Design the Network Hierarchy

Network Hierarchy Overview

You can create a network hierarchy that represents your network's geographical locations. The hierarchical organization enables you to easily apply design settings or configurations to a specific hierarchical element. For example, you can apply design settings to an entire area or to only a floor.

You can name hierarchical elements to help you identify where to apply design settings later.

The hierarchical elements that you can create have rules that dictate under which elements they can reside and which elements can reside under them.

- **Global**: Default element under which all other hierarchical elements reside. Areas and sites are the only elements that can reside directly under **Global**.

- **Areas** and **Sites**: Areas and sites reside under **Global** or under other areas or sites. They do not have a physical address. As the largest element, they identify a geographic region. They provide a way to group areas and sites.

- **Buildings**: Buildings reside under areas or sites. When you create a building, you need to specify a physical address or latitude and longitude coordinates. Buildings can't contain areas. However, they can contain floors.

- **Floors**: Floors reside under buildings. You can add floors to buildings with or without maps that contain various building components, like walls and windows. If you decide to use floor maps, you can manually create them or import them from files, such as DXF, DWG, JPG, GIF, PNG, or PDF file types. Then you can position your wireless devices on the floor maps to visualize your wireless network coverage.

You can change the site hierarchy for unprovisioned devices while preserving AP locations on floor maps. Note, however, that you can't move an existing floor to a different building.

To get started, build your network hierarchy using one of the following methods:

- Create a new network hierarchy. For more information, see Design a New Network Hierarchy, on page 2.

- Import an existing network hierarchy from Cisco Prime Infrastructure or Ekahau Pro. For more information, see Use an Existing Cisco Network Hierarchy, on page 2 or Use an Existing Ekahau Network Hierarchy, on page 5.

Design a New Network Hierarchy

The **Design** area is where you create the structure and framework of your network, including the physical topology, network settings, and device type profiles that you can apply to devices throughout your network. Use the **Design** workflow if you do not already have an existing infrastructure. If you have an existing infrastructure, use the **Discovery** feature. For more information, see Discovery Overview.

You can perform these tasks in the **Design** area:

Step 1   Create your network hierarchy. For more information, see Create a Site in a Network Hierarchy, on page 10.

Step 2   Define global network settings. For more information, see Network Settings Overview.

Step 3   Define network profiles. For more information, see Network Profiles Overview.

Use an Existing Cisco Network Hierarchy

If you have an existing network hierarchy in Cisco Prime Infrastructure, you can export it and then import it into Cisco DNA Center, saving time and effort spent in creating a new network hierarchy.

The following information is available for you to re-create your network hierarchy:

- **Site Hierarchy**: Your existing site hierarchy is downloaded in a CSV file format. The CSV file contains details such as site names, parent hierarchy, number of floors, location, and site address.

- **Map Archive**: Map information is downloaded as a map archive in a TAR file format. The map archive file contains data such as the date and time, number of floors, and APs. Depending on what you choose to download, the map archive can also include map information, such as floor dimensions (length, width, and height) and details about the APs and overlay objects that have been placed on the floor maps. You can also choose to download calibration information, such as the RF attenuation model that has been applied to each floor.

  You can choose to base the map archive on the global hierarchy or the hierarchy of a single site, building, or floor, as follows:

  - **Site**: The chosen site and all of its subsites, buildings, and floors are exported.

  - **Building**: The chosen building and all of its floors are exported.

  - **Floor**: The chosen floor is exported.

Note   Cisco DNA Center supports the United States' Federal Information Processing Standards (FIPS). FIPS is an optional mode that can be enabled when installing the Cisco DNA Center image. By default, FIPS mode is disabled.

FIPS mode has the following impact on the export and import of map archives.

If FIPS mode is *enabled*:

- Exported map archives are unencrypted.

- Only unencrypted map archives can be imported.

If FIPS mode is *disabled*:

- Exported map archives are encrypted.

- Both encrypted and unencrypted map archives can be imported.

Export Your Site Hierarchy from Cisco Prime Infrastructure

You can export your site hierarchy from Cisco Prime Infrastructure in a CSV file format. The CSV file contains details such as site names, parent hierarchy, number of floors, location, and site address.

Before you begin

Site hierarchy export is supported in Cisco Prime Infrastructure, Release 3.2 and later.

Step 1   In Cisco Prime Infrastructure, choose **Inventory** > **Group Management** > **Network Device Groups**.

Step 2   In the **Device Groups** window, click **Export Groups**.

Step 3   In the **Export Groups** dialog box, click the **APIC-EM** radio button.

Step 4   To download the CSV file, click **OK**.

The CSV file is downloaded.

Export Your Map Archive from Cisco Prime Infrastructure

You can export map archive files from Cisco Prime Infrastructure and import them into Cisco DNA Center. Map archives contain map information, such as floor dimensions, and calibration information, such as the Radio Frequency (RF) attenuation model that has been applied to each floor in Cisco Prime Infrastructure.

Step 1   From the Cisco Prime Infrastructure GUI, choose **Maps** > **Wireless Maps** > **Site Maps (New)**.

Step 2   From the **Export** drop-down list, choose **Map Archive**.

The **Export Map Archive** window opens, and the **Select Sites** window opens by default.

Step 3 Check the check box of a specific site, campus, building, or floor that you want to export. Alternatively, check the **Select All** check box to export all the maps.

Step 4 Select at least one of the following options:

- **Map Information**: Click the **On** button to export floor dimensions (length, width, and height) and details about the APs and overlay objects that have been placed on the floor maps.

- **Calibration Information**: Click the **On** button to export the RF attenuation model that has been applied to each floor. It is a good practice to export the existing calibration data from Cisco Prime Infrastructure. Otherwise, you must reenter the calibration details manually.

  If you choose to include calibration information, you also need to specify whether to include information for selected maps or all information, as follows:

  - **Calibration Information for selected maps**: Calibration information for the selected site maps is exported.

  - **All Calibration Information**: Calibration information for the selected map and any additional calibration information that is available in the system is exported.

Step 5 Click **Generate Map Archive**.

The following message shows the progress of the operation:

```
Exporting data is in progress
```

A TAR file is created and is saved to your local machine.

Step 6 Click **Done**.

Import Your Site Hierarchy to Cisco DNA Center

You can import a site hierarchy that you exported from Cisco Prime Infrastructure as a CSV file. For information about exporting the site hierarchy, see Export Your Site Hierarchy from Cisco Prime Infrastructure, on page 3.

Before you begin

- Make sure that you have Cisco Wireless Controllers and APs in your Cisco DNA Center inventory. If not, discover them using the **Discovery** feature.

- Add and position APs on a floor map.

- If you manually created sites in Cisco DNA Center that are present in Cisco Prime Infrastructure, you must remove them from Cisco DNA Center before you can import them.

Step 1 Click the menu icon (≡) and choose **Design** > **Network Hierarchy**.

Step 2 From the map tool bar, click **Import** and choose **Import Sites**.

Step 3 In the dialog box, click one of the following radio buttons:

- **Merge with Existing Sites**: The downloaded site information is combined with the existing site information.

• **Overwrite Existing Sites**: If the same site already exists in Cisco DNA Center, the existing site information is overwritten with the downloaded site information.

Step 4   In the dialog box, drag and drop your CSV file into the download area. Alternatively, you can click **Choose a file** and navigate to where your CSV file is located, then click **Upload**.

> **Note**   If you do not have a CSV file, click **Download Template** to download a CSV file that you can edit and upload.

Import Your Map Archive to Cisco DNA Center

You can import a map archive TAR file into Cisco DNA Center. For example, you can upload the TAR file that you exported from Cisco Prime Infrastructure.

> ✎
>
> **Note**   Cisco DNA Center supports the United States' Federal Information Processing Standards (FIPS). FIPS is an optional mode that can be enabled when installing the Cisco DNA Center image. By default, FIPS mode is disabled.

For information about exporting site hierarchy, see Export Your Map Archive from Cisco Prime Infrastructure, on page 3.

Step 1   Click the menu icon (☰) and choose **Design** > **Network Hierarchy**.

Step 2   From the map toolbar, click **Import** and choose **Import Maps**.

Step 3   In the **Import Maps** dialog box, drag and drop the map archive file.

Step 4   Click **Import**.

The map archive file is imported.

Use an Existing Ekahau Network Hierarchy

The Ekahau Pro tool allows you to create a complete network plan for your enterprise, including floor layout, AP locations, and obstacles. After creating the floor layout, you can export the simulated network plan as an Ekahau project file. You can also export the real-world site survey data into a format that Cisco DNA Center can use.

Export an Ekahau Project

You can export your network hierarchy from Ekahau Pro and import it into Cisco DNA Center for further planning.

Step 1 In the Ekahau Pro tool, plan the floor layout:

- Create buildings and floors.

   It is not mandatory to create buildings in the Ekahau Pro tool.

- Import the floor plan.

- Add the planned APs or hypothetical APs.

- Add building coordinates.

- Define the site name.

   The AP name that you provide here will be used to update the AP name on the Cisco Wireless Controller during the wireless controller configuration.

- Add obstacles.

- Export the project.

Note	If you're using Ekahau Cloud, make sure to synchronize any local changes to the Ekahau Cloud before exporting the Ekahau project. If the Ekahau project has local changes (such as the removal of an AP or wall) that are out-of-sync with the Ekahau Cloud project, importing the Ekahau project to Cisco DNA Center can fail.

Step 2 Deploy the planned APs at locations designed on the floor layout.

- The physical AP is mounted at the designed location that is specified on the floor layout. The MAC address of the planned AP is updated with the MAC address of the physical AP.

- The physical AP is connected to the VLAN of the intended wireless controller.

Step 3 In Cisco DNA Center, configure the Cisco Wireless Controller.

   a. Discover the Cisco Wireless Controller and APs in your network by running the **Discovery** job, so that the discovered wireless controllers and APs are listed on the **Inventory** window.

   b. Update the AP name on the wireless controller with the AP name given in the Ekahau Pro project during the floor planning.

Step 4 Import the Ekahau project into Cisco DNA Center.

Step 5 Map the planned APs to real APs in Cisco DNA Center.

Import an Ekahau Project to Cisco DNA Center

Before you begin

Importing an Ekahau Cloud project can fail if the project has local changes (such as removing an AP or wall), that are out-of-sync with the Ekahau Cloud project. To avoid this situation, make sure to synchronize any local changes to the Ekahau Cloud before importing the Ekahau Cloud project to Cisco DNA Center.

Step 1   Click the menu icon (☰) and choose **Design** > **Network Hierarchy**.

Step 2   Design your network hierarchy by adding sites, buildings, and floors.

> **Note**   For more information, see Create a Site in a Network Hierarchy, on page 10, Add a Building, on page 11, and Add a Basic Floor to a Building, on page 13.
>
> While adding floors, make sure that you create floors with the same name given in the Ekahau project.

Step 3   In the left pane, hover your cursor over the ellipsis ••• icon next to the site where you want to import the Ekahau project and choose **Import Ekahau Project**.

The **Import Ekahau Project** dialog box appears.

Step 4   Drag and drop the ESX file into the boxed area in the **Import Ekahau Project** dialog box, or click the **click to select** link and browse to the ESX file.

> **Note**   To import buildings, they need to contain coordinates inside the Ekahau Project. You can add coordinates in Ekahau Pro. After successfully importing an Ekahau Project, each planned AP is mapped to an existing real AP in the inventory using the AP name. The planned AP is displayed with an icon **P** on the floor map. For example, if the name of the planned AP is SJC01-02-AP-B-1, the import process searches for the real AP with the same name.

Step 5   If an AP is not found in the inventory and remains unmapped, the planned AP is retained on the floor.

To see the reason for the mismatch, hover your cursor over the planned AP icon on the floor map, and click **Import History**.

The following attempts are made to map the planned APs to real APs:

- If the newly discovered APs match the planned AP, the planned AP is replaced with the discovered real AP.

- If a planned AP remains unmapped, you can manually replace the planned AP with the real AP, providing reasons for the failure.

Step 6   To manually assign the planned AP to a real AP, hover your cursor over the planned AP icon on the floor map, and click **Assign** > **Assign**.

The **Assign Planned APs** panel appears.

Step 7   In the **Assign Planned APs** panel, map the planned AP to a real AP by AP name, AP type, or All APs.

Step 8   Click the radio button next to the AP Name, and click **Assign** to manually assign the planned AP.

Step 9   Click **Save**.

Import an Ekahau Site Survey to Cisco DNA Center

You can upload an Ekahau site survey to create the buildings and floors in your network hierarchy. The site survey includes information about wireless devices, including the site, building, and floor to which it is assigned and its position on the floor map. However, it doesn't include the AP antenna information. So, you need to upload this information separately using a CSV file.

Cisco DNA Center includes a CSV template file that you can download and edit to define the required AP antenna information. The CSV file contains the following fields and defaults:

	A	B	C	D	E	F	G	H	I	J
1	model	antennaName0	antennaAzimuth0	antennaElevation0	antennaName1	antennaAzimuth1	antennaElevation1	antennaName2	antennaAzimuth2	antennaElevation2
2	AP2700I	Internal-2700-5GHz	90d	0d	Internal-2700-2.4GHz	90d	0d			
3	AP1850I	Internal-1850-5GHz	90d	0d	Internal-1850-2.4GHz	90d	0d			
4	AP3800E	AIR-ANT2524DB-R-5GHz	179.9543762d	0d	AIR-ANT2524DB-R-2.4GHz	179.9543762d	0d			
5										

If an AP isn't in the Cisco DNA Center device inventory, it's imported as a planned AP. However, you can use a naming convention so that when you add an AP to the device inventory, Cisco DNA Center can automatically convert it to an actual AP.

The naming convention is **AP-** followed by the last four digits of the AP's MAC address, for example, `AP-c4:e0`. Using this information, Cisco DNA Center attempts to match the provided digits with the last four digits of an AP's Ethernet MAC or radio MAC address. If this information isn't available or a match is unsuccessful, Cisco DNA Center attempts to match AP names.

Step 1   Click the menu icon (≡) and choose **Design** > **Network Hierarchy**.

Step 2   From the map toolbar, click + **Add Site** > **Add Area**.

Alternatively, you can hover your cursor over the ellipsis ••• next to the parent site or **Global** in the left pane, and choose **Add Area**. For more information, see .

Step 3   In the left pane, hover your cursor over the ellipsis ••• icon next to the site you just created and choose **Import Ekahau Survey**.

Step 4   In the **Import Ekahau Survey** dialog box, drag and drop the Ekahau Survey file into the **Ekahau Survey** boxed area, or click the **Choose a file** link and browse to the ESX file.

Step 5   Drag and drop the CSV file into the **AP Mapping CSV** boxed area, or click the **Choose a file** link and browse to the CSV file.

> **Note**   If you do not have a CSV file, click **Download AP Mapping Template** to download a CSV file that you can edit and upload.

Step 6   Click **Import**.

After the files are successfully downloaded, a success message is displayed.

Step 7   Click **View Hierarchy** and navigate to the floors to verify that the devices have been imported and positioned properly.

Hover the cursor over a device to view its details.

Export Your Network Hierarchy From Cisco DNA Center

You can export a site hierarchy to a CSV format file. You can also export a complete network map (global hierarchy) or the hierarchy of a site, building, or floor. You can choose either a Cisco Prime Infrastructure or Ekahau Pro format. Exporting your network hierarchy into these formats allows you to continue to work on your network hierarchy in these tools.

Export Your Site Hierarchy from Cisco DNA Center

You can export a site hierarchy to a CSV format file. The CSV file contains details such as site names, parent hierarchy, number of floors, location, and site address.

Step 1 Click the menu icon (☰) and choose **Design** > **Network Hierarchy**.

Step 2 From the map toolbar, click **Export** and choose **Export Sites**.

Step 3 In the **Export Sites** dialog box, click **OK**.

Export Your Map Archive from Cisco DNA Center

You can export a complete network map (global hierarchy) or the hierarchy of a site, building, or floor to either a Cisco Prime Infrastructure or Ekahau Pro format. You can export up to 500 floors.

Note Cisco DNA Center supports the United States' Federal Information Processing Standards (FIPS). FIPS is an optional mode that can be enabled when installing the Cisco DNA Center image. By default, FIPS mode is disabled.

FIPS mode has the following impact on the export and import of map archives.

If FIPS mode is *enabled*:

- Exported map archives are unencrypted.

- Only unencrypted map archives can be imported.

If FIPS mode is *disabled*:

- Exported map archives are encrypted.

- Both encrypted and unencrypted map archives can be imported.

Step 1 Click the menu icon (☰) and choose **Design** > **Network Hierarchy**.

Step 2 To export the complete network map, from the map toolbar, click **Export** and choose **Export Maps**.

Alternatively, from the left pane, hover your cursor over the ellipsis (•••) next to a site, building, or floor and choose **Export Maps**.

The information that is exported depends on what you choose:

- **Site**: The chosen site and all of its subsites, buildings, and floors are exported.

- **Building**: The chosen building and all of its floors are exported.

- **Floor**: The chosen floor is exported.

Step 3 In the **Export Maps** dialog box, click either the **Ekahau Project** or the **Prime** radio button.

Step 4 Click **Export**.

Search the Network Hierarchy

You can search the network hierarchy to quickly find a site, building, or area. This is particularly helpful after you have added many sites, areas, or buildings.

Step 1 To search the hierarchy, from the **Search Hierarchy** search field in the left pane, enter either the partial or full name of the site, building, or floor name that you are searching.

The hierarchy is filtered based on the text you enter in the search field.

Step 2 To search the hierarchy by **Site Name** and **Site Type** filter criteria, click the filter icon in the **Search Hierarchy** search field and do the following:

  a. In the **Site Name** field, enter the name of the site that you want to search.

  b. Check the **Include Address for all Building** check box to include the address of all building in the search result.

  c. In the **Site Type** area, check the check boxes next to **Area**, **Building**, or **Floor** that you want to include in filter criteria.

  d. Click **Search**.

The hierarchy is filtered based on the filter criteria.

  e. To exclude the search criteria in the left pane, click the cross-mark next to respective criteria.

# Manage Sites in Your Network Hierarchy

Create a Site in a Network Hierarchy

Cisco DNA Center allows you to easily define physical sites and then specify common resources for those sites. The **Design** area uses a hierarchical format for intuitive use, while eliminating the need to redefine the same resource in multiple places when provisioning devices. By default, there is one site called **Global**. You can add more sites, buildings, and areas to your network hierarchy. You must create at least one site before you can use the provision features.

Step 1 Click the menu icon (☰) and choose **Design** > **Network Hierarchy**.

A world map appears in the right pane.

Step 2 From the map toolbar, click + **Add Site** and choose **Add Area**.

> **Note** You can also hover your cursor over the ellipsis • • • next to the parent site in the left pane, and then choose **Add Area**.

Step 3   Enter the site name in the **Area Name** field.

The **Area Name** field has the following restrictions:

- The area name cannot exceed 40 characters.

- Special characters & > < ? ' " / [ ] aren't allowed.

Step 4   From the **Parent** drop-down list, choose a parent node.

Note   By default, **Global** is the parent node.

Step 5   Click **Add**.

The site is created under the parent node in the left pane.

Edit a Site

Step 1   Click the menu icon (≡) and choose **Design** > **Network Hierarchy**.
Step 2   In the left pane, hover your cursor over the ellipsis ••• next to the site and choose **Edit Area**.
Step 3   In the **Edit Area** dialog box, make the necessary edits.
Step 4   Click **Update** to save your changes.

Delete a Site

Step 1   Click the menu icon (≡) and choose **Design** > **Network Hierarchy**.
Step 2   In the left pane, hover your cursor over the ellipsis ••• next to the site and choose **Delete Area**.
Step 3   In the dialog box, click **OK** to confirm the deletion.

Manage Buildings in Your Network Hierarchy

Add a Building

Step 1   Click the menu icon (≡) and choose **Design** > **Network Hierarchy**.
Step 2   In the **Network Hierarchy** window, click +**Add Site** > **Add Building**.

Alternatively, you can hover your cursor over the ellipsis ••• next to the parent site in the left pane, and choose **Add Building**.

Step 3   In the **Add Building** dialog box, add the building details:

a) In the **Building Name** field, enter a name for the building.

The **Building Name** field has the following restrictions:

- The building name cannot exceed 40 characters.

- Special characters & > < ? ' " / [ ] aren't allowed.

b) From the **Parent** drop-down list, choose a parent node. **Global** is the default parent node.
c) In the **Address** field, enter an address.

Alternatively, you can click on the map to input the address. Adding an address causes the **Longitude** and **Latitude** coordinate fields to be automatically populated. You can manually change the longitude and latitude coordinates to change the address.

Step 4   Click **Add**.

The building is created and appears under the parent site in the left pane.

Edit a Building

Step 1   Click the menu icon (≡) and choose **Design** > **Network Hierarchy**.
Step 2   In the left pane, hover your cursor over the ellipsis ••• next to the building and choose **Edit Building**.
Step 3   In the **Edit Building** dialog box, make the necessary edits.
Step 4   Click **Update** to save your changes.

Delete a Building

Deleting a building deletes all its container maps. APs from the deleted maps are moved to the Unassigned state.

Step 1   Click the menu icon (≡) and choose **Design** > **Network Hierarchy**.
Step 2   In the left pane, hover your cursor over the ellipsis ••• next to the building and choose **Delete Building**.
Step 3   In the dialog box, click **OK** to confirm the deletion.

Manage Floors in Your Network Hierarchy

Floors and Floor Maps Overview

There are several reasons to add floors and floor maps to a building in Cisco DNA Center. 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. Using the floorplan, Cisco DNA 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 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. In either case, we recommend that you import a file with an existing floor plan to get started.

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 Cisco DNA 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.

Add a Basic Floor to a Building

After you add a building, you can add floors to it. You can add a basic floor that doesn't have a floor map, or you can add a floor and include a floor map at the same time.

To add a basic floor to a building, use this procedure.

To add a floor with a CAD, non-CAD, or Ekahau file floor map, see one of the following topics:

Step 1   Click the menu icon (☰) and choose **Design** > **Network Hierarchy**.

Step 2 In the left pane, hover your cursor over the ellipsis ••• next to the desired building and choose **Add Floor**.

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

The **Floor Name** field has the following restrictions:

- The floor name cannot exceed 40 characters.

- Special characters & > < ? ' " / [ ] aren't allowed.

Step 4 For the **Type (RF Model)** drop-down list, choose the RF model to apply to the floor.

Note The RF model determines how the RF is calculated based on the characteristics of the floor.

Step 5 Click **Add**.

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 manually create all of the floor elements, such as the walls and shelving, for them to be represented in the wireless map. For details, see Configure Floor Map Elements and Overlays in 2D Maps.

- **Import a CAD file**: When you use a CAD file (DXF or DWG file type) to import the floor map, Cisco DNA Center imports the CAD layers and allows you to specify which layers appear as floor elements in the wireless map.

  Because the computation of a 3D heatmap requires significant computing power, we recommend that you include only the CAD layers that contribute significantly to the heatmap computation. You should include enough information to get an accurate heatmap, but not unnecessary information that overloads the computation process and delays the heatmap display.

  Cisco DNA Center takes these initial steps to minimize the time it takes to generate a heatmap:

  - Restricts the maximum number of walls for 2D and 3D maps. The maximum number of walls for a 3D heatmap is 3000, after optimization. If your CAD file contains more, Cisco DNA Center alerts you and preserves the 3000 most relevant walls (based on the length of the wall multiplied by its attenuation).

    The maximum number of walls for a 2D heatmap is 300, after optimization. If your CAD file contains more, Cisco DNA Center alerts you and preserves the 300 most relevant walls (based on the length of the wall multiplied by its attenuation).

  - Automatically removes small obstructions (under 0.75 ft) and the second sides of the walls, leaving only one side per wall. (Cisco DNA Center applies an attenuation value for each wall, not for each side of a wall.)

When deciding which layers and elements to import, focus on obstacles that create the most attenuation. In principle, the longer and thicker a wall is, the higher its attenuation. Low walls, like cubicles, and narrow walls, like columns, have low attenuation and have little affect on the heatmap. Even if the material of an obstacle is heavy, the attenuation is not significant, because the signal can radiate around the obstacle. Likewise, if you are not interested in the coverage outside of a building, do not include external walls or windows. Doing so provides better 3D visualization of the inside of the building.

If your CAD file does not have walls in specific layers, but has walls mixed with other elements, do not select them for import. You can add walls manually later. For information, see Add, Edit, and Delete Walls.

Block inserts and proxy entities cannot be imported. Please make imported layers 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 15.

- **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 16.

- **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 Cisco DNA Center, on page 6.

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. Cisco DNA 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 DNA Spaces. Although the floor map images might be in formats that are supported by Cisco DNA 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

To view a wireless map, you must create a floor map. 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 appear in the 2D view. For 3D floor maps, Cisco DNA Center imports the CAD layers as the walls, shelving, obstacles, and other elements in the map.

Step 1 Click the menu icon (☰) and choose **Design** > **Network Hierarchy**.

Step 2   In the left hierarchy pane, 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.

> **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** dialog box, choose the CAD layers that you want to appear as floor elements in the map:

a) For the **2D** column, check the check boxes of the CAD layer that you want to appear in the 2D view.

b) For the **3D Wall/Shelving Type** column, use the drop-down list to choose a CAD layer that specifies the type of the wall or shelving.

> **Note**   For a layer to appear in the 3D view, a **3D Wall/Shelving Type** value is required. The wall/shelving type affects attenuation and how the heatmap is calculated. For more information, see Floor Map Creation Methods, on page 14.

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 the walls and shelving, cannot be imported, and you need to add them manually later. For more information, see Configure Floor Map Elements and Overlays in 2D Maps.

Step 1   Click the menu icon (☰) and choose **Design** > **Network Hierarchy**.

Step 2   In the left hierarchy pane, 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 non-CAD file (JPG, GIF, PNG, or PDF file type) onto the **Floor Image** area.

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

Step 6   Click **Add**.

The floor map is created.

| 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. |

Step 7 From the map toolbar, click **Add/Edit**.

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

a) From the map toolbar, click **Add/Edit** > **Overlays** > **Walls**.

b) 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.

c) 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:

a) From the map toolbar, click **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
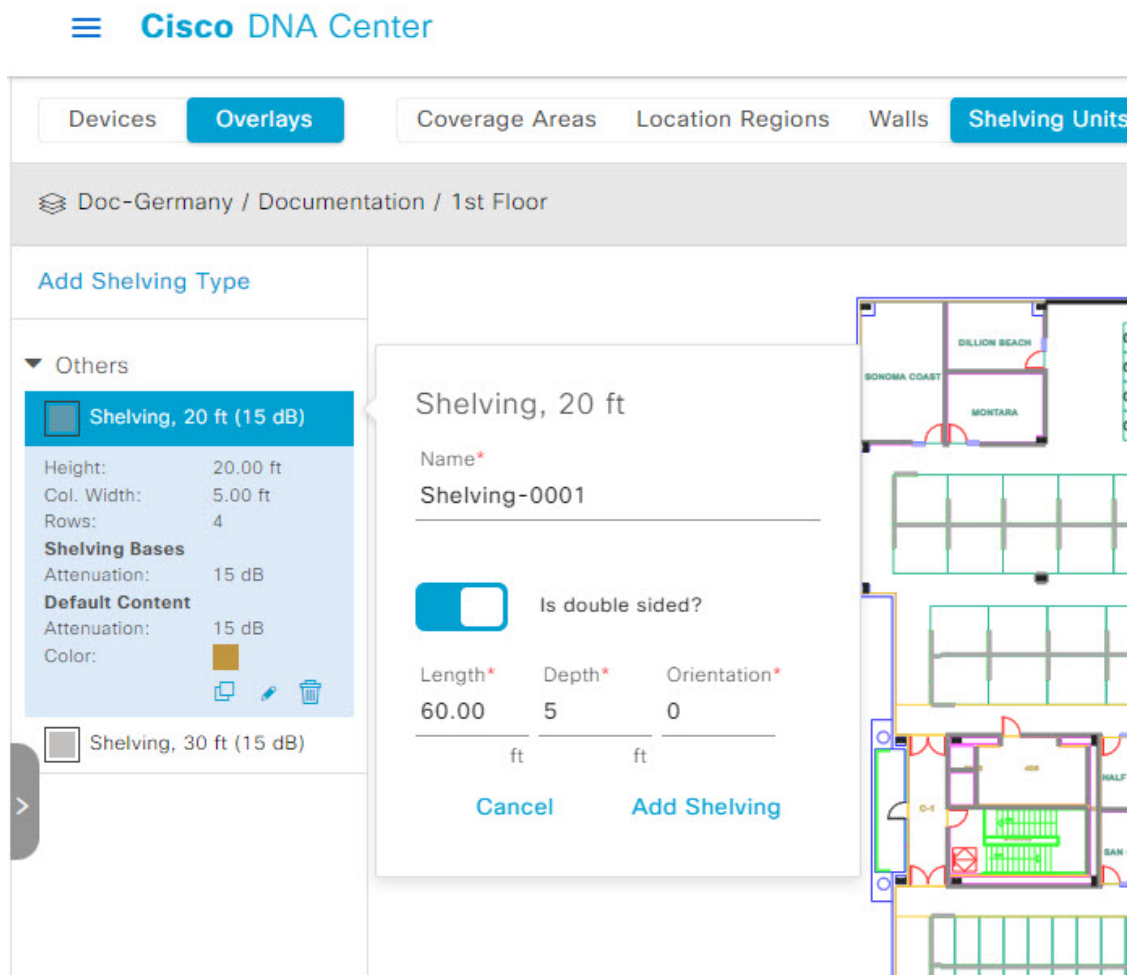
c) In the **Shelving** dialog box, click **Add Shelving** to add the shelving to the floor map.

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.

- **Delete**: Remove the shelving from the floor map.

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