



Monitor and Troubleshoot Network Health

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About Network

A network consists of one or more devices, including routers, switches, wireless controllers, and access points.

Monitor and Troubleshoot the Health of Your Network

Use this procedure to get a global view of your network and to determine if there are potential issues that must be addressed.

A network consists of one or more devices, including routers, switches, wireless controllers, and access points.



Note The network health score exists only in the context of a location. If the location of a device is not available, it is not counted in the network health score.

Before you begin

Configure Assurance. See [Basic Setup Workflow](#).

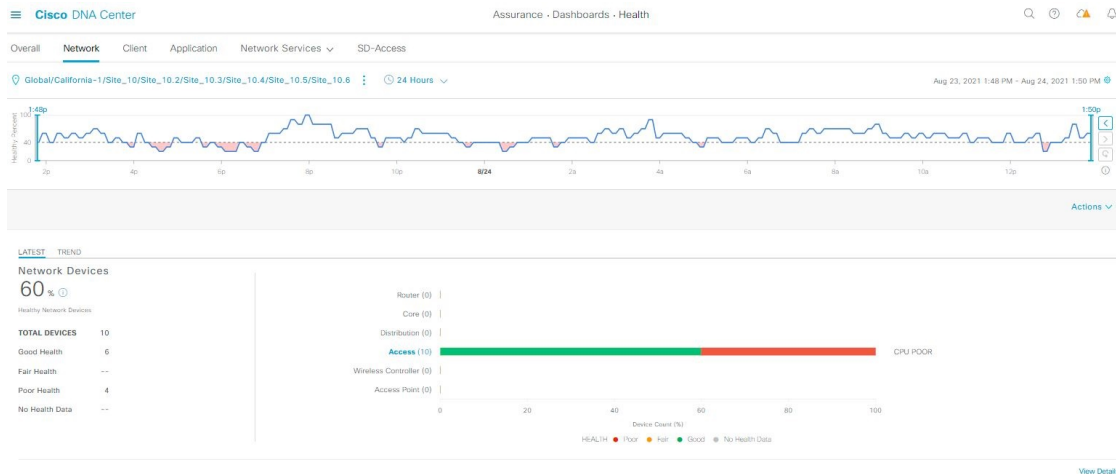
Step 1 Click the menu icon (☰) and choose **Assurance** > **Health**.


The **Overall** health dashboard appears.


Step 2 Click the **Network** tab.

The **Network** health dashboard appears.






Figure 1: Network Health Dashboard






Step 3 Click the location option ( Global) in the top menu bar to select the site, building, or floor from the Site hierarchy.

Step 4 Click  next to the location icon and choose **Site Details** to view the Sites table.

The location pane has the following functionality:

Location Option	
Item	Description
 toggle button List View	Click this toggle button to display the sites and buildings from your network in a list format. Click the drop-down list for the following options: <ul style="list-style-type: none"> Hierarchical Site View: Sorts the list at a site level. From the Go to sites column, click  for a site or building to display data only for that location on the Network dashboard. Building View: Sorts the list at a building level. From the Go to sites column, click  for a site or building to display data only for that location on the Network dashboard.
 toggle button Map View	Click this toggle button to display the health of all the network sites on a geographic location-oriented network health map. By default, the network sites are color coded according to the severity of the problem.
 Hide Sites	Click the Hide Sites icon to hide the sites table.

Location Option	
Item	Description
 <p>Topology tool</p>	<p>Click this icon to open the Topology window, which has the following views:</p> <ul style="list-style-type: none">  Geographical View: Click this toggle button to display your network in a geographical map. Hover your cursor over a location to view the percentage of healthy devices.  Topology View: Click this toggle button to display a topology of how the components in the network are connected. Hover your cursor over a device to display device information, such as device role, IP address, and software version. To obtain a 360° view of the device, click View Details 360.

- Step 5** Click the time range setting (🕒) in the top menu bar to specify the time range of data that appears on the dashboard.
- From the drop-down menu, choose the 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** Click the **Actions** drop-down list in the top menu bar for the following functionality:
- **Export Dashboard:** Enables you to export the network dashboard to PDF format. Click **Export Dashboard** to view the preview page and click **Save**.
 - **Edit Dashboard:** Enables you to customize the dashboard display. See [Change the Position of a Dashlet](#) and [Create a Custom Dashboard](#).

- Step 7** Use the **Network Health** timeline for the following functionality.
- You can specify a more granular time range. You can click and drag the timeline boundary lines to specify the time range. This sets the context for the custom charts on the dashboard.
- You can use the arrow buttons on the right of the timeline to view data for up to 30 days.
- Hover your cursor within the timeline chart to view the network device health score percentage at a specific time.
- The dotted horizontal line represents the threshold for a healthy network, which by default is set to 40%.
- To change the threshold value:
- Hover your cursor over the information (ℹ️) icon.
 - In the tooltip, click the edit (✏️) icon.
 - In the **Network Health Threshold** slide-in pane, click and drag the blue line to set the threshold percentage value.
 - Click **Save**.

Note Changing the custom threshold affects when the Network Device Summary Health Score is displayed as red. The custom threshold does not change the number of healthy or unhealthy devices.

- Step 8** Use the **Network Devices Health Summary** dashlet for the following functionality:

Network Devices Health Summary Dashlet	
Item	Description
Network Devices Health Summary area	<p>Includes the following tabs:</p> <ul style="list-style-type: none"> • Latest: Displayed by default. The left pane provides the network health summary score and the total number of devices. The right pane displays charts. <ul style="list-style-type: none"> • Network Health Summary Score: The Network Health Summary score is the percentage of healthy (good) devices in your overall network or selected site. See Network Health Score, on page 24. • Total Devices: Provides the total number of network devices and the count of devices that have Good Health, Fair Health, Poor Health, and No Health Data. • Charts: This color-coded snapshot-view chart shows the performance of each device category (Access, Core, Distribution, Router, Wireless Controller, and Access Points) over the last 5 minutes. <p>Hover your cursor over a color to display the health score and the number of devices associated with that color.</p> <p>If the chart shows a low health score (red or orange), the KPIs that contributed to the low health score are shown next to the bar. Examples include link errors, high CPU, high memory, high noise, and low air quality.</p> <p>You can also click a hyperlinked device category (Access, Core, Distribution, Router, Wireless Controller, and Access Point) to open a slide-in pane with additional details.</p> • Trend: Click the Trend tab to display a trend chart. This color-coded trend chart shows the performance of devices over a time range. Hover your cursor over the chart to display the total number of devices and their health over time. <p>The color in the charts represent the health of the network devices:</p> <ul style="list-style-type: none"> ●: Poor network devices. Health score range is 1 to 3. ●: Fair network devices. Health score range is 4 to 7. ●: Good network devices. Health score range is 8 to 10. ●: No Health data. Health score is 0.
View Details	Click View Details to open a slide-in pane with additional details. From the slide-in pane, you can click a color segment in the chart to refresh the data in the table that is displayed below the chart.

Step 9 Use the **AP** dashlets to view the following information:




Total APs Up/Down Dashlet
<p>Color-coded chart that provides the following AP status information: number of APs that are connected to the network and the number of APs that are not connected to the network.</p> <p>The Latest tab provides a 5-minute snapshot view.</p> <p>The Trend tab provides a trend view for the time range that you selected in the time range settings. For example, if the time range is set to the last three hours, the trend tab displays three hours of data.</p> <p>Click View Details to open a slide-in pane with additional details. From the slide-in pane, you can click a color segment in the chart to refresh the data in the table that is displayed below the chart.</p>

Top N APs by Client Count Dashlet
<p>Chart that provides information about the APs that have the highest number of clients.</p> <p>The Latest tab provides a 5-minute snapshot view.</p> <p>The Trend tab provides a trend view for the time range that you selected in the time range settings. For example, if the time range is set to the last three hours, the trend tab displays three hours of data.</p> <p>Click View Details to open a slide-in pane with additional details. From the slide-in pane, you can click a color segment in the chart to refresh the data in the table that is displayed below the chart.</p>

Top N APs by High Interference Dashlet
<p>Information about the APs that have high interference. You can choose 2.4 GHz or 5 GHz.</p> <p>The Latest tab provides a 5-minute snapshot view.</p> <p>The Trend tab provides a trend view for the time range that you selected in the time range settings. For example, if the time range is set to the last three hours, the trend tab displays three hours of data.</p> <p>Click View Details to open a slide-in pane with additional details. From the slide-in pane, you can click a color segment in the chart to refresh the data in the table that is displayed below the chart.</p>

Step 10 Use the **Network Devices** dashlet for the following functionality:

Network Devices Dashlet	
Item	Description
Type	<p>Filter the table based on the device type with the following options: All, Access, Core, Distribution, Router, WLC, and AP.</p> <p>Note When you filter the devices based on device type "Router", it displays the device(s) with device role "Border Routers".</p> <p>For SDA Fabric Domain, filter the table based on the fabric type with the following options: All, Fabric Control Plane, Fabric Border, Fabric Edge, Fabric WLC, Fabric AP, and Extended Node.</p>

Network Devices Dashlet	
Item	Description
Overall Health	<p>Filter the table based on the overall health score of the device with the following options:</p> <ul style="list-style-type: none"> • All • Poor: Devices with a health score range from 1 to 3. • Fair: Devices with a health score range from 4 to 7. • Good: Devices with a health score range from 8 to 10. • No Health: Devices with no health data.
Network Devices table	<p>View device information for all the devices in the network or for a selected site in a table format.</p> <p>Note The Overall Health Score is the minimum subscore of the following KPI metric health scores: System Health, Data Plane Connectivity, and Control Plane Connectivity.</p> <p>In the Overall Health Score column, hover your cursor over a health score. The Device Health score is displayed along with the health and percentage value of all of the KPI metrics. The Device Health score is the minimum subscore of the KPI metrics, depending on the type of device. For routers and switches, the following are the KPI metrics: System Resources (memory utilization and CPU utilization), Data Plane (uplink availability and link errors), and Fabric (Control Plane Reachability). The Fabric Domain Name, Fabric Name and Fabric Role columns display the fabric domain name, fabric name, and fabric role (Edge, Border, Map Server, and so on).</p> <p>The Reachability column displays the status of the device (Reachable, Up, Unreachable, Rebooting, and so on).</p>
Device 360	<p>Display a 360° view of a device by clicking the device name in the Device column. Device 360 provides detailed information for troubleshooting device issues.</p>
 Export	Click Export to export the device information to a CSV file.
	<p>Customize the data you want displayed in the table:</p> <ol style="list-style-type: none"> a. Click  . A list of options is displayed. b. Check the check boxes for the data you want displayed in the table. c. Click Apply.

Step 11 Use the **Network Devices Reachability** dashlet to view the following information:

Network Devices Reachability Dashlet

Color-coded chart shows the reachability status of routers, switches, and wireless controllers.

- **Reachable**
- **Unreachable**

The **Latest** tab provides a 5-minute snapshot view.

The **Trend** tab provides a trend view for the time range that you selected in the time range settings. For example, if the time range is set to the last three hours, the trend tab displays three hours of data.

Click **View Details** to open a slide-in pane with additional details. From the slide-in pane, you can hover your cursor over the timeline slider to view the reachability status of over a time period. The Reachability status count of top devices based on role and location is displayed below the timeline slider as horizontal bar graphs.

You can select the data displayed as horizontal bars to filter the table based on the reachability status, device types, and location with the following options: All, Access, Core, Distribution, Router, and WLC.

Step 12

Use the **WAN Link Utilization** dashlet to view the following information:

WAN Link Utilization Dashlet

The bar chart shows the status of the WAN link utilization percentage only for the available WAN links.

Note For a link to be considered a WAN link, you must manually assign the system-generated WAN tag to the required port. See "Assign Tags to Ports" in the Manage Your Inventory chapter of the [Cisco DNA Center User Guide](#).

The **Latest** tab provides a 10-minute snapshot view of **Available** and **Not Available** WAN links.

The **Trend** tab provides a trend view for the time range that you selected in the time range settings. For example, if the time range is set to the last three hours, the trend tab displays three hours of data.

Click **View Details** to open a slide-in pane with additional details. From the slide-in pane, you can select an element on the chart to view more detailed data.

You can select the data displayed as horizontal bars below the timeline slider to filter the table based on top locations, device types, and location.

Step 13

Use the **WAN Link Availability** dashlet to view the following information:

WAN Link Availability Dashlet

Color-coded chart displays the information on the available WAN links in your network.

The **Latest** tab provides the percentage of WAN links utilized.

The **Trend** tab provides a trend view for the time range that you selected in the time range settings. For example, if the time range is set to the last three hours, the trend tab displays three hours of data.

Click **View Details** to open a slide-in pane with additional details. From the slide-in pane, you can select an element on the chart to view more detailed data.

You can select the data displayed as horizontal bars below the timeline slider to filter the table based on top locations (link count) and device types (link count).

Monitor and Troubleshoot the Health of a Device

Use this procedure to view details about a specific device and determine if there are potential issues that must be addressed.

Step 1 Click the menu icon (☰) and choose **Assurance > Health**.

The **Overall** health dashboard appears.

Step 2 Click the **Network** tab.

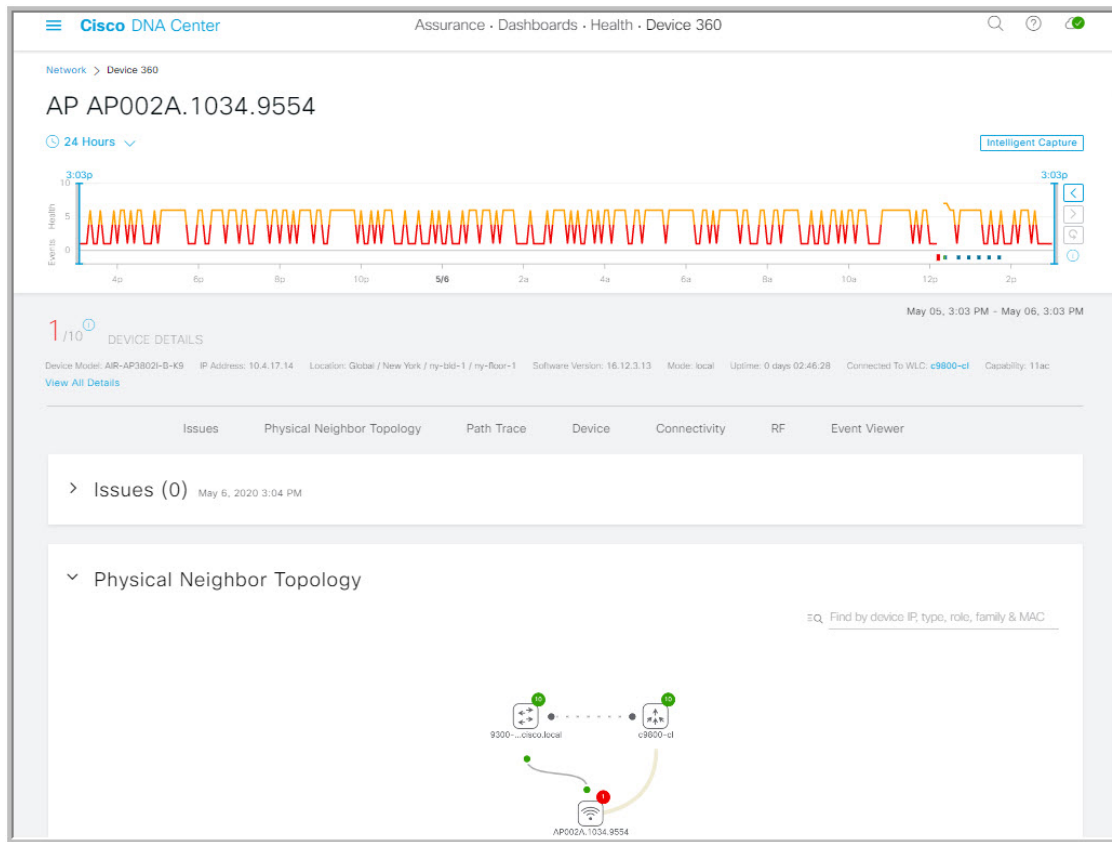
Step 3 In the **Network** health dashboard, do one of the following:

- In the **Network Devices** dashlet, click a device name in the **Device Name** column.
- In the **Search** field, enter the device name, IP address, or MAC address.

The **Device 360** window displays a 360° view of the network device.

Note The **Map View** appears by default.

Figure 2: Device 360 Window



Step 4 Click the time range setting (🕒 24 Hours ▾) to specify the time range of data that is 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 Click **Intelligent Capture** to view, monitor, and troubleshoot captured onboarding and data packets for a specific network device and to determine if there are potential issues that must be addressed. See [View RF Statistics and Manage Spectrum Analysis Data for an Access Point](#).

Note Intelligent Capture is not supported for all AP models. If **Intelligent Capture** is not displayed, verify that the AP is a supported model, and that the AP is assigned to a location on the **Network Health** dashboard.

Step 6 Use the timeline slider to view the health and events information about the network device over a period of time.

Note Gaps in the timeline indicate that no health data was retrieved from the device. This situation can occur when a device is in maintenance mode.

The timeline slider has the following functionality:

- **Health:** You can hover your cursor over the timeline slider to view the client's health score and KPIs for a 5-minute window. The device's health score is the minimum of all KPI health scores.

When you double-click the graph, it displays the timeline slider in a 1-hour time period.

Note If you want to display information longer than 1 hour, manually move the timeline slider to the desired time range.

When you double-click the timeline, it displays the timeline slider in a 1-hour time period. The entire window is refreshed, providing updates for that hour. Note that the timestamps next to each category (**Issues**, **Connectivity**, and so on) are also refreshed.

- **Events:** Event data is displayed as color-coded vertical bars on the graph. Green vertical bars indicate successful events and red vertical bars indicate events that failed.

Each vertical bar represents 5 minutes of time. Multiple significant events can be generated during each 5-minute window. Hover your cursor over the vertical bar to get more information about the events.

Step 7

You can view the device's health score in the **Device Details** area, below the timeline.

Note Devices in maintenance mode are not included in the calculation of a device's health score.

The details for the device's health score are as follows:

- **Switch:** The health score for switches is the minimum subscore of the following parameters: memory utilization, CPU utilization, link errors, link discards, uplink availability, and reachability to the control plane. In addition, for fabric devices, it includes fabric health. For more information, see [Switch Health Score, on page 25](#).

Note **Switches:** Uplink availability is based on infrastructure links.

Cisco StackWise Virtual: Uplink availability is based on infrastructure links, Cisco StackWise Virtual links (SVL), and Dual Active Detection (DAD) links. See [About Cisco StackWise Virtual and Its Limitations, on page 20](#).

Cisco StackWise: Uplink availability is based on infrastructure links and Cisco StackWise links. See [About Cisco StackWise and Its Limitations, on page 21](#).

- **Router:** The health score for routers is the minimum subscore of the following parameters: memory utilization, CPU utilization, link errors, link discards, uplink availability, and reachability to the control plane. For more information, see [Router Health Score, on page 26](#).

Note Uplink availability is based on infrastructure links.

- **AP:** The health score for APs is the minimum subscore of the following parameters: memory utilization, CPU utilization, link errors, radio utilization, interference, noise, and air quality. For more information, see [AP Health Score, on page 27](#).

- **Wireless Controller:** The health score for wireless controllers is the minimum subscore of the following parameters: memory utilization, free timers, free memory buffers (Mbufs), work queue element (WQE) pools, packet pools, and link errors. For fabric wireless controllers, it includes fabric health. For more information, see [Wireless Controller Health Score, on page 28](#).

The color of the health score represents its severity. The health is measured on a scale of 1 to 10, where 10 is the best score. A score of 0 indicates that data could not be obtained or the device is in maintenance mode.

- Critical issues. Health score range is 1 to 3.
- Warnings. Health score range is 4 to 7.
- No errors or warning. Health score range is 8 to 10.
- No data available (includes devices in maintenance mode). Health score is 0.

Step 8 Use the **Device Details** area, below the timeline, to view the most current information about the device, such as the building and floor where the device is located, the device model, IP address, software version installed on the device, device role, HA status, the IP address or MAC address, and the uptime.

Note For **Fabric**, the following elements are displayed in the device details area: **Fabric Role**, **Fabric Domain**, **Fabric Site**, **System Resources**, **Data Plane**, **Virtual Network**, and **Events**.

For **Cisco StackWise Virtual**, two additional elements are displayed: **Stack Status: StackWise Virtual** and **StackWise Virtual Domain**.

For **Cisco StackWise**, an additional **StackWise** element is displayed, along with the number of switches in the stack, such as **StackWise (2)**. A stack can contain a maximum of eight switches.

For **Mesh APs**, the following details are displayed in the device details area: **Mode**, **Mesh Role** and **RAP**.

For PoE-capable devices, the following elements are also displayed in the device details area: **IEEE Class**, **Negotiated Power Level**, and **PoE Status**.

Step 9 Click **View All Details** in the **Device Details** area to open a slide-in pane that displays additional attributes of a device, such as general information, network information, and rack location. Depending on the device type, additional device-specific details may be included.

Step 10 Use the **Issues** category to view issues that must be addressed.

Note When a device is in maintenance mode, it does not trigger any issues.

Issues are listed based on the timestamp. The most recent issue is listed first.

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.

From the slide-in pane, you can do the following:

- To resolve an issue:
 - a. From the drop-down list, choose **Resolve**.
 - b. Click **Resolved Issues** to view the issues that are resolved.
- To ignore an issue:
 - a. From the drop-down list, choose **Ignore**.
 - b. On the slider, set the number of hours to ignore the issue.
 - c. Click **Confirm**.
 - d. Click **Ignored Issues** to view the issues that have been ignored.

Step 11 Use the **Physical Neighbor Topology** category to view the topology of the device and how that device is connected to neighboring devices.


You can do the following:

- Click a node to display a slide-in pane that displays information about the node.
- Click a link between two devices to see the details about that specific link, such as the port/interface corresponding to the link, admin status, port mode, and so on.
- Hover your cursor over the link ends (dots) to see the status of the link.

- Hover your cursor over a group of devices and click **View Devices List** to view the list of devices and their details.
- In the Search field in the **Onboarding** area, you can search for a specific device. The specific node is selected, and the corresponding information about the device is displayed.

Note For AP 360, the 2-GHz and 5-GHz clients are displayed, and the dotted link lines going from these two clients are not clickable. Also, the link line between AP to wireless controller and wireless controller to AP is not clickable.

Note For an SD-Access Fabric, the fabric groups are displayed with a fabric badge icon.

Note The Cisco StackWise Virtual and Cisco StackWise are displayed with a stack icon (). Path Trace displays a switch icon if a Cisco StackWise Virtual or a Cisco StackWise is involved in that path.

Step 12 Use the **Event View** category to view an audit trail of events for the device. The Event Viewer table provides information about the issue such as the reason code and the time stamp when the event occurred. Click an event to view details about that event in the right pane.

- **For APs:** Lists scenarios and the sequence of subevents that led to each scenario. This allows you to pinpoint during which subevent an issue occurred. Radio resource management (RRM) events, such as Transmit Power Change, RF Channel Change, and Radio Reset, are displayed.
- **For Switches and Routers:** Displays all syslogs that have a severity of Critical and above (Emergency and Alert), events for any links that are up or down, and events for devices that are reachable or unreachable. Syslogs that are less severe than Critical level (Error, Warning, Notice, and Info) are also displayed. For more information, see [Selected Syslogs Below Critical Level for Switches and Routers, on page 18](#).
- **Wireless Controllers:** Lists wireless controller events. For Cisco AireOS devices, selected traps and syslogs are displayed. For Cisco IOS controllers, selected syslogs and events are displayed.

Step 13 Use the **Path Trace** category to run a path trace.

Click **Run New Path Trace** to display a network topology between a specified source device and a destination device. The topology includes the path's direction and the devices along the path, including their IP addresses. The display also shows the protocol of the devices along the path (**Switched, STP, ECMP, Routed, Trace Route**) or other source type.

See [Perform a Path Trace](#).

Step 14 Click the **Application Experience** category to view the running applications in your network.

To view the metrics in a chart format, click the radio button next to an application. A slide-in pane opens with the relevant information.

See [About Application Experience and Application Visibility](#) and [View Application Experience of a Host](#).

Note This category is displayed only for routers.

Step 15 Use the **Detail Information** category to view the device's historical KPIs performing over a period of time.

Click the following tabs to view the respective details:

Device Info Tab

Displays information about the device CPU, memory, uptime, temperature, and so on.

Note If there are multiple sensors for a wireless controller, the data reflects the latest maximum temperature of all sensors.

Note For network devices that are configured out of band, the uptime chart does not correlate correctly with the health score and other data. For example, the uptime chart for a 24-hour window shows that the device was down at 11:39 am and at 2:40 pm. Then, if you choose a 3-hour window, 11:00 am – 2:00 pm (in the timeline slider), the downtime is not displayed. This issue occurs because Cisco DNA Center is not able to receive the sys uptime information from the device. To work around this issue, synchronize the configuration between the device and Cisco DNA Center.

Connectivity Tab

Displays information about the health of a device's connection with the network. This tab is available for APs.

The Connectivity tab contains radio-specific KPIs, such as Radio 0, Radio 1, and Radio 2. Click the appropriate radio to view information such as Current Channel, Extended Channel(s), RF Profile, Band, Mode, and Current Channel Width. You can also view charts for Traffic, Client Count, and so on.

- **Traffic:** The traffic (in Mbps) for radios is displayed. The Rx (receiver) data packets and Tx (transmitter) data packets (in bytes) are shown as color-coded lines on the chart.
Hover your cursor over a time instance on the graph to view the amount of traffic (Rx or Tx) sent or received for a particular day and time.
- **Client Count:** The number of clients for radios is displayed. The client count is shown as color-coded lines on the chart.
Hover your cursor over a time instance on the graph to view the number of clients connected to an AP for a particular day and time.
- **Link Error:** To display information about interfaces, check the check boxes next to the interfaces on the right of the chart. Based on the interfaces you choose, the error percentage for each interface is displayed as color-coded lines on the chart.
Hover your cursor over a time instance on the graph to view the error percentage for a particular day and time. You can choose a maximum of five interfaces.
- **Ethernet Interface KPI:** The Ethernet interface KPIs contain interfaces such as GigabitEthernet0 and GigabitEthernet1. Click the appropriate interface to display the charts for Utilization, Error, and Rate. You can also view the total and average values for the KPIs aggregated for a time range selected on the top of AP 360.

Note A Connected Switch banner is displayed for interfaces connected with switches.

- **Retries:** The connection retries for radios are displayed in the retries chart.

Note Only infrastructure links are considered for link errors. Infrastructure links are topological links connecting network devices, such as switches, routers, wireless controllers, and APs.

Fabric Site Tab

This tab is available for SD-Access fabric.

Fabric KPIs are grouped under different categories: **Fabric Site Connectivity**, **Fabric Infrastructure**, and **Fabric Control Plane**. You can filter based on these categories to view the respective KPIs: **CP Reachability**, **LISP Session Status**, and **Pub-Sub Session Status for INFRA VN**. Based on the selection, view the table with reachability information, such as the destination, IP address, and type. Check the check box next to destination to view the control plane reachability status, lisp, and pubsub session status charts.

Note The uplink status chart shows data only if the Fabric Underlay Automation is used to provision the fabric.

Interfaces Tab

Contains information about the selected interface, such as the name, description, operational status, and link speed.

Use the PORT TYPE tabs to display information about a specific port type. The tabs that are displayed depend on the type of device selected:

- **Switches and Routers**: Displays **All**, **Access**, **Auto**, **Routed**, and **Trunk** port types.
- **Cisco StackWise Virtual**: Displays **All**, **Access**, **Auto**, **Routed**, **TrunkSVL**, and **DAD** port types.
- **Cisco StackWise**: Displays **All**, **Access**, **Auto**, **Routed**, **Trunk**, and **StackWisePort** port types.
- **Wireless Controller**: Displays **All**, **Ethernet**, and **Virtual** port types.

The table contains sortable columns. However, if you try to sort a column with a new parameter, the expanded interface list collapses.

Note For the **Link Speed** data column, the speed capacity of the interface or physical port is displayed. If the port has negotiated to a certain speed, that negotiated speed is displayed.

To display the operational status of the interfaces for a particular day and time in a chart format, check the check boxes next to the interfaces. You can choose a maximum of five interfaces. The first interface in the table is selected by default.

The **Interface Availability**, **Utilization**, **Error**, and **Link Discard** charts are displayed below the table.

Note For wireless controllers, link discard information is not provided in a separate chart. It is provided, along with other data, in a **Traffic Summary** table. Data in the **Traffic Summary** table is shown only for the physical and Ethernet interfaces of a wireless controller.

The **Tx Utilization** and **Rx Utilization** chart values are populated in **Percentage** and **Rate (bps)**. You can toggle between the Percentage and Rate to view the utilization values.

PoE Tab

This tab is available for PoE-capable switches and APs.

Displays the device's Power over Ethernet (PoE) telemetry.

Switches

The **POWER SUMMARY** section displays the switch's overall PoE telemetry:


- **Power Budget:** The overall power that the switch allocates for use with PoE-capable devices.
- **Used Power:** The power being supplied by the switch to PoE-capable devices.
- **Remaining Power:** The unused power available for use by PoE-capable devices.
- **Power Usage:** The percentage of power being supplied by the switch to PoE-capable devices. This value is equal to the value of the **Used Power** divided by the value of the **Power Budget**.

The **Power Stack** section lists the power stack devices connected to PoE, such as Power Stack Name, Stack Mode, Stack Topology, Allocated Power, Consumed Power, Remaining Power, and so on.

The **Module Power Details** section lists the components in the switch that supply power for PoE.

The **PoE Interfaces** section lists the PoE-capable devices connected to the switch's interfaces. At the top of the section is a count of interfaces that are currently off.

You can customize the table by doing the following:

- Use the **POE CONFIG**, **ADMIN STATUS**, and **POE OPER STATUS (SIGNAL PAIR)** filters above the table to filter the interfaces.
- Use the search bar to perform searches for specific interfaces, PoE-capable devices, or any other values.
- Click  to open a menu where you can add and remove columns for specific data types.

APs

The **Detail Information** section displays the AP's PoE telemetry: IEEE PD Class, Power Level, PoE Admin Status, PoE Oper Status, PoE Policing Status, Switch Name, Interface Name, Allocated Power, Consumed Power, Max Power Drawn, PoE Priority, PoE Configuration, and Perpetual PoE.

The **Power Distribution** section displays a trend chart of the power distribution (allocated and consumed power) for the selected time range.

StackWise Tab

This tab is available for Cisco StackWise.

Displays information about the Cisco StackWise, such as the serial number, product ID, MAC address, role, state, priority, and the neighboring switch number.

StackWise Virtual Tab

This tab is available for Cisco StackWise Virtual.

Displays information about the Cisco StackWise Virtual, such as the serial number, product ID, MAC address, role, state, priority, uptime, and port numbers.

RF Tab

This tab is available for APs and wireless clients.

- The RF tab contains radio-specific KPIs, such as Radio 0, Radio 1, and Radio 2. Click the appropriate radio tab to display charts for radio channel utilization, traffic utilization, interference, noise, air quality, air-time efficiency, wireless latency by client distribution, Tx power, channel information, and so on.

Note RF Tab Limitation

When an AP with three radios (for example, a Cisco Catalyst 9130 AP) connects to a wireless controller running 17.2 or later, the device supports all three radios, and three radios (Radio 0, Radio 1, and Radio 2) are displayed under the RF tab.

When that same AP connects to a wireless controller running version 17.1 or older, the device supports two radios, and two radios (Radio 0 and Radio 1) are displayed under the RF tab.

However, if an AP moves from a wireless controller running a newer version to one running an older version (17.2+ > 17.1), the RF tab continues to display the three radios (Radio 0, Radio 1, and Radio 2) that were initially detected.

- For AP 5-GHz radios, a DFS tab provides information about Dynamic Frequency Selection (DFS) radar events.
- For AP 360, the RF tab contains the **Neighbors and Rogues** tab. It contains **Band** (2-GHz and 5-GHz radio frequencies), **Type** (All, Neighbor, Rogue), and **RSSI Range** (0 to -100 dBm) filters. Depending on the filter selection, the AP table is refreshed.

AP table data contains Identifier, Radio, RSSI (dBm), Channel, Type, SSID, Client Count, and Tx Power (dBm). Use the search bar to find AP devices, radios, or any other values.

Click  to open a menu where you can use **Edit Table Column** to enable or disable specific columns.

Click **Export** to export the table data to a CSV file.

- Depending on the filter selection, the Wi-Fi analyzer graph is displayed below the table. The Wi-Fi graph summarizes the total and average values for the KPIs aggregated for a time range selected on the top of the AP 360 timeline slider.

Check the check boxes next to the APs to view the Wi-Fi analyzer graph for the specific AP. Hover your cursor over the chart to view details.

Click the **Chart Setting** icon to enable or disable the **Access Point Label**, which is shown in the graph for each AP.

Virtual Network Tab

This tab is available for SD-Access fabric.

The KPIs are grouped under the **VN Services** and **Fabric Control plane** categories. You can select the category to view the **Multicast (external RP)** and **Pub-Sub Session Status** KPIs. You can filter the categories to display the table with reachability information, such as the destination, IP address, and type. Check the check box next to destination to view the control plane reachability status, lisp and pubsub session status charts.

Transits and Peers Network Tab

This tab is available for SD-Access fabric.

The **Transits and Peers Network** tab contains these **Transit Site Control Plane** KPIs: **LISP Session from Border to Transit Site Control Plane** and **Pub-Sub Session from Border to Transit Site Control Plane**. Check the appropriate KPI check box to display the charts and table with reachability information, such as the destination, IP address, and type.

Mesh Tab

This tab is available for Mesh APs.

The **Mesh** tab shows a device's mesh role, mesh profile, downstream MAPs, mesh backhaul channel, hops to RAP, bridge group name, and backhaul interface.

It also provides the following radio-specific KPIs: **Current Channel**, **Extended Channel(s)**, **Mode**, **RF Profile**, **Band**, **Tx Power**, **Clean Air Status**, **Admin State**, and **Current Channel Width**.

- Step 16** To compare the health of AP radios across the floor in a building, click the toggle button in the top-right corner to switch between **Detail View** and **Map and Comparison View**.
- Map and Comparison View** displays a floor map with the AP radios placed on it.
- Step 17** From the **View Floor** drop-down list, choose the floor on which you want to compare the AP radios.
- Hover your cursor over the AP icon on the floor map to view the device details of an AP radio, such as **MAC Address**, **Model**, **Mode**, and **Issue Count**.
- Step 18** Click **Compare AP Radios** to compare the AP radios on the floor map.
- The **Map View** appears by default, showing the last 5 minutes of AP radio data.
- Step 19** Click the AP icon on the floor map.
- A dialog box appears to select or deselect the radios for comparison.
- Step 20** Check the check boxes next to the list of radios that you want to compare on a floor.
- Note**
- By default, Cisco DNA Center selects the current AP for comparison only if the first radio of the respective AP is in monitor mode.
 - **Local**, **Remote**, and **Hybrid** modes are the only AP radio modes enabled for comparison.
 - You can select up to five AP radios at a time for comparison.
- Step 21** Use **AP Radio Comparison** to view the list of AP radios selected for comparison.
- You can compare **Radio**, **IP Address**, **Model**, **Uptime**, **Connected to WLC**, and **Floor**.
- Step 22** Use **Comparative Metrics** to view the comparative metrics for the selected KPIs.
- Step 23** From the **Select KPI** drop-down list, choose the KPIs for which you want to see the comparative matrices.
- You can select from the following KPIs:
- Channel Information
 - Throughput (Rx Rate)

- Radio Retries
- Interference
- Air Quality
- Management Frames
- Tx Errors
- Tx Power
- Traffic Utilization
- Tx Traffic Utilization
- Throughput (Tx Rate)
- Connected Client Count
- Channel Utilization
- Noise
- Wireless Latency
- Data Frames
- Rx Errors
- Multicast Counter
- Rx Traffic Utilization

Step 24 Click the toggle button to switch between **Map View** and **Table View**.

The **Access Point Radios** table view lists the AP radios.

Step 25 Check the check box next to the AP radios that you want to compare on a floor map.

Step 26 To remove all radios from the comparison in the **AP Radio Comparison** area, click **Clear Selection**.

Step 27 Click **Exit Comparison** to exit.

Selected Syslogs Below Critical Level for Switches and Routers

The following tables provide the selected list of syslog messages, less than Critical level (Error, Warning, Notice, and Info), that are displayed in the **Event Viewer** from the **Device 360** window:

Protocol Events	Layer 2 Events
OSPF-5-ADJCHG	SW_MATM-4-MACFLAP_NOTIF
IFDAMP-5-UPDOWN	MAC_LIMIT-4-PORT_EXCEED
BGP-5-ADJCHANGE	MAC_LIMIT-4-VLAN_EXCEED
DUAL-5-NBRCHANGE	IGMP-6-IGMP_GROUP_LIMIT
BGP-5-ADJCHANGE-bfd	SPANNTREE-5-ROOTCHANGE
CLNS-5-ADJCHANGE	UDLD-4-UDLD_PORT_DISABLED
LDP-5-NBRCHG-TDP	PM-4-ERR_DISABLE
LDP-5-NBRCHG-LDP	CDP-4-DUPLEX_MISMATCH
CDP-4-NATIVE_VLAN_MISMATCH	LINK-5-CHANGED
LISP-4-LOCAL_EID_RLOC_INCONSISTENCY	PORT-5-IF_DOWN
LISP-4-LOCAL_EID_NO_ROUTE	PORT-5-IF_UP
LISP-4-CEF_DISABLED	
LISP-4-LOCAL_EID_MAP_REGISTER_FAILURE	
LISP-4-MAP_CACHE_WARNING_THRESHOLD_REACHED	

Hardware Platform Events

```

SYS-5-CONFIG_I
SYS-5-RELOAD
SYS-5-RESTART
OIR-6-INSCARD
OIR-6-REMCARD
OIR-SP-6-INSCARD
OIR-SP-6-REMCARD
PLATFORM_STACKPOWER-6-CABLE_EVENT
PLATFORM_STACKPOWER-6-LINK_EVENT
PLATFORM_STACKPOWER-4-TOO_MANY_ERRORS
PLATFORM_STACKPOWER-4-VERSION_MISMATCH
PLATFORM_STACKPOWER-4-UNDER_BUDGET
PLATFORM_STACKPOWER-4-INSUFFICIENT_PWR
PLATFORM_STACKPOWER-4-REDUNDANCY_LOSS
ILPOWER-5-POWER_GRANTED
ILPOWER-5-LINKDOWN_DISCONNECT
ILPOWER-5-IEEE_DISCONNECT
ILPOWER-5-INVALID_IEEE_CLASS
ILPOWER-4-LOG_OVERDRAWN
ILPOWER-5-CLR_OVERDRAWN

```

About Cisco StackWise Virtual and Its Limitations

Cisco StackWise Virtual is a network system visualization technology that allows two physical switches to operate as a single logical virtual switch using a 40-G or 10-G Ethernet connection.

Supported Devices for StackWise Virtual

The following table lists the Cisco Catalyst Switches that support StackWise Virtual:

Device	Minimum Supported IOS-XE Software Version
Cisco Catalyst 9300 Series Switches	16.11+
Cisco Catalyst 9400 Series Switches	16.11+
Cisco Catalyst 9500 Series Switches	16.11+

StackWise Virtual Limitations

Cisco StackWise Virtual has the following known limitations:

- After you have configured Cisco StackWise Virtual, the second switch still appears in the inventory, and stops responding because it does not have its own IP address. As a workaround, do the following:
 1. Delete both the switches from the inventory. See [Delete a Network Device](#).
 2. Configure StackWise Virtual. (Configure the two switches into one virtual switch.)
 3. Discover the devices. See [Discover Your Network Using an IP Address Range](#), [Discover Your Network Using CDP](#), or [Discover Your Network Using LLDP](#).



Note After StackWise Virtual is discovered, one switch plays the active role, while the other a standby role. Both switches in the stack get associated with one primary management IP address.

- After you remove Cisco StackWise Virtual, the two switches are independent. They both have the same IP address and operate in Dual Active Detection (DAD) state. As a workaround, do the following:
 1. Configure a different IP address on the second switch.
 2. Rediscover the devices. See [Discover Your Network Using an IP Address Range](#), [Discover Your Network Using CDP](#), or [Discover Your Network Using LLDP](#).

About Cisco StackWise and Its Limitations

The Cisco StackWise technology provides an innovative new method for collectively utilizing the capabilities of a stack of switches. Individual switches intelligently join to create a single switching unit with a 32-Gbps switching backplane. Configuration and routing information is shared by every switch in the stack, creating a single switching unit.

Supported Devices for Cisco StackWise

The following devices support Cisco StackWise:

- Cisco Catalyst 3650 Series Switches
- Cisco Catalyst 3850 Series Switches
- Cisco Catalyst 9300 Series Switches


Cisco StackWise Limitations

Cisco StackWise has the following known limitations:


- Ring status is not displayed in the **Device 360** header.
- Link Speed information is not provided in the **Detail Information > Interfaces** tab.

Configure Health Score Settings for Network Devices

Use this procedure to configure the health score settings for network devices. You can customize the health score calculation for network devices by changing the KPI thresholds and specifying the KPIs that are included for the calculation.


-
- Step 1** Click the menu icon () and choose **Assurance > Manage > Health Score Settings**.
The **Health Score** window appears.
- Step 2** Click the tab of the network device category to customize its health score calculation settings.
The tab displays the KPIs that affect the network device type's health score calculation.
- Step 3** From the **KPI Name** column, click the KPI name link.
The slide-in pane for the KPI appears.
- Step 4** Configure the KPI health score settings:
- If the KPI threshold is quantitative, you can customize the threshold value for what is considered a good health score.
 - To Sync or Unsync the common KPI threshold between the health and issues settings, use the Synced toggle button. The sync works vice-versa when it is synced from health or issue settings page.
 - To remove the KPI from the health score calculation, uncheck the **Included in Device health Score** check box.
- Note** A network device's health score is the lowest score from all its included KPI scores.

Restriction At least one KPI must be included for the health score calculation.

Attention When viewing the KPI health scores for a network device, excluded KPIs display a NA instead of a health score.
- To restore the default settings, hover your cursor over **View Default Setting** and click  **Use Default**.
- Step 5** Click **Apply**.
A confirmation dialog box is displayed.
-

Enable SNMP Collector Metrics for Fabric Devices

For the health score to populate correctly for fabric devices, you must enable the SNMP Collector metrics.

-
- Step 1** Click the menu icon () and choose **System > Data Platform**.
- Step 2** Click **Collectors**.
A list of collectors is displayed.
- Step 3** Click **COLLECTOR-SNMP**.

The **COLLECTOR-SNMP** window opens.

Step 4 Click **+ Add**.

The **SNMP Configuration** dialog box opens.

Step 5 Check the check boxes adjacent to all the metrics except QOS.

Figure 3: SNMP Configuration

Step 6 In the **Configuration Name** field, enter a unique name for the SNMP configuration.

Step 7 Click **Save Configuration**.

Understand Network Health Score and KPI Metrics

This section provides information about how the network health scores and KPI metrics are computed.

Network Health Score

The Network Health score is a percentage of the number of healthy network devices (a health score from 8 to 10) divided by the total number of network devices. The score is calculated every 5 minutes.

For example:

90% (health score) = 90 (network devices with health score from 8 to 10) ÷ 100 (total number of network devices)

Device Category Health Score

The Device Category Health score (Access, Core, Distribution, Router, Wireless) is the percentage of the number of healthy network devices (a health score from 8 to 10) in a target category, divided by the total number of network devices in that category. The score is calculated every 5 minutes.

For example:

90% (health score) = 90 (network devices in a target category with health score from 8 to 10) ÷ 100 (network devices in that category)

Individual Device Health Score

The Individual Device Health score is the minimum score of following KPI metric health scores: System Health, Data Plane Connectivity, and Control Plane Connectivity. The KPI metric score is based on the threshold that is defined per KPI.

Device Health Score = MIN (System Health, Data Plane Connectivity, Control Plane Connectivity)

Depending on the type of device, the metrics vary.

System Health	
Device Type	Description
Switch (Access and Distribution)	Includes system-monitoring metrics, such as CPU utilization and memory utilization.
Wireless	Includes the following system-monitoring metrics: <ul style="list-style-type: none"> • For wireless controllers, it includes memory utilization, free timers, and free Mbufs. • For AP, it includes CPU utilization and memory utilization.
Router	Includes system-monitoring metrics, such as CPU utilization and memory utilization.

System Health	
Device Type	Description
Fabric	Includes system-monitoring metrics, such as CPU utilization and memory utilization.
Data Plane Connectivity	
Device Type	Description
Switch (Access and Distribution)	Includes metrics, such as link errors and link status. For switches, the Inter-device Link Availability metric counts physical stack ports, network device-connected links, and fabric edge-facing port channels.
Wireless	Includes the following metrics: <ul style="list-style-type: none"> • For wireless controllers, it includes metrics, such as WQE pool, packet pools, and link errors. • For AP, it includes RF metrics, such as interface, noise, air quality, and radio utilization.
Router	Includes metrics, such as link errors.
Control Plane Connectivity	
Device Type	Description
Wireless	Includes the following KPIs: <ul style="list-style-type: none"> • For wireless controllers, it includes connectivity to the Control Plane node servers. • For fabric devices, it includes metrics, such as connectivity to the Control Plane node.

Switch Health Score

The Switch Health score is the minimum subscore of the following parameters:

Parameter	Score Calculation
CPU Utilization	<ul style="list-style-type: none"> • If CPU utilization is 95 percent or less, the score is 10. • If CPU utilization is more than 95 percent, the score is 1.
Memory Utilization	<ul style="list-style-type: none"> • If memory utilization is 95 percent or less, the score is 10. • If memory utilization is more than 95 percent, the score is 1.

Parameter	Score Calculation
Link Errors (Rx and Tx)	<p>Only infrastructure links are considered for link errors. Infrastructure links are topological links between network devices, such as switches, routers, wireless controllers, and APs.</p> <p>If a physical infrastructure interface has errors, the score is 8, if all links are down, it is 1, otherwise it is 10.</p>
Link Discards	<p>Only infrastructure links are considered for link discards. Infrastructure links are topological links between network devices, such as switches, routers, wireless controllers, and APs.</p> <p>If a physical infra link has packet drops (discards), the score is 8, if all links encounter discards, it is 1, otherwise it is 10.</p>
Link Status	<p>Only infrastructure links are considered for link status UP/DOWN. Infrastructure links are topological links between network devices, such as switches, routers, wireless controllers, and APs.</p> <p>If a physical infrastructure interface is down, the score is 8, if all interfaces are down, it is 1, otherwise it is 10.</p>
Connection to Control Plane Node—Fabric Devices Only (Edge and Border)	<ul style="list-style-type: none"> • If the Control Plane node is reachable, the score is 10. • If the Control Plane node is unreachable, the score is 1. <p>Note If there is more than 1 Control Plane node in a fabric network, and all the Control Plane nodes are reachable, the score is 10; otherwise, the score is 1.</p> <p>Note For the health score to populate correctly for fabric devices, enable SNMP Collector metrics. See Enable SNMP Collector Metrics for Fabric Devices, on page 22.</p>

Router Health Score

The Router Health score is the minimum subscore of the following parameters:

Parameter	Score Calculation
CPU Utilization	<ul style="list-style-type: none"> • If CPU utilization is 95 percent or less, the score is 10. • If CPU utilization is more than 95 percent, the score is 1.
Memory Utilization	<ul style="list-style-type: none"> • If memory utilization is 95 percent or less, the score is 10. • If memory utilization is more than 95 percent, the score is 1.
WAN Connectivity	<ul style="list-style-type: none"> • If the WAN connectivity is down, the score is 1. • If the WAN connectivity is up, the score is 10.

Parameter	Score Calculation
Link Errors	<p>Only infrastructure links are considered for link errors. Infrastructure links are topological links between network devices, such as switches, routers, wireless controllers, and APs.</p> <p>If a physical infrastructure interface has errors, the score is 8, if all links are down, it is 1, otherwise it is 10.</p>
Link Discards	<p>Only infrastructure links are considered for link discards. Infrastructure links are topological links between network devices, such as switches, routers, wireless controllers, and APs.</p> <p>If a physical infra link has packet drops (discards), the score is 8, if all links encounter discards, it is 1, otherwise it is 10.</p>

AP Health Score

The AP Health score is the minimum subscore of the following parameters:

Parameter	Score Calculation
CPU Utilization	<ul style="list-style-type: none"> • If CPU utilization is 90 percent or less, the score is 10. • If CPU utilization is more than 90 percent, the score is 1.
Memory Utilization	<ul style="list-style-type: none"> • If memory utilization is less than 90 percent, the score is 10. • If available memory is 90 percent or more, the score is 1.
Radio Utilization Score	<p>The score is calculated individually for each radio, and then the average radio score is determined.</p> <ul style="list-style-type: none"> • If radio utilization is less than 70 percent, the score is 10. • If radio utilization is 70 percent or more, the score is 1.
Interference Score	<p>The score is calculated individually for each radio, and then the average radio score is determined.</p> <p>For 2.4-GHz radio:</p> <ul style="list-style-type: none"> • If interference is less than or equal to 50 percent, the score is 10. • If interference is more than 50 percent, the score is 1. <p>For 5-GHz radio:</p> <ul style="list-style-type: none"> • If interference is less than or equal to 20 percent, the score 10. • If interference is more than 20 percent, the score is 1.

Parameter	Score Calculation
RF Noise Score	<p>The score is calculated individually for each radio, and then the average radio score is determined.</p> <p>For 2.4-GHz radio:</p> <ul style="list-style-type: none"> • If RF noise is less than -81dBm, the score is 10. • If RF noise is -81dBm or more, the score is 1. <p>For 5-GHz radio:</p> <ul style="list-style-type: none"> • If RF noise is less than -83dBm, the score is 10. • If RF noise is -83dBm or more, the score is 1.
Air Quality Score	<p>The score is calculated individually for each radio, and then the average radio the score is determined.</p> <p>For 2.4-GHz radio:</p> <ul style="list-style-type: none"> • If air quality is 60 percent or more, the score is 10. • If air quality is less than 60 percent, the score is 1. <p>For 5-GHz radio:</p> <ul style="list-style-type: none"> • If air quality is 75 percent or more, the score is 10. • If air quality is less than 75 percent, the score is 1.

Wireless Controller Health Score

The Wireless Controller Health score is the minimum subscore of the following parameters:

Parameter	Score Calculation
Memory Utilization	<ul style="list-style-type: none"> • If memory utilization is less than 90 percent, the score is 10. • If the available memory is 90 percent or more, the score is 1.
Free Timer Score	<ul style="list-style-type: none"> • If the number of free timers is 20 percent or more, the score is 10. • If the number of free timers is 20 percent or less, the score is 1.
Free Memory Buffers (MBufs)	<ul style="list-style-type: none"> • If the number of free memory buffer is 20 percent or more, the score is 10. • If the number of free memory buffer is less than 20 percent, the score is 1.

Parameter	Score Calculation
Work Queue Element (WQE) Pool Score	<ul style="list-style-type: none"> • If the wqe pool is greater than wqe pool threshold, the score is 10. • If the wqe pool is at the same level as or lower than the wqe pool threshold, the score is 1.
Packet Pools	<ul style="list-style-type: none"> • If the packet pool is greater than the packet pool threshold, the score is 10. • If the packet pool is at the same level as or lower than the packet pool threshold, the score is 1.
Link Errors	<ul style="list-style-type: none"> • If link errors are less than 1 percent, the score is 10. • If link errors are 1 percent or more, the score is 1.
Connection to Control Plane Node—Fabric Wireless Controllers Only	<ul style="list-style-type: none"> • If the Control Plane node is reachable, the score is good. • If the Control Plane node is unreachable, the score is poor. <p>Note If there is more than 1 Control Plane node in a fabric network, and all the Control Plane nodes are reachable, the score is 10; otherwise, the score is 1.</p>

Effects of Maintenance Mode on Network Health Scores and KPI Metrics

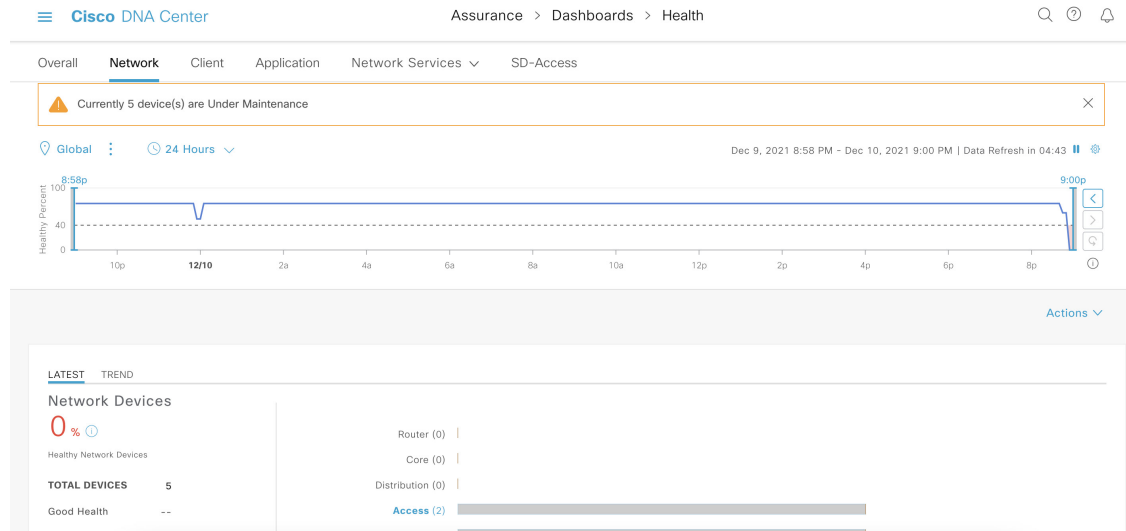
When a network device (router, switch, wireless controller, or access point) is placed in maintenance mode, its clients are also placed in maintenance mode. For example, when you place a Cisco Wireless Controller in maintenance mode, any APs associated with the wireless controller are also placed in maintenance mode. Cisco DNA Center treats all devices in maintenance mode the same, regardless of whether a device was placed in maintenance mode as an administrative action or as a result of its association with a device.

Network health scores and KPI metrics do not include network devices that are in maintenance mode, because while a network device is in maintenance mode, Cisco DNA Center does not perform the following tasks for the device:

- Gather health data.
- Collect interface statistics.
- Trigger issues.
- Include the device in calculating health scores, such as site health scores.

When you access network health scores and KPI metrics while a device is in maintenance mode, Cisco DNA Center displays a banner indicating that a device is in maintenance mode. In addition, start and end times of the maintenance window are indicated in the device 360 pages and logged as events in the system status log. The dashboards allow you to filter by devices that are in maintenance mode.

Figure 4: Device 360 Page With Maintenance Banner



Cisco DNA Center continues to perform the following tasks for a device that is in maintenance mode:

- Relevant events are still generated and can be displayed in the event viewer during maintenance mode.
- Maintenance-related operations, such as image upgraded, bulk provisioning, and so on still trigger events.
- The availability report in Assurance is not impacted.
- Topology is not impacted.