Cable Host Board representation

Liav Ben-Artsi – Marvell Technology Group

Supporters

- Mike Dudek – Qlogic
- Adee Ran – Intel Corporation
- Charles Moore – Avago Technologies

Background

- In reference to "802.3bj Draft 2.0 Copper Cable Specifications VS COM Simulations" presentation - dudek_3bj_02_0513, a representation of the cable host board trace is required.
- The Package insertion loss and return loss use the following representation for 1mm traces (as recommended in Benartsi__3bj_01a_0513 and concatenated to the required length by a methodology presented in eq: 93A–11 & 93A-12).

$$S_{11} = S_{22} = \rho_0 + \rho_1 * f + \rho_2 * f^2 + \rho_3 * f^3 + \rho_4 * f^4$$

$$S_{21} = S_{12} = \exp(\gamma_0 + \gamma_1 * \sqrt{f} + \gamma_2 * f + \gamma_3 * f^2)$$

- It is suggested to use the same methodology (and reference the same equations) for representation of the cable host board trace.

Host Board Representation

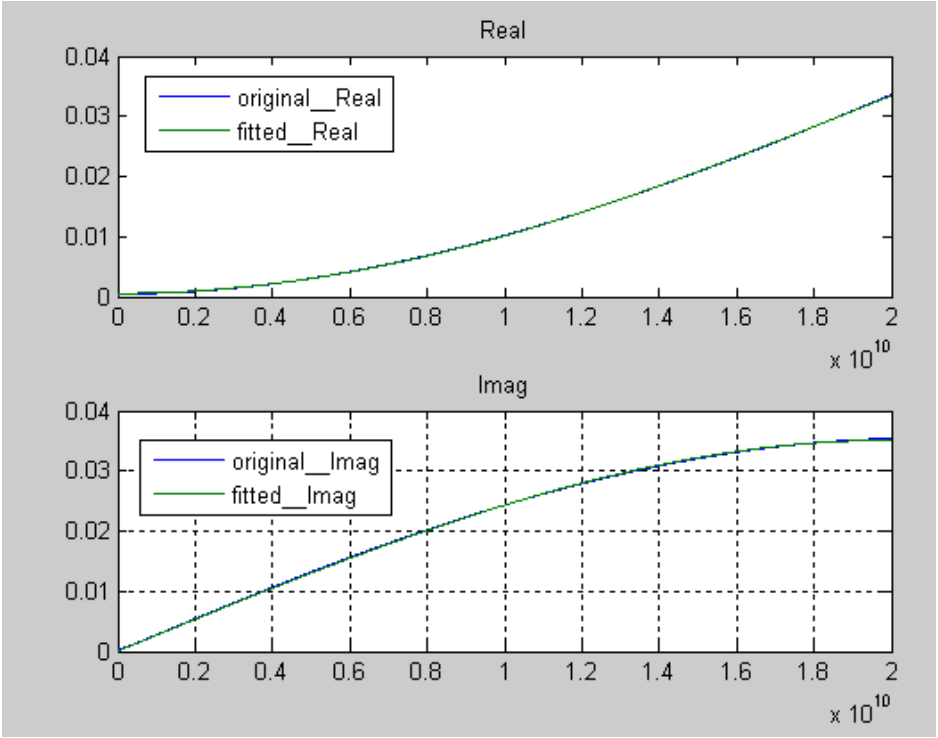
- Below is the fit results of a 1mm host board trace.

$$S_{11} = S_{22} = \rho_0 + \rho_1 * f + \rho_2 * f^2 + \rho_3 * f^3 + \rho_4 * f^4$$

$$S_{21} = S_{12} = \exp(\gamma_0 + \gamma_1 * \sqrt{f} + \gamma_2 * f + \gamma_3 * f^2)$$

-

In the graphs:
Return Loss Imag and Real fitting.
HFSS (Original) vs. Fitting result



Suggested Remedy - Results

- The suggested coefficients provide one insertion and return loss representation of the host board, while using 185x1mm sections:

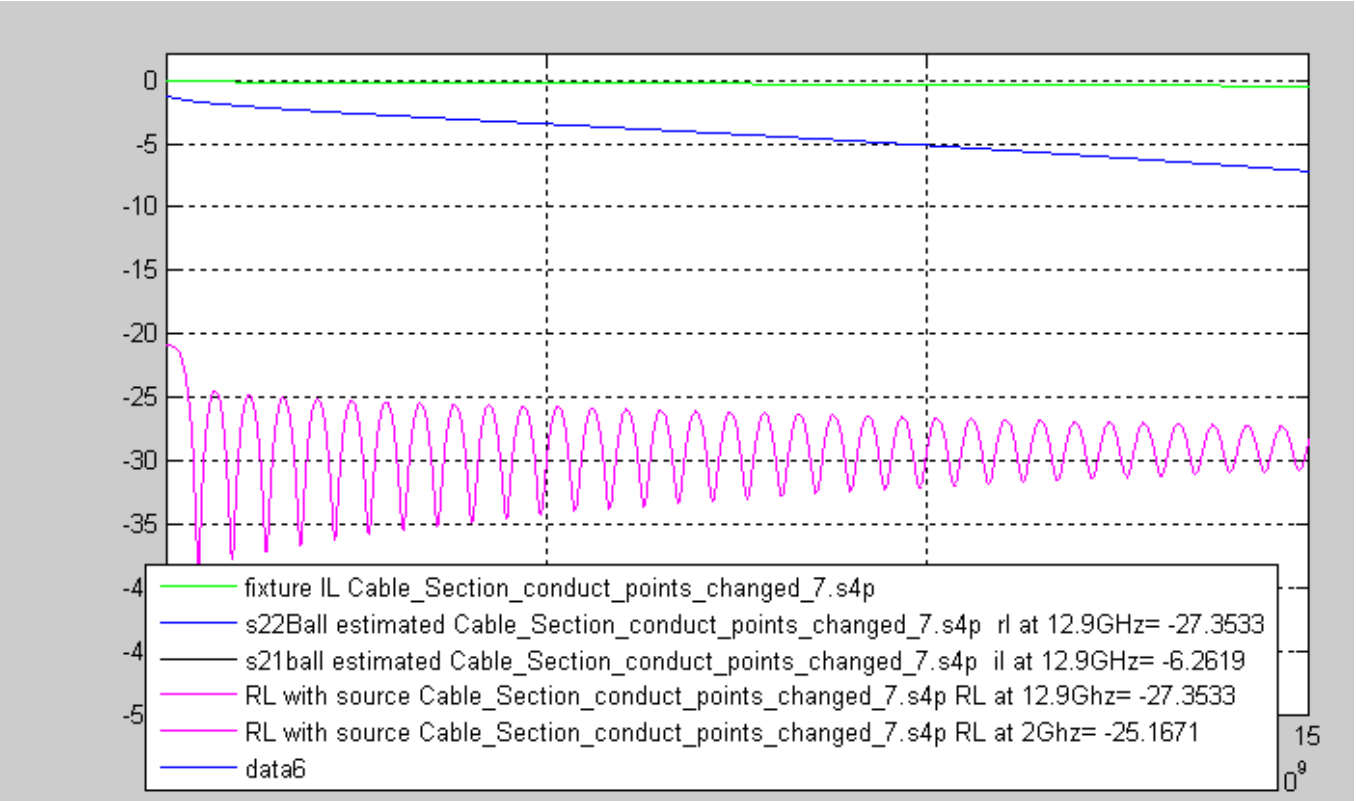


Table1 – Cable Host Board Coefficients

Gamma0	-6.69E-4	---
Gamma1	-5.8E-4 -1.572E-4i	1/GHz^(1/2)
Gamma2	-1.297E-06 -37.203E-3i	1/GHz
Gamma3	-6.78E-06 -1.514E-06i	1/GHz^2
Roh0	5.63643E-4	---
Roh1	-1.111E-18 +2.654E-3i	1/GHz
Roh2	9.975E-5 +7.218E-20i	1/GHz^2
Roh3	4.718E-21 -2.252E-06i	1/GHz^3
Roh4	-4.404E-08 -4.404E-08i	1/GHz^4
Sections	185	

Thank You!