# Cisco WAE 6.4 Network Visualization Guide

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# Overview

To visualize a network topology in WAE Design, you need a basic understanding of layouts and templates, and how they relate to plan files. Once you understand these concepts, you can proceed to visualize the network and save a plan file as a template for use in WAE Live or WAE Design Archive, or simply save it as a plan file for simulation purposes in WAE Design. This chapter describes these concepts. The guide itself includes the following topics.

- Visualizing a WAE Network—Describes how to affect the visualization of a network, including such topics as how to assign sites to nodes, how to modify visual attributes of objects, and how to change the canvas (background) of the weathermap (WAE Live) or network plot (WAE Design). It also explains the use of traffic utilization colors, their defaults, and how to change these colors.
- Using Layouts—Explains the basic differences between Weathermap and Design layouts and how they are typically used, as well as how to create, edit, and view layouts.
- Plan Files and Templates—Describes how to save plan files and templates locally and remotely, how to copy visual elements and objects from a template, and how to modify the plan file database using the WAE Design GUI.
- Access WAE Live—Describes how to open plan files and templates from WAE Live, as well as how to save templates to WAE Live.
- Access an Archive—Describes how to open/save plan files and templates from/to an archive.
- Access WAE Automation Server and Deploy—Describes how to open/save plan files from/to a WAE Automation server, as well as how to deploy plan files and patch files to the network.

## Plan Files and Templates

The unit of data storage that is displayed in weathermaps (web UIs) and network plots (WAE Design GUI) is the plan file. Each plan file consists of a series of tables that describe network characteristics, including network topology, traffic, service classes, and routing protocols. Note that what is visible in the web applications and the WAE Design GUI differs since the former represents collected data from an operating network, while the latter can additionally represent simulated networks and network state.

These plans files are typically created as a result of the process that discovers topology and traffic. They can, however, be created using CLI tools or the WAE Design GUI, which can be useful when designing greenfield networks.

- **Plan files**—Plan files might reside on a single local devise, such as a laptop, and are typically used for simulation purposes in WAE Design. Plan files might also be stored remotely in an archive for use in web applications. The WAE Automation server contains a working plan file (of the current network), and potentially contains plan files in staging areas.

- **Templates**—Each archive contains a "pattern" plan file called a template by which all the plan files are modeled for visualization in the web application. Templates usually contain visual elements that dictate how the objects appear in the network and the canvas (background) behind it. Templates might also contains objects that are not discoverable but are of use in network simulations, for example physical circuit routes. For more detailed information about templates, see the Plan Files and Templates chapter.

**Note** The WAE Automation server does not contain templates as defined here. Also note that while the Coordinated Maintenance uses templates, the application does so only for the purpose of having current topology (not for visualization purposes).

# Layouts and Visualization

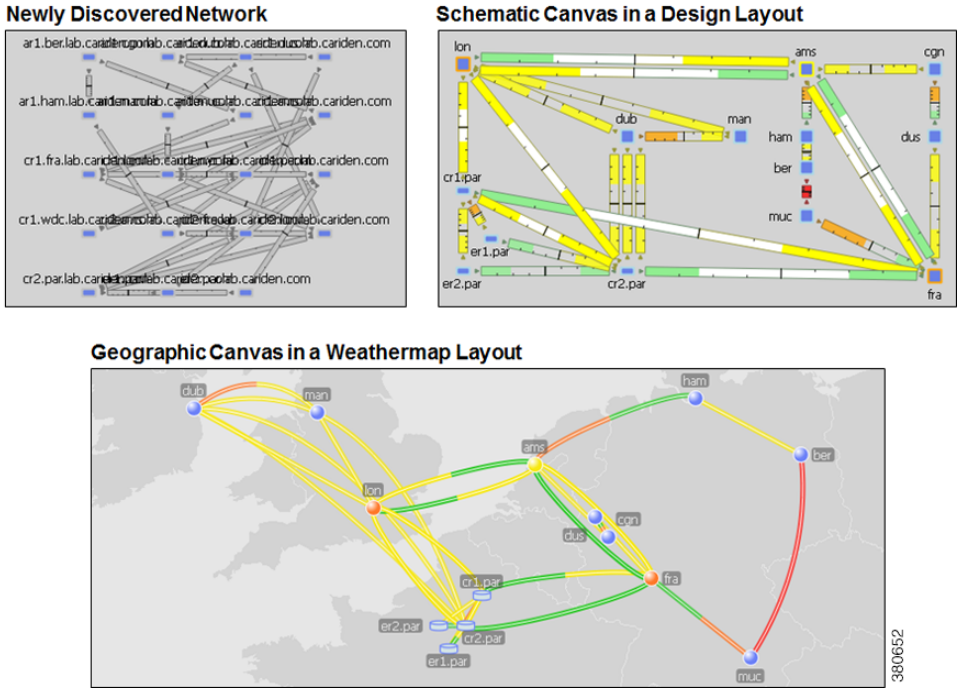
The manner in which plan files are laid out to visualize the network is called a layout. Each plan has a default layout. The WAE Design GUI provides numerous tools for re-arranging the topology and affecting the appearance of objects, both for newly discovered networks and for greenfield designs. With these tools you can create multiple layouts per plan file, each with its own visualization. For example, layouts can have schematic or geographic site canvases, or show specific sections of the network.

All layouts are one of two types: either Weathermap (primarily for preparing layout templates) or Design (for planning and design work in WAE Design). Unless otherwise noted, the procedures described in this guide apply to both Weathermap and Design layouts.

Layer 3 visualization is supported in WAE Design, WAE Design Archive, and WAE Live. Layer 1 visualization is supported in WAE Design. Most of the visualization tools are available for both Layer 3 and Layer 1.

Figure 1-1 shows an example of a newly discovered network, a Design layout with a schematic canvas, and a Weathermap layout with a geographic canvas.

*Figure 1-1 Example Network Before and After Modifying the Layout*




# Related Topics

- *WAE Design Use Guide*
- *WAE Design Integration and Development Guide*
- *WAE Live Administration Guide*
- *WAE Design Archive User and Administration Guide*


# Visualizing a WAE Network

WAE Design creates a simple default layout for newly discovered networks using one site per node, and each site name is based on the node name. Once the plan is opened in the WAE Design GUI, you typically rename and re-arrange objects in the newly discovered network using a sequence of steps outlined in the following sections.

- Remove Suffixes from Node Names—Remove suffixes from node names to ease readability of them in the plot and tables.
- Assign Sites to Nodes—Automatically places nodes into appropriate sites using simple rules or using a mapping table kept in the plan file.
- Arrange Sites and Nodes—Arrange sites and nodes using tools that offer a variety of alignment and display options.
- Circuits and Interfaces—Change the manner in which circuits and interfaces are displayed.
- Set Plot Backgrounds—Set the background for the network plot, including schematic view, geographic outline background, and detailed geographic map views.
- Traffic Utilization Colors—Change the traffic utilization colors saved with the plan and its multiple layouts, and create a customized user default color scheme.
- Set Plot Option Defaults—Set and use both user defaults and system defaults.

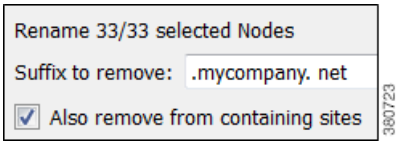
**Helpful Tips**

- If you are using multiple layouts, arranging sites and nodes maintains the position of these sites in all layouts within the plan file. However, all changes made using the Plot Options dialog box are set on a per-layout basis so before making such changes, ensure you are in the proper layout.
- Topology changes, such as adding, duplicating, and deleting objects, affect simulation results. It is recommended that after making these types of changes that you rerun the initializers and optimization tools if you have been using them. For example, you might want to rerun Metric Optimization to optimize the undifferentiated traffic, or if modeling an MPLS network, you might want to rerun the FRR LSP initializer.

# Remove Suffixes from Node Names

Node names collected from the network often have long suffixes that are the same for all nodes. This tool simplifies the process of removing these unwanted suffixes and acts on all nodes in the network regardless of whether they are selected.

**Example:** If all nodes in the network had a .mycompany.net suffix, you could remove this suffix by entering .mycompany.net in the Suffix to Remove field.




**Step 1** Select the Initializers->Rename Nodes menu.

**Step 2** Enter the suffix that you want to remove from the node names.

**Step 3** To remove this suffix from sites as well, select the "Also remove from containing sites" option. Then click OK.

# Assign Sites to Nodes

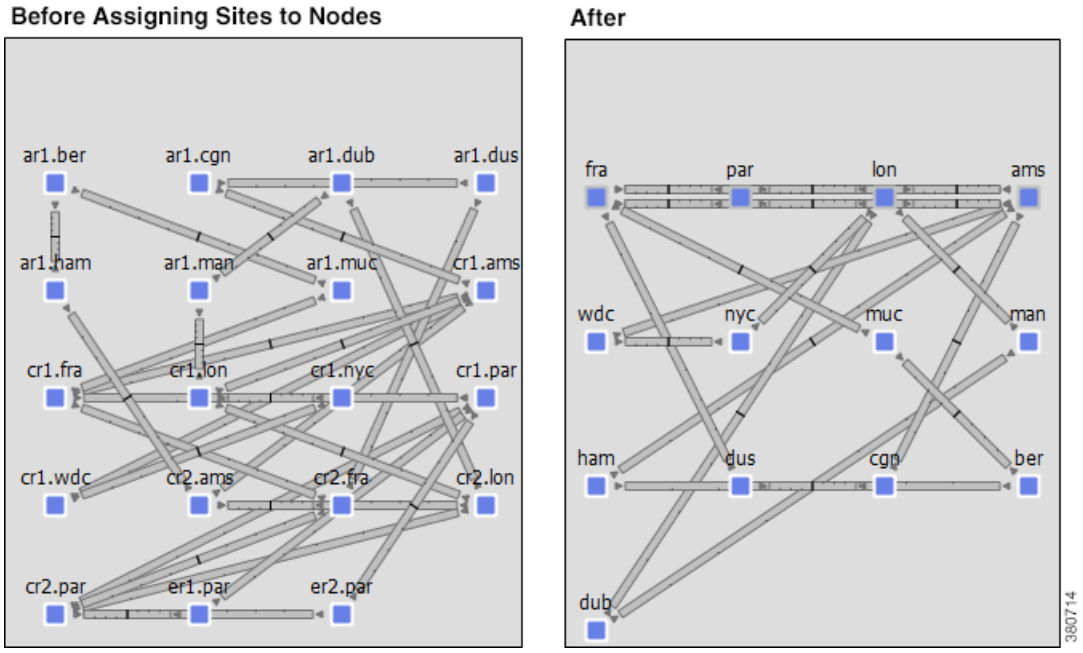
Although nodes do not have to be contained in sites, adding them to sites can simplify and improve the visualization of the network. The Assign Sites to Nodes tool enables you to re-organize your network by changing the node-to-site mappings. For instance, you would typically place all nodes in the same geographic location or point-of-presence (PoP) into a single site. There are two options.

- One approach enables you to create a node-to-site association based on a simple mapping rule that applies to all nodes. This creates a temporary mapping that is not stored in the plan file.
- Another approach enables you to create or further customize a Node-to-Site Mapping table. This table uses more powerful rules to map nodes to sites based on regular expression substitutions. Because the table is stored in the plan file (as a <NodeSiteMappingRules> table), you can maintain and re-use it. In particular, when a collected plan is provided with a visual layout by a template plan for insertion into the WAE Design Archive, this table in the template is applied to assign sites to nodes in the collected plan file.

Figure 2-1shows an example of network plot before and after assigning sites to nodes. Beforehand, there were 19 sites and after there were 13. Notice the new site names that were generated.

For a description of how WAE Design makes node-to-site assignments when nodes are discovered, see the Plan Files and Templates chapter.

*Figure 2-1 Example Before and After Assigning Sites to Nodes*




# Site Assignment Rules

The Assign Sites to Nodes tool assigns sites as follows.

If a node is not in an external AS and is not a PSN, then WAE Design assigns nodes to sites based on the Simple Mapping Rules or on the Node-to-Site Mapping Rules, depending on which is selected in the Assign Sites to Nodes dialog box.

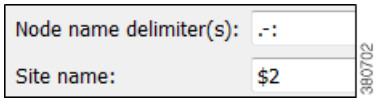
If the node is in an external AS, WAE Design assigns it to a site named after the AS name. If the AS name does not exist, WAE Design assigns the node to a site named after its ASN.

If the node is not in an external AS and it is a pseudo-node (PSN), then WAE Design assigns it to the site that contains the most nodes connected to the PSN. In case of a tie, WAE Design assigns the node to the site with the lowest lexicographic name.

## Simple Mapping Rules

To create temporary node-to-site mappings that are not stored in the plan file, use the "Simple Mapping Rules" option in the Assign Sites to Nodes dialog box. The mapping is created using two fields: Node Name Delimiter and Site Name.

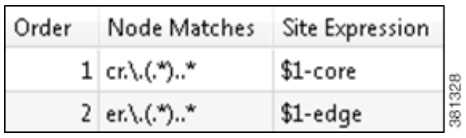
- **Node Name Delimiter**—WAE Design uses this field to identify which sections of the node names are to be used in the assignments. By default, these are a period, a dash, and a colon (.-:). This means that new site names are based on the sections between these characters. For example, by default WAE Design parses the node name of acme.router into two sections: acme and router.




- **Site Name**—WAE Design uses this field to determine how to create the site names based on the node names. In the following list, # equals any integer.
- $# — Specifies the section reading left to right. For example, $1 matches **chicago** in **chicago.isp**. Note that $0 specifies the entire node name. In Figure 2-1, the new site names were created using $2.
- [#:#] — Specifies the character range reading left to right. For example, $1[1:3] matches **chi** in **chicago.isp**.
- $-# — Specifies the section name reading right to left. For example, $-1 matches **jose** in **san.jose**.
- [-#:-#] — Specifies the character range reading right to left. For example, both $2[-4:-1] and $-2[-4,-1] match **jose** in **san.jose.cr1**.

# Node-to-Site Mapping Rules

To create a Node-to-Site Mapping <NodeSiteMappingRules> table in the plan file, particularly for use by the template, use the "Use rules in Node-to-Site Mapping Table" option in the Assign Sites to Nodes dialog box. An attempt is made to match the node name to expressions in the Node Matches column. If a match is found, then the node is assigned to the site as defined by the corresponding Site Expression. This graphical example matches cr1.lax into lax-core and er1.lax into lax-edge.




The order in which these matches are attempted is defined by the Order column.

| Column | Description |
|---|---|
| Order | Identifies the order in which rules are applied |
| Node Matches | Regular expression matching the node names |
| Site Expression | Site name expression, which can use references in the Node Matches rule |

## Examples

| Node Matches | Site Expression | Result |
|---|---|---|
| cr1.chi.isp.net | chi | Map node cr1.chi.isp.net to site chi |
| .*\.(.*)\..* | $1 | Map node cr1.chi.isp.net to site chi as above, but also maps node cr1.okc.isp.net to site okc |

| Node Matches | Site Expression | Result |
|---|---|---|
| ..(.)\.(.*)..* | $2-$1 | Map node cr1.par.isp.net to site par-1 |

# Assign Sites to Nodes Dialog Box

**Step 1** Select one or more nodes if you want to assign sites to specific nodes. If you do not select nodes, WAE Design assigns sites for all nodes in the plan file for that view.

**Step 2** Access the Assign Sites to Nodes initializer using one of these methods.

- Right-click on one of the selected nodes, and select Assign Sites to Nodes from the context menu.
- Select the Initializers->Assign Sites to Nodes menu.

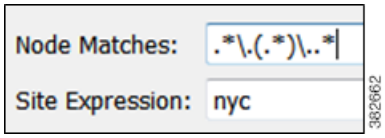
**Step 3** Select which method of node-to-site mappings you want to use.

- To use a temporary node-to-site mapping that is not stored in the plan file, select the "Simple Mapping Rules" option. See the Simple Mapping Rules section.

  To use a Node-to-Site Mapping table that is saved with in the file, select the "Use # rules in Node-to-Site Mapping Table" option.

  To edit those rules, click the Edit Table button. See the Node-to-Site Mapping Rules section.

  – To add a new rule, select an existing rule (if applicable) from the list, and then click on either the Insert Before or Insert After button to determine where the new rule goes sequentially. This opens a dialog box for adding a new rule.

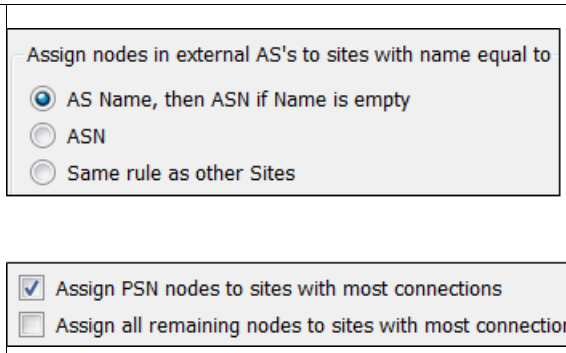
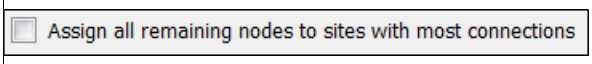



  – To edit an existing rule, select it from the list and then select the Edit button.

  – To delete an existing rule, select it from the list, select the Delete button.

**Step 4** For those nodes that the node-to-site definition does not find or cannot create a matching site, you have the option to keep the nodes in their current sites (if applicable) or to remove them from sites. To keep them in their current sites, select the "Keep unmatched nodes in current sites" option.

**Step 5** Select options based on whether you are in the Layer 3 or Layer 1 view, as follows.

| Layer | Description | |
|---|---|---|
| Layer 3 | • For nodes that are in external AS's, assign them to sites according to one of the following options.<br>– AS name, then ASN if the name is empty<br>– ASN<br>– Using the same rules as other sites<br>• Select whether to assign PSN nodes and all remaining nodes to sites with most connections |  |
| Layer 1 | • Select whether to assign remaining nodes to sites with most connections |  |

**Step 6** To verify assignments, click the Update Preview button. Once satisfied with the mappings, click OK.

# Arrange Sites and Nodes

You can arrange sites and nodes using the following methods.

**Note** All schematic (X and Y) properties are relevant to the network plot, not to a parent site.

- Schematically
  - Align sites and nodes automatically through using the Arrange palette. See the Align Sites and Nodes Schematically section.
  - Click and drag them to the desired location.
  - Sites: Enter values in the Screen X and Screen Y fields of a site Properties dialog box.
  - Nodes: Enter values in the X and Y fields of a node Properties dialog box.
- Geographically—Note that WAE Design uses geographic longitude and latitude for calculating distances and latencies between nodes that are used in various analyses.
  - Automatically assign sites to locations using the Initializers->Assign Locations to Sites tool. See the Assign Geographic Locations to Sites section.
  - Click and drag them to the desired location.
  - Enter values in the Longitude and Latitude fields of a site or nodes Properties dialog box.

### Helpful Tips

- Moving nodes and sites can often change the visibility of objects in within a site plot. Use the Fit-to-Plot (four arrows) icon in the site plot to bring all objects into view.
- Ensure you are in the proper plot background (Schematic or Geographic) for making the type of change you want to make. If you are using a geographic background and you move an object, this changes the geographic coordinates, but not the schematic ones. Conversely, if you are using a schematic background and you move an object, this changes the schematic coordinates, but not the geographic ones. To change the schematic or geographic background, use the Plot Options icon on the Visualization toolbar. For more information, see the Set Plot Backgrounds section.

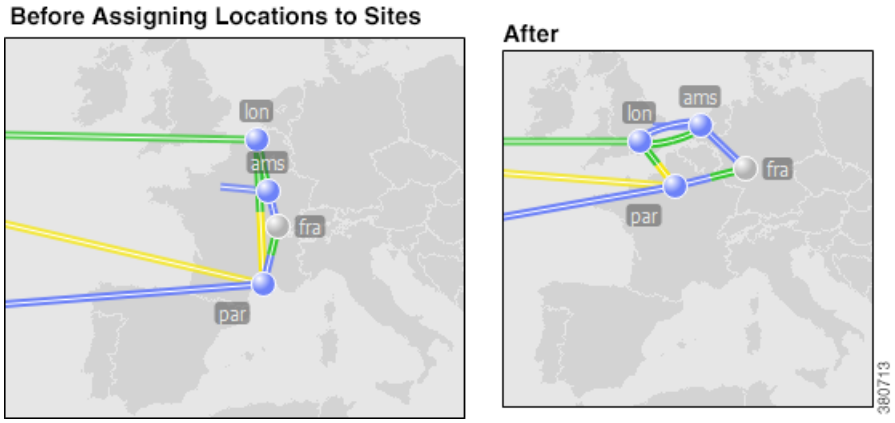
# Assign Geographic Locations to Sites

WAE Design includes a database of worldwide city names and airport codes that identify the longitude and latitude of major cities. Using the Locations tool that accesses this database enables you to quickly lay out sites within a network with geographic precision.

You can quickly assign multiple sites to these locations following these steps. Note that changing the geographic location of a site does not change the location of its children sites.

**Note** To see the effects of geographic moves, you must be using a geographic background. To enable a geographic background, use the Plot Options icon on the Visualization toolbar. For more information, see the Set Plot Backgrounds section.

*Figure 2-2 Example Before and After Assigning Locations to Sites*




**Step 1** Optional: Select one or more sites. If you do not make a selection, a table containing airport codes for all sites is populated.

**Step 2** Open the tool in one of these ways.

- Right-click on a selected site, and select Assign Locations to Sites from the context menu.
- Select the Initializers->Assign Locations to Sites menu.

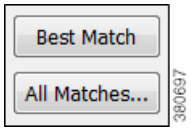
**Step 3** Set the longitude and latitude values using one of the following methods.

- Enter longitude and latitude values directly into the table cells.

- In each of these two methods, WAE Design fills in the fields with the most closely associated airport or city code in its database, thereby assigning longitude and latitude.

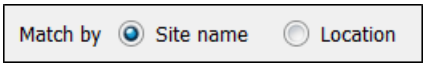
  If desired, select one or more rows from the table. If you do not select rows, WAE Design fills in the longitude and latitude values for all sites.

  - Click the Best Match button.
  - Press **Enter.** (**Do not press OK.**)




- Select a cell in the table, and click the All Matches button. WAE Design finds all airport or city codes that might be applicable to that site or location. Select the one you want, and press OK.

**Step 4** If using an automated way of assigning locations, select whether to match the longitude and latitude values based on the sites or on the locations.

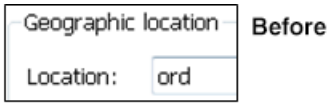


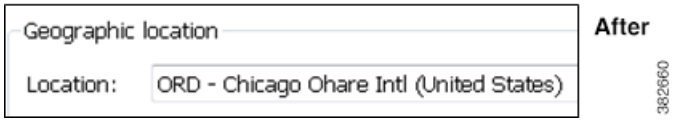

**Note** You can directly enter location information in the Location column. If you then match by site, locations might change based on the match. If you match by location, the site names do not change.

**Step 5** Click OK to accept the newly assigned locations.

## Initialize Site Location

As an alternative to using the Assign Locations to Sites initializer, you can set a location from the Properties dialog box.




**Helpful Tip:** Use airport codes for best results.

**Step 1** Right-click on a site, and select Properties.

**Step 2** In the Location field, enter a geographic name, such as a city, or enter an airport code.

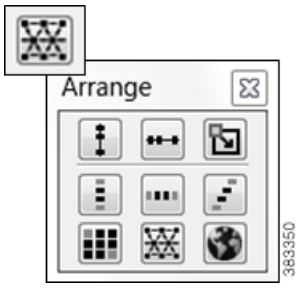
- To replace the location with the best match in the WAE Design database, press Enter.
- To look up the best location, press Alt-Enter. (On a Mac, press Option-Return.) A Lookup Location dialog box appears.

WAE Design fills in the Location fields with the most closely associated airport or city code in its database. Select a location, and click OK.

**Step 3** Click OK to accept the newly assigned location.

# Align Sites and Nodes Schematically

The Arrange palette offers a number of options for precisely aligning sites or nodes within the network plot and on a per-site basis. Although the schematic X and Y properties are in relationship to the network plot, the tools within the Arrange palette operate within the container, where the container can be the network plot or one or more sites, depending on which nodes and/or sites you selected.




**Note** To see the effects of schematic moves, you must be using a schematic background. To enable a schematic background, use the Plot Options icon on the Visualization toolbar. For more information, see the Set Plot Backgrounds section.

**Step 1** Select multiple nodes or sites. If the selected nodes or sites are within different parent sites, they are arranged on a site-by-site basis, if applicable.

**Step 2** To open the Arrange palette, either right-click in an empty area of the network plot and select Arrange from the context menu, or select the Arrange icon in the Visualization toolbar.

**Step 3** Select objects to reposition in one of the following ways.

- Select sites or nodes either by selecting them individually (Shift-click) or by dragging the cursor around them. This is a good way to select a group of objects based on location or connectivity.
- Select sites or nodes by selecting rows in the Sites or Nodes table, respectively. Both tables can be filtered and sorted so this is a good way to select a group of objects based on their name or other site properties.

**Step 4** Arrange the selected sites or nodes.

- To arrange sites or nodes within a plot, click the desired alignment icon.
- To arrange sites or nodes within a specific boundary, set the boundary box and then click the desired icon.

**Boundary Box:** A user-defined *boundary box* sets the borders within which the sites or nodes are arranged. To create a boundary box, press and hold the Ctrl key (Cmd on Mac), click the alignment icon, and drag the cursor to form a box. When you release the Ctrl (Cmd) key, the sites or nodes are arranged to positions within that boundary box.

| Icon | Description |
|---|---|
|  | Align selected objects vertically without changing their horizontal location.<br>Align selected objects horizontally without changing their vertical location. |
|  | Align selected objects vertically, horizontally, or diagonally. The objects are evenly positioned between the outermost selections. You can use boundary boxes. |
|  | Align selected objects vertically, horizontally, or diagonally. The objects are evenly positioned between the outermost selections. You can use boundary boxes. |
|  | Distribute to a grid determined by upper left and lower right of the selected items. You can use boundary boxes. |
|  | Arrange objects in an orderly way based on connections between them. You can use boundary boxes. |
|  | Arrange selected objects proportional to their longitudes and latitudes, either within their original boundary box or within a new one. Any selected objects that do not contain longitudes and latitudes are arranged in an orderly way based on connections between them. |

## Edge Groups

Large, complex networks often contain a limited number of core sites that form the network backbone, with many edge sites that connect locally to one or more of the core sites.

- A core site contains at least one core node, and an edge site contains only edge nodes.
- An edge group is the collection of edge sites that attach to core sites in the same way. A common example of an edge group is a topology where several edge sites have redundant connections to the core sites. If each edge site has the same redundant connections to the same core sites, they are in the same edge group.

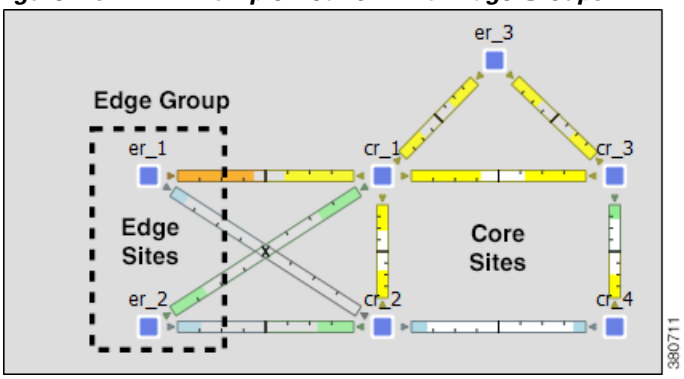
### Arrange Edge Sites

The Arrange palette has special features for arranging edge sites. To access this palette, right-click in an empty area, and select Arrange from the context menu.

| Initializers->Edge Group Menu | Description |
|---|---|
| Select | • Select all sites in all edge groups.<br>• Select all sites within a specific edge group, select one site within it, and then select this menu. |
| Separate | To separate one or more sites from the network, select those sites and then select this menu. Note this does not separate the entire edge group. It only separates the selected sites. |

Figure 2-3 shows an example network with edge sites that have been arranged to separate them from the core. Both sites on the left are in the same edge group because they each have two connections to the same two core sites. The site at the top of the diagram is in a separate edge group because it has different connections to the core sites. Edge sites can have a somewhat more complex topology, because they can also connect to a core site through another edge site.

*Figure 2-3 Example Network with Edge Groups*




## Define Nodes as Edge or Core

Follow these steps to define nodes as core or edge. By default, all nodes are core nodes.


**Step 1** Select one or more nodes. Typically, in a large network with hundreds of nodes, filtering to the edge nodes is the fastest way to find and select them. For information on how to filter table entries, see the *WAE Design User Guide*.

**Step 2** Right-click on one of the nodes, and select Properties.

**Step 3** Select core or edge from the Function list, and press OK.

# Show and Hide Nodes or Sites

By default, nodes and sites are visible in the network plot. You can hide nodes and sites and their connecting circuits on a per-layout basis, though they still exist in the plan file and tables.

**Note** Hiding a site also hides all of its contained objects.

| To ... | Do This ... |
|---|---|
| Hide nodes or sites | 1. Select one or more nodes or sites from the plot, or select them from their respective Nodes or Sites table.<br>2. Right-click on one of the selected objects, and select Layout->Hide Nodes or Hides Sites from the context menu. |
| Find hidden nodes or sites | 1. Use the Shown column of the Nodes table or Sites table. |
| Show nodes or sites | 1. Select one or more nodes or sites from their respective Nodes or Sites table.<br>2. Right-click on one of the objects, and select Layout->Show Nodes or Show Sites from the context menu. |

## Site Relationships to L3 and L1 Nodes

The WAE Design network plot supports the visualization of both L1 and L3 topologies. By default, sites containing L3 nodes appear in the L3 view and sites containing L1 nodes appear in the L1 view. Empty sites and sites containing both L3 and L1 nodes appear in both views. To toggle whether to show or hide sites per view based on whether they contain L3 or L1 nodes, use the Layer 1 tab in the Plot Options dialog box. For detailed information, see the *WAE Design User Guide*. For information on saving user defaults, see the Set Plot Backgrounds section.

Although the WAE Design GUI shows weathermap layouts in the Layer 1 view, WAE Live and WAE Design Archive applications show only L3 topologies.

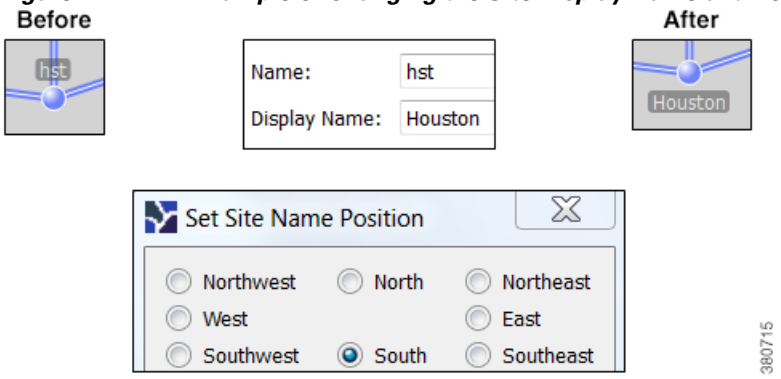
# Set and Position Display Name

By default, site and node names appear above the object. However, you can change this positioning. Additionally, rather than showing the site names, you can set a different display name that can be internationalized. Figure 2-4 shows an example of changing both for a site.

| To ... | Do This ... |
|---|---|
| Set the site display name | 1. Either double-click a site in the Sites table, or right-click on a site and select Properties from the context menu.<br>2. Enter a name in the Display Name field, and click OK. |

| To ... | Do This ... |
|---|---|
| Change where site names are positioned | 1. Right-click on one or more selected sites, and select the Layout->Set Site Name Position context menu.<br>2. Select the direction in which you want the site name to appear in reference to the site, and click OK. |
| Change where node names are positioned | 1. Right-click on one or more nodes selected nodes, and select the Set Node Name Position context menu.<br>2. Select the direction in which you want the node name to appear in reference to the site, and click OK. |

*Figure 2-4 Example of Changing the Site Display Name and Position*

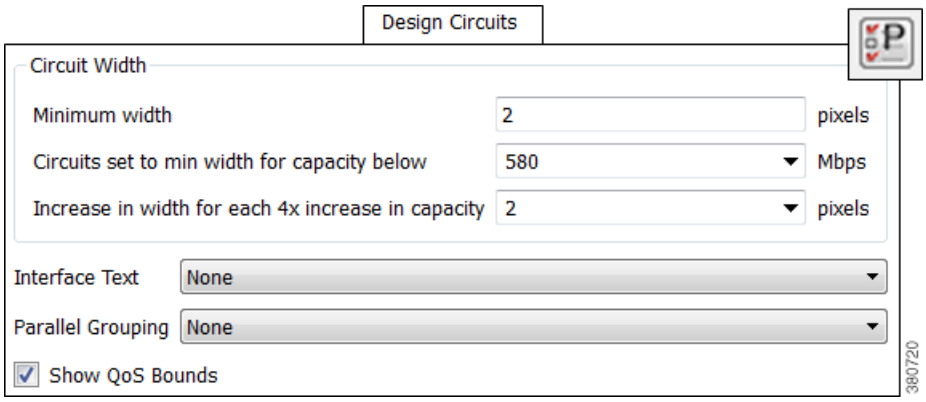



# Circuits and Interfaces

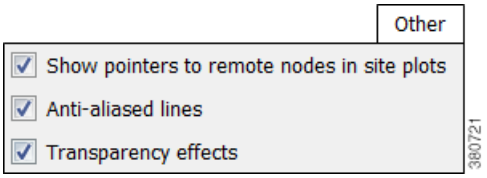
## Set Circuit and Interface Appearance

You can change how circuits are displayed by clicking the Plot Options icon in the top, right of the Visualization toolbar. Alternatively, select the Edit->Plot->Plot Options->Edit Options menu. For information on saving user defaults, see the Set Plot Backgrounds section.

The Design Circuits tab has the following options.



- Circuit Width—The circuit width is based on its capacity (the higher the capacity, the wider the circuit). Using these options, you can set the minimum width and the capacity it represents, as well as how fast the width grows as the capacity grows.
- Interface Text—This option, which is applicable to Design layouts only, enables you to display the percentage of interface filled with traffic, or the interface name, IP address, or IGP metric.
- Parallel Grouping—This option simplifies the representation of parallel circuits into a single circuit. By default, there is no grouping. See Set How Parallel Circuits Appear.
- Show QoS Bounds—This option, which is applicable to Design layouts only, enables you to toggle on/off the display of QoS bounds, which is the maximum interface capacity available without violating the QoS requirements. The default is On. For QoS bound information, see the *WAE Design User Guide*.
- The Other tab enables you to toggle on/off the following settings.

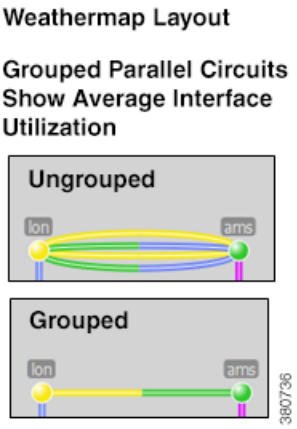



  - Whether remote node names appear in the site plot.
  - Whether to use anti-aliased lines. Turning off this option reduces the smoothness of lines in the plot, but speeds up the plot updates on some platforms.
  - Whether transparency effects are used when plotting some circuits on top of others. Turning off this option speeds up the plot updates on some platforms.

## Set How Parallel Circuits Appear

By default, WAE Design displays all circuits individually. For example, if you have parallel site circuits, they are displayed in a stacked manner.

To simplify the visual display of a plan, you can group parallel circuits using any one of the methods described in step 3 of the following instructions. The grouped circuits show capacity and outbound utilization in the network plot and if applicable, in the site plots as follows. If the circuits are between sites, the utilization includes the utilization of nested interfaces, if applicable.




- The capacity of the grouped circuit is the sum of the individual circuits.
- The utilization of the grouped circuit is the average of the utilizations (weighted by capacity) of the individual circuits. The color fill of the grouped circuit shows this average.
- In the Design layout, each side of the grouped circuit is divided lengthwise into its constituent interfaces that are individually selectable. Each interface within a grouped circuit has a thin colored border showing the utilization of that interface. Each interface continues to show textual information, such as IGP metric, if this has been enabled.

Figure 2-5 shows an example in the network plot using a Design layout.

**Note** Parallel groupings change the visual representation of the layout, but do not affect the plan itself. If you want to literally merge parallel circuits (rather than just change the appearance), see the *WAE Design User Guide*.

**Step 1** Click the Plot Options icon in the Visualization toolbar.

**Step 2** Select the Design Circuits tab.

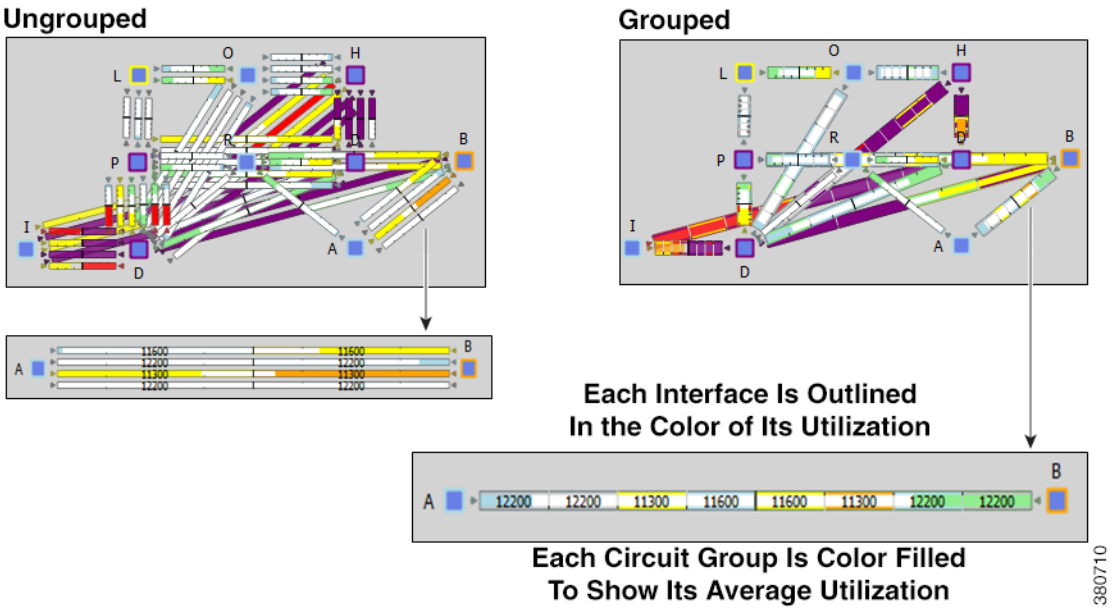
**Step 3** From the Parallel Grouping drop-down list, select one of the following methods.

- None—Each parallel circuit is displayed as a separate circuit (default).
- Node—Groups parallel circuits between two nodes.
- Metric—Groups parallel circuits between two nodes whose interfaces have the same IGP metric.
- Site—Groups parallel circuits between two sites.
- SRLG—Groups parallel circuits that belong to the same SRLG.
- Group Name—Groups circuits belonging to a user-specified group set in the Parallel Group Name field of the circuit Properties dialog box. (See the *WAE Design User Guide*.)

**Step 4** For Design layouts, you can set the maximum display width for parallel circuits.

**Step 5** Click OK. For information on saving user defaults, see the Set Plot Option Defaults section.

*Figure 2-5 Both Ungrouped and Grouped Parallel Circuits by Site in a Design Layout*

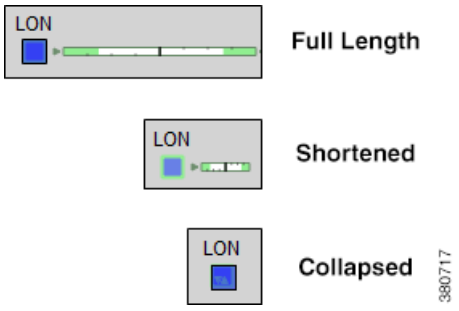



## Set Interface Style

By default, two interfaces are represented in the plot as two sides of a full-length circuit drawn from one site to another. However, circuits connected to internal or external AS's are shortened.

This full-length model works well when the sites are close together, but if they are far apart full-length circuits can clutter the plot. You may want to display the sites as regions by shortening circuits between them.

Interfaces between the same two sites or between the same two nodes have the same interface style. If you change the style for any one of these interfaces, the style of all associated interfaces changes too.




**Step 1** Select one or more interfaces or circuits.

**Step 2** Right-click on one of the selections. From the context menu, select Layout->Set Interface Style->Option, where Option is one of the following choices.

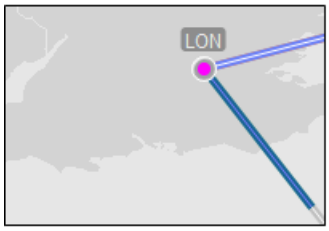
- Full Length—The entire interface is displayed.
- Shortened—A short portion of each interface is shown attached to the node containing the outward-bound interface.

- Collapsed—The interfaces are not shown on either side of the node or site. The remote interface on the circuit does not appear.
- Default—If the circuit is connecting two nodes in the same internal AS, the interfaces appear as full length; if it connecting two nodes in different AS's, the interfaces appear as shortened.

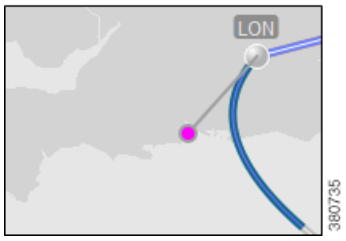
# Curved Weathermap Circuits

Follow these steps to move and curve the circuits in a Weathermap layout.

1. Click circuit




2. Drag icon



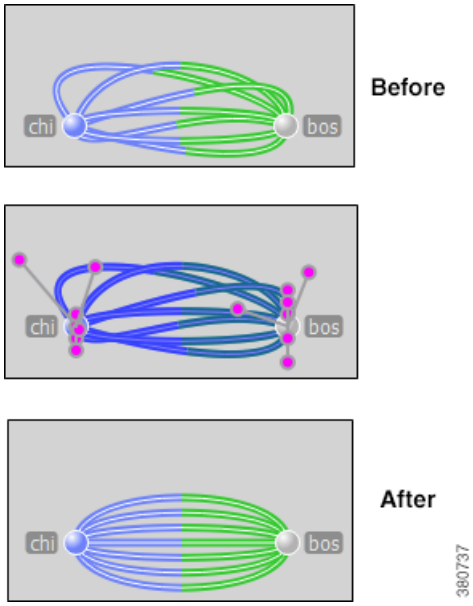

**Step 1** Click the circuit to see a circular pink icon.

**Step 2** Drag the pink circle in any direction, thus creating curved circuit lines.

To move circuits such that the sites or peers stay in horizontal or vertical alignment, press and hold the Shift key while dragging the circular icon.

## Reset Curves

One way to simplify a Weathermap layout is to reset the circuits' curves. Doing so changes the curves so they are more similar to ones that exist, and removes circuit overlap.

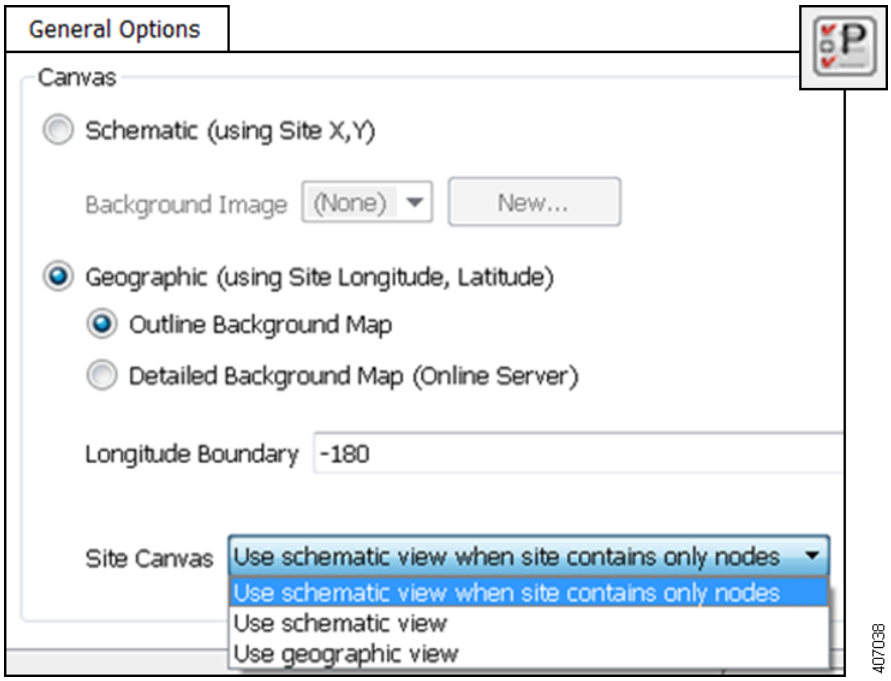



**Step 1** Select all circuits that you want to reset.

**Step 2** Right-click on one of the selected circuits, and select Layout->Reset Curves from the context menu.

# Set Plot Backgrounds

Select the network plot background in the Plot Options dialog box, General Options tab, which is selectable via the Plot Options icon in the Visualization toolbar. Alternatively, select the Edit->Plot->Plot Options->Edit Options menu. Figure 2-6 shows an example of three available options. For information on user and system defaults, see the Set Plot Backgrounds section.




- Schematic views show the network based on the X,Y properties of the nodes and sites.

  Additionally, you have the option to select or add a static background image in .png format. If the image is a background map, the topology likely will not map to an imported image, so you have to re-arrange the sites accordingly. Note that these images can be saved in .pln or .db formats, but not in .txt format.

- Geographic views show the network based on the Longitude and Latitude properties of the nodes and sites.
  - Outline Background Map—Geographic map with outline of countries and if applicable, USA states.
  - Detailed Background Map—Geographic map with streets. Click the zoom icon (magnifying glass icon in the Visualization toolbar) to see the level of desired detail. This option requires Internet connectivity to access the online map server. If connectivity is unavailable, use the outline background, or download a map image and import it as a background image. To access a different online map server, see the *WAE Design Integration and Development Guide*.
  - Longitude Boundary—Measurement in degrees that specifies the east-west position of a point on the Earth's surface. The default is the -180 degrees, but could be changed, for example, to provide a continuous view of the Pacific.

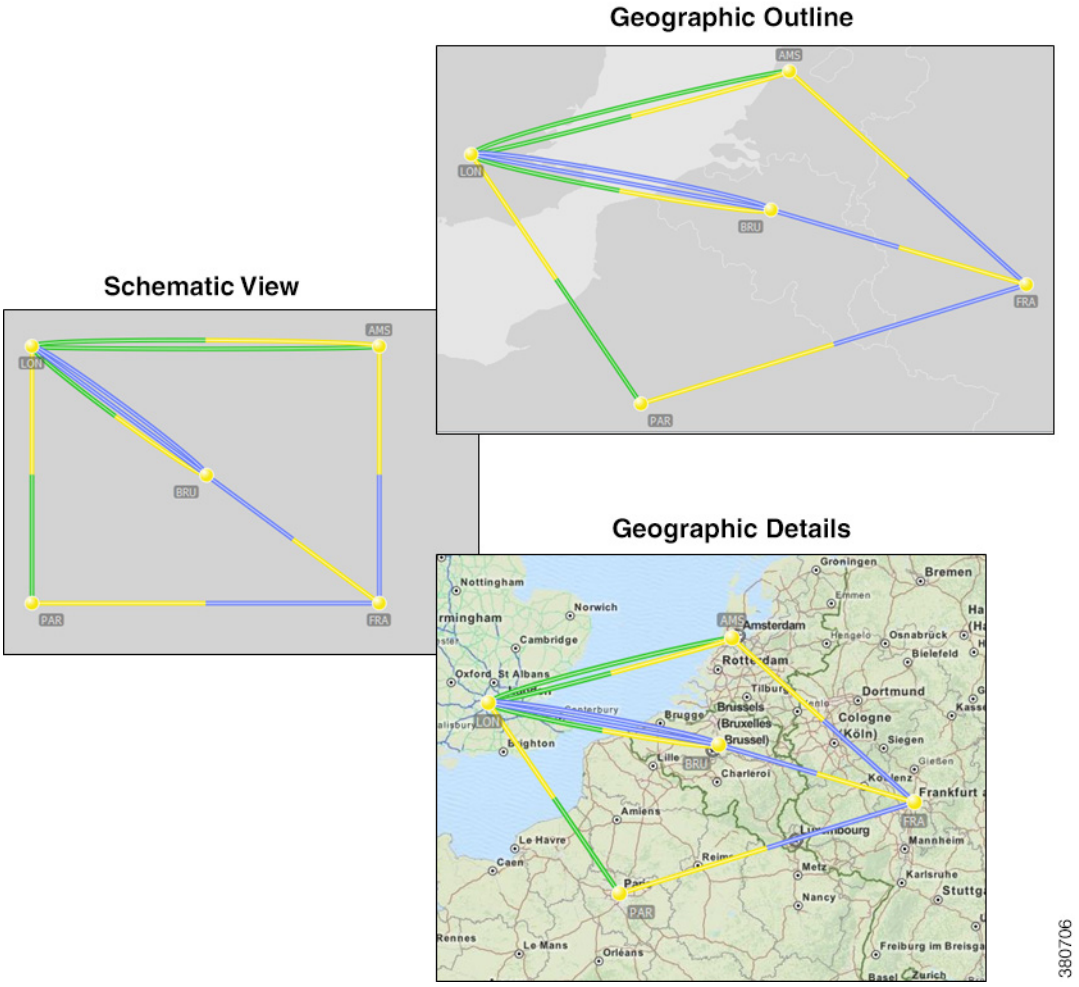
– Site Canvas—If you are using the schematic view for the network plot, all sites show only the schematic view and you cannot further configure the site view. If you are using either of the geographic views, you can specify how to view the sites using the Site Canvas options. These options apply to all sites, regardless of whether they contain L3 nodes, L1 nodes, or both. Note that this option does not affect the placement of nodes that are not in sites.

  Schematic view—Shows nodes and sites network based on the X,Y properties of the nodes and sites.

  Geographic view—Shows the same background as the geographic view selected for the network plot (outline or detailed).

  Schematic view when site contains only nodes—Use this option to visualize nodes that have the same geographic coordinates within the same site. Using the geographic view results in these nodes being placed on top of each other.

***Figure 2-6 Backgrounds for WAE Design Network Plot***

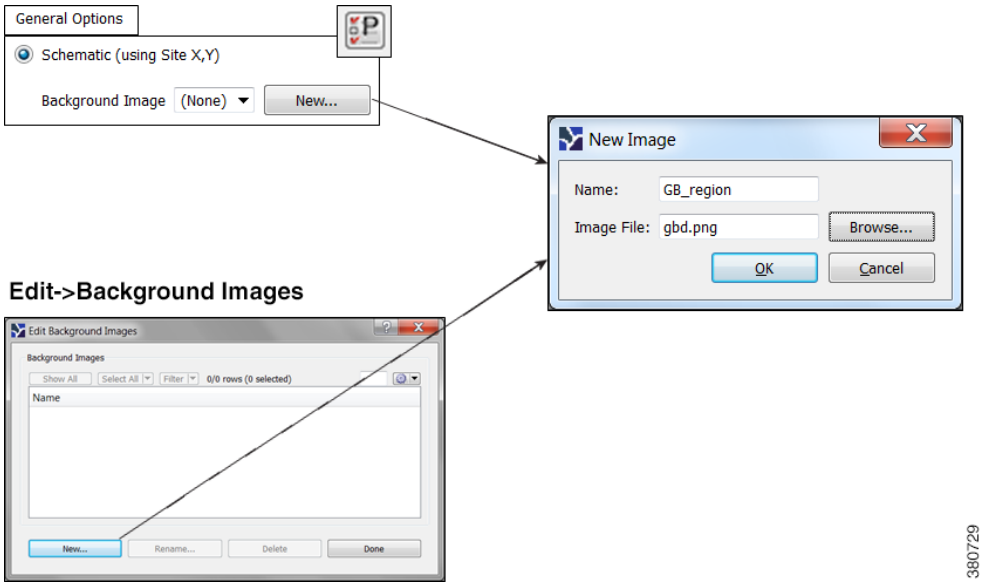


# Create Static Background Map

If you have a static .png image that you prefer to use as a background, you can add these either through the Plot Options dialog box or the Edit menu. You can also rename and delete them using the Edit option.

| Add Static Background Map Through Plot Options | Add Static Background Map Through Edit Menu |
|---|---|
| 1. Click the Plot Options icon in the Visualization toolbar, or select the Edit->Plot->Plot Options->Edit Options menu.<br>2. In the General Options tab, select the Schematic option.<br>3. Click the New button next to the Background Image list.<br>a. Enter the name of the map as it will appear for selection from the GUI.<br>b. Enter or browse to the name of the .png file that is the static image you are uploading.<br>c. Click OK.<br>4. Click OK in the Plot Options dialog box. | 1. Select the Edit->Plot->Background Images menu.<br>2. Click the New button.<br>a. Enter the name of the map as it will appear for selection in the GUI.<br>b. Enter or browse to the name of the .png file that is the static image you are uploading.<br>c. Click OK.<br>3. Click Done in the Edit Background Images dialog box. |

*Figure 2-7 Add a Static Background Image*

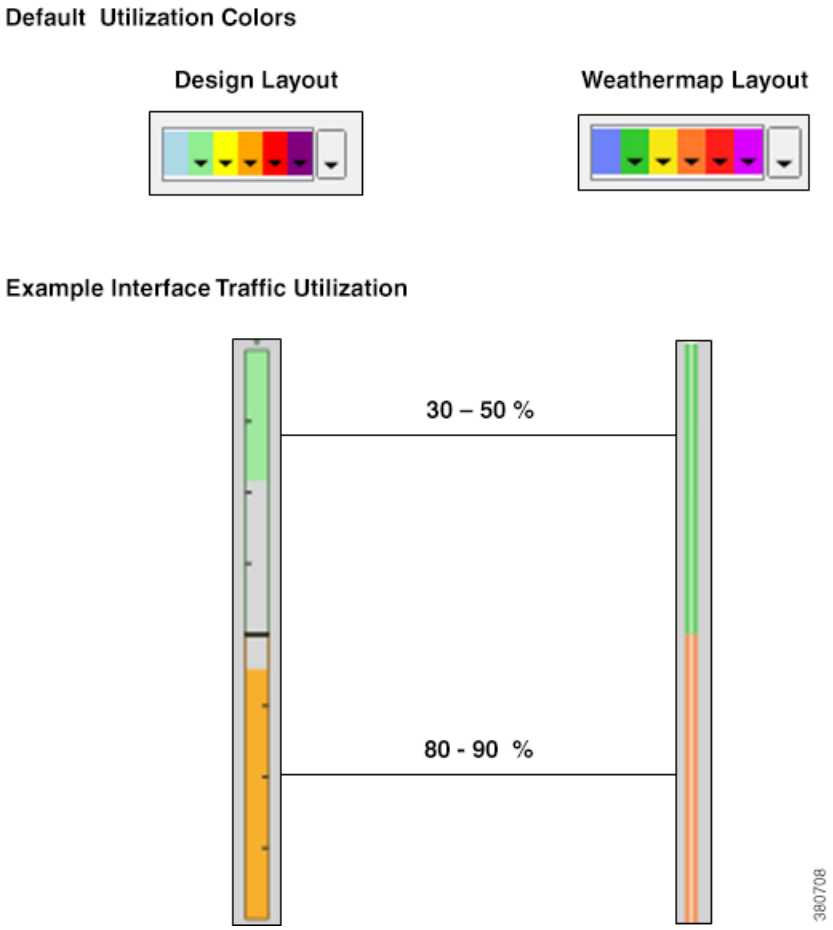



# Traffic Utilization Colors

Interfaces have both measured and simulated traffic (in Mbps). This traffic appears on the interfaces as color fills that represent the percentage of outbound traffic in comparison to its capacity. The default colors for these representations appear in the Utilization Color menu, which is a set of color-coded drop-down lists in the Visualization toolbar. There are six default colors representing thresholds ranging from 0% to 100% (Figure 2-8).

Note that in the L1 view, only the Failure Impact view shows colors, and those colors are related to L3 interface utilization. For information, see the *WAE Design User Guide*, Layer 1 chapter.

***Figure 2-8 Default Utilization Colors***

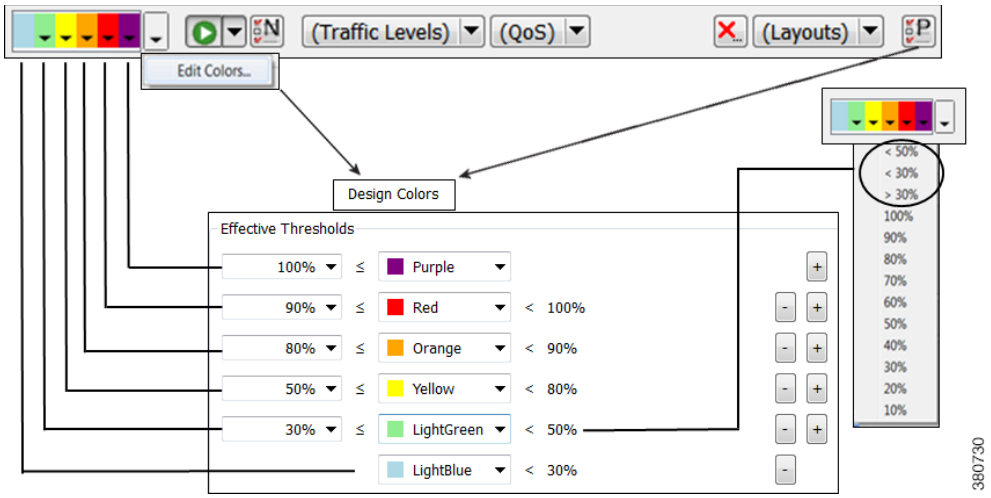



Each default utilization color has a menu whose numbers correspond with their values in the Design Colors tab of the Plot Options dialog box (Figure 2-9). It is from this Edit Colors dialog box that you edit the colors used for traffic utilization.

You can edit the utilization values, add and remove colors, and locate interfaces that meet utilizations levels of special concern. Edits to these colors are saved to the plan file when the file is saved. You can also create and save a set of user defaults that can be applied to other plan files. Different utilization colors can be set for different layouts in a plan. For information on saving and applying user defaults, see the Set Plot Backgrounds section.

**Note** All documentation and instructions are written according to default colors using a Design layout. If you change to a Weathermap layout or if you change colors and their uses, the instructions herein still apply.

*Figure 2-9 Relationship of Edit Colors Dialog Box to Traffic Utilization Color Menu*




# Change Traffic Utilization Values

## Find and Set Maximum Utilization

- Select Max from the purple drop-down list. WAE Design finds the most utilized interface and sets the minimum utilization for purple to that value. As a result, that interface (and only that interface) is highlighted in the plot with purple. This method offers a quick way to determine the most highly utilized interface.
- Open the Plot Options, Design Colors dialog box by selecting the far right, gray drop-down list from the Utilization Color menu. Here, either enter a new value or select a value from the drop-down list in the top, purple row. Click OK to save the changes.

## Change Minimum Utilization Values

If you set a minimum value that imposes on an existing utilization value, WAE Design calculates a new percentage for that existing utilization or calculates that it cannot be used.

**Example:** The default for red is 90-100%, and the default for orange is 80-90%. If you set red to mean 80-100% utilization, orange is not used in the plot to show utilization. If you set red, however, to mean 85-100%, then WAE Design adjusts the orange value to the remaining amount available, which in this example is 80-85%.

To change minimum utilization values, use either the color drop-down list or the Plot Options, Design Colors dialog box. Both options behave the same way. Modifications in the drop-down list appear in the Design Color dialog box and vice versa.

**Step 1** If using the dialog box, open it using one of these methods.

- Click the Plot Options icon, and select the Design Colors tab.
- Select the far right, gray drop-down list from the Utilization Color menu.
- Select the Edit->Plot->Plot Options->Edit Options menu, and select the Design Colors tab.

**Step 2** Change the minimum value using one of these methods.

- If you select an exact value, that value becomes the new minimum.
- If you select a number with a greater-than sign (>) next to it, WAE Design finds the interface that is closest to and greater than that value.

  **Example:** By default, yellow is 50-80%. If you select >50%, WAE Design finds the interface with a utilization that is closest to and greater than 50% (Figure 2-10).
- If you select a number with a less-than sign (<) next to it, WAE Design finds the interface that is closest to and less than that value.

  **Example:** By default, light green is 30-50%. If you select <50%, WAE Design finds the interface with a utilization that is closest to and less than 50% (Figure 2-11).
- If in the dialog box, you can enter a value directly into the field.

**Step 3** If in the dialog box, click OK to save the changes.

*Figure 2-10 Example of Changing a Minimum Utilization Value Using the Color Drop-Down List*

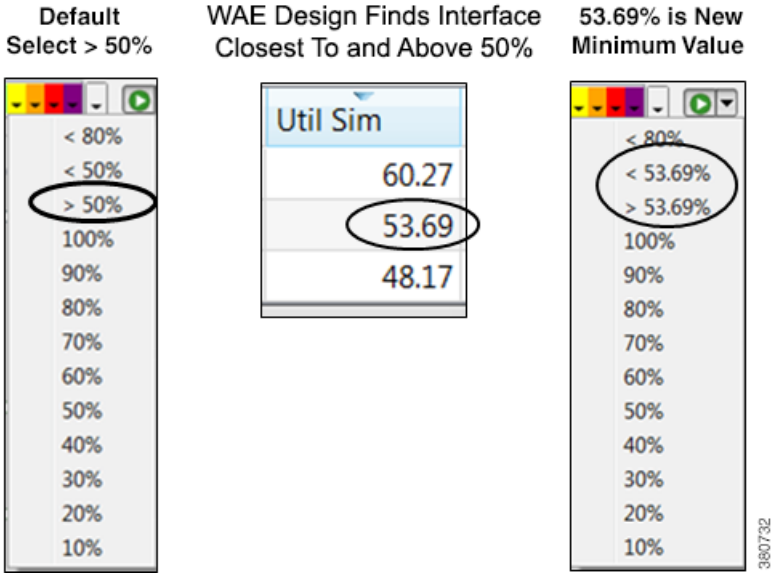
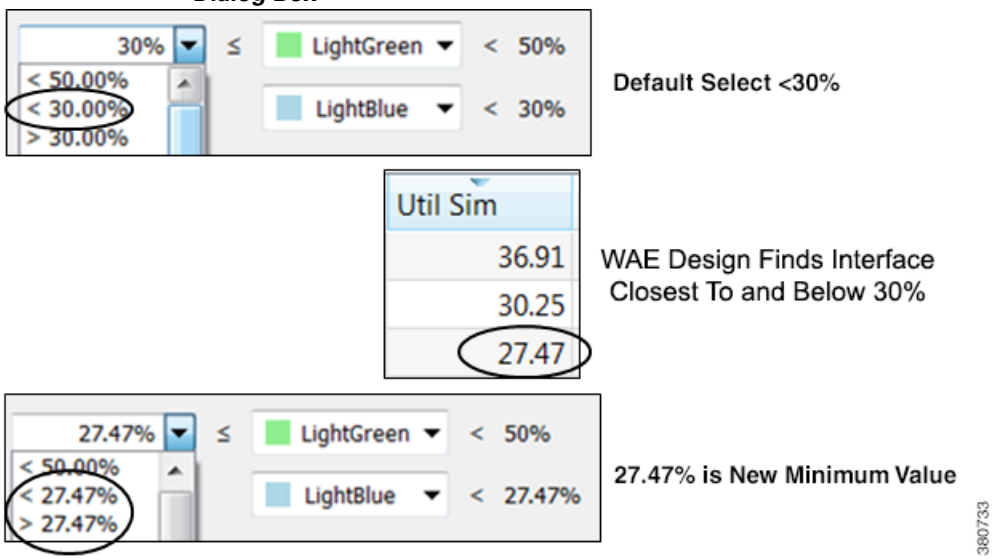


*Figure 2-11 Example of Changing a Minimum Utilization Value in the Plot Options, Design Colors Dialog Box*




# Add and Delete Utilization Colors

## Add New Utilization Colors

After adding a color, the maximum utilization value for it is based on the minimum value above it. When you assign the new color a minimum utilization value, it always imposes on the utilization range below it (unless the utilization value you are adding is the lowest). Since this minimum value imposes on an existing one, WAE Design recalculates a new percentage for that existing utilization or calculates that it cannot be used.

Once a utilization color is added, it appears in the Utilization Color menu.

**Step 1** Open the Design Colors dialog box using one of these methods.

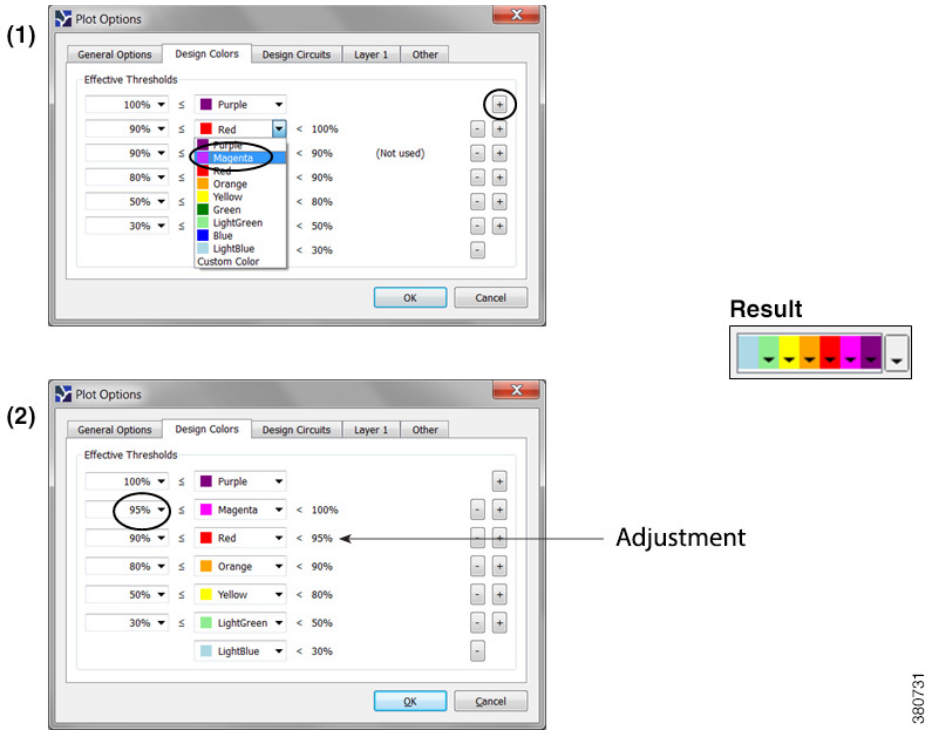
- Click the Plot Options icon, and select the Design Colors tab.
- Select the far right, gray drop-down list from the Utilization Color menu.
- Select the Edit->Plot->Plot Options->Edit Options menu, and select the Design Colors tab.

**Step 2** Click on the plus (+) button to the right of the color below which you are adding a new color. The row is replicated below it and is marked as *Not used*. For example, to add a utilization color below red, click on the + button on the same row as red.

**Step 3** In the new row, either enter a new minimum value or select it from the list, and then click OK.

**Example:** Figure 2-12 demonstrates adding a magenta utilization color with a range of 95-100%.

*Figure 2-12 Example of Adding a Magenta Utilization Color with a Range of 95-100%*




## Delete a Utilization Color

Although you can delete a default color so that it is not represented on the plot, doing so does not remove that color from the Utilization Color menu. Deleting a color that you previously added, however, removes it from the toolbar.

**Step 1** Select the far right, gray drop-down list from the Utilization Colors toolbar.

**Step 2** Click on the minus (-) button associated with the row you want delete. Then click OK.

# Set Plot Option Defaults

Each time you modify one or more plot options, they are saved in the plan file for the current layout. When you save the file, these plot options are saved per layout.

There are two types of plot option defaults.

- **User Defaults**—A set of customized plot options that you can create, set, and apply to other plan files. Each time you set a user default, it overrides the previous version.

If you open a previously unopened plan file, its default plot options are the user defaults if they exist.

**Example:** If you set the user defaults for plan A, you can then open plan B and apply these user defaults to it.

- **System Defaults**—The set of plot option defaults that comes with WAE Design. These are not configurable, and can always be applied.

  System defaults are applied to a previously unopened plan file if no user defaults have yet been defined.

User and system defaults are per layout type. For instance, if you are in a Design layout and you apply user defaults, then the Design user defaults apply. If you are in a Weathermap layout and you apply system defaults, then the Weathermap system defaults apply.

| To ... | Select This Menu ... |
|---|---|
| Apply system defaults. | Edit->Plot->Plot Options->Apply System Defaults |
| Save current plot options to user defaults. Note you cannot cancel the result of having saved the user defaults. | Edit->Plot->Plot Options->Save User Defaults |
| Apply user defaults. | Edit->Plot->Plot Options->Apply User Defaults |

**Note** You can also save how you view tables, columns, foreground and background objects, and other preferences for all plan files that you open in the future, use the View menu. For more information, see the *WAE Design User Guide*, User Interface chapter.

# Related Topics

- Using Layouts chapter
- *WAE Design User Guide*
- *WAE Design Integration and Development Guide*


# Using Layouts

A single plan can contain numerous layouts, each containing its own set of visual properties. Given the complexity of networks, you might need to create different layouts for numerous reasons. For instance, you might need to simplify sections of the network for better analysis or planning purposes. Another use might be to display a geographic layout or a schematic layout.

The attributes that are set and saved on a per-layout basis are hide/show objects, interface styles, site name placement, and all plot options. You can save the plot options as user defaults, thus making it easier to apply the same plot options to different layouts.

Saving a plan file saves all layouts. Once plot layouts have been designed for a particular plan file, you can copy them to another plan file by selecting the File->Copy From Template menu.

## Weathermap vs. Design Layouts

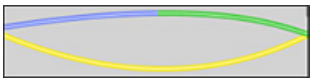
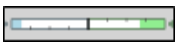
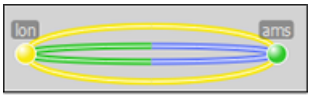
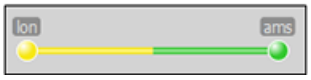
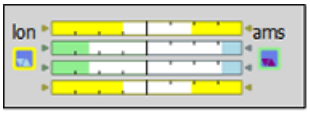
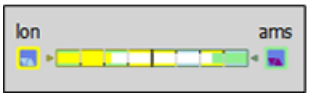
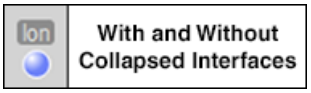
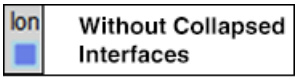
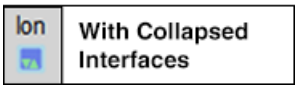
There are two layout types: Weathermap and Design.

- The Weathermap layout is designed for use in a static, non-interactive view of a fixed network layout, with an emphasis on seeing operational issues such as high utilization. It is recommended for creating and editing WAE Live weathermap templates.
- The Design layout is more useful for interactive work where the emphasis is on detailed interactions and network editing. It is recommended for planning and design work within the WAE Design GUI. The WAE Design Archive application only supports the Design layout.

**Note** Plan files open using the layout named Default, which is a Design layout. If this is your first time opening a plan file and you are modifying it to use in WAE Live, you must first either create a Weathermap layout or change the Default type to be a Weathermap layout. For instructions, see the Create or Edit Layouts section.

The conventions described in this guide apply to both Weathermap and Design layout types, but there are key differences between the two. Table 3-1 describes these differences, and Figure 3-1 shows an example of each layout using the same topology and canvas.

*Table 3-1 Differences Between Weathermap and Design Layouts*

| Description | Weathermap Layout | Design Layout |
|---|---|---|
| The shape and size of the circuits differ.<br>• Weathermap circuits have a fixed width. They can also be curved to enhance a static network view.<br>• Design circuits show different widths depending on capacity. These circuits cannot be curved.<br>**Example:** In the graphs on the right, the top circuit has a capacity of 1,000 Mbps, and the circuit on the bottom has a capacity of 10,000 Mbps. |  |  |
| In Weathermap layouts, the traffic utilization color fills the entire interface. In Design layouts, the color fills up the interface proportional to traffic utilization levels. |  |  |
| Parallel circuits render differently. In both layouts, color fill of the grouped circuit shows this average. In the Design layout, however, the circuit is divided lengthwise into its constituent interfaces, and each interface has a colored border showing the utilization of that interface. |  <br>  |  <br>  |
| The default utilization colors are different. The Weathermap layout uses more saturated and more appropriate colors for static viewing in a Web browser, whereas the Design colors are more suitable for the interactive work in the GUI. |  |  |
| The site icon and site name appear differently.<br>• In the Weathermap layout, the color of the site icon is the maximum utilization color of all intrasite interfaces within the site. The site icon does not reflect whether interfaces from it are collapsed.<br>• In the Design layout, the color of the site border is the maximum utilization color of all intrasite interfaces within it.<br>Up/down triangles in a site reflect interfaces from it are collapsed. |  |  <br>  |

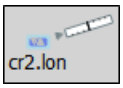
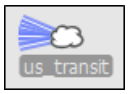
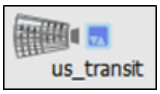
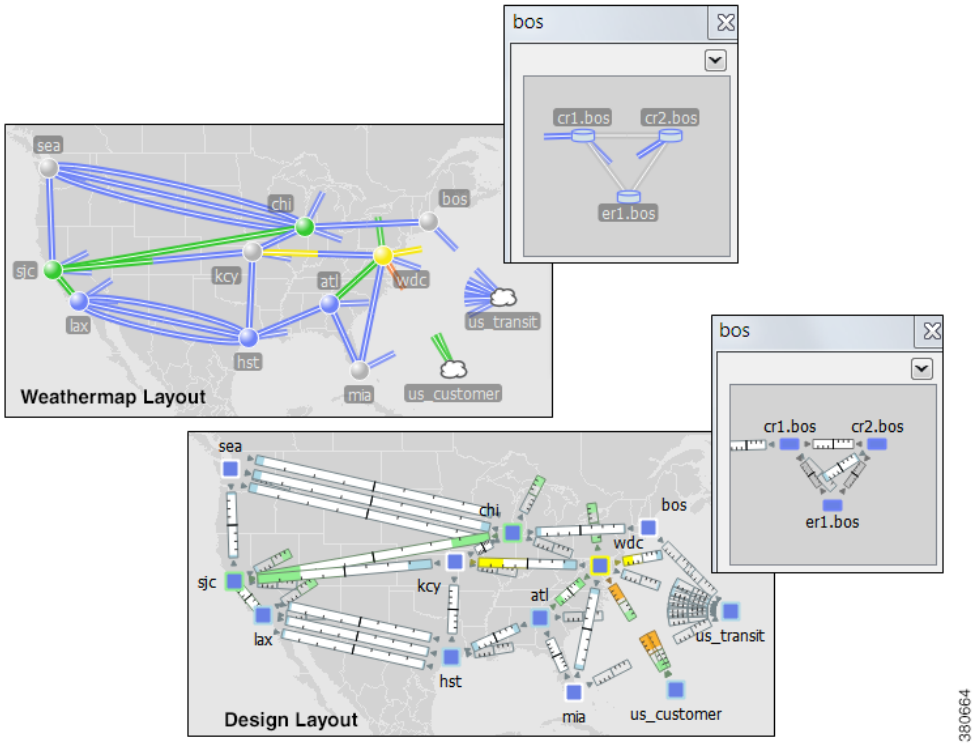
| Description | Weathermap Layout | Design Layout |
|---|---|---|
| The node icon and node name appear differently. In the Weathermap layout, the node icon does not reflect whether interfaces from it are collapsed, whereas in the Design layout, it does. |  |  |
| The peer site icon and peer name appear differently. In the Weathermap layout, peering sites (that is, any site containing one or more external AS nodes) appears as a cloud. In the Design layout, they have the same appearance as sites, and, like other sites, they reflect whether interfaces from them are collapsed. |  |  |

*Figure 3-1 Example Weathermap and Design Layouts Using the Same Topology and Canvas*



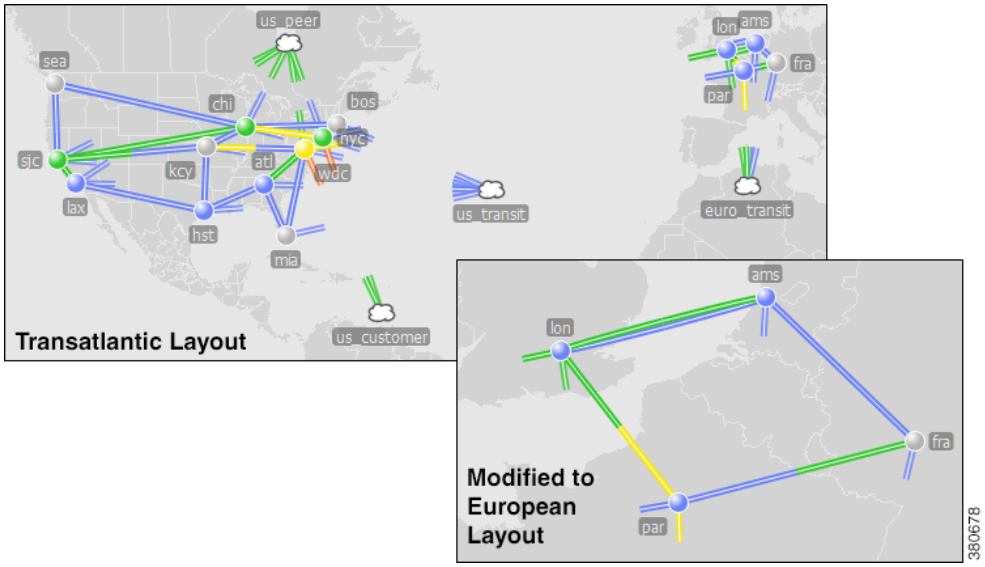

# Create or Edit Layouts

You can create or edit layouts to change the appearance or to narrow or broaden what you see in the plan file. This might be useful, for example, to focus on a specific section of a network. For example, Figure 3-2 shows a transatlantic layout that was modified to show only the European sites. Following are a few of the ways in which you might choose to create or edit layouts.

- Modify interface style. For example, you might want to shorten the interfaces to external sites.

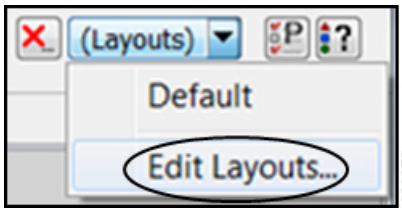
- Show or hide sites.
- Arrange objects.
- Change the background map.
- Make other visual changes to the plot, such as identifying how circuits and interfaces appear.

*Figure 3-2 Example Modified Weathermap Layout*




# Create Layouts

**Step 1** Select Edit Layout from the Layouts drop-down list. The Edit Plot Layouts dialog box appears.




**Step 2** You can use either New or Duplicate to create a new layout, or use the Edit option to edit existing layouts.

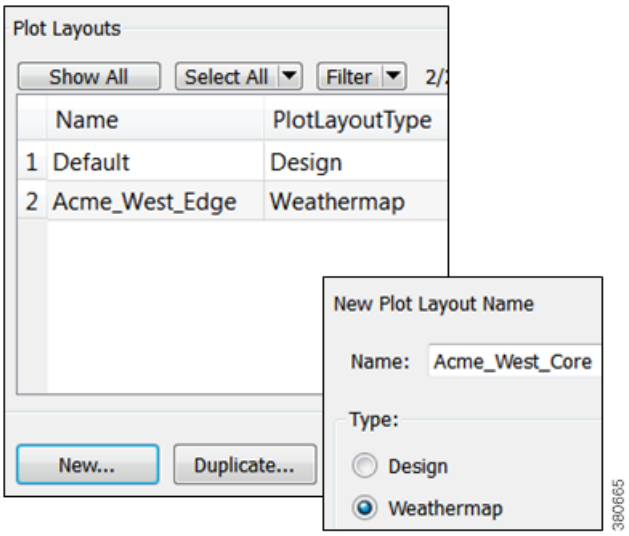
- To create a new layout based on the layout that is currently open, click New.

  In the New Plot Layout dialog box, enter the layout name.

  Select whether this is a Design or Weathermap layout.

  Click OK.

If the sites have longitude and latitude coordinates defined, those are preserved. Otherwise, the sites are arranged in a square formation. Other plot settings are set to their defaults.




- To duplicate the layout exactly, select an existing layout, and then click Duplicate. Enter the name, and then click OK. This copies the layout type (Design or Weathermap). If you need to change the layout type, you must then edit it.

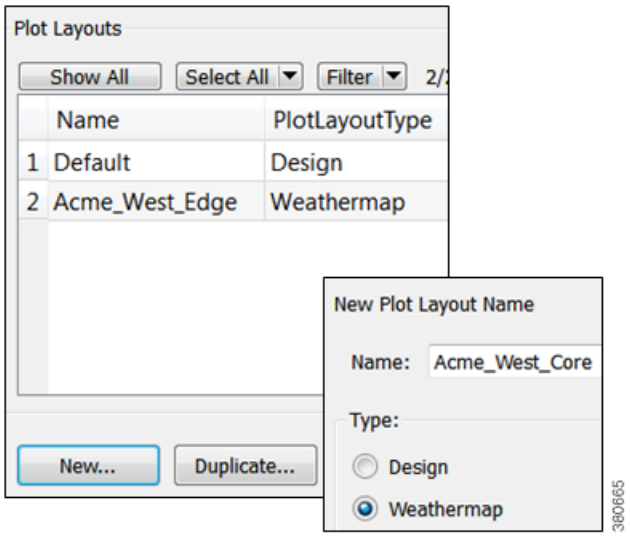
**Step 3** Click OK in the Edit Plot Layouts dialog box.

# Edit Layout Name or Type

**Step 1** Select the name of an existing layout from the Edit Layouts menu, and then click Edit.

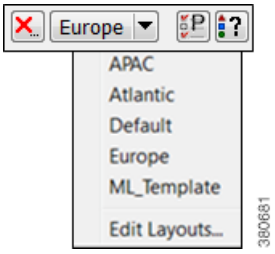
**Step 2** Modify the name, the type, or both, and then click OK.

**Step 3** Click OK in the Edit Plot Layouts dialog box.




# View Layouts

To view a layout, click on the Layout icon in the top, right corner, and select the desired layout from the drop-down list.




# Related Topics

- Visualizing a WAE Network chapter
- Plan Files and Templates chapter
- Access WAE Live chapter
- Access an Archive chapter
- Access WAE Automation Server and Deploy chapter


# Plan Files and Templates

This chapter describes plans files and templates so that you understand their structure, and how templates are applied to plan files for visualization in the applications. Only those applications or servers that are accessible from the WAE Design GUI are mentioned in this chapter.

- Plan Files—Provides a brief description of plan files. For detailed plan file information, see the *WAE Design Integration and Development Guide*.
- Templates—Describes how templates apply to plan files, how they integrate with the applications, how the Copy from Template tool works.

Figure 4-1 shows the plan file and template workflow for applications. The recommendation is to open the remote plan file, modify it in the GUI to create the visual template, and save it to the remote archive as a template (where it overwrites the archived template).

Figure 4-1 also shows the workflow of using the WAE Design GUI to open plan files from and save plan files to the remote WAE Automation server, wherein they can then be deployed to the network.

## Plan Files

A plan file is comprised of a series of tables that store information about a network, including topology, configuration information, traffic, failure state, and visual layout Additionally, WAE Design uses plan file information to perform simulations.

Plans files are typically created by the WAE Collector discovery process for use by the applications or the APIs. The WAE Live, WAE Design Archive, and WAE Design applications all have interfaces for viewing the network through a *plan file*. The WAE Coordinated Maintenance application uses plan files for traffic data.

The WAE Design GUI can access remote servers to send and receive plan files.

## Templates

A WAE Design *template* identifies how the plan file visually looks and can contain information that is not discovered. As such, templates are a convenient way to replicate manual changes across multiple plan files. For instance, you can augment newly discovered plans with non-discoverable information.

No matter the discovery method, the way to make further visual enhancements to the plan file is using the WAE Design GUI, which can access remote servers to send and receive templates.

Where templates are created depends on the discovery method.

- For WAE Live, the template is stored in a map archive. It is to this location that you are saving a template if saving it from the WAE Design GUI to WAE Live.

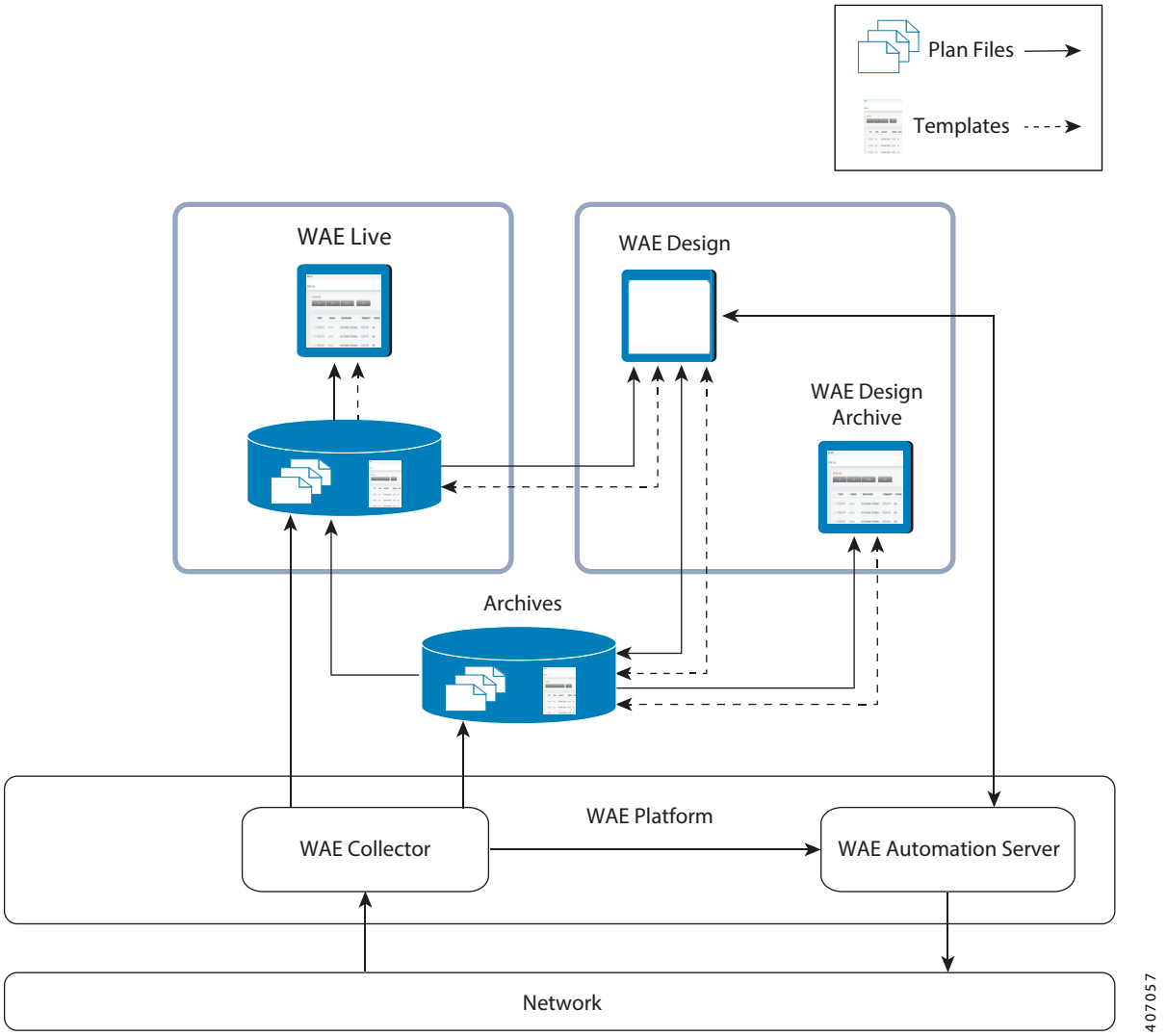
  Once WAE Live requests and receives a plan file, it automatically applies its own template that contains the visual elements for laying out the network. If this template has not yet been enhanced using the WAE Design GUI, the plan file is visualized in the default, unprocessed state. If a template does not yet exist in the map archive, WAE Live creates one from the latest plan file and stores it that location.

- If using the augmented or manual method of discovery, the `copy_from_template` tool is used within the snapshot process to either include more objects in the template, change the visual representation of them, or both. The resulting snapshot plan file is saved to an external archive. These files are available for use in the applications. While those plan files might already have visualization enhancements (via `copy_from_template`), WAE Live will still apply its own template as described in the previous bullet.

When saving a template from WAE Design to either WAE Live or to an archive, template changes apply only to plan files collected after that template is saved. That is, those templates changes do not apply to historical plan files.

**Note** The WAE Automation server does not contain templates as defined here. Also note that while the WAE Coordinated Maintenance application uses templates, it does so only for the purpose of having current topology (not for visualization purposes). This section only describes templates used for visualization purposes.

*Figure 4-1 Plan File and Template Flow Using the WAE Design GUI*




# Copy from Template

The Copy from Template tool enables you to copy objects and their properties from one a template to another file. By copying a template, you can augment newly discovered plans with non-discoverable information, such as sites, layouts, shared-risk link groups (SRLGs), external endpoints, and Layer 1 (L1) objects.

- One common use is to use the CLI `copy_from_template` tool to automate the process of applying a template to newly discovered network snapshots before saving them in an archive. Thus, when you open the new plan file, you need not complete its layout or insert non-discovered objects. Note that this CLI `copy_from_template` tool has more functionality than in the GUI. For information, see the `copy_from_template -help` output.
- Another use is to create one or more visual layouts in one plan file and copy the layouts into other plan files, thus avoiding repetitive efforts of recreating layouts. This practice is useful even for plans created outside of network discovery.

The selected properties or objects are copied from the template to the open plan file, and a report is displayed. If there are nodes or interfaces in the plan file that are not in the template, this might indicate that the discovered network has been changed, and the template is out of date. In this case, the report states that the template should be updated.

Note that you can individually import SRLGs, a Layer 1 model, a QoS model, demand groupings, external endpoints, and tags from one plan file to another, all from the File->Import menu. For information, see the *WAE Design Integration and Development Guide*.

## Assigning Nodes to Sites

In the WAE Design GUI, the visual layout is based on the schematic or geographic arrangement of sites and nodes. If nodes are within sites, this node-to-site assignment is not discoverable.

When layouts are copied from the template, nodes that are discovered are placed in the plan file as follows.

- Each existing node without a parent site continues to exist without a parent.
- If a discovered node is matched to a node within a site in an existing template, it is assigned to the same site.
- If the node is new, it is assigned to a site based on the Node-to-Site Mapping (<NodeSiteMappingRules>) table in the template. For information on how these tables are created, see the Visualizing a WAE Network chapter.
- If WAE Design cannot assign the discovered node to an existing site, an ExtraNodes site is created and the unassigned node is placed there. This site appears at the top, right of the plot.

## Copying Missing Information

If any nodes, circuits, L1 nodes, or L1 links are down, the network discovery process omits them from the discovered plan file. Since a template used for network discovery typically contains these objects, it can fill in the missing objects to provide a complete visualization of the network. Whether these objects are set to inactive or active depends on the selected copy method (Table 4-1).

Errors in network discovery can sometimes prevent node names, interface names, or IP addresses from being discovered correctly. The Copy from Template tool attempts to fill in the missing object information by matching nodes and interfaces in the two plans by name and IP address; for nodes that are in external AS's, it also checks the BGP-ID. For example, if the discovery process finds an IP address of an interface, but not its name, the tool looks for an interface in the template with a matching IP address, and then copies over the name from the template interface.

## Copy Methods

The objects and properties that are copied depends on the selected method (Table 4-1).

*Table 4-1 Copy from Template Methods*

| Copy from Template Method | Description |
|---|---|
| Fill in missing details | • Copies L3 template layout, including site assignments for nodes.<br>• Copies L3 nodes and circuits, and sets them to inactive.<br>• For newly discovered L3 nodes, assigns nodes to sites based on the <NodeSiteMappingRules> table created using the Assign Sites to Nodes feature. For information on creating this table, see the Visualizing a WAE Network chapter.<br>• Copies non-discoverable L3 objects, such as SRLGs and AS relationships. |
| Fill in visual elements only | • Copies L3 template layout.<br>• For newly discovered L3 nodes, assigns nodes to sites based on the <NodeSiteMappingRules> table created using the Assign Sites to Nodes feature. |
| Copy L1 visual layout | • Copies template layout for L1 objects.<br>• Site assignments are based on the site assignments in the template. Any L1 nodes that exist in the plan file but not in the template are placed in an ExtraL1Nodes site that is created for this purpose. |
| Copy the L1 model from the template | You cannot copy L1 objects without copying L3 objects (without "Fill in missing details" also being selected).<br>• Copies template layout, including site assignments for L1 nodes.<br>• Copies all L1 objects.<br>• Site assignments are based on the site assignments in the template. Any L1 nodes that exist in the plan file but not in the template are placed in an ExtraL1Nodes site that is created for this purpose. |

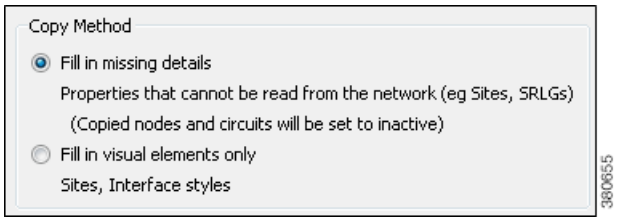
## Copy from Template Steps

For information on how to copy from template in the CLI, refer to the `copy_from_template -help` output.

**Step 1** Select the File->Copy From Template menu. The Copy Values From Template File dialog box appears.

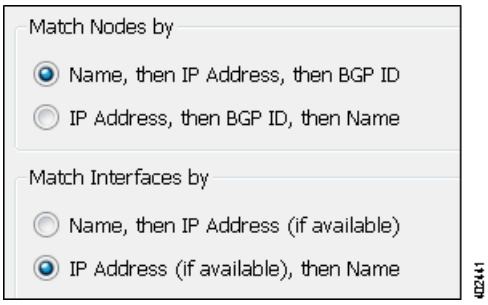
**Step 2** In the Template File field, enter or browse to the fully-qualified path and filename of the plan you are copying.

**Step 3** Specify how to copy L3 values from the template into the plan. See Table 4-1.




**Step 4** Specify how to match nodes in the plan with those in the template.

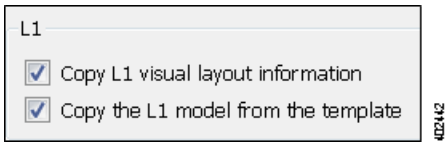
- Name, the IP address, then BGP ID—Select this option to match all nodes by name if possible, then by IP address, and then by BGP ID.
- IP Address, then BGP ID, then Name—Select this option to match all nodes by matching by IP address if possible, then by BGP ID, and then by name.




**Step 5** Specify how to match interfaces in the plan with those in the template.

- Name, then IP Address (if available)—Select this option to match all interfaces and circuits by name if possible, and then by IP address.
- IP Address (if available), then Name—Select this option to match all interfaces and circuits by matching by IP address if possible, and then by name.

**Step 6** Optional: Specify how to copy L1 values from the template into the plan. See Table 4-1.




**Step 7** Optional: Selectively choose which nodes to include by clicking the Preview/Customize button. From here you can click the Edit button to select nodes, as well as set copied nodes to inactive. If the plan file contains nodes that the template does not contain, they are put into a site named ExtraNodes (for L3 nodes) or ExtraL1Nodes (for L1 nodes).

To view which circuits to include, click the Next button.You can click Edit to select specific circuits and/or you can set the circuits to inactive. It is recommended that you not use this option unless you also choose to include nodes associated with these circuits.

**Step 8** Click OK.

**Step 9** Look at the network plot to verify the success of the copied template.

# Related Topics

- Access WAE Live chapter
- Access an Archive chapter
- Access WAE Automation Server and Deploy chapter
- *WAE Design Integration and Development Guide*

- `copy_from_template` CLI tool in `$CARIDEN_HOME/bin`, where `$CARIDEN_HOME` is the directory in which the WAE Design, WAE Live, and WAE Collector executables and binaries are installed. On Linux, the default `$CARIDEN_HOME` is `/opt/cariden/software/mate/current`.


# Access WAE Live

WAE Live can be installed on the same or different Linux device or VM as WAE Design. WAE Live plan files and templates are stored in map archive repositories.

From the WAE Design GUI, you can extract WAE Live .pln plan files and templates from WAE Live and make whatever modifications are necessary. You can then re-insert them as template files into a map archive directory. Another use case for accessing WAE Live is to open plan files containing traffic used in the Forecasting tool.

**Note** When uploading a template to a map archive, you are overwriting the template that is in that map archive.

## Prerequisites

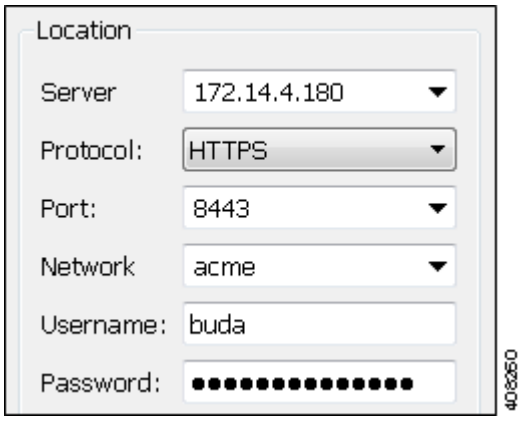
- You must know the username and password for the WAE Live administrator (admin role), which is set in the web System UI.
- To access any network other than the default, that network must first be configured for WAE Live.
- You must know the name of the network and the map archive.
  - The default WAE Live network name is “default,” and the default map archive name is “default-archive.”
  - All other map archive names use the format <network_name>-archive.

## Access WAE Live

**Step 1** In the WAE Design GUI, use the File menu to start the process.

- To download a WAE Live plan file or template from a remote Live Map archive, select the File->Open from->WAE Live menu.

- To upload a WAE Live template to a remote Live Map archive, select the File->Save to->WAE Live menu. You must have an administrative username and password to upload templates.




**Step 2** After opening the dialog box, enter or select the hostname or IP address of the server.

**Step 3** Identify how to connect to the server by selecting the appropriate protocol and by entering or selecting the port number (for example, HTTPS 8443).

**Step 4** Enter or select the name of the network you are accessing. The name of the default WAE Live network is “default.”

**Step 5** Enter the username and password that gives you access to the server. Both are case sensitive. If you do not know the password, contact your system administrator.

**Step 6** If saving a template, click OK and stop here. If opening a plan file or template, continue to step 7.

**Step 7** Select one of the following options, and then click OK.

- Template—Open the template file.
- Latest plan—Open the most recent plan file available.
- Plan at time—Specify an exact date and time. If these plan file are not local, you either need to log in to the server or ask the administrator of that server for the proper date and time.

  On the server, these plan files are stored in a map archive. To find it, go to the directory in which the plan file is stored and then drill down to the specific directory to list contents. The format of this directory structure is as follows.

  ```
  <map_archive_path>/data/<year>/<month>/<YYMMDD>_UTC
  ```

  Note that the default map archive path is `/opt/cariden/data/mldata/archives/<network_name>-archive`.

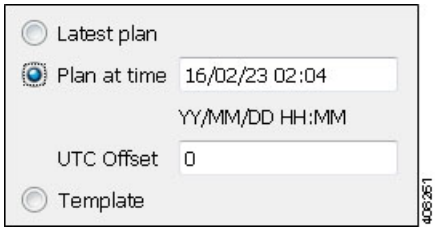
  Plan files are listed in these map archive directories in the following format.

  ```
  YYMMDD_HHMM_UTC.pln
  ```

  **Example:** Using the map archive named acme-archive, you would drill down to the following directory to choose a plan file created on February 23, 2016.

  ```
  /opt/cariden/data/mldata/archive/acme-archive/data/2016/02/160223_UTC
  ll
  -rw-r--r-- 1 cariden cariden 115651 Feb 23 02:04 160223_0204_UTC.pln
  -rw-r--r-- 1 cariden cariden 115651 Feb 23 02:04 160223_0304_UTC.pln
  -rw-r--r-- 1 cariden cariden 115651 Feb 23 02:04 160223_0404_UTC.pln
  ```

If selecting a specific plan file and if the operating system's UTC is different than 0, you must enter that UTC value.




**Note** If you have access to the WAE Live UI, the plan files are displayed in a configurable time zone. These time zones might not be the same as stored in the map archive. For instance, in the above example, the WAE Live GUI might be displaying this same plan file as February 22, 14:04 with a UTC of -8. Therefore, it is best practice to reference the map archive in the directory structure (not the plan files in WAE Live) to determine specific plan file dates and times to open in WAE Design.

# Save and Clear Settings

- To save all settings for use the next time you open the remote access dialog box, click Save Settings. This saves all settings whether the fields and all entries in the drop-down lists are empty or not. You can optionally save the authentication password.
- To clear all current user-specified settings from the fields and from the drop-down lists, click Clear Settings. Note that this does not clear the default Protocol, Port, and Network values, though manual entries in these fields are cleared.
- To delete all user-specific settings so the next time you open the remote access dialog box all fields and all drop-down lists are empty (except for the default Protocol, Port, and Network values), follow these steps.

  Click Clear Settings.

  Ensure Save Settings is enabled.

  Click OK to exit. Upon being prompted for whether to continue, click Yes.

# Related Topics

- *WAE Live Administration Guide*
- *WAE Live User Guide*
- *WAE Design User Guide*
- *WAE Design Integration and Development Guide*


# Access an Archive

Plan files and templates are stored in archive repositories, which can be installed on the same or on a different device or VM than WAE Design GUI. From the WAE Design GUI, you can extract .pln plan files from these archive directories, make whatever modifications are necessary, and re-insert them as .pln files into an archive used by other applications. You can also open, modify, and then save a remote archive template.

**Note** When uploading a template to a remote archive, you are overwriting the template that is in the archive.

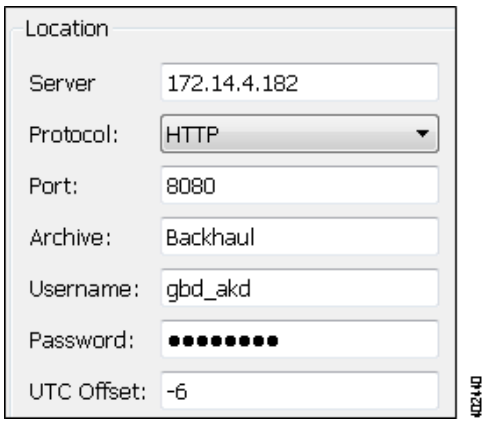
## Prerequisites

- You must know the username and password for the WAE Design Archive administrator (admin role), which is set in the web System UI.
- One or more archives must be configured.

## Access an Archive

**Step 1** In the WAE Design GUI, use the file menu to start the process.

- To open a WAE Design Archive plan file or template from a remote archive directory, select the File->Open from->Archive menu.
- To save a WAE Design Archive plan file or template in a remote archive directory, select the File->Save to->Archive menu. You must have an administrative username and password to upload plan files or templates.




**Step 2** After opening the dialog box, enter or select the hostname or IP address of the server.

**Step 3** Identify how to connect to the server by selecting the appropriate protocol and by entering or selecting the port number (for example, HTTP 8080).

**Step 4** Enter or select the name of the archive you are accessing.

**Step 5** Enter the username and password that gives you access to the server. Both are case sensitive. If you do not know the password, contact your web system administrator.

**Step 6** Enter the UTC offset to apply to the date specified in the "Plan at Time" field. If you do not enter a date, the file is opened or saved according the server's UTC time.

**Step 7** Select options for either opening/saving a plan file or template.

- If opening or saving a template, select the Template option.
- Plan files
  - If opening a plan file, identify which one by the latest or by a specific time.
  - If saving a plan file, identify the time as current or as a specific time.
  - If entering a time, use the YY/MM/DD HH:MM format.

Then click OK.

**Step 8** Select one of the following options, and then click OK.

- Template—Open the template file.
- (Open from) Latest plan—Open the most recent plan file available.
- (Save to) Plan at current time—Save the plan file using the current date and time stamp.
- Plan at time—Specify an exact date and time. If these plan file are not local, you either need to log in to the server or ask the administrator of that server for the proper date and time.

  On the server, these plan files are stored in an archive directory. To find it, go to the directory in which the plan file is stored and then drill down to the specific directory to list its contents. The format of this directory structure is as follows.

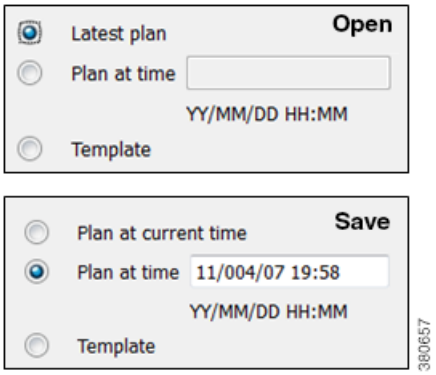
  ```
  <archive_path>/data/<year>/<month>/<YYMMDD>_UTC
  ```

  Plan files are listed in these archive directories in the following format.

  ```
  YYMMDD_HHMM_UTC.pln
  ```

**Example:** This example shows an archive directory named cgo-archive for November 8, 2015. It has three plan files that were collected 30 minutes apart as shown by their times.

```
/opt/cariden/archives/cgo-archive/data/2015/11/151108_UTC
ll
-rw-r--r-- 1 cariden cariden 115651 Feb 23 02:04 151108_0201_UTC.pln
-rw-r--r-- 1 cariden cariden 115651 Feb 23 02:04 151108_0231_UTC.pln
-rw-r--r-- 1 cariden cariden 115651 Feb 23 02:04 151108_0301_UTC.pln
```




# Save and Clear Settings

- To save all settings for use the next time you open the remote access dialog box, click Save Settings. This saves all settings whether the fields and all entries in the drop-down lists are empty or not. You can optionally save the authentication password.
- To clear all current user-specified settings from the fields and from the drop-down lists, click Clear Settings. Note that this does not clear the default Protocol, Port, and UTC Offset values, though manual entries in these fields are cleared.
- To delete all user-specific settings so the next time you open the remote access dialog box all fields and all drop-down lists are empty (except for the default Protocol, Port, and UTC Offset values), follow these steps.

  Click Clear Settings.

  Ensure Save Settings is enabled.

  Click OK to exit. Upon being prompted for whether to continue, click Yes.

# Related Topics

- *WAE Design Archive User and Administration Guide*
- *WAE Design User Guide*
- *WAE Live Administration Guide*

- *WAE Coordinated Maintenance User and Administration Guide*


# Access WAE Automation Server and Deploy

From the WAE Design GUI, you can open plan files residing on a remote WAE Automation server to make modifications before deploying LSPs or saving the plan file back to the server.

To work with files being deployed to the network or saved to the WAE Automation server, you need to understand these two terms.

- The *working plan file* represents the current state of the network.
- A *staging area* is an area in which you can work on plan files without deploying them. There is only one working plan file area, but there can be multiple staging areas.

For general descriptions of patch files and plan files, and for information on creating patch files, see the *WAE Design User Guide*.

## Prerequisites

- You must know the username and password of the WAE Automation server, or its authentication must be disabled.
- If using the staging area, it must already exist on the server, and you must know the stage ID.
- The WAE Automation server must be configured for the type of deployment you are using.

## Open Remote Plan File

**Step 1** Select the File->Open from->WAE Automation Server menu.

**Step 2** Identify the remote server using the steps outlined in the Identify Server Location section.

**Step 3** If opening a plan file from a staging area, enter the stage ID. If left blank, the working plan file is opened.

## Deploy to the Network

You have two options for deploying LSPs to the network. One is using a patch file, and the other is using a plan file.

**Note** It is strongly recommended that you verify a patch file or plan file before deploying LSPs to the network. The patch file can be verified via the View Dry Run option. Verification of the plan file is a manual process.

# Deploy Patch Files

When deploying a patch file, it is applied to the working plan file that currently resides on the server, and the working plan file is then deployed to the network.

**Note** You can only deploy new, modified, and deleted LSPs.

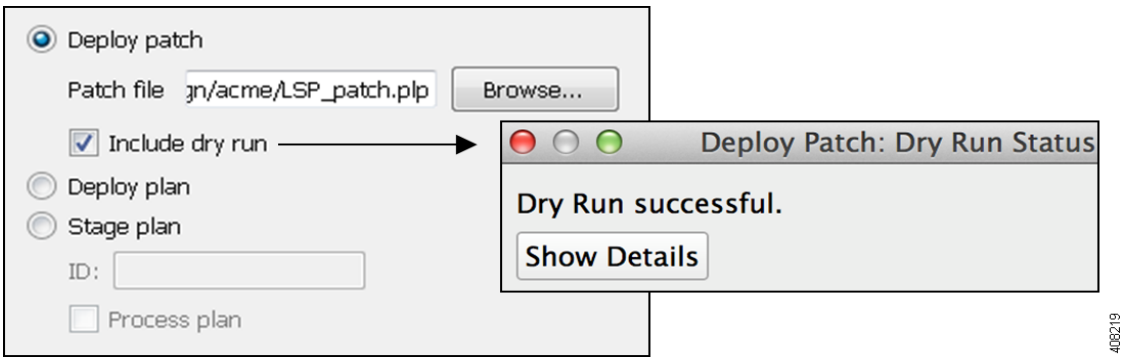
## Patch Deployment

**Step 1** Select the File->Save to->WAE Automation Server menu.

**Step 2** Identify the remote server using the steps outlined in the Identify Server Location section.

**Step 3** Select Deploy Patch.

If deploying a patch file, you can browse to or enter its full path. Best practice is to select View Dry Run to verify the patch file can be successfully applied to the working plan file on the server. If you choose this option, a dialog box appears showing whether the deployment of this patch would be successful, unsuccessful, or only partially successful. To view details about the dry run on a per-LSP basis, click the Show Details button. All LSPs have a State field that identifies success, failure, or that the analysis is in progress. Additionally, LSPs that would not deploy successfully appear in red. To save this information for future analysis, which can be helpful in troubleshooting issues, click Save Status.




**Step 4** Click OK. A status bar appears followed by a display of the deployment status, which provides a job ID that uniquely identifies this deployment. The status also identifies the success, failure, or partial success of the deployment of these LSPs to the network. Click the Show Details button for more information on a per-LSP basis. All LSPs have a State field that identifies success, failure, or that the deployment is currently in progress. Additionally, LSPs that failed to deploy appear in red. To save this information for future analysis, click Save Status.

## Deploy Plans

When deploying a plan file, it is compared to the working plan file that currently resides on the server, and then the LSP differences are deployed directly to the network. A copy of it is also saved to the working plan file area.

**Step 1** Select the File->Save to->WAE Automation Server menu.

**Step 2** Identify the remote server using the steps outlined in the Identify Server Location section.

**Step 3** Select Deploy Plan.

**Step 4** Click OK.

# Save to WAE Automation Server

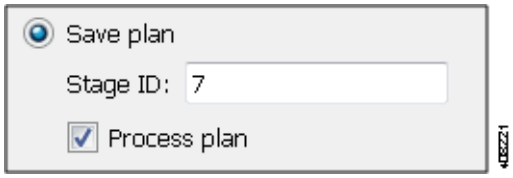
You can save plan files to either the working plan file area or staging area. You can optionally "process" the plan so that upon querying a demand, worst-case analysis is automatically performed on interfaces, circuits, and SRLGs. Note that these plan files are not stored with the plan files generated by WAE Collector.

Saving the plan file to the working area overwrites the existing plan file. This means that any newly discovered or recently modified plan files are overwritten. For this reason, if you are not deploying a patch file or plan file, it is a best practice to save plan files to a staging area.

**Step 1** Select the File->Save to->WAE Automation Server menu.

**Step 2** Identify the remote server using the steps outlined in the Identify Server Location section.

**Step 3** Select the Save Plan option.




**Step 4** If using a staging area for this access, enter the stage ID number. If this field is left empty, the plan file is saved to the working plan area.

**Step 5** (Optional) to simulate failure scenarios such that upon querying a demand, worst-case analysis is automatically performed on interfaces, circuits, and SRLGs, select the Process Plan option.

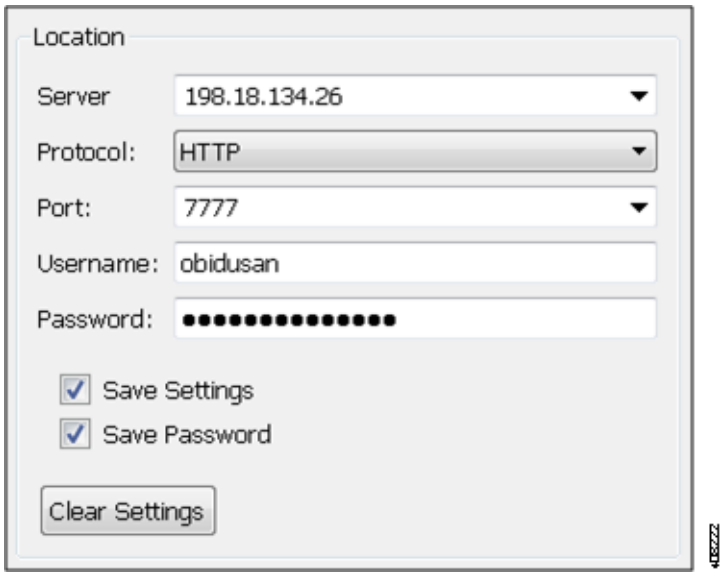
**Step 6** Click OK.

# Identify Server Location

**Step 1** After opening the dialog box, enter or select the hostname or IP address of the server.

**Step 2** Identify how to connect to the server by selecting the appropriate protocol and by entering or selecting the port number (for example, HTTP 7777).

**Step 3** If the authentication is enabled, enter the same username and password. If the authentication is disabled, the username and password fields must be empty.




## Save and Clear Settings

- To save all settings for use the next time you open the remote access dialog box, click Save Settings. This saves all settings whether the fields and all entries in the drop-down lists are empty or not. You can optionally save the authentication password.
- To clear all current user-specified settings from the fields and from the drop-down lists, click Clear Settings. Note that this does not clear the default Protocol, Port, and Stage ID values, though manual entries in these fields are cleared.
- To delete all user-specific settings so the next time you open the remote access dialog box all fields and all drop-down lists are empty (except for the default Protocol, Port, and Stage ID values), follow these steps.

  Click Clear Settings.

  Ensure Save Settings is enabled.

  Click OK to exit. Upon being prompted for whether to continue, click Yes.

# Related Topics

- *WAE Design User Guide* (For descriptions of patch files and plan files, and for information on creating patch files.)