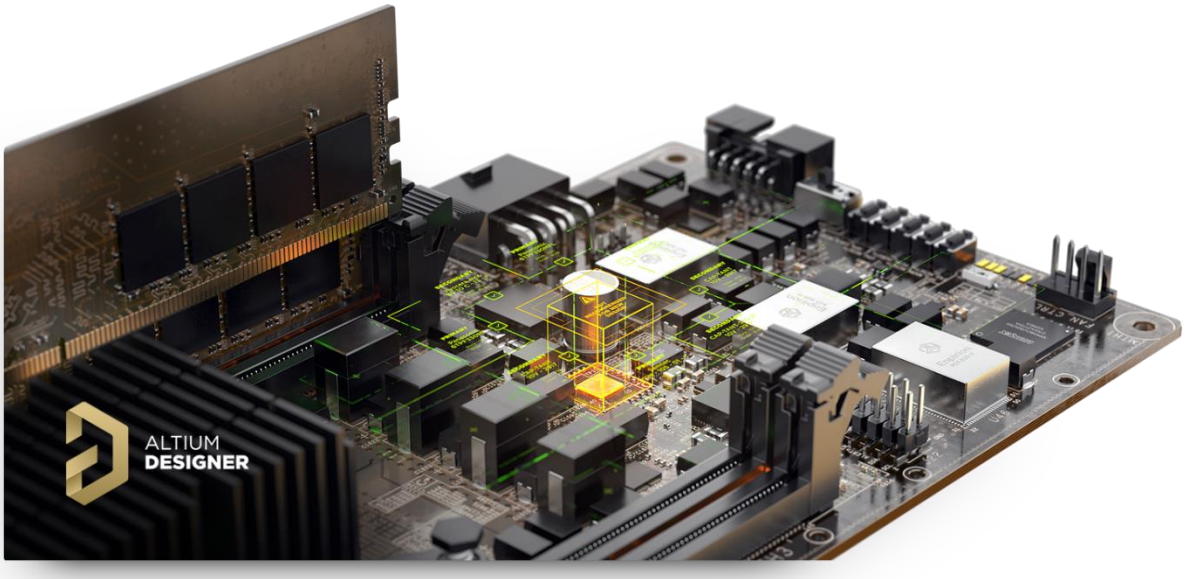

Altium Designer

Advanced Course

Module: Re-Routing

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Re-Routing

1.1 Purpose

PCB routing is a highly iterative process, it is normal for existing routes to be modified as new routes are placed and component locations are adjusted. Altium Designer's interactive router has features that assist in this process, **Loop Removal**, and **Preserve track angles while dragging** (or track sliding) are very powerful for re-routing a board. In addition, the Push feature and Post-Route Glossing tools are very powerful features. In this exercise you will modify and re-route existing routes as is common when iteratively routing a PCB.

1.2 Shortcuts

Shortcuts when working with Re-Routing

F1:	**Help**
J-C:	**Jump Component**
Shift+S:	**Single Layer Mode**
U-T / Ctrl+W:	**Interactive Routing**
Shift+D:	**Toggle Loop removal**
CTRL+ALT+G:	**Gloss Selected**
CTRL+S:	Save Document

1.3 Preparation

1. **Close all existing projects and documents.**
2. Open the `Re_Routing.PrjPCB` project found in its respective folder of the Advanced Training.

1.4 Procedure

1.4.1 **Loop removal**

3. You will now modify some of the routing of the connector HDR2. To jump to HDR2, press **J-C**, type in `HDR2`, and click **OK**. Navigate to the left-hand side of HDR2, zooming in as necessary.
4. If you are not currently in Single Layer Mode (meaning only the Active Layer should be visible/shown in color), switch to single layer mode by pressing the **Shift+S** keyboard shortcut. You can toggle Single Layer Mode by pressing **Shift+S** again. Another method to verify you are in Single Layer Mode is in the Heads-up display, where (Single) is visible, as seen in Figure 1.

This requires the Heads-Up option for **Current Layer** to be enabled under the Insight Modes section of **Preferences - PCB Editor - Board Insight Modes**.

Figure 1. Heads-up display showing Single Layer Mode

5. To edit an existing route, select **Route » Interactive Routing**. The connection that you will modify is HA2 (Figure 2).
   a) Click to start re-routing on the vertical section of the connection, where it passes between pad 1 and pad 3 of HDR2 (click anywhere on this segment).
   b) Route down and diagonally across to meet HA2, above where it connects to U1 pad 191, as shown in Figure 2. When you meet the old route the redundant segments are removed.

Loop removal does not require any special action on your part. Run the Interactive Routing command, click to start re-routing an existing route, define the new path, then come back to meet the old, existing routing. As soon you create the new path, any redundant track segments (forming the old loop) are automatically removed.

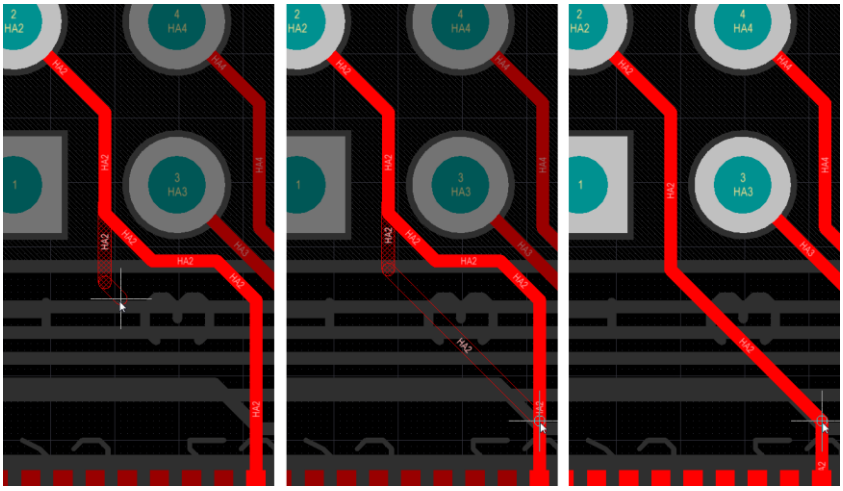

Figure 2. (a) Click on the existing routing, (b) then re-route to define a new path for connection HA2, (c) when you finish the old loop is removed

Loop removal can be used to re-route multi-layer connections layers and that include vias. Note that loop removal should not be used on nets that include intentional loops, such as ground nets. Because the entire net is analyzed for redundant loops, intentional loops on another part of the board can be removed. For these nets Loop Removal can be selectively disabled, by double-clicking on the net name in the *PCB* panel.

1.4.2 **Gloss**

We will use Glossing to clean up the routing between U1 and S2. Glossing is a sophisticated set of algorithms developed specifically to produce cleaner routing and pad entries, that respect the intent of the applicable design rules. Glossing attempts to reduce the path length and improve the shape of corners and reduce their number, generally resulting in neater routing created from fewer segments.

6. The track segments for nets SW0 to SW7 are just above U6. Press **J-C**, type in `U6`, and click **OK**.

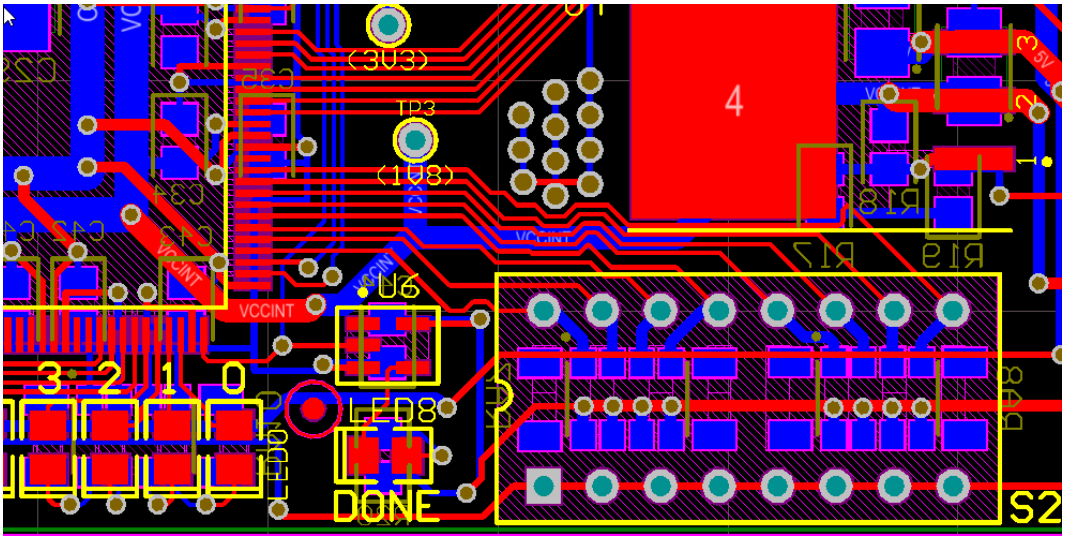

Figure 3. View between U1 and S2

7. For ease of selection, click the filter in the *Active Bar*, click **All Objects** to toggle all options off, then click **Tracks**, see Figure 4.

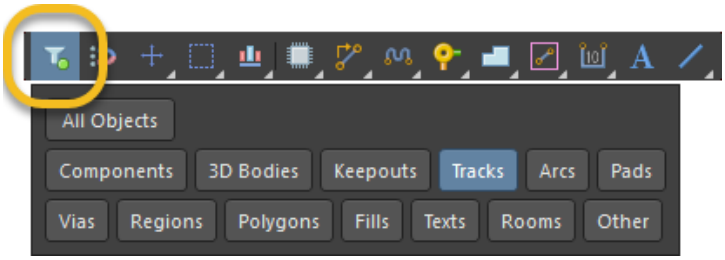

Figure 4. Active Bar Selection Filter for Tracks Only

8. Drag a selection box from lower right to upper left to select the parallel track segments leaving U1 and routing to S2. This will select the first track segment of those parallel routed nets. Press **Shift+S** to isolate top layer, refer to Figure 5 below.

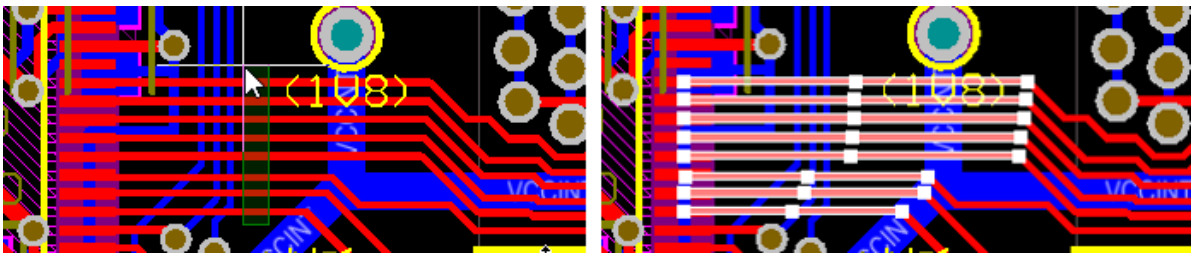

Figure 5. Selecting top routes. Press Shift+S to isolate top layer

Drag the selection window from left-to-right, you will select all objects that fall completely within the bounds of the selection area. This behavior is the same as using the **Edit » Select » Inside Area** command, Figure 5.
Drag the selection window from right-to-left, you'll select all objects that fall completely inside the selection area or are touched by its boundary. This behavior is the same as using the **Edit » Select » Touching Rectangle** command.

9. Press the **TAB** key to extend this selection to all connected tracks. Press the **TAB** key three more times to toggle through the selection modes and note how the selection changes.

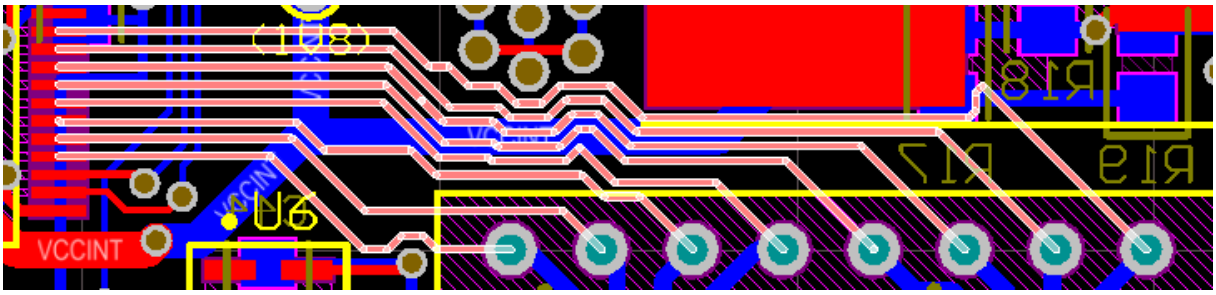

Figure 6. Results of pressing Tab to extend selection

10. With all of the tracks selected (as shown in the Figure 6 above) execute the Glossing Feature **Route » Gloss Selected** or **CTRL + ALT + G**.
11. The Glossing tool will straighten up and remove unnecessary track vertices in a routed path, Figure 7.

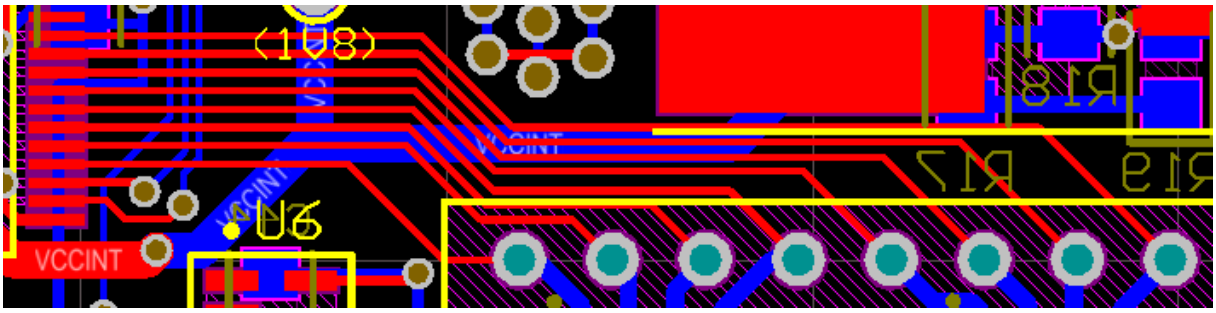

Figure 7. Results of applying Gloss command

1.4.3 **Drag**

The next feature for modifying existing routing is the ability to drag a track segment.

12. To slide a track segment, first click on it to select it.
    a) Click once to select a diagonal segment of `SW0`, as shown in Figure 8.
    b) Position the cursor so it is over the selected track segment, it will change to a double headed arrow  , as shown in Figure 8.
    c) Click and hold the left mouse button, then move the cursor to the left. The diagonal track segment will slide, and the angles to the connected segments will be maintained. As you continue to move the diagonal segment to the left, the SW0 routing will automatically wrap around the VCCO via that is in the way.
    d) Position the segment anywhere to the left of its original location, then release the mouse button.

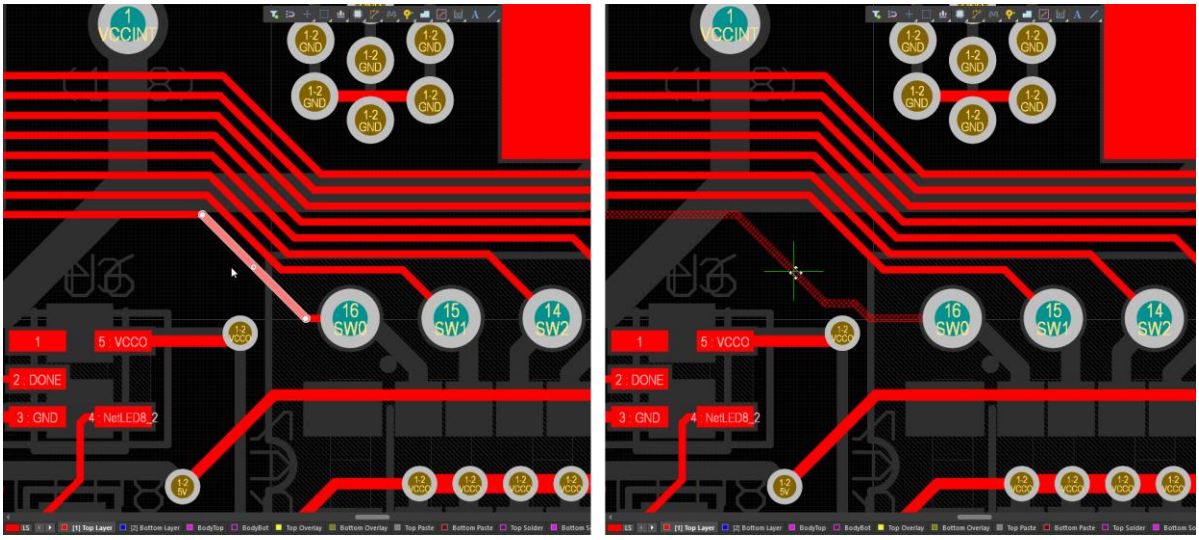

Figure 8. Click to select a segment, then click and hold to slide that segment

13. You can also slide multiple selected segments. The easiest way to select multiple segments is to use the Select Touching Line command. To launch this command, press **S** to activate the *Select* sub-menu, then press **L** to run the **Touching Line** command, as shown in Figure 9.
    a) Position the cursor below the diagonal segment of SW1, click once to start the selection line, then move the cursor up so that the selection line touches all the diagonal segments for SW1 through SW7. Then click a second time to perform the selection, take a look at Figure 9 for a better idea of how this works.

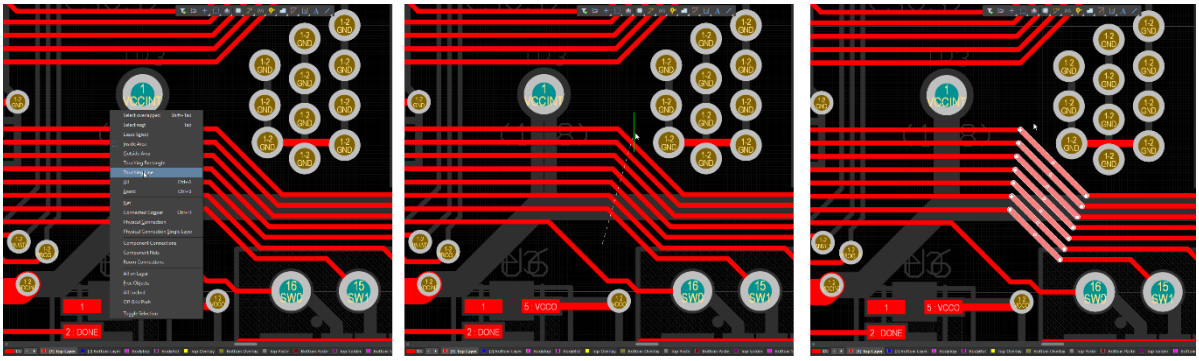

Figure 9. Press S, L then click to select segments touching that line

    b) Hover the cursor over any of the selected segments, the cursor will change to the double-headed arrow  .
    c) Click and hold to grab the segments, then move the mouse to slide them to the left. Note that you will not be able to position them on top of any existing track segments.
    d) Release the segments so they are adjacent to SW0.

Track sliding also actually uses the interactive router, so it can also push and shove existing tracks, vias, and jumper pads. There are 2 ways of invoking the track sliding feature: by clicking once to select a segment first, or by holding the Ctrl key as you click on the segment. Once you start to slide, release the Ctrl key.

14. Alternatively, to slide multiple track segments you can simply slide one and use it to push other segments. To slide all of the diagonal segments, click once to select SW7, as shown in Figure 10 below.
    a) Click and hold on the selected segment, then move the mouse to the left. As you move the mouse take note of the Status Bar, it shows the current mode, which defaults to Push. If it is not in Push mode press **Shift+R** to cycle to Push mode.
    Note: This requires that the other routing modes are enabled in the Interactive Routing Modes section of your preferences.
    b) The moving segment will push the other SW segments. Move all segments a small distance to the left, then release the mouse button.

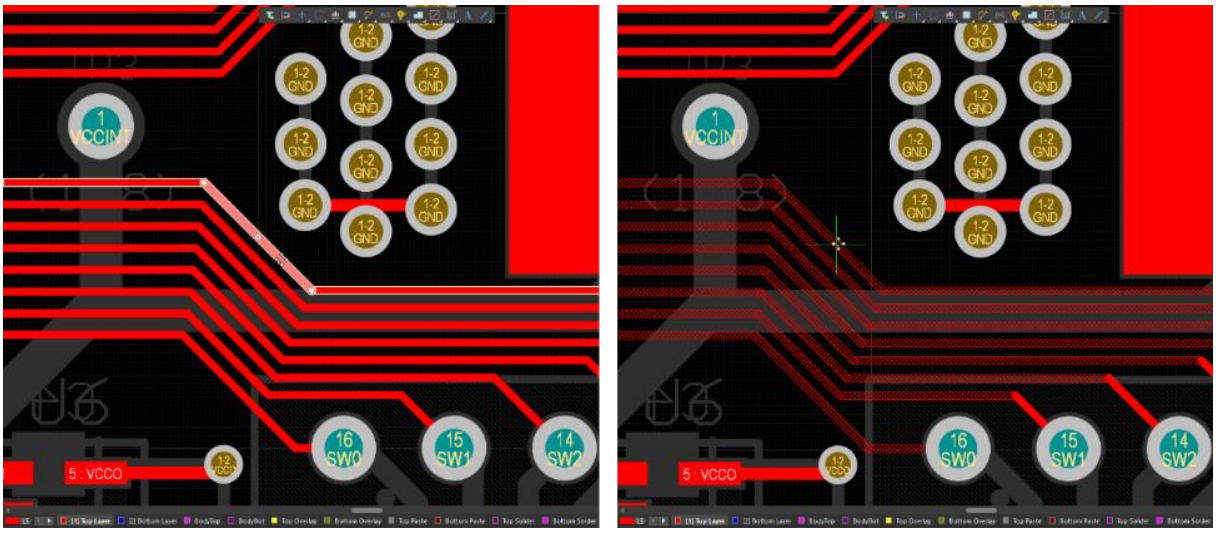

Figure 10*. Use the sliding segment to push other segments*

15. You can also launch the sliding mode without selecting the track segment first, to do this hold the **Ctrl** key and then click on the segment, start to move the segment and release the **Ctrl** key.
16. **Close the project and any open documents.**

Congratulations on completing module

Re-Routing

from the

Altium Designer Advanced Course

Thank you for choosing Altium Designer