Unified Cursor-Snap System (PCB)

Cursor snap is the process whereby the physical mouse cursor's pixel position on the screen drives the position of a 'logical cursor' in the coordinate space of a design document such as a PCB. The objective is for the system to be able to place the logical cursor onto sensible and useful coordinates without the user needing to specify these in a high resolution way. Variable geometry boards – where component pins are often placed on quite different metric and imperial grids – serve to add greater complexity to this objective. To date, Altium Designer has provided a robust solution to this objective through the use of an Electrical Grid alongside a regular Cartesian grid. The Electrical Grid solves the geometry issue by allowing important object points – or hotspots – to be used as virtual grid points.

Altium Designer takes this solution to the next level, with the arrival of the Unified Cursor-Snap System. This system brings together three different sub-systems to collectively drive the way that the cursor snaps onto given sets of preferred coordinates: User-Definable Grids, available in both Cartesian and Polar flavors; Snap Guides, that can be freely placed and provide a handy visual cue for object alignment; and enhanced object Snap-Points, enabling placed objects to pull the cursor into position based on cursor proximity to an object's hotspot(s). Use a combination of these features as you see fit, ensuring placement and alignment of your objects in the PCB workspace is a snap!

Accessing the System

Access to the Unified Cursor-Snap System as a whole, in terms of all of its constituent sub-systems and controls, is made from the dedicated Snap button, located at the bottom right of the main editing area (to the left of the Mask Level button). Clicking this button presents a menu with a range of commands, shown in the following image and summarized thereafter.
The Snap button provides menu access to commands relating to all aspects of the Unified Cursor-Snap System.

- **Grids** – this command launches the Grid Manager dialog, from where you can define and manage your own local customized grids, as well as the default snap grid for the board.

- **Guides** – this command opens the Snap Guide Manager dialog, from where you can define and manage a range of manual snap guides and snap points for the board.

- **Snap To Linear Guides** – this command is used to toggle whether the cursor can snap to manually placed linear Snap Guides. The command is checked when this particular sub-system is enabled. (Corresponds to the Snap To Linear Guides option in the Board Options dialog).

- **Snap To Point Guides** – this command is used to toggle whether the cursor can snap to manually placed point Snap Guides. The command is checked when this particular sub-system is enabled. (Corresponds to the Snap To Point Guides option in the Board Options dialog).

- **Snap To Grids** – this command is used to toggle whether the cursor can snap to grids defined for the board. The command is checked when this particular sub-system is enabled. (Corresponds to the option of the same name in the Board Options dialog).

- **Snap To Objects (Single Axis)** – this command is used to toggle whether the cursor can snap to dynamic alignment guides created through proximity to the hotspot(s) of placed objects. The command is checked when this particular sub-system is enabled. (Corresponds to the Snap To Object Axis option in the Board Options dialog).

- **Snap To Objects (Dual Axis)** – this command, which is essentially the legacy Electrical Grid, is used to toggle whether the cursor can snap to the hotspot(s) of placed objects when it is simultaneously close (on both the x and y axis) to such a hotspot. The command is checked when this particular sub-system is enabled. (Corresponds to the Snap To Object Hotspots option in the Board Options dialog).

- **Include Near Aligned Objects** – this command toggles the use of near objects when aligning the cursor to the horizontal or vertical axis of an enabled object's hotspot(s). This is single-axis object snap, with the cursor aligned using a system-generated dynamic alignment guide. (Corresponds to the Near Objects option in the Board Options dialog).

- **Include Far Aligned Objects** – this command toggles the use of far objects when aligning the cursor to the horizontal or vertical axis of an enabled object's hotspot(s). This is single-axis object snap, with the cursor aligned using a system-generated dynamic alignment guide. (Corresponds to the Far Objects option in the Board Options dialog).

- **Advanced Snap Options** – this command gives access to the Board Options dialog. Here you can also enable/disable the various cursor-snap sub-systems. For single-axis object snap, the dialog provides advanced options to control how different types of objects are used as Snap-Point sources.

**User-Definable Grids**

*Main article: Grid Manager (PCB)*

Any number of user-defined grids can be defined for the workspace, with all grid management performed from within the Grid Manager dialog. Access this dialog (in PCB and PCB Library Editors) by selecting the Grids... menu option after clicking on the Snap button at the bottom-right of the
workspace. The Grid Manager can also be accessed using the command of the same name on the main Tools menu, and through the keyboard shortcuts – G, M.

The Grid Manager dialog - command central for defining and organizing the grids for use with your board.

Use the Grid Manager dialog to define Cartesian or Polar-based local grids by which to place design objects – especially components – with greater precision. Each grid-type is fully customizable using a dedicated editing dialog. Define where in the workspace the grid is to be located, the step size of the grid, the extent of the grid and two levels of visual display for the grid in the workspace.
Example Polar and Cartesian grids, summarized in the Grid Manager and fully defined in underlying editors.

These localized grids can be nested, allowing you to essentially stack grids over each other and therefore build grid hierarchy. Where, in a particular region of the workspace, you have defined a number of local placement grids in a nested fashion, you can assign a priority level – ensuring the grid you need is the one actually used!

A predefined, default snap grid is available – Global Board Snap Grid – which is the grid used in all areas of the board where a specific custom grid has not been defined. The snapping priority of this grid is lower than any of the custom grids you define. In other words, a custom grid will always be snapped to first, where defined.

The cursor will only snap to a defined grid (including the default snap grid), provided the option Snap To Grids is enabled, in the Snap Options region of the Board Options dialog (Design>Board Options).

Component Grids

Any custom grid can be assigned as a Component-only grid, to do that enable the Comp option in the Grid Manager dialog for the required grid, as shown in the image below.

![Grid Manager](image)

Configure the options to set a grid as component-only.

To set a grid as a component-only grid, enable the Comp option and disable the Non Comp option. Note that this component-only grid will only display when you are performing a component-type action, such as moving a component.

What Happened to the Visible Grids?

Visible grids are no longer a separate 'entity' within the PCB workspace. Now, the grids that are displayed are the actual grids defined in the Grid Manager. Note that you can still hide all the snap grids, if you prefer. To do so, open the View Configurations dialog (L shortcut) and disable the Show
option for the Default Grid Color - Small and Default Grid Color - Large options.

Snap Guides

Main article: Snap Guide Manager (PCB)

Snap Guides are special objects that are manually placed specifically for the purpose of driving the cursor-snap on a certain axis or point – assisting in object/component placement. They can also serve as a visual indicator for general layout or alignment purposes.

A variety of different Snap Guides are available for placement directly from the Place>Work Guides sub-menu (PCB and PCB Library Editors). Full configuration and management of Snap Guides is performed from within the Snap Guide Manager dialog, launched from the Guides option on the Snap menu in the lower right of the main editing area.

During an interactive process such as placing or moving, the cursor will snap to a placed guide, at the point where that guide intersects a defined grid. Using a guide, objects can quickly be aligned simply by dragging them until they 'snap' against the guideline.

Linear Snap Guides

The following table summarizes the different types of linear Snap Guides available:

<table>
<thead>
<tr>
<th>Guide Type</th>
<th>Guide Placement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vertical</td>
<td>Click to place a vertical guideline at the desired X-coordinate location in the workspace.</td>
</tr>
<tr>
<td>Horizontal</td>
<td>Click to place a horizontal guideline at the desired Y-coordinate location in the workspace.</td>
</tr>
<tr>
<td>45 Degree</td>
<td>Click to place a 45 degree (y=x) guideline that passes through the desired X,Y coordinate location in the workspace.</td>
</tr>
<tr>
<td>-45 Degree</td>
<td>Click to place a -45 degree (y=-x) guideline that passes through the desired X,Y coordinate location in the workspace.</td>
</tr>
</tbody>
</table>
Examples of the various Snap Guides available to assist you during placement on your PCB document or PCB Library document.

The cursor will only snap to a placed linear Snap Guide provided the option **Snap To Linear Guides** is enabled, in the **Snap Options** region of the **Board Options** dialog (Design»Board Options).

**Point Snap Guide**

For even finer control over object placement, place a point Snap Guide – a manual snap point if you will. A point Snap Guide is simply a hotspot that you manually mark within the confines of a defined grid. During an interactive process, such as placing or moving an object, that object's hotspot will 'snap' to a point Snap Guide, when it passes into close proximity with it.

Simply choose the **Place»Work Guides»Place Snap Point** command (PCB and PCB Library Editors), position the cursor at the required location in the workspace and click to drop a point Snap Guide at that location. Again, management of point Snap Guides, as with all Snap Guides, is performed from within the **Snap Guide Manager** dialog.

Visually, point Snap Guides are particularly beneficial when the grid marker type is set to Dots.
The cursor will only snap to a placed point Snap Guide provided the option **Snap To Point Guides** is enabled, in the **Snap Options** region of the **Board Options** dialog (Design»Board Options).

**Object Snap-Points**

Every object in the PCB design space is considered to have a number of important points such as the center of a pad, ends of tracks etc. These hot-spots are considered as Snap-Points and are different for different types and sizes of objects. Every object generates a series of these Snap-Points, with different Snap-Points having different attractive forces for the cursor. For example, the endpoints and mid-points of tracks should have a higher pull than other points along the track.

In terms of cursor-snap, there are essentially two flavors of use of these object Snap-Points:

**Snap To Object Hotspots**

This is the same legacy Electrical Grid system found in all previous releases of Altium Designer. It is a dual-axis system, where the mouse cursor must be simultaneously close (on both the x and y axis) to an object's Snap-Point in order for the object to pull the cursor towards that Snap-Point.

Snap To Object Hotspots is only available when the **Snap To Object Hotspots** option is enabled, in the **Snap Options** region of the **Board Options** dialog (Design»Board Options). Use the associated **Range** option to determine the extent of attraction from an object's hotspot, within which the cursor will be snapped to that hotspot.
Snap To Object Axis

Wouldn't it be neat if some kind of pop-up guideline automatically appeared while you place, move or drag a design object - a guide that was there when you needed it, but then just as quickly disappeared when you're finished with the action you're performing? And wouldn't it be great if these guides were available based on where the cursor was in relation to an object's hotspot? Relax, Altium Designer's got you covered with the Snap To Object Axis option!

As you move an object in the workspace, guides are automatically generated by the system, based on the Snap-Points of existing placed objects, within the vicinity of the cursor. The cursor can pulled into alignment with either the horizontal or vertical position of an object's Snap-Point. This allows an object Snap-Point that is close to the mouse cursor on one axis, but distant on the other axis, to drive the cursor position.

With Snap To Object Axis option, dynamic alignment guides appear in the workspace, generated through vertical or horizontal proximity of the cursor in relation to Snap-Points of existing placed objects.

Snap To Object Axis is only available provided the option Snap To Object Axis is enabled, in the Snap Options region of the Board Options dialog (Design>Board Options). Use options available in the Advanced Options - Snap To Object Axis region of the dialog – accessed by clicking on the Advanced link to the right – to control how different types of objects are used as Snap-Point sources.
The Board Options dialog provides advanced options for controlling single-axis object snap.

- **Near Objects** - enable those design objects that you want to use as snap point sources as you move the cursor near to them. Use the associated Near Range field to specify the distance the cursor can be from an enabled object, inside which that object's hotspot will cause the cursor to snap to a system-generated dynamic alignment guide.

- **Far Objects** - enable those design objects that you want to use as snap point sources when the cursor is further away from an object, beyond the specified Near Range. An enabled object’s hotspot will continue to cause the cursor to snap to a system-generated dynamic alignment guide, at this greater distance.

By default, all objects (Pads, Vias, Tracks, Arcs, Fills, Regions, Texts) are enabled as Near Objects and only Pads and Vias enabled as Far Objects. The Near Range is set to 1000mil.

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