Network Synthesis

What's New with Network Synthesis

Examples and Videos

Using the Network Synthesis Wizard for a Power Amplifier

This is a load pull based example, in that the goals in the wizard are based directly on measurements for the load pull file in the project. Results are saved in the project, but you can re-run the synthesis, it only takes a few seconds to complete. Note that clicking on the various schematics in the User Folder in the project will show the results for that schematic. Also, the Smith graph with the contours shows the s-parameter result for the chosen schematic. This uses the S_Term measurement, in order to normalize to 5 instead of 50, making it easier to visually judge the results. The “Performance vs Frequency” rectangular graph uses our “G_LPINT2” measurement to show the results of output power and PAE across frequency. Test drive the project.

Your browser does not support HTML5 video.

Using the Network Synthesis Wizard to Match a Multi-band Antenna

This is a dual-band antenna (0.95-1.05 GHz and 3.6-4.4 GHz), which uses the NetMatch measurement to synthesize networks based on lowest possible mismatch loss. Results are again saved with the project. You can also re-synthesize, of course, but note that this one does take a few minutes to complete. Note that NetMatch is in terms of mismatch loss (rather than return loss). Thus, the goals are set to zero; the wizard is trying to minimize the mismatch loss. Test drive the project.

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Using the Network Synthesis Wizard to Match an interstage match

This is an x-band driver and power amplifier (10 - 12 GHz), which uses the NetMatch2 measurement to synthesize networks based on lowest possible mismatch loss. Results are saved in the project, but you can re-run the synthesis, it only takes a few seconds to complete. Note that NetMatch2 is in terms of mismatch loss (rather than return loss). Thus, the goals are set to zero; the wizard is trying to minimize the mismatch loss. Test drive the project.

Where can I learn about the Network Synthesis Wizard?

Documentation

What's New Guide for Network Synthesis

Frequently Asked Questions

I set a reasonable return loss goal, using the NetMatch measurement, but the wizard isn’t generating any usable networks.

NetMatch is in terms of mismatch loss, not return loss. For instance, set the goal=0 to try to achieve the best possible conjugate match. As another example, a goal of 0.49 dB would try to achieve the equivalent of 10 dB return loss. The "synthesis_wizard_multiband_antenna" example below uses NetMatch.

Ok, so I understand that we’re optimizing for mismatch loss, but I don’t have a way of measuring this directly after synthesizing networks.

The S_Term measurement can be used to see this….in fact, an S_Term measurement will be automatically generated on a rectangular graph if the “Add performance measurements” box is checked on the Results tab of the wizard.

I have a power amplifier and want to create matching networks that will achieve my specific performance goals, not just generate conjugate matches.

Use the Load_Pull or Load_Pull_A measurement. These will allow you to set performance targets directly, based on a measured or simulated load pull file for your device. See the "synthesis_wizard_PA_aligned" example below.

I have a multi-band design, is there a way to create goals for each band?

Yes, goals can be set for sub-bands by unchecking the “Min” and/or “Max” boxes in the Optimization Goal dialog. Note that when doing multi-band problems, it’s useful to customize the “Frequencies for initial search” on the Search Options tab. The "synthesis_wizard_multiband_antenna" example uses this approach.

The wizard generated some networks that meet my goal at the edges of my band of interest, but not in the mid-band.

Check the “Frequencies to match” list on the Synthesis Definition tab. The wizard will only consider frequencies that are in this list. So, it may be necessary to add additional frequencies points between the band edges, particularly for problems that are broadband in nature.

My manually generated matching network with real components gives better return loss than any of the synthesized networks.

This is possible since we’re synthesizing based on mismatch loss. Consider for instance that any series resistance will improve the return loss without necessarily improving the mismatch loss.

I have a power amplifier and want to set Smith Chart target goals for multiple harmonics.

You can use theHarmAreaMatchmeasurement for this, which will allow you to define an area on the Smith Chart for a given harmonic.

Can I have the synthesis wizard generate a matching network that matches to multiple networks? This would be common for say a Doherty amplifier configuration.

Yes, this is achieved by making goals for both of the impedance you are trying to match to. The wizard will then attempt to find networks that match all of the specified impedances simultaneously.