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Virtuoso Width Spacing Patterns User Guide

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Contents

Preface

Width Spacing Patterns (WSPs) are used in advanced node designs to create tracks with specific widths and spacing for correct-by-construction track-based routing. This user guide describes how to use the following:

- WSP Manager to create and modify WSPs.
- Track Pattern Assistant to choose the WSPs for a region or the global area that are displayed as tracks in the canvas.

This user guide is aimed at developers and designers of integrated circuits and assumes that you are familiar with:

- The Virtuoso design environment and application infrastructure mechanisms designed to support consistent operations between all Cadence® tools.
- The applications used to design and develop integrated circuits in the Virtuoso design environment, notably, the Virtuoso Layout Suite.
- The Virtuoso design environment technology file.

This preface contains the following topics:

Scope

The functionality described in this guide can be used only in ICADVM18.1advanced nodes and advanced methodologies releases.

Licensing Requirements

For information on ICADVM18.1advanced nodes and advanced methodologies licensing in the Virtuoso design environment, see *License Requirements for Advanced Node Features* in *Virtuoso Software Licensing and Configuration User Guide*.

Related Documentation

What's New and KPNS

- *Virtuoso Width Spacing Patterns What's New*
- *Virtuoso Width Spacing Patterns Known Problems and Solutions*

Installation, Environment, and Infrastructure

- *Cadence Installation Guide*.
- *Virtuoso Design Environment User Guide*
- *Virtuoso Design Environment SKILL Reference*
- *Cadence Application Infrastructure User Guide*

Technology Information

- *Virtuoso Technology Data User Guide*
- *Virtuoso Technology Data ASCII Files Reference*
- *Virtuoso Technology Data Constraints Reference*
- *Virtuoso Technology Data SKILL Reference*
- *Virtuoso Design Environment SKILL Reference*

Virtuoso Tools

- *Virtuoso Layout Viewer User Guide*
- *Virtuoso Layout Suite XL: Basic Editing User Guide*
- *Virtuoso Layout Suite XL: Connectivity Driven Editing Guide*

- *Virtuoso Layout Suite EXL Reference*
- *Virtuoso Concurrent Layout User Guide*
- *Virtuoso Design Planner User Guide*
- *Virtuoso Multi-Patterning Technology User Guide*
- *Virtuoso Placer User Guide*
- *Virtuoso Simulation Driven Interactive Routing User Guide*
- *Virtuoso RF Solution Guide*
- *Virtuoso Electromagnetic Solver Assistant User Guide*

Additional Learning Resources

Video Library

The Video Library on the Cadence Online Support website provides a comprehensive list of videos on various Cadence products.

To view a list of videos related to a specific product, you can use the *Filter Results* feature available in the pane on the left. For example, click the *Virtuoso Layout Suite* product link to view a list of videos available for the product.

You can also save your product preferences in the Product Selection form, which opens when you click the *Edit* icon located next to *My Products*.

Virtuoso Videos Book

You can access certain videos directly from Cadence Help. To learn more about this feature and to access the list of available videos, see Virtuoso Videos.

Rapid Adoption Kits

Cadence provides a number of Rapid Adoption Kits that demonstrate how to use Virtuoso applications in your design flows. These kits contain design databases and instructions on how to run the design flow.

In addition, Cadence offers the following training courses that are relevant to Virtuoso Width Spacing Patterns:

- Virtuoso Layout for Advanced Nodes
- Virtuoso Connectivity-Driven Layout Transition

Cadence also offers the following training courses on the SKILL programming language, which you can use to customize, extend, and automate your design environment:

- SKILL Language Programming Introduction
- SKILL Language Programming
- Advanced SKILL Language Programming

To explore the full range of training courses provided by Cadence in your region, visit Cadence Training or write to training_enroll@cadence.com.

Note: The links in this section open in a separate web browser window when clicked in Cadence Help.

Help and Support Facilities

Virtuoso offers several built-in features to let you access help and support directly from the software.

- The Virtuoso *Help* menu provides consistent help system access across Virtuoso tools and applications. The standard Virtuoso *Help* menu lets you access the most useful help and support resources from the Cadence support and corporate websites directly from the CIW or any Virtuoso application.
- The Virtuoso Welcome Page is a self-help launch pad offering access to a host of useful knowledge resources, including quick links to content available within the Virtuoso installation as well as to other popular online content.

  The Welcome Page is displayed by default when you open Cadence Help in standalone mode from a Virtuoso installation. You can also access it at any time by selecting *Help – Virtuoso Documentation Library* from any application window, or by clicking the *Home* button on the Cadence Help toolbar (provided you have not set a custom home page).

For more information, see Getting Help in *Virtuoso Design Environment User Guide.*

Customer Support

For assistance with Cadence products:

- Contact Cadence Customer Support

  Cadence is committed to keeping your design teams productive by providing answers to technical questions and to any queries about the latest software updates and training needs. For more information, visit https://www.cadence.com/support.

- Log on to Cadence Online Support

  Customers with a maintenance contract with Cadence can obtain the latest information about various tools at https://support.cadence.com.

Feedback about Documentation

You can contact Cadence Customer Support to open a service request if you:

- Find erroneous information in a product manual
- Cannot find in a product manual the information you are looking for
- Face an issue while accessing documentation by using Cadence Help

You can also submit feedback by using the following methods:

- In the Cadence Help window, click the *Feedback* button and follow instructions.
- On the Cadence Online Support Product Manuals page, select the required product and submit your feedback by using the *Provide Feedback* box.

Typographic and Syntax Conventions

The following typographic and syntax conventions are used in this manual.

text	Indicates names of manuals, menu commands, buttons, and fields.
`text`	Indicates text that you must type as presented. Typically used to denote command, function, routine, or argument names that must be typed literally.
`z_argument`	Indicates text that you must replace with an appropriate argument value. The prefix (in this example, *`z_`*) indicates the data type the argument can accept and must not be typed.
|	Separates a choice of options.
`{ }`	Encloses a list of choices, separated by vertical bars, from which you **must** choose one.
`[ ]`	Encloses an optional argument or a list of choices separated by vertical bars, from which you **may** choose one.
`[ ?argName` *`t_arg`* `]`	Denotes a *key argument*. The question mark and argument name must be typed as they appear in the syntax and must be followed by the required value for that argument.
`...`	Indicates that you can repeat the previous argument. Used with brackets to indicate that you can specify zero or more arguments. Used without brackets to indicate that you must specify at least one argument.
`,...`	Indicates that multiple arguments must be separated by commas.
`=>`	Indicates the values returned by a Cadence® SKILL® language function.
`/`	Separates the values that can be returned by a Cadence SKILL language function.

If a command-line or SKILL expression is too long to fit within the paragraph margins of this document, the remainder of the expression is moved to the next line and indented. In code excerpts, a backslash (\ ) indicates that the current line continues on to the next line.

1

Using Width Spacing Patterns

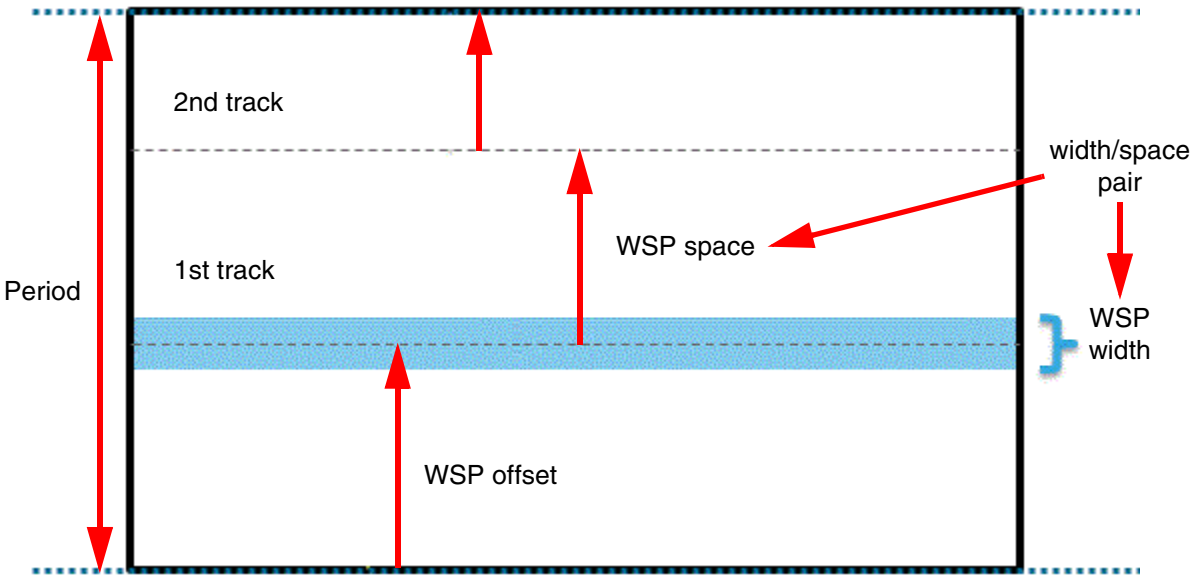
This chapter covers the following topics:

Overview

Virtuoso® Layout Suite L now supports Width Spacing Patterns (WSP) to create tracks in the layout. WSPs are an advanced form of snap pattern definitions (SPDef) that define the tracks on which shapes can be placed.

WSPs are defined in the technology database and the design using the following layer rules:

- `widthSpacingPattern` (WSP) defines tracks as width and spacing pairs. Each width spacing pattern can span one or more periods. The first track of a pattern is anchored to the global period grid using an offset, as shown in the following figure. Width spacing patterns are not associated with a specific metal layer or direction.

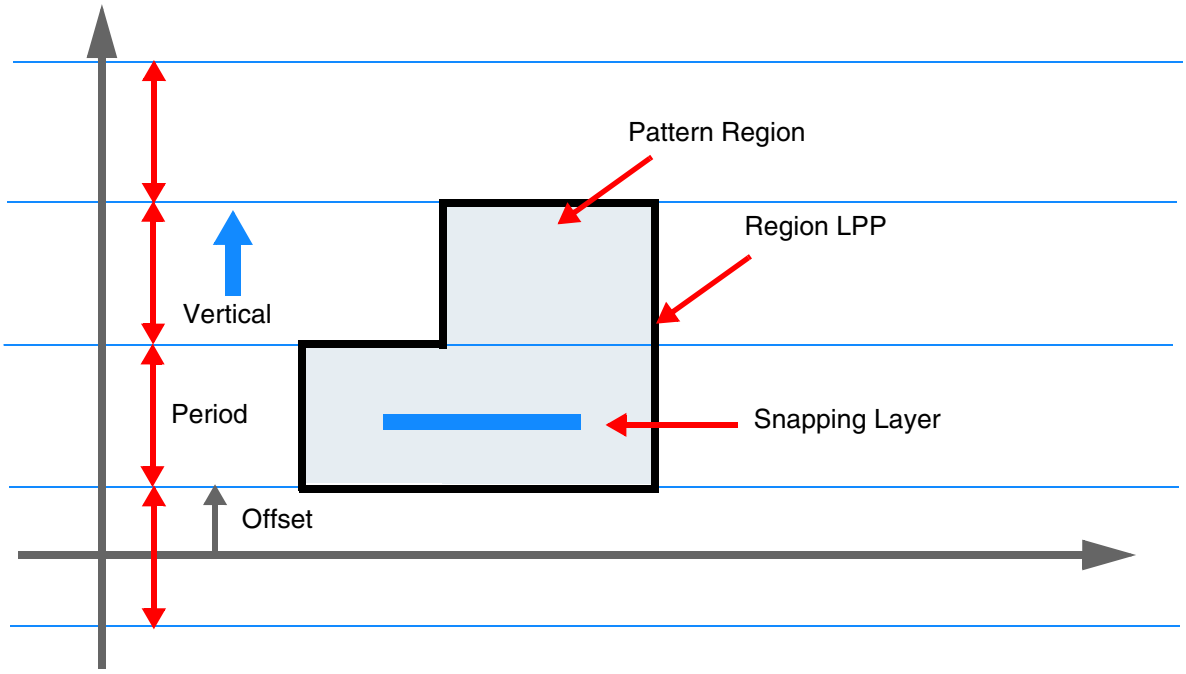


- `widthSpacingPatternGroups` are collections of width spacing patterns.
- `widthSpacingSnapPatternDefs` (WSSPDef) define the following:
  - The *layer-purpose pair* for the WSSPDef.
  - The *period* (the spacing between coarse-grain period tracks).
  - The *direction* in which the period spacing is applied.
  - The *offset* (distance of the nearest period track to the anchor reference).
  - The *snapping layers* to which the WSSPDef applies.
  - The allowed `widthSpacingPatterns` and `widthSpacingPatternGroups` for the WSSPDef.

- The default active pattern (WSP).

WSSPDefs can apply to a global grid and/or to a *pattern region*.

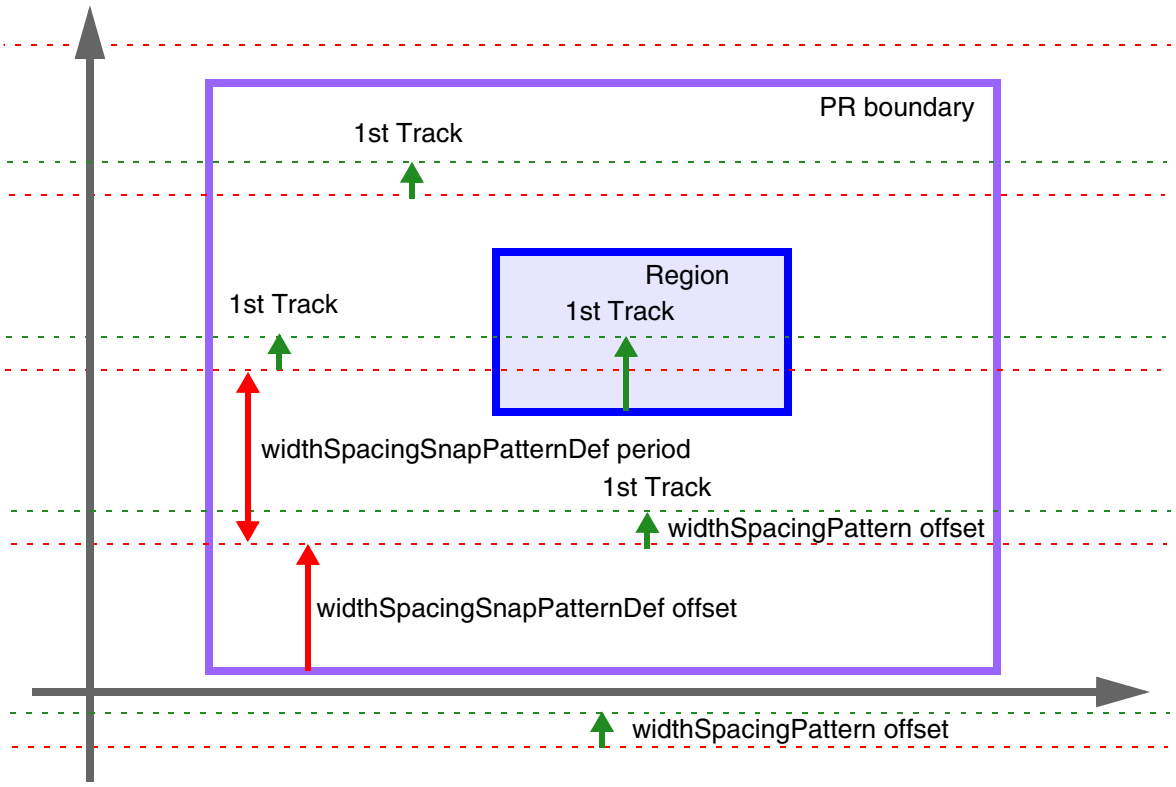
The following figure illustrates the WSSPDef attributes. In this case, the track pattern spacing is vertical, so the tracks are horizontal. There is no SnapBoundary or PR boundary, so periods are offset from the origin axis. A pattern region layer-purpose pair and a snapping layer are defined. The polygon on the specified layer-purpose pair specifies the region to which the WSSPDef applies.



In the figure below, the red dotted lines indicate the global period grid in each stripe of the period grid. This grid is anchored to the PR boundary through the offset for the WSSPDef.

The green dotted lines indicate the first track in each period. The global default active pattern is applied outside pattern regions, and its offset specifies the distance from the period grid line to the first wiring track.

Finally, a region shape is used to apply a non-default active pattern within an area of the cellview. The active pattern specified on the region overrides the global default active pattern and its offset specifies the location of the first track.



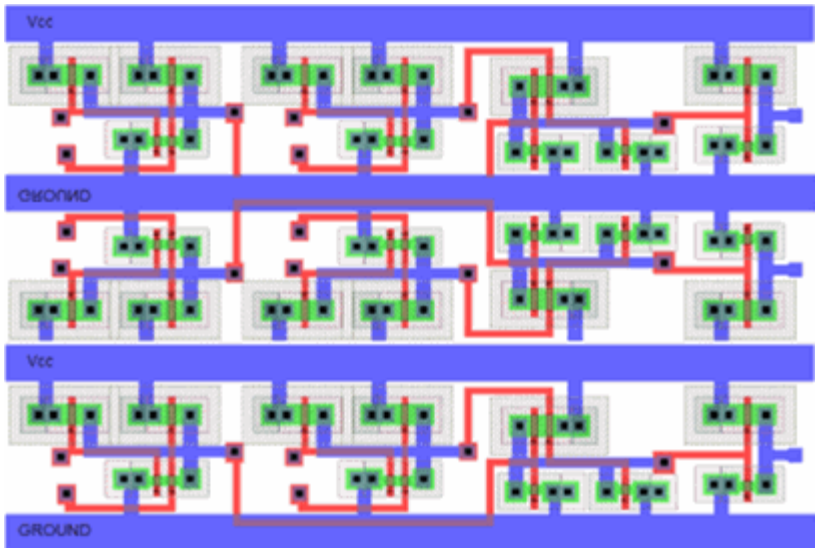
- `relatedSnapPatterns` are predefined groupings of SPDefs and WSSPDefs. `relatedSnapPatterns` create groups of regions in the layout.

Pattern Flipping

In a standard WSP grid, the pattern offset is always relative to the bottom-left edge of a region and the pattern tracks are applied toward the top-right edge of the region. This is also referred to as *stepping*.

A common placement strategy flips instances in alternating rows so that they can share a common power or ground rail. This strategy requires that routing tracks for these instances be flipped in the same manner.

The following example has three rows of devices. The devices in the middle row are flipped. This allows the middle row to share the power rail with the row below it and share the ground rail with the row above it.



Not flipped

Flipped

Not flipped

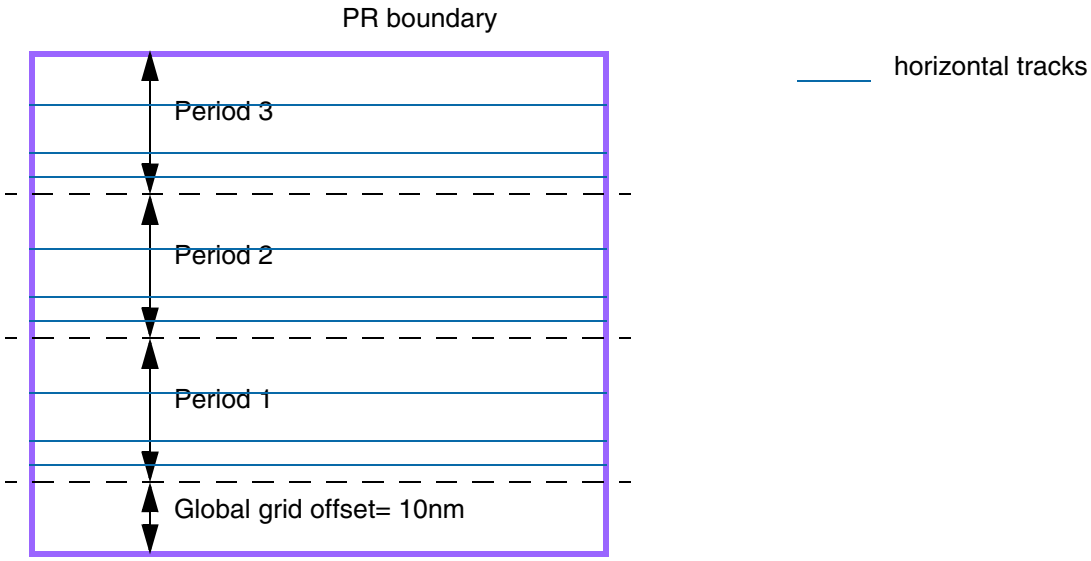
A common usage model is to define the WSP period to match the row height. If this model was used for the example above, the figure would represent three periods. The tracks in the middle region must be flipped so that they align with the existing wires in the instance master.

Pattern flipping can be applied to the global grid or to a pattern region and is set with reference to the *first period*. The first period can be flipped or not flipped, as specified by the *repeat mode*, and all other periods alternate accordingly.

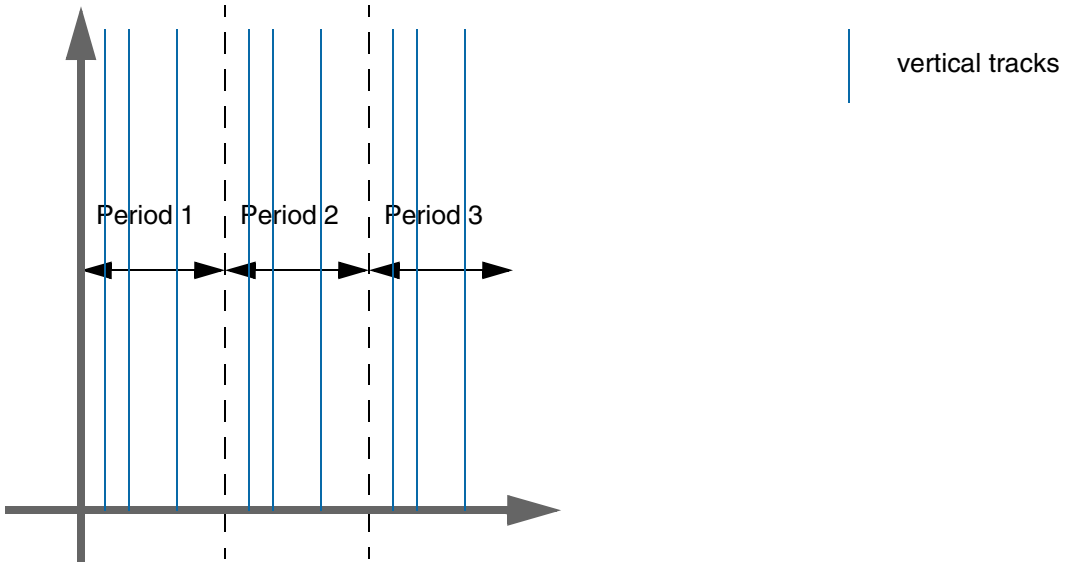
Identifying the First Period

- For global grids, the first period is anchored by the offset reference. Usually this is the period closest to the bottom-left edge of the PR boundary or origin axis, unless the global grid offset is larger than one period.

- Consider a cellview with a vertical global grid (horizontal tracks) where the offset reference is "boundary" and the global grid offset is 10nm. The bottom edge of the first period is 10nm above the bottom edge of the PR boundary.



- Consider a cellview with its global grid offset reference set to "origin" and a horizontal grid direction (vertical tracks). If the global grid offset is zero, then the period with the left edge at the vertical origin axis is the first period.



- For regions, the first period is at the bottom-left of the region shape.

Repeat Modes

Repeat modes determine how a pattern is interpreted for use in adjacent periods. The allowed and default repeat modes are specified on a widthSpacingPattern; the repeat mode can be specified in the layout on global grids and pattern regions.

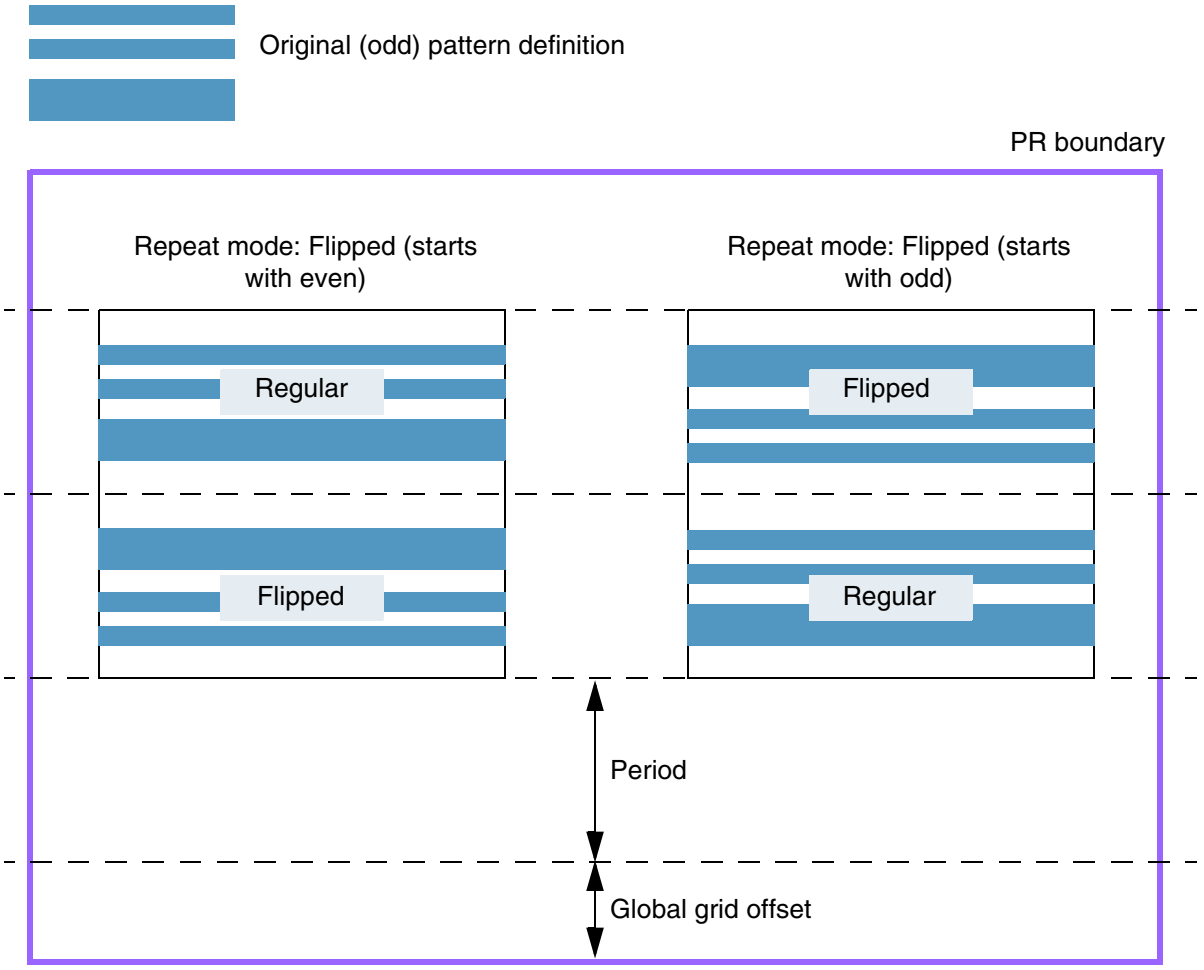
The allowed repeat mode attribute (`'allowedRepeatMode`) indicates how a pattern is allowed to repeat when a region stretches across more than one period, and the default repeat mode attribute (`'defaultRepeatMode`) is used to initialize the repeat mode on regions and global grids when they are first created.

In a layout:

- A repeat mode can be defined at the following two levels:
  - On a region: A region has a set of allowed patterns and a repeat mode can be specified for each pattern.
  - On a global grid: Each global grid also has a set of allowed patterns and a repeat mode can be specified for each pattern. A global grid in a cellview is identified by a global `widthSpacingSnapPatternDef`.
- A repeat mode defined on a global grid or a pattern region can be of one of the following types:
  - *Stepped*: The pattern is the same in every period.
  - *Flipped Odd*: The pattern is flipped in every other period. The first period is not flipped.
  - *Flipped Even*: The pattern is flipped in every other period. The first period is flipped.

A repeat mode is not inherited and does not have a look-up precedence. As a result, when the repeat mode of the global grid changes, the regions on that global grid are not affected. However, when a region with a pattern for which the repeat mode is set is copied, the repeat mode is also copied to the newly created region.

The following example illustrates how a pattern in a region appears when "even" and "odd" flipped repeat modes are applied to the pattern:

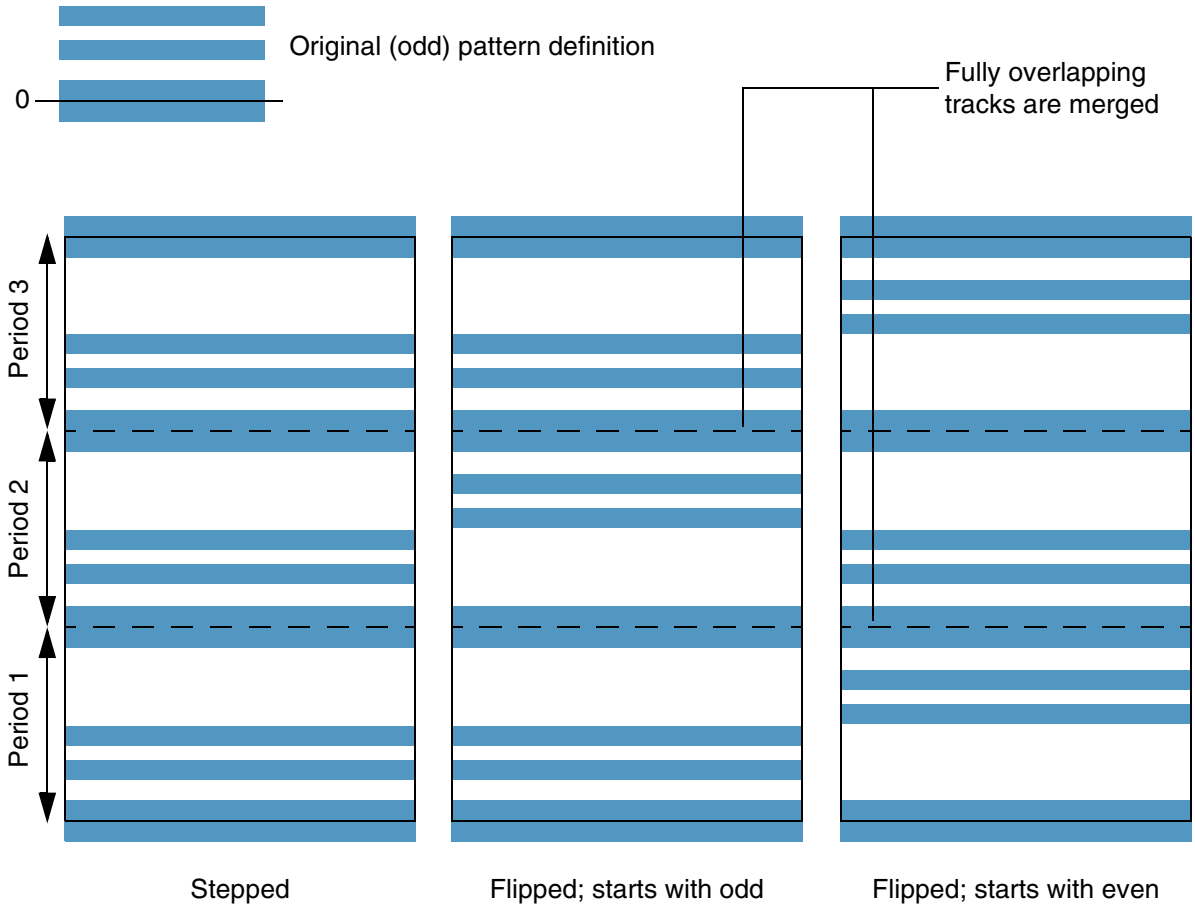


Note: When a starting color is assigned to the pattern, the starting color always applies to the bottom-most track in the pattern, regardless of whether the pattern is flipped or not. This ensures tracks have alternating colors across the cellview.

Patterns with Zero Offset

When a pattern has zero offset, the centerline of the first track is located on the period line or the bottom edge of the region. In a legal pattern, the height of the pattern needs to be compatible with the period and the height of the region. Therefore, a track at offset zero is also present on the top period line or the top region boundary. When a pattern with zero offset is flipped, the top and bottom tracks overlap and are merged into one single track.

The following example illustrates how a pattern with zero offset appears when "even" and "odd" flipped repeat modes are applied to the pattern in a region:



Preparing to Use Width Spacing Patterns

Width spacing patterns can be defined in the technology library or in the design database.

- Technology library WSPs

  WSPs in a technology library can be used by all cellviews that are attached to that library. There are two ways to define technology library WSPs, as described in the following sections:

  - Creating WSPs in the Technology File
  - Technology Database SKILL Functions in Using SKILL Functions for Width Spacing Patterns

- Design WSPs

  Design WSPs can be used only in the current design, and can be created and modified, as described in the following sections:

  - Using the WSP Manager
  - Design Database SKILL Functions in Using SKILL Functions for Width Spacing Patterns

For information on layer purposes for WSPs, see Specifying Purposes for WSPs.

Creating WSPs in the Technology File

WSPs that are defined in a technology library can be used by all cellviews that are attached to that library.

To create width spacing patterns in the technology file, you set the following:

- Definition of pattern-related constructs

Construct	Required/ Optional
widthSpacingPattern	Required
widthSpacingPatternGroups	Optional
widthSpacingSnapPatternDefs	Required
relatedSnapPatterns	Optional

- Placement and Alignment constraints

  These constraints enable WSSPDefs to be used in the global grid for layout editing. The library-wide default set of enabled global WSSPDefs can be specified by a snapGridVertical and/or snapGridHorizontal constraint in the ASCII technology file foundry constraint group. These constraints can be overridden in the design to enable WSSPDefs other than the global defaults, as described in Specifying the Active Patterns.

Specifying Purposes for WSPs

Multiple WSPs can be assigned to a WSSPDef and multiple WSSPDefs can be on a single layer-purpose pair. If you use WSP Manager to create design WSPs, they are assigned to the `track` purpose for the layer. If you define WSPs in a technology file or using SKILL functions, you can assign them to a predefined purpose (Cadence recommends using the `track` purpose) or a user-defined purpose. To define a purpose to be used for WSPs, see Creating a User-Defined Purpose for WSPs.

Creating a User-Defined Purpose for WSPs

To define a purpose for WSPs, you must provide the following in the technology file:

- A user-defined purpose for the grid type

  The parent purpose for the user-defined purpose must be `"annotation"`. For example,

```
techPurposes(
;( PurposeName  #    [abbrev] [parent purpose]     )
  …
  ( type1       30000   RG1    'parent "annotation" )
   …
```

- Layer-purpose pair using the specified user-defined purpose

  For example,

  ```
  techLayerPurposePriorities(
  ;( LayerName    Purpose )
    …
    ( Metal2       type1 )
     …
  ```

  Using this example, if `Metal2:type1` is specified as the layer-purpose pair for a width spacing snap pattern definition, then the rectangles and polygons on `Metal2:type1` identify regions for the definition.

- Display packet and attributes associated with the layer-purpose pair

  For example,

  ```
  techDisplays(
  ;( LayerName    Purpose   Packet     Vis   Sel   Con2ChgLy  DrgEnbl  Valid )
    …
    ( Metal2       type1     m2t1       t     t      nil        t        t    )
     …
  ```

To display WSPs on the user-defined purpose, you must set the display resource file, as described in Setting the Display Resource File.

Setting the Display Resource File

To display width spacing patterns, the `display.drf` file can include definitions for the outline, full, track, and period display packets. For example,

```
drDefinePacket(
;( Display PacketName             Stipple LineStyle Fill      Outline FillStyle)
  ( display m2WSP                  blank  dash      red       red outline)
  ( display m2WSP_snapPatternFull  x      solid     redWeak   red outlineStipple)
  ( display m2WSP_snapPatternTracks x     longDash  red       red outline
  ( display m2WSP_snapPatternPeriod x  longDashThick red      red outline
)
…
);
```

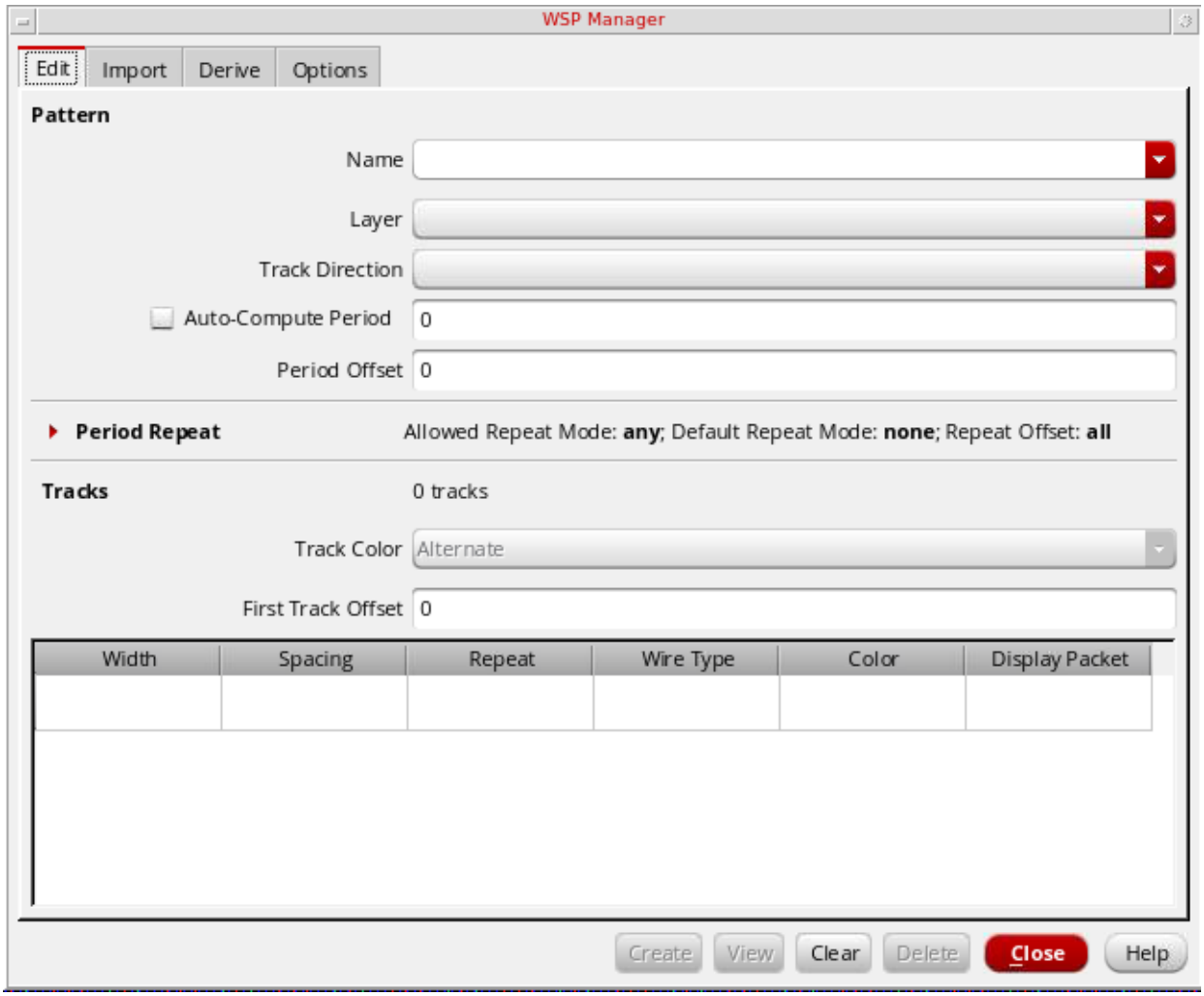
In this example, `m2WSP` is the display packet associated with the layer-purpose pair (`"Metal2" "type1"`), which was used to create the WSSPDef for one of the `Metal2` grids.

Using the WSP Manager

Use WSP Manager to create and modify width spacing patterns, import width spacing patterns from other designs, and generate width spacing patterns from existing shapes in the layout canvas.

1. To use WSP Manager, choose *Create – P&R Objects – Width Spacing Patterns*.

   The WSP Manager form is displayed.



2. Click a tab for the action that you want:

   - *Edit*

     Follow the procedure in Creating and Modifying WSPs in WSP Manager.

- *Import*

  Follow the procedure in Importing WSPs from Another Design.

- *Derive*

  Follow the procedure in Generating WSPs from Existing Shapes.

- *Options*

  Follow the procedure in Specifying WSPs Options.

 Video

For a video overview of this feature, see Introducing WSP Manager on Cadence Online Support.

Creating and Modifying WSPs in WSP Manager

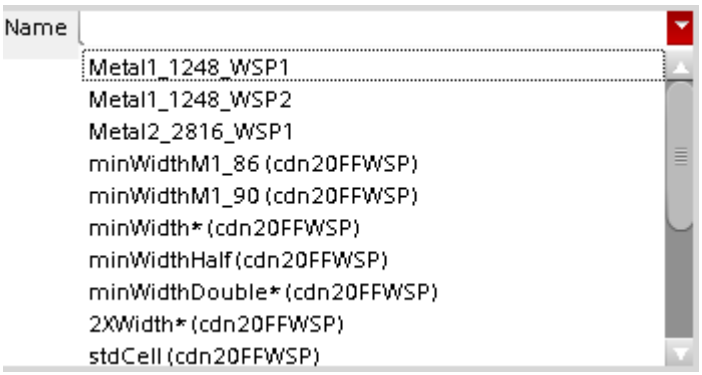
In the *Edit* page of WSP Manager, you can create and modify width spacing patterns.

1. Specify a new pattern name in the *Name* field or choose a pattern from the drop-down list box.

   Pattern names in the drop-down list have one of the following formats:

pattern_name	The existing pattern is in the design database.
pattern_name (*techlib_name*)	The existing pattern is in the specified technology library.
pattern_name * (*techlib_name*)	The existing pattern is in the specified technology library and is used in multiple layers or by multiple WSSPDefs.
pattern_name ! (*techlib_name*)	The existing pattern is in the specified technology library but is not assigned to any WSSPDef.

Examples of these formats are shown below:



Caution

If you modify a pattern that is in the technology library, the pattern is copied to the design database. Cadence strongly recommends that you change the name of the pattern to avoid conflicts with the technology library pattern.

Tip

When naming patterns, Cadence recommends that the name begin with the name of the layer.

2. Choose a *Layer* from the drop-down list box.

   Layers in the list are specified in the `validLayers` constraint of the `wireConstraintGroup` constraint group. This constraint group is specified by the wireConstraintGroup environment variable that can be set in the *Wire Editing* section of the Layout Editor Options form.

   The drop-down list box also shows the preferred routing direction graphically, if set, for each of the layers.

3. Choose a *Track Direction* from the drop-down list box.

   Note: When you set the *Layer*, the *Track Direction* is automatically set to the preferred routing direction for the selected layer.

4. Specify the *Period,* in microns, or choose *Auto-Compute* to compute the period based on the track setup and show the computed value in the *Period* field. When *Auto-Compute* is enabled, the *Period* is not editable. Valid *Period* values are greater than 0 microns.

5. Specify the *Period Offset* (global pattern offset), in microns, that is the distance from the start of the pattern to the PR boundary, if it exists, or to the origin in the axis specified by the *Track Direction*.
6. Specify the tracks for the pattern, as described in Specifying WSP Tracks.
7. Specify the period repeat options, as described in Specifying WSP Period Repeat Options.
8. Click *View* to preview the width spacing pattern tracks without saving them in the design database. This button is active only when all the required fields have been set.
9. When all the required fields have been set and you are satisfied with the pattern, click *Create* (for a new pattern) or *Update* (for an existing pattern) to save it in the design database.

   Note: There must be at least one track in the *Tracks* table and the pattern height (sum of widths and spacings in the *Tracks* table) cannot be greater than the *Period*.

   The CIW shows the name of the WSSPDef that is created for the pattern. If this is the first pattern for the layer, it will be the active pattern and can be viewed in the canvas. If it is not the first pattern for the layer, then you need the WSSPDef and WSP names to activate the pattern using the *Track Pattern* assistant. For more information, see Working with the Track Pattern Assistant.

There are additional buttons at the bottom of the WSP Manager *Edit* page to do the following:

- *Clear*

  Clears the fields and the track setup, and resets the fields to values stored in the environment variables for the form, listed in List of WSP Manager Environment Variables.

- *Delete*

  Removes the current pattern from the design database.

Video

For a video overview of this feature, see WSP Manager: Creating and Modifying WSPs on Cadence Online Support.

Saving a Modified WSP

If you modify a WSP in the *Edit* page of WSP Manager, the *Save Changes* dialog box appears if you do not choose *Update* before attempting to do one of the following:

- Switch to another window.

- Switch to another existing WSP from the *Name* field drop-down list box.

You can choose to save the modified WSP, discard the changes, or cancel.

Note: If you modify a WSP, then type a new pattern name in the *Name* field before saving the changes, the current settings are used for the new pattern and the *Save Changes* dialog box will not be shown.

Specifying WSP Tracks

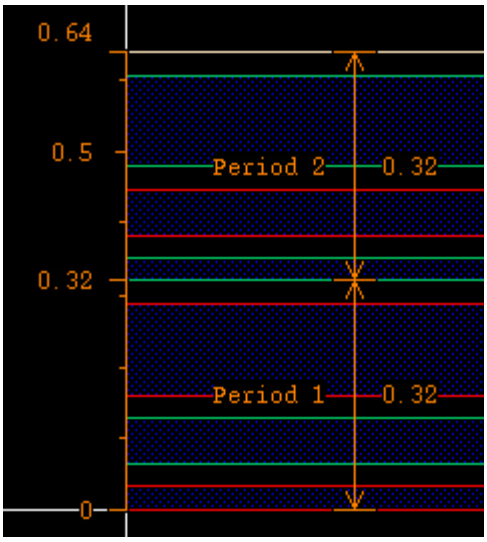
The *Tracks* group at the bottom of the WSP Manager *Edit* page lets you configure the tracks for the pattern, and choose options for the track color, spacing mode, and first track offset.

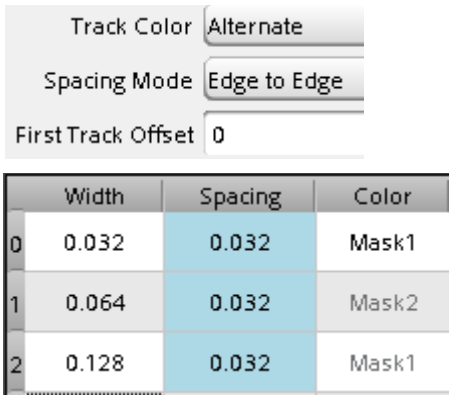
Important

You should always specify the *Layer* before adding the tracks so that the correct width and spacing defaults can be used.

1. Choose the *Track Color* from the drop-down list box:
   - *Alternate*

Track colors are automatically assigned based on the color of the first colored track. The color of each subsequent track in the pattern is shifted from the previous track, as shown below.





In *Alternate* mode, only the first track color is selectable. Track colors alternate in the pattern and through period repeats.

In the *Tracks* table, only the color of the first track can be assigned to one of the mask colors defined for the layer. The color of each subsequent track will be shifted, including through period repeats.

- *As Specified*

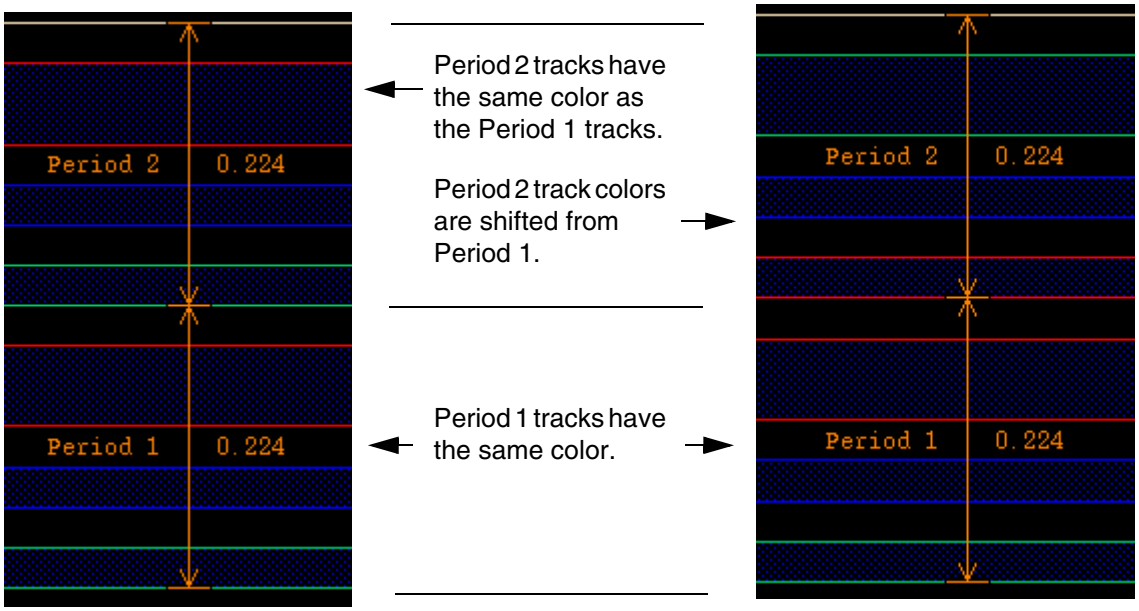
  The color for each track in the pattern must be assigned directly in the *Tracks* table and will be the same for period repeats.

- *As Specified with Period Shift*

The color for each track in the pattern must be assigned directly in the *Tracks* table. When a pattern is repeated, the color will be shifted for the next period.

	Width	Spacing	Color
0	0.032	0.032	Mask2
1	0.032	0.032	
2	0.064	0.032	Mask1

The same pattern is used for both of the examples below.



When *Track Color* is *As Specified*, the track colors stay the same for each period.

When *Track Color* is *As Specified with Period Shift*, the track colors shift for each period.

2. Specify the *First Track Offset* as a floating number.

   This is the distance, in microns, between the first period track and the start of the period. To understand how the *First Track Offset* value is affected by the *Spacing Mode*, see *How Spacing Mode and First Track Offset Are Related*.

3. For each track, specify the following in the table:

   - *Width* is the track width as a floating number, in microns.
   - *Spacing* is the distance between this track and the next track, measured using the *Spacing Mode*, in microns. By default, spacing is computed automatically, but you can manually override the value. For more information, see How Spacing Is Computed for Tracks.

- *Repeat* lets you repeat the track width, spacing, and wire type multiple times instead of re-entering each row. The track color follows the sequence specified by *Track Color* in the *Tracks* group box. You can show repeated rows individually in the table by using the *Expand Row* option, described in Using the WSP Manager Tracks Table Options.
- *Wire Type* is the wire type for the track. Specify a wire type or choose a wire type from the drop-down box that lists predefined signal types (sigTypes) and wire types defined in other patterns.
- *Color* is the track color. Choose uncolored (blank), or a valid mask color for the layer from the drop-down list box.

  If the *Track Color* in the *Tracks* group box is *Alternate*, only the first track color can be chosen. The color for all the other tracks will be shifted, in order, through the valid mask colors and cannot be changed.
- *Display Packet* is the display packet name for the WSP track.

How Spacing Is Computed for Tracks

By default, *Spacing* values are automatically computed and are highlighted in light blue. When you manually override a spacing value, it will no longer be highlighted in the *Tracks* table. You can re-enable the computation for a spacing value, as described in Using the WSP Manager Tracks Table Options.

The computed spacing value for a track is the minimum spacing, as defined in the technology library, based on the width of the track and the next track.

For the last track of a pattern, if *Auto-Compute* is not selected and the track spacingu is computed (highlighted in light blue), the spacing is set so that the pattern fills the period.

How Spacing Mode and First Track Offset Are Related

The *Spacing Mode* setting determines the minimum allowed *First Track Offset* value, as shown in the table below:

Spacing Mode	First Track Offset Minimum
Center to Center	0
Edge to Edge	negative one-half of the first track width

When you change the *Spacing Mode* value, the *First Track Offset* value is automatically adjusted to maintain the position of the tracks.

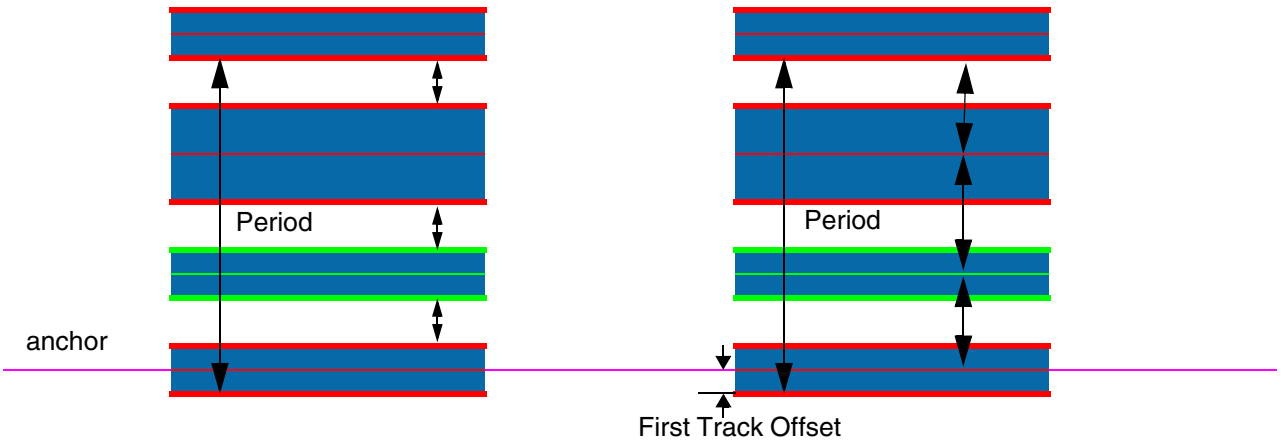
- *Spacing Mode* changed from *Edge to Edge* to *Center to Center*

  A value equal to one-half of the first track width is added to the *First Track Offset* value.

- *Spacing Mode* changed from *Center to Center* to *Edge to Edge*

  A value equal to one-half of the first track width is subtracted from the *First Track Offset* value.

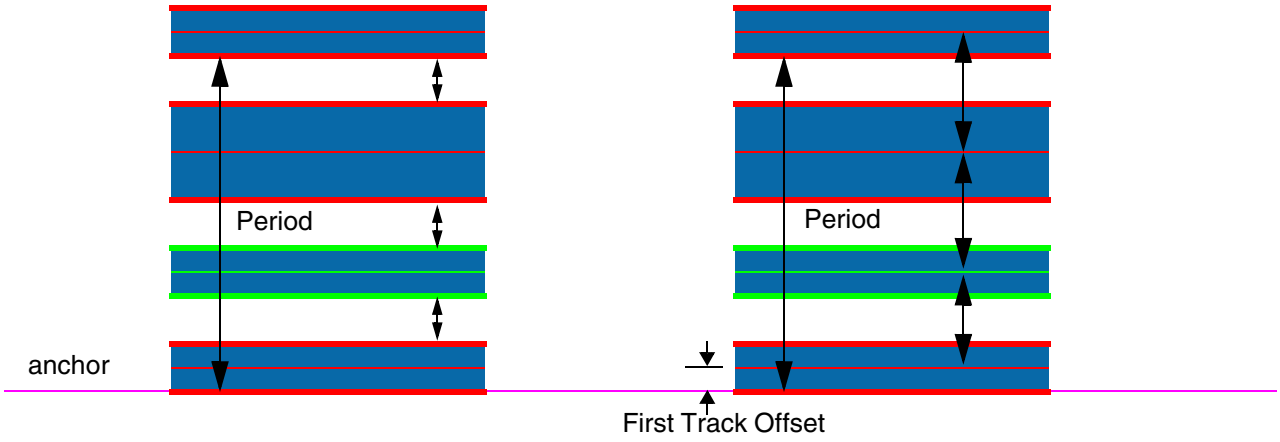
In the figure below, the same pattern is shown with different values for *Spacing Mode* and *First Track Offset*. A *Center to Center* spacing mode with a *First Track Offset* of 0 is the same as the *Edge to Edge* spacing mode with a *First Track Offset* equal to negative one-half of the first track width.



Spacing Mode: Center to Center
First Track Offset: 0

Spacing Mode: Edge to Edge
Track Offset: negative one-half of the first track width

Similarly, an *Edge to Edge* spacing mode with a *First Track Offset* of 0 is the same as the *Center to Center* spacing mode with a *First Track Offset* of equal to one-half of the first track width.



Spacing Mode: Edge to Edge
First Track Offset: 0

Spacing Mode: Center to Center
Track Offset: one-half of the first track width

Customizing the WSP Manager Tracks Table Columns

To change the width of a column:

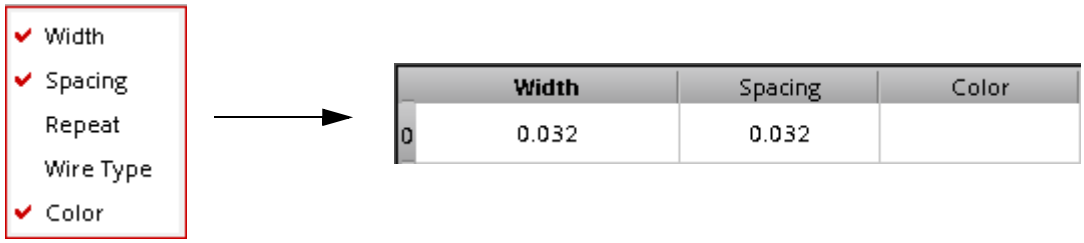
➡ Click the column separator in the header row and move it left or right.

To reorder the columns:

➡ Grab the column name in the header row and move it left or right to the new position.

To add or remove columns:

➡ Right-click in the table header row, then choose the columns to display from the list.

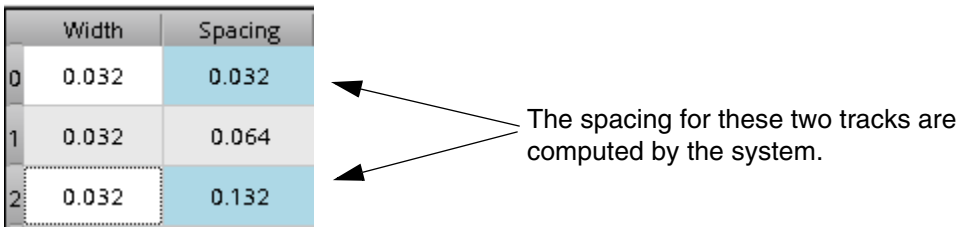


Using the WSP Manager Tracks Table Options

To access additional WSP Manager *Tracks* table options:

1. (Optional) Choose multiple rows in the *Tracks* table by doing one of the following:
   - Click and drag over the rows, or click the first row, then `Shift`+click the last row to select consecutive rows.
   - Click the first row, then `Control`+click the other rows to select non-consecutive rows.
2. Right-click a selected *Tracks* table field or an unselected field in the table.

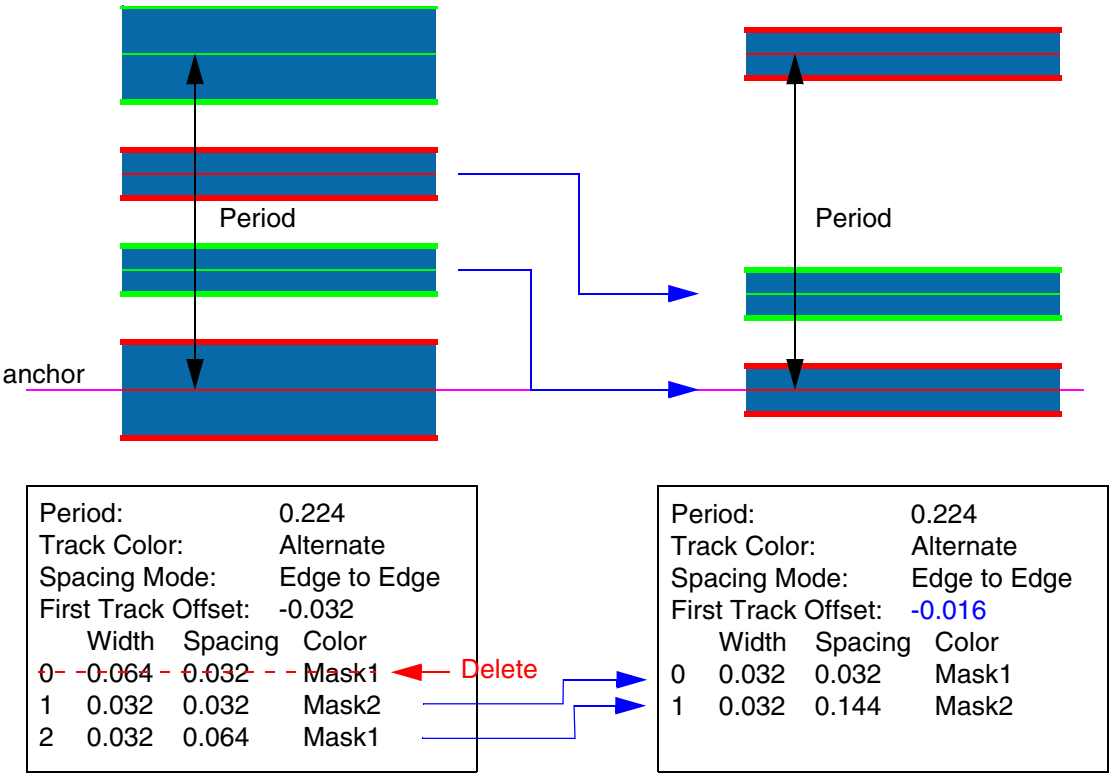
   The *Tracks* RMB options pop-up window appears. If you clicked on a previously unselected field, it is now the only selected field. Options in the following steps operate on the rows of the selected fields.
3. Choose an option from the list:
   - *Use computed spacing* is enabled by default. Spacing values with this option enabled are highlighted in light blue. This option is shown in the *Tracks* RMB options pop-up window only when a selected field is in the *Spacing* column. For information on the computation methods, see How Spacing Is Computed for Tracks.



   - *Insert Row* inserts a row above the selected row with *Width* equal to the minimum width. If multiple rows are selected, one row is inserted for each of them.
   - *Duplicate Row* inserts a copy of the selected row above the selected row. If multiple rows are selected, one row is inserted for each of them.
   - *Expand Row* flattens a row that has repeats, to show each row individually in the table.
   - *Repeat from Period* sets the *Repeat* column for the current row to the maximum number of repeats possible to fit into the period with the existing tracks. This option cannot be used when more than one row is selected or *Auto-Compute* is enabled for the period.

- *Delete Row* removes the selected rows. The spacing for the last track of the pattern is adjusted so that the period is not changed. *First Track Offset* is adjusted if all of the following are true:
  - Row 0 is selected.
  - *Spacing Mode* is *Edge to Edge.*
  - *First Track Offset* is less than negative one-half of the second row width.

  For these cases, *First Track Offset* is changed to negative one-half of the new row 0 width, as shown in the example below:



  In this example, *First Track Offset* is -0.032, which is less than negative one-half of the second row width (-0.016). When row 0 is removed, *First Track Offset* is adjusted to -0.016 to maintain the relative position of the first track with respect to the anchor.

- *Undo* reverses the last *Tracks* table change, such as adding or deleting; duplicating a row; and changing a width or color. *Tracks* table changes are stored in the *Tracks* table stack that is reset when the table is saved or you switch to a different pattern. You can undo a series of changes from the stack.

- *Redo* reapplies a change that was reversed by an *Undo*.

- *Initialize from layout* automatically generates the tracks from standard cells. This option enables you to automatically generate WSPs based on standard cells with subcells placed in rows to determine the period height and track pattern.

  The WSP Manager observes objects in the standard cells and creates a WSP pattern from those objects. The stop level specified on the Display Options form is used to determine the level of hierarchy relevant for extracting the WSP pattern.

  The palette visibility of objects also determines the objects used to derive the WSP pattern.

  To automatically generate tracks, you must select the layer from the *Layer* field. The track direction is automatically selected based on the preferred routing direction. When you select the *Initialize from layout* option in the *Tracks* RMB options pop-up window, the tracks table is populated based on the cells placed in the current design. You can now view the tracks that have been automatically created and then create and save the WSP to the cellview.

  In case the selected layer has no objects, the tracks that are automatically generated are based on the minimum width and minimum space. The number of tracks are based on the number of masks for that layer in the technology file.

Specifying WSP Period Repeat Options

By default, this group is minimized and shows the current settings for the group fields.

1. Click the expand button to the left of *Period Repeat* to change the group field settings.

2. Choose the *Allowed Repeat Mode* from the drop-down list box.

   - *Any*

     The pattern can be stepped or flipped when it is repeated.

- *None*

  The pattern cannot be repeated. This is used for single period patterns, typically transitional patterns that are only used to create a region. This setting is not allowed for the active pattern of the global grid.

- *Stepped Only*

  The pattern can only be stepped when it is repeated.

- *Flipped Only*

  The pattern can be flipped in every other period repeat.

Note: If *Allowed Repeat Mode* is changed to *None* for an active global pattern, the associated WSSPDef will be removed from the allowed patterns in the *Track Pattern* assistant. Conversely, if an existing pattern is changed from *Allowed Repeat Mode None* to another value, it will be allowed as an active global pattern in the *Track Pattern* assistant. For more information, see *Specifying the Active Patterns*.

3. Choose the *Default Repeat Mode* from the drop-down list box. This initializes the repeat mode when this pattern is used for regions and global grids.

   - *None*

     There is no repeat mode set for this pattern.

   - *Stepped*

     The pattern is the same in every period.

   - *Flipped Starts with Odd*

     The pattern is flipped in every other period. The first period is not flipped.

   - *Flipped Starts with Even*

     The pattern is flipped in every other period. The first period is flipped.

4. Choose the *Repeat Offset* from the drop-down list box.

   - *First Period Only*

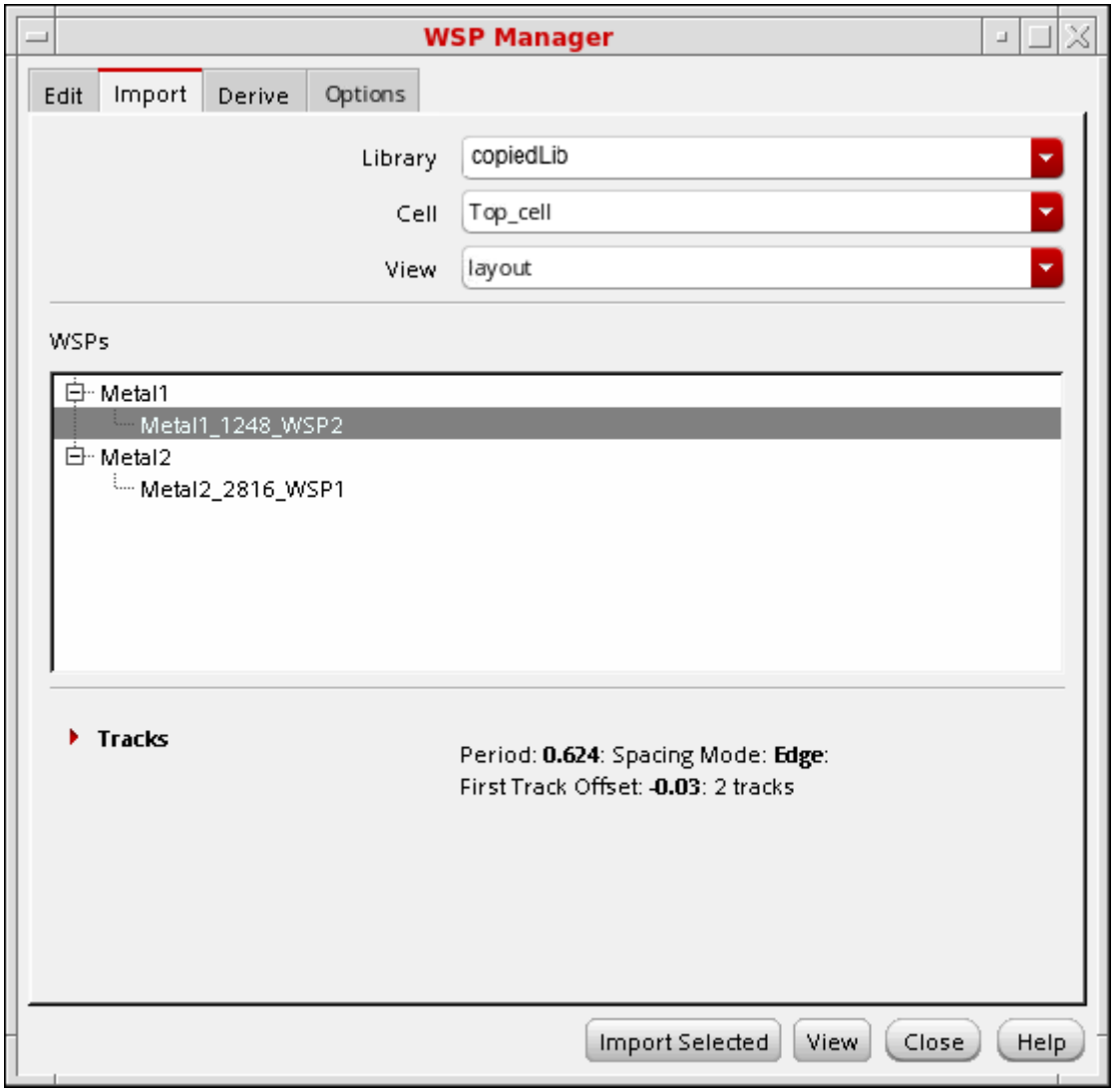
     The *First Track Offset* will be used only for the first period.

   - *All Periods*

     The *First Track Offset* will be used for each period.

Importing WSPs from Another Design

In the *Import* page of WSP Manager, you specify a cellview from which to import WSPs. Only design WSPs can be imported from another design, not technology library WSPs. Regions are not copied from the other design. You cannot import a design to itself.



1. Choose the *Library*, *Cell*, and *View* names from the respective drop-down list boxes.

   The *WSPs* section shows the width spacing patterns, grouped by layer, from the design database.

2. (Optional) Choose a pattern in the *WSPs* section to show the track details in the *Tracks* table.

   Note: To view the track details, only one pattern can be selected.

a. (Optional) Click *View* to preview the pattern tracks. This button is active only when a pattern is selected in the *WSPs* section.

3. Click *Import Selected* to import the width spacing patterns that are selected in the *WSPs* section to the current design. This button is active only when at least one pattern is selected in the *WSPs* section.

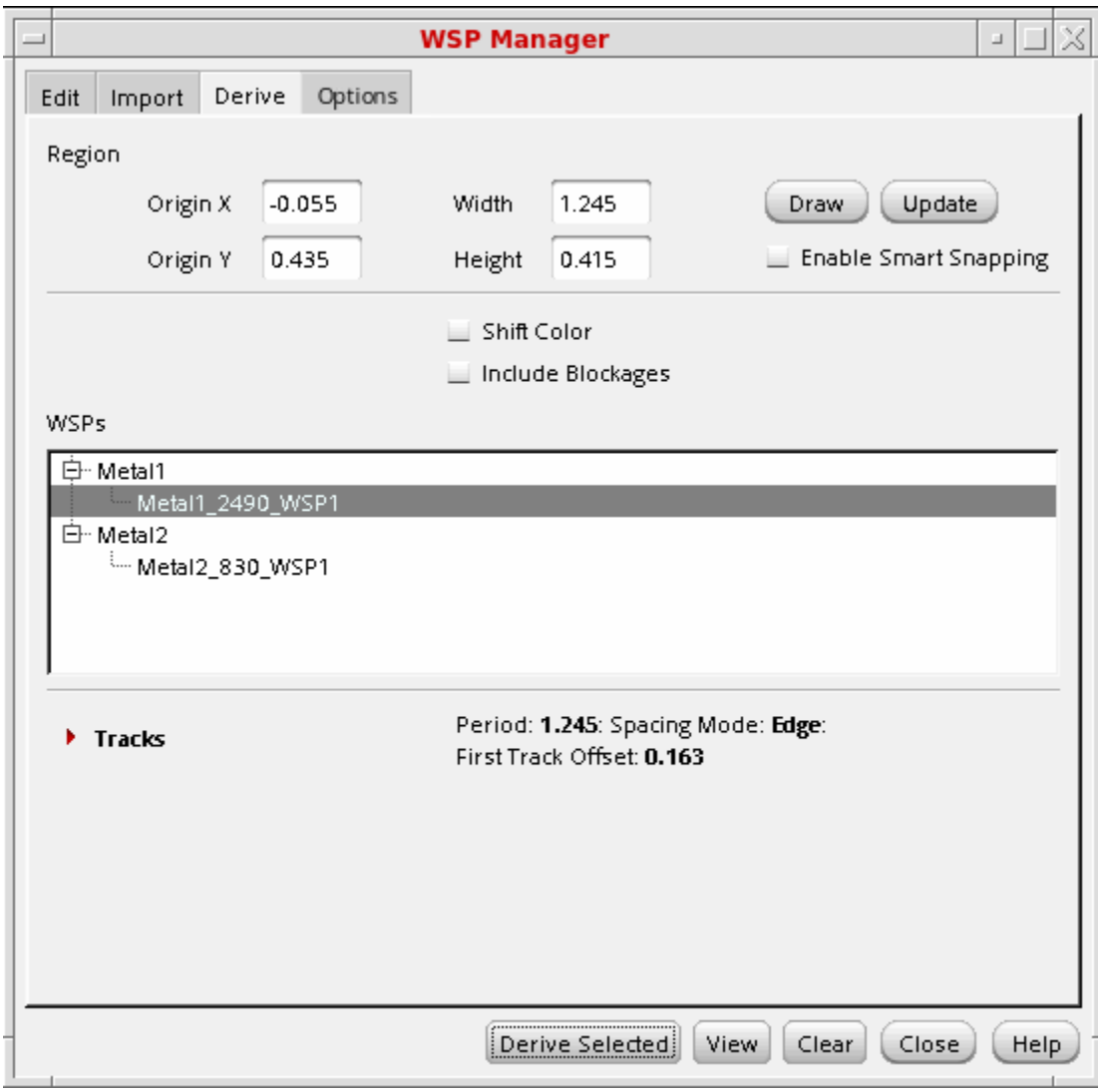
Note: After you select the *Import All* or *Import Selected* option, if the design has existing WSPs with the same name as those that are being imported, you are prompted with a dialog box where you can choose to overwrite these WSPs during import.

 Video

For a video overview of this feature, see WSP Manager: Importing WSPs from Another Cellview on Cadence Online Support.

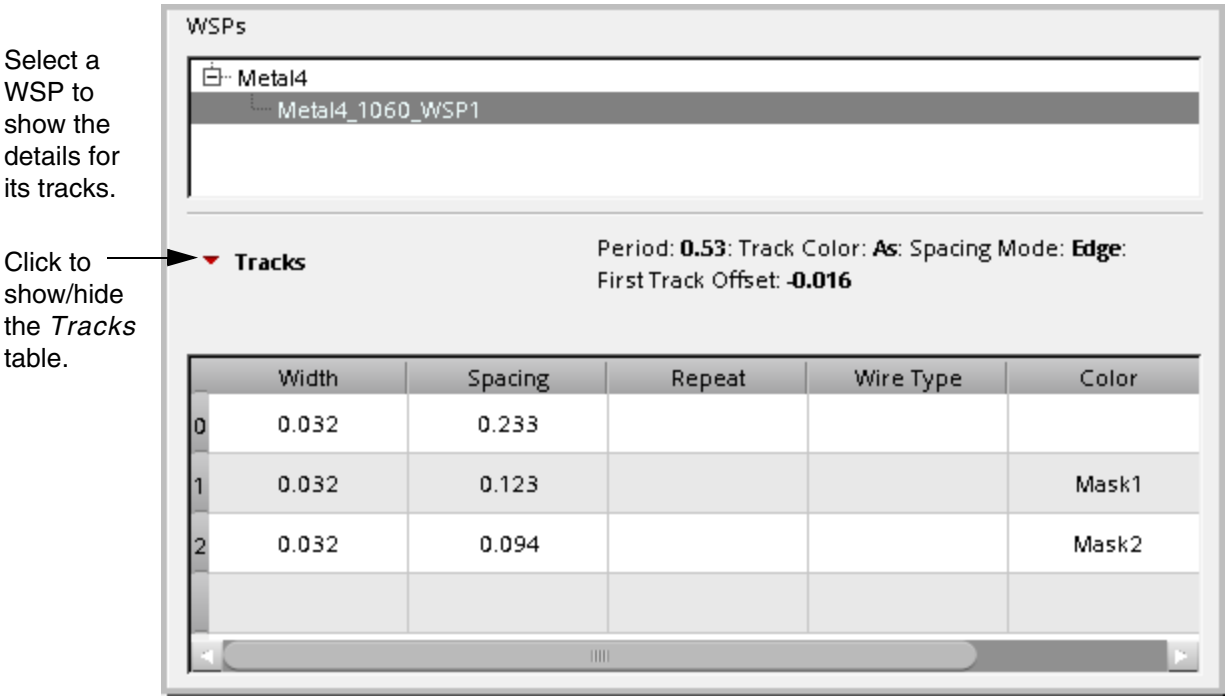
Generating WSPs from Existing Shapes

In the *Derive* page of WSP Manager, you can generate width spacing patterns from existing shapes within a region of the layout canvas, based on the width, spacing, and color of the shapes.

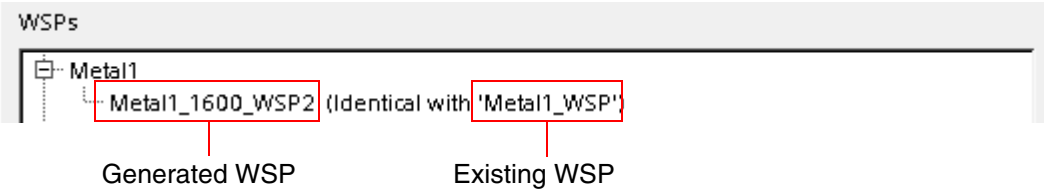


1. Set the search box *Region* using one of these methods:
   - Click *Draw*, then draw the rectangular search box in the canvas.
   - Set the *Origin X*, *Origin Y, Width*, and *Length* fields manually, then click *Update*.

Width spacing patterns are generated for the shapes in the search box, subject to the Guidelines for Generating WSP Tracks, and are listed in the *WSPs* group box, grouped by layer.



If a generated WSP matches an existing WSP in the current design or technology, it is identified in the *WSPs* group box as follows:



2. (Optional) Double-click a WSP name in the *WSPs* list to edit the name.

Valid names can include only letters (A-Z, a-z), digits (0-9), underscore (_), and hyphen (-), and cannot begin with an underscore or a hyphen.

a. (Optional) Click *View* to preview the pattern tracks. This button is active only when a pattern in the *WSPs* section is selected.

3. Choose one or more WSPs in the *WSPs* group box by doing one of the following:

- ❑ Click a WSP.

- Click and drag over the WSP names, or click the first WSP, then `Shift`+click the last WSP to select consecutive WSPs.
- Click the first row, then `Control`+click the other rows to select non-consecutive WSPs.
- Press `Control+a` to select all the WSPs.

Note: To prevent the creation of duplicate WSPs, exclude the generated WSPs that are labeled as *Identical with* an existing WSP.

4. Click *Derive Selected* to import the selected WSPs to the current design and show the tracks in the canvas.

   Note: The shapes on the `"annotation"` purpose are ignored when generating width spacing patterns from existing shapes.

 Video

For a video overview of this feature, see WSP Manager: Generating WSPs from Shapes on Cadence Online Support.

Guidelines for Generating WSP Tracks

- The visible shapes on all the visible hierarchy levels are considered.
- Only one WSP track is created for multiple shapes on the same layer with the same width, color, and centerline. If there is a colored shape that either overlaps or is next to a gray shape with the same width and centerline, only the colored track is created.
- The routing direction is determined by evaluating the following conditions, in order:
  - If the width/height ratios for all the shapes on a layer in the search box are consistent, then the routing direction is the direction where the length is more. For example, if all the same-layer shapes in the search box are longer in the vertical direction, then the routing direction is vertical.
  - If the routing direction cannot be determined by the width/height ratio, then the preferred routing direction for the layer is used, unless it is bidirectional.
  - If neither of the first two conditions is met, then no WSP is generated.
- Tracks are modeled for the shapes that are fully or partially inside the search box. If the centerline of the track is within the search box, or on the left or bottom edge of the search box, then the track is included in the generated WSP.
- The generated WSP is anchored to the PR boundary, if it exists, or to the origin.

- Tracks are not generated for labels in the design.

WSP Manager Derive Options

When generating WSPs from existing shapes, you have the following options:

- *Enable Smart Snapping*

  Snaps to objects in the canvas when drawing the search box.

- *Shift Color*

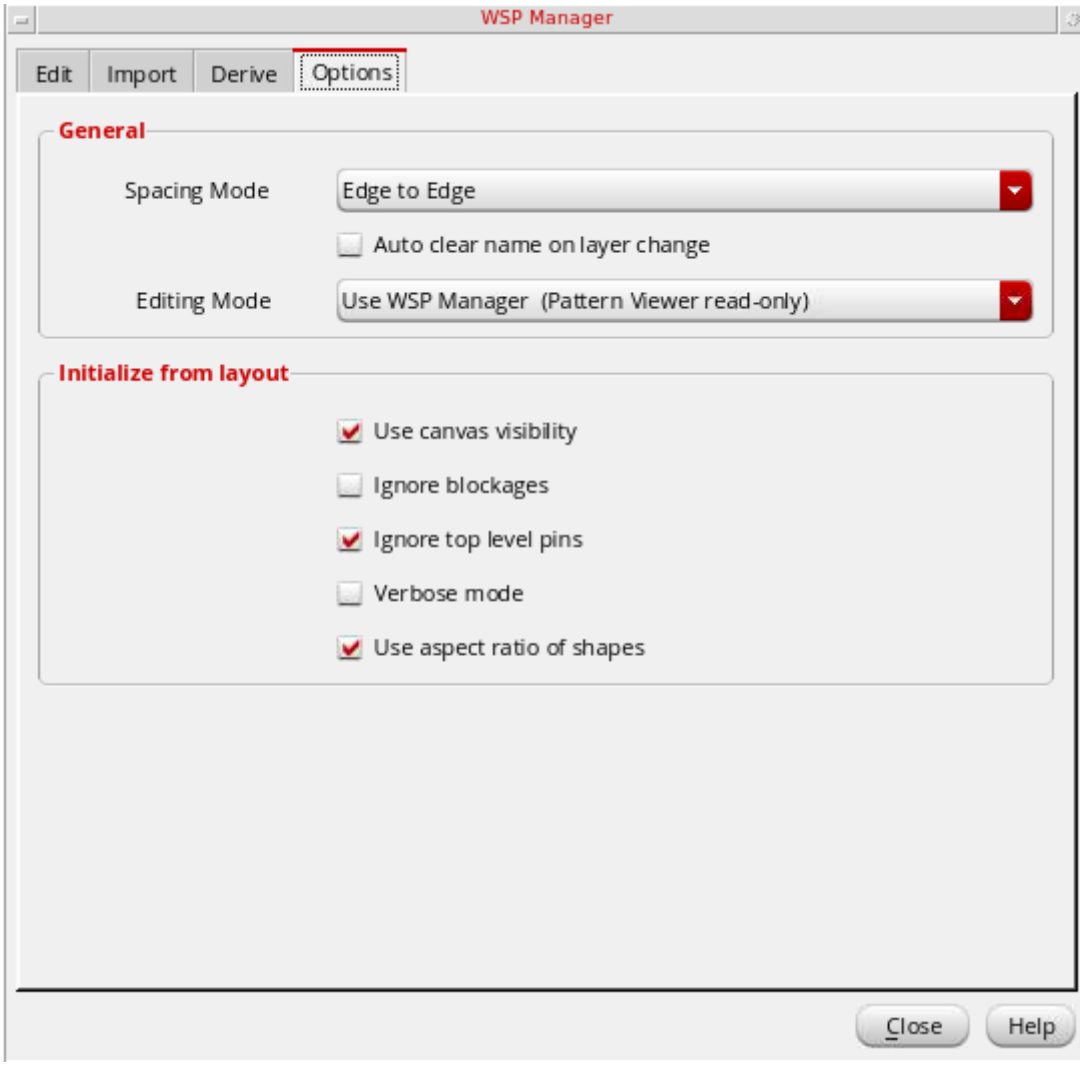
  Shifts track colors when a pattern is repeated.

- *Include Blockages*

  Generates tracks for blockage shapes.

Specifying WSPs Options

In the *Options* page of WSP Manager, you can specify the options to be used when creating, modifying, copying, or generating width spacing patterns.



1. Choose the *Spacing Mode* from the drop-down list box:

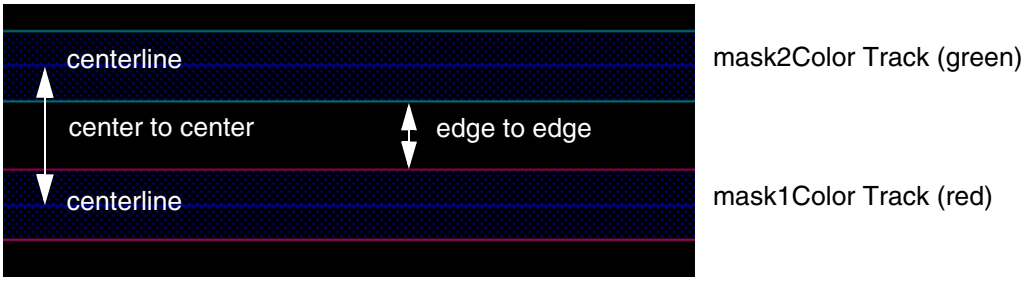
   - *Center to Center*

     Measures the spacing from centerline to centerline between the tracks and for *First Track Offset*.

   - *Edge to Edge*

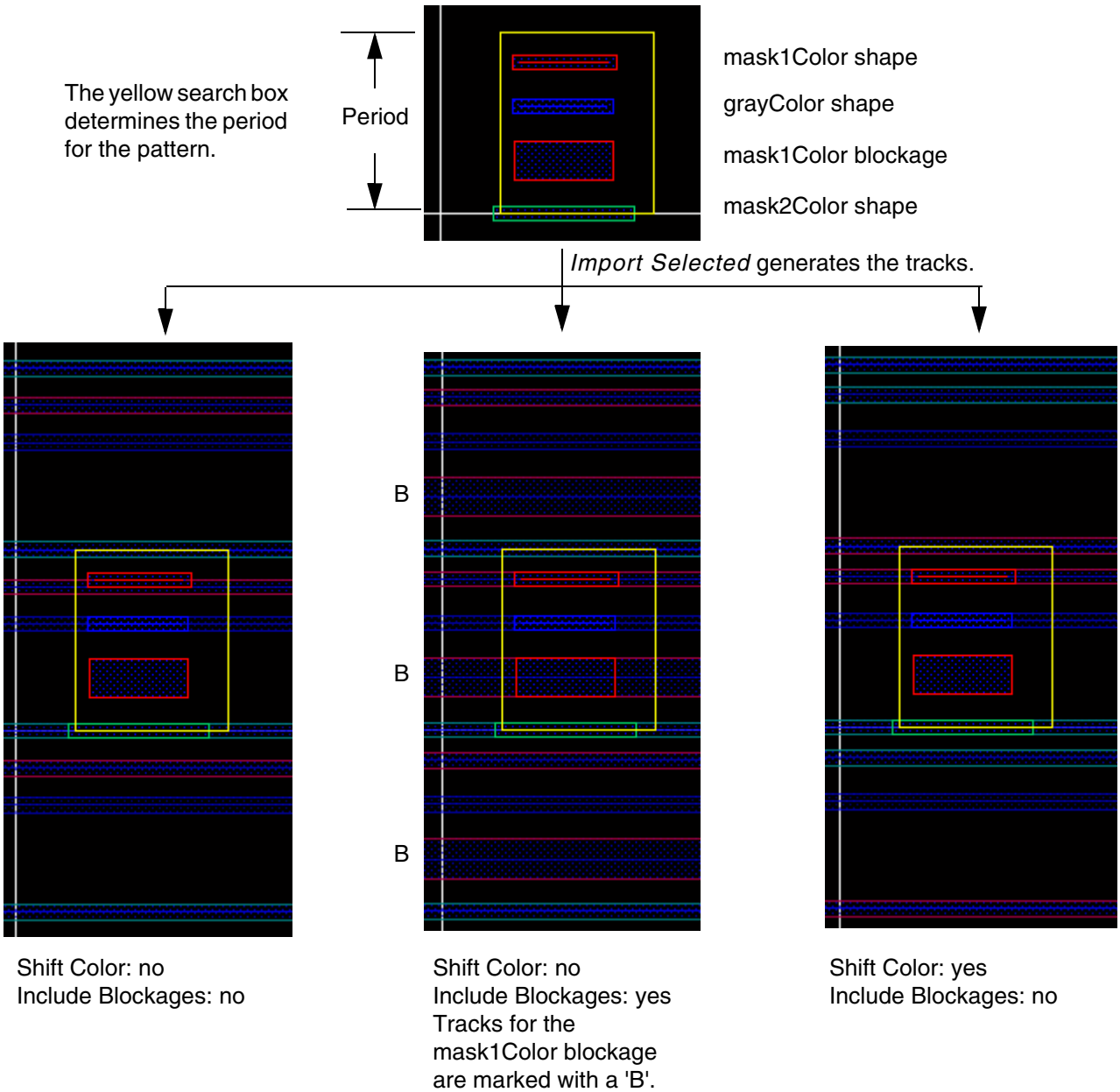
Measures the spacing from edge to edge between the tracks and for *First Track Offset*.

The center-to-center spacing between two tracks equals the edge-to-edge spacing between the tracks plus one-half the width of each track, as shown below:



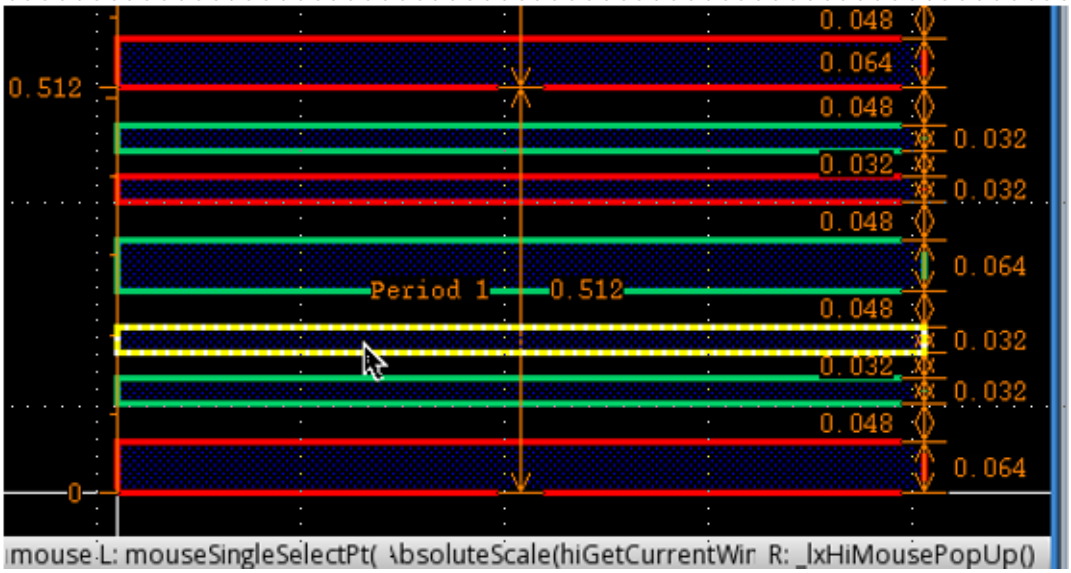
To understand how changing the *Spacing Mode* setting affects the *First Track Offset* value, see *How Spacing Mode and First Track Offset Are Related*.

The following example shows the effect of the *Shift Color* and *Include Blockages* options.



2. Click the *Auto clear name on layer change* check box to automatically clear the name in the *Layer* field on the *Edit* tab when you change the layer name.
3. Choose the *Editing Mode* from the drop-down list box:

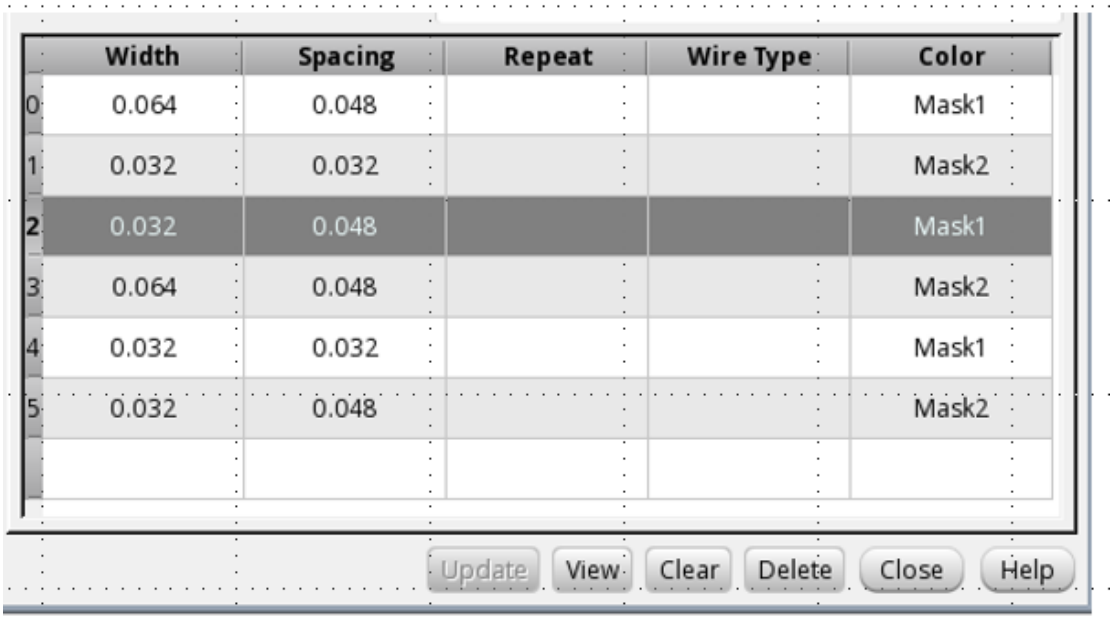
- *Use WSP Manager (Pattern Viewer read-only)*
  Lets you update the tracks on the *Edit* tab. Then, you can preview the tracks.



Tracks preview

- *Use Pattern Viewer (Period and Track table read-only)*
  Lets you edit the tracks graphically. The tracks table is updated based on the edits in the preview. You must make the edits in the first period region. The edits you can

make include creating shapes, changing the colors of tracks, or deleting, stretching, or moving tracks.



Tracks table

4. Click the *Use canvas visibility* check box to use the visibility options specified in the Palette assistant and *Display Levels*: *Stop* in the Display Options form.
5. Click the *Ignore blockages* check box to include or exclude blockages when creating tracks.
6. Click the *Ignore top level pins* check box to include or exclude pins at the top level when creating tracks.
7. Click the *Verbose mode* check box to display debug messages in the CIW.
8. Click the *Use aspect ratio of shapes* check box to ignore the shapes that are not drawn along the right direction.

   Note: The shapes on the `"annotation"` purpose are ignored when initializing width spacing patterns from layout.

Note: When you copy a related snap pattern, it's attributes are also copied.

Working with the Track Pattern Assistant

Use the *Track Pattern* assistant to choose the width spacing patterns for a region or global area that are displayed as tracks on the canvas.

The *Track Pattern* assistant is a dockable assistant for enabling the predefined WSSPDefs for the global grid and choosing the active pattern and optional wire type for enabled WSSPDefs from the allowed patterns. To show only a subgroup of available patterns, you can filter WSSPDefs by group, name, and period, and filter patterns by name and wire type. Filter settings can be saved to memory or to a file and be restored later. You can control the visibility of the active patterns in the canvas. Width spacing pattern regions can be created and edited using sub-forms.

Only the WSSPDefs with a specified snapping layer will be shown in the *Track Pattern* assistant and its subforms, such as *Create Region*. WSSPDefs without a snapping layer are automatically filtered out.

This section covers the following topics:

- Launching the WSP Active Checker
- Customizing the Track Pattern Assistant
- Creating and Editing Related Snap Pattern Group

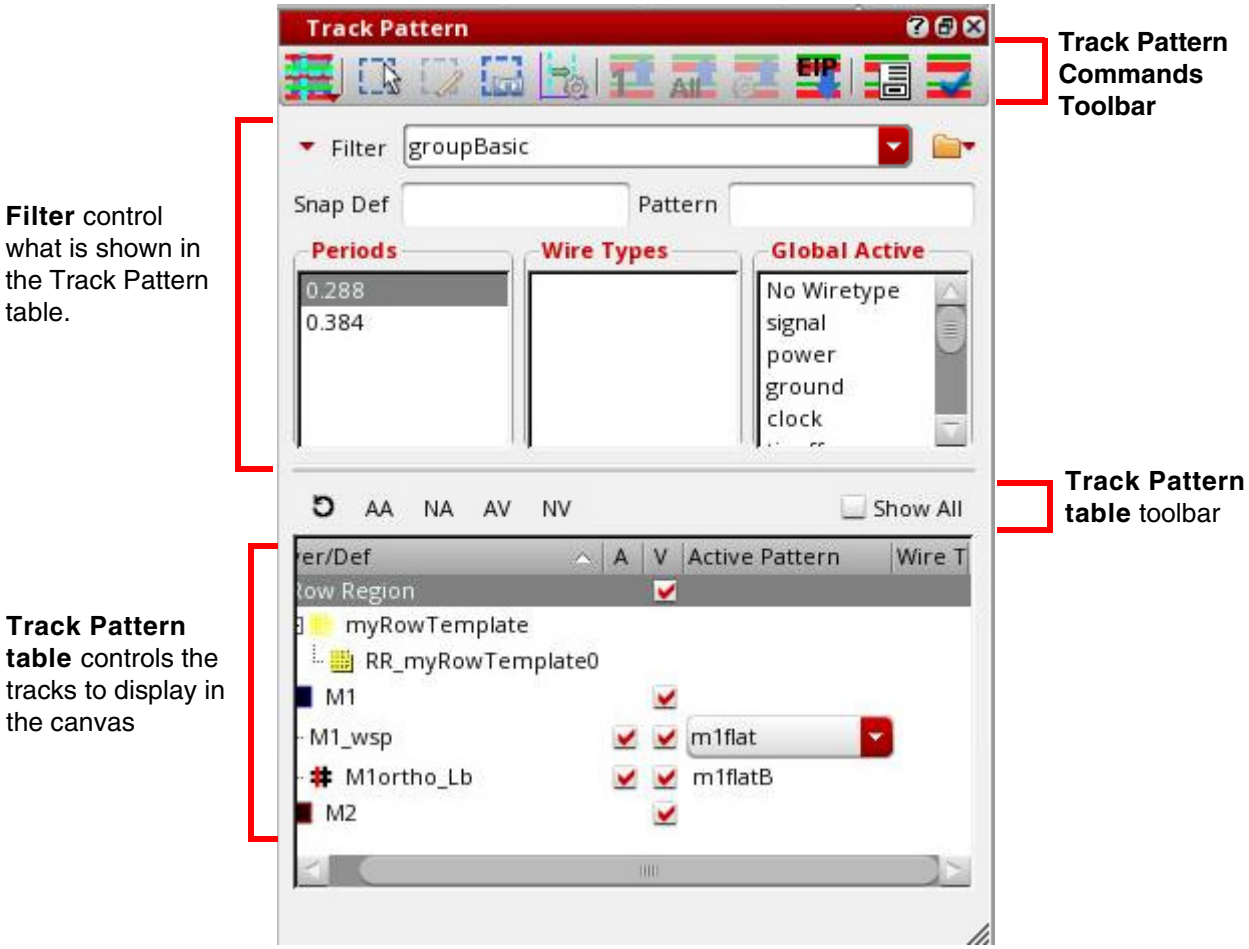
Launching the Track Pattern Assistant

Use one of the following methods to access the *Track Pattern* assistant:

- Select *Window – Assistants – Track Pattern*.
- Right-click in the main menu and select *Assistants – Track Pattern*.

Once selected, the *Track Pattern* assistant is added as a docked assistant pane within the current session window. By default, the *Track Pattern* assistant is positioned on the right side of the layout window.

The *Track Pattern* assistant Graphical User Interface (GUI) is divided into sections:



- The top section has a toolbar that contains buttons for Track Pattern commands. You can open the following forms:
  - Choosing the Track Pattern Display Mode
  - Creating Width Spacing Pattern Regions
  - Editing Width Spacing Pattern Regions
  - Stretching Width Spacing Pattern Regions
  - Choosing the Track Pattern Display Mode
  - Pulling Up Patterns from a Subcell
  - Pushing down WSSPDefs in EIP
  - Launching the WSP Manager

- Launching the WSP Active Checker

- The next section shows filters that control what is shown in the Track Pattern table. For more information, see Setting Track Pattern Assistant Filters. There are also fields for saving, loading, and deleting filter settings, as described in Saving and Restoring Filter Settings.
- Using controls in the Display section, you can choose which active patterns are visible in the canvas. These controls are described in the Controlling the Visibility of Track Patterns section.
- The bottom section shows the Track Pattern table of active patterns for WSSPDefs and SPDefs grouped by layer with display controls to show or hide the active patterns in the canvas. For more information, see Specifying the Active Patterns.
- The bottom-left corner of the form shows the *Track Pattern* assistant scope, described in Controlling the Track Pattern Assistant Scope.

Pattern flipping can be specified for global grids, as described in Choosing the Track Pattern Display Mode, and for regions as described in Creating Width Spacing Pattern Regions and Editing Width Spacing Pattern Regions.

Track Pattern Assistant Title Bar Buttons

The *Track Pattern* assistant title bar has the following buttons:

 Help

Displays information about how to use the *Track Pattern* assistant.

 Dock/Float

Docks or undocks the *Track Pattern* assistant.

Note: You can also drag the *Track Pattern* assistant icon to dock or undock it.

 Hide

Hides *Track Pattern* assistant.

Controlling the Track Pattern Assistant Scope

The regions selected in the canvas determine the *Track Pattern* assistant scope, which is shown at the bottom-left corner of the GUI. The scope controls the patterns that are shown in the Track Pattern table, and what is displayed in the *Periods* and *Wire Types* fields of the *Filter* section as described below.

- No region or multiple pattern region groups

  When no width spacing pattern region or multiple pattern region groups are selected in the canvas, the *Track Pattern* assistant *Filter* section and table apply to the global area of a width spacing pattern grid. The *Track Pattern* assistant scope is blank.

- One pattern region group

  When one pattern region group is selected in the canvas, the *Track Pattern* assistant *Filter* and table apply only to that pattern region group. The Track Pattern scope shows `Pattern Region Group` with the region name, if specified.

For information on the Track Pattern table, see Using the Track Pattern Table.

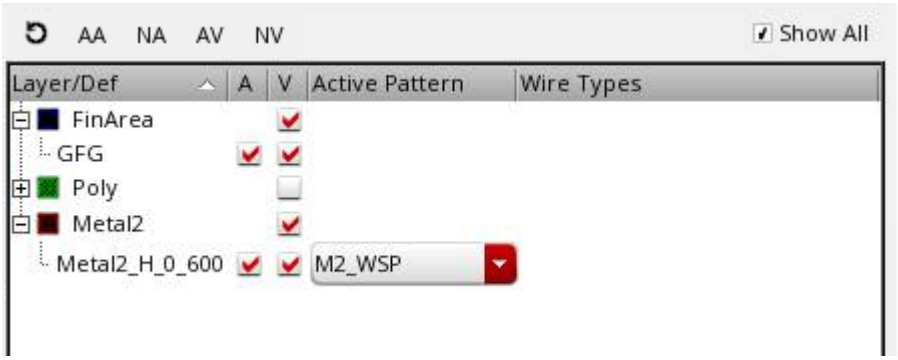
For information on creating regions, see Creating Width Spacing Pattern Regions.

Using the Track Pattern Table

The key components for establishing tracks using width spacing patterns are:

- widthSpacingPattern (required)
- widthSpacingPatternGroups (optional)
- widthSpacingSnapPatternDefs (required)
- relatedSnapPatterns (optional)

These are set in the technology file or for the design as described in Preparing to Use Width Spacing Patterns, and are shown in the Track Pattern table with the following columns:



- *Layer/Def*

  Shows the defined WSSPDefs and SPDefs for each layer. SPDefs will not have entries in the *Active Pattern* or *Wire Types* columns. An SPDef is the active pattern if it is enabled.

- *A* (Globally Active)

  Enables or disables the globally active WSP in the canvas.

- *V* (Visibility)

  Shows or hides the active pattern in the canvas.

  Note: If one or more patterns are visible in the canvas, when you click the *V* (Visibility) column, all patterns are hidden. In case, no patterns are visible, when you click *V* (Visibility), all patterns are visible.

- *Active Pattern*

  Selects the active WSP for each WSSPDef.

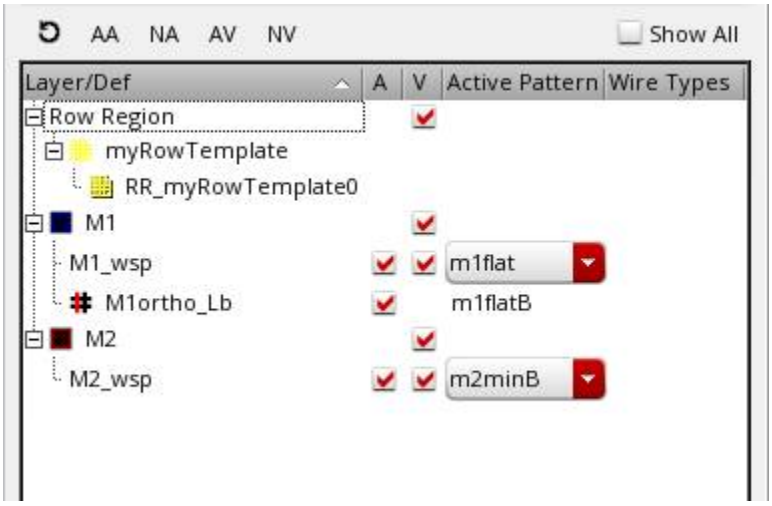
- *Wire Types*

  Selects the active wire types for the active pattern. If no wire type is shown, then all the wire types for the active pattern are active.

The global grid typically has one WSSPDef per layer, and each WSSPDef can have one or more allowed patterns and/or pattern groups, but only one active pattern. Entries in the table can be filtered, as described in Setting Track Pattern Assistant Filters. Filters can be cleared, as described in Clearing Filters.

For WSSPDefs, the active WSP must be in a WSSPDef that is enabled in the *Track Pattern* assistant. To enable a WSSPDef, see Enabling and Disabling WSSPDefs.

In addition to WSSPdefs, you can also view row templates in the *Track Pattern* assistant.



The Track Pattern table displays the row template used to create the row region. The row region is displayed under the row template.

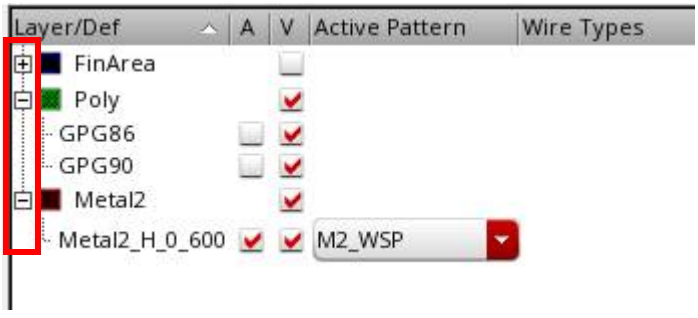
Expanding and Collapsing the Layers

To show the WSSPDefs and SPDefs for a layer in the Track Pattern table:

➡ Click the plus sign (+) to the left of the layer name.

The WSSPDefs and SPDefs for the layer will be shown below the layer name.

Click + or - to expand or collapse the layer.



To hide the WSSPDefs and SPDefs for a layer in the Track Pattern table:

➡ Click the minus sign (-) to the left of the layer name.

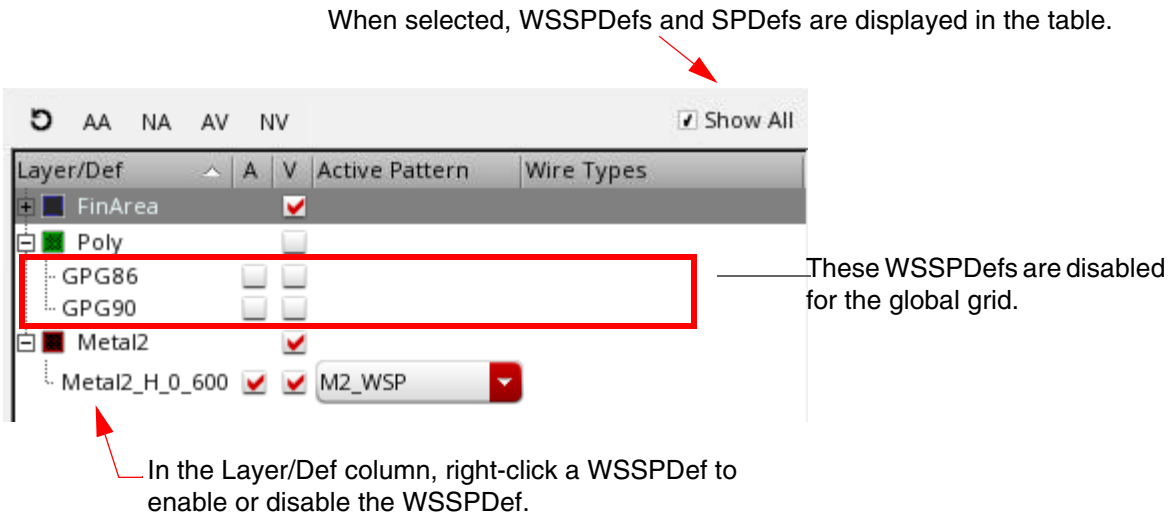
Only the layer name will be shown.

To toggle between expanding and collapsing all the layers:

➡ `Shift`+click *Reset*.

Enabling and Disabling WSSPDefs

You can change the active pattern only for the WSSPDefs that are enabled.



To enable a WSSPDef:

1. Choose the *Show all* check box to show the WSSPDefs in the table, as described in Filtering by Related Snap Patterns.
2. Click the *A* column check box for the desired WSP if the WSSPDef.

   The *Active Pattern*, *Wire Types*, and *Visibility* for the WSSPDef will be selectable.

To disable an enabled WSSPDef:

➡ Click the *A* column check box for the desired WSP to deselect it.

If *Show all* is not selected, the WSSPDef will be removed from the Track Pattern table. The *Periods* and *Wire Types* lists in the *Filter* section will include periods for only the enabled WSSPDefs, and wire types for all the active patterns of only the enabled WSSPDefs, respectively.

Showing and Hiding WSSPDefs and SPDefs

By default, WSSPDefs and SPDefs are not shown in the Track Pattern table.

To show the WSSPDefs and SPDefs:

➡ Select the *Show all* check box.

The WSSPDefs and SPDefs will be shown in the table. The *Active Pattern*, *Wire Types,* and *Visibility* for the WSSPDefs will not be selectable. The *Periods* and *Wire Types* lists in the *Filter* section will include periods for the WSSPDefs, and wire types for all the active patterns of the WSSPDefs, respectively.

To hide the WSSPDefs and SPDefs:

➡ Deselect the *Show all* check box.

All WSSPDefs and SPDefs will be removed from the Track Pattern table. The *Periods* and *Wire Types* lists in the *Filter* section will include periods for only the enabled WSSPDefs, and wire types for all the active patterns of only the enabled WSSPDefs, respectively.

The *Show all* check box can also be set using the tpaShowDisabled environment variable.

Specifying the Active Patterns

Each WSSPDef has a default active pattern. If a WSSPDef has more than one allowed pattern, you can change the active pattern using the *Track Pattern* assistant.

To choose the *Active Pattern* for a layer in the Track Pattern table, do the following:

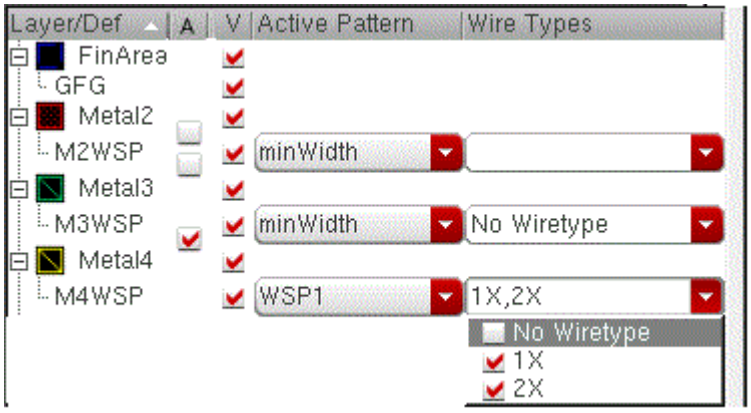
1. If needed, click the plus sign (+) to the left of the layer name to expand the layer and show the WSSPDefs for the layer.
2. Click *Show all* if the WSSPDef for the desired WSP is disabled and not visible in the table.
3. Click the *A* column check box for the desired WSP if the WSSPDef is currently disabled.
4. Choose a WSP from the *Active Pattern* drop-down list of allowed patterns.

   The selected WSP is the active pattern for the layer.

   Note: A single-height (non-repeating) pattern cannot be set as the active pattern for a layer in the global grid, but can be used in regions.
5. (Optional) Choose one or more wire types from the *Wire Types* drop-down list.

   The active pattern specifies the width and spacing for a set of tracks. Each track can have an optional wire type. If *Wire Types* is empty, then tracks will be created in the canvas for all wire types in the active WSP. Otherwise, tracks will be created only for the selected

wire types. The following example shows different Wire Types selections for Metal2, Metal3, and Metal4.



Tracks will be created on Metal2 for all wire types in the minWidth pattern.

Only tracks with no wire type in the minWidth pattern will be created on Metal3.

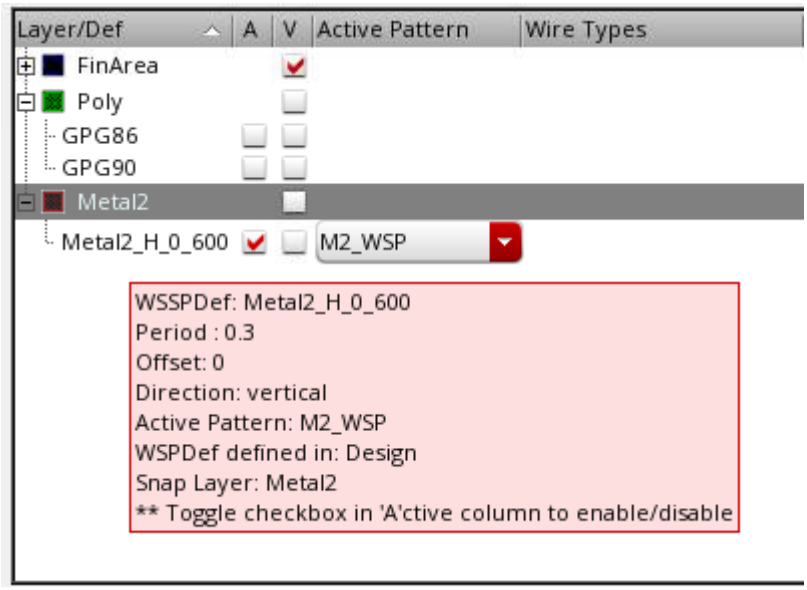
Only tracks with a wire type of 1X or 2X in the WSP1 pattern will be created on Metal4.

Showing WSSPDef Information

To show the information for a WSSPDef in the Track Pattern Assistant:

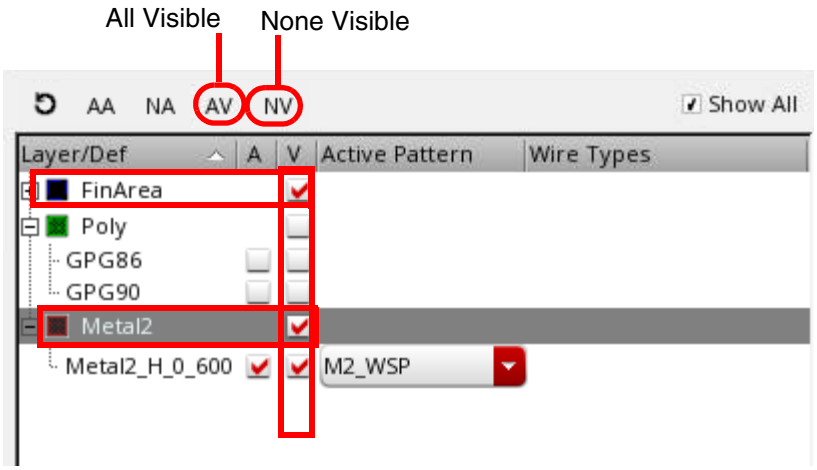
➡ Place the pointer over the WSSPDef name in the table.

The WSSPDef name, period, offset, direction, active pattern, and snap layer are displayed.



Controlling the Visibility of Track Patterns

You can control the visibility of the track patterns in the canvas using the *Track Pattern* assistant.



To show or hide the active pattern for an enabled WSSPDef:

➡ Click in the Visibility column for the WSSPDef to toggle the setting.

To show or hide the active patterns for a layer:

➡ Click in the Visibility column for the layer to toggle the setting.

To show all the active patterns for the global grid and regions in the canvas:

➡ Click *AV*.

To hide all the patterns in the canvas:

➡ Click *NV*.

To show or hide all active patterns in the canvas:

➡ Click *AA*.

To show or hide none active the patterns in the canvas:

➡ Click *NA*.

To reset all filters and turn off the visibility of patterns:

➡ Click the reset icon .

You can also control visibility of the track patterns from the *Grids* panel of the Palette Assistant, as described in *Virtuoso Layout Suite L User Guide*. You can control the visibility of both routing and orthogonal WSSPDefs using the *V* column in the *Grids* panel of the Palette assistant. When an orthogonal WSSPDef is both active and visible, you can see the grid lines on the canvas. However, even if the WSP has a width value and the display mode is *Full*, the orthogonal WSSPDefs only show a centerline.

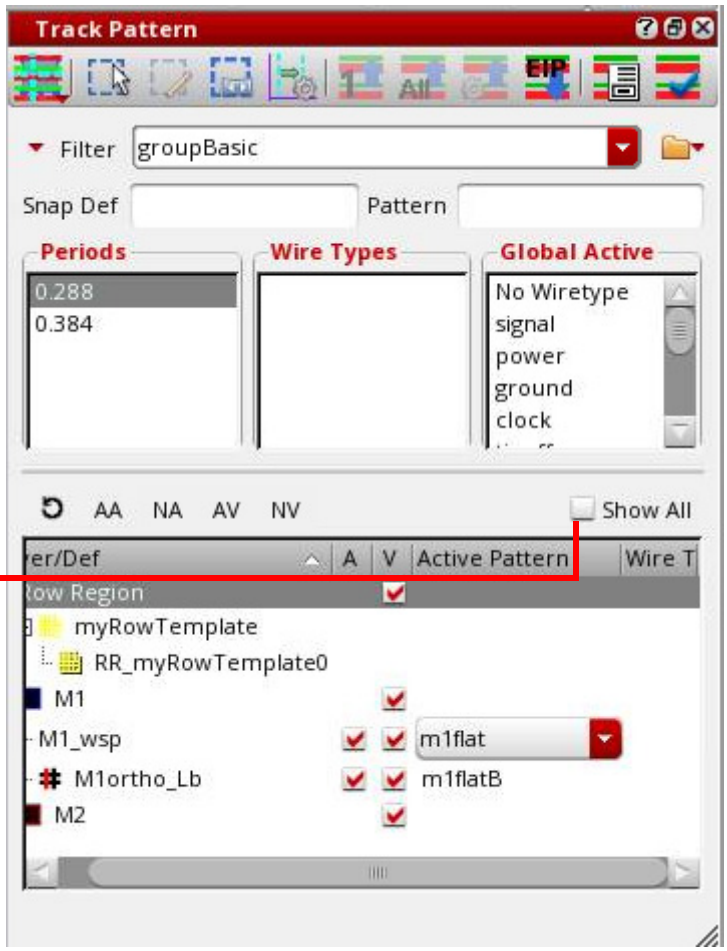
Setting Track Pattern Assistant Filters

There are several ways to filter the WSSPDefs and SPDefs that are shown in the Track Pattern table.

Set *Filter* to show only WSSPDefs in the table for a selected RSP or matching a saved filter.

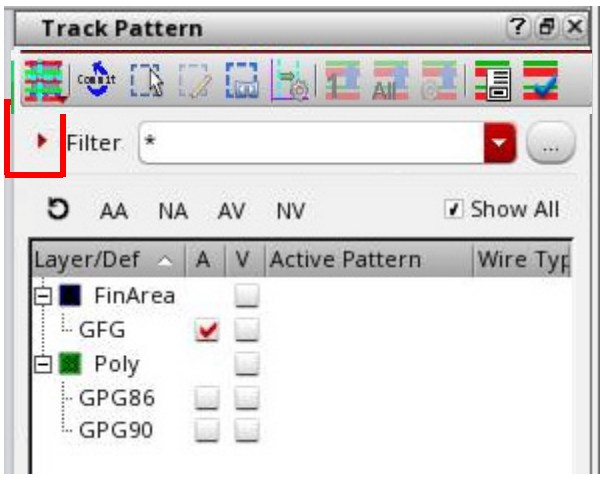
Filter WSSPDefs and SPDefs shown in the table by *Snap Def*, *Pattern*, *Periods*, and *Wire Types.*

Choose *Show all* to show WSSPDefs and SPDefs in the table.



You can collapse or expand the *Filter* section using the disclosure button,  . This lets you view more of the WSSPDef state information in the *Tracks* table.

By default, the *Filter* section is collapsed.



To reduce the clutter in the table and show only the active patterns, WSSPDefs and SPDefs are hidden by default. To view all the defined WSSPDefs and SPDefs, see Showing and Hiding WSSPDefs and SPDefs.

To show only the WSSPDefs in a related snap pattern group in the table, see Filtering by Related Snap Patterns.

The filters (*Snap Def*, *Pattern*, *Periods*, and *Wire Types*) are evaluated dynamically to customize the table, in order of precedence from highest to lowest:

- Filtering by Snap Defs
- Filtering by Pattern
- Filtering by Periods
- Filtering by Wire Types
- Filtering by Global Active

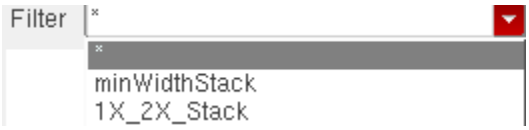
Using S*nap Def*, *Pattern*, *Periods*, and *Wire Types* filters affects the WSSPDefs and SPDefs that are shown in the Track Pattern table but does not change the patterns that are displayed in the canvas.

Filtering by Related Snap Patterns

Customers with a large number of width spacing patterns will often create related snap pattern groups to limit different design groups to a smaller set of patterns or active patterns.

To show only the WSSPDefs in a related snap pattern group:

➡ Choose the related snap pattern group in the *Filter* drop-down list.



Note: The *Filter* drop-down list will show the defined related snap pattern groups and filter settings that are saved in the memory, as described in *Saving and Restoring Filter Settings*.

The *Snap Def* filter will be cleared. Only WSSPDefs in the selected related snap pattern group will be shown in the table. Any SPDefs in the table are not affected. The patterns in the canvas might also change if any of the current active patterns are not allowed in the related snap pattern. For these cases, the active pattern will be assigned to an allowed pattern in the related snap pattern group.

Filtering by Snap Defs

To show only WSSPDefs and SPDefs matching an expression:

➡ Type the expression in the *Snap Def* field.

As you type, WSSPDefs and SPDefs in the *Layer/Def* column of the table will dynamically update to include only those matching the expression. Expressions are case-sensitive and can include the special characters shown in Table 1-1.

Table 1-1 Expression Syntax

`?`	Matches any single character.
`*`	Matches any sequence of zero or more characters.
[*chars***]**	Matches any single character in *chars*. If *chars* contains a sequence of the form *a*`-`*x*, then any character between *a* and *x* (inclusively) will match.
{*a*, *b*, **…}**	Matches any of the strings *a*, *b*, … listed within the braces.

Filtering by Pattern

To show only WSSPDefs with allowed WSPs matching an expression:

➡ Type the expression in the *Pattern* field.

As you type, WSSPDefs in the *Layer/Def* column of the table will dynamically update to include only WSSPDefs with WSPs that match the expression. Expressions are case-sensitive and can include the special characters shown in Table 1-1.

Filtering by Periods

If *Show all* is selected, the *Periods* filter list box will show the periods for the enabled and WSSPDefs in the Track Pattern table. Otherwise, only the periods for the enabled WSSPDefs are shown.

To show only WSSPDefs with a specific period:

➡ Click the period in the *Periods* list box.

The period is selected. Only WSSPDefs with a period matching a selected period will be shown in the Track Pattern table. Multiple periods can be selected.

To deselect a period:

➡ Click the period.

The filter is removed for the period.

Filtering by Wire Types

If *Show all* is selected, the *Wire Types* filter list box will show the wire types for the *active* patterns of the enabled and WSSPDefs in the Track Pattern table. Otherwise, only the wire types for the active patterns of the enabled WSSPDefs are shown.

To show only WSSPDefs with an active WSP containing a pattern of a specific wire type:

➡ Click the wire type in the *Wire Types* list box.

The wire type is selected. WSSPDefs with an active WSP containing a pattern of a wire type matching a highlighted wire type will be shown in the Track Pattern table. Multiple wire types can be selected.

To deselect a wire type:

➡ Click the wire type.

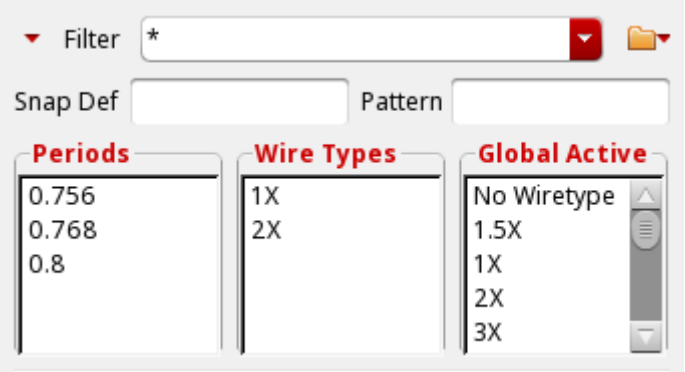
The filter is removed for the wire type.

Important

Choosing wire types in the *Wire Types* filter list does not set the wire types for the active pattern. You must set the wire types for the active pattern in the Track Pattern table. For more information, see Specifying the Active Patterns.

Filtering by Global Active

The *Global Active* filter relates to the SKILL functions, `dbSetCellViewActiveWireTypes` and `dbGetCellViewActiveWireTypes`. The cellview active wire types modify what is available in a WSP. This is similar to the way wire types are selected for a specific `widthSpacingSnapPatternDefs` in the Track Pattern table. The *Global Active* filter sets the active wire type for all WSSPDefs instead of just a single WSSPDef in the cellview. This is unlike the *Wire Types* column in the Track Pattern table which displays a single WSSPDef.



Clearing Filters

To reset all filters and turn off the visibility of patterns:

➡ Click the reset icon .

All filters are reset, and the WSSPDefs and SPDefs are refreshed accordingly in the Track Pattern table. The visibility for all the patterns is turned off.

To reset only filters:

➡ `Shift`+click the reset icon .

All layers in the Track Pattern table are collapsed or expanded.

➡ `Ctrl`+click the reset icon .

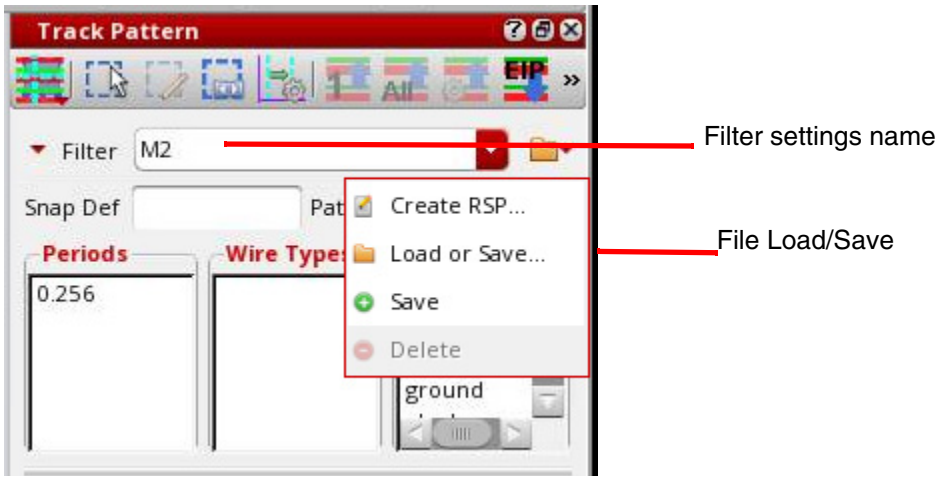
Only the filter settings are reset.

➡ `Ctrl+Alt+Shift`+click the reset icon .

The defaults are restored and the Track Pattern table is refreshed.

Saving and Restoring Filter Settings

Filter settings in *Track Pattern* assistant can be saved and restored from the memory or a file.



To save the current filter settings in memory:

1. Type the name for the current filter settings in the *Filter* field.
2. Click *Save*.

   The filter settings are saved to the assigned name, which is added to the list of settings in the *Filter* drop-down list.

To restore the saved filter settings from memory:

➡ Select the filter settings name from the *Filter* drop-down list.

The filter settings are restored.

Note: Related snap pattern group names are also shown in the drop-down list and can be selected to filter the patterns in the Track Pattern table, as described in Filtering by Related Snap Patterns.

To delete filter settings from memory:

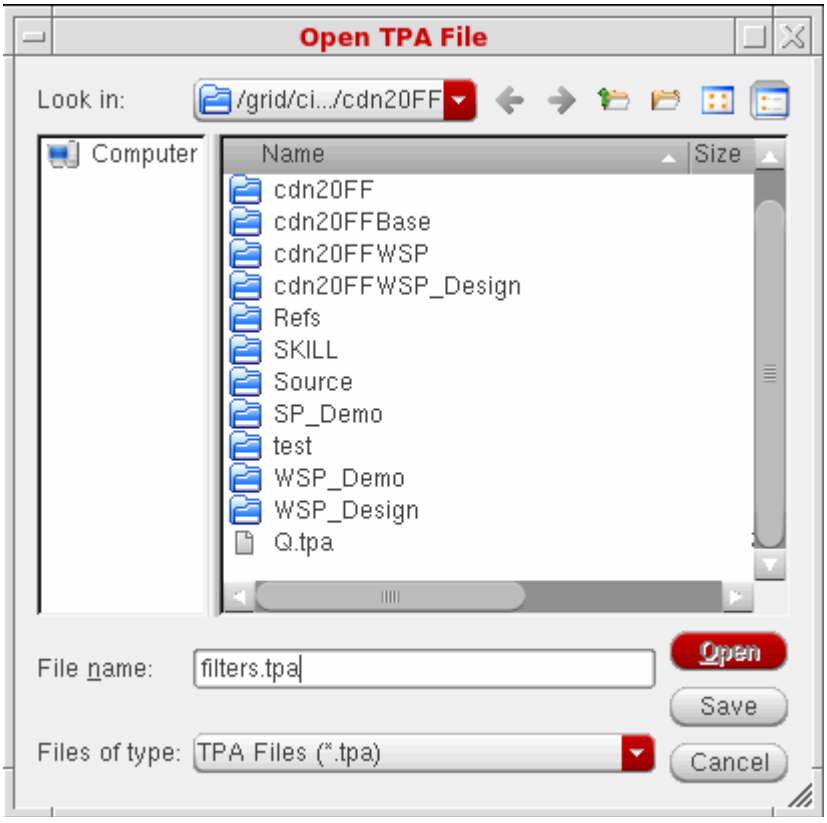
1. Select the filter settings name from the *Filter* drop-down list.
2. Click *Delete*.

   Note: Although defined width spacing pattern group names are shown in the drop-down list, they cannot be deleted.

To store all the saved filter settings to a file:

1. Click the *Load or Save* option from the  drop-down list in the *Track Pattern* assistant.

   The *Open TPA File* form appears.



2. Enter the filename.

Important

The filename must have a `.tpa` extension, otherwise the *Save* button will not be active.

3. Choose *Save*.

   All the filter settings that are saved in memory will be stored in the specified TPA file.

To load filter settings from a TPA file:

1. Click the *Browse* button (…) in *Track Pattern* assistant.

   The Open TPA File form appears.

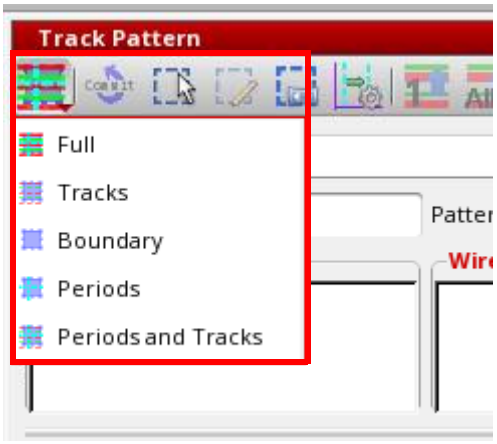
2. Enter the filename or browse through the hierarchy for the file to load.

3. Click *Open*.

   All the filter settings in the specified TPA file will be available in the *Filter* drop-down list of *Track Pattern* assistant.

Choosing the Track Pattern Display Mode

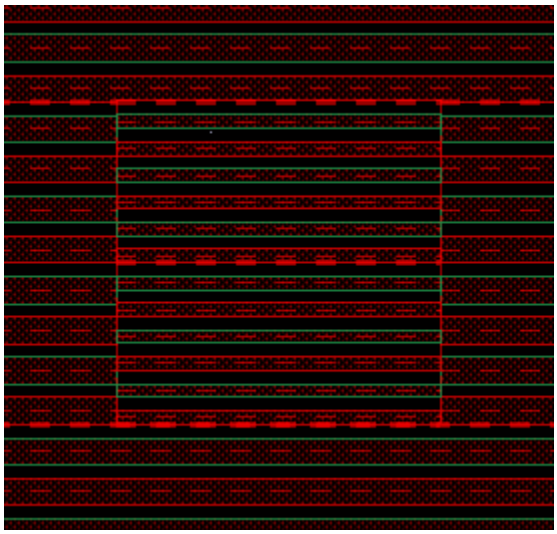
Click the track pattern *Display Mode* icon on the toolbar in the *Track Pattern* assistant to control the display of boundaries and track elements in the canvas. You can choose one of the following from the list: *Full*, *Tracks*, *Boundary*, *Periods*, and *Period and Tracks.*



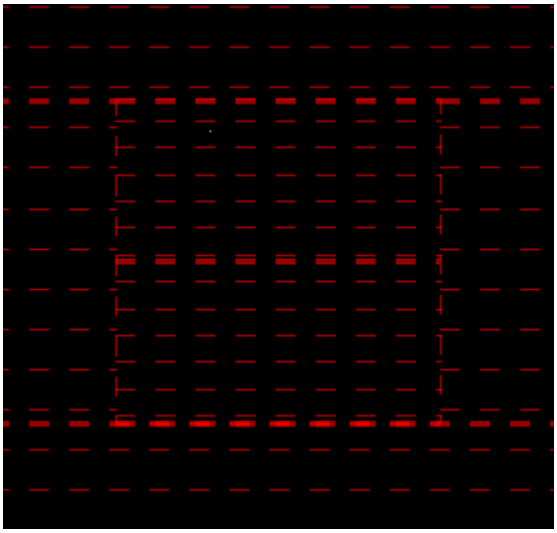
Note: The *Display Mode* icon on the toolbar changes to reflect the current display mode.

The following figure depicts the display options.

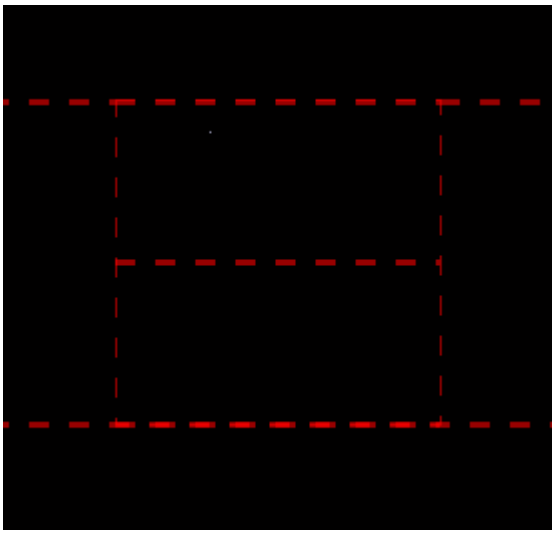
.



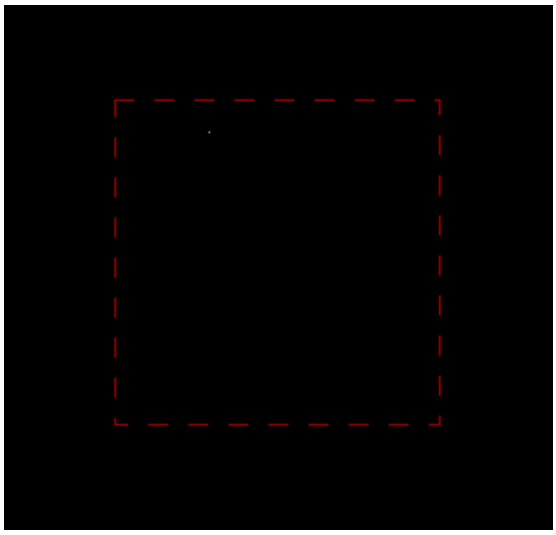
Full shows tracks and track widths, periods, and WSP and SP region boundaries.



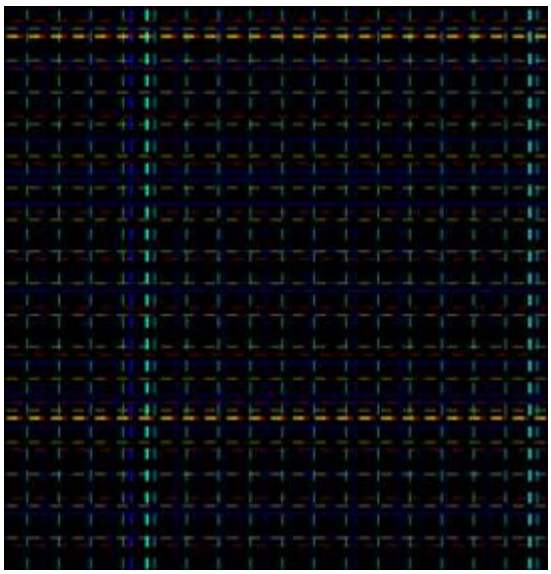
Tracks shows tracks, periods, and WSP and SP region boundaries.



Periods shows periods and WSP and SP region boundaries.



Boundary shows WSP and SP region boundaries.



Periods and Tracks shows both periods and tracks

The display mode can also be set in the *Snap Pattern Display* field of the Display Options form. For more information, see Controlling the Display of Width Spacing Patterns in *Virtuoso Layout Suite L User Guide.*

Committing Active WSSPDefs as Global Defs

You can commit active WSSPDefs as global defs. This eliminates the need to select the RSP in the filter every time you want to select a related snap pattern.

To make an active WSSPDef a global def, select the active WSSPDef in the Track Pattern Assistant and click the *Commit to Global* icon.

The selections in the track pattern table are committed as global settings. If you set the active WSP pattern and remove the filter and then select * in the *Filter* field, the global def is displayed in the track pattern table.

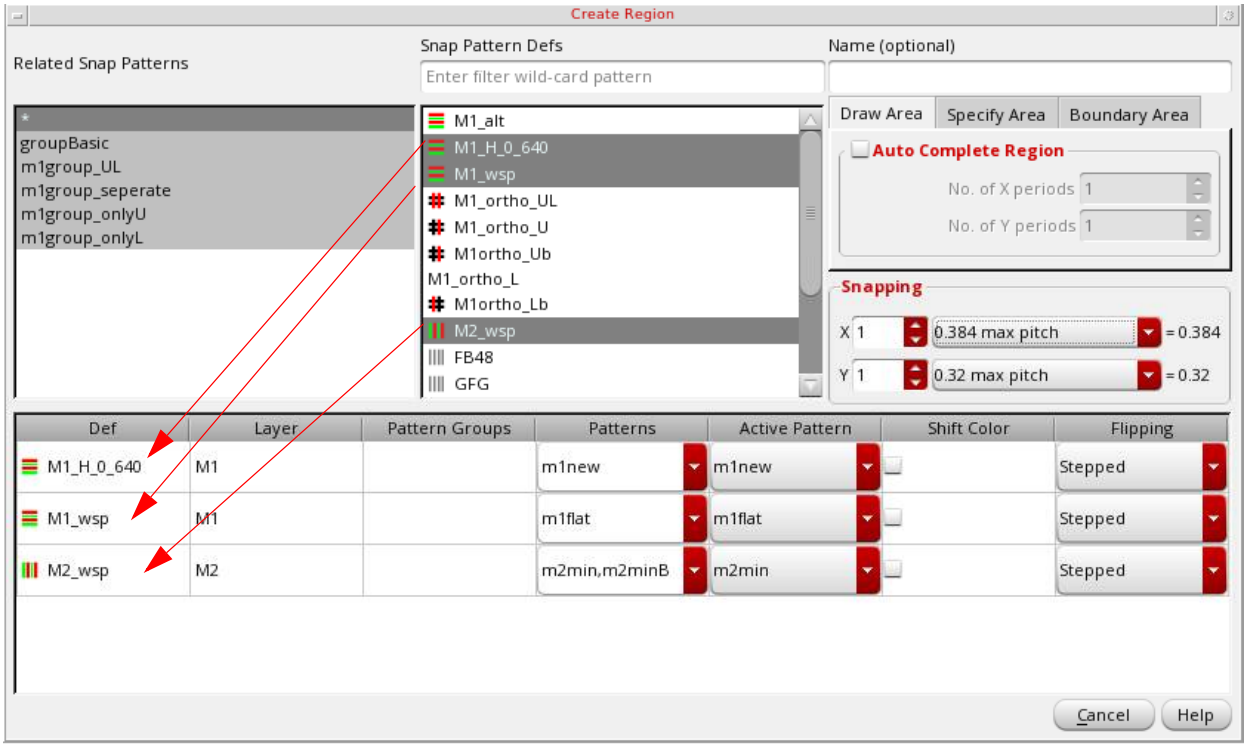
Creating Width Spacing Pattern Regions

You create width spacing pattern regions for areas where you want to use a grid that is different from the global grid. Single-layer and multiple-layer regions can be created and are represented by an `oaFigGroup`.

To create a width spacing pattern region:

1. Click the *Create Region* icon on the toolbar in the *Track Pattern* assistant. Press `F3` to open the form.

The *Create Region* form appears.



1. Choose one of the following in the *Related Snap Patterns* list:

   - Asterisk (*)

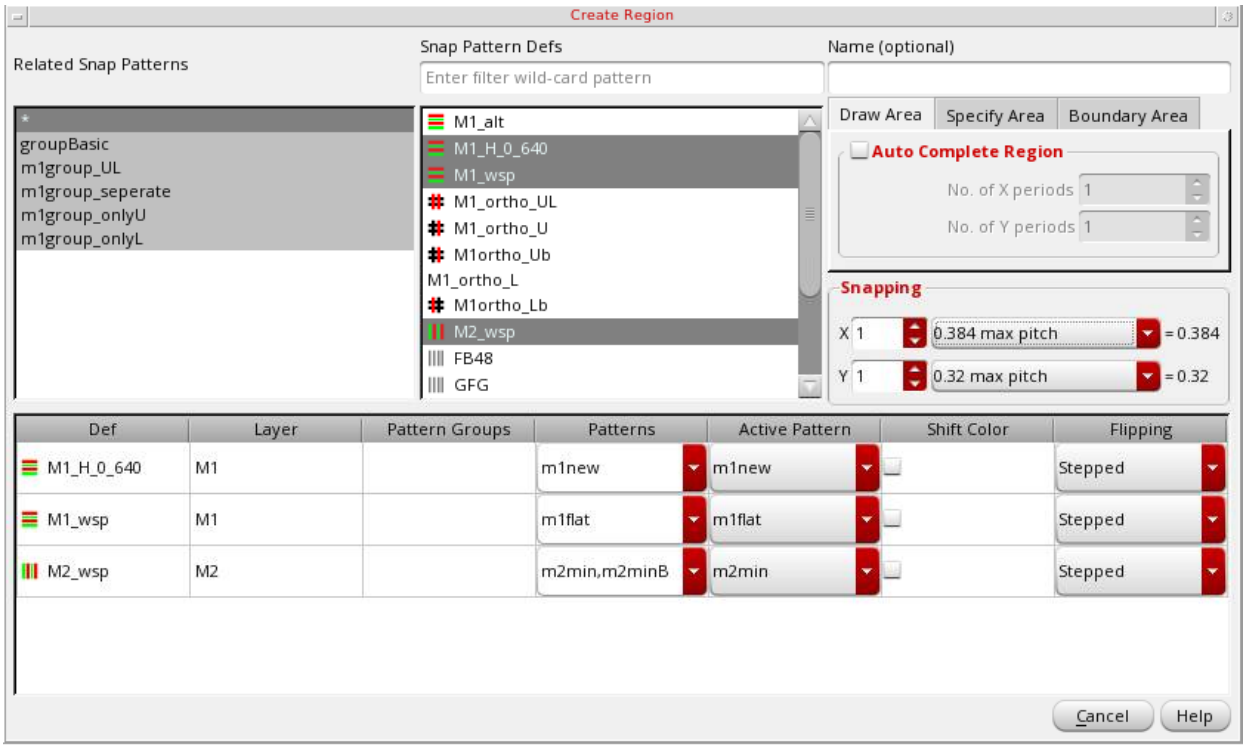
     Shows all the defined WSSPDefs in the *Snap Pattern Defs* list.

   - A related snap pattern group name

Shows only the WSSPDefs for the selected related snap pattern group in the *Snap Pattern Defs* list.

- Row template:

  The row templates are stored so that you can select a related snap pattern with row templates instead of individual elements.



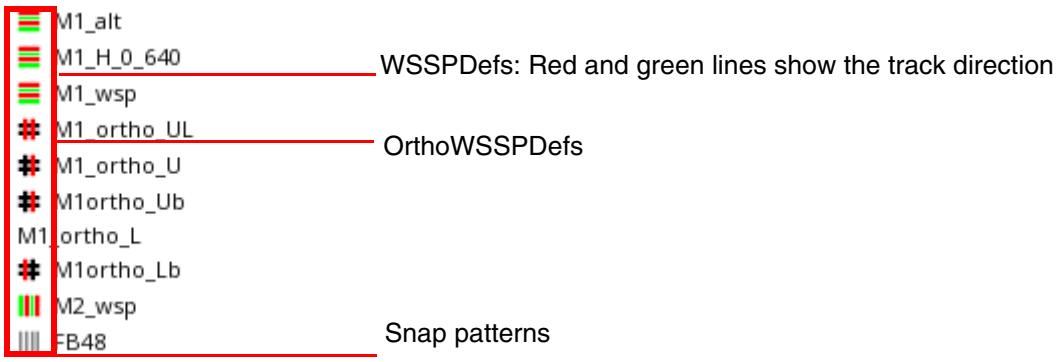
1. Choose one or more WSSPDefs in the *Snap Pattern Defs* list.

   A row appears in the table at the bottom of the form for each selected WSSPDef, showing the following:

   - *Def* name

     The different element types have icons Along with the addition of row templates, in order to tell the difference between different element types, icons have been added next to the names as well. OrthoWSSPDefs have the black hashtag with red line showing which position – old style ortho WSSPDefs have no icon like M1_ortho_L.

Snap patterns get black lines, and WSSPDefs get red&green lines which show the track direction.



- *Layer*

  Display the layer name of the patterns (WSP).

- *Pattern Group*

  Choose the pattern groups (WSPG) to allow for the region from the drop-down list of defined pattern groups for the WSSPDef.

- *Patterns*

  Choose the patterns (WSP) to allow for the region from the drop-down list of defined patterns for the WSSPDef.

- *Active Pattern*

  Choose the active pattern from the drop-down list.

- *Shift Color*

  Choose whether colors should be shifted for the pattern.

- *Flipping*

  Choose the repeat mode for the region as one of the following: *Stepped*, *Flipped Odd*, or *Flipped Even*. *Unset* restores this value to the global grid default.

  - *Stepped*: The pattern is the same in every period.
  - *Flipped Odd*: The pattern is flipped in every other period. The first period is not flipped.
  - *Flipped Even*: The pattern is flipped in every other period. The first period is flipped.

Note: The available choices are dependent on the allowed repeat mode setting for the pattern.

Note: You can use the text box to filter the *Snap Pattern Defs* by name. When you apply the name filter for WSSPDefs, the selections that you make are retained in the Snap Pattern Defs list. Also, the selections are reflected in the region table.

2. (Optional) Enter a *Name*.

When selected in the canvas, this region name will appear in *Track Pattern* assistant at the bottom-left of the form. If not specified, the region will be assigned a name in the following format: `FG_`*x* where *x* is an integer.

3. You can choose from one of the following WSP creation options:

- *Draw Area:* You can draw an area by specifying the options on this tab.

  You can select the *Auto Complete Region* check box to enable the *No. of X periods* and *No. of Y periods* fields.

  Snapping: You can derive the WSP region snapping values by specifying the options in this section. This section can be used to specify or select:

  - A Multiplier: You can specify a multiplier for *X* and *Y* fields. The multiplier can be an integer, float, or fraction.
  - Snapping Options: You can select the region snapping values from the following list of options:

    max pitch: The pitch with the largest value of the selected WSSPDefs in horizontal or vertical direction.

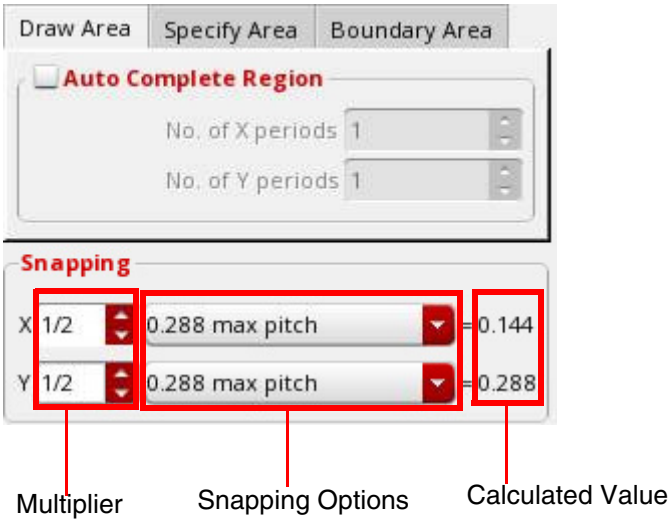
    manufacturing grid: The value specified in the manufacturing grid.

    user units: One user unit. For the RSP that you select in the Create Region form, if the `regionSnapPitchVertical` and `regionSnapPitchHorizontal` values are specified in the `relatedSnapPatterns` in the technology database, these values are used as the user unit values for snapping the RSP.

    window snap: This is the value specified in the *X Snap Spacing* and *Y Snap Spacing* values in the Display Options form.

    predefined value: A value predefined for a WSP.

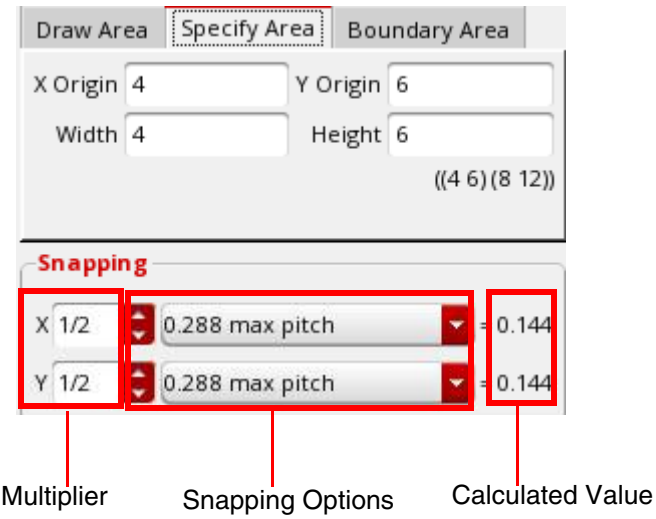
- X/Y Calculated Values: The X and Y snapping values calculated based on options specified above are displayed after the equal to sign in the *Snapping* section.



- *Specify Area:* You can specify the area of the width spacing pattern region by specifying the options on this tab.

  You can specify the *X Origin*, *Y Origin*, *Width*, and *Height* for the width spacing pattern region.

  Snapping: The options in the snapping section are the same as those available in the *Draw Area* tab. These are explained in the *Draw Area* section above.

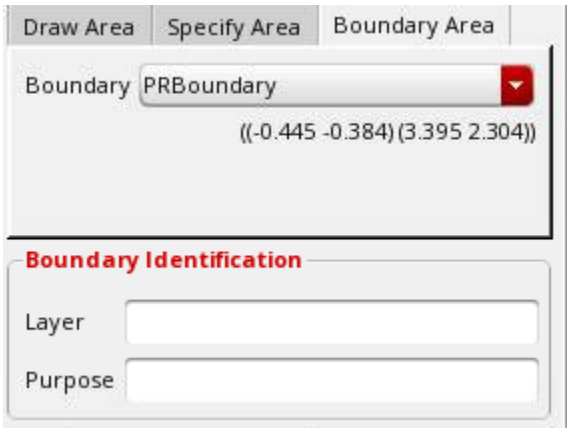


- *Boundary Area:* You can specify the boundary area, PR boundary, or area boundary of the width spacing pattern region by specifying the options on this tab.

  You can select the boundary, PR boundary or area boundary, from the *Boundary* drop-down list box.

  You can also specify the boundary identification details in the *Layer Pattern* and *Purpose* fields. You can use the wildcard characters `*` or `?` for matching the layer name. The default value for the *Purpose* field is `id`. You can also specify a string that represents a purpose in the this field.

  When you specify the layer and purpose, all shapes on matching LPPs are added to the *Boundary* drop-down list box.



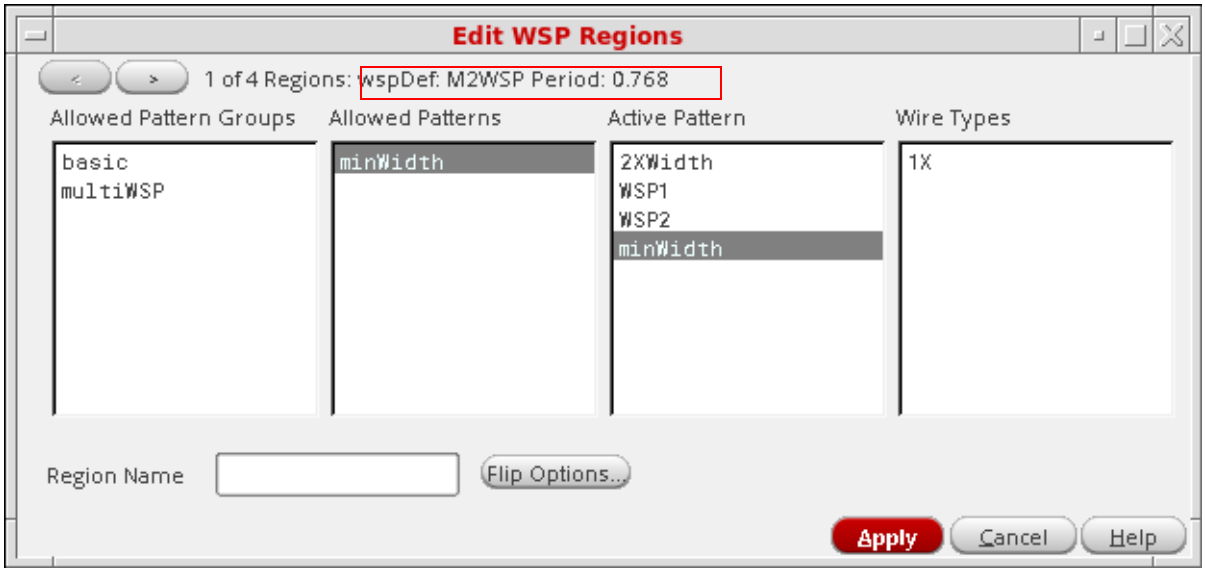
Editing Width Spacing Pattern Regions

You can change the attributes associated with WSP regions such as the region name, allowed patterns and pattern groups, the active pattern, wire types, and repeat mode.

To edit WSP regions:

1. Select one or more regions in the canvas.
2. Click the *Edit Region* icon on the toolbar in the *Track Pattern* assistant.

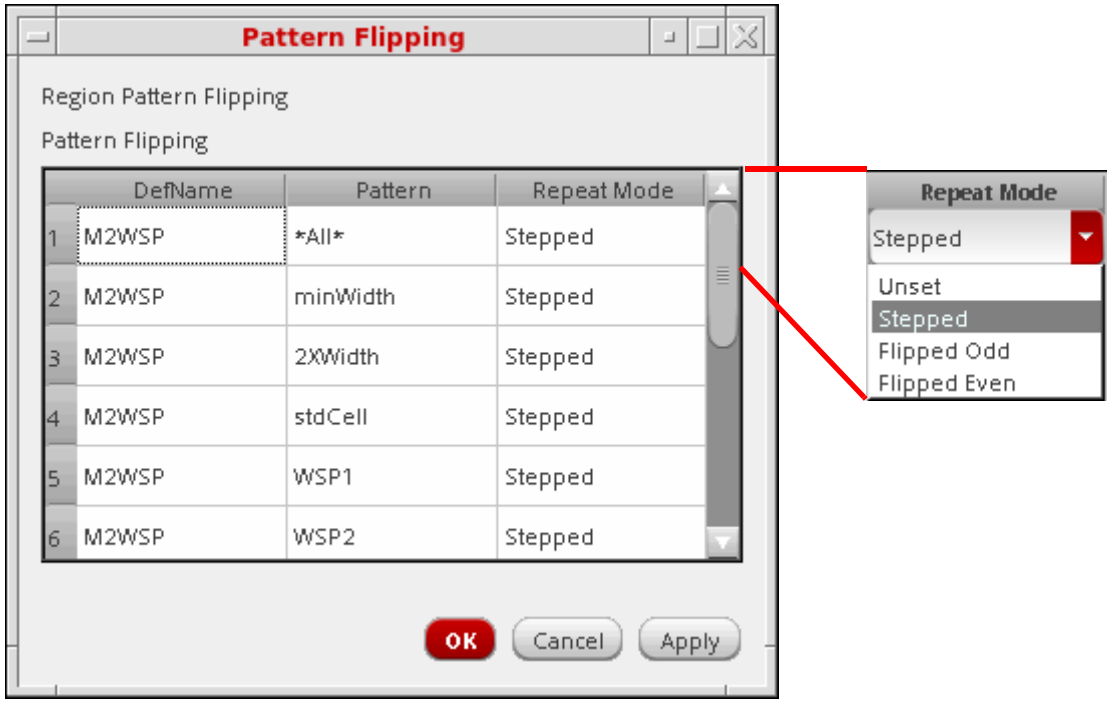
The Edit WSP Regions form appears.



The current region index and number of regions are shown at the top of the form with the WSSPDef and period for the current region. Each region group will be represented by a region for each of its layers. For example, a region group comprising three layers will be represented by three regions, one for each of the three layers.

3. Use the left and right arrows at the upper-left corner of the form to scroll between the regions.
4. Choose the *Allowed Pattern Groups*, *Allowed Patterns*, the *Active Pattern*, and *Wire Types* in the respective lists for the region.
5. Click *Flip Options* to view or change the repeat mode for a pattern in the region.

The Pattern Flipping form appears.



The default repeat mode for a WSSPDef in the region is the first table entry for the WSSPDef with *Pattern *All**. All patterns in the WSSPDef will have the same repeat mode unless you change individual settings in the *Repeat Mode* column.

Choose the default repeat mode or individual pattern repeat modes for the region as one of the following: *Stepped*, *Flipped Odd*, or *Flipped Even* from the respective row in the *Repeat Mode* column. *Unset* restores the value to the global grid repeat mode for a WSSPDef, or to the default for the WSSPDef if you are unsetting an individual pattern.

- *Stepped*: The pattern is the same in every period.
- *Flipped Odd*: The pattern is flipped in every other period. The first period is not flipped.
- *Flipped Even*: The pattern is flipped in every other period. The first period is flipped.

Note: The available choices are dependent on the allowed repeat mode setting for the pattern.

6. Click *OK* or *Apply* to set the changes.

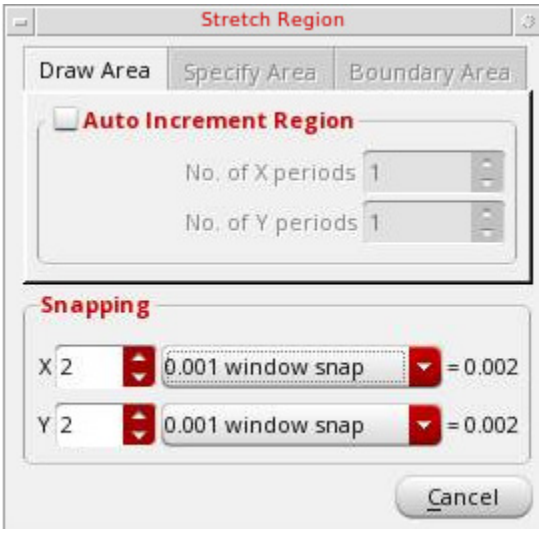
Stretching Width Spacing Pattern Regions

You can stretch a width spacing pattern region. The region is stretched based on the *Number of X periods*/*Number of Y periods* or a combination of *X Step*/*Y Step* and *Multiplier*.

To stretch a width spacing pattern region:

1. Click the *Stretch Region* icon on the toolbar in the *Track Pattern* assistant. Press `F3` to open the form.

The Stretch Region form appears.



2. Select the *Auto Increment Region* check box to enable the *No. of X periods* and *No. of Y periods* fields. The width spacing pattern region will be stretched based in these values.
3. Specify the multipliers in the *Snapping* section. You can specify a multiplier for *X* and *Y* fields. The multiplier can be an integer, float, or fraction. You can select the region snapping values from the drop-down list. The X and Y snapping values calculated based on options specified above are displayed after the equal to sign in the *Snapping* section.

The width spacing pattern region is stretched based on the values specified on the *Stretch Region* form.

Note: The row region which is at the same location as the width spacing pattern region is also stretched when the *Stretch Region* command is selected.

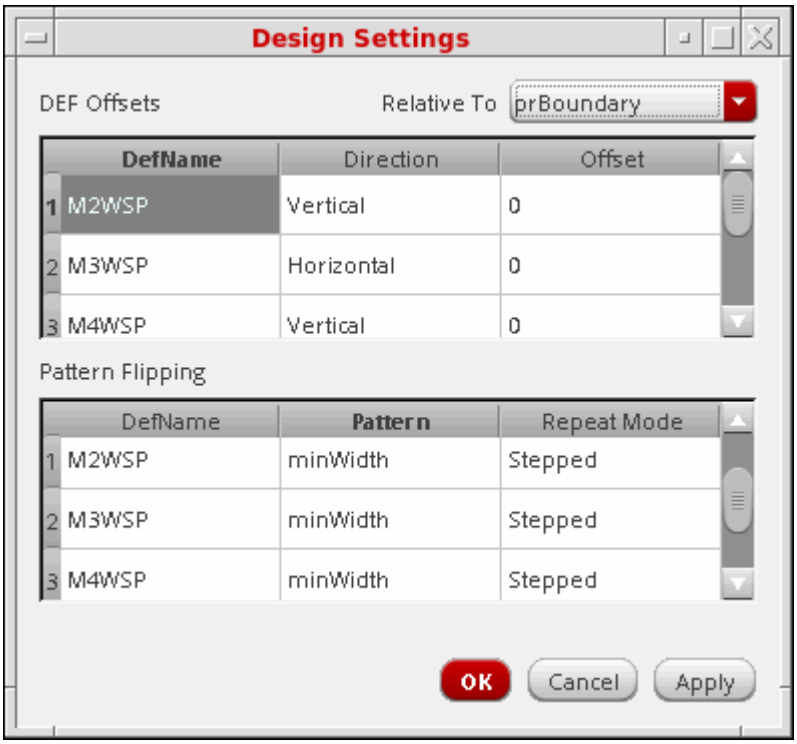
So the present CCR is for the Stretch Region command to enable resizing the row region at the same time as the pattern region.

Choosing the Global Grid Settings

To specify the repeat mode, DEF offsets, and the offset reference for the WSSPDefs in the design:

1. Click the *Design* icon on the toolbar in the *Track Pattern* assistant.

The Design Settings form appears.



2. Choose whether the *DEF Offsets* are *Relative To prBoundary* or *Origin* from the drop-down menu.
3. For each WSSPDef in the *DEF Offsets* table, enter the offset in the *Offset* column.
4. For each *Pattern* in the *Pattern Flipping* table, choose the *Repeat Mode* for the global grid as one of the following: *Stepped*, *Flipped Odd*, or *Flipped Even*. *Unset* restores this value to the global grid default.
   - *Stepped*: The pattern is the same in every period.
   - *Flipped Odd*: The pattern is flipped in every other period. The first period is not flipped.

- *Flipped Even*: The pattern is flipped in every other period. The first period is flipped.

Note: The available choices are dependent on the allowed repeat mode setting for the pattern.

5. Click *OK* or *Apply* to set the values.

Pulling Up Patterns from a Subcell

To pull up the WSSPDefs for a single subcell or all instances of an instance master:

1. Select an instance that has WSSPDefs in the layout.
2. Click *Pull Up One* (for only this instance), *Pull Up All* (for all the instances of an instance master), *Pull Up WSPs For Layers* (for all instances of a layer) icons on the toolbar in the *Track Pattern* assistant. When you select *Pull Up WSPs For Layers*, you can select the layers to be used to pull up the WSPs.

- All the WSPs and WSSPDefs that are defined in the instance master are copied to the level 0 design, if they are not already present in the level 0 design.
- All pattern regions and their attributes are copied from level 1 to level 0.
- A pattern region is created for every active SPDef in the instance master using the PR boundary, if it is set, or the bounding box of the instance master, if the PR boundary is not set. The regions will be named *def_cell_inst,* where *def* is the SPDef name, *cell* is the cell name, and *inst* is the instance name.
- A figGroup is created with all instance boundary pattern regions as members. The figGroup for the global WSPs is named `wspRegion_cell_inst` and local pattern regions, if they exist, are named *figGrp_cell_inst*, where *figGrp* is the local region name, *cell* is the cell name, and *inst* is the instance name.

You can select and view the newly created figGroups using the Navigator assistant.

Pushing down WSSPDefs in EIP

You can use the *EIP Auto Pushdown Options* icon on the toolbar in the *Track Pattern* assistant to have pins in a subcell snap to the top-level WSP tracks.

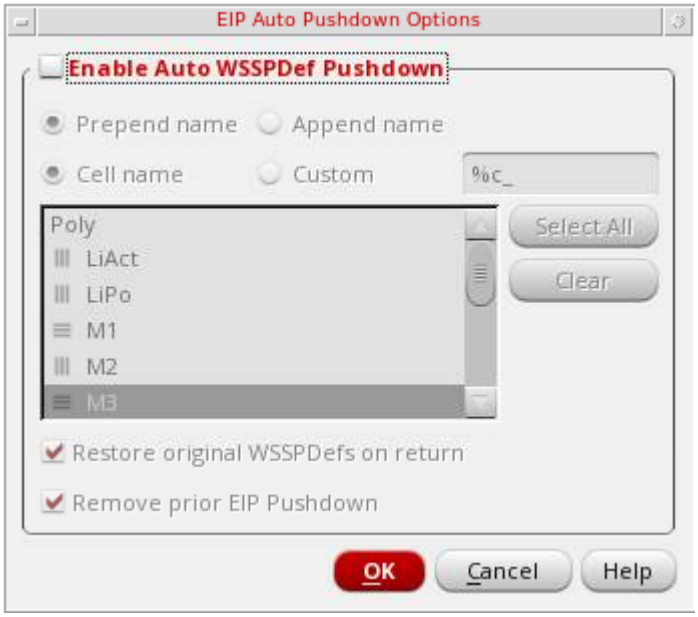
This option lets you copy WSPs from the parent cell into the subcell when entering Edit-in-place. You could use this to adjust pin locations in subcells to match the top level cell's WSP locations. However, all standard WSP-based functionality is still applicable, such as there is no limitation to perform edits to pins. This means that pathSegs and wires also snap to the pushed down WSPs.

If the *Enable Auto WSSPDef Pushdown* option is enabled on the EIP Auto Pushdown Options form, the WSPs are pulled down on the desired layers in the subcell. The subcell is renamed based on the top-level cell name to reflect the origin of the WSPs.

To push down WSSPDefs snap to the top-level WSP tracks:

1. Select an instance that has WSSPDefs in the layout.
2. Click the *EIP Auto Pushdown Options* icon on the toolbar in the *Track Pattern* assistant.

The EIP Auto Pushdown Options form opens.



3. Select the *Enable Auto WSSPDef Pushdown* check box.
4. Select prepend name, append name, cell name or custom to add the parent cellview name appropriately to the WSSPDef name that is pulled down.
5. Select the pushdown layer from the list box.
6. Select the *Restore original WSSPDefs on return* check box to turn to top and revert the subcell to the same active WSPs present prior to the EIP pushdown.
7. Select the *Remove prior EIP Pushdown* check box to remove the WSPs that have been created in prior EIP pushdowns.

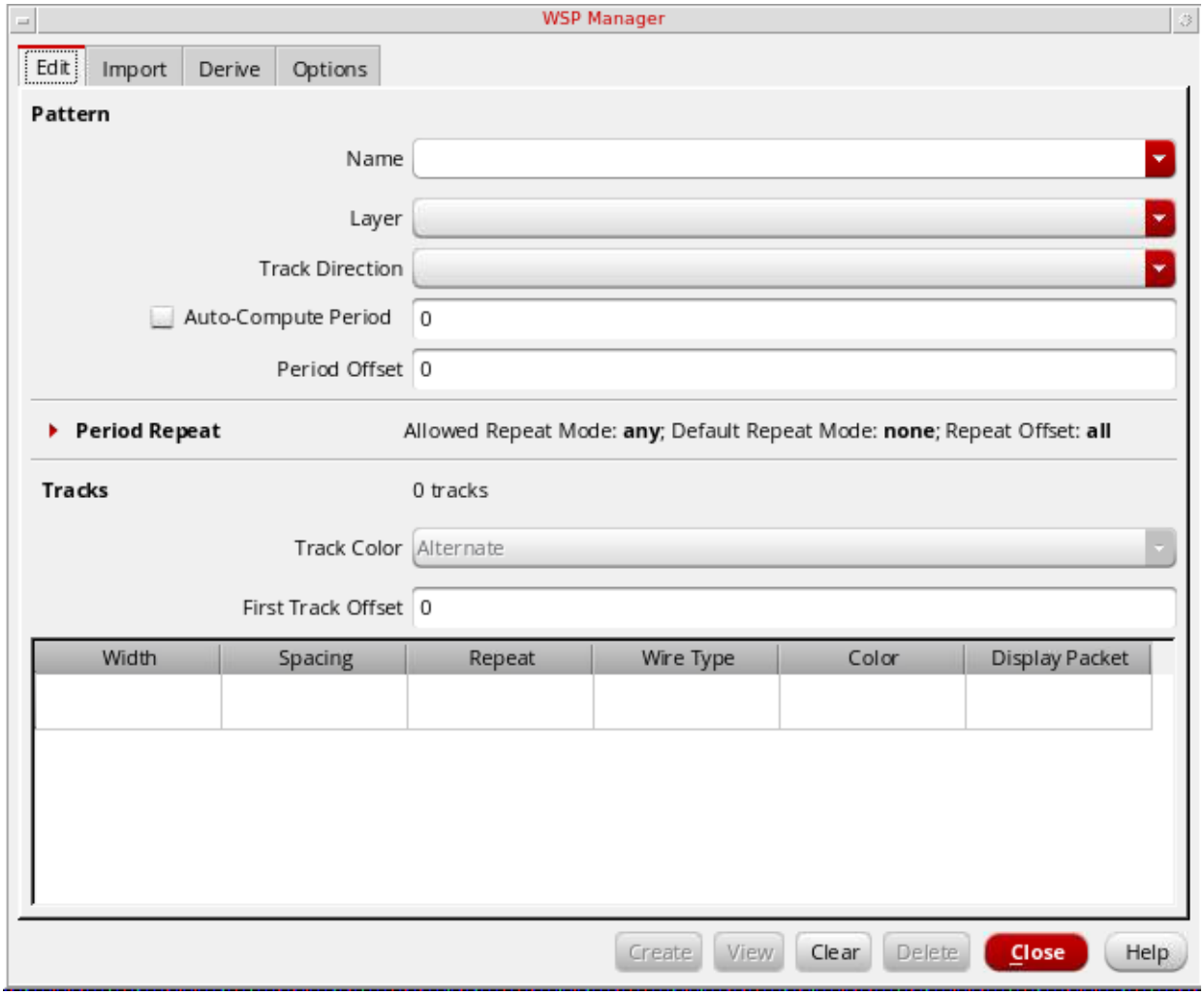
Launching the WSP Manager

You can launch the WSP Manager from the *Track Pattern* assistant.

Note: You should set the tpaShowWSPBtn environment variable to `nil` to remove the *WSP Manager* icon from the *Track Pattern* assistant toolbar.

To launch the WSP Manager, click the *WSP Manager* icon on the toolbar in the *Track Pattern* assistant.

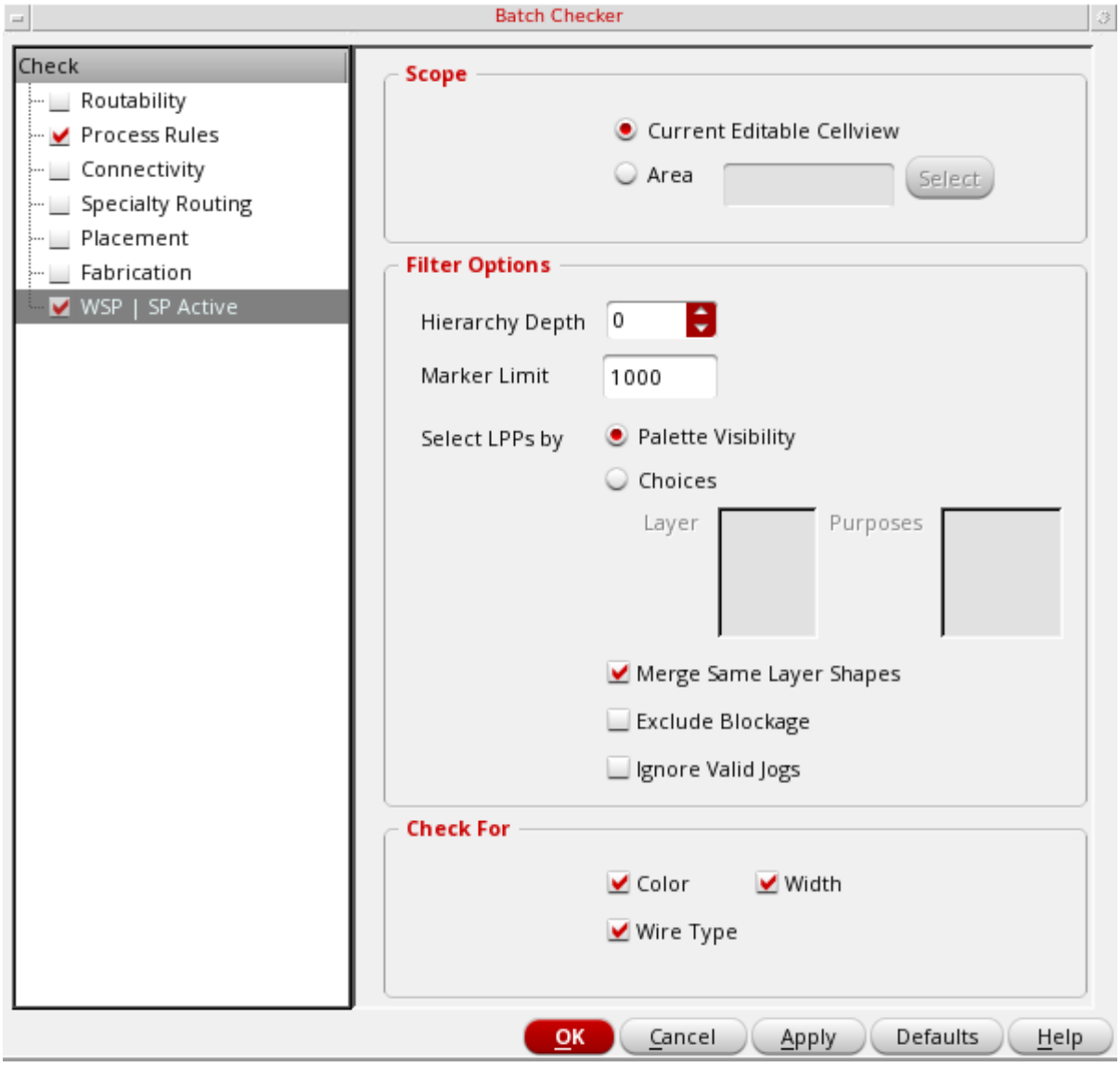
The *WSP Manager* form appears.



Launching the WSP Active Checker

You can launch *WSP Active Checker* from the *Track Pattern* assistant. To launch it, click the *WSP Active Checker* icon on the toolbar in the *Track Pattern* assistant.

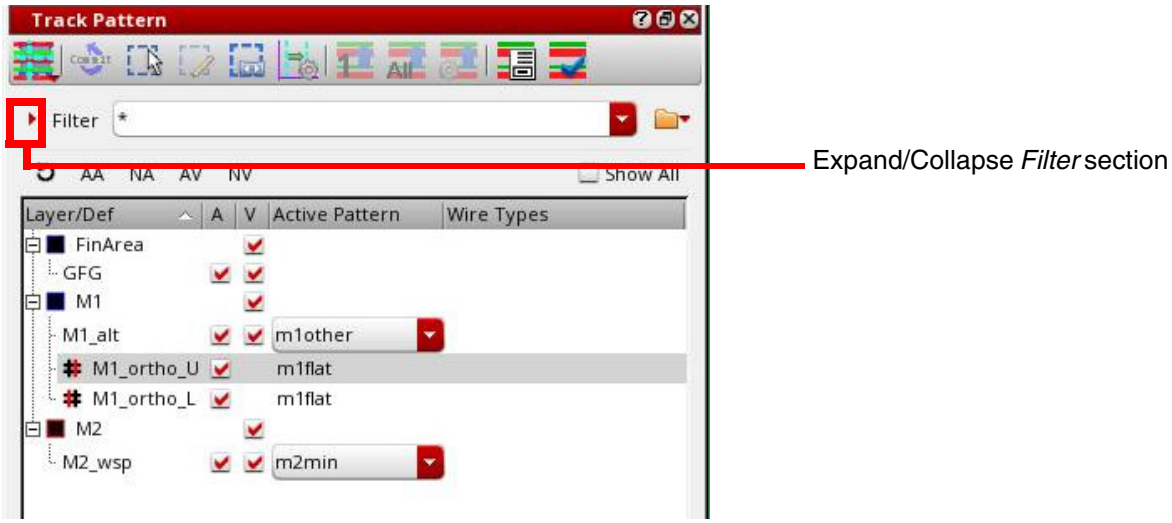
The *Batch Checker* form appears.

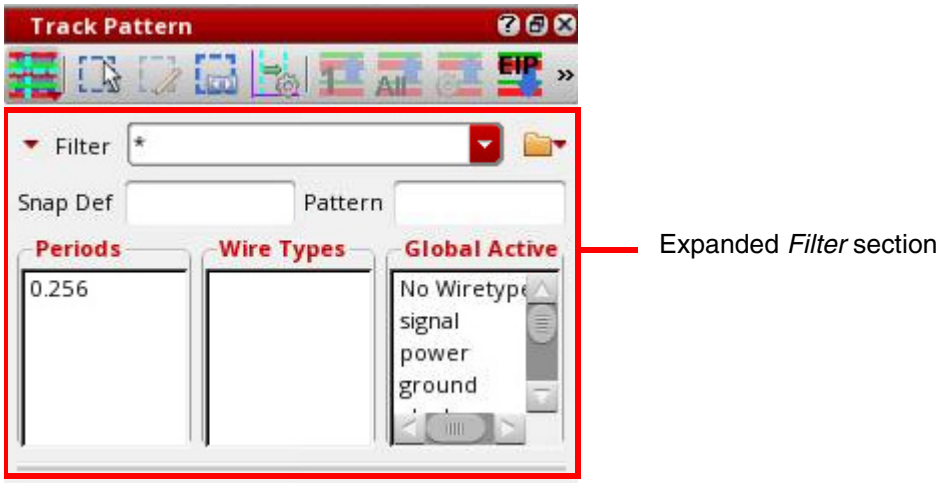


Customizing the Track Pattern Assistant

You can customize the *Track Pattern* assistant in the following ways:

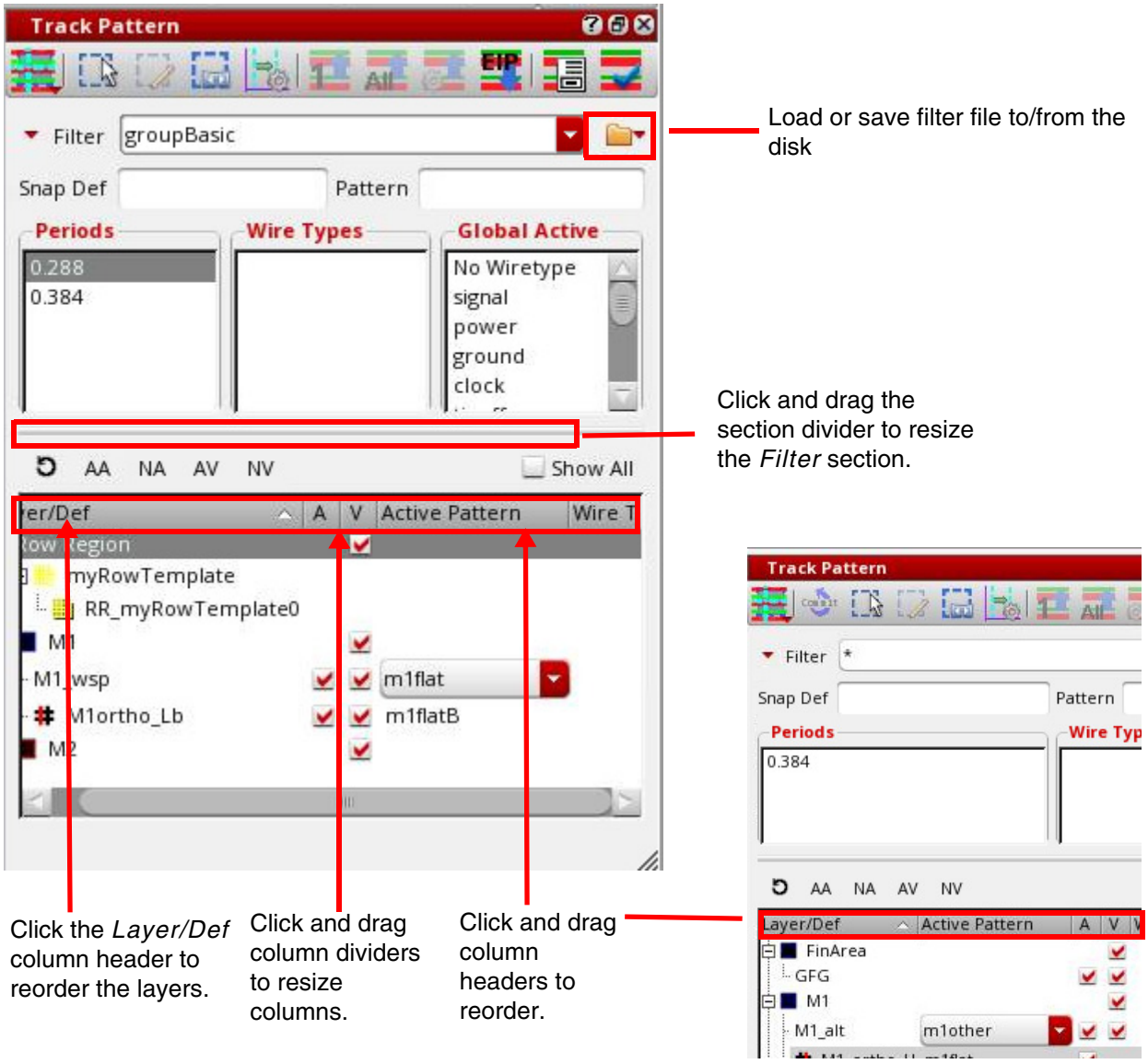
- You can control the visibility of the *Filter* section by expanding or collapsing it using the icon, .
- You can also click and drag the horizontal section divider to control the amount of information shown in the *Filter* section.





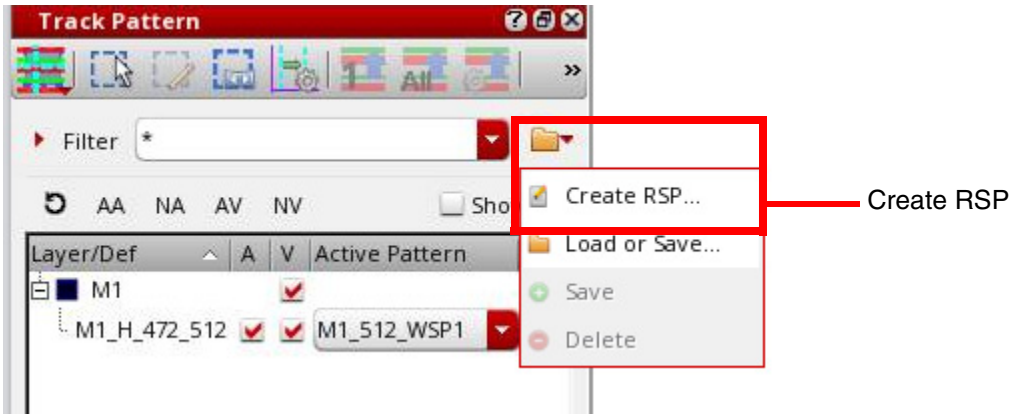
- Click and drag table column headers to the left or right to reorder columns.
- Click table column dividers to resize the columns.

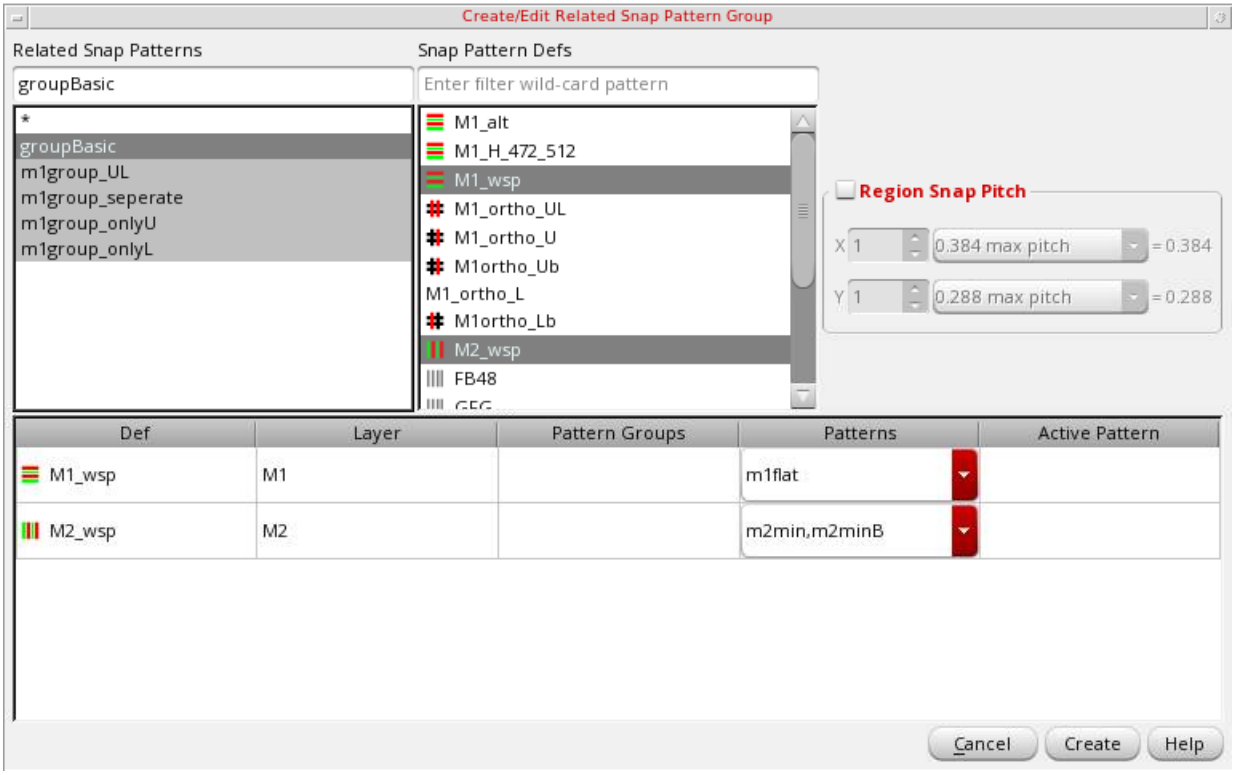
- Click the *Layer/Def* column to reorder the layers in an ascending or descending order.



Creating and Editing Related Snap Pattern Group

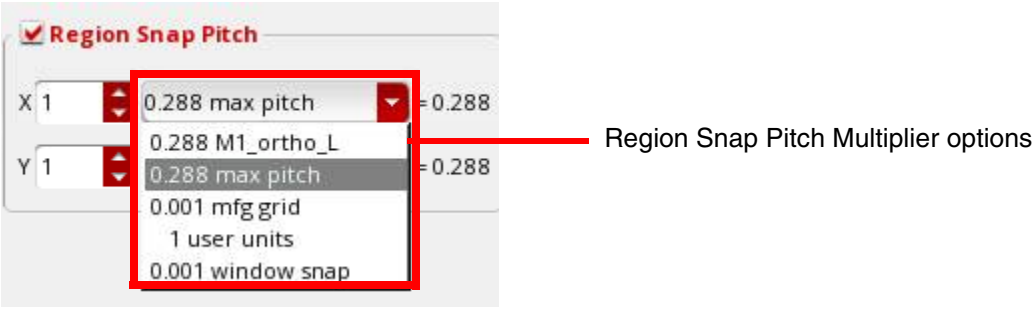
You can create or edit related snap patterns using the *Create RSP* option.





You can create or edit related snap patterns in the Create/Edit Related Snap Pattern Group form. You can select the snap pattern defs for a related snap pattern.

You can select the *Region Snap Pitch* check box to specify the *X* and *Y* attributes for the pitch.



Using SKILL Functions for Width Spacing Patterns

You can use SKILL functions to create, find, and access `widthSpacingPattern`, `widthSpacingPatternGroup`, and `relatedSnapPatterns` objects in both the design and technology databases. In addition, these functions are used to create, find, and access `widthSpacingSnapPatternDefs` in the technology database.

WSP functions also have the ability to access the attributes of a given object, find an object of a specific type using the object name, and get a list of all the objects of a specific type in both the technology and design databases.

For the SKILL functions associated with the Virtuoso Layout Suite L *Track Pattern* assistant, see Track Pattern Assistant Functions in *Virtuoso Layout Suite SKILL Reference*.

Technology Database SKILL Functions

- Width Spacing Pattern SKILL Functions
- Width Spacing Snap Pattern Def SKILL Functions
- Width Spacing Pattern Groups SKILL Functions
- Related Snap Patterns SKILL Functions

For more information, refer to *Virtuoso Technology Data SKILL Reference*.

Design Database SKILL Functions

- Width Spacing Pattern Functions
- Width Spacing Pattern Group Functions
- Width Spacing Snap Pattern Def Functions
- Related Snap Pattern Functions
- Pattern Region Functions

For more information, refer to *Virtuoso Design Environment SKILL Reference*.

Width Spacing Pattern Support in Virtuoso Tools

Once you have created tracks in the layout using WSPs, you can do the following:

- Snap wires to tracks, as described in Width Spacing Pattern Support in Wire Editing.
- Snap objects to tracks during layout editing, as described in Width Spacing Patterns Support in Layout Editing.
- Check shapes in the layout for WSP conformance using the Batch Checker, as described in WSP Active Checking, or using the `wspCheckActive` SKILL function.

  Note: You can use the environment variable, `WSP_ACTIVECHECK_WIRETYPESALLOWED_ON_NOWIRETYPETRACK`, to allow the shapes on the specified wire type, `wireTypeName`, to be created on WSP tracks with no wire type. This ensures that no violations are reported in WSP checker. Use the following command:

  ```
  setenv WSP_ACTIVECHECK_WIRETYPESALLOWED_ON_NOWIRETYPETRACK
  "wireTypeName"
  ```

- Use the Annotation Browser to view and manage the WSP Active check violation markers that are created by the Batch Checker or running the `wspCheckActive` SKILL function, as described in Finding Violations.
- Translate your design to Stream format, as described Design Translation Using XStream Translator. If you use WSP regions, your layer mapping file must have a `WSPRegionType` qualifier set, as described in Layer Mapping Support for Region Shapes.

A

WSP Forms Reference

This appendix describes the Virtuoso Width Spacing Patterns forms:

- WSP Manager
  - Edit Tab
  - Import tab
  - Derive tab
  - Options tab

Note: Many of the options described in this section have a corresponding environment variable noted next to the description. For more information, see WSP Environment Variables.

WSP Manager

Use **WSP Manager** to create and modify width spacing patterns in the current design, copy width spacing patterns from another design, and generate width spacing patterns from existing layout shapes.

WSP Manager tabs are described in the following sections:

- Edit Tab
- Import tab
- Derive tab
- Options tab

For details on using the WSP Manager GUI, see Using the WSP Manager.

Edit Tab

Create and modify width spacing patterns in the current design.

Pattern

Name specifies the width spacing pattern name. If the pattern is defined in a technology library that is attached to the design, the technology library name is shown in parentheses. Patterns with an asterisk (*) are used in multiple layers or multiple WSSPDefs. By default, no name is specified.

WSP Def Name lets you modify the WSSPDef name. The new name is used to create the WSSPDef.

Note: This field is displayed only if the *Enable def name editing* option is selected in the *Options* tab. Using this field, you cannot modify names of existing WSSPDefs.

Layer specifies the layer for the width spacing pattern tracks. Choose a layer from the drop-down list box. By default, no layer is specified.

Track Direction specifies the direction for the width spacing pattern tracks. This is usually the same as the routing layer direction. Choices are *Horizontal* or *Vertical*. By default, the track direction is not specified.

Auto-Compute computes the period based on the track setup and shows the value in the *Period* field.
Environment variable: autoComputePeriod

Period specifies the width spacing snap pattern period definition when *Auto-Compute* is not selected. When *Auto-Compute* is selected, the computed period based on the track setup is shown. You can specify only positive values in this field.
Environment variable: period

Period Offset specifies the global pattern offset (the distance from the start of the pattern to the PR boundary, if it exists, or to the origin in the axis specified by the *Track Direction*). You can specify only positive values in this field.
Environment variable: periodOffset

Period Repeat

Allowed Repeat Mode specifies the allowed repeat modes for the width spacing pattern. Choices are *Any*, *None*, *Stepped Only*, or *Flipped Only*.
Environment variable: patternRepeat

Default Repeat Mode specifies the default repeat mode for the width spacing pattern. Choices are *None*, *Stepped*, *Flipped Starts With Odd*, or *Flipped Starts With Even*. The default value is *Stepped*.

Repeat Offset specifies how the *First Track Offset* is to be applied. Choices are *First Period Only* or *All Periods*.
Environment variable: repeatOffset

Tracks

Track Color specifies how colors are assigned to tracks. Choices are *Alternate*, *As Specified*, and *As Specified with Period Shift*.
Environment variable: trackColor

First Track Offset specifies the offset to the first track from the beginning of the pattern period.
Environment variable: firstTrackOffset

Tracks is a table that defines the tracks for the pattern in rows, with the first track as row 0. The table columns can be shown or hidden.
Environment variable: trackColumns

Width is the track width in user units.

Spacing is the spacing between tracks, in user units.

Repeat is the number of times to repeat the track.

Wire Type specifies the wire type for the track as a user-defined type, or a wire type or signal type that is predefined in the technology library.

Color specifies the mask color for the track.

Display Packet specifies the display packet name for the WSP track.

Create adds the width spacing pattern to the design database.

View lets you preview the pattern without saving it to the design database.

Clear resets the *Edit* fields to their environment variable value, if available, or their default value. The *Tracks* table is cleared.

Delete removes the width spacing pattern from the design database.

Import tab

Copy width spacing patterns from another design.

Library, **Cell**, and **View** specify the cellview to be imported.
Environment variables: importLibName, importCellName, importViewName

Import as global specifies the imported WSP and its associated definition is global. This makes the width spacing patterns visible globally.
Environment variables: importAsGlobal

WSPs shows the design width spacing patterns by layer for the specified cellview. Width spacing patterns in the technology library are not shown.

Import as global, if selected, imports the WSPs as global WSPs.

Tracks shows the details of the tracks for the pattern selected in the *WSPs* section.

Width is the track width in user units.

Spacing is the spacing between tracks, in user units.

Repeat is the number of times to repeat the track.

Wire Type sets the wire type for the track as a user-defined type, or a wire or signal type that is defined in the technology library.

Color sets the mask color for the track.

Display Packet specifies the display packet name for the WSP track.

Import Selected imports the width spacing patterns that are selected in the *WSPs* section to the current design.

View lets you preview the selected pattern without saving it to the design database.

Derive tab

Generate width spacing patterns from existing layout shapes in the search box *Region*.

Region

Origin X is the x-coordinate of the origin for the search box.

Origin Y is the y-coordinate of the origin for the search box.

Width is the width of the search box in the x-axis direction.

Height is the height of the search box in the y-axis direction.

Draw lets you click in the canvas to set the vertices of the search box. This automatically sets the *Origin X*, *Origin Y*, *Width*, and *Height* fields.

Update draws the search box in the canvas based on the *Origin X*, *Origin Y*, *Width*, and *Height* settings, and updates the width spacing patterns in the *WSPs* list.

Enable Smart Snapping identifies objects close to the mouse pointer and snaps to them when drawing the search box.
Environment variable: smartSnap

Shift Color shifts track colors when a pattern is repeated.
Environment variable: shiftColor

Include Blockages adds tracks for blockage shapes.
Environment variable: includeBlockages

WSPs

Lists the width spacing patterns generated from the shapes in the search box, by layer.

Tracks shows the details of the tracks for the pattern selected in the *WSPs* section *when only one pattern is selected*.

Width is the track width in user units.

Spacing is the spacing between tracks in user units.

Repeat is the number of times to repeat the track.

Wire Type specifies the wire type for the track as a user-defined type or a wire type or signal type that is predefined in the technology library.

Color specifies the mask color for the track.

Display Packet specifies the display packet name for the WSP track.

Derive Selected derives the selected width spacing patterns to the current design and displays the tracks in the canvas.

View lets you preview the selected pattern without saving it to the design database.

Clear removes the search box, clears the *Region*, *WSPs*, and *Tracks* fields in the *Derive* tab.

Options tab

Specify the options to be used when creating, modifying, copying, or generating width spacing patterns.

General

Spacing Mode specifies how the spacing between tracks is measured. The choices are *Edge to Edge* and *Center to Center*.
Environment variable: spacingMode

Note: When you change the *Spacing Mode* in the *Options* tab, the spacing mode for all the tabs in the WSP Manager changes.

Auto clear name on layer change, if selected, automatically clears the name in the *Layer* field on the *Edit* tab when you change the layer name. This ensures that an existing WSP is not overwritten by mistake.
Environment variable: autoClearOnLayerChange

Editing Mode specifies the editing mode for tracks. The choices are *Use Pattern Viewer (Period and Track table read-only)* and *Use WSP Manager (Pattern Viewer read-only)*.

Enable new def as global, if selected, makes the new WSSPDef as a global WSSPDef and is set globally active if there are no pre-existing globally active definitions on the same layer.
Environment variable: activateNewPatterns

Enable def name editing, if selected, displays the *WSP Def Name* field on the *Edit* tab that lets you modify the WSSPDef name. The new name is used to create the WSSPDef.
Environment variable: defNameEditing

Note: You cannot modify names of existing WSSPDefs.

Initialize from layout

Use canvas visibility, if selected, uses the visibility options specified in the Palette Assistant and *Display Levels*: *Stop* in the Display Options form. If not selected, uses all the objects across hierarchies and all the layer-purpose pairs to generate the WSP.
Environment variable: usePaletteVisibility

Ignore blockages lets you include or exclude blockages when creating tracks.
Environment variable: ignoreBlockagesForInit

Ignore top level pins lets you include or exclude pins at the top level when creating tracks.
Environment variable: ignoreL0Pins

Verbose mode, if selected, displays debug messages in the CIW.
Environment variable: verbose

Use aspect ratio of shapes, if selected, ignores the shapes that are not drawn along the right direction.
Environment variable: useAspectRatio

B

WSP Environment Variables

This appendix describes the `layout` and `layout.wspMgr` environment variables associated with Width Spacing Patterns (WSPs). For information about Virtuoso® Layout Suite L environment variables, and how to get and set the values for the environment variables, refer to the Environment Variables appendix in the *Virtuoso Layout Suite L User Guide*.

Note: Only the environment variables documented in this chapter are supported for public use. All other WSP-related environment variables, regardless of their name or prefix, and undocumented aspects of the environment variables described below, are private and are subject to change at any time.

Related Topics

- List of General WSP Environment Variables
  - tpaShowWSPBtn
  - wspTemplateCell
  - wspTemplateFile
- List of WSP Manager Environment Variables
  - Edit tab
    - autoComputePeriod
    - firstTrackOffset
    - patternRepeat
    - period
    - periodOffset
    - repeatOffset
    - trackColor

List of General WSP Environment Variables

These `layout` environment variables are used to initialize the WSP information in a design:

- wspTemplateCell
- wspTemplateFile

tpaShowWSPBtn

```
layout tpaShowWSPBtn 'boolean { t | nil }
```

Description

Displays the *WSP Manager* button in the Track Patter Assistant. The WSP selected in the Tracks Pattern table is selected in the *WSP Manager*.

GUI Equivalent

Command	*Assistant – Track Pattern*
Field	*WSP Manager*

Examples

```
envGetVal("layout" "tpaShowWSPBtn")
envSetVal("layout" "tpaShowWSPBtn" 'boolean t)
```

Related Topics

List of WSP Manager Environment Variables

Environment Variables

wspTemplateCell

```
layout wspTemplateCell 'string "any_template_name"
```

Description

Determines the name of the template cellview from which to copy the WSP information when a new design or an existing design is opened, unless the WSP information already exists. The objects copied are: WSPs, WSP Groups, related snap patterns, and WSSPDefs. Region shapes are not copied. Valid values for the template cellview name are in the format: *cell* or *cell/view* in the same library, or *lib/cell/view*. The default view is `layout`. The default value is `""`.

GUI Equivalent

None

Examples

```
envGetVal("layout" "wspTemplateCell")
envSetVal("layout" "wspTemplateCell" 'string "myWSP")
```

Related Topics

List of General WSP Environment Variables

Environment Variables

wspTemplateFile

```
layout wspTemplateFile 'string "any_file_name"
```

Description

Determines the name of the SKILL file that will be loaded when a design is opened or a new cellview is created. The SKILL file is not loaded if there is existing WSP data in the cellview. The standard search mechanism is used (current directory, home directory, project directory, and so on). The default name is `".wspinit"`. For more information on WSP SKILL functions, refer to Using SKILL Functions for Width Spacing Patterns.

GUI Equivalent

None

Examples

```
envGetVal("layout" "wspTemplateFile")
envSetVal("layout" "wspTemplateFile" 'string "myWSPinit")
```

Related Topics

List of General WSP Environment Variables

Environment Variables

List of WSP Manager Environment Variables

These `layout.wspMgr` environment variables are used to initialize the WSP Manager settings for a session. For more information on WSP Manager, see Using the WSP Manager.

- Edit tab
  - autoComputePeriod
  - firstTrackOffset
  - patternRepeat
  - period
  - periodOffset
  - repeatOffset
  - spacingMode
  - trackColor
  - trackColumns
- Import tab
  - importCellName
  - importLibName
  - importViewName
  - importAsGlobal
- Derive tab
  - includeBlockages
  - shiftColor
  - smartSnap
- Options tab
  - spacingMode
  - autoClearOnLayerChange
  - activateNewPatterns
  - defNameEditing

- usePaletteVisibility
- ignoreBlockagesForInit
- ignoreL0Pins
- verbose
- useAspectRatio

autoComputePeriod

```
layout.wspMgr autoComputePeriod 'boolean { t | nil }
```

Description

Specifies whether the period is automatically computed based on the tracks in the width spacing pattern. The default value is `nil`.

GUI Equivalent

Command	*Create – P&R Objects – Width Spacing Patterns*
Field	*Auto-Compute* (Edit Tab of WSP Manager)

Examples

```
envGetVal("layout.wspMgr" "autoComputePeriod")
envSetVal("layout.wspMgr" "autoComputePeriod" 'boolean t)
```

Related Topics

List of WSP Manager Environment Variables

Environment Variables

firstTrackOffset

```
layout.wspMgr firstTrackOffset 'float offset_in_microns
```

Description

Specifies the offset, in microns, from the first track to the beginning of the pattern period. The default value is 0.

GUI Equivalent

Command	*Create – P&R Objects – Width Spacing Patterns*
Field	*First Track Offset* (Edit Tab of WSP Manager)

Examples

```
envGetVal("layout.wspMgr" "firstTrackOffset")
envSetVal("layout.wspMgr" "firstTrackOffset" 'float 1.0)
```

Related Topics

List of WSP Manager Environment Variables

Environment Variables

patternRepeat

```
layout.wspMgr patternRepeat 'cyclic { "any" | "none" | "stepped" | "flipped" }
```

Description

Specifies the allowed repeat mode for the width spacing pattern. The default value is `any`.

GUI Equivalent

Command	*Create – P&R Objects – Width Spacing Patterns*
Field	*Allowed Repeat Mode* (Edit Tab of WSP Manager)

Examples

```
envGetVal("layout.wspMgr" "patternRepeat")
envSetVal("layout.wspMgr" "patternRepeat" 'cyclic "stepped")
```

Related Topics

List of WSP Manager Environment Variables

Environment Variables

period

```
layout.wspMgr period 'float period_in_microns
```

Description

Specifies the period, in microns, of the width spacing pattern. If you set this value, the autoComputePeriod environment variable should be set to `nil`. The default value is `0`.

GUI Equivalent

Command	*Create – P&R Objects – Width Spacing Patterns*
Field	*Period* (Edit Tab of WSP Manager)

Examples

```
envGetVal("layout.wspMgr" "period")
envSetVal("layout.wspMgr" "period" 'float 2.0)
```

Related Topics

List of WSP Manager Environment Variables

Environment Variables

periodOffset

```
layout.wspMgr periodOffset 'float offset_in_microns
```

Description

Specifies the global period offset, the distance from the start of the width spacing pattern to the origin in the axis of the track direction. The default value is `0`.

GUI Equivalent

Command	*Create – P&R Objects – Width Spacing Patterns*
Field	*Period Offset* (Edit Tab of WSP Manager)

Examples

```
envGetVal("layout.wspMgr" "periodOffset")
envSetVal("layout.wspMgr" "periodOffset" 'float 2.5)
```

Related Topics

List of WSP Manager Environment Variables

Environment Variables

repeatOffset

```
layout.wspMgr repeatOffset 'cyclic { "first" | "all" }
```

Description

Specifies whether the first track offset is to be applied to only the first period or to all the periods. The default value is `all`.

GUI Equivalent

Command	*Create – P&R Objects – Width Spacing Patterns*
Field	*Repeat Offset* (Edit Tab of WSP Manager)

Examples

```
envGetVal("layout.wspMgr" "repeatOffset")
envSetVal("layout.wspMgr" "repeatOffset" 'cyclic "first")
```

Related Topics

List of WSP Manager Environment Variables

Environment Variables

trackColor

```
layout.wspMgr trackColor 'cyclic { "alternate" | "user" | "shift" }
```

Description

Specifies how tracks are assigned colors.

- `alternate` cycles through mask colors in order, starting from the first track's color.
- `user` assigns the colors explicitly from the track table.
- `shift` assigns the colors explicitly from the track table for the first period, then applies a shift for each subsequent period.

The default value is `alternate`.

GUI Equivalent

Command	*Create – P&R Objects – Width Spacing Patterns*
Field	*Track Color* (Edit Tab of WSP Manager)

Examples

```
envGetVal("layout.wspMgr" "trackColor")
envSetVal("layout.wspMgr" "trackColor" 'cyclic "alternate")
```

Related Topics

List of WSP Manager Environment Variables

Environment Variables

trackColumns

```
layout.wspMgr trackColumns 'string {["width"]["spacing"]["repeat"]["wiretype"]
     ["color"]}
```

Description

Specifies the columns as a space-separated string for the *Tracks* table in the WSP Manager form. The default value is `"width spacing repeat wiretype color"`.

GUI Equivalent

Command	*Create – P&R Objects – Width Spacing Patterns*
Field	*Tracks* (Edit Tab, Import tab, Derive tab of WSP Manager)

Examples

```
envGetVal("layout.wspMgr" "trackColumns")
envSetVal("layout.wspMgr" "trackColumns" 'string "width spacing color")
```

Related Topics

List of WSP Manager Environment Variables

Environment Variables

importCellName

```
layout.wspMgr importCellName 'string "any_cell_name"
```

Description

Sets the cell name of the cellview to import. The default value is `""`.

GUI Equivalent

Command	*Create – P&R Objects – Width Spacing Patterns*
Field	*Cell* (Import tab of WSP Manager)

Examples

```
envGetVal("layout.wspMgr" "importCellName")
envSetVal("layout.wspMgr" "importCellName" 'string "m2_wsp1")
```

Related Topics

List of WSP Manager Environment Variables

Environment Variables

importLibName

```
layout.wspMgr importLibName 'string "any_lib_name"
```

Description

Sets the library name of the cellview to import. The default value is `""`.

GUI Equivalent

Command	*Create – P&R Objects – Width Spacing Patterns*
Field	*Library* (Import tab of WSP Manager)

Examples

```
envGetVal("layout.wspMgr" "importLibName")
envSetVal("layout.wspMgr" "importLibName" 'string "myDemo")
```

Related Topics

List of WSP Manager Environment Variables

Environment Variables

importViewName

```
layout.wspMgr importViewName 'string "any_view_name"
```

Description

Sets the view name of the cellview to import. The default value is `""`.

GUI Equivalent

Command	*Create – P&R Objects – Width Spacing Patterns*
Field	*View* (Import tab of WSP Manager)

Examples

```
envGetVal("layout.wspMgr" "importViewName")
envSetVal("layout.wspMgr" "importViewName" 'string "layout")
```

Related Topics

List of WSP Manager Environment Variables

Environment Variables

importAsGlobal

```
layout.wspMgr importAsGlobal 'boolean { t | nil }
```

Description

Specifies whether the WSPs are imported as global WSPs.The default value is `nil`.

GUI Equivalent

Command	*Create – P&R Objects – Width Spacing Patterns*
Field	*Import as global* (Import tab of WSP Manager)

Examples

```
envGetVal("layout.wspMgr" "importAsGlobal")
envSetVal("layout.wspMgr" "importAsGlobal" 'boolean t)
```

Related Topics

List of WSP Manager Environment Variables

Environment Variables

includeBlockages

```
layout.wspMgr includeBlockages 'boolean { t | nil }
```

Description

Specifies whether to generate tracks for the blockage shapes in the search box of the canvas. The default value is `nil`.

GUI Equivalent

Command	*Create – P&R Objects – Width Spacing Patterns*
Field	*Include Blockages* (Derive tab of WSP Manager)

Examples

```
envGetVal("layout.wspMgr" "includeBlockages")
envSetVal("layout.wspMgr" "includeBlockages" 'boolean t)
```

Related Topics

List of WSP Manager Environment Variables

Environment Variables

shiftColor

```
layout.wspMgr shiftColor 'boolean { t | nil }
```

Description

Specifies whether track colors should be shifted when a pattern is repeated. The default value is `nil`.

GUI Equivalent

Command	*Create – P&R Objects – Width Spacing Patterns*
Field	*Shift Color* (Derive tab of WSP Manager)

Examples

```
envGetVal("layout.wspMgr" "shiftColor")
envSetVal("layout.wspMgr" "shiftColor" 'boolean t)
```

Related Topics

List of WSP Manager Environment Variables

Environment Variables

smartSnap

```
layout.wspMgr smartSnap 'boolean { t | nil }
```

Description

Specifies whether edges of the search box are snapped to objects in the canvas when the search box is drawn. The default value is `nil`.

GUI Equivalent

Command	*Create – P&R Objects – Width Spacing Patterns*
Field	*Enable Smart Snapping* (Derive tab of WSP Manager)

Examples

```
envGetVal("layout.wspMgr" "smartSnap")
envSetVal("layout.wspMgr" "smartSnap" 'boolean t)
```

Related Topics

List of WSP Manager Environment Variables

Environment Variables

spacingMode

```
layout.wspMgr spacingMode 'cyclic { "centerToCenter" | "edgeToEdge" }
```

Description

Specifies how the spacing is to be measured between tracks for the width spacing pattern. The default value is `edgeToEdge`.

GUI Equivalent

Command	*Create – P&R Objects – Width Spacing Patterns*
Field	*Spacing Mode* (Edit Tab of WSP Manager)

Examples

```
envGetVal("layout.wspMgr" "spacingMode")
envSetVal("layout.wspMgr" "spacingMode" 'cyclic "centerToCenter")
```

Related Topics

List of WSP Manager Environment Variables

Environment Variables

autoClearOnLayerChange

```
layout.wspMgr autoClearOnLayerChange 'boolean { t | nil }
```

Description

Specifies whether the name in the *Layer* field on the *Edit* tab is automatically cleared when you change the layer name. The default value is `nil`.

GUI Equivalent

Command	*Create – P&R Objects – Width Spacing Patterns*
Field	*Auto clear name on layer change* (Options tab of WSP Manager)

Examples

```
envGetVal("layout.wspMgr" "autoClearOnLayerChange")
envSetVal("layout.wspMgr" "autoClearOnLayerChange" 'boolean t)
```

Related Topics

List of WSP Manager Environment Variables

Environment Variables

activateNewPatterns

```
layout.wspMgr activateNewPatterns 'boolean { t | nil }
```

Description

Specifies whether the new WSSPDef is global. The default value is `t`.

GUI Equivalent

Command	*Create – P&R Objects – Width Spacing Patterns*
Field	*Enable new def as global* (Options tab of WSP Manager)

Examples

```
envGetVal("layout.wspMgr" "activateNewPatterns")
envSetVal("layout.wspMgr" "activateNewPatterns" 'boolean t)
```

Related Topics

List of WSP Manager Environment Variables

Environment Variables

defNameEditing

```
layout.wspMgr defNameEditing 'boolean { t | nil }
```

Description

Displays the *WSP Def Name* field on the *Edit* tab that lets you modify the WSSPDef name. The new name is used to create the WSSPDef. The default value is `nil`.

GUI Equivalent

Command	*Create – P&R Objects – Width Spacing Patterns*
Field	*Enable def name editing* (Options tab of WSP Manager)

Examples

```
envGetVal("layout.wspMgr" "defNameEditing")
envSetVal("layout.wspMgr" "defNameEditing" 'boolean t)
```

Related Topics

List of WSP Manager Environment Variables

Environment Variables

usePaletteVisibility

```
layout.wspMgr usePaletteVisibility 'boolean { t | nil }
```

Description

Specifies whether the visibility options specified in the Palette and *Display Levels*: *Stop* in the Display Options form are used. The default value is `nil`.

GUI Equivalent

Command	*Create – P&R Objects – Width Spacing Patterns*
Field	*Use canvas visibility* (Options tab of WSP Manager)

Examples

```
envGetVal("layout.wspMgr" "usePaletteVisibility")
envSetVal("layout.wspMgr" "usePaletteVisibility" 'boolean t)
```

Related Topics

List of WSP Manager Environment Variables

Environment Variables

ignoreBlockagesForInit

```
layout.wspMgr ignoreBlockagesForInit 'boolean { t | nil }
```

Description

Specifies whether to include or exclude blockages when creating tracks. The default value is `nil`.

GUI Equivalent

Command	*Create – P&R Objects – Width Spacing Patterns*
Field	*Ignore blockages* (Options tab of WSP Manager)

Examples

```
envGetVal("layout.wspMgr" "ignoreBlockagesForInit")
envSetVal("layout.wspMgr" "ignoreBlockagesForInit" 'boolean t)
```

Related Topics

List of WSP Manager Environment Variables

Environment Variables

ignoreL0Pins

```
layout.wspMgr ignoreL0Pins 'boolean { t | nil }
```

Description

Specifies whether to include or exclude pins at the top level when creating tracks. The default value is `nil`.

GUI Equivalent

Command	*Create – P&R Objects – Width Spacing Patterns*
Field	*Ignore top level pins* (Options tab of WSP Manager)

Examples

```
envGetVal("layout.wspMgr" "ignoreL0Pins")
envSetVal("layout.wspMgr" "ignoreL0Pins" 'boolean t)
```

Related Topics

List of WSP Manager Environment Variables

Environment Variables

verbose

```
layout.wspMgr verbose 'boolean { t | nil }
```

Description

Specifies whether to display debug messages in the CIW. The default value is `nil`.

GUI Equivalent

Command	*Create – P&R Objects – Width Spacing Patterns*
Field	*Verbose mode* (Options tab of WSP Manager)

Examples

```
envGetVal("layout.wspMgr" "verbose")
envSetVal("layout.wspMgr" "verbose" 'boolean t)
```

Related Topics

List of WSP Manager Environment Variables

Environment Variables

useAspectRatio

```
layout.wspMgr useAspectRatio 'boolean { t | nil }
```

Description

Specifies whether to ignore shapes that are not drawn in the right direction.

The default value is `nil`.

GUI Equivalent

Command	*Create – P&R Objects – Width Spacing Patterns*
Field	*Use aspect ratio of shapes* (Options tab of WSP Manager)

Examples

```
envGetVal("layout.wspMgr" "useAspectRatio")
envSetVal("layout.wspMgr" "useAspectRatio" 'boolean t)
```

Related Topics

List of WSP Manager Environment Variables

List of Track Pattern Assistant Environment Variables

The following `layout` environment variable is used for Track Pattern assistant:

- enableAutoPushdown
- pushdownLayers
- removePriorPushdown
- renameDefs
- restoreDefsOnReturn
- tpaFilterFile
- tpaShowDisabled

enableAutoPushdown

```
layout.tpa enableAutoPushdown 'boolean { t | nil }
```

Description

Specifies that it copies Edit-In-Place for the specified layers. The default value is `nil`.

GUI Equivalent

Command	*Assistant – Track Pattern – EIP Auto Pushdown Options*
Field	*Enable Auto WSSPDef Pushdown*

Examples

```
envGetVal("layout.tpa" "enableAutoPushdown")
envSetVal("layout.tpa" "enableAutoPushdown" 'boolean t)
```

Related Topics

List of WSP Manager Environment Variables

pushdownLayers

```
layout.tpa pushdownLayers 'string "layername"
```

Description

Specifies the layers that are to be pulled down on EIP. The default value is `""`. This means that on enabling the *EIP Auto Pushdown Options*, the design is evaluated to preselect all the current active WSP layers.

GUI Equivalent

Command	*Assistant – Track Pattern – EIP Auto Pushdown Options*
Field	*Layers list box*

Examples

```
envGetVal("layout.tpa" "pushdownLayers")
envSetVal("layout.tpa" "pushdownLayers" 'string "M1:M2")
```

Related Topics

List of WSP Manager Environment Variables

Environment Variables

removePriorPushdown

```
layout.tpa removePriorPushdown 'boolean { t | nil }
```

Description

Specifies whether to remove the WSPs that have been created in prior EIP pushdowns. The default value is `t`.

GUI Equivalent

Command	*Assistant – Track Pattern – EIP Auto Pushdown Options*
Field	*Remove prior EIP Pushdown*

Examples

```
envGetVal("layout.tpa" "removePriorPushdown")
envSetVal("layout.tpa" "removePriorPushdown" 'boolean t)
```

Related Topics

List of WSP Manager Environment Variables

renameDefs

```
layout.tpa renameDefs 'string "layername"
```

Description

Sets the radio buttons and the input text field when the *Enable Auto WSSPDef Pushdown* option is selected. The values are interpreted based on the content. The string value is used to determine how to adjust the WSP name when doing the EIP pushdown. If the value starts with `&`, the *Append name* radio button is selected. If the value has no `&`, or if it ends with an `&`, the *Prepend name* radio button is selected. If the value is `&_%c`, the *Cell name* and *Append name* radio buttons are selected. If the value is `%c_`, the *Prepend name* and Cell name radio buttons are selected. In other cases, *Custom* is selected.

GUI Equivalent

Command	*Assistant – Track Pattern – EIP Auto Pushdown Options*
Field	*Auto WSSPDef Pushdown radio buttons and text field*

Examples

```
envGetVal("layout.tpa" "renameDefs")
envSetVal("layout.tpa" "renameDefs" 'string "%c_")
```

Related Topics

List of WSP Manager Environment Variables

restoreDefsOnReturn

```
layout.tpa restoreDefsOnReturn 'boolean { t | nil }
```

Description

Specifies to add in a callback on return to top to revert the active WSPs to what they were before the EIP pushdown. The default value is `t`.

GUI Equivalent

Command	*Assistant – Track Pattern – EIP Auto Pushdown Options*
Field	*Restore original WSSPDefs on return*

Examples

```
envGetVal("layout.tpa" "restoreDefsOnReturn")
envSetVal("layout.tpa" "restoreDefsOnReturn" 'boolean t)
```

Related Topics

List of WSP Manager Environment Variables

tpaAutoRegionNameFromRSP

```
layout tpaAutoRegionNameFromRSP 'boolean { t | nil }
```

Description

Specifies when a related snap pattern is selected, the region name is automatically generated. The value specified by you for the region name is ignored. The default value is `nil`.

GUI Equivalent

None

Examples

```
envGetVal("layout" "tpaAutoRegionNameFromRSP")
envSetVal("layout" "tpaAutoRegionNameFromRSP" 'boolean t)
```

Related Topics

List of WSP Manager Environment Variables

tpaFilterFile

```
layout tpaFilterFile 'string "any_file_name"
```

Description

Determines the name of the TPA filter file that is to be loaded automatically when the Track Pattern assistant is initialized. The default value is `""`.

GUI Equivalent

None

Examples

```
envGetVal("layout" "tpaFilterFile")
envSetVal("layout" "tpaFilterFile" 'string "myTPA")
```

Related Topics

List of WSP Manager Environment Variables

tpaShowDisabled

```
layout tpaShowDisabled 'boolean { t | nil }
```

Description

Specifies whether disabled WSSPDefs and global SPDefs are shown in the Track Pattern assistant Track Pattern table. The default value is `nil`.

GUI Equivalent

Command	*Assistant – Track Pattern*
Field	*Show All*

Examples

```
envGetVal("layout" "tpaShowDisabled")
```

```
envSetVal("layout" "tpaShowDisabled" 'boolean t)
```