IEEE802.3ap

Channel Model Ad Hoc

S-Parameter Cascading for Channel Model

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Overview

Problem

Present channel quality criteria doesn't correlate with BER during simulations

Perceived Reason

Re-reflections caused by impedance mismatches of the individual channel components is causing system level (state flow) losses not visible with individual component analysis

Possible Remedies

- **Cascaded component analysis and simulation**
- **Re-reflection Pulse Analysis of channels (moore_01_1104)**
- **Correlate StatEye BER to Re-reflection Pulse Analysis**

Cascading S-Parameters

1. Used ADS (Agilent's Advanced Design System) to input the individual .s4p files for a TX package, a linecard / backplane / linecard, a coupling capacitor, and an RX package

2. Created a schematic that cascades the individual .s4p files with Ad Hoc port conventions

3. Added an S-Parameter simulation that stimulates the cascade to generate a global .s4p file

4. This could be iterated with every component permutation

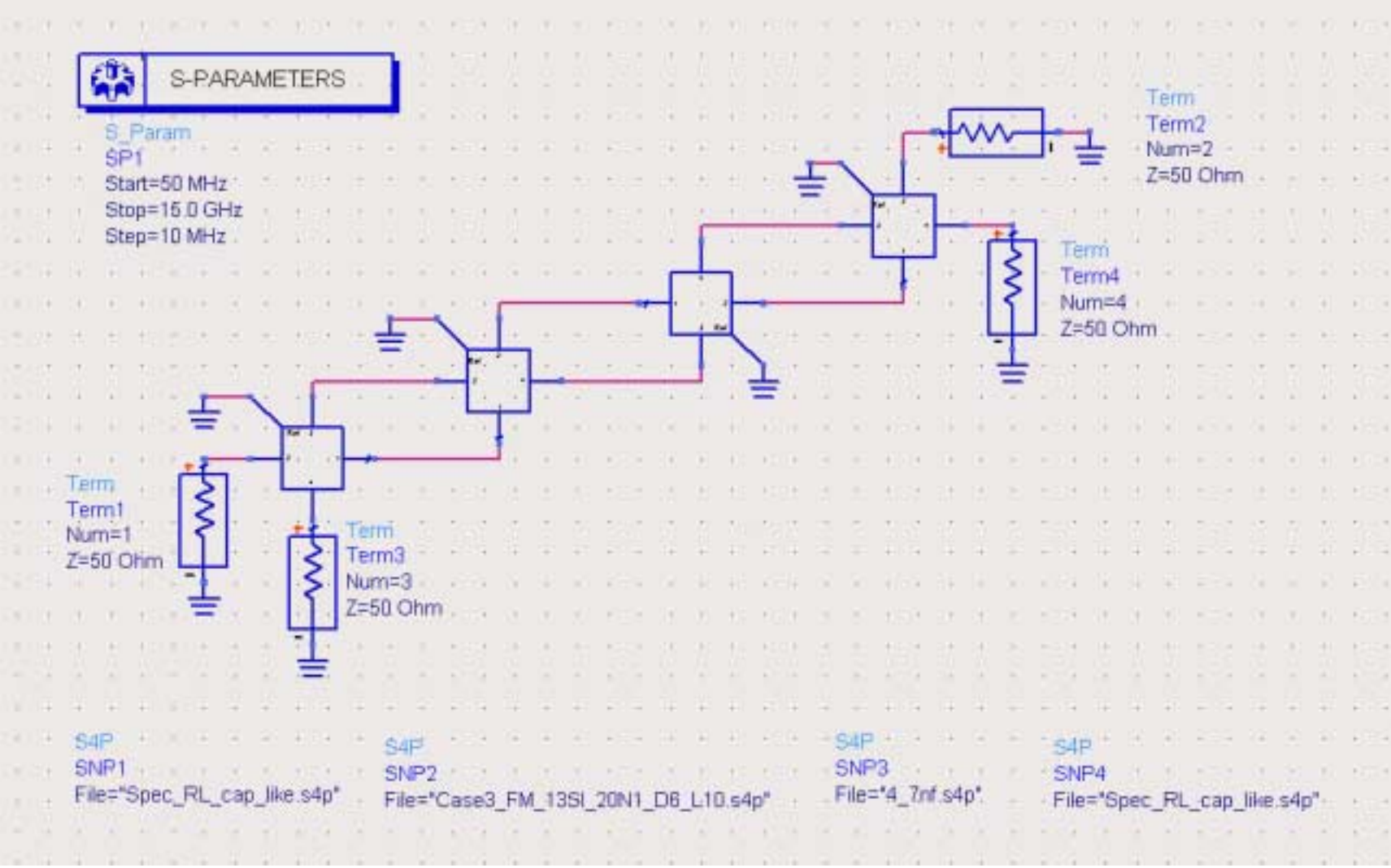
5. For this proof of concept, I used:

    a. Rich's Spec_RL_cap_like.s4p for the package

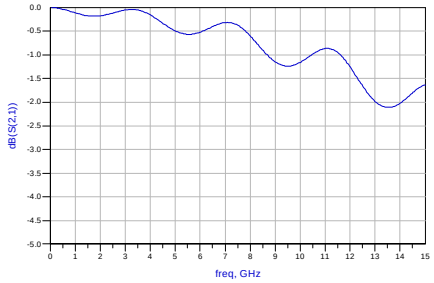
    b. John's Tyco thru channel data for the backplane

    c. My 4_7nf.s4p for the coupling capacitor

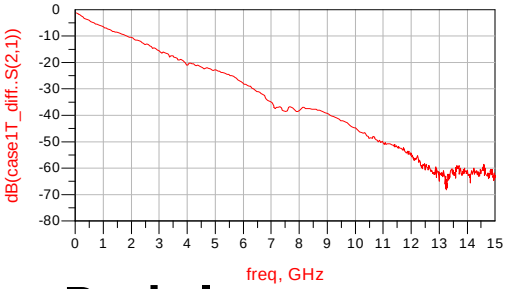
Example ADS Cascading Schematic



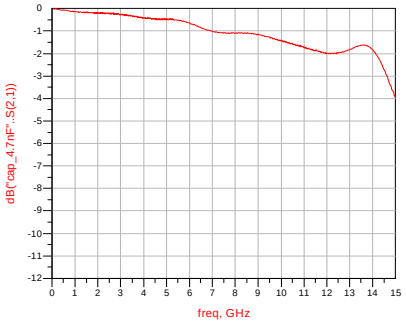
SDD21 and SDD11 of Channel Sections



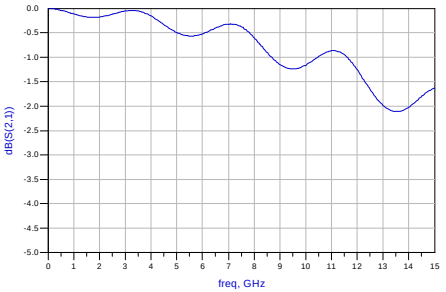
Package SDD21



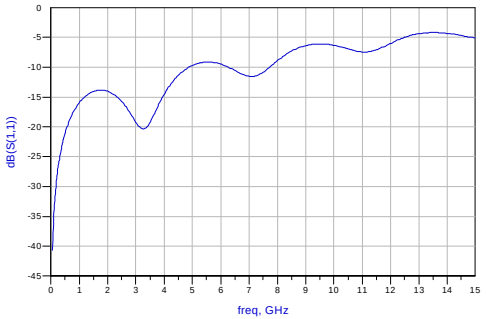
Backplane + linecards SDD21



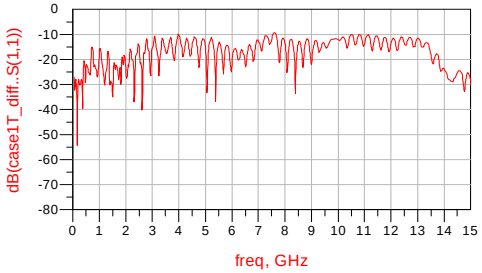
Coupling cap SDD21



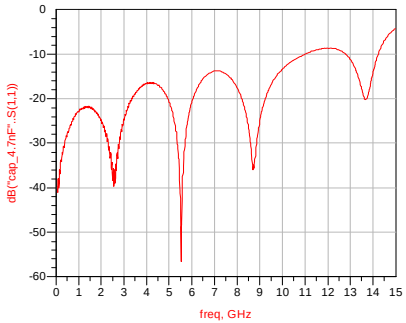
Package SDD21



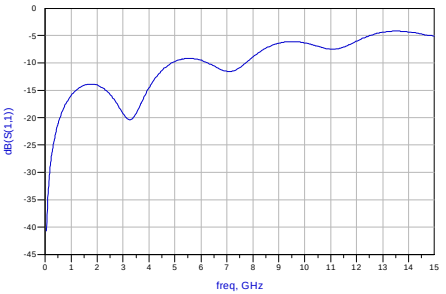
Package SDD11



Backplane + lincards SDD11

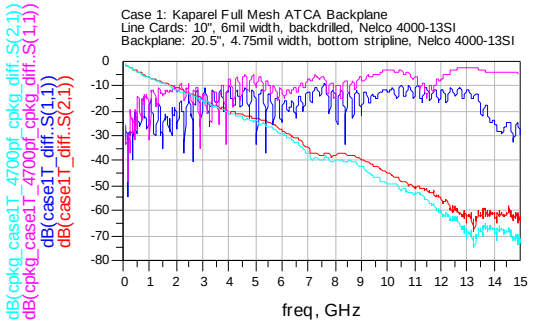


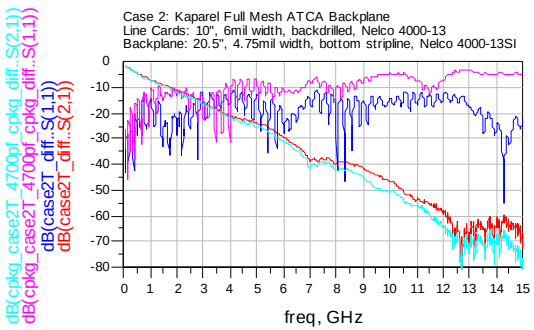
Coupling cap SDD11

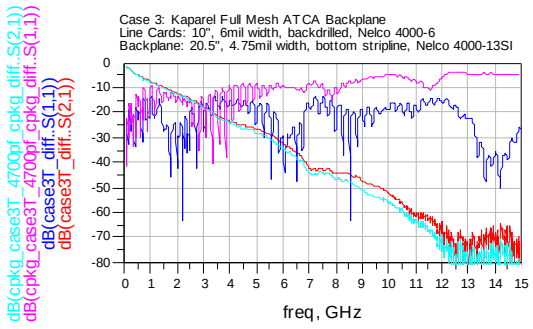


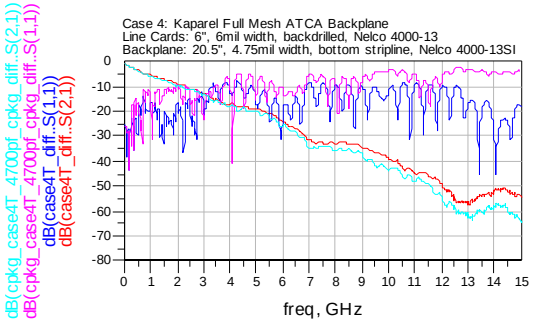
Package SDD11

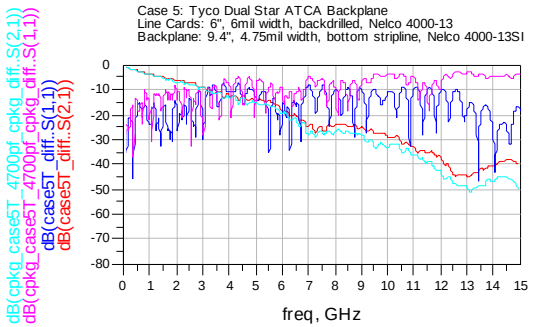
SDD21 & SDD11 of Backplane vs. Cascade

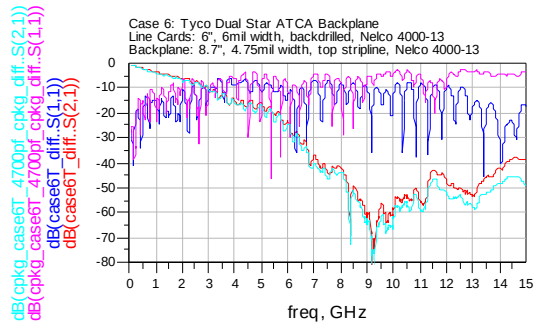


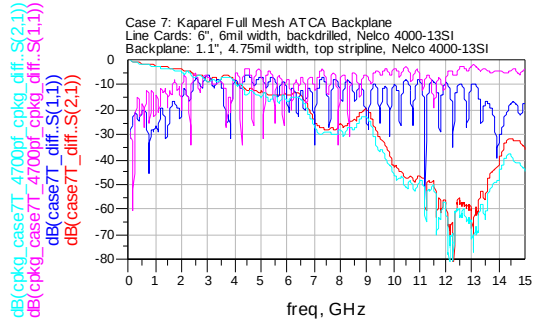












Conclusions

- For insertion loss, the cascaded S-parameters were a few dB worse than the backplane and lossier with frequency increase.
- For return loss, the cascaded S-parameters were consistantly worse especially at high frequencies. The consistency is due to the accumulated IR losses of the cascaded system.
- StatEye BER testing remains to be completed.
- Re-reflection Pulse Analysis remains to be completed.
- Correlation between StatEye and Re-reflection Pulse Analysis remains to be completed.