



Work with Wireless 2D and 3D Floor Maps

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Floor Maps Overview

There are several reasons to add floors with floor maps. One reason is to see your wireless network the way it exists today. Another reason is to help you plan and visualize future changes.

You can visualize your wireless network by creating or importing a floor map that contains various building components, like walls and windows, and then positioning your wireless devices on it.

Interactive planning helps you plan a floor layout by drawing planned, or hypothetical, APs and obstacles with a raster image or a CAD floor plan as the backdrop. You can export the floor map as a PDF and share it with the technicians who are mounting the APs. The floor drawing helps the technicians to visualize the floor layout and the exact AP mount locations.

With interactive floor planning, you can:

- Create a floor layout with a raster or CAD floor plan as the canvas.
- Place the planned APs or hypothetical APs on the floor map based on the signal coverage requirement. These hypothetical APs or planned APs are not yet installed or discovered by Catalyst Center.
- Assign the antenna type and orientation.
- Draw obstacles, such as walls and shelving on the floor, that impact the signal attenuation.
- Plan all APs in sequence.
- Export the floor map as a PDF.

Heatmap Overview

A heatmap is a visual representation of the Radio Frequency (RF) signal coverage of the wireless network devices in a particular area. In Catalyst Center, you can generate a heatmap on a per floor basis by creating or importing a floor map that contains various building components, like walls and windows, and then positioning your wireless devices on it.

Using the floor map, Catalyst Center computes 2D and 3D heatmaps that show the relative intensity of the RF signals in the coverage area. For 2D wireless maps, the heatmap is computed at height of 3 feet from the floor, while in 3D wireless maps, the heatmap is computed using the entire volume of the floor (from floor-to-ceiling). For this reason, using 3D wireless maps is especially useful for computing wireless coverage in high-ceiling environments, like warehouses.

In addition, the 3D wireless heatmap can compute the effect of a floor's signal coverage on its neighboring floors. Neighboring floors are the two floors directly above and below the selected floor. Neighboring floors are configurable, meaning you can choose which neighboring floors you want to use in a heatmap computation. (See **Contributing Floors** in [3D Map View Options, on page 47](#).) In this way, you can detect, visualize, and analyze the impact of a floor's signal coverage on other floors. For example, you might have clients on the first floor who are connecting with APs on the second floor, or clients might be competing for signal on the same channel (called cochannel interference). In some cases, this might be an intentional design. However, if this design isn't intentional, you can take steps to change it.

The legacy heatmap generator is still available to be used. However, we recommend that you use the enhanced 3D-computed heatmap generator for both 2D and 3D heatmaps, because it can generate heatmaps much faster.

3D-Computed Heatmap Generator

The 3D-computed heatmap generator, which is enabled by default, offers several advantages over the legacy heatmap generator. It uses the specialized graphics processing unit (GPU) to accelerate graphics rendering. Therefore, it can generate heatmaps substantially faster than the legacy heatmap generator. In addition, you can set a limit to the number of walls that are included in a heatmap computation, which also helps to enhance processing speed.

The 3D-computed heatmap generator automatically removes small obstructions (under 0.75 ft) and the second sides of the walls, leaving only one side per wall. (Catalyst Center applies an attenuation value for each wall, not for each side of a wall.)

Legacy Heatmap Generator

The legacy (server-based) heatmap generator is still available to be used. However, we recommend that you use the enhanced 3D-computed heatmap for 2D heatmaps because performance and accuracy are much better.

The legacy server-based heatmap generator has a limit on the number of walls that can be used to compute 2D and 3D heatmaps. The maximum number of walls for a 2D heatmap is 300, after optimization. If your CAD file contains more, Catalyst Center alerts you and preserves the 300 most relevant walls (based on the length of the wall multiplied by its attenuation). The maximum number of walls for a 3D heatmap is 3000, after optimization. If your CAD file contains more, Catalyst Center alerts you and preserves the 3000 most relevant walls (based on the length of the wall multiplied by its attenuation).

Although the 3D-computed heatmap generator is enabled by default, you can disable it and use the legacy heatmap generator instead.

Wireless Maps Prerequisite

The system you use to compute and display both 2D and 3D wireless heatmaps must have a Graphical Processing Unit (GPU) installed and enabled on it. For example, if you're using a Windows virtual machine (VM), you need to make sure that it has a GPU.

Add a Floor with a Map File

When you create a floor, you can include a floor map at the same time. The following topics help you understand the different floor creation methods depending on the floor map file type that you use. Procedures for each method are also provided.

Floor Map Creation Methods

To view a wireless map, first you need to create or import a floor map:

- **Create a Floor Map:** To create a floor map from scratch, you need to add the floor elements manually. The floor elements, like walls, windows, shelving, and so on, are displayed in the wireless map and used for heatmap computations. For details, see [2D Floor Map Devices and Overlay Objects, on page 8](#).
- **Import a CAD file:** When you use a CAD file (DXF or DWG file type) to import a floor map, Catalyst Center converts the CAD layers into the floor elements (walls, windows, shelving, and so on) that you specify. The floor elements are displayed in the wireless map and are used for heatmap computations.

Previously, Catalyst Center didn't limit the number of walls that could be imported from a CAD file. Now, however, Catalyst Center allows you to set a limit. The fewer walls you import, the less time it takes for the heatmap to be computed. For more information about heatmap generation, see [Heatmap Overview, on page 2](#).

When deciding which layers and elements to import, focus on obstacles that create the most signal attenuation. In principle, the longer, thicker, and denser a wall is, the higher its attenuation. Low walls, like cubicles, and narrow walls, like columns, have low attenuation and have little effect on the heatmap. However, even if a material of an obstacle is dense, the attenuation might not be significant if the signal can radiate around it. If you're not interested in the coverage outside of a building, don't include external walls or windows. Doing so provides better 3D visualization of the inside of the building.

If your CAD file doesn't have walls in specific layers but has walls mixed with other elements, don't select them for import. You can add walls manually later. For information, see [Add, Edit, and Remove Walls, on page 27](#).

Block inserts and proxy entities can't be imported. Imported layers must contain only native elements like lines, polylines, arcs, and so on.

For the procedure, see [Add a Floor with a CAD Map File, on page 4](#).

- **Import a non-CAD image file:** You can use JPG, GIF, PNG, or PDF files to import the floor plan. Typically, this type of file is used to create 2D floor maps. However, you need to manually create the floor elements, such as the walls and shelving, for them to be represented in the wireless map. For the procedure, see [Add a Floor with a Non-CAD Map File, on page 5](#).
- **Import a Ekahau Pro Project plan:** You can import Ekahau project data, such as the obstacles, APs, and more, to create a wireless map. For the procedure, see [Import an Ekahau Project to Catalyst Center](#).

Guidelines for Image Files to Use in Maps

Follow these guidelines to use map image files:

- Use a graphical application that can save the map image files to any of these formats—.jpg, .gif, .png, .pdf, .dxf, and .dwg.
- Map image files can be of any size. Catalyst Center imports the full definition of the original images to its database, but during display, it automatically resizes them to fit the workspace.
- Obtain the horizontal and vertical dimensions of the site in feet or meters before importing. This helps you to specify these dimensions during map import.
- Avoid using floor map images with rotation metadata, because the images might not render correctly when synced to CMX or Cisco Spaces. Although the floor map images might be in formats that are supported by Catalyst Center, the ways in which certain tools add the metadata can be rendered differently. For example, an image file with rotation metadata that is opened in three different applications might render horizontally in two applications and vertically in the other.

Add a Floor with a CAD Map File

You can use CAD files (DXF or DWG file types) to create a floor map.

For 2D floor maps, you must choose the CAD layers that you want to be used in the 2D view. For 3D floor maps, Catalyst Center converts the CAD layers you choose into the floor elements that you define. You can define floor elements as walls, shelving, windows, obstacles, and so on.

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- Step 1** From the top-left corner, click the menu icon and choose **Design > Network Hierarchy**.
- Step 2** From the left hierarchy tree, hover your cursor over the ellipsis **...** next to the building and choose **Add Floor**.
- Step 3** In the **Floor Name** field, enter a name for the floor.
- Step 4** From the **Type (RF Model)** drop-down list, choose the RF model to apply to the floor. The RF model determines how the RF is calculated based on the characteristics of the floor.
- Step 5** Drag and drop the CAD file (the DXF or DWG file type) to the **Floor Image** area.

When importing a CAD file, Catalyst Center will only import entities of the following types:

- Lines, open polylines, and closed polygons: LINE, LWPOLYLINE, POLYLINE, and SOLID
- Radius-based: ARC, CIRCLE, ELLIPSE (including arcs of ellipse)
- Other geometry elements: SPLINE
- Texts: ATTRIB, MTEXT, TEXT
- Block insertions (normally used for furniture): INSERT

Note By default, overlays are not displayed after you import a map. So, after you import a floor plan, make sure that you enable the overlay visibility. From the map toolbar, click **View Options**. From the right pane, expand **Overlay Objects** and click the toggle button for each object you want to display.

- Step 6** In the **Floormap** window, choose the CAD layers that you want to include in the floor map:
- a) In the **2D** column, check the check boxes corresponding to the CAD layers that you want in the 2D floor map.

Tip If some elements aren't displayed on the map (even when the **2D** check boxes are checked for the corresponding CAD layers), go to AutoCAD, open the required CAD file, select all the elements in the required layers, run the **Explode** command, and save it as a new DWG file. This action converts unsupported wrapper entities, like group and proxy entities, to entities that Catalyst Center can read. Then close the **Floormap** window and upload the updated CAD file (see [Step 5, on page 4](#)).

- b) In the **Wall/Shelving Type** column, click the drop-down and, for each CAD layer that you want converted, choose the wall or shelving type that you want the CAD layer converted into.

Each wall or shelving type has a decibel (dB) value associated with it. This dB value is used to compute signal attenuation in the heatmap. For more information, see [Floor Map Creation Methods, on page 3](#).

After a wall/shelving type is selected, the **Counter** column is updated with the number of units detected in the CAD file and the **Total Selected Walls Counter** is incremented. If the total number of selected walls exceeds the import walls limit, you have three options to proceed:

- Add the floormap with the current number of walls. In this case, Catalyst Center imports only the most relevant walls (equal to the import walls limit).
- Increase the import walls limit. Keep in mind that the more walls you import, the longer it takes for the heatmap to be computed.
- Decrease the total number of selected walls to a number that doesn't exceed the import walls limit by deselecting one or more wall/shelving types.

- c) Click **Use Selected Layers**.

Step 7 Enter the floor map dimensions in the **Width**, **Length**, and **Height** fields.

Step 8 Click **Add**.

By default, the map is displayed with a grid. To turn the grid off or on, use the **Show Grid** toggle button at the bottom-left side of the map.

Note After you import a floor plan, make sure that you enable the overlay visibility. (From the floor, click **View Options** and enable the overlay toggles in **Overlay Objects**). By default, overlays are not displayed after you import a map.

Add a Floor with a Non-CAD Map File

You can use non-CAD files (JPG, GIF, PNG, or PDF file types) to create a floor map. However, when using a non-CAD file, the 3D floor elements, such as walls and shelvings, cannot be imported, and you must add them manually later. For more information, see [2D Floor Map Devices and Overlay Objects, on page 8](#).

Step 1 From the top-left corner, click the menu icon and choose **Design > Network Hierarchy**.

Step 2 From the left hierarchy tree, hover your cursor over the ellipsis **...** next to the building and choose **Add Floor**.

Step 3 In the **Floor Name** field, enter a name for the floor.

Step 4 In the **Global Unit System** area, select **Feet** or **Meters**.

When the floor is added, all the floors across all the sites sync to display all measurements in your chosen unit system. To update the global unit system, see [2D Map View Options, on page 35](#).

Add a Floor with a Non-CAD Map File

Step 5 From the **Type (RF Model)** drop-down list, choose the RF model to apply to the floor. The RF model determines how the RF is calculated based on the characteristics of the floor.

Step 6 Drag and drop the non-CAD file (JPG, GIF, PNG, or PDF file type) onto the **Floor Image** area.

Note Ensure to provide the precise dimensions of floors that are in the PDF format, because the image width and height ratio cannot be extracted from them.

Step 7 Click **Add**.

The floor map is created.

Note After you import a floor plan, make sure that you enable overlay visibility. (From the floor, click **View Options** and in **Overlay Objects**, enable overlay visibility by clicking the overlay object's corresponding toggle button.) By default, overlays are not displayed after you import a map.

Step 8 To add walls as a 3D floor element, do the following:

- From the map toolbar, click **2D > Add/Edit > Overlays > Walls**.
- From the left pane of the map, click the wall type that you want to add.

If the wall type is not in the list, click **Add Wall Type** to create a new wall type.

- Use the drawing tool to create a wall on the map:
 - Click where you want to begin the wall. Then move your cursor to the next point and click again. Continue this process until you have created the wall in the shape you want.
 - To finalize the wall, double click where you want the wall to end. To cancel the drawing, right-click the map.
 - To change the type of an existing wall, right-click the shape and choose **Change Type**.
 - To move an existing wall, drag and drop the shape to the new location.
 - To remove an existing wall, right-click the shape and choose **Delete**.

Figure 1: Adding a Wall with the Drawing Tool

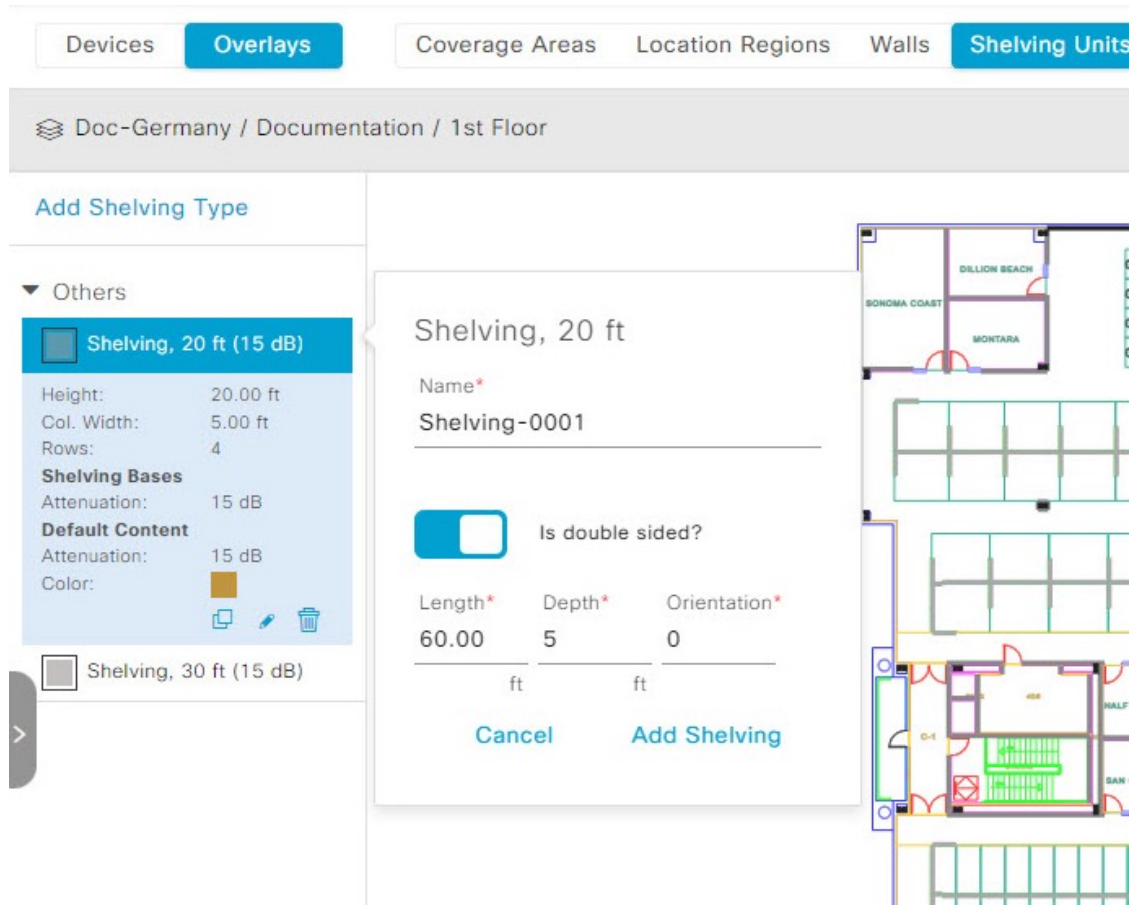


Step 9 To add shelving units as a 3D floor element, do the following:

- In the map toolbar, click **2D > Add/Edit > Overlays > Shelving Units**.

- b) In the left pane of the map, click the shelving type that you want to add.
- In the **Shelving** dialog box, you can edit the name, dimensions, and orientation of the shelving type. Orientation refers to the angle of the shelving, for example, 0 means that the shelving is vertical and parallel to the y axis.
 - If a shelving type is not in the list, click **Add Shelving Type** to create a new shelving type.

Figure 2: Choosing a Shelving Type to Add



- c) In the **Shelving** dialog box, click **Add Shelving** to add the shelving to the floor map.
- d) Drag and drop the shelving to move it to a location on the floor map.
- e) Right-click the shelving and choose one of the following actions:
- **Edit**: Edit the name, dimensions, and orientation of the shelving.
 - **Clone**: Create a copy of the shelving.
 - **Array**: Create an array of shelving by specifying the number of shelves and the distance between them.
 - **Remove**: Remove the shelving from the floor map.

Step 10 When you're done, click **Save** in the map toolbar.

Work with 2D Maps

2D maps are primarily used to configure elements on a floor map and view heatmaps.

Using 2D maps, you can add floor map elements and overlays. While viewing a 2D map, you can manipulate the display of the various elements and overlays. You can also filter device data and identify wireless interferers.

Catalyst Center calculates the strength and quality of wireless signals. These RF predictions are commonly known as heatmaps, because they show the relative intensity of the RF signals on the 2D wireless coverages area map.

2D Floor Map Devices and Overlay Objects

In 2D maps, you can configure devices and overlay objects on your floor maps.

Devices

- **APs:** An access point (AP) serves as the connection point between wireless and wired networks or as the center point of a standalone wireless network. In 2D maps, an AP represents an actual, installed device. For a list of APs that Catalyst Center supports, see the [Cisco Catalyst Center Compatibility Matrix](#).
- **Planned APs:** Planned APs are representations of APs that have not been installed yet. By placing planned APs on a map, you can envision your wireless network RF coverage and make changes before you actually install the APs.
- **Sensors:** A sensor is a dedicated Cisco Aironet 1800S Active Sensor that gets bootstrapped using Cisco PnP. After it obtains the Assurance server reachability details, it communicates directly with the Assurance server. For more details, including information about sensor tests, see the [Cisco Catalyst Assurance User Guide](#).

Overlay Objects

- **Coverage Areas:** By default, any area defined as part of a floor map is considered as a wireless coverage area. However, if you have a building that is nonrectangular or you want to mark a nonrectangular or polygon-shaped area on a floor, you can use the **Coverage Areas** drawing tool to create a coverage area.
- **Openings:** An opening, also called an atrium, is an open-air or skylight-covered area within a building. An opening can extend through multiple floors and can affect wireless signal coverage areas.
- **Location Regions:** Location regions define areas that are included in or excluded from the computation of heatmaps. Inclusion areas are included in the calculations, and exclusion areas are not included. For example, you might want to exclude areas such as openings, atriums, or stairwells within a building, but include a work area, such as cubicles, labs, or manufacturing floors.
- **Walls:** Walls define any exterior or interior vertical structures in a building, such as windows, cubicles, and doors. Because they can be made of different materials and have different densities, they can significantly impact RF signal attenuation and heatmap calculation. For example, the more walls you include in a floor map, the longer it can take to compute a heatmap. Although, even if you have a high number of walls on your floormap, you can adjust the number used to compute the heatmap. For information, see [2D Map View Options, on page 35](#) and [3D Map View Options, on page 47](#).

- **Shelving Units:** Shelving units are obstacles that can significantly impact RF signal attenuation and heatmap calculation. A high-ceiling warehouse is an example of a location with shelving units.
- **Markers:** A marker identifies a location on a map. When you create a marker, you can name it and position it to help you identify it later.
- **GPS Markers:** When integrated with Catalyst Center, location services, such as Cisco Spaces or Cisco Connected Mobile Experiences (CMX), use GPS markers to calculate the approximate geographical location of clients.
- **Align Points:** Align points are markers that are used to position multiple floors that have different physical shapes. In 3D maps, floors are aligned at the top-left corner of the map (point 0,0). If you manage each floor independently, the misalignment is not a problem. However, to use some of the features of 3D maps, the floors need to be aligned as they are in reality. To compensate this misalignment, you can insert one or more align points on two or more floors, so that the floors align properly one on top of the other in a 3D map.

Work with APs on a Floor Map

Catalyst Center computes heatmaps for the entire map that show the relative intensity of the Radio Frequency (RF) signals in the coverage area. For 2D wireless maps, the heatmap is only an approximation of the actual RF signal intensity because it does not consider the attenuation of various building materials, such as drywall or metal objects, nor does it display the effects of RF signals bouncing off obstructions.

Follow these guidelines while placing APs on the floor map:

- Place APs along the periphery of coverage areas to keep devices close to the exterior of rooms and buildings. APs placed in the center of these coverage areas provide good data on devices that would otherwise appear equidistant from all other APs.
- Location accuracy can be improved by increasing overall AP density and moving APs close to the perimeter of the coverage area.
- In long and narrow coverage areas, avoid placing APs in a straight line. Stagger them so that each AP is more likely to provide a unique snapshot of the device location.
- Although the design provides enough AP density for high-bandwidth applications, location suffers because each AP view of a single device is not varied enough. Therefore, location is difficult to determine. Move the APs to the perimeter of the coverage area and stagger them. Each has a greater likelihood of offering a distinctly different view of the device, resulting in higher location accuracy.
- For optimal heatmap visibility on floor maps, configure the AP height to approximately 10 feet (3 meters) or lower.

Export APs from Cisco Prime Infrastructure and Import into Catalyst Center

Catalyst Center allows you to import, assign, and position a collection of APs to the floor map. If you have an existing collection of APs on Cisco Prime Infrastructure, you can import it into Catalyst Center, saving time and effort spent in importing, assigning, and positioning APs to the floor map.

This procedure describes how to export an existing collection of APs from Cisco Prime Infrastructure and to import it into Catalyst Center.

Before you begin

- To perform the following task, you must be a **Super Admin** or **Network Admin**.
- Make sure that you have APs in your inventory. If not, discover them using the **Discovery** feature.
- Add and position APs on a floor map.
- The area, building, and floor must be present in the site hierarchy.

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- Step 1** Export the AP positions from Cisco Prime Infrastructure as a CSV file to your workstation.
- Step 2** From the top-left corner, click the menu icon and choose **Design > Network Hierarchy**.
- Step 3** From the left hierarchy tree, hover your cursor over the ellipsis **...** next to the site and choose **Import Access Points**. Alternatively, from the map toolbar, you can click **Import** and choose **Import Access Points**.
- Step 4** In the **Import Access Points** dialog box, drag and drop the AP file, or click **Choose a file** to select the file from your workstation.
- Note**
- To manually create the **AP Positions** CSV file with the Prime template, export the Prime template to your workstation by clicking **Download Prime Template**. The Prime template does not support nested files.
 - To manually create the **AP Positions** CSV file with the Catalyst Center template, export the Catalyst Center template to your workstation by clicking **Download Cisco DNA Center Template**. The Catalyst Center template supports nested files.
- Wait for the CSV file to download. The CSV file contains information about the AP positions of various sites in the network.
- Step 5** Click **Import**.
The **Import Summary** window is displayed.
- The **Information** tab shows the list of successfully imported APs.
 - Click the **Warning** tab to see the list of warnings.
 - Click the **Error** tab to see the list of errors.
- Step 6** In the top-right corner of the **Import Summary** window, click **Done** to return to the **Network Hierarchy** window.
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Add APs to a Map

This procedure describes how to add APs to a map.

Before you begin

Make sure that you have Cisco APs in your inventory. If not, discover them using the Discovery feature. See [Discovery Overview](#).

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- Step 1** From the top-left corner, click the menu icon and choose **Design > Network Hierarchy**.

Step 2 From the left hierarchy tree, choose a floor.

Step 3 From the map toolbar, click **2D > Add/Edit**.

By default, the **Devices** and **Access Points** toggle buttons are chosen.

Step 4 In the left pane of the map, click **Add Access Points**.

Step 5 In the **Add Access Points** slide-in pane, do one of the following in the table:

- **To add a single AP:** Locate the AP that you want to add, and scroll to the right and click **Add**.
- **To add multiple APs:** Check the check boxes next to the APs you want to add, and click **Add Selected**.

Note You can search for APs using the search option available. Use the **Filter** field to search for APs using the AP name, MAC address, model, or Cisco Wireless Controller. The search is case-insensitive. The search results appear in a table. Click **Add** to add one or more of these APs to the floor area.

In edit mode, newly added APs are displayed in the **Unpositioned** category in the map left pane. For more information, see [Position an AP on a Map, on page 14](#).

Step 6 After adding the APs to a floor, close the **Add Access Points** slide-in pane.

What to do next

When you add an AP to a map, the wireless map automatically stores the following data even after the AP is deleted from the inventory:

- AP name
- AP MAC address
- Current site of the AP
- Current position of the AP on the map



Note If you delete the corresponding site from the network hierarchy, the stored AP data is also removed.

When you delete the wireless controller with all its managed APs from the inventory, Catalyst Center displays a planned AP icon for the corresponding APs on the map. For more information, see [About the AP Icon and Planned AP Icon, on page 38](#).

If the same AP is rediscovered in the inventory later, Catalyst Center automatically places it back on the map at the same site and position even if a different wireless controller manages it.

To remove the AP data from the map when the AP is deleted from the inventory, you can do one of the following:

- Before deleting the wireless controller from the inventory, assign the corresponding APs to the **Global** site. For more information, see [Add a Device to a Site](#).
- After deleting the wireless controller from the inventory, remove the corresponding planned APs from the map. For more information, see [Remove APs from a Map, on page 22](#).

Add Planned APs to a Map

This procedure shows you how to use the AP Model Catalog feature to add a planned AP to a floor and configure its model, antenna type, azimuth, and elevation orientation. Using the planned AP that you just created and placed, you can add more planned APs with the same properties.

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- Step 1** From the top-left corner, click the menu icon and choose **Design > Network Hierarchy**.
- Step 2** From the left hierarchy tree, choose a floor.
- Step 3** In the map toolbar, click **2D > Add/Edit**.
- By default, the **Devices** and **Access Points** toggle buttons are chosen.
- Step 4** In the left pane of the map, in the **Planned AP Models** area, click the AP model of the planned AP that you want to add.
- Note** If the AP model isn't listed, click **Add Model** and choose the AP model to add to the list.
- Step 5** On the floor map, click the location where you want to place the planned AP.
- A planned AP of the selected model is added to the floor map, and the **Edit Planned AP** slide-in pane is displayed with an AP name added to it by default.
- Step 6** In the **Edit Planned AP** slide-in pane, click the gear icon that is located next to the **AP Name** field.
- The **Name pattern** dialog box is displayed.
- Step 7** When you add the first AP to the floor, make sure that you enter a valid name pattern, for example, SJC-BLD21-FL2-AP#####, and then click **Set name pattern**.
- Note** The planned APs must be unique within Catalyst Center. So, make sure that the name pattern identifies the floor.
- The ##### in the name pattern is replaced by numbers in the **AP Name**, for example, SJC-BLD21-FL2-AP0001, SJC-BLD21-FL2-AP0002, and so on.
- Step 8** From the **Antenna** drop-down list, choose the appropriate antenna type, including dual antennas, for the AP.
- Note** The antenna image reflects the selected antenna.
- Step 9** Depending on the antenna type, enter the **Azimuth** and **Elevation** orientation in degrees.
- Step 10** (Optional) Configure any of the other settings, as needed. For information about these settings, see [Edit an AP, on page 18](#).
- Step 11** Perform the following actions, as needed:
- To add another planned AP with the same properties as that of the planned AP that you just added, on the floor map, click a location where you want to position the new AP.
- A new AP icon is displayed on the map with all of the properties inherited and the AP name appended, for example, BLD1-AP0002-TX.
- To add more planned APs with the same properties and appended AP name, click the floor map.
 - To stop adding planned APs to the floor map, press **Esc** or right-click the floor map.
 - To reposition the planned APs, drag and drop them to the appropriate location in the floor map.

- To delete a planned AP, right-click the AP icon and click **Remove**.
- To edit a planned AP, right-click the AP icon and click **Edit**.
- To autoplace a planned AP, see [Autoplace Planned APs on a Map, on page 13](#).

Step 12 In the map toolbar, click **Save**.

Autoplace Planned APs on a Map

Autoplacing planned APs on a floor map allows you to see how many planned APs can be placed within the dimensions of the map. Using the planned AP model, maximum distance you'd like between the planned APs, and coverage area dimensions, the system calculates the maximum number of planned APs placements and adds them to the floor map.

Step 1 From the top-left corner, click the menu icon and choose **Design > Network Hierarchy**.

Step 2 From the left hierarchy tree, choose a floor.

Step 3 In the map toolbar, click **2D > Add/Edit**.

By default, the **Devices** and **Access Points** toggle buttons are chosen.

Step 4 In the left pane of the map, click **Autoplace Planned APs**.

Step 5 In the **Autoplace Planned APs** dialog box, choose the AP model, enter the maximum distance you'd like between the planned APs, and enter a valid name pattern.

The ##### in the name pattern is replaced by numbers in the planned AP name—for example, AP-0001, AP-0002, and so on.

Step 6 Click **Create**.

The system calculates the maximum number of planned APs placements and adds them to the floor map. The system automatically selects all the newly placed planned APs, and the **Edit APs** slide-in pane, where you can collectively edit all the new planned APs, is displayed.

Step 7 From the **Antenna** drop-down list, choose the antenna type.

Step 8 (Optional) To collectively update the planned APs, edit the available fields.

Step 9 Click **Apply** to apply the update to all the autoplaced planned APs.

Step 10 (Optional) Perform the following actions, as needed:

- To edit a planned AP, either click the planned AP icon or right-click the planned AP icon and choose **Edit**.
- To stop editing a planned AP, press **Esc**, right-click the floor map, or close the **Edit Planned AP** slide-in pane.
- To reposition the planned APs, drag and drop them to the appropriate location in the floor map.
- To remove a planned AP, right-click the planned AP icon and choose **Remove**.

Step 11 When you're ready, click **Save** to save the changes to the map.

Assign Actual APs to Planned APs

After you install the actual APs in your wireless network, you can assign them to the planned APs on your map. This procedure describes how to assign planned APs to actual APs.

-
- Step 1** From the top-left corner, click the menu icon and choose **Design > Network Hierarchy**.
- Step 2** From the left hierarchy tree, choose a floor.
- Step 3** In the map toolbar, click **2D > Add/Edit**.
By default, the **Devices** and **Access Points** toggle buttons are chosen.
- Step 4** In the left pane of the map, click **Assign Planned APs**.
- Step 5** On the floor map, click a planned AP.
- Step 6** In the **Assign Planned APs** slide-in pane, check the check box next to the AP that you want to assign.
- Step 7** Click **Assign**.
- Step 8** In the map toolbar, click **Save**.
-

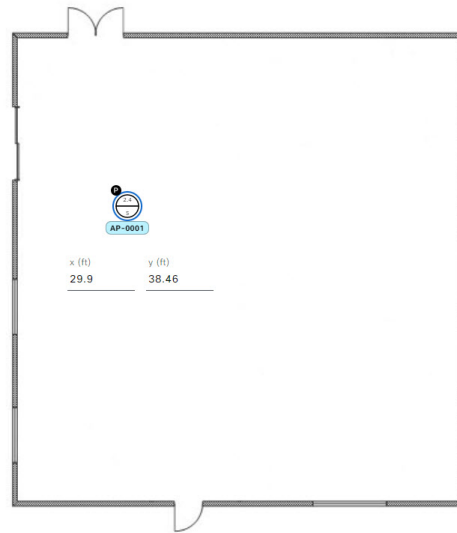
Position an AP on a Map

After adding an AP to a floor, you must position it on the map using one of the following methods:

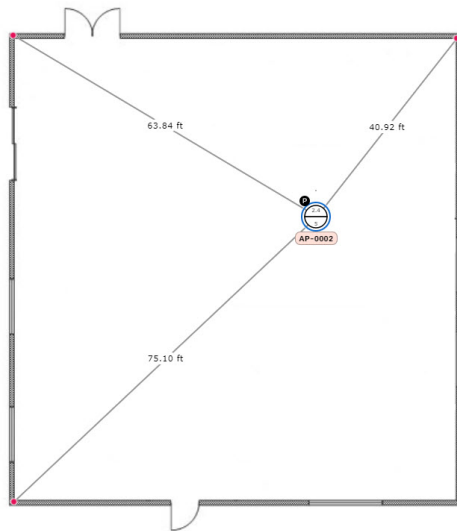
- Manually position it on the map. Use this method if you can approximate the location of the AP using reference points in the building that you can correlate to the detail on the floor map.



- Define its **x** and **y** coordinates. Use this method if you have the exact coordinates of the AP and you want its position on the map to be as accurate as possible.

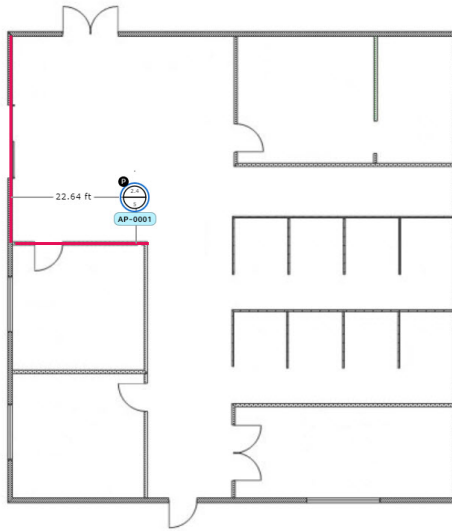


- Triangulate it using 3 points. Use this method if you have large open space with only a few points from which to measure the distance to the AP. For example, you might measure from the AP to each corner of the room.



- Intersect it based on its distance from two walls. Use this method if the AP is located in a space where you have two walls that intersect, even if they aren't perpendicular to one another.

Position an AP on a Map



For all but the first method (manual positioning), you need to have your measurements on hand, and make sure the unit of measure is specified correctly in the **Global Map Properties** settings. For information, see in [2D Map View Options](#), on page 35.

Step 1 From the top-left corner, click the menu icon and choose **Design > Network Hierarchy**.

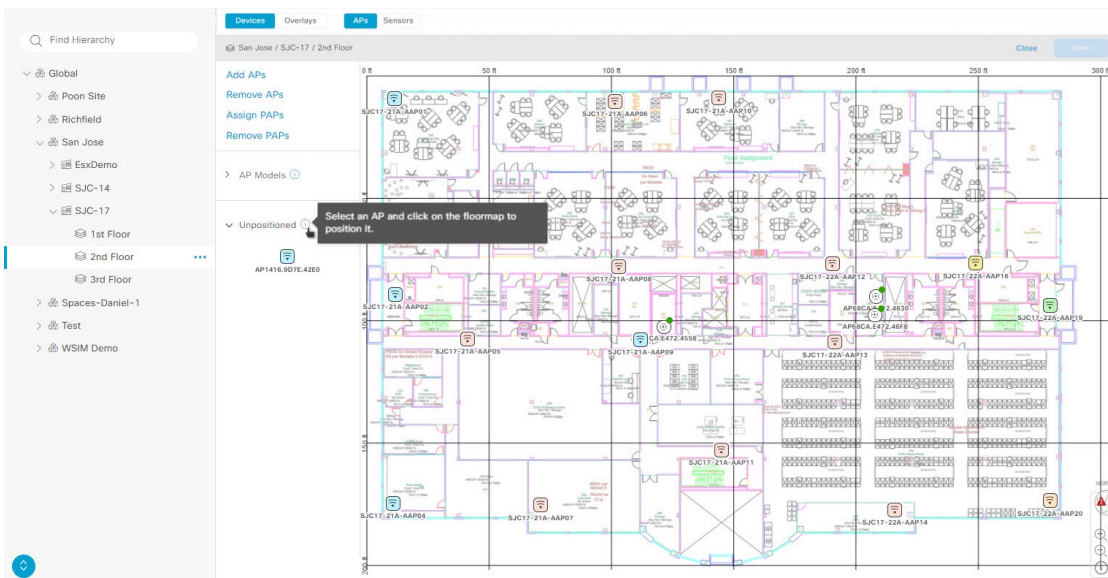
Step 2 From the left hierarchy tree, choose a floor.

Step 3 In the map toolbar, click **2D > Add/Edit**.

By default, the **Devices** and **Access Points** toggle buttons are chosen.

Step 4 From the left pane of the map, in the **Unpositioned** area, click an AP.

Figure 3: Unpositioned APs



Step 5 To position the AP, use one of the following methods:

- Click the location on the floor map where you want to position the AP.
- Define its **x** and **y** coordinates in the **Edit AP** slide-in pane.
- Triangulate its location:
 - a. In the **Edit AP** slide-in pane, click **3 points**.
 - b. Click on floor map to draw the first point.
 - c. In the dialog box, set the distance from the AP to the first point and click **Set Distance**.
 - d. Define the second and third points similarly, and click **Save**.
- Define two walls on the floor map and position the APs between the defined walls:
 - a. In the **Edit AP** slide-in pane, click **2 walls**.
 - b. To define the first wall, click the floor map to start drawing the line. Click again to finish drawing the line.
A dialog box is displayed to set the distance from the AP to the first wall.
 - c. Enter the distance in meters, and click **Set Distance**.
 - d. Define the second wall similarly, making sure that the distance to the AP from the first and second walls create an intersecting point.
 - e. Click **Save**.

The AP is placed based on the defined distance between the walls.

Step 6 In the map toolbar, click **Save**.

Note If Cisco Connected Mobile Experiences (CMX) is synchronized with Catalyst Center, you can view the location of clients on the heatmap. See [Create Cisco CMX Settings](#).

Reposition an AP on a Map

After you position APs on a map, you can reposition them. This procedure shows you how to reposition an AP on a map.



Note You can perform this task in a 2D or 3D map.

Step 1 From the top-left corner, click the menu icon and choose **Design > Network Hierarchy**.

Step 2 From the left hierarchy tree, choose a floor.

Step 3 For 2D, do the following:

- a) In the map toolbar, click **2D > Add/Edit**.
- b) On the map, drag and drop the AP to the new position.

Step 4 For 3D, do the following:

- a) In the map toolbar, click **3D > Edit/Clone**.
- b) On the map, right-click the AP and choose **Move**.
- c) On the map, drag and drop the AP to the new position.

Step 5 In the map toolbar, click **Save**.

Edit an AP

This procedure shows you how to change the configuration of a single AP or planned AP. To change the configuration of multiple APs at the same time, see [Edit Multiple APs, on page 20](#).



Note You can perform this task in a 2D or 3D map.

Step 1 From the top-left corner, click the menu icon and choose **Design > Network Hierarchy**.

Step 2 From the left hierarchy tree, choose a floor.

Step 3 For 2D, do the following:

- a) In the map toolbar, click **2D > Add/Edit**.
- b) On the map, right-click the AP and choose **Edit**.

Step 4 For 3D, do the following:

- a) In the map toolbar, click **3D > Edit/Clone**.
- b) On the map, click the AP that you want to edit.

Step 5 In the slide-in pane, change any of the following AP and planned AP settings, as available:

- **AP Name** or **Planned AP Name**: Name of the AP.
- **MAC Address**: MAC address of the selected AP.
- **AP Model**: Model of the selected AP.

Note For APs in 3D maps, you can change the **AP Model** field to visualize its impact, but the changes aren't saved and don't persist across floors. Instead, you can update this AP field from the **Inventory** window.

- **x (ft)**: X-axis coordinate of the AP.
- **y (ft)**: Y-axis coordinate of the AP.
- **AP Height (ft)**: Height of the AP.
- **Antenna**: Antenna type for this AP.

Note For external APs, you must select an antenna. If you don't select an antenna, the AP will not be present on the map.

- **Channel**: Channel to be used by the AP. Only channels that are supported by the AP model are displayed.

Note For APs in 3D maps, you can change the **Channel** field to visualize its impact, but the changes aren't saved and don't persist across floors. Instead, you can update this AP field from the **Inventory** window.

- **Tx Power (dBm):** Transmit power for the channel. Only power levels that are supported by the channel are displayed.

Note For APs in 3D maps, you can change the **Tx Power (dBm)** field to visualize its impact, but the changes aren't saved and don't persist across floors. Instead, you can update this AP field from the **Inventory** window.

- **Azimuth:** Angle of the antenna, measured relative to the x axis, clockwise. The azimuth range is from 0 through 360. In Catalyst Center, pointing right is 0 degrees or 360 degrees; pointing down is 90 degrees.

You can manually enter the value or use the blue arrow under the field to change the value.

Note For omnidirectional antennas, the azimuth is not relevant if the elevation is 0.

- **Elevation:** In degrees. You can manually enter the value or use the blue arrow under the field to change the value.

Note For APs and antenna models that are designed to be placed on a ceiling, 0 elevation means pointing down. For APs and antenna models that are designed to be placed on a wall, 0 elevation means pointing horizontally and negative values mean pointing down.

Figure 4: Edit AP Slide-In Pane

Edit AP
×

Position by
3 points
2 walls
 Remove

AP Name
AP6C8B.D3BA.693C

MAC Address

AP Model*
AP4800 ▼

x (ft)	y (ft)	AP Height (ft)*
74.33	26.29	10.00

XOR (Monitor Mode) 802.11a More ▼

Antenna*
Internal-4800-Dual ▼

Integrated Dual Band Radio (gain: 0dbi)

Azimuth	Elevation
0	0

→

→

Step 6 Do one of the following:

- For 2D, after making the changes, close the slide-in pane.
- For 3D, click **Apply** to apply the changes.

Step 7 In the map toolbar, click **Save**.

Edit Multiple APs

When you select only one AP or planned AP, you can change all editable attributes. However, when you select multiple APs or planned APs, only some attributes are editable, as follows:

- When the selected devices have the same value for an attribute, the value is displayed. Otherwise, the value is blank. In either case, if you change the value, the new value is applied to all the selected devices.
- When the selected APs have the same model number and radios (number of radios and operating band), the antennas are editable. Otherwise, they are not editable.
- You can change the model numbers of planned APs but not added APs. So, if you select an AP, the model number is not editable.
- Because bulk changes affect more devices, they do not take effect immediately. You must click **Apply** to apply your changes.

This procedure shows you how to update the editable attributes for multiple APs at the same time.



Note You can perform this task in a 2D or 3D map.


Step 1 From the top-left corner, click the menu icon and choose **Design > Network Hierarchy**.

Step 2 From the left hierarchy tree, choose a floor.

Step 3 Do one of the following:

- For 2D, in the map toolbar, click **2D > Add/Edit**.
- For 3D, in the map toolbar, click **3D > Edit/Clone**.

Step 4 Select the APs, using one of the following methods:

- Click the first device, then press and hold the **Shift** key while you click the rest of the devices.
- In the 2D map navigation controls toolbar, click the select by rectangle icon (). Then click an area of the map and drag the highlighted rectangle to select APs in a contiguous area. All the highlighted APs within the rectangle are selected.

To deselect APs, use one of the following methods:

- To deselect a single AP, press and hold the **Shift** key while you click the AP.
- To deselect all APs except one, click the AP you want to remain selected. All others are deselected.
- To deselect all APs, press the **ESC** key or close the **Edit** pane.

Step 5 In the slide-in pane, configure the settings of the APs, as available:

- **AP Name** or **Planned AP Name**: Name of the AP.
- **MAC Address**: MAC address of the selected AP.
- **AP Model**: Model of the selected AP.

Note For APs in 3D maps, you can change the **AP Model** field to visualize its impact, but the changes aren't saved and don't persist across floors. Instead, you can update this AP field from the **Inventory** window.

- **x**: X-axis coordinate of the AP. You can manually enter the value.
- **y**: Y-axis coordinate of the AP. You can manually enter the value.
- **AP Height**: Height of the AP. You can manually enter the value.
- **Antenna**: Antenna type for this AP.

Note For external APs, you must select an antenna, or the AP will not be present in the map.

- **Channel**: Channel to be used by the AP. Only channels that are supported by the AP model are displayed.

Note For APs in 3D maps, you can change the **Channel** field to visualize its impact, but the changes aren't saved and don't persist across floors. Instead, you can update this AP field from the **Inventory** window.

- **Tx Power (dBm)**: Transmit power for the channel. Only power levels that are supported by the channel are displayed.

Note For APs in 3D maps, you can change the **Tx Power (dBm)** field to visualize its impact, but the changes aren't saved and don't persist across floors. Instead, you can update this AP field from the **Inventory** window.

- **Azimuth**: Angle of the antenna, measured relative to the x axis, clockwise. The azimuth range is from 0 through 360. In Catalyst Center, pointing right is 0 degrees or 360 degrees; pointing down is 90 degrees.

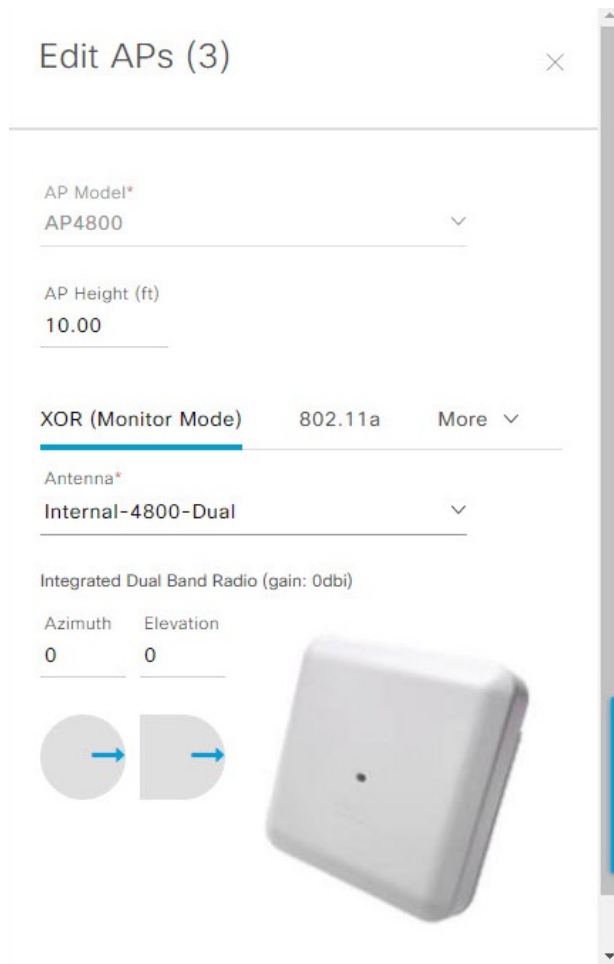
You can manually enter the value or use the blue arrow under the field to change the value.

Note For omnidirectional antennas, the azimuth is not relevant if the elevation is 0.

- **Elevation**: In degrees. You can manually enter the value or use the blue arrow under the field to change the value.

Note For APs and antenna models that are designed to be placed on a ceiling, 0 elevation means pointing down. For APs and antenna models that are designed to be placed on a wall, 0 elevation means pointing horizontally and negative values mean pointing down.

Figure 5: Edit APs Slide-In Pane



Step 6 In the slide-in pane, click **Apply** to apply the changes.

Step 7 In the map toolbar, click **Save**.

Remove APs from a Map

This procedure shows you how to remove APs and planned APs (PAPs) from a map.

Step 1 From the top-left corner, click the menu icon and choose **Design > Network Hierarchy**.

Step 2 From the left hierarchy tree, choose a floor.

Step 3 In the map toolbar, click **2D > Add/Edit**.

Step 4 To remove APs (including planned APs), do the following:

- a) Click the AP. To select multiple APs, click the first AP and while pressing the **Shift** key, click the rest of the APs.
- b) In the slide-in pane, click **Remove**.

Step 5 In the map toolbar, click **Save**.

Work with Sensors on a Floor Map

The following topics show you how to add sensors to floor maps and position, reposition, and delete them, if needed.

For more information about sensors, see [2D Floor Map Devices and Overlay Objects, on page 8](#).

Add Sensors to a Map

This procedure shows you how to add sensors to a map.

Before you begin

Make sure you have the Cisco AP 1800S sensor in your inventory. The Cisco Aironet 1800s Active Sensor must be provisioned using Plug and Play for it to show up in the Inventory. See the "Provision the Wireless Cisco Aironet 1800s Active Sensor" topic in the [Cisco Catalyst Assurance User Guide](#).

Step 1 From the top-left corner, click the menu icon and choose **Design > Network Hierarchy**.

Step 2 From the left hierarchy tree, choose a floor.

Step 3 In the map toolbar, click **2D > Add/Edit > Sensors**.

Step 4 In the **Add Sensors** slide-in pane, check the check boxes of the sensors that you want to add. Alternatively, click **Add** next to the sensor row.

Note You can search for specific sensors using the **Filter** field. Search using the name, MAC address, or model of a sensor. The search is not case-sensitive. The results are displayed in the table. Click **Add** to add one or more of these sensors to the floor area.

Newly added sensors are displayed in the **Unpositioned** category in the left pane of the map in edit mode.

Step 5 In the map toolbar, click **Save**.

Position Sensors on a Map

Newly added sensors are displayed in the **Unpositioned** category in the left pane of the map in edit mode. This procedure shows you how to position a sensor after initially adding it.

Before you begin

Sensors must be added to the map before they can be positioned. For information, see [Add Sensors to a Map, on page 23](#)

Step 1 From the top-left corner, click the menu icon and choose **Design > Network Hierarchy**.

Step 2 From the left hierarchy tree, choose a floor.

Step 3 In the map toolbar, click **2D > Add/Edit > Sensors**.

Step 4 In the left pane of the map, click a sensor in the **Unpositioned** category to position the sensor.

Reposition a Sensor on a Map

- Step 5** On the floor map, click the location where you want to position the sensor.
- You can use the **x**, **y**, and **Height** fields in the **Sensor Details** slide-in pane to enter the exact x, y, and z coordinates for the sensor.
- Step 6** In the map toolbar, click **Save**.

Reposition a Sensor on a Map

After you position sensors on a map, you can reposition them. This procedure shows you how to reposition a sensor on a map.



Note You can perform this task in a 2D or 3D map.

- Step 1** From the top-left corner, click the menu icon and choose **Design > Network Hierarchy**.
- Step 2** From the left hierarchy tree, choose a floor.
- Step 3** In the map toolbar, do one of the following:
- Click **2D > Add/Edit**.
 - Click **3D > Edit/Clone**.
- Step 4** On the map, drag and drop the sensor to the new position.
- Step 5** In the map toolbar, click **Save**.

Remove Sensors from a Map

This procedure shows you how to remove sensors from a floor map.

- Step 1** From the top-left corner, click the menu icon and choose **Design > Network Hierarchy**.
- Step 2** From the left hierarchy tree, choose a floor.
- Step 3** In the map toolbar, click **2D > Add/Edit**.
- Step 4** To remove sensors, do the following:
- a) Click the sensor, or to select multiple sensors, click the first sensor and while pressing the **Shift** key, click the rest of the sensors.
 - b) In the **Edit** pane, click **Remove**.
- Step 5** In the map toolbar, click **Save**.

Add, Edit, and Remove Coverage Areas

This procedure shows you how to mark a nonrectangular or polygon-shaped area as a coverage area on a floor map.

For more information about coverage areas, see [2D Floor Map Devices and Overlay Objects, on page 8](#).

Step 1 From the top-left corner, click the menu icon and choose **Design > Network Hierarchy**.

Step 2 From the left hierarchy tree, choose a floor.

Step 3 In the map toolbar, click **2D > Add/Edit > Overlays > Coverage Areas**.

Step 4 To add a coverage area, do the following:

- a) In the **Coverage Area** dialog box, enter a name for the coverage area in the field.
- b) Click **Add Coverage**.
- c) Click on the map to create a point and initiate the drawing tool.
- d) Continue creating points to define the coverage area shape.

Note The coverage area shape must have at least three points. Click and drag a point to redefine the coverage area shape.

- e) Double-click to exit the drawing tool and finalize the coverage area shape.

Step 5 To edit a coverage area, do the following:

- a) In the map toolbar, click **Add/Edit > Coverage Areas**.
- b) To redefine the shape of a coverage area, click and drag a point.
- c) To edit a coverage area name, right-click the coverage area and choose **Edit**.

Step 6 To delete a coverage area, do the following:

- a) In the map toolbar, click **Add/Edit > Coverage Areas**.
- b) Right-click the coverage area and choose **Remove**.

Step 7 In the map toolbar, click **Save**.

Add, Edit, Copy, and Remove Openings

Creating an opening is similar to creating an open space or atrium on a floor. On multifloor buildings, typically the opening extends vertically through multiple floors. This procedure shows you how to add, edit, and remove openings on a floor map. It also shows you how to copy openings to other floors.

For more information about openings, see [2D Floor Map Devices and Overlay Objects, on page 8](#).

Step 1 From the top-left corner, click the menu icon and choose **Design > Network Hierarchy**.

Step 2 From the left hierarchy tree, choose a floor.

Step 3 In the map toolbar, click **2D > Add/Edit > Overlays > Openings**.

Step 4 To add an opening, do the following:

- a) From the left pane of the map, click **Opening**.
- b) Click on the map to create a point and initiate the drawing tool.

- c) Continue creating points to define the opening shape.

Note The opening shape must have at least three points. Click and drag a point to redefine the opening shape.

- d) Double-click to exit the drawing tool and finalize the shape.

Step 5 To edit an opening, do the following:

- a) In the map toolbar, click **Add/Edit > Openings**.
- b) To redefine the shape of an opening, click and drag a point.
- c) To move an opening, click inside the shaded area. Then, drag and drop the opening where you want to place it.

Step 6 To copy an opening from one floor to another, do the following:

- a) In the map toolbar, click **Add/Edit > Openings**.
- b) Right-click the opening and choose **Copy to other floors**.
- c) In the dialog box, check the check boxes next to the relevant floors.
- d) Click **Copy**.
- e) Click **Close**.

Step 7 To remove an opening, do the following:

- a) In the map toolbar, click **Add/Edit > Openings**.
- b) Right-click the opening and choose **Remove**.

Step 8 In the map toolbar, click **Save**.

Add, Edit, and Remove Location Regions

Location regions are areas on the map that are either included in or excluded from the heatmap calculation. The following topics show you how to add, edit, and remove location regions.

Add, Edit, and Remove an Inclusion Region

This procedure shows you how to add, edit, and remove an inclusion region. Use the following guidelines to define an inclusion region on a floor map:

- Inclusion regions can be any polygon-shaped area and must have at least three points.
- You can only define one inclusion region on a floor. By default, an inclusion region is defined for each floor area when it is created. The inclusion region is indicated by a solid aqua line, and generally outlines the entire floor area.

For more information about inclusion regions, see [2D Floor Map Devices and Overlay Objects, on page 8](#).

Step 1 From the top-left corner, click the menu icon and choose **Design > Network Hierarchy**.

Step 2 From the left hierarchy tree, choose a floor.

Step 3 In the map toolbar, click **2D > Add/Edit > Overlays > Location Regions**.

Step 4 In the left pane of the map, click the **Inclusion** icon.

Step 5 To create an inclusion region, use the drawing tool:

- a) Click the map to create a point where you want the inclusion region to begin.
- b) Move the cursor to the next point and click again.

- c) Continue creating points to define the inclusion region shape.
- d) To finalize the shape, double-click the map.

Alternatively, from the left pane of the map, click the **Inclusion** icon.

- e) To exit the drawing tool, double-click the map again.

Step 6 To edit the location of an inclusion region, drag and drop the shape to the new location.

Step 7 To remove an inclusion region, right-click the shape and choose **Remove**.

Step 8 In the map toolbar, click **Save**.

Add, Edit, and Remove an Exclusion Region

This procedure shows you how to add, edit, and remove an exclusion region. Use the following guidelines to define exclusion regions on a floor map:

- Exclusion regions can be any polygon-shaped area and must have at least three points.
- Exclusion regions are defined within the borders of an inclusion region.
- You can define multiple exclusion regions on a floor map.

For more information about exclusion regions, see [2D Floor Map Devices and Overlay Objects, on page 8](#).

Step 1 From the top-left corner, click the menu icon and choose **Design > Network Hierarchy**.

Step 2 From the left hierarchy tree, choose a floor.

Step 3 In the map toolbar, click **2D > Add/Edit > Overlays > Location Regions**.

Step 4 From the left pane of the map, click the **Exclusion** icon.

Step 5 To create an exclusion region, use the drawing tool:

- a) Click the map to create a point where you want the exclusion region to begin.
- b) Move the cursor to the next point and click again.
- c) Continue creating points to define the exclusion region shape.
- d) To finalize the shape, double-click the map.

Alternatively, from the map left pane, click the **Exclusion** icon.

- e) To exit the drawing tool, double-click the map again.

Step 6 To edit the location of an exclusion region, drag and drop the shape to the new location.

Step 7 To remove an exclusion region, right-click the shape and choose **Remove**.

Step 8 In the map toolbar, click **Save**.

Add, Edit, and Remove Walls

This procedure shows you how to add, edit, move, and remove walls on a floor map.

For information about how walls impact RF signal attenuation and heatmap calculation, see [2D Floor Map Devices and Overlay Objects, on page 8](#).

-
- Step 1** From the top-left corner, click the menu icon and choose **Design > Network Hierarchy**.
- Step 2** From the left hierarchy tree, choose a floor.
- Step 3** In the map toolbar, click **2D > Add/Edit > Overlays > Walls**.
- Step 4** To add walls, do the following:
- a) In the left pane of the map, click a wall type from the **Others** or **On this floor** category.

Note If a wall type isn't listed, click **Add Wall Type** to create a custom wall type.
 - b) Click the map to create a point where you want the wall to begin.
 - c) Move the cursor to the next point, where you want to end the wall or where you want to create a corner and click again.
 - d) Continue creating points to define the wall shape.
 - e) To end a wall, double-click the map.

Alternatively, from the left pane, click the wall type.
 - f) To exit the drawing tool, double-click the map again.
- Step 5** To change a wall type, and depending on the wall type also configure its parameters, do the following:
- a) Click the wall that you want to change.

The **Wall Type** dialog box opens.
 - b) From the **Wall Type** drop-down list, choose the type of wall.
 - c) Configure any other parameters that are appropriate for the new wall type.
 - d) Click **Update**.
- Step 6** To move a wall, do the following:
- a) Hover your cursor over the wall that you want to move.

The wall turns black, which means it's selected.
 - b) Click the wall and drag and drop it to the new location.
- Step 7** To remove a wall, right-click the wall and choose **Remove**.
- Step 8** In the map toolbar, click **Save**.
-

Add, Copy, Edit, and Remove Shelving Units

This procedure shows you how to add, copy, edit, and remove shelving units on a floor map.

For information about shelving units, see [2D Floor Map Devices and Overlay Objects, on page 8](#).

- Step 1** From the top-left corner, click the menu icon and choose **Design > Network Hierarchy**.
- Step 2** From the left hierarchy tree, choose a floor.
- Step 3** In the map toolbar, click **2D > Add/Edit > Overlays > Shelving Units**.
- Step 4** To add shelving units, do the following:
- a) In the left pane of the map, click the shelving type you want to add.

- b) In the shelving dialog box, configure the name, dimensions, orientation, and whether the unit is double-sided, or leave the default values. Orientation means the angle of the shelving unit. A shelving unit with an orientation of 0 means that the shelving unit is vertical and parallel to the y-axis.

If a shelving type is not in the list, click **Add Shelving Type** to create a shelving type.

- c) Click **Add Shelving**.

The shelving unit is displayed on the map.

- d) Drag and drop the shelving unit to its location on the map.

Step 5

To create a copy or an array of a shelving unit, do one of the following:

- To create a copy, right-click the shelving unit and choose **Clone**.
- To create an array, right-click the shelving unit and choose **Array**. Then specify the number of units and the distance between them.

Step 6

To edit the name, dimensions, orientation, and whether it is two-sided, right-click the shelving unit and choose **Edit**.

Step 7

To remove a shelving unit, right-click the shelving unit and choose **Remove**.

Step 8

In the map toolbar, click **Save**.

Add, Edit, and Remove Markers

The following procedure shows you how to add, edit, and remove markers.

Step 1

From the top-left corner, click the menu icon and choose **Design > Network Hierarchy**.

Step 2

From the left hierarchy tree, choose a floor.

Step 3

In the map toolbar, click **2D > Add/Edit > Overlays > Markers**.

Step 4

In the left pane of the map, click the **Markers** icon.

Step 5

In the **Place Markers** dialog box, enter the name for the marker, and click **Add Marker**.

Step 6

To place the marker, click the map where you want to place the marker.

Step 7

To move a marker, hover your cursor over the marker until it turns blue. Then drag and drop it in the new location.

Step 8

To edit a marker, right-click the marker and choose **Edit**.

Step 9

To remove a marker, right-click the marker and choose **Remove**.

Step 10

In the map toolbar, click **Save**.

Add, Edit, and Remove GPS Markers

This procedure shows you how to add, edit, and remove GPS markers. For more information about GPS markers, see [2D Floor Map Devices and Overlay Objects, on page 8](#).



Note The GPS marker is an attribute of the building. You can apply it to all the floors of the building.

-
- Step 1** From the top-left corner, click the menu icon and choose **Design > Network Hierarchy**.
- Step 2** From the left hierarchy tree, choose a floor.
- Step 3** In the map toolbar, click **2D > Add/Edit > Overlays > GPS Markers**.
- Step 4** To add a GPS marker, do the following:
- In the left pane of the map, click the **GPS Markers** icon.
 - On the map, click the location where you want to place the GPS marker.
GPS markers must be positioned inside the outer-perimeter walls, typically at the building corners.
 - In the **Place Markers** dialog box, enter the name, latitude, longitude, and the x and y coordinates in the appropriate fields.
The latitude and longitude coordinates of the GPS marker located in the northwest corner of a floor must match the building coordinates.
 - Click **Add GPS Marker**.
- Step 5** To edit a GPS marker, right-click the GPS marker and choose **Edit**.
- Step 6** To remove a GPS marker, right-click the GPS marker and choose **Remove**.
- Step 7** In the map toolbar, click **Save**.
-

Add, Edit, and Remove Align Points

This procedure shows you how to add, edit, and remove align points. For more information about align points, see [2D Floor Map Devices and Overlay Objects, on page 8](#).

- Step 1** From the top-left corner, click the menu icon and choose **Design > Network Hierarchy**.
- Step 2** From the left hierarchy tree, choose a floor.
- Step 3** In the map toolbar, click **2D > Add/Edit > Overlays > Align Points**.
- Step 4** To add an alignment point, do the following:
- In the left pane of the map, click the **Align Points** icon.
 - On the map, click the location where you want to place the alignment point.
- Step 5** To edit the name of an alignment point, do the following:
- Right-click the alignment point and choose **Edit**.
 - Change the name and click **Edit Marker**.
- Step 6** To change the location of an alignment point, do the following:
- Right-click the alignment point and choose **Edit**.
 - Click **Edit Marker**.
 - Drag and drop the alignment point to the new location.
- Step 7** To remove an alignment point, right-click the alignment point and choose **Remove**.
- Step 8** In the map toolbar, click **Save**.
-

View a 2D Wireless Heatmap

Use the 2D heatmap to view information about your wireless network.

Step 1 From the top-left corner, click the menu icon and choose **Design > Network Hierarchy**.

Step 2 From the left hierarchy tree, choose a floor.

Step 3 In the map toolbar, click **2D**.

The wireless 2D map opens.

Step 4 To display specific details about devices, do the following, based on the device type:

- **APs:** The AP icon indicates the number of radios, their frequency and health, overall health score of the device, and the AP name and mode. For more information about interpreting the AP icon, see [About the AP Icon and Planned AP Icon, on page 38](#).

To display device details, hover your cursor over an AP icon. Information, such as the AP's Rx neighbors, clients, interferers, and health score, is displayed.

For more details about an AP, in the dialog box, click the **Device 360** link.

Note For **Device 360**, the *Assurance - Base* package is required.

- **Mesh APs:** To display device details, hover your cursor over a mesh AP icon. Information, such as mesh, backhaul, and access data, is displayed.
- **Clients:** To display client information, including a link to its associated AP, hover your cursor over or click a client. For more details about a client, in the dialog box, click the **Client 360** link.
- **Sensors:** To view the status and test results of a sensor, click a sensor icon.
- **Switches and Switch Stacks:** To display the member switches of a switch stack, click the arrow next to the switch stack icon. To display the connections between a switch and its associated APs, hover your cursor over the switch or switch stack icon. The map displays a line showing the connections from the switch and its associated APs. You can also identify switch and AP associations by color. APs connected to one specific switch have labels that match the color code on the switch icon.

Using Cisco Discovery Protocol (CDP), Catalyst Center can detect and display unmanaged switches that are connected to managed APs. An unmanaged switch is depicted as a typical switch icon with a "U" for unmanaged (🔍).

To display device details, click a switch or switch stack icon. A slide-in pane opens and displays the device details and options for the heatmap display. Under **Select Heatmap**, you can click any of the following radio buttons:

- **All visible switches:** Computes and displays the heatmap for all the switches in the visible map area.
- **This switch:** Computes and displays the heatmap for the selected switch only.
- **Rest of visible switches:** Computes and displays the heatmap for all of the visible switches, except for the selected switch.
- **None:** Does not include any switch in the heatmap computation and heatmap display.

Step 5 To display information about a link, click the link. Depending on the type of link, information such as link health and other statistics are displayed.

2D Map Toolbar

For a mesh link, you can perform a link test between two mesh APs.

Step 6 Use the tools and options shown in the following figure to gain insights about your wireless network.

Figure 6: 2D Wireless Map Showing Tools and Options





Callout	Description
1	Map Toolbar: In above the map, use the toolbar options to control what's displayed on the heatmap. For details, see 2D Map Toolbar, on page 32 .
2	View Options Slide-In Pane: In the slide-in pane, use the view options to customize the heatmap display. For details, see 2D Map View Options, on page 35 .
3	Navigation Controls: From the bottom-right corner of the map, use the map navigation controls to manage the heatmap display. For details, see 2D Map Navigation Controls, on page 37 .





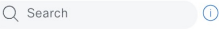
2D Map Toolbar

To access the 2D map, from the top-left corner, click the menu icon and choose **Design > Network Hierarchy**. From the left hierarchy tree, choose a floor, and in the map toolbar, click **2D**.

The map toolbar consists of two bars and is located above the map. Use the map toolbar for the following actions and settings:

Item	Description
	Click 2D to view the wireless map in 2D, or click 3D to view it in 3D.
	Wi-Fi Band Filter: Hover your cursor over the Wi-Fi band filter, and from the drop-down list, choose a Wi-Fi band.

Item	Description
Add/Edit	<p>Click this button to add, edit, and remove the following devices and overlay objects:</p> <ul style="list-style-type: none"> • Devices <ul style="list-style-type: none"> • Access points: For details, see Work with APs on a Floor Map, on page 9. • Sensors: For details, see Add Sensors to a Map, on page 23. • Overlay Objects <ul style="list-style-type: none"> • Coverage areas: For details, see Add, Edit, and Remove Coverage Areas, on page 25. • Openings: For details, see Add, Edit, Copy, and Remove Openings, on page 25 • Location regions: For details, see Add, Edit, and Remove Location Regions, on page 26. • Walls: For details, see Add, Edit, and Remove Walls, on page 27. • Shelving Units: For details, see Add, Copy, Edit, and Remove Shelving Units, on page 28. • Markers: For details, see Add, Edit, and Remove Markers, on page 29. • GPS markers: For details, see Add, Edit, and Remove GPS Markers, on page 29. • Align points: For details, see Add, Edit, and Remove Align Points, on page 30.
Data/Filters	<p>Click Data/Filters to open the Data/Filters slide-in pane that displays a device type list. Choose a device type to view and filter the device data that displays in the wireless map. For details, see Filter Device Data on a Floor, on page 41.</p>
View Options	<p>Click View Options to open the View Options slide-in pane, which contains the options for controlling the display of the map, devices, and overlay objects. For details, see 2D Map View Options, on page 35.</p>

Item	Description
More	<p>Hover your cursor over More, and from the drop-down list, choose one of the following options:</p> <ul style="list-style-type: none"> • Recompute: Recompute the heatmap. • Export: Export the floor map to a PDF or CSV file format. • Edit Floor: Change the floor details, such as its name. • Set Scale: Change the map scale by providing a known measurement on the map: <ol style="list-style-type: none"> 1. Click the map to specify the starting point of the measurement. 2. Click the map again to specify the ending point of the measurement. 3. In the New line length (ft) field, enter the length of the measurement. 4. Click OK. <p>The floor map dimensions are recalculated based on the new measurement.</p> • Measure Distance: Measure a distance on the floor map. Click the map to specify a starting point. Click the map again to specify an ending point. The distance of the measurement is displayed. • CMX/Cisco Spaces Sync History: Display a log that shows when Cisco Connected Mobile Experiences (CMX) and Cisco Spaces synchronized data. The log entries include the request received time, start and end times, status, and failure message (if the operation failed). • Floor Import History: Display the floor import history logs of importing map archive files. The logs detail the successfully and unsuccessfully imported APs, planned APs, and overlay objects.
 Area or Site / Building / Floor	<p>Full Hierarchy Path: Displays the full navigational path of the floor, including its associated building and area or site. Click the down arrow to navigate to a different floor.</p>
	<p>Refresh: Click this icon to update the device and map data. To the left of the icon is the timestamp for the last refresh</p>
	<p>Cisco Spaces Connector: Click this icon to display information, such as the IP address, status, and version, about the Cisco Spaces Connector.</p>
	<p>Map Notification: Hover your cursor over this icon to display map information, such as the number of unpositioned APs or planned APs and filters applied to the map. To remove the filters, click Click to clear.</p>
	<p>Search: Use the Search field to find specific floor map elements such as APs, sensors, clients, and so on. The results of your search are listed in a slide-in pane below the Search field.</p> <p>When you hover your cursor over an element in the list, an indicator points to the element on the map. If the element is outside the field of view, the indicator is displayed as a broken red line. Reorient the map to see the element.</p>

2D Map View Options

To access the 2D map, from the top-left corner, click the menu icon and choose **Design > Network Hierarchy**. From the left hierarchy tree, choose a floor, and in the map toolbar, click **2D > View Options**.

The **View Options** slide-in pane opens. Expand the categories to view the settings:

- **Map:** Contains various floor map and heatmap settings:

Item	Description
Show Grid	Click this toggle button to enable or disable a grid on the floor map. The grid provides the dimensions of the floor map.
Map Opacity %	Use this slider to customize the opacity or transparency of the floor map.
Heatmap Type	<p>The heatmap provides a graphical representation of Radio Frequency (RF) wireless data where the values taken by a variable are represented in maps as colors. RSSI heatmaps are computed based on a floor's RSSI prediction model, antenna type, and its orientation.</p> <p>2D heatmaps use fixed transmit powers: 18 dB for 2.4-GHz; 15 dB for 5-GHz; and 5 dB for 6-GHz.</p> <p>3D heatmaps use real-time transmit power of operational APs and 11 dB for planned APs.</p> <p>Use the drop-down list to choose the heatmap type:</p> <ul style="list-style-type: none"> • Operational RSSI: Coverage heatmap, which identifies the wireless signal strength of operational APs. • Planned RSSI: Hypothetical heatmap that shows the coverage that planned APs would have on a floor. • Operational + Planned (3D-only): (Visible only if the legacy heatmap generator is enabled.) In the 2D map, only operational APs are used to compute the heatmap. To use operational and planned APs in the heatmap computation, you can either enable the 3D-computed heatmap generator or navigate to the 3D map. For information, see the Disable 3D-Computed Heatmap field in this topic. • Operational + Planned: (Visible only if the 3D-computed heatmap generator is enabled.) Coverage heatmap created using both operational and planned APs. • Client Density: Density of associated clients. • IDS: Heatmap that shows the monitor mode AP coverage provided to the wireless clients on a floor map.
RSSI Cut off (dBm)	Use this slider to set the threshold for the RSSI value to appear on the heatmap. RSSI values that do not meet the threshold are faded.
Heatmap Opacity %	Use this slider to customize the opacity or transparency of the heatmap.
Heatmap Color Scheme	Customize the color scheme of the power level for the heatmap. The options are Legacy , Natural , and Monochrome . Note that Monochrome only supports the Contour option for the Heatmap Shape .
Heatmap Shape	Customize the color progression of the power level on the heatmap. The options are Contour and Gradient .

- **Access Points:** Click this toggle button to enable or disable the AP icons on the floor map.

Expand this category to configure the type of label to display with each AP. Valid label types are **Name**, **MAC address**, **IP address**, **Bridge Group Names**, and so on. From the **Display Label** drop-down list, choose a label type.

To display other details about APs, see [View a 2D Wireless Heatmap, on page 31](#).

- **Planned Access Points:** Click this toggle button to enable or disable the appearance of planned AP icons on the floor map.

Expand this category to display labels with the planned AP name. From the **Display Label** drop-down list, choose a label type.

- **Switches:** Click this toggle button to enable or disable the appearance of switch or switch stack icons on the floor map. Using Cisco Discovery Protocol (CDP), Catalyst Center can detect and display unmanaged switches that are connected to managed APs. An unmanaged switch is depicted as a typical switch icon with a "U" for unmanaged.

Expand this category to display labels with the switch name, MAC address, or AP count. (For unmanaged switches, only the switch name and AP count are available.) From the **Display Label** drop-down list, choose a label type.

To display other details about switches, see [View a 2D Wireless Heatmap, on page 31](#).

- **Sensors:** Click this toggle button to enable or disable the appearance of sensor icons on the floor map.

Expand this category to display labels with the sensor name, MAC address, or AP count. From the **Display Label** drop-down list, choose a label type.




To display other details about sensors, see [View a 2D Wireless Heatmap, on page 31](#).

- **Mesh:** Click this toggle button to enable or disable the appearance of mesh APs on the floor map.

Expand this category to configure options that control how the mesh AP-to-root AP link relationships are displayed:

- **Link Label:** To disable link labels, click the **None** radio button. To display labels for link signal-to-noise ratios, click the **Link SNR** radio button. To display labels for packet error rates, click the **Packet Error Rate** radio button. The link label setting is reflected on the map immediately.
- **Link Color:** To disable link color, click the **None** radio button. To display link signal-to-noise ratios in color, click the **Link SNR** radio button. To display packet error rates in color, click the **Packet Error Rate** radio button.

The link color settings are reflected on the map immediately. See the following table for color definitions.

Link Color	Link Signal Noise Ratio (SNR)	Packet Error Rate (PER)
	Represents an SNR above 25 dB (high value)	Represents a PER of one percent (1%) or lower
	Represents an SNR between 20 dB and 25 dB (acceptable value)	Represents a PER that is less than ten percent (10%) and greater than one percent (1%)
	Represents an SNR below 20 dB (low value)	Represents a PER that is greater than ten percent (10%)

- **Mesh Parent-Child Hierarchical View:** Choose which mesh APs to display. From this drop-down list, choose **Select Only Root APs**, **Select up to 1st hops**, **Select up to 2nd hops**, **Select up to 3rd hops**, **Select up to 4th hops**, or **Select All**.
- **Overlay Objects:** Expand this category and click any of the overlay objects to enable or disable the overlay objects on the floor map.
- **Clients:** Click this toggle button to enable or disable the appearance of client icons on the floor map.
Expand this category to display labels with the client name, MAC address, or AP count. From the **Display Label** drop-down list, choose a label type.
To enable or disable clients in close proximity to be grouped together, click the **Show Client Clusters** toggle button.
- **Interferers:** Click this toggle button to enable or disable the appearance of client icons on the floor map.
Expand this category to enable or disable the appearance of a zone of impact from interferers. Click the **Show Zone of Impact** toggle button.
- **Map Properties:** Expand this category to configure the following settings on the map:
 - **Auto Refresh:** From this drop-down list, choose a time interval for the map display to be refreshed.
 - **Heatmap Walls Limit:** (Available only with the 3D-computed heatmap generator.) Enter the number of walls to be used in the heatmap computation. The more walls included, the longer it takes to compute the heatmap. The default and recommended limit is 3000.
 - **Mesh SNR Colors** and **Mesh PER Colors:** (Available only when mesh devices are present.) Enter the threshold ranges and their corresponding colors.
- **Global Map Properties:** Expand this category to configure the following settings for all wireless maps:
 - **Units of Measure:** From the drop-down list, choose either **Feet** (imperial system) or **Meters** (metric system).
 - **Disable 3D-Computed Heatmap:** Click this toggle button to disable the default 3D-computed heatmap generator and enable the legacy heatmap generator. Be aware that computation and rendering using the legacy heatmap generator is not as fast as the 3D-computed heatmap, and you can't configure a limit on the number of walls to be included to compute the heatmap. (The **Heatmap Walls Limit** field is removed from the display.) The maximum number of walls using the legacy heatmap generator is 300, after optimization. If your floor map contains more, Catalyst Center alerts you and preserves the 300 most relevant walls (based on the length of the wall multiplied by its attenuation).






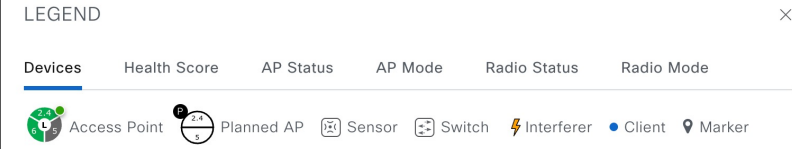
The 3D-computed heatmap generator offers several advantages over the legacy heatmap generator. It uses the specialized graphics processing unit (GPU), which allows it to generate the heatmaps substantially faster than the legacy heatmap generator. In addition, you can set a limit to the number of walls that are included in a heatmap computation, which also helps to enhance processing speed.

2D Map Navigation Controls

To access the 2D map, from the top-left corner, click the menu icon and choose **Design > Network Hierarchy**. From the left hierarchy tree, choose a floor, and in the map toolbar, click **2D**.

The 2D map navigation controls are located at the bottom-right of the map. For details about the map, see [View a 2D Wireless Heatmap, on page 31](#).

Use the map navigation controls for the following functions:

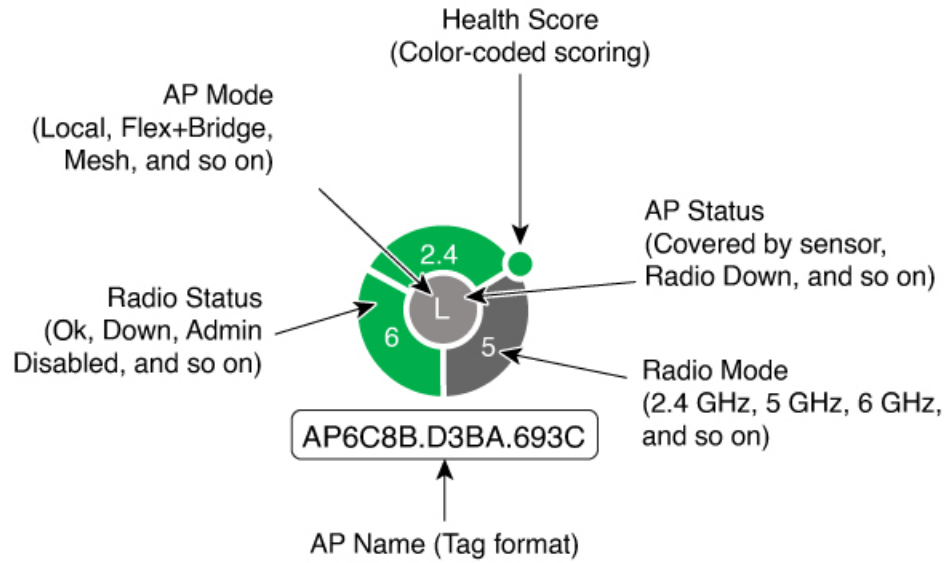
Map Navigation Controls	Description
	Select by rectangle: Displays only in editing mode. Use this icon to select multiple APs in a contiguous area on the map. First click this icon, then click an area on the map, and drag the highlighted rectangle. All the highlighted APs within the rectangle are selected.
	Alert: This icon displays when you choose to remove a banner notification without first resolving the error by clicking Do not show this alert anymore . When the error is resolved, the system doesn't display this alert icon.
	Default Map View: Click to reset the map view to the default.
	Zoom In / Zoom Out: Click the zoom in and out icons to enlarge and reduce the size of the map. Alternatively, you can use your mouse wheel to zoom in and out.
	<p>Map Legend: Click this icon to view the map legend, which describes the map icons such as the device type, average health score, and AP status. For more information about the AP icon and planned AP icon, see About the AP Icon and Planned AP Icon, on page 38.</p> 

About the AP Icon and Planned AP Icon

AP Icon

AP icons provide information about the configuration and health of the APs in your network. The circular AP icon is divided into radio bands that are color coded to show the radio status. Its center circle displays a letter for the AP mode. The background color of or "X" over its center circle shows the AP status. The color-coded small circle in the upper-right corner of the AP icon displays the health score. For the color-coding details of the radio status, AP status, and the health score, see the map legend in a 2D floor map.

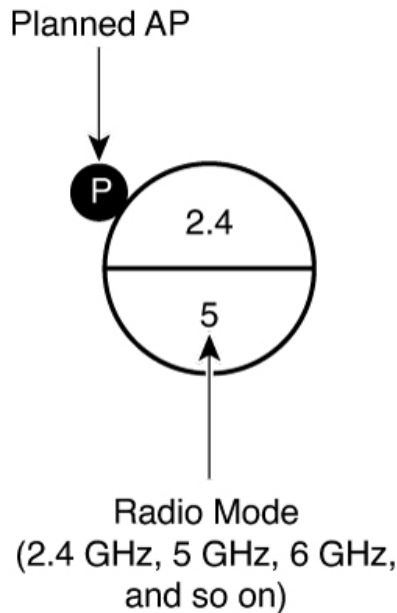
The following diagram shows all the elements of an AP icon:



Planned AP Icon

Planned AP icons provide information about the configuration of the planned APs in your network. The circular planned AP icon is divided into radio bands and displays a "P" in its upper-left corner. For more information about the radio mode, see the map legend in a 2D floor map.

The following diagram shows all the elements of a planned AP icon:



View an Unmanaged Switch Connected to Managed APs

Catalyst Center can detect the unmanaged switches in your network and the managed APs to which they are connected. The unmanaged switches and their connections to APs can be displayed in a 2D floor map. This capability is helpful if you have switches that you don't want to manage using Catalyst Center, but you still want to view them in relation to your managed APs.



Note This feature is not supported on Cisco AireOS Wireless LAN Controllers.

Before you begin

- Install and configure Catalyst Center Platform. For information, see the [Cisco Catalyst Center Platform User Guide](#).
- Enable Cisco Catalyst Assurance. For information, see the [Cisco Catalyst Assurance User Guide](#).
- Enable Cisco AI Network Analytics data collection. For information, see [Cisco Catalyst Assurance User Guide](#).
- Add wireless controllers to the Catalyst Center Inventory and provision them so that their telemetry data is available to Catalyst Center. For information, see [Provision Embedded Wireless on Cisco Catalyst 9000 Series Switches](#) or [Provision a Cisco Catalyst 9800 Series Wireless Controller](#), as appropriate.

Step 1 From the top-left corner, click the menu icon and choose **Design > Network Hierarchy**.

Step 2 From the left hierarchy tree, choose a floor.


Step 3 In the map toolbar, click **2D**.

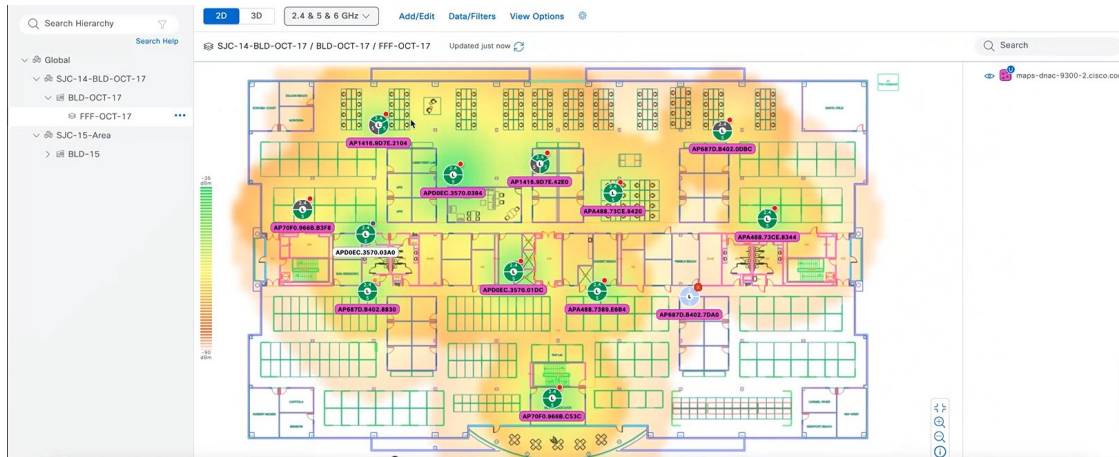
The wireless 2D map opens and displays the APs that have been added.

Step 4 Add APs to the floor map. For information, see [Add APs to a Map, on page 10](#).

Note If an AP is in Local, Bridge, or FlexConnect mode, connect it to the unmanaged switch and join it to a wireless controller.

After Catalyst Center refreshes the display, any unmanaged switches are listed in the right pane.

An unmanaged switch is depicted as a typical switch icon with a "U" for unmanaged (.



- Step 5** (Optional) Hover your cursor over an unmanaged switch to display links between the switch and the APs to which it is connected.
- Step 6** (Optional) Click the unmanaged switch to display additional details about the switch in a slide-in pane. All information that is available for managed switches is also available for unmanaged switches, except for the MAC address and its reachability status.

For more information about the elements, tools, and options available on 2D maps, see [View a 2D Wireless Heatmap](#), on page 31.

Filter Device Data on a Floor

For 2D wireless maps, you can apply various filters to network devices such as APs, sensors, and so on. Based on the filter criteria, the search results display in a table. Filtering device data is helpful in locating specific devices on floors with many devices.

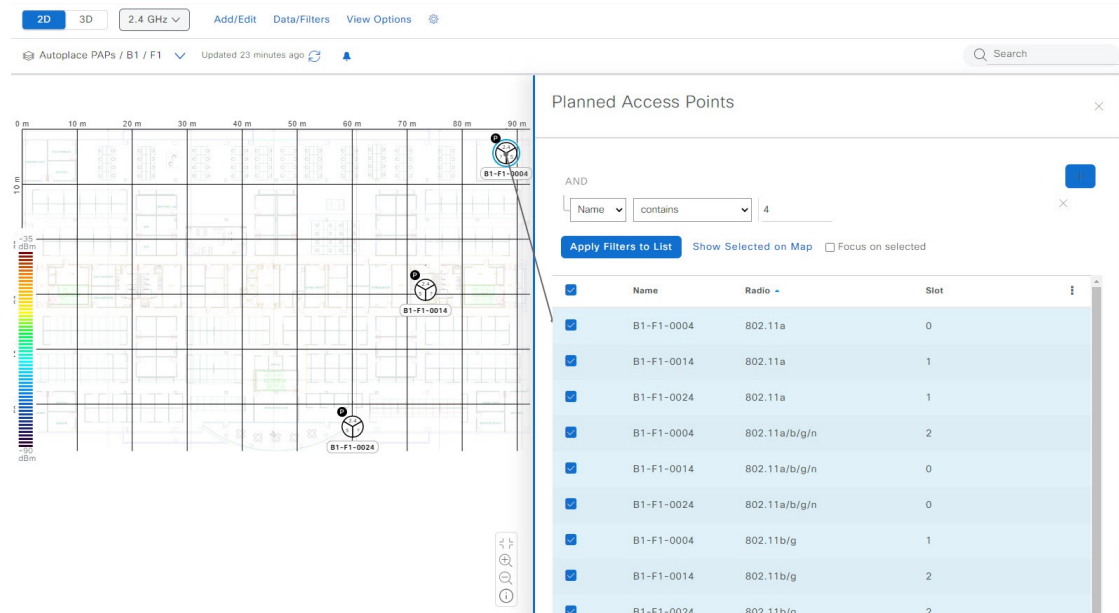
- Step 1** From the top-left corner, click the menu icon and choose **Design > Network Hierarchy**.
- Step 2** From the left hierarchy tree, choose a floor.
- Step 3** In the map toolbar, click **2D**.
- Step 4** In the map toolbar, click **Data/Filters**.
- Step 5** In the **Data/Filters** slide-in pane, click the device type that you want to apply a filter to.
- Step 6** Define the filter rules by using the drop-down lists to choose the parameters.
- Step 7** To add more filter rules, click the + icon near the top of the slide-in pane.
- Step 8** To customize the columns displayed in the table, do the following:
- In the top-right corner of the table, click the three vertical dots.
 - To display a column, check the check box next to the column name.
 - To hide a column, uncheck the check box next to the column name.
 - Click **Apply**.

Step 9

When you're done, you can do any of the following:

- To display the results of your filter in the table, click **Apply Filters to List**.
- To display the results of your filter in the map, click **Show Selected on Map**.
- To locate the position of a device on the map, hover your cursor over the device in the table. A line is displayed from the device to its position on the map.

Figure 7: Locating a Device from the Filter Results

**Step 10**

To remove applied filters, in the lower map toolbar, hover your cursor over the notifications icon and click **Click to clear**.

Step 11

To return to the **Data/Filters** slide-in pane, click **Data/Filters** from the navigation path in the top-left corner.

Step 12

To close the slide-in pane and save the filter, click **x**.

Identify Wireless Interferers on the Floor Map

This feature is a 2D map feature.

Catalyst Center can detect interference and disable the interference source for a specific band on a floor map. Any interference in the 2.4-GHz band disrupts the network traffic of the 802.11 wireless network.

Catalyst Center can identify the position, area of impact, and intensity of the interferer.

This procedure shows how to identify network interferers on a floor map.

Before you begin

Ensure that either Cisco Connected Mobile Experiences (CMX) or Cisco Spaces is integrated with Catalyst Center. For information, see [About Cisco Spaces Integration](#).

-
- Step 1** From the top-left corner, click the menu icon and choose **Design > Network Hierarchy**.
- Step 2** From the left hierarchy tree, choose a floor.
- Step 3** In the map toolbar, click **2D**.
- Step 4** In the **Network Hierarchy** window, click **View Options**.
- Step 5** In the **View Options** window, scroll down and click the **Interferers** toggle button to enable interferers to be displayed on the floor map.
- Step 6** Expand the **Interferers** category and click the **Show Zone of Impact** toggle button to enable the zone of impact of interferers to appear on the floor map.
- Note** By default, **Zone of Impact** is disabled.
- Step 7** On the floor map, hover your cursor over the interferer icon and click the impacted channel to view the interferer device details.
-

Work with 3D Maps

3D maps are primarily used to plan and analyze a wireless network on a floor. As such, there are minimal configuration and edit functions that you can perform in 3D maps.

With 3D wireless maps, you can view a 3D representation of your wireless network. A near real-time predictive model dynamically updates the 3D map to show changes in RF coverage.

Prerequisite

The system you use to compute and display 3D wireless heatmaps must have a Graphical Processing Unit (GPU) installed and enabled on it. For example, if you're using a Windows virtual machine (VM), you need to make sure that it has a GPU.

3D Maps Features and Functionality

Here are some of the unique features and functionality that 3D wireless maps offers:

- Navigate through your wireless network in a 3D environment with a first person view or third person view.
- Gain insights into the areas in your wireless network where service-level agreements (SLAs) are not being met.
- Run an optimizer tool to compute the best AP layout to meet your SLAs.
- View the RF coverage for different elevations and use the **Scanner** tool to view the RF coverage for specific elevations.
- Crop the Key Performance Indicator (KPI) heatmap with the clipping tools.
- Predict the x, y, z coordinates of a specific point on the floor plan with the pin tool to better plan for placement of APs or sensors.
- Visualize floor plan elements, such as walls, in 3D to see how they affect RF coverage and attenuation.

- Simulate your wireless network in various configurations to see how the wireless coverage on a floor is affected. You can save these simulations and open them later to make more changes.
- Modify KPIs, telemetry, and 3D map element settings to customize your map display.

Configure Floor Map Elements and Overlays in 3D Maps

In 3D maps, you are limited to the following configuration and edit functions:

- [Clone an AP, on page 44](#)
- [Edit an AP, on page 18](#)
- [Edit Multiple APs, on page 20](#)
- [Reposition an AP on a Map, on page 17](#)
- [Reposition a Sensor on a Map, on page 24](#)

To configure other floor map elements or overlays, you need to use the 2D map. For details, see [2D Floor Map Devices and Overlay Objects, on page 8](#).

Clone an AP

You can duplicate an AP with its configuration by cloning it.

Before you begin

You must have actual APs to clone.

-
- Step 1** From the top-left corner, click the menu icon and choose **Design > Network Hierarchy**.
 - Step 2** From the left hierarchy tree, choose a floor.
 - Step 3** In the map toolbar, click **3D**.
 - Step 4** In the map toolbar, click the **Simulation** toggle button to view the map in simulation mode.
 - Step 5** In the map toolbar, click **Edit/Clone**.
 - Step 6** On the map, click an AP.
 - Step 7** In the **AP Details** slide-in pane, click **Clone**.

A duplicate AP is created and displayed below the original AP. Its name is appended with **-1**. If you keep cloning the same AP, the name continues to be incrementally appended. For example, the first clone for **a-floor1-ap01** is named **a-floor1-ap01-1**, the second clone for the same AP is named **a-floor1-ap01-2**, and so on.
 - Step 8** On the map, right-click the cloned AP and choose **Move**.
 - Step 9** Drag and drop the AP to its new position.
 - Step 10** Click **Save**.
-

View a 3D Wireless Heatmap

Use this procedure to view a 3D wireless map.

Step 1 From the top-left corner, click the menu icon and choose **Design > Network Hierarchy**.

Step 2 From the left hierarchy tree, choose a floor.

Step 3 In the map toolbar, click **3D**.

The 3D wireless map opens.

Note A 3D heatmap is delimited by its coverage area, which is the full floor width and length, by default. To specify a polygon for the heatmap boundaries, click **2D > Add/Edit > Overlays** and, in the left pane of the map, click **Coverage Area**. You can add and edit the coverage area in the 2D map. However, these boundaries don't apply to the 2D map view because the full floor width and length are used for the 2D map view.

Step 4 To display specific details about devices, hover your cursor over the device icon. Information about the device is displayed in a dialog box.

Note If the *Assurance - Base* package is installed, a link to the **Device 360** window is also displayed in the dialog box.

Step 5 To view the heatmap for one or more APs, select and deselect the APs using one of the following methods:

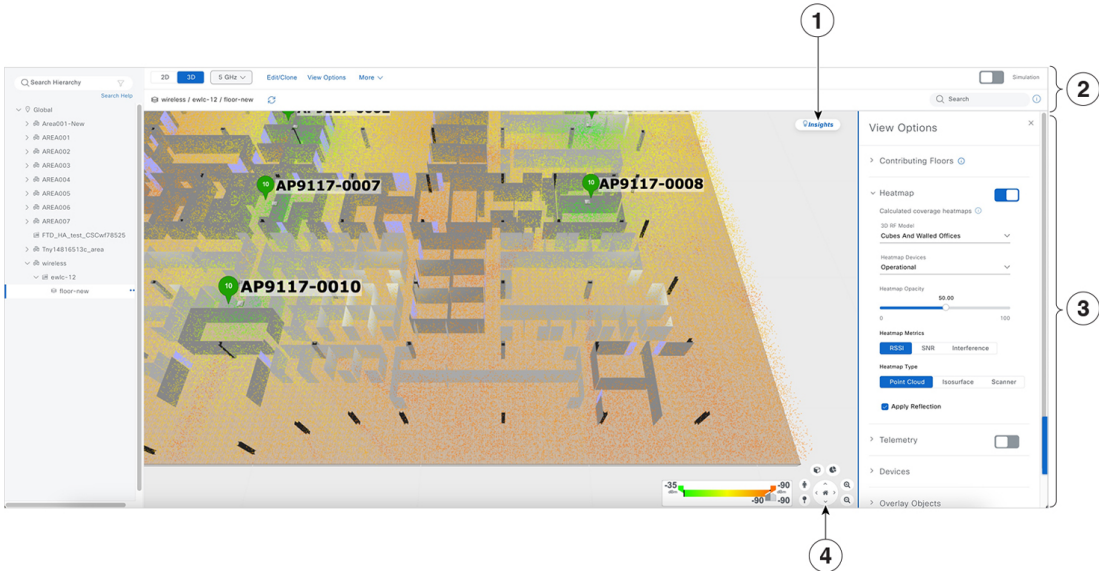
- To select a single AP, click the AP.
- To select multiple APs, press the **Shift** key while clicking each AP, and then release the **Shift** key.
- To deselect a single AP, click the AP.

Note If no APs are selected, the heatmap includes all APs.

- To deselect all APs, press the **ESC** key or double-click an area of the map that doesn't have any APs.

Step 6 Use the tools and options shown in the following figure to gain insights about your wireless network.

Figure 8: 3D Wireless Map Showing Tools and Options






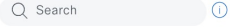
Callout	Description
1	Insights Option: In the top-right corner of the map, click Insights to view and understand potential issues in your wireless network. For details, see Gain Insights from a 3D Wireless Map, on page 56 .
2	Map Toolbar: Above the map, use the toolbar options to control what's displayed on the heatmap. For details, see 3D Wireless Map Toolbar, on page 46 .
3	View Options Slide-In Pane: In the slide-in pane, use the view options to control the heatmap display. You can manipulate elements, such as which floors are displayed, heatmap coverage and metrics, telemetry thresholds, devices and clients, overlay objects, and the depiction of a floor and sky. For details, see 3D Map View Options, on page 47 .
4	Navigation Controls: In the bottom-right corner of the map, use the map navigation controls to view the heatmap from various perspectives. For details, see 3D Map Navigation Controls, on page 50 .

3D Wireless Map Toolbar

To access the 3D map, from the top-left corner, click the menu icon and choose **Design > Network Hierarchy**. From the left hierarchy tree, choose a floor, and in the map toolbar, click **3D**.

The map toolbar consists of two bars and is located above the map. Use the map toolbar for the following actions and settings:

Item	Description
<div style="display: flex; gap: 10px;"> 2D 3D </div>	Click 3D to view the wireless map in 3D, or click 2D to view it in 2D.

Item	Description
	Wi-Fi Band Filter: Hover your cursor over the Wi-Fi band filter, and from the drop-down list, choose a Wi-Fi band.
Edit/Clone	Click Edit/Clone to edit or clone existing or planned APs. For details, see Clone an AP, on page 44 . Note Adding operational APs from the inventory is not available in the 3D map. To add operational APs, click Add/Edit in the 2D map toolbar.
View Options	Click View Options to open the View Options slide-in pane, which contains the options for controlling the display of the contributing floors, map, telemetry, devices, overlay objects, and floor geometry. For details, see 3D Map View Options, on page 47 .
More	Hover your cursor over More , and click Insights Configuration to customize the conditions for insights. For details, see Gain Insights from a 3D Wireless Map, on page 56 .
Simulation	Click the Simulation toggle button to view the map in simulation mode. When the 3D wireless map enters simulation mode, the lower map toolbar displays the message: "You are in Simulation Mode". For details, see Create Simulations for 3D Wireless Maps, on page 58 . Note Simulation mode is available only in 3D maps, not in 2D maps.
 Area or Site / Building / Floor	Full Hierarchy Path: Displays the full navigational path of the floor, including its associated building and site.
	Refresh: Click the refresh icon to update the device and map data.
	Search: Use the Search field to find specific floor map elements such as APs, sensors, clients, and so on. The results of your search are listed in a slide-in pane below the Search field. When you hover your cursor over an element in the list, an indicator points to the element on the map. If the element is outside the field of view, the indicator is displayed as a broken red line. Reorient the map to see the element.

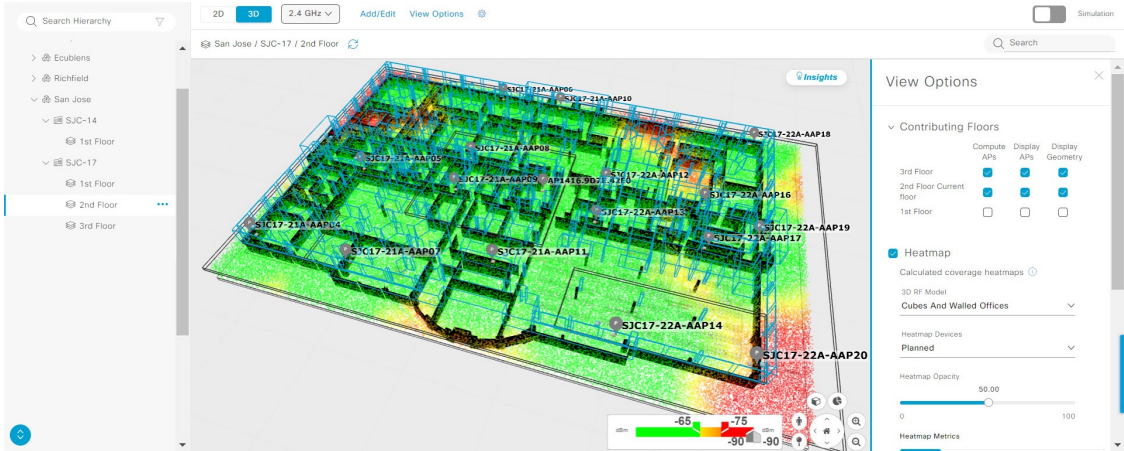
3D Map View Options

To access the 3D map, from the top-left corner, click the menu icon and choose **Design > Network Hierarchy**. From the left hierarchy tree, choose a floor, and in the map toolbar, click **3D > View Options**.

The **View Options** slide-in pane opens. Expand the categories to view the settings:

- **Contributing Floors:** Expand this option to include more floors in the heatmap computation. When including a floor, you can choose to add its APs in the heatmap computation and display its APs and floor geometry. Click **Apply** to generate the heatmap with your settings.

Figure 9: 3D Map of Multiple Floors



Item	Description
Compute APs	Check this check box to include a floor's APs when computing the heatmap.
Display APs	Check this check box to display a floor's APs in the heatmap.
Display Geometry	Check this check box to display a floor's physical attributes in the heatmap.

- **Heatmap:** Click the **Heatmap** toggle button to display the heatmap, and expand this option to configure the settings using the following table:

Item	Description
3D RF Model	Use this drop-down list to choose the RF model. The RF model determines how RF is calculated based on the floor geometry. Available models include drywall offices, cubes and walled offices, free space, outdoor open space, and indoor high ceiling. Note We recommend that you choose Free Space if you manually placed the walls or imported them from a CAD file or Ekahau project. If you didn't manually place the walls, use an RF model other than Free Space .
Heatmap Devices	Use this drop-down list to choose whether to display operational devices, operational and planned devices, or only planned devices on the heatmap.
Heatmap Opacity	Use this slider to customize the opacity or transparency of the heatmap.

Item	Description
Heatmap Metrics	Choose the type of metrics to display on the heatmap: <ul style="list-style-type: none"> • RSSI: Displays the Received Signal Strength Indicator (RSSI) values. • SNR: Displays the signal-to-noise ratio (SNR) values. • Interference: Displays the SNR that is caused by co-channel interference (CCI) or adjacent channel interference. • Leakage: Displays signal leakage between floors. For this option to be available, you must compute the heatmap with two or more contributing floors.
Heatmap Type	Choose the heatmap type: <ul style="list-style-type: none"> • Point Cloud: Provides a collection of data points in space. Each data point has x, y, and z coordinates. • Isosurface: Represents the RSSI with isolines or lines of a contiguous value. • Scanner: Displays the RSSI for a specific elevation.
Apply Reflection	Check this check box to show signal reflection, which can be caused when a signal bounces off materials such as glass, whiteboards, and plastic.

- **Telemetry**: Click the **Telemetry** toggle button to enable and disable telemetry. When telemetry is enabled, click a sensor or AP to view its telemetry:
 - The telemetry for a sensor displays the predicted and measured RSSI values between a sensor AP and other APs.
 - The telemetry for an AP displays the predicted and measured RSSI values between neighbor APs.

Expand this option to use the **Telemetry Threshold** slider to set the threshold for telemetry sources to be displayed on the heatmap. Telemetry sources with predicted values that do not meet the threshold are faded.

- **Devices**: Expand this option to configure the settings using the following table:

Item	Description
APs	Check this check box to display APs on the map.
Planned APs	Check this check box to display planned APs on the map.
Sensors	Check this check box to display sensors on the map.

Item	Description
Clients	<p>Check this check box to display clients on the map. Additionally, you can do the following:</p> <ul style="list-style-type: none"> • Display clients in their default blue color (None) or by their RSSI, SNR, or Health Score. For RSSI, SNR, and Health Score, clients are colored blue, yellow, or red, depending on their current condition. • Use the Ball Size slider to change the size of the ball that represents a client on the map.

- **Overlay Objects:** Expand this option to configure the settings using the following table:

Item	Description
Geometry	Check this check box to display the floor geometry.
Height	Use this slider to set the height of walls on the heatmap.

- **Map:** Expand this option to configure the settings using the following table:


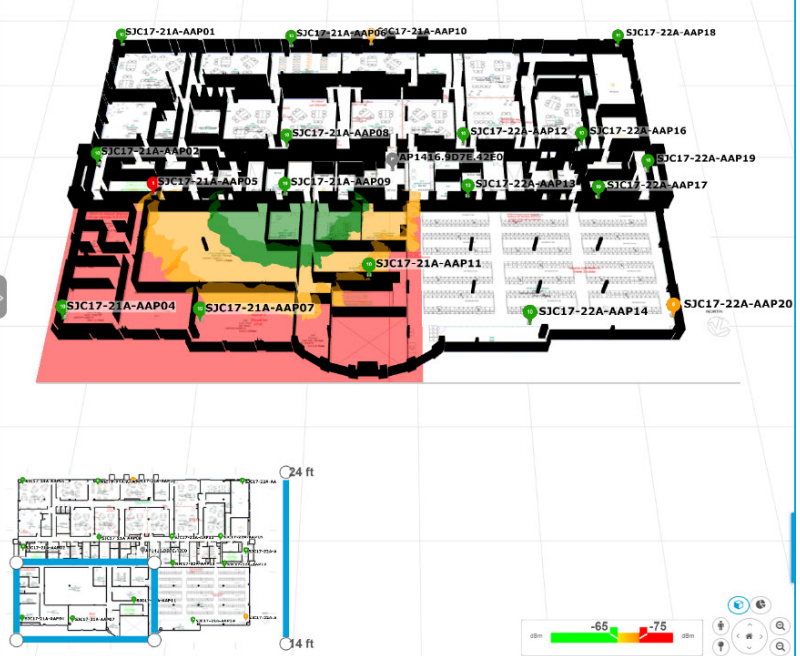
Item	Description
Sky	Check this check box to display the sky in the heatmap.
Floor	Check this check box to display the floor in the heatmap.




3D Map Navigation Controls



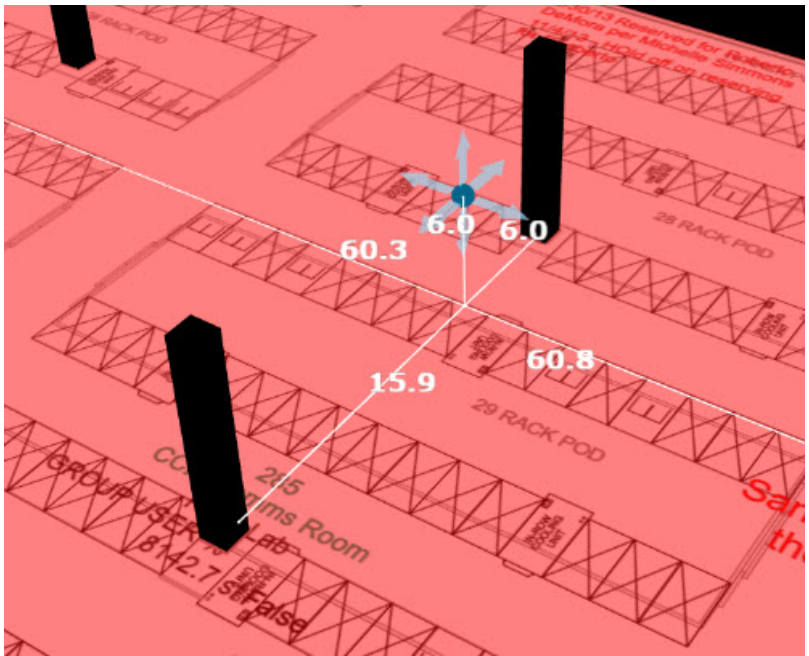

To access the 2D map, from the top-left corner, click the menu icon and choose **Design > Network Hierarchy**. From the left hierarchy tree, choose a floor, and in the map toolbar, click **3D**.



The 3D map navigation controls are located at the bottom-right corner of the map. For details about the map, see [View a 3D Wireless Heatmap, on page 45](#).

Use the map navigation controls at the bottom-right corner of the map to control the map view.

Map Navigation Control	Description
	<p>Use clip box: Click this icon to crop the heatmap using a box shape. Use the clipper at the bottom-left corner of the map to specify the crop:</p> <ul style="list-style-type: none"> • Click and drag one of the anchor points to change the size of the crop. • Click and drag one of the anchor points on the right vertical slider to specify the height range of the crop. <p>Figure 10: Clip Box</p> 

Map Navigation Control	Description
	<p>Use clip planes: Click this icon to crop the heatmap using a donut shape. Use the clipper at the bottom-left corner of the map to specify the crop:</p> <ul style="list-style-type: none"> • Click and drag the anchor point in the center of the donut to reposition the donut. • Click and drag the two outer anchor points to change the shape of the crop. <p><i>Figure 11: Clip Planes in Use</i></p> 
	<p>First Person View: Click this icon to switch between first-person view and third-person view.</p> <p>The blue sphere indicates your position on the map. As you move throughout the map, your field of view changes. You can use the mini map at the lower-left corner to get an idea of your field of view and orientation.</p> <p>Note If you have more than one floor selected for display, the First Person View automatically positions you on the current floor.</p> <p>For details, such as the controls for view, see Use First-Person and Third-Person Views for 3D Wireless Maps, on page 54.</p>

Map Navigation Control	Description
	<p>Third Person View: Click this icon to switch between first person view and third person view. You can also drag and drop the icon on the map where you want to be positioned.</p> <p>The blue sphere indicates your position on the map. As you move throughout the map, your field of view changes. You can use the mini map at the lower-left corner to get an idea of your field of view and orientation.</p> <p>For details, such as the controls for view, see Use First-Person and Third-Person Views for 3D Wireless Maps, on page 54.</p>
	<p>Place a pin: Click this icon to view a predicted measurement (x, y, and z coordinates) of a specific point on the floor map. By placing a pin, you can view the measurements of the distance from the pin to the end of the yard stick. As you zoom in or zoom out, the position of the measurements is adjusted to stay in your view. Drag and drop the pin to change its position, as follows:</p> <ul style="list-style-type: none"> • To move the pin horizontally: Click the horizontal arrows and drag the pin left, right, forward, or backward. The selected arrows and yard stick are highlighted while active. • To move the pin vertically: Click the vertical arrows and drag the pin up or down. The selected arrows and yard stick are highlighted while active. <p>For a video demonstration, click here.</p> <p>Figure 12: Adjusting a Pin</p> 
	<p>Zoom In: Click this icon to enlarge the view. Alternatively, you can use your mouse wheel to zoom in.</p>

Map Navigation Control	Description
	Zoom Out: Click this icon to reduce the size of the image and to increase your field of view. Alternatively, you can use the scroll wheel on your mouse to zoom out.
	Map Rotation and Default Map View: Click the directional arrows to change the camera angle. Click the Return Home icon to reset the map to the default view.



Use First-Person and Third-Person Views for 3D Wireless Maps

You can use the first-person and third-person views to gain different perspectives of your wireless network.

Step 1 From the top-left corner, click the menu icon and choose **Design > Network Hierarchy**.

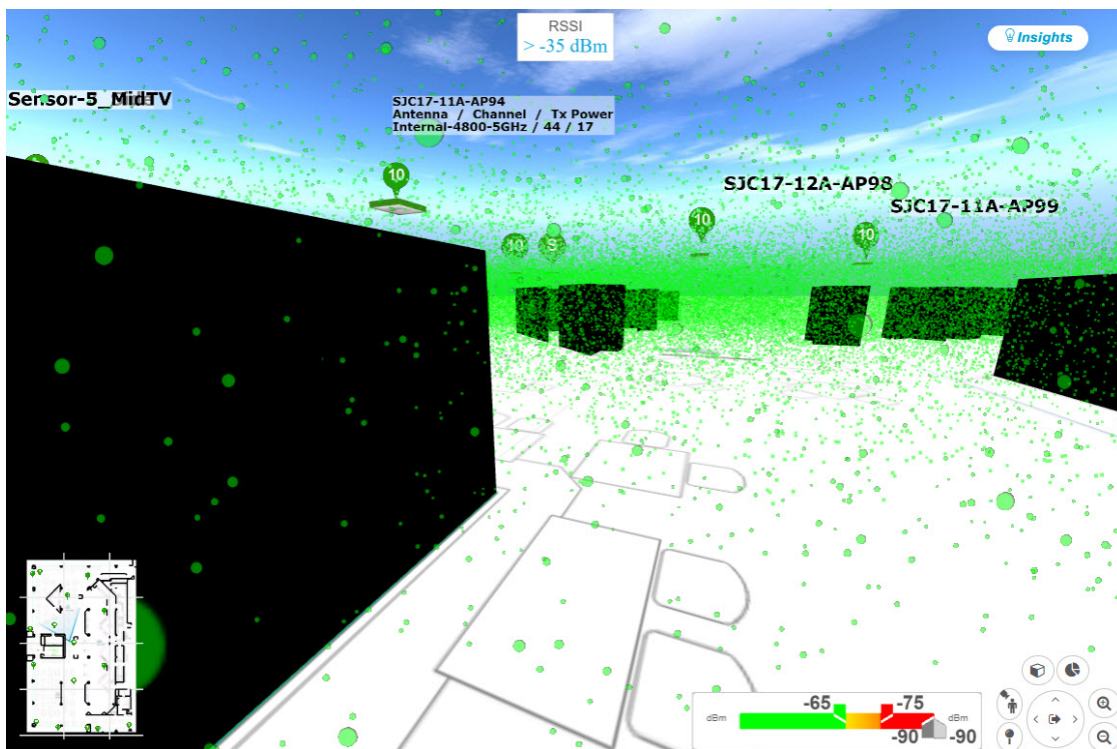
Step 2 From the left hierarchy tree, choose a floor.

Step 3 In the map toolbar, click **3D**.

Step 4 To use the first-person view, click the first-person view icon  in the map navigation controls. Optionally, you can drag and drop the person icon  to a specific location on the map.

The map view changes to the first-person view.

Figure 13: First-Person View



Step 5 You can control the first-person view by doing the following:

Action	Controls
Move forward/backward and right/left.	Use the W , A , S , and D keys or arrow keys.
Change the camera angle.	Click and hold the left mouse button on the map and move the mouse wheel.
Raise the altitude of the camera angle.	Hold the Spacebar .
Lower the altitude of the camera angle.	Hold Shift + Spacebar .


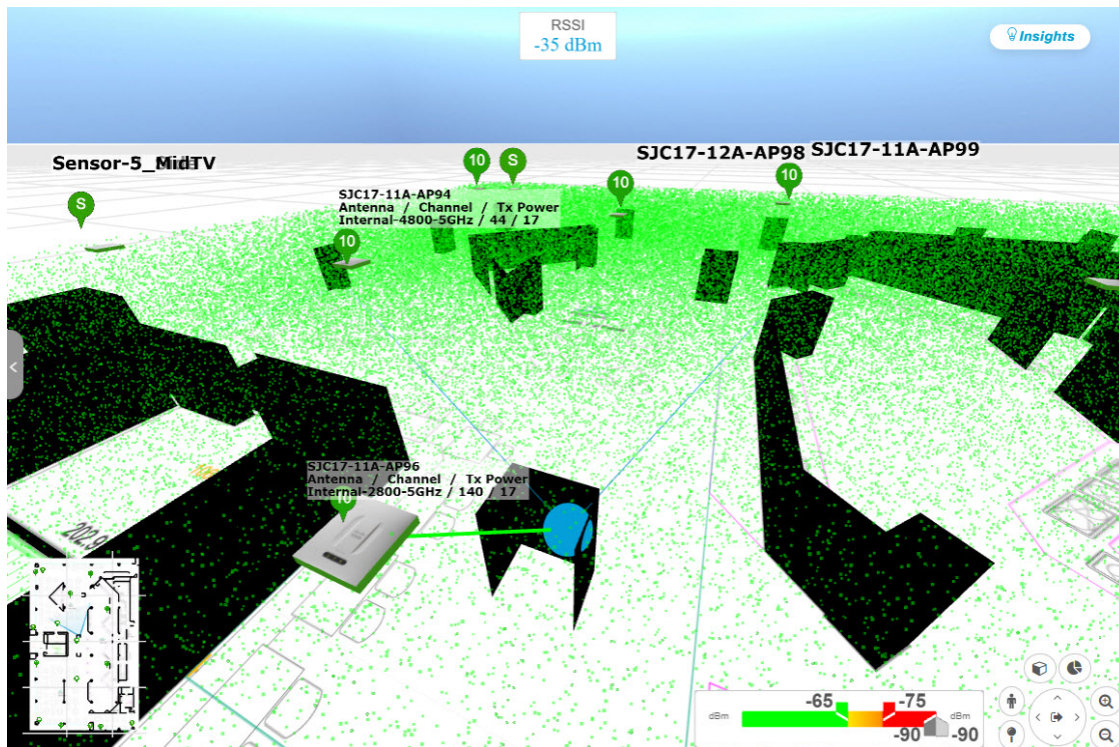
Step 6 To use the third-person view, click the third-person view icon  from the map navigation controls. The map view changes to the third-person view.

Figure 14: Third-Person View



Step 7 You can control the third-person view by doing the following:


Action	Controls
Move forward/backward and right/left.	Use the W , A , S , and D keys or arrow keys.
Change the camera angle.	Click and drag on the map.
Raise the altitude of the camera angle.	Hold the Spacebar .

Action	Controls
Lower the altitude of the camera angle.	Hold Shift + Spacebar .

Step 8 To return to the default view, click the return home icon



Display Details About APs and Clients

If you have a location service, such as Cisco Spaces or Cisco Connected Mobile Experiences (CMX), installed on Catalyst Center, you can view the locations of clients on a floor. Clients are identified as a small blue ball () on the map.

Step 1 From the top-left corner, click the menu icon and choose **Design > Network Hierarchy**.

Step 2 From the left hierarchy tree, choose a floor.

Step 3 In the map toolbar, click **3D**.

Note A 3D heatmap is delimited by its coverage area, which is the full floor width and length, by default. To specify a polygon for the heatmap boundaries, edit the **Coverage Area** field value in the 2D map view. However, these boundaries do not apply to the 2D map view because the full floor width and length are used for the 2D map view.

Step 4 To display details about an AP, click the AP.

Step 5 To display information about a client, hover your cursor over the ball (client).

A line is drawn between the client and its associated AP. A dialog box is displayed with information, such as the client's IPv4 address, IPv6 IP address, RSSI value, and so on. To open the **Client 360** window, click the **Client 360** link in the dialog box.

Step 6 To display the client in a color that corresponds to its RSSI, SNR, or health score, do the following:

- Click **View Options > Devices and Clients**.
- Check the **Clients** check box.
- Under the **Clients** check box, click **None** (default blue color), **RSSI**, **SNR**, or **Health Score**.

Step 7 To resize the ball, use the **Ball Size** slider in the **View Options** pane. This feature helps you to view clients in cases where there are many clients or only a few. For example, in cases where there are many clients, you can make the ball smaller, and in cases where there are only a few clients, you can make the ball larger.

Gain Insights from a 3D Wireless Map

Catalyst Center actively monitors the network performance of 3D wireless maps and provides insights into areas where service-level agreements (SLA) are not being met.

Step 1 From the top-left corner, click the menu icon and choose **Design > Network Hierarchy**.

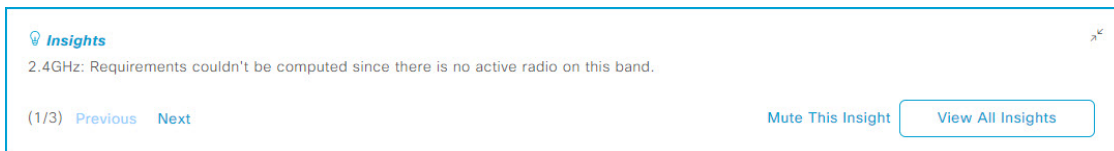
Step 2 From the left hierarchy tree, choose a floor.

Step 3 In the map toolbar, click **3D**.


Step 4 At the top-right corner of the map, click **Insights**.

The **Insights** area opens and displays information about the coverage areas that don't meet a specific KPI threshold, for example, RSSI is ≥ -70 dBm.

Figure 15: Insights Area



Step 5 In the **Insights** area, you can do any of the following actions:

Item	Details
View coverage gaps	Click this link to display the wireless coverage area. Red areas show where the SLA is not being met. Green areas show where it's being met.
Optimizer	Click this link to have Catalyst Center analyze the wireless coverage area. You can indicate the maximum number of APs that you are willing to move and add, and Catalyst Center computes a configuration where the wireless coverage is maximized. For more information, see Run the Wireless Coverage Optimizer, on page 57 .
Mute This Insight	Click this button to exclude an insight from displaying in the Insights dialog box. Muted insights appear at the bottom of the list in the All Insights slide-in pane.
View All Insights	Click this button to display all active and muted insights. For each insight, you can click Mute or Unmute to exclude or include its display in the Insights dialog box. Click Edit Configuration to customize the insight KPI settings. Another way to customize insight KPI settings is from the map toolbar. Hover your cursor over the gear icon  in the map toolbar and choose Insights Configurations .


Run the Wireless Coverage Optimizer

For wireless areas that aren't meeting their SLA, the optimizer takes your input of the maximum number of APs that you are prepared to move and add, and computes a configuration where the wireless coverage is maximized.

This procedure shows you how to run the wireless coverage optimizer.

Step 1 From the top-left corner, click the menu icon and choose **Design > Network Hierarchy**.

Step 2 From the left hierarchy tree, choose a floor.

- Step 3** In the map toolbar, click **3D**.
- Step 4** At the top-right corner of the map, click **Insights**.
The **Insights** area opens and displays information about the coverage areas that don't meet a specific KPI threshold, for example, RSSI is ≥ -70 dBm.
- Step 5** (Optional) To display the wireless coverage area, click **View**.
Red areas show where the SLA is not being met. Green areas show where the SLA is being met.
- Step 6** (Optional) If there are specific APs that you don't want the optimizer to move, you can right-click them and choose **Lock** to lock their position. To remove the lock, right-click the AP and choose **Unlock**.
- Step 7** Click **Optimizer**.
- Step 8** In the **Coverage Optimizer** dialog box, enter the maximum number of APs that you are prepared to move and add. If you don't want to move or add APs, leave the corresponding field blank or enter **0**.
- Step 9** Click **Run Optimizer**.
If needed, you can manually move any of the APs to other locations.
- Step 10** When the analysis is complete, click **View Results**.
Catalyst Center displays a proposed layout that increases the wireless coverage to maximize the SLA. If the optimizer recommends moving an AP, the new layout displays a blue line to the recommended new location. Any new APs that have been added to the layout are displayed as blue markers ().
- Step 11** To save the new layout as a simulation, click **Save as a plan**. To exit without saving, click the **x** at the top-right corner of the map.
Later, if you implement the recommended changes to your physical wireless network, you can save the simulation as an operational map. For information, see [Create Simulations for 3D Wireless Maps, on page 58](#).

Create Simulations for 3D Wireless Maps

You can create simulations for 3D wireless maps.



Note Simulation mode is available only in 3D maps, not in 2D maps.

Simulations allow you to change device configurations without actually implementing them. You can create multiple simulations and load them at any time.

- Step 1** From the top-left corner, click the menu icon and choose **Design > Network Hierarchy**.
- Step 2** From the left hierarchy tree, choose a floor.
- Step 3** In the map toolbar, click **3D**.
- Step 4** In the map toolbar, click the **Simulation** toggle button to view the map in simulation mode.
The lower map toolbar displays the message: "You are in Simulation Mode".

Step 5 In the map toolbar, click **Edit/Clone**.

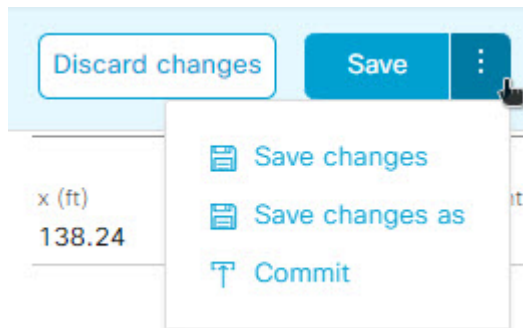
In simulation mode, only particular attributes are editable for previewing the impact of changes on the heatmap.

Step 6 Make any changes to the devices, as needed, for the simulation, and then click **Apply**.

- **APs:** You can change the model, channel, antenna, and more.
- **PAPs:** You can change the model, channel, antenna, and more.

Step 7 In the map toolbar, hover your cursor over the vertical ellipsis and choose **Save changes as** to save the configuration as a new simulation.

Figure 16: Saving as a Simulation



Note Choose **Save changes** when you want to save any changes to an existing simulation.

Choose **Commit** when you want to commit the simulation to the production environment. Note that you can only commit planned APs.

Step 8 In the **Save Simulation** dialog box, enter a name for the simulation and click **Save**.

The new simulation is displayed on the map.

Step 9 (Optional) To display a different simulation, do the following:

- Make sure that you are in simulation mode and are not editing any devices.
- From the **Select Simulation** drop-down list, choose a simulation.
If you have no saved simulations, **None available** is displayed instead of the **Select Simulation** drop-down list.

Step 10 (Optional) To delete a simulation, do the following:

- From the **Select Simulation** drop-down list, choose a simulation.
- Click the delete icon next to the **Select Simulation** drop-down list.

