The traditional approach to calculate signal length is to add up the centerline length of all segments used in a route, as well as the vertical distance due to the height of the vias, which was originally determined by the board thickness.

This approach is not adequate for a high speed design though, for a number of reasons, including:

- Stacked and overlapping objects - an algorithm that simply adds the centerline length of all objects in a net does not cater for stacked or overlapped objects (which autorouters are notorious for placing).
- Wandering route path within an object - there is often routing objects completely within a pad or via, which can falsely add to the length, as shown in the first image below. The second image shows how the route length is calculated when a fill object is part of the routing - note how the algorithm is smart enough to ignore the section of the track segments that lie within the fill.
- Via length - blind and buried vias do not traverse all layers of the board, so the board thickness is not sufficiently accurate to determine the vertical route length. The actual via height must be used, taking into consideration the copper and insulation thicknesses that the via passes through. The third image below shows the Primitives section of the PCB panel in Nets mode, note how the length contribution of the first and third vias, which are blind vias, are smaller than the second via, which is a thru-hole via.

The PCB editor's new length calculator returns the most accurate route length possible.

Wandering routes are ignored during length calculations, the thin brown line shows the calculated route length.

Unnecessary objects are also ignored during length calculations.

Accurate lengths, based on the layers traversed and the stackup dimensions, are calculated for vias.

Source URL:
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