices that is sending NetFlow traffic to Cisco DNA Center such as router, switch, wireless controller, and appliance.</p> <p><b>Note</b> The following warning message is displayed for the device under maintenance mode during specific time range:</p> <p>The exporters with warning icon were in maintenance mode during the selected period of time.</p>
<b>Health Score</b>	<p>The last 5-minute health score. The health score is calculated on the basis of the application's qualitative metrics, which include packet loss, network latency, and jitter.</p> <p><b>Note</b> The health score is not available for Cisco Catalyst 9000 Series Switches and Cisco AireOS wireless controller. These devices do <i>not</i> poll the KPIs that are required to calculate a health score.</p>
<b>Traffic Class</b>	Displays the application's NBAR classifying information if available.
<b>Go to Device 360</b>	Click to open the <b>Device 360</b> window for a specific device.

**Step 11** To view metric charts, do the following:

- For routers and appliances, click the exporter row to display charts (below the row) for the following metrics: usage, average throughput, packet loss, jitter, and latency.
- For switches and wireless controllers, click the device name to open a slide-in pane to view charts for the following metrics: usage and average throughput.

You can also click **Device 360** in the slide-in pane to open the **Device 360** window for a specific device.

Metric Charts	
Charts	Description
Usage	The number of bytes transferred by the client for the particular application.
Throughput	The rate of the application traffic (in Mbps) flowing between the client and the server.
Packet Loss	The percentage (maximum and average) of packet loss. <b>Note</b> This metric is not available for switches and wireless controllers.
Latency	The network latency time (maximum and average) in milliseconds. The following latency charts are available: <ul style="list-style-type: none"> <li>• Network Latency</li> <li>• Client Network Latency</li> <li>• Server Network Latency</li> <li>• Application Network Latency</li> </ul> <b>Note</b> This metric is not available for switches and wireless controllers.
Jitter	The variance in time delay in milliseconds (maximum and average) between data packets over your network. <b>Note</b> This metric is not available for switches and wireless controllers.
DSCP	<ul style="list-style-type: none"> <li>• <b>Observed:</b> The application's current DSCP value.</li> <li>• <b>Expected:</b> The default DSCP value assigned by NBAR.</li> </ul> <b>Note</b> This metric is not available for Optimized APM.

**Step 12** View the list of clients that are accessing the application in the **Application Endpoint** table (displayed after the metric charts).

Click the **Managed Clients** tab, if you want to view only the clients that are managed by Cisco DNA Center.

Details about each client is provided in the table, such as identifier (user ID, hostname, IP address, or MAC address, whichever is available in that order), client, client health, app health, usage, device type, MAC address, and VLAN ID.

For active clients, you can click the **Identifier** column to open the **Client 360** window.

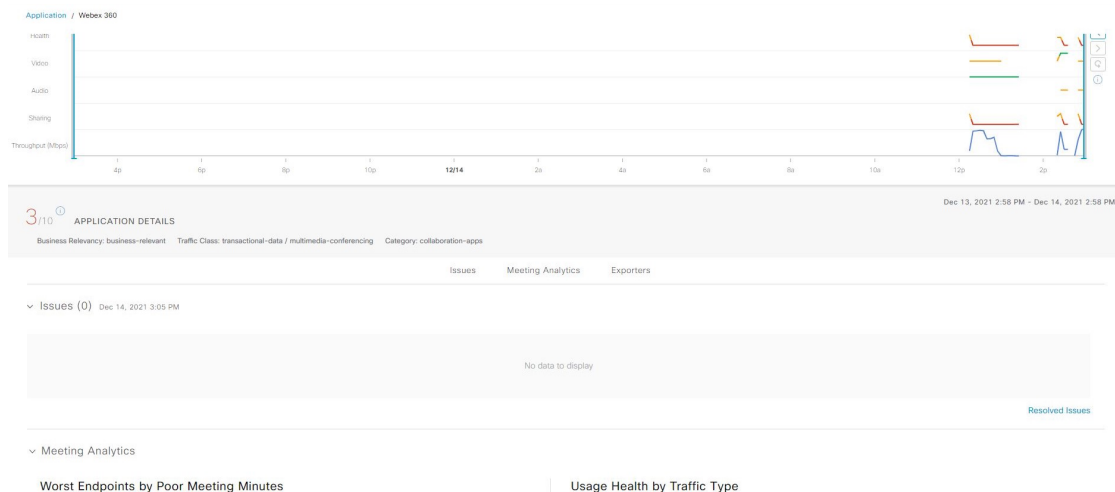
You can view up to 100 clients in this table. To view additional clients, click **Show More**.

## Monitor and Troubleshoot Health of a Webex Application

Use this procedure to view details about a Webex application.

- Step 1** From the top-left corner, click the menu icon and choose **Assurance > Health**.  
The **Overall** health dashboard is displayed.
- Step 2** Click the **Application** tab.  
The **Application** health dashboard appears.
- Step 3** In the **Application** table, click the **Webex** application.  
The **Webex 360** window appears, which provides a 360° view of the application.

**Figure 2: Webex 360**



- Step 4** Use the **Summary dashlet** to view the total number of data usage, average throughput, and active clients in your overall network, or selected site.
- Step 5** Click the time range setting (🕒) at the top-left corner to specify the time range for the application data that you want displayed on the window:
- From the drop-down menu, choose a time range: **3 hours**, **24 hours**, or **7 days**.
  - Specify the **Start Date** and time; and the **End Date** and time.
  - Click **Apply**.
- Step 6** To display application information for a particular location, choose the location from the *Location* drop-down list.
- Step 7** Use the application health timeline slider to view the application's health score for a more granular time range, sub applications, the network quality and application quality information.  
Hover your cursor within the timeline to view the health score at a specific time.

**Step 8** Use the **Application Details** area, below the timeline, to view the following information:

<b>Application Details</b>	
<b>Item</b>	<b>Description</b>
<b>Health Score</b>	The health score of an application is calculated based on the weighted average of the application's qualitative metrics, which include packet loss, network latency, and jitter.
<b>Time and Date range</b>	Displays the time and date range for the data that is displayed in the <b>Webex 360</b> window.
<b>Business Relevance Traffic Class Category</b>	Displays the application's Next Generation Network-Based Application Recognition (NBAR) classifying information.
<b>Issues category</b>	Click to view the list of issues.
<b>Meeting Analytics</b>	Click to view the Meeting Analytics data.
<b>Exporters tab</b>	Click to view the list of devices that send NetFlow traffic to Cisco DNA Center and other details.

**Step 9** You can view information about issues from the **Issues** category:

- a) Click an issue to open a slide-in pane to view the corresponding details, such as description of the issue, impact, and suggested actions.
- b) From the slide-in pane, you can do the following:
  - To resolve an issue:
    - a. From the **Status** drop-down list, choose **Resolve**.
    - b. Click **Resolved Issues** to view the list of issues that are resolved.
  - To ignore an issue:
    - a. From the **Status** drop-down list, choose **Ignore**.
    - b. Set the number of hours to ignore the issue on the slider.
    - c. Click **Confirm**.

For information about issues, see [View and Manage Issues](#).

**Step 10** Use the **Meeting Analytics** dashlets for the following functionality:

<b>Worst Endpoints by Poor Meeting Minutes</b>
Click <b>Latest</b> and <b>Trend</b> chart to view the status of worst endpoints by poor meeting minutes. You can filter the data based on <b>By Percentage</b> or <b>By Total Poor Minutes</b> .

**Usage Health by Traffic Type**

Click **Latest** to view the chart to view usage health based on the traffic type for Audio, Sharing, and Video.  
 Click **Trend** to view the chart displays usage health based on the traffic type for Audio, Sharing, and Video.  
 You can hover on a color segment in the chart to view the percentage of health.

**Step 11** Click **Exporters** to view the following information:

Exporters	
Item	Description
<b>Device</b>	<p>Displays the list of devices that is sending NetFlow traffic to Cisco DNA Center such as router, switch, wireless controller, and appliance.</p> <p><b>Note</b> The following warning message is displayed for the device under maintenance mode during specific time range:</p> <p>The exporters with warning icon were in maintenance mode during the selected period of time.</p>
<b>Health Score</b>	<p>The last 5-minute health score. The health score is calculated on the basis of the application's qualitative metrics, which include packet loss, network latency, and jitter.</p> <p><b>Note</b> The health score is not available for Cisco Catalyst 9000 Series Switches and Cisco AireOS wireless controller. These devices do <i>not</i> poll the KPIs that are required to calculate a health score.</p>
<b>Traffic Class</b>	Displays the application's NBAR classifying information if available.
<b>Go to Device 360</b>	Click to open the <b>Device 360</b> window for a specific device.

**Step 12** To view metric charts for audio, video and sharing, do the following:

Metric Charts	
Charts	Description
<b>Usage</b>	The number of bytes transferred by the client for the particular application.
<b>Throughput</b>	The rate of the application traffic (in Mbps) flowing between the client and the server. You can hover your cursor over chart to view the throughput value for audio, video, and sharing.
<b>Packet Loss</b>	<p>The percentage (maximum and average) of packet loss.</p> <p><b>Note</b> This metric is not available for switches and wireless controllers.</p>

Metric Charts	
Charts	Description
<b>Latency</b>	<p>The network latency time (maximum and average) in milliseconds. The following latency charts are available:</p> <ul style="list-style-type: none"> <li>• Network Latency</li> <li>• Client Network Latency</li> <li>• Server Network Latency</li> <li>• Application Network Latency</li> </ul> <p><b>Note</b> This metric is not available for switches and wireless controllers.</p>
<b>Jitter</b>	<p>The variance in time delay in milliseconds (maximum and average) between data packets over your network.</p> <p><b>Note</b> This metric is not available for switches and wireless controllers.</p>

**Step 13** View the list of clients that are accessing the application in the **Application Endpoint** table (displayed after the metric charts).

Details about each client is provided in the table, such as identifier (user ID, hostname, IP address, or MAC address, whichever is available in that order), client, client health, app health, usage, device type, MAC address, and VLAN ID.

For active clients, you can click the **Identifier** column to open the **Client 360** window.

You can view up to 100 clients in this table. To view additional clients, click **Show More**.

## Monitor and Troubleshoot the Health of a Microsoft Teams Application

Use this procedure to view details about a **Microsoft Teams** application.

**Step 1** From the top-left corner, click the menu icon and choose **Assurance > Health**.

The **Overall** health dashboard is displayed.

**Step 2** Click the **Application** tab.

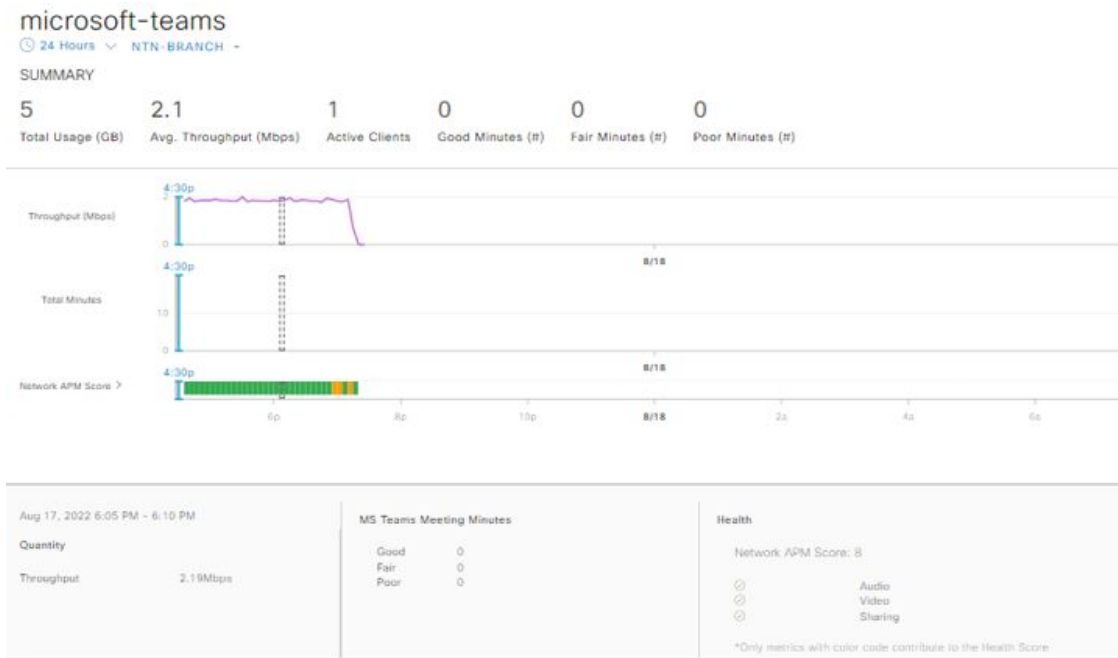
The **Application** health dashboard is displayed.

**Step 3** In the **Application** table, click a **microsoft-teams** application.

An **MS Teams 360** window is displayed, which provides a 360° view of an application.



Figure 3: MS Teams 360



**Step 4** Use the **Summary** dashlet to view the total number of data usage, average throughput, active clients, good minutes, fair minutes, and poor minutes in your overall network or selected site.

**Step 5** In the top-left corner, click the time range setting (🕒) to specify the time range for the application data that you want to be displayed on the window.

- a) From the drop-down menu, choose a time range: **3 hours**, **24 hours**, or **7 days**.
- b) Specify the **Start Date** and time and the **End Date** and time.
- c) Click **Apply**.

**Note** By default, selected site and time range in the Application dashboard is displayed in an MS Teams 360.

**Step 6** To display application information for a particular location, choose the location from the **Location** drop-down list.

**Step 7** Use the application health timeline slider to view the **Throughput**, **Total Minutes**, and **Network APM Score**.

Hover your cursor in the timeline to view the health score at a specific time.

**Note** Network APM score is a health score, which is calculated based on NetFlow exported from the managed network devices. For more information regarding APM, see [Supported Platforms, on page 2](#).

**Step 8** Use the **Application Details** area, below the timeline, to view the following information:

Application Details	
Item	Description
<b>Time and Date</b> range	Displays the time and date range for the data that is displayed in the <b>MS Teams 360</b> window.
<b>Health</b>	Displays the health score of <b>Audio</b> , <b>Video</b> , and <b>Sharing</b> .
<b>Quantity</b>	Displays <b>Throughput</b> data.

Application Details	
Item	Description
MS Teams Meeting Minutes	Displays information about <b>Good</b> , <b>Fair</b> , and <b>Poor</b> minutes.
Business Relevance Traffic Class Category	Displays the application's next generation Network-Based Application Recognition (NBAR) classifying information.
Issues category	Click to view the list of issues.
Meeting Analytics	Click to view the Meeting Analytics data.
Exporters tab	Click to view the list of devices that send NetFlow traffic to Cisco DNA Center and other details.

**Step 9**

You can view information about issues from the **Issues** category:

- a) Click an issue to open a slide-in pane to view the corresponding details, such as a description of the issue, impact, and suggested actions.
- b) From the slide-in pane, you can do the following:
  - To resolve an issue:
    - a. From the **Status** drop-down list, choose **Resolve**.
    - b. Click **Resolved Issues** to view the list of issues that are resolved.
  - To ignore an issue:
    - a. From the **Status** drop-down list, choose **Ignore**.
    - b. Set the number of hours to ignore the issue on the slider.
    - c. Click **Confirm**.

For information about issues, see [View and Manage Issues](#).

**Step 10**

Use the **Meeting Analytics** dashlets for the following functionality:

Meeting Analytics	
Item	Description
Top Access Devices	Click the <b>Latest</b> and <b>Trend</b> charts to view the status of top access devices by good and poor minutes.  You can filter the data based on <b>By Poor Meeting Minutes</b> , <b>By Total Meeting Minutes</b> , <b>By Total Usage</b> , and <b>By Poor Network APM Score</b> .
Top Endpoints	Click the <b>Latest</b> and <b>Trend</b> charts to view the status of top endpoints by good and poor minutes.  You can filter the data based on <b>By Poor Meeting Minutes</b> , <b>By Total Meeting Minutes</b> , <b>By Total Usage</b> , and <b>By Poor Network APM Score</b> .

**Step 11** Click **Exporters** to view the following information:

Exporters	
Item	Description
<b>Device</b>	Displays the devices that are sending NetFlow traffic to Cisco DNA Center.  <b>Note</b> The following warning message is displayed for the device under maintenance mode during a specific time range:  The exporters with warning icon were in maintenance mode during the selected period of time.
<b>Health Score</b>	The last 5-minute health score. The health score is calculated based on the application's qualitative metrics, which include packet loss, network latency, and jitter.  <b>Note</b> The health score is not available for Cisco Catalyst 9000 Series Switches and Cisco AireOS wireless controller. These devices do <i>not</i> poll the KPIs that are required to calculate a health score.
<b>Traffic Class</b>	Displays the application's NBAR classifying information, if available.

**Step 12** To view metric charts for audio, video, and sharing, do the following:

Metric Charts	
Charts	Description
<b>Usage</b>	The number of bytes transferred by the client for the particular application.
<b>Throughput</b>	The rate of the application traffic (in Mbps) flowing between the client and the server. You can hover your cursor over the chart to view the throughput value for audio, video, and sharing.
<b>Packet Loss</b>	The percentage (maximum and average) of packet loss.  <b>Note</b> This metric is not available for switches and wireless controllers.
<b>Jitter</b>	The variance in time delay in milliseconds (maximum and average) between data packets over your network.  <b>Note</b> This metric is not available for switches and wireless controllers.

**Step 13** View the list of clients that are accessing the application in the **Application Endpoint** table (displayed after the metric charts).

The table shows details about each client, such as identifier (user ID, hostname, IP address, or MAC address), client health, Network APM score, Microsoft Teams Score, usage, device type, MAC address, and VLAN ID.

For active clients, click the **Identifier** column to open the **Client 360** window.

You can view up to 100 clients in this table. To view additional clients, click **Show More**.

# Configure Health Score Settings for Applications

Use this procedure to configure the health score settings for applications. You can customize the health score calculation for applications by changing the KPI thresholds on a per-traffic class basis and specifying the KPIs that are included for the calculation.

- 
- Step 1** From the top-left corner, click the menu icon and choose **Assurance > Manage > Health Score Settings**.
- Step 2** Click the **Application Health** tab.
- Step 3** Click the tab of the application category to customize its health score calculation settings.  
The tab displays the KPIs that affect the health score calculation of the application.
- Step 4** From the **KPI Name** column, click the KPI name link.  
The slide-in pane for the KPI appears.
- Step 5** Configure the KPI health score settings:
- Customize the KPI threshold value for **Poor**, **Fair**, and **Good** health score.
  - Weight**: Valid weights are between 1–10. The higher the weight is, the KPI has more impact on the application health.
  - Check **Include for health score** check box if you want this KPI to be included in the health score calculation.
  - Click **Reset to Default** to restore the default KPI settings.
- Step 6** Click **Apply**.
- 

## Understand Application Health Score and KPI Metrics

This section provides information about how the overall and individual application health scores and KPI metrics are computed.

### Overall Application Health Score

The Application Health score is the percentage of the number of healthy business-relevant applications (a health score from 8 to 10), divided by the total number of business relevant applications. The score is calculated over the latest 5-minute interval.

Example:  $90\% \text{ (health score)} = 90 \text{ (business-relevant applications with a health score from 8 to 10)} \div 100 \text{ (total number of business-relevant applications)}$

### Individual Application Health Score

The Individual Application Health score is calculated based on the weighted average of the application's qualitative metrics, which include packet loss, network latency, and jitter.

The Individual Application health is measured on a scale of 1 to 10, with 10 being the best score. The following formula is used to calculate the Individual Application Health score:

$$\text{Individual Application Health Score} = (\text{Latency\_Weight} * \text{Latency\_VoS\_Score} + \text{Jitter\_Weight} * \text{Jitter\_VoS\_Score} + \text{PacketLoss\_Weight} * \text{PacketLoss\_VoS\_Score}) \div (\text{Latency\_Weight} + \text{Jitter\_Weight} + \text{PacketLoss\_Weight})$$


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**Note** The health score is not available for Cisco Catalyst 9000 Series Switches and Cisco AireOS wireless controller. These devices do *not* poll the KPIs that are required to calculate a health score.

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The workflow for calculating the Individual Application Health score is as follows:

1. Obtain the KPIs: Jitter, Latency, and Packet Loss.
2. Determine the application's Traffic Class based on the DSCP value from the flow record.
3. Convert the KPI numbers into Validation of Service score (VoS score) using the Cisco Validated Design (CVD) thresholds for each Traffic Class and KPI metric.
4. Get the weightage of the KPIs based on the application's Traffic Class and Tolerance level. The weightage is based on RFC4594.
5. Calculate the Application Health score. This is the weighted average of packet loss, network latency, and jitter.

