AltiumLive 2018 University Day

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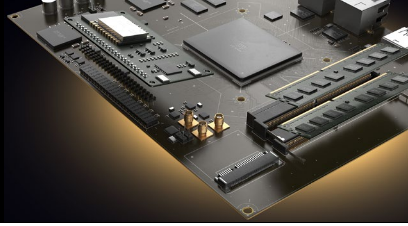
Altium



Impedance-Controlled Routing and Routing Automation

Illustrates why impedance-controlled routing is necessary for high-speed designs.

Agenda

Controlled Impedance Routing

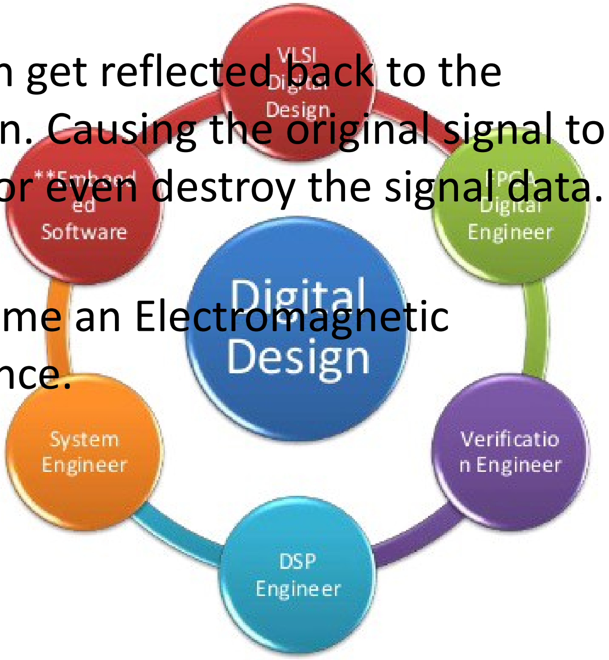
- ➢ Do we need it?
- ➢ What are the challenges?

- When a device that switched state too quickly that the transition is complete before the signal can travel along the route.
- Signal with fast edge can radiate and couple with adjacent routes.

Digital Design Engineer

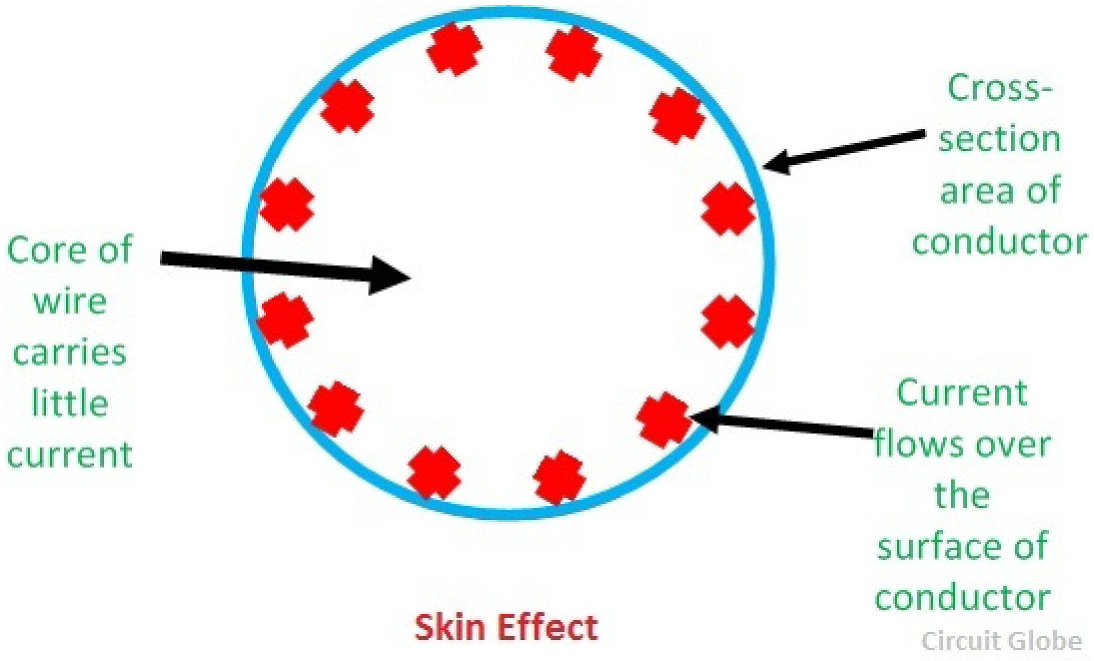
Signal can get reflected back to the source pin. Causing the original signal to degrade or even destroy the signal data.

Can become an Electromagnetic Interference.



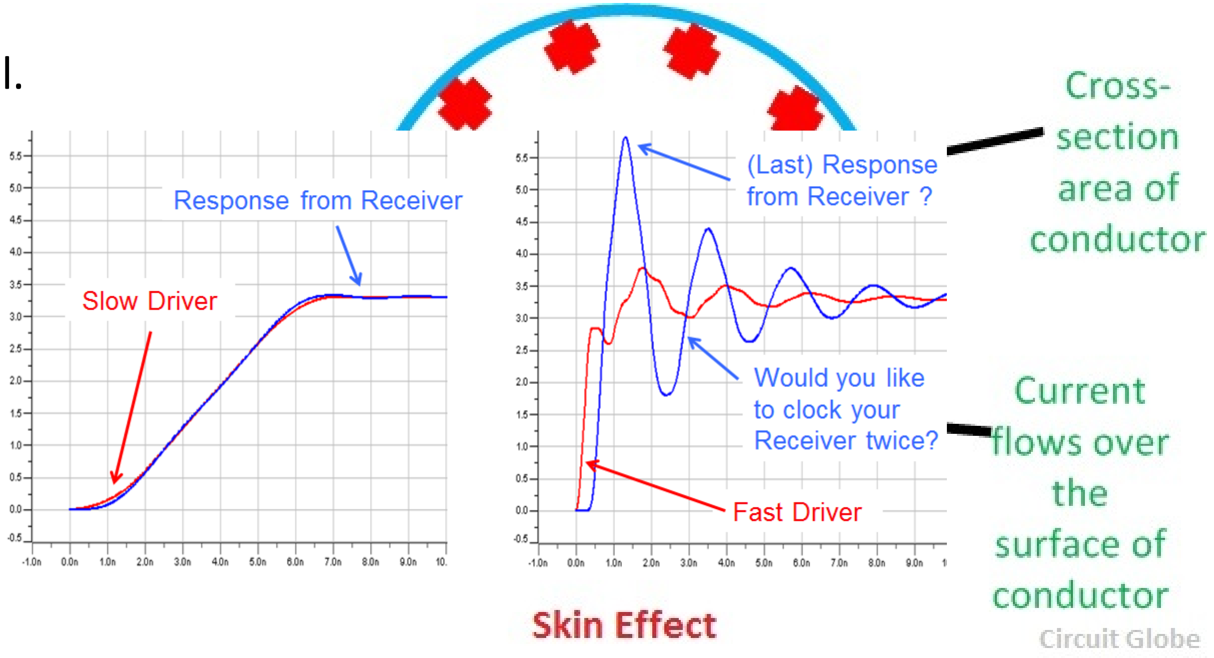
Controlled Impedance Routing

- Skin Effect
  - When energy is distributed within a conductor such that the current density is largest near the surface of the conductor.
  - Since the energy is not travelling through the conductor itself, this can slow down the signal.



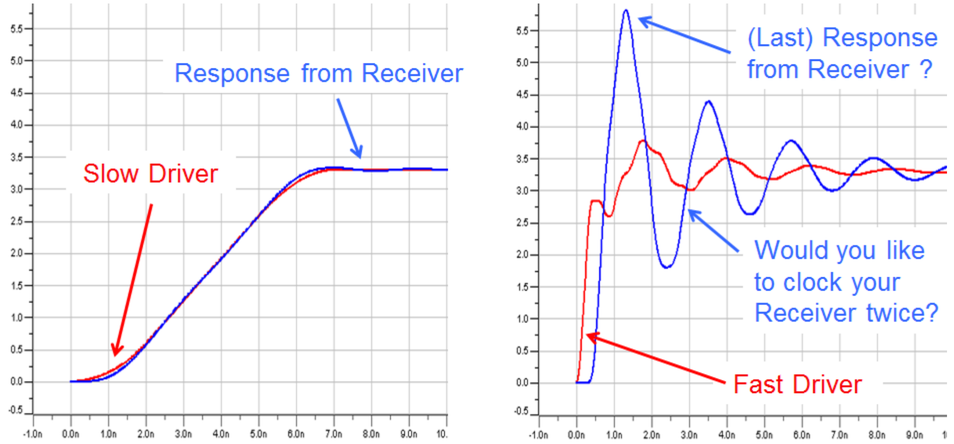
Controlled Impedance Routing

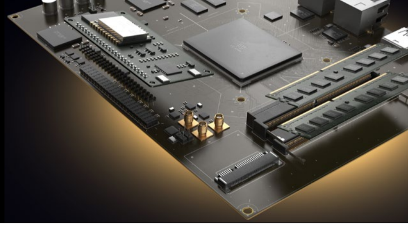
- Skin Effect
  - When energy is distributed within a conductor such that the current density is largest near the surface of the conductor.
  - Since the energy is not travelling through the conductor itself, this can slow down the signal.
- How can this be a problem?
  - When a signal arrives at the target pin, but causes some signal to be reflected back.
  - When a edge transition is completed before reflected energy arrives back, this will interac and change the original signal.



Controlled Impedance Routing

- Effects of reflection
  - Distortions of the signal can trigger an overshoot that causes the chip to burn or undershoot that causes the device to trigger twice.

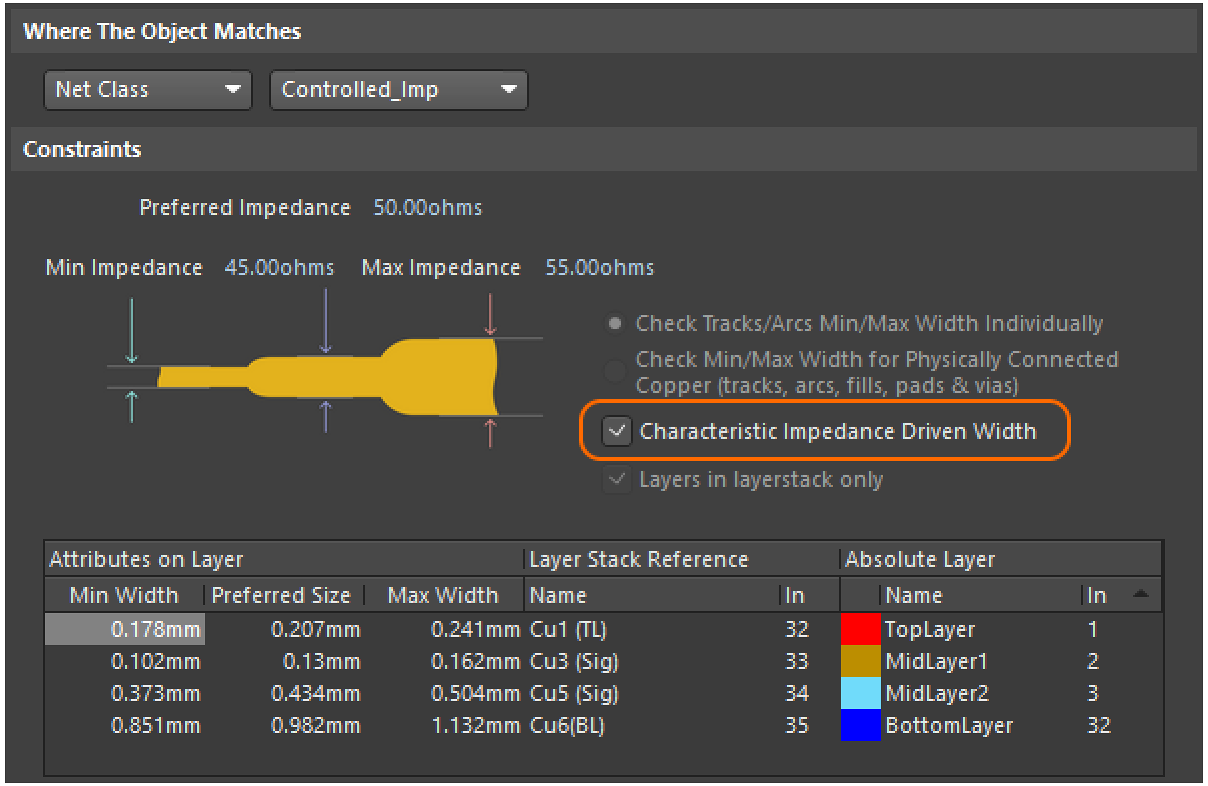




Controlled Impedance Routing

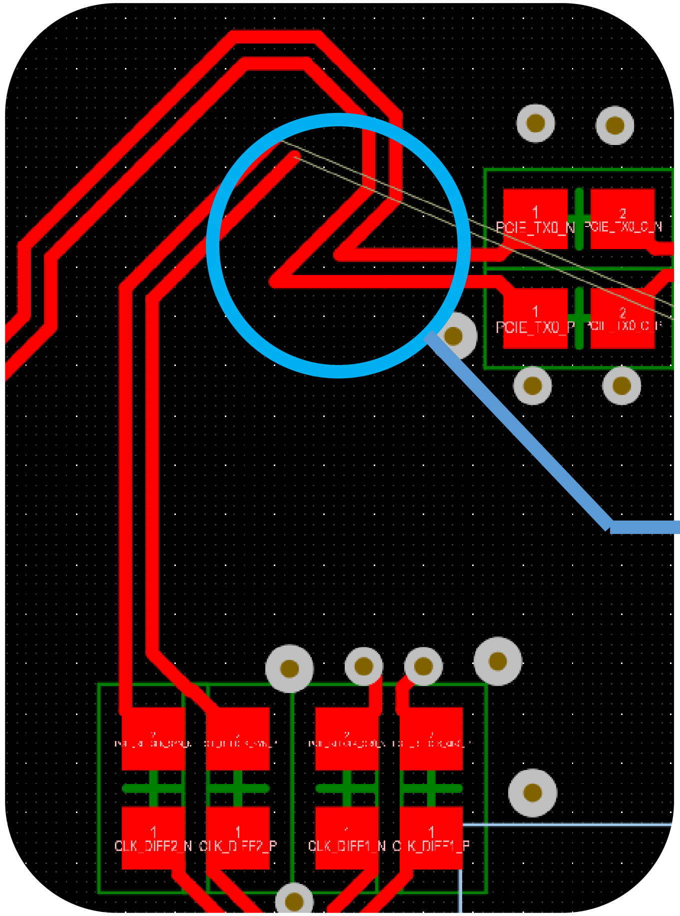
- Possible solutions
  - Adapt a series impedance of a transmission line embedded in your PCB.
  - For more complex design, a termination can be added to the signal, thus preventing the designer from using wide traces.

Characteristic Impedance Driven Width

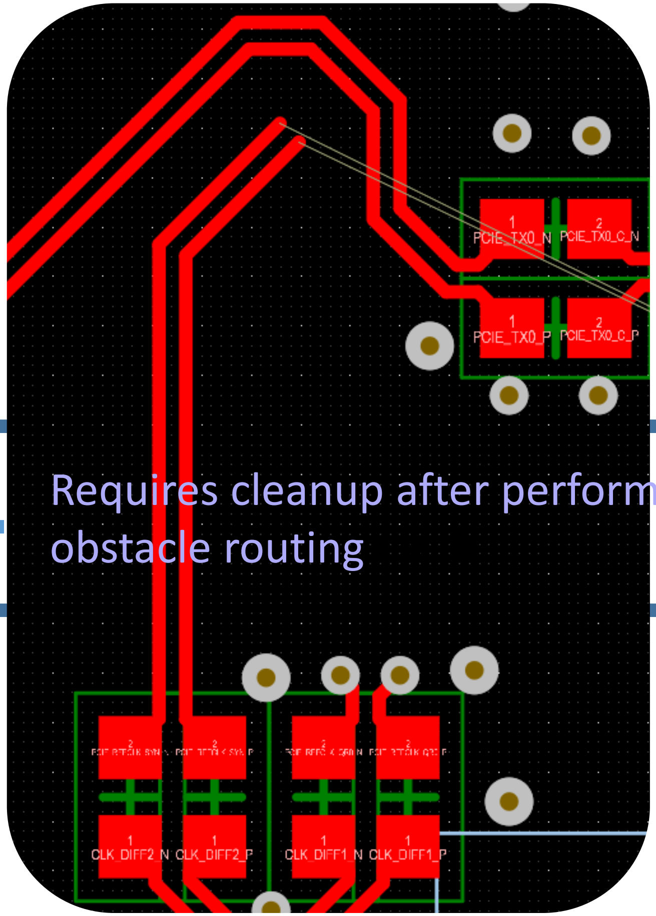


Glossing Pushed Routes

AD18



AD19



Requires cleanup after performing the push obstacle routing

Follow Mode

- Rather than requiring the designer to route "against" the contour using careful and accurate mouse movements and click actions to ensure the new route hugs the contour, in Follow mode the designer simply clicks to nominate the contour, then moves the cursor along the contour to define the route direction.
- In Follow mode, the interactive router will add track and arc segments so that the new route follows the contour, in compliance with applicable design rules. This feature is particularly useful when placing curved routes.

DEMO