Observe Network Trends and Gain Insights

About Network Trends and Insights

Cisco AI Network Analytics uses machine learning algorithms and AI techniques to provide the following:

- **Trends and Insights**: Determine global patterns (trends) and deviations to provide system-generated insights.
- **Comparative Analytics**, which includes:
  - **AI-Driven AP Comparisons in Network Heatmaps**: Compare all of the APs in your network for a given month in a heatmap to spot trends and gain insights.
  - **AI-Driven Peer Comparisons**: Determine how your network is performing in comparison to your peer networks for a selected Key Performance Indicator (KPI).
  - **AI-Driven Network Comparisons**: View, compare, and identify performance improvement opportunities for objects in your network (buildings, AP model families, wireless endpoints) across selected KPIs.

Note Cisco AI Network Analytics use cases that involve throughput on the Catalyst 9800 Series Wireless Controller are not supported.

View Network Trends and Obtain Insights

Trends are long-term evolutions of behavior in your network observed over a time period. These trends provide insights about the performance of your network (represented in beeswarm charts). The following types of insights are provided:

- **Intra-Site**: Cisco AI Network Analytics looks into a single site or building and highlights the outlier device only within that building. In this case, the entity in the beeswarm chart is a radio and it is represented by a circle.
- **Inter-Site**: Cisco AI Network Analytics looks at the global network and identifies an outlier building with respect to the selected KPI. In this case, the entity in the beeswarm chart is a building and it is represented by a polygon.

Use this procedure to view trends in your network.

Step 1 In the Cisco DNA Center GUI, click the **Menu** icon (☰) and choose **Assurance** > **Network Insights**.

The **Network Insights** window appears with filters: **Capacity**, **Coverage**, and **Throughput**. Click the appropriate filter to refresh the data in the table. The Capacity filter is selected by default with the following information:

Note The filters are dynamic. If there are no insights available for a filter, that filter is not displayed.

Insights Table	
Item	**Description**
Occurrence	Time duration when this trend was observed. For example, May 27 - June 03 2019.
Insight	List of all the AI-Driven insights that were observed during a specific time period.
Category	Category under which the insight was observed. Can be one of the following: **Capacity**, **Coverage**, and **Throughput**.
Frequency band	Band frequency that was used on the AP on which the insight was observed. Can be **2.4 GHz**, **5 GHz**, or both band frequencies.
KPI	Key Performance Indicator (KPI) for that specific insight.
⋮ icon	Allows you to customize the columns that you want displayed in the Insights table. Click the ⋮ icon, uncheck the check box for the column that you do not want displayed, and then click **Apply**.

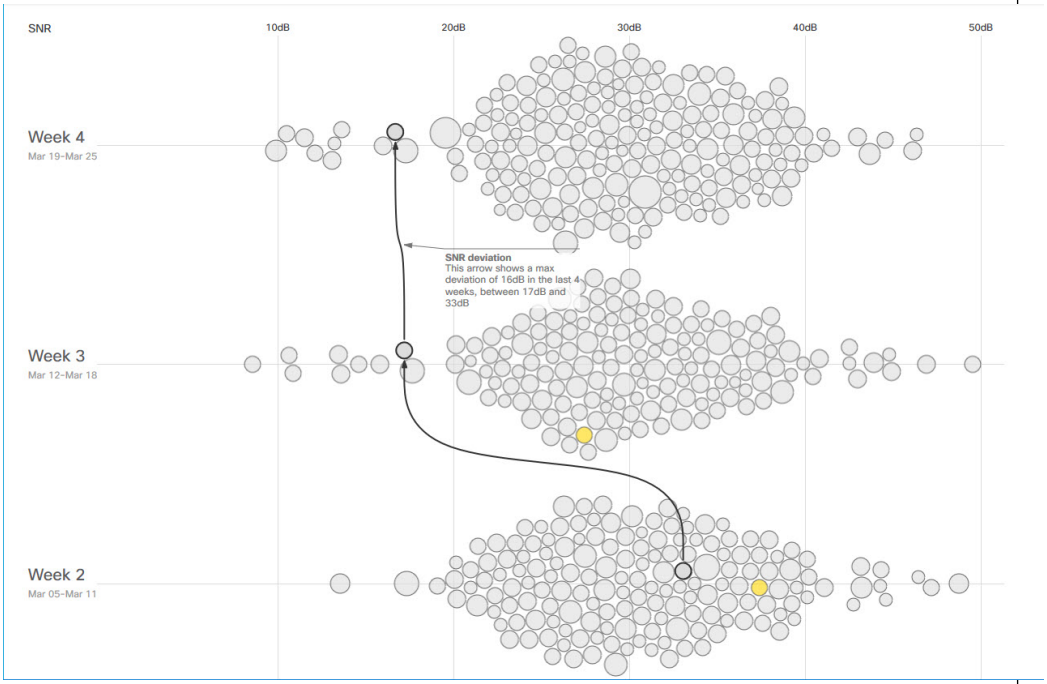
Step 2 From the **Insight** column, click an insight to open a slide-in pane, which provides the following information:

Insight Details Slide-In Pane	
Item	**Description**
Cisco AI	Provides information about how the insights are computed. Click Learn More to get an overview of Artificial Intelligent.
Insight Summary	A brief summary about the trend that is observed in the Beeswarm chart below. The summary provides information such as the name of the Site or AP, client count, the radio band frequency, and the time period during which the deviation was observed.
Weekly Client Load	Client load per week.

Insight Details Slide-In Pane	
Item	**Description**

Troubleshoot	Provides links that allow you to troubleshoot and fix the trend before it becomes a critical issue:
	• **Network Heatmap** opens the heatmap and provides information about the AP or building that is highlighted in the Beeswarm chart. The heatmap that displays is for the specific month in which the trend was observed.
	  • **Intra-Site**: The heatmap launches with the specific AP highlighted and prioritized in the list.
	  • **Inter-Site**: The heatmap launches with the filtered view of the APs in the building (site).
	• ***AP_Name*** opens the **Device 360** page for that AP.

Issue Count	Issue count gradient.

Insight Details Slide-In Pane	
Item	**Description**
Chart	Beeswarm chart displays the performance of the client devices in your network in a 4-week time period as shown in the following figure. The bottom of the chart represents week-1 and the top of the chart represents week-4. If there is a systematic deviation of network behavior over a time period, that trend is displayed by arrows in the chart. ***Figure 1: Beeswarm Chart***  **Note** • Each circle in the Beeswarm chart represents the following: • **Intra-Site**: The circle represents a radio. • **Inter-Site**: The polygon represents a building. • The size of the circle represents the number of clients in the AP. A small circle has a lower client count and the large circle has a higher client count.

Step 3 Hover your cursor over a circle in the chart to get information, such as the name and MAC address of the AP, the band frequency, the AP group, the location of the AP, issue count, client count, and the KPI value.

Note For Global sites, when you hover your cursor over a circle in the chart, you will see information, such as the building in which the trend was observed and the client count.

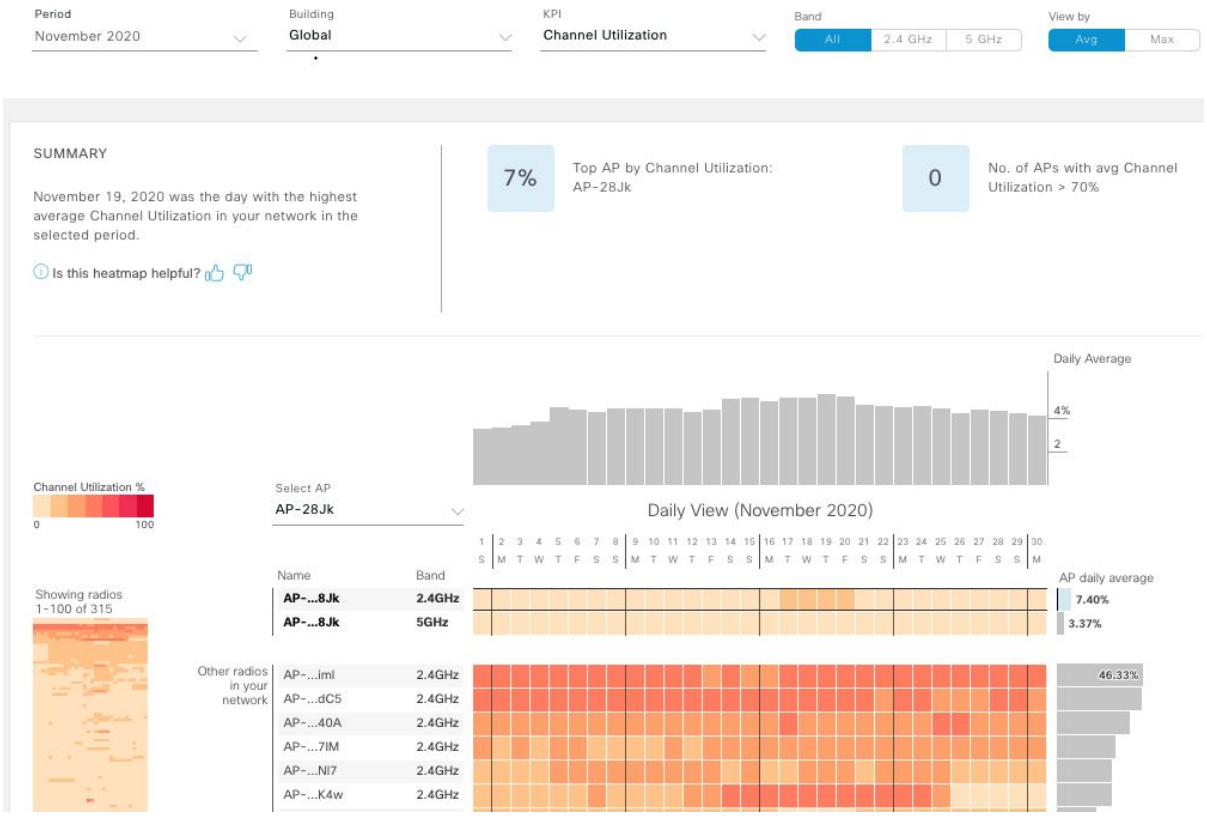
Compare Access Points in Network Heatmaps

Use this procedure to visually compare all of the APs in your network for a given month in a heatmap to spot trends and gain insights. You can choose to compare APs across different KPIs and band frequencies. The insights you gain provide information about the most congested KPIs, the most congested APs, and within those APs, which APs are being used. This information allows you to further drill down to the site or building in which the trend has been observed. After you have pinpointed your AP or a group of APs, you can determine how those APs are behaving historically: per day, per week, and during the entire month.

Step 1 In the Cisco DNA Center GUI, click the **Menu** icon (☰) and choose **Assurance** > **Network Heatmap**.

The **Network Heatmap** window appears with the following information:

Figure 2: Network Heatmap Window



Network Heatmap Window	
Item	**Description**
Period	Displays information in the heatmap for the month you choose from the drop-down list.
Building	Displays information in the heatmap for your entire global network or for a specific site and building that you choose from the drop-down list. Default is **Global**.

Network Heatmap Window	
Item	**Description**
KPI drop-down list	Displays information in the heatmap for the KPI you choose from the drop-down list. Default is **Client Count**.
Band	Displays information in the heatmap for the band frequency you choose. Options are: **All**, **2.4 GHz**, and **5 GHz**. Default is **All**.
View By	Allows you to view the information in the heatmap based on the option you choose. Based on the KPI you choose, the options displayed in the **View By** list vary. Some KPIs allow you to sort by **Avg**, **Min**, or **Max**, some by **Avg** or **Max**, while other KPIs do not provide any options.
Summary area	Displays a summary of the insight gained from the heatmap analysis. Provides the following type of information: • The day of the month that was the busiest. • Number of APs that had no clients per radio. • Number of APs that had more than 50 clients per radio.
Feedback icon	Click the  icon to provide your comments on whether the information on this page was helpful, and then click **Submit**.
KPI gradient	Depending on the KPI you choose from the KPI drop-down list, this area provides information about the performance of that KPI in a color gradient. The darker color block indicates a significant KPI score. For example, a lower RSSI score is more significant than a higher RSSI score. A higher client count score is more significant than a lower client count score.
Search AP drop-down list	Allows you to search and select an AP. Do the following: **a.** Click the **Search AP** drop-down list, and then enter the AP name in the search filter. The AP that you searched for is highlighted in the drop-down list. **b.** Click that highlighted AP to select it. The heatmap for individual radios of the AP is displayed separately on the heatmap.
Network Daily Avg, **Min**, or **Max** graph	Depending on what you have chose in the **View By** options, the appropriate graph is displayed If you chose **Avg**, the graph shows the daily average value and highlights the highest daily average. If you chose **Min** or **Max**, the graph shows minimum or maximum daily value, and highlights accordingly. Hover your cursor over the bar on the graph to view the KPI value for each day.

Network Heatmap Window	
Item	**Description**
Showing Radios heatmap	Provides a compressed view of the heatmap. By default, this area displays the heatmap for the first 100 radios. To view the heatmap data for additional radios, scroll down to the bottom of the compressed heatmap, and then choose the appropriate option from the drop-down list.
AP Heatmap area	Contains the following: • **Radios in Your Network**: Displays the name of the AP and the band frequency that was used by the client. Click on the icon next to the AP to open the **Device 360** page for that AP. Depending on the band frequency you choose from the **Band** options, this area lists the APs in the corresponding chosen band. • **AP Heatmap**: Allows you to determine how the APs are behaving historically: per hour, per day, per week, and during the entire month. The intensity of the color in the blocks indicates its significance. The darker color block is more significant than the lighter color block. Each row in the heatmap represents one AP. Hover your cursor over a color block in the **Heatmap** to get information, such as the name and MAC address of the AP, the band frequency, the location of the AP, and the daily average KPI score. • **AP Daily Average** or **AP Daily Max**: Depending on what you choose in the **Sort By** option, this area displays the average KPI score or the max KPI score for each AP during the month. The AP with the highest score is listed on top. Hover your cursor over the **AP Daily Average** or the **AP Daily Max** area to determine the average or max KPI value for an AP during the month.

Step 2 To view the heatmap data for additional radios, scroll down to the bottom of the window, and then choose the appropriate option from the drop-down list.

Compare KPI Values with Peers in Your Network

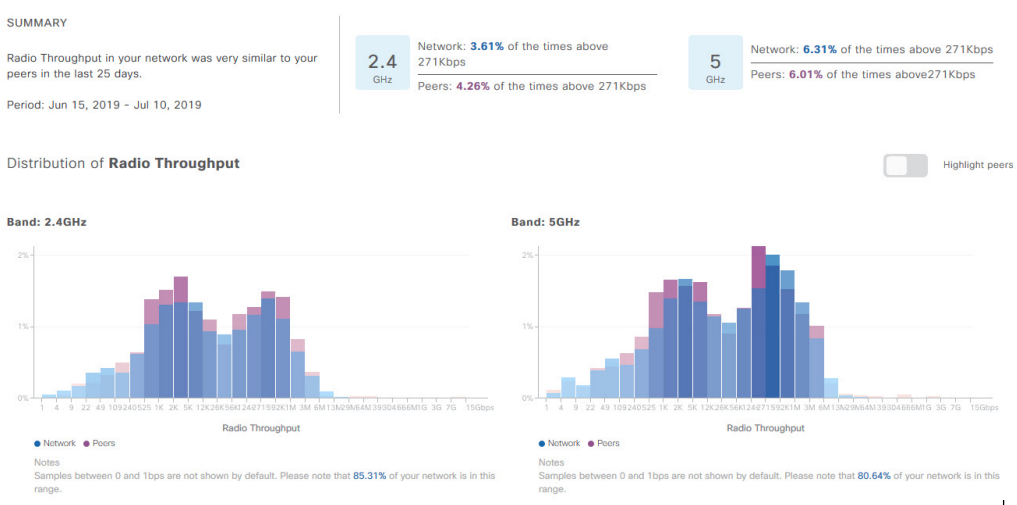
Use this procedure to determine how your network is performing in comparison to your peer networks for a selected Key Performance Indicators (KPI).

Note The peer networks that are used for comparison of similar network size.

Peer comparison uses a couple of months data from the date of onboarding for computations.

Step 1 In the Cisco DNA Center GUI, click the **Menu** icon (≡) and choose **Assurance** > **Peer Comparison**.

The **Peer Comparison** window appears with the following information:

Peer Comparison Window	
Item	**Description**
KPI drop-down list	Choose a KPI from the drop-down list. Options are: **Radio Throughput**, **Cloud Apps Throughput**, **Radio Resets**, **Packet Failure Rate**, **Interference**, and **RSSI**. Default is **Radio Throughput**.
Show	Choose the day for which you want to compare the KPI values between your network and your peer networks. Default is **All**.
Summary	AI Network Analytics analyzes the bar graphs and provides a brief summary about the findings. Provides the following information: • **2.4 GHz**: Summary of the Network and Peer values for the 2.4 GHz band frequency. • **5 GHz**: Summary of the Network and Peer values for the 5 GHz band frequency.
Highlight Peers toggle button	Allows you to toggle between your network and the peer network graphs.
Peer Comparison Bar Graph	By default, highlights the KPI values for your network in the **Band 2.4 GHz** and **Band 5 GHz** graphs as shown in the following figure. To highlight the KPI values for the peer networks, click the **Highlight Peers** button. ***Figure 3: Peer Comparison Bar Graph***  The colors in the graph represent the following: • **Blue**: Your network. • **Pink**: Peer networks.

Step 2 To display the KPI values for your network and your peer networks for a specific day, choose the appropriate day from the **Show** area.

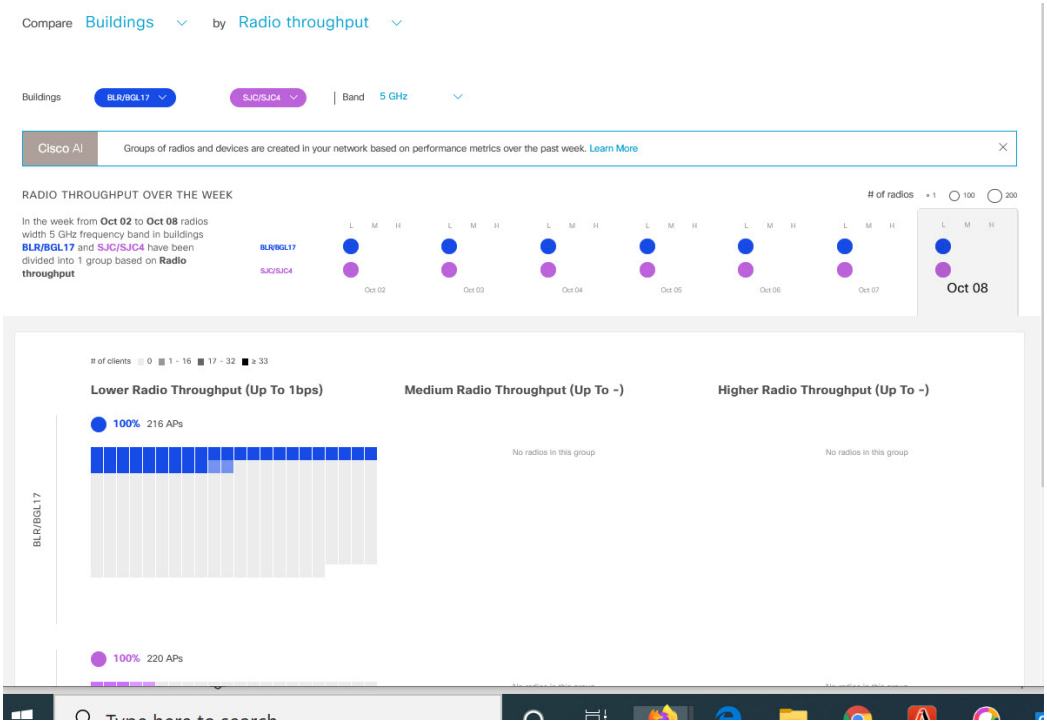
Compare Buildings, AP Model Families, and Wireless Endpoint Types

Use this procedure to view, compare, and identify performance improvement opportunities for objects in your network (buildings, AP model families, wireless endpoints) across selected Key Performance Indicators (KPIs).

Step 1 In the Cisco DNA Center GUI, click the **Menu** icon (☰) and choose **Assurance** > **Network Object Comparison**.

The **Network Object Comparison** window appears with the following information:

Figure 4: Network Object Comparison Window



Network Object Comparison Window	
Item	**Description**
Compare drop-down list	Choose the object in your network that you want to compare. Options are: **Buildings** (sites), **AP Model Families**, or **Wireless Endpoints** (Android device, Android phone, IOS tablet, IOS phone, Linux workstation, and so on).

Network Object Comparison Window	
Item	**Description**
By KPI drop-down list	Choose a KPI that you want to use to compare the objects in your network. For **Buildings**, the options are: • **Radio Throughput** • **Channel Utilization** • **Average Client RSSI** • **Average Client SNR** • **Average Onboarding Time** • **Average Authorization Time** • **Average DHCP Time** • **Cloud Throughput** • **Media Throughput** • **Social Throughput** • **Interference** For **AP Model Families**, the options are: • **Radio Throughput** • **Interference** • **Media Apps Throughput** • **Average Client RSSI** • **Channel Utilization** • **Average Client SNR** • **Cloud Throughput** • **Social Throughput** For **Wireless Endpoints**, the options are: • **Average AAA Time** • **Average Onboarding Time** • **Average DHCP Time**

Network Object Comparison Window	
Item	**Description**
Buildings **AP Model Families** or **Wireless Endpoints** drop-down list	Choose the first network object (building, AP model family, or wireless endpoint), for which you want to compare the KPI values. The first network object is represented in blue color. Choose the second network object with which you want to compare the KPI values of the first network object. The second network object is represented in pink/purple color.
Band	Choose the band frequency. Options are: **Band 2.4 GHz** and **Band 5 GHz**.
Summary/Timeline	Displays the average KPI performance for each day of the week, for each network object.
Client Count gradient or **Device Count** gradient	For certain KPIs, such as **Radio Throughput** and **Average Client RSSI**, this area provides the client count per radio for each of the sites. For certain KPIs, such as **Onboarding Time**, this area provides the number of devices for each of the sites. The intensity of the color in the blocks indicates the client count or device count. The darker color block has more clients or devices than the lighter color block.
AP Clusters or Device Type Clusters	This area displays two sets of clusters, one for each network object. From this area you can visually compare the performance of the two network objects. It provides the following information: • The KPI performance in percentage. • How the objects in your network are clustered in each site. • The objects in your network that are seeing low, medium, and high KPI values. For certain KPIs, such as **Onboarding Time** and **Authorization Time**, this area displays the following: • The types of devices that the client's onboarded in each site. For example, Windows workstation, OS X workstation, Linux workstation, Android phone, IOS device, and so on. • The number of each device type. • The number of devices that are seeing slow, medium, and faster KPI time.

Step 2 Hover your cursor over a color block in the cluster to get information about the AP, such as the date, the building in which the AP resides, the model number of the AP, radio protocol, and the radio client count. A darker color block has more clients than a lighter color block.