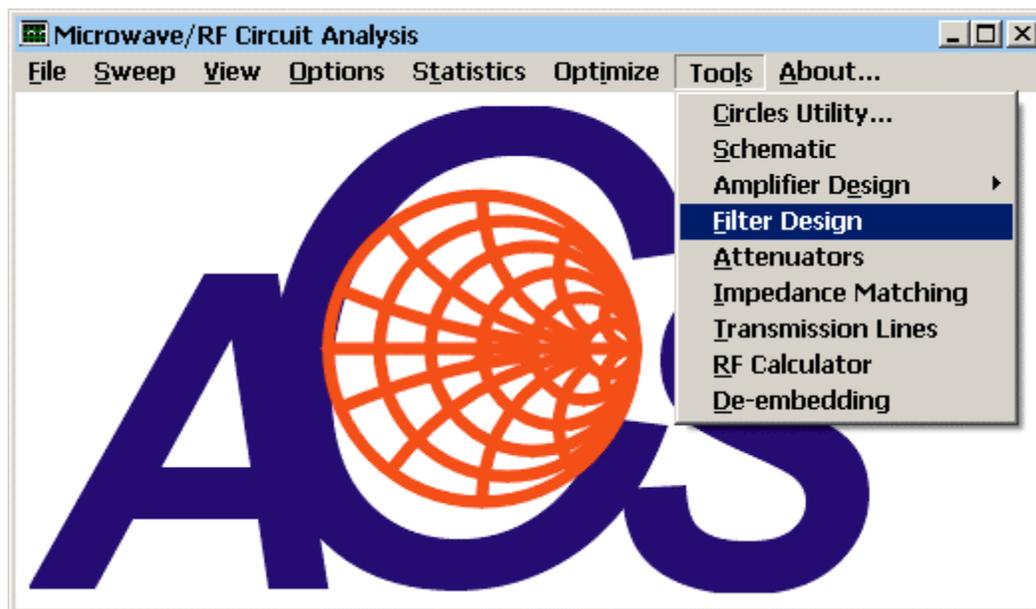


LINC2 FILTER Synthesis

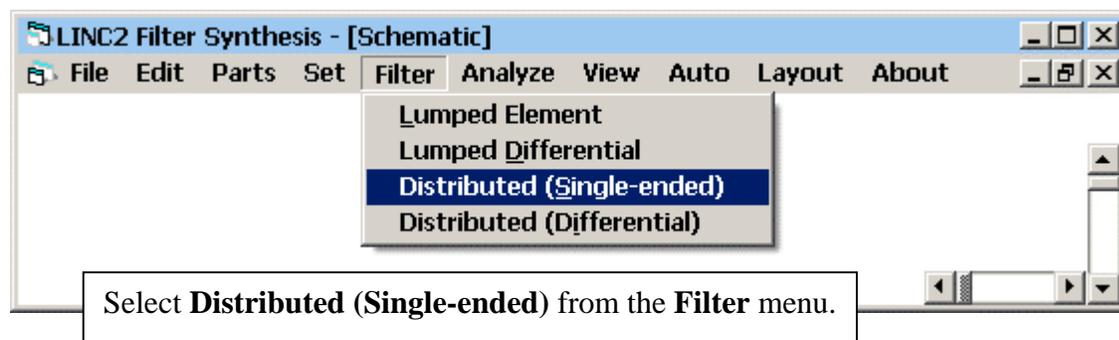


The LINC2 filter synthesis program is started by selecting **Filter Design** from the main LINC2 **Tools** menu as shown above.

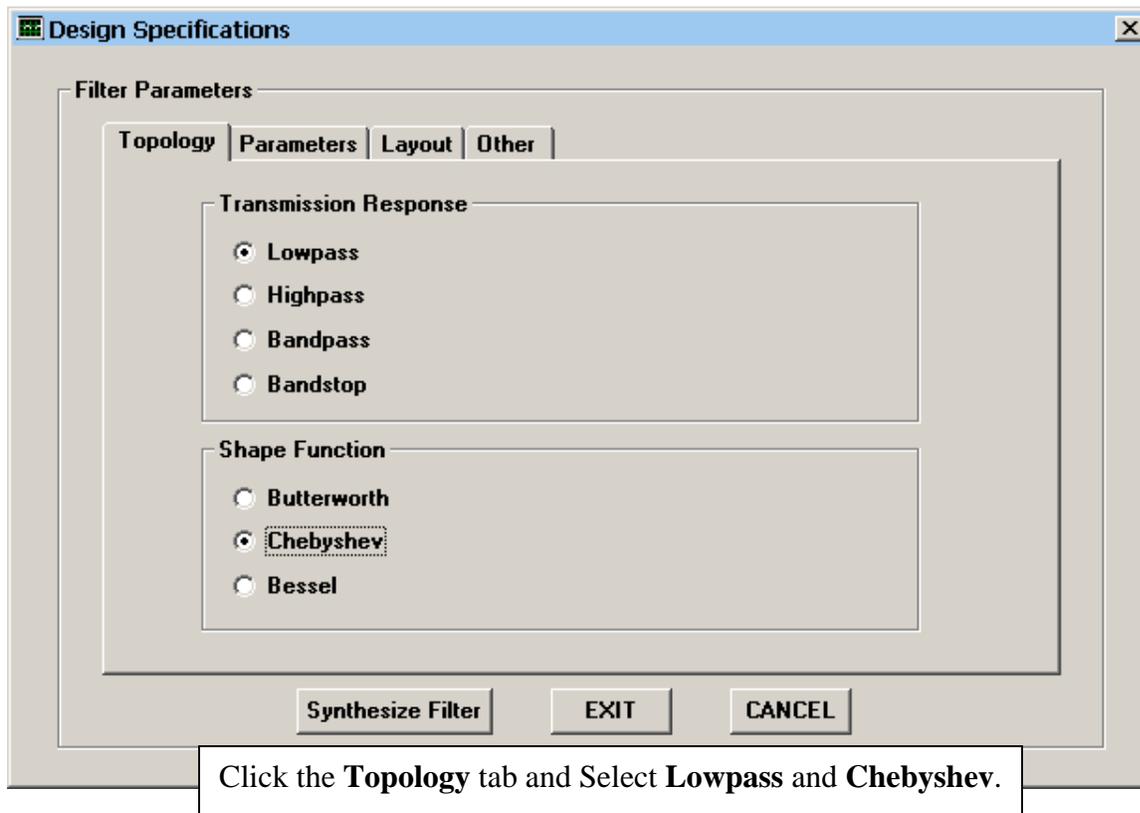
The initial filter synthesis process usually generates an ideal electrical schematic. When the schematic (with ideal elements) is converted to a physical layout, non-ideal attributes are often introduced that alter the desired filter characteristics. EM simulation can help the designer understand these changes so they can be compensated for in the original design (such as a shift in the frequency specification).

The following example will demonstrate how a 7th order distributed Chebyshev lowpass filter can be specified, synthesized, and exported to the Sonnet[®] EM simulator for analysis in a matter of minutes with only a few menu clicks and keystrokes.

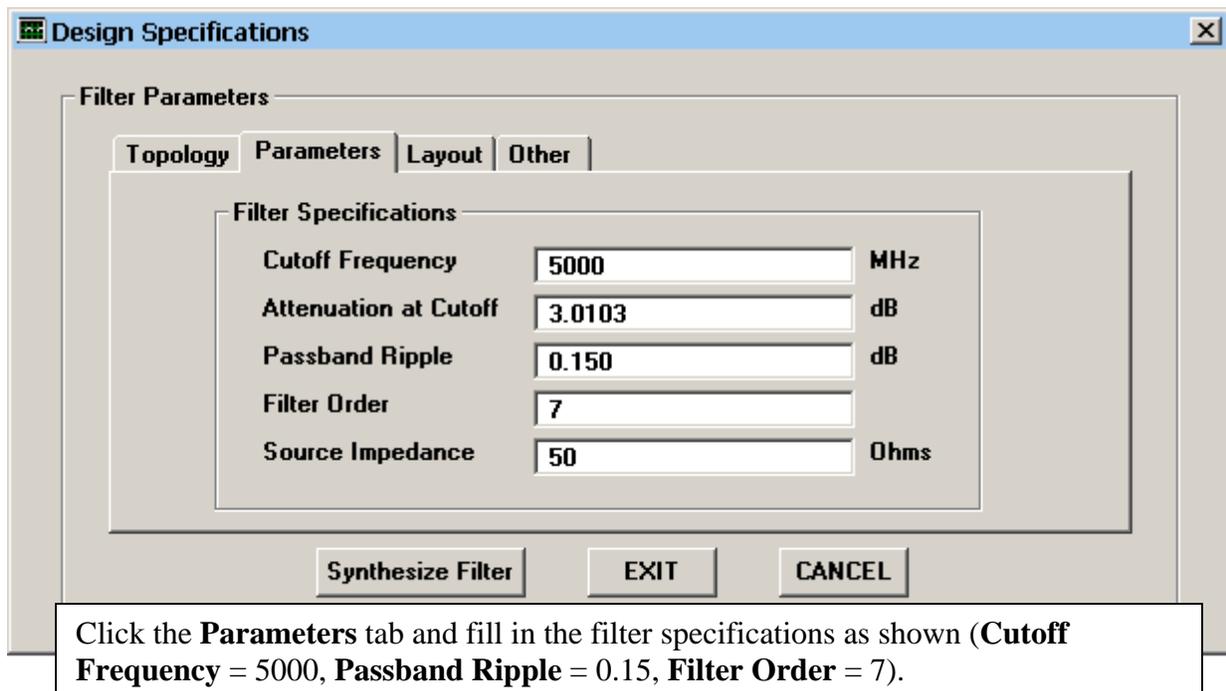
First, select **Distributed (Single-ended)** from the **Filter** menu:

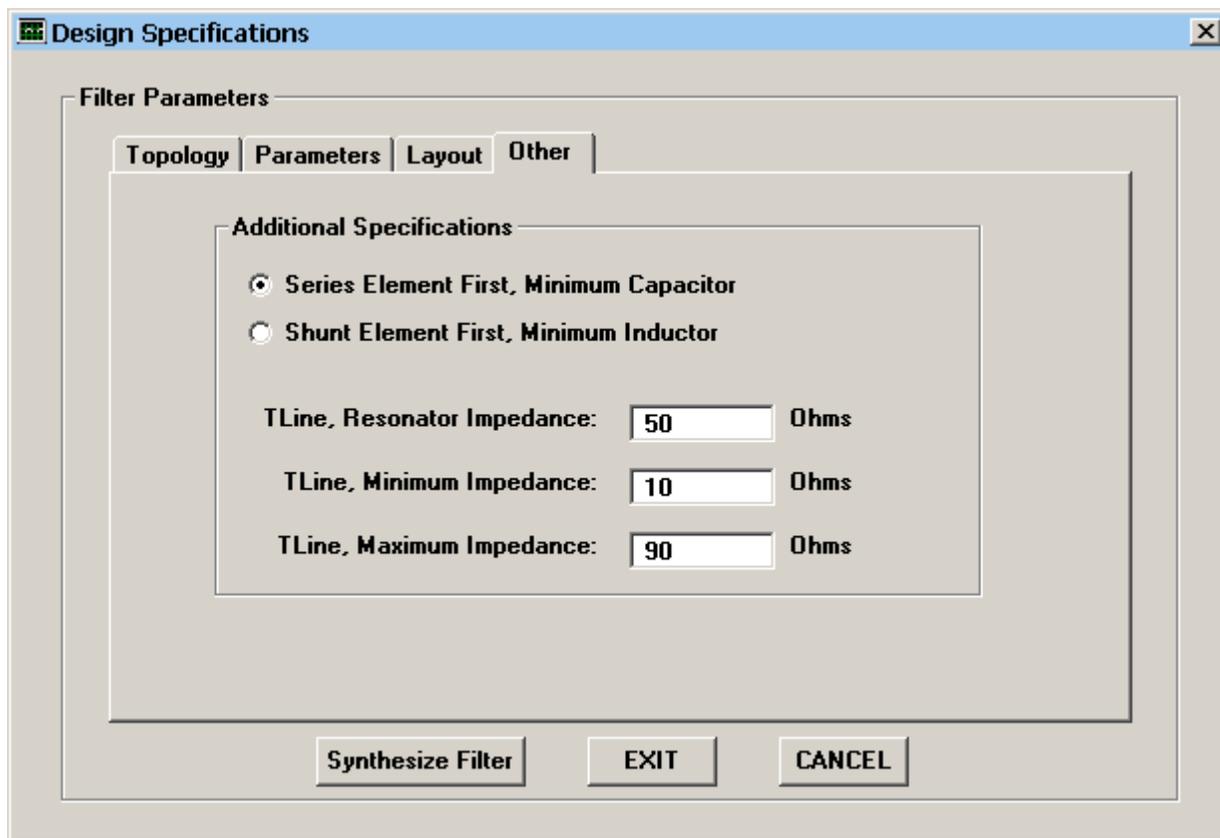


Click **Topology** and Select **Chebyshev Lowpass**.

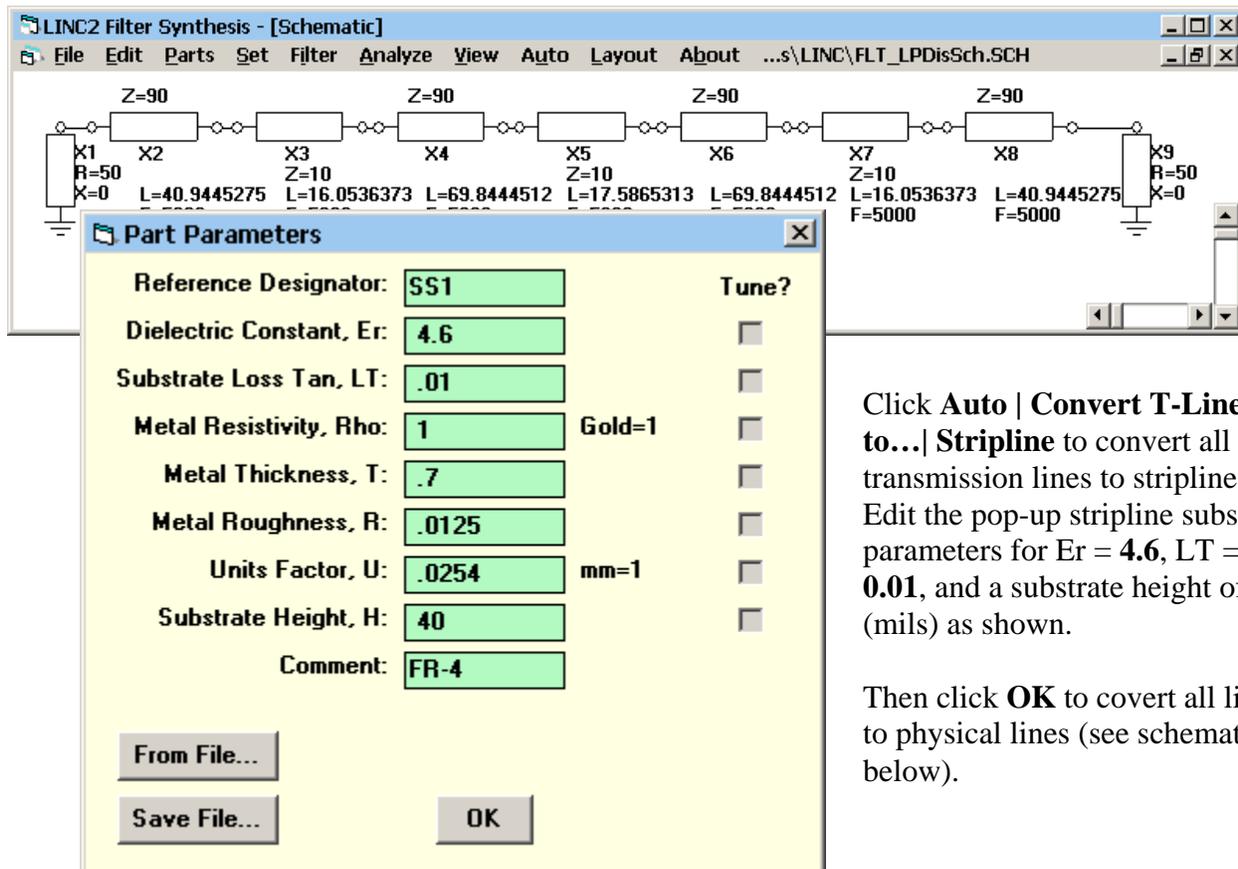


Enter the detailed filter specifications:



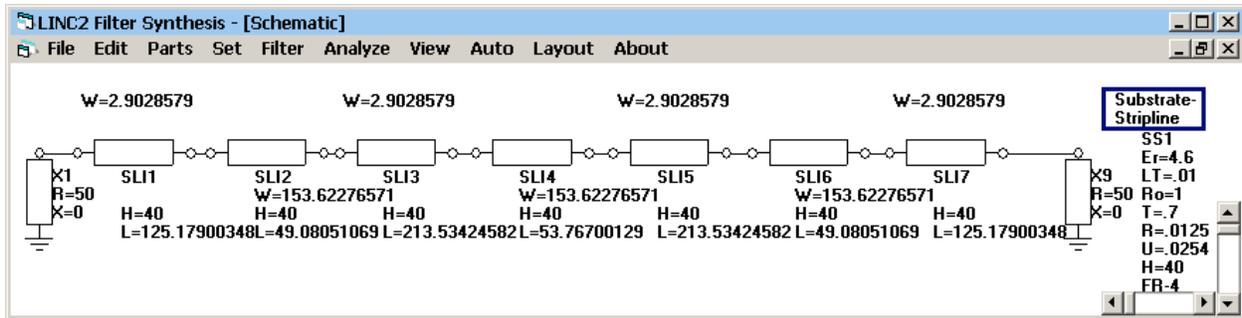


Click the **Other** tab and change the TLine (transmission line) minimum and maximum impedances to 10 and 90 ohms respectively. The filter specifications are now complete. Click the **Synthesize Filter** button and **Exit** to see the filter schematic (below).

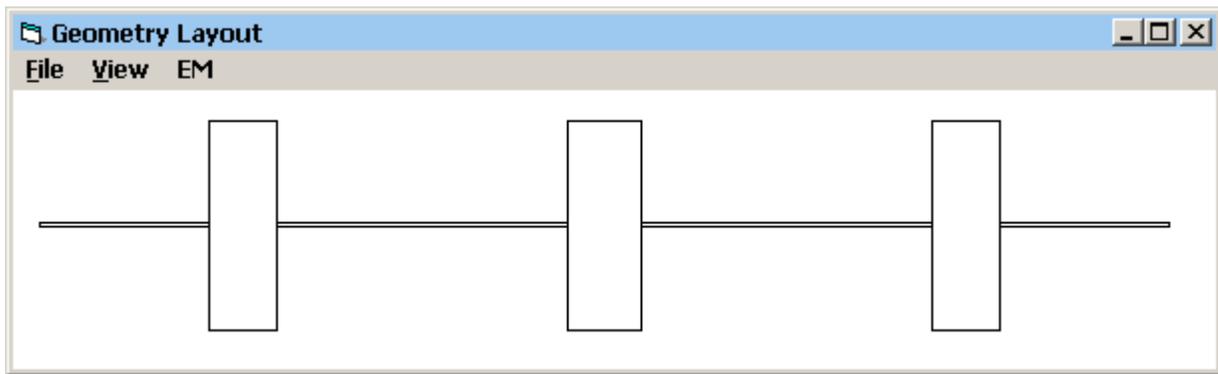


Click **Auto | Convert T-Lines to... | Stripline** to convert all transmission lines to striplines. Edit the pop-up stripline substrate parameters for $Er = 4.6$, $LT = 0.01$, and a substrate height of **40** (mils) as shown.

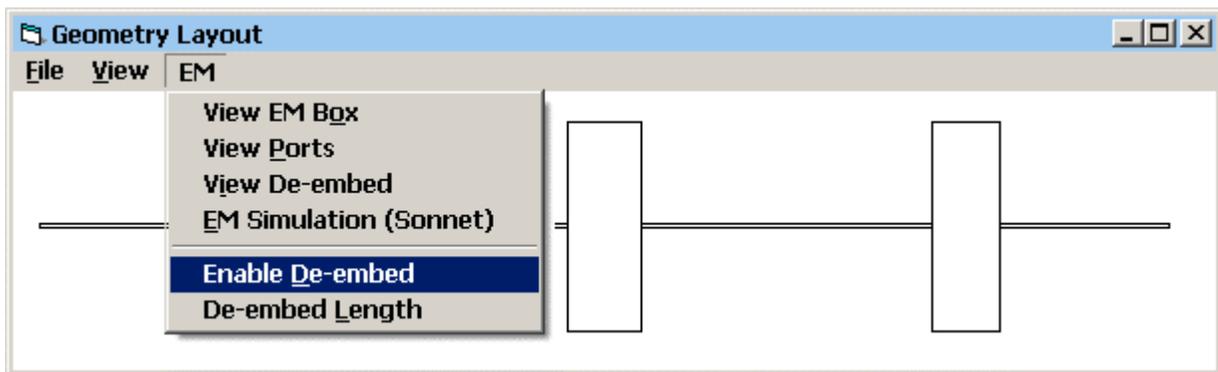
Then click **OK** to convert all lines to physical lines (see schematic below).



The resulting schematic is converted to all physical T-lines. Click **Layout** to see the layout geometry (below).

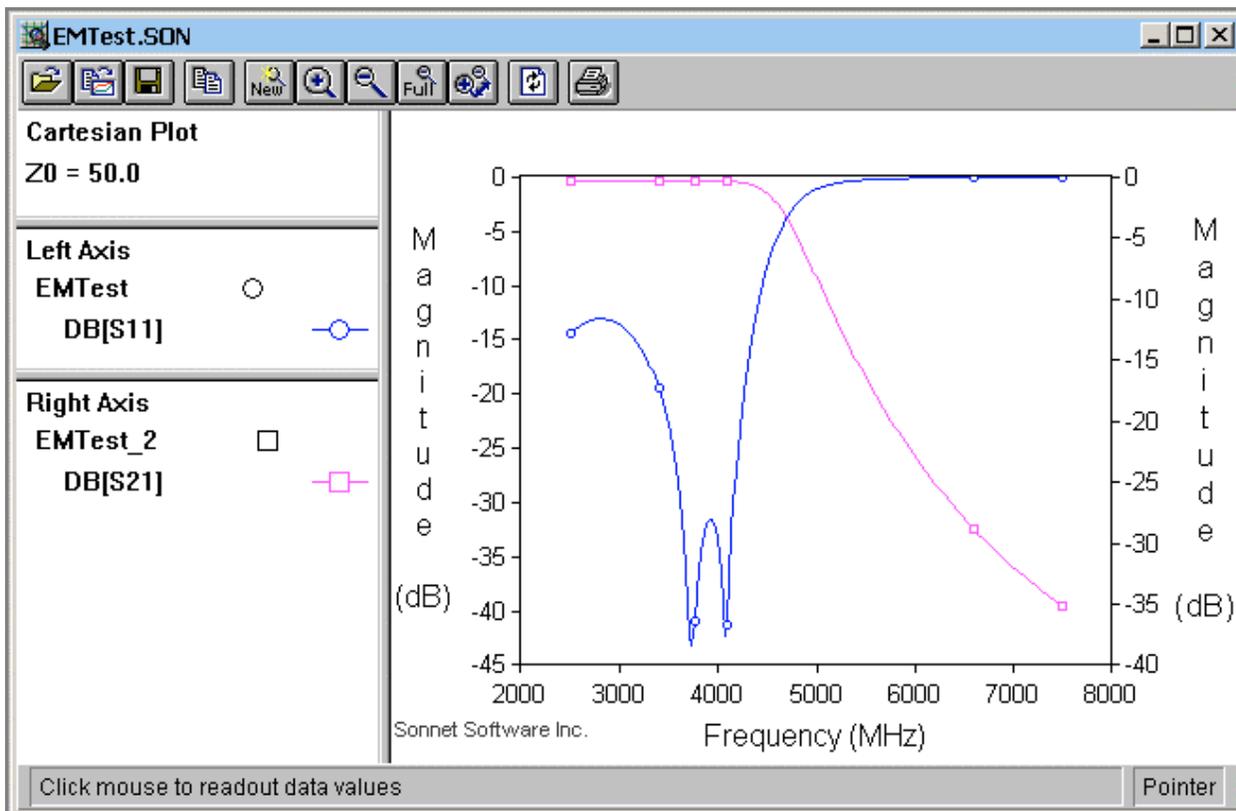
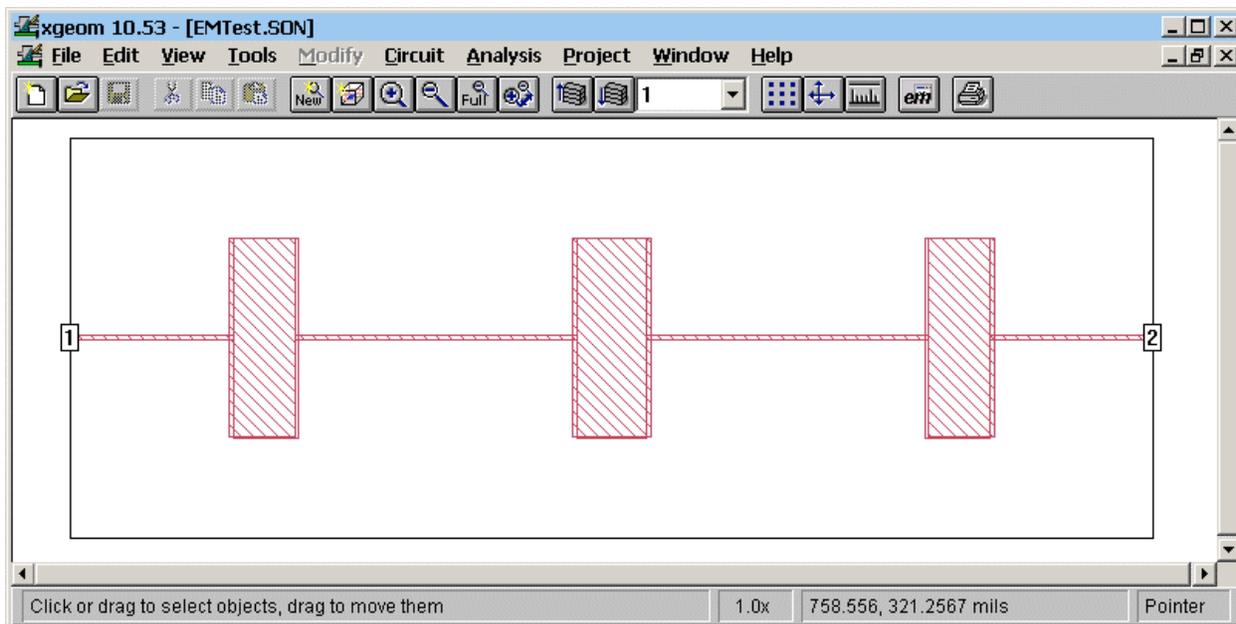


For this example, remove the de-embedding option by un-checking **De-embed Enabled** from the EM menu as shown below. Then select **EM Simulation (Sonnet)** from the EM menu.



When EM Simulation (Sonnet) is selected, the file EMTTest.SON is created and automatically exported to the Sonnet[®] xgeom project editor ready for analysis. The EM box, metal and substrate layers and frequency parameters are already loaded. The layout in Sonnet[®] is shown below.

Simply select **Analyze** from the Sonnet[®] project menu to run the simulation. When the simulation is complete, select **Project | View Response | New Graph** to get the response plots shown below.



The plot of S21 shows that the filter response is lowpass with a cutoff frequency slightly ahead of the 5000 MHz design goal. The insertion loss in the passband ranges between 0.3 and 0.4 dB, which is very close to the 0.15 dB passband ripple specified.

This filter example ran in a Sonnet[®] simulation using only 6 Mbytes of memory, which means that it would be able to run in all versions of Sonnet, including Sonnet Lite[®].

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