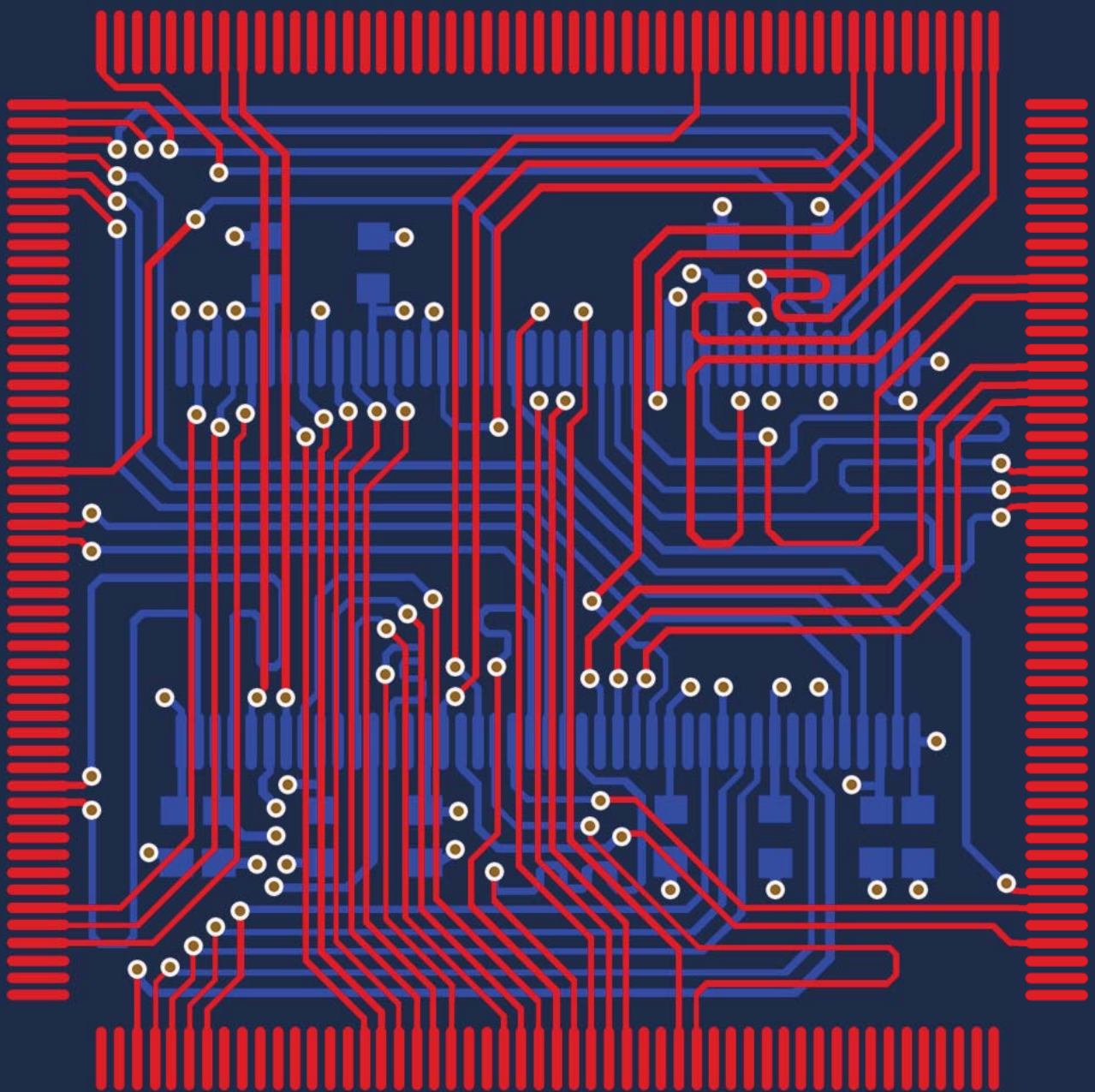


Altium[®]

ActiveRoute for Altium Designer



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ACTIVEROUTE FOR ALTIUM DESIGNER

Interactive routing is the most challenging and tedious task in the PCB design process. Experienced designers enjoy the challenge, applying their creative puzzle-solving talents to win the many battles and ultimately the war. Designers who are new to the task and those who would rather focus on other aspects of design, struggle in execution. Yet, everyone eventually gets weary of the tedium.

Some of the routing challenges include managing where the routes are placed, ordering escapes out of pin/via arrays, making the routing efficient, and fulfilling the high speed and fabrication concerns.

ActiveRoute for Altium Designer® is an interactive routing method that applies high levels of user-controlled automation while producing high quality results in a very short time. The purpose of ActiveRoute is to diminish the challenge of routing, eliminate the tedium, and increase productivity significantly.

ROUTING ON MULTIPLE LAYERS

In the context of interactive routing tools, one unique aspect of ActiveRoute is that it can route on multiple layers simultaneously. This is important to obtain efficient routing, to follow the designer's planning and to achieve fast performance.

By default, if no layers are chosen in the ActiveRoute panel, the routing occurs on just the active layer. However, if multiple layers are chosen in the panel, ActiveRoute will distribute the routes fairly evenly across those layers.

Since ActiveRoute can perform over multiple layers, when there is any difficulty routing a particular connection on one layer, it can immediately try it on one of the other layers. The result is that the route will be more direct. Plus, time will not be wasted trying it over and over on the same layer only to complete it with excessive meandering or simply failing.

The alternative to the ActiveRoute distribution method is for the user to start the router on one layer and route as much as possible. When there are unrouted connections, start the router again on the next layer, and continue with the unrouted connections in the same fashion ad nauseam layer by layer. Using this method, completion on each layer becomes a higher priority for the routing algorithm and meandering usually occurs. Typically, this method also results in a significant imbalance of the routes on each layer, with the most on the first layer and the least on the last.

The figures below show a comparison of the results when routing one layer at a time, versus distributing the routes. It is clear from these images that a relatively-even distribution results in less meandering and leaving enough room for tuning on all the layers.

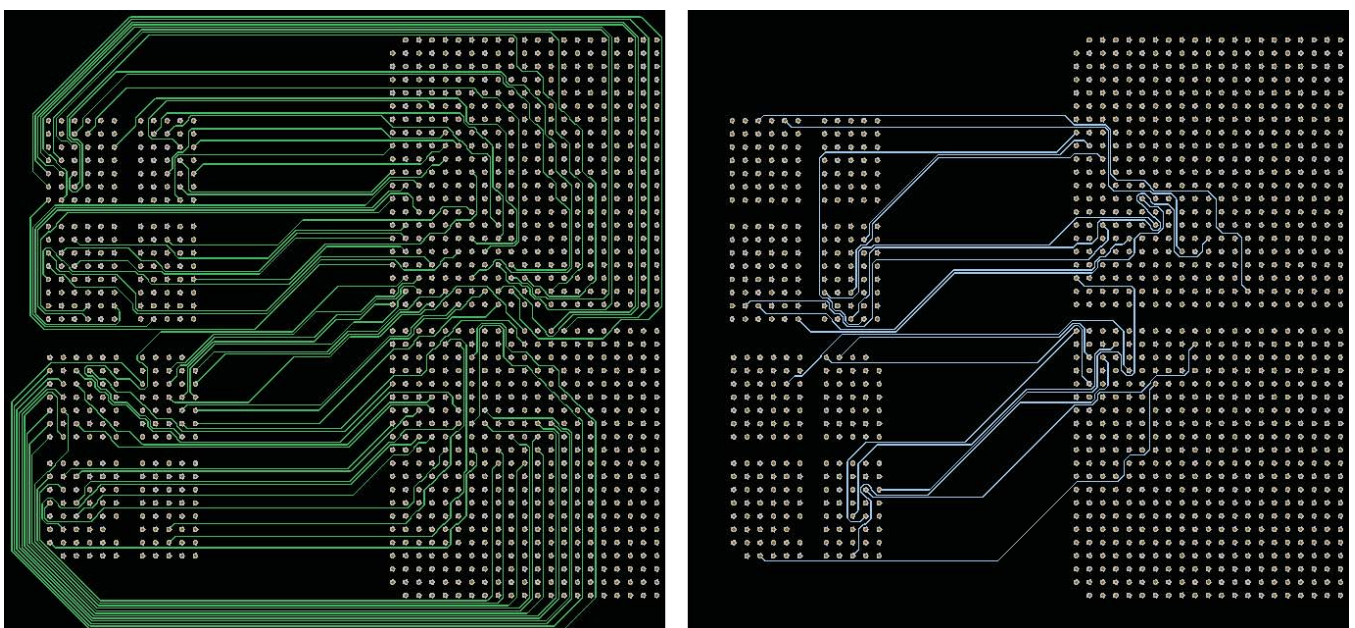


Figure 1: Routing one layer at a time. The first layer (green) contains 71 routes. The fourth layer, in blue, contains only 19 routes.

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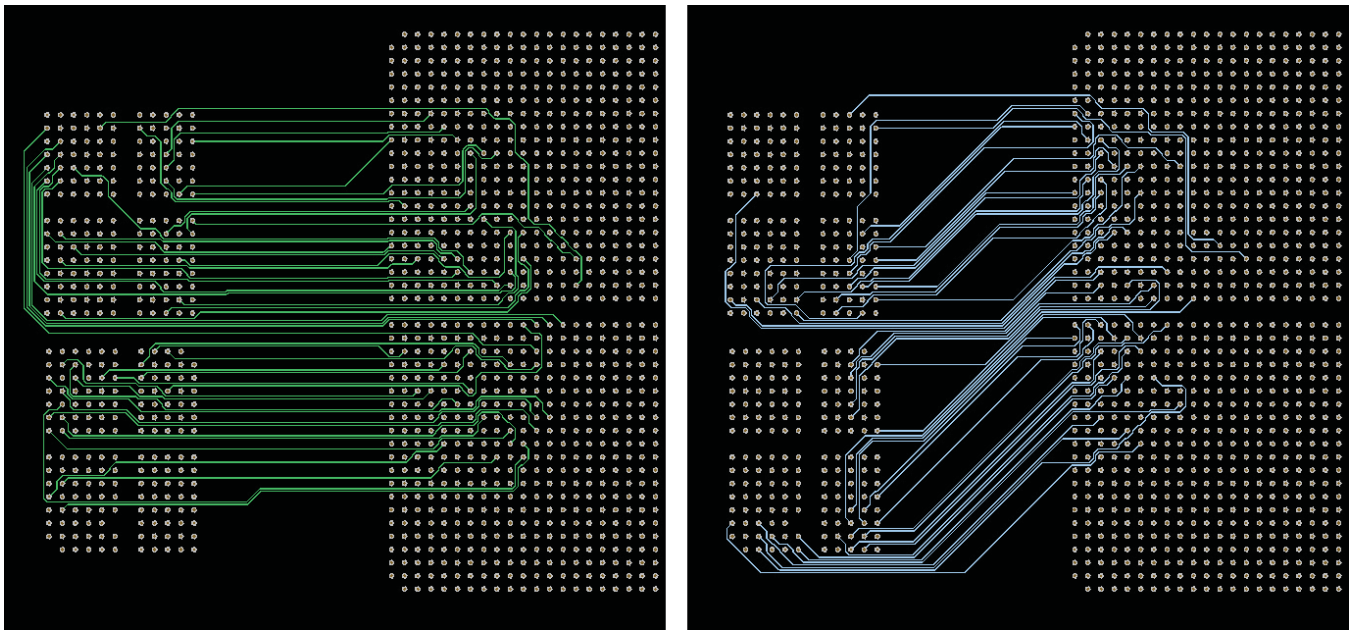


Figure 2: This time, multiple layers were routed simultaneously, resulting in a much more even distribution of traces. Layer 1 (green) has 48 routes and Layer 4 (blue) has 44.

In the context of time to route using these two methods, routing one layer at a time took 9m:19s and routing the multiple layers together took 0m:59s which is 3.37288 times faster, but who's counting. Better results, faster time to completion.

There are two other benefits of routing on multiple layers simultaneously — space for tuning and overall performance. Since the traces will be more evenly distributed, there will be more room for tuning if required. If a routing algorithm struggles to make a completion, it adjusts the costs for each additional attempt to succeed. This takes time. The ActiveRoute method of routing on multiple layers eliminates this struggle, which makes it incredibly fast.

One last note relative to this topic. ActiveRoute obeys the layer restriction rules, by net and net class. This means if you select multiple layers in the panel, the routing will only be placed on legal layers for each individual net.

CONCLUSION

ActiveRoute changes the paradigm for interactive routing. Here we have talked about the advantages of considering multiple layers. Additional papers will address other important aspects such as route quality, optimizing escape order, performance and the ability to control the location of routes with route guides.