SPE Multidrop Enhancements Mixing Segment Considerations Update

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Background

- **IEEE P802.3da Task Force Work Items**
  https://www.ieee802.org/3/da/workitems/index-word.html

Mixing Segment	specifications (IL, RL, mode conversion, etc.), MDI specs (tighter than CG?)
MDI + stub	connection (inductance, capacitance, resistance)

- **Follow-on July 2020 Single Pair Multidrop Considerations**
  - **https://www.ieee802.org/3/da/public/jul20/diminico_SPMD_01_0720.pdf**

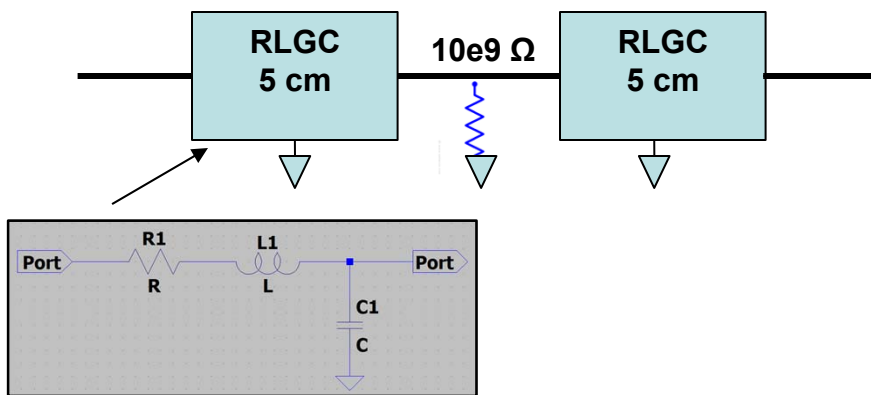- **Follow-on November 2020 Single Pair Multidrop Considerations**
  - **https://www.ieee802.org/3/da/public/111820/diminico_SPMD_01_1120.pdf**
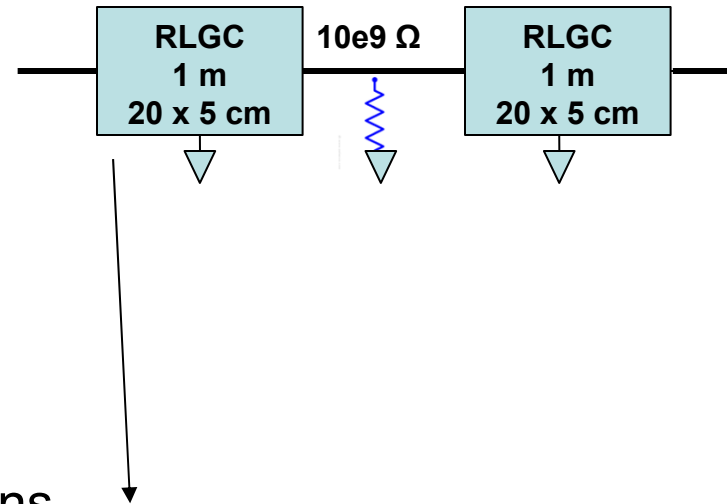
Contributors

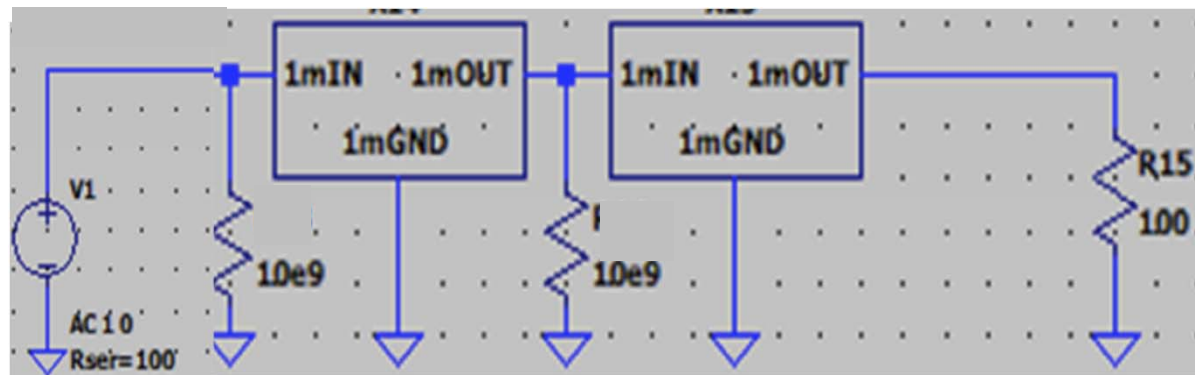- **Paul Wachtel, Bob Voss, Ron Nordin – Panduit**

Analysis Cable Model
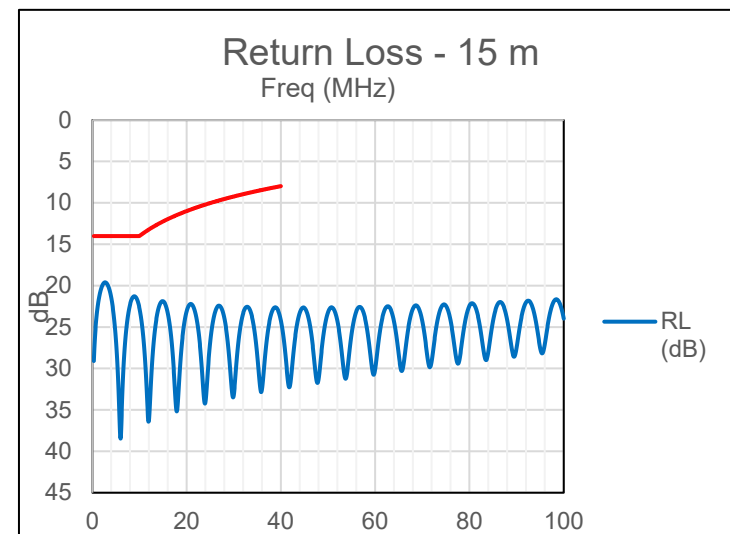
- 5 cm RLCG

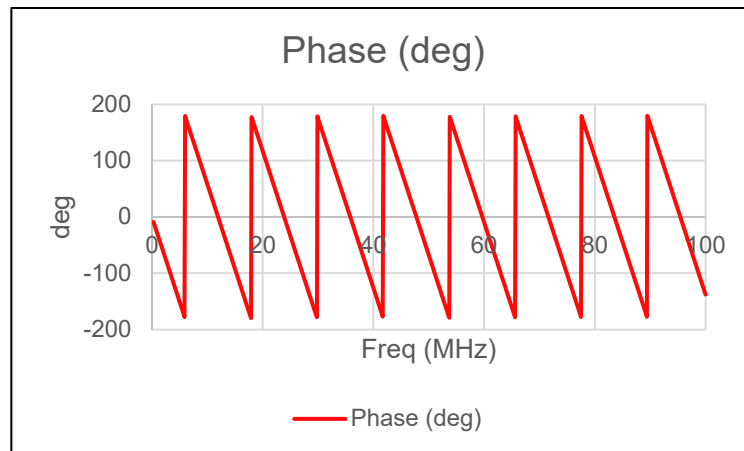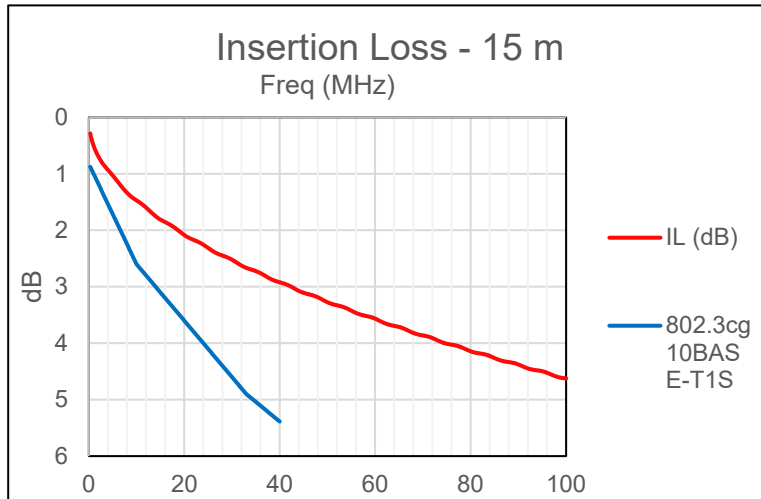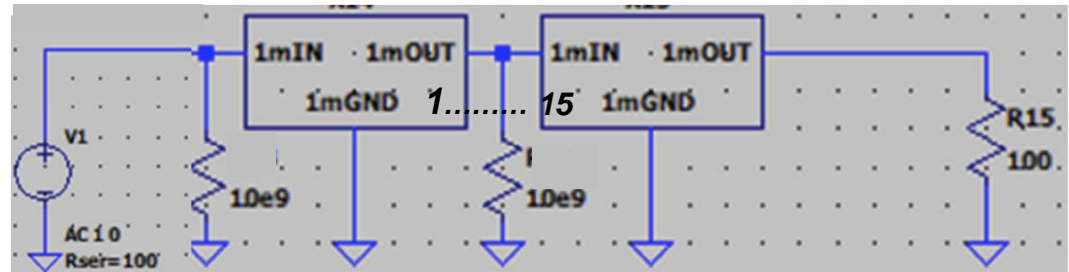- Concatenate 20*5 cm RLCG - 1 m

- Spice model 1 m cable sections

Analysis Cable model – 15 meters

- ## 1 m - 15 sections

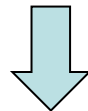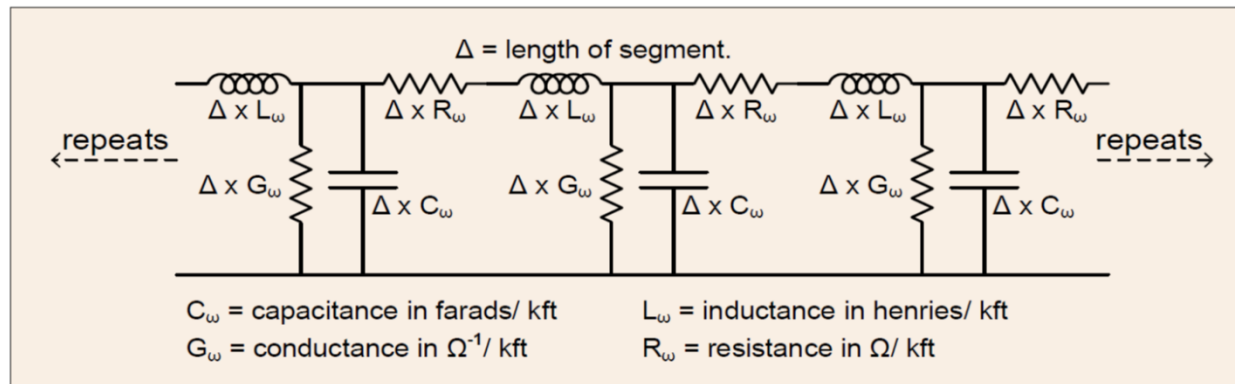

Insertion Loss - 15 m

Return Loss - 15 m

Phase (deg)

Consistent with >>10SPE Study Group Automotive Channel for Multi-Drop Stefan Buntz, Daimler AG
http://www.ieee802.org/3/10SPE/public/adhoc/buntz_10SPE_03_1005.pdf

Analysis Cable model

- SPICE's built in transmission line models or lumped component sub-circuit approximations not sufficient for transient analysis
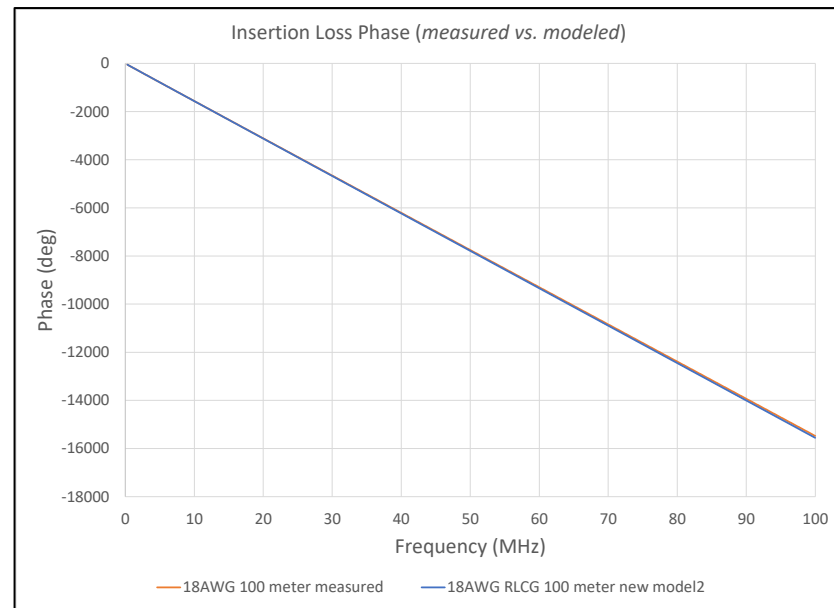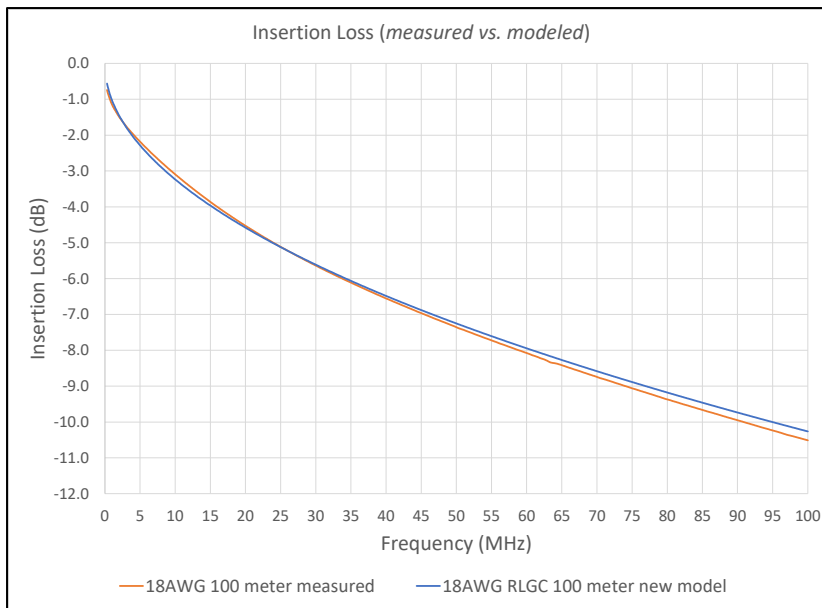

Δ = length of segment.

$\Delta \times L_\omega$ $\Delta \times R_\omega$ $\Delta \times L_\omega$ $\Delta \times R_\omega$ $\Delta \times L_\omega$ $\Delta \times R_\omega$

repeats ←- - - - - -

$\Delta \times G_\omega$ $\Delta \times C_\omega$ $\Delta \times G_\omega$ $\Delta \times C_\omega$ $\Delta \times G_\omega$ $\Delta \times C_\omega$

repeats - - - - - →

C_ω = capacitance in farads/ kft
G_ω = conductance in Ω^{-1}/ kft

L_ω = inductance in henries/ kft
R_ω = resistance in Ω/ kft

**SPICE Simulation of Transmission Lines
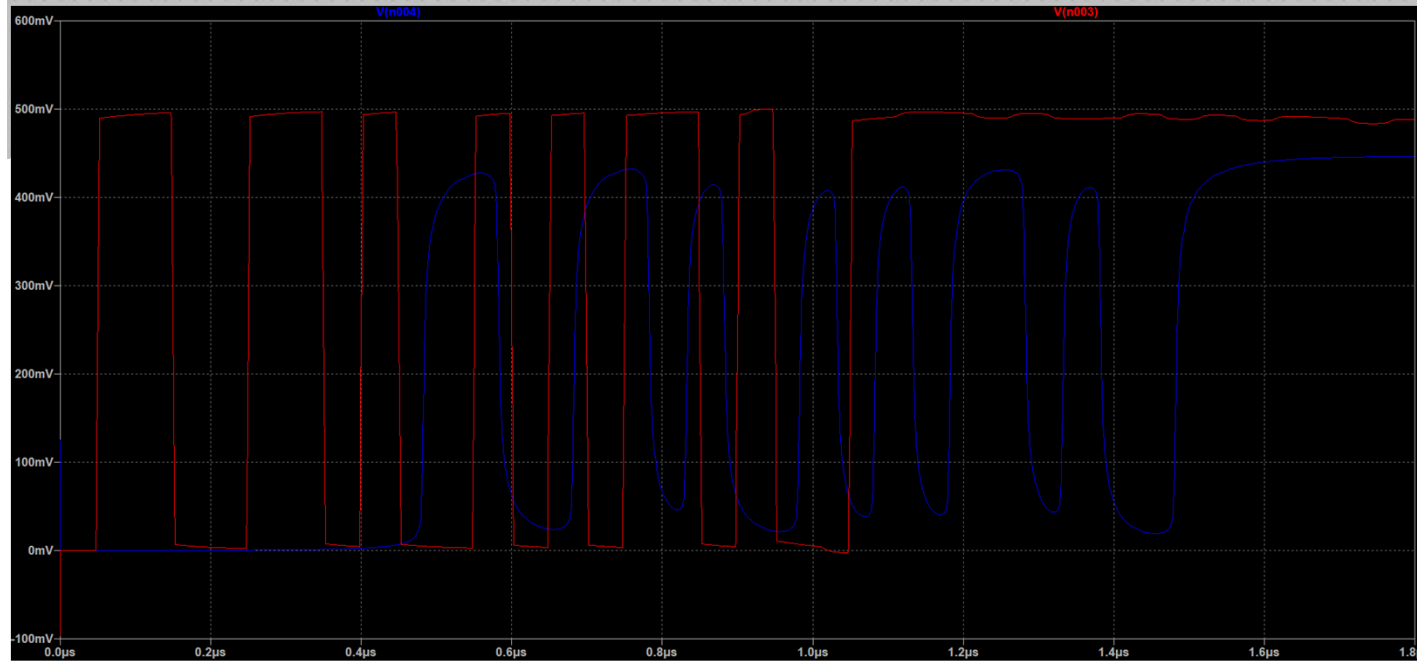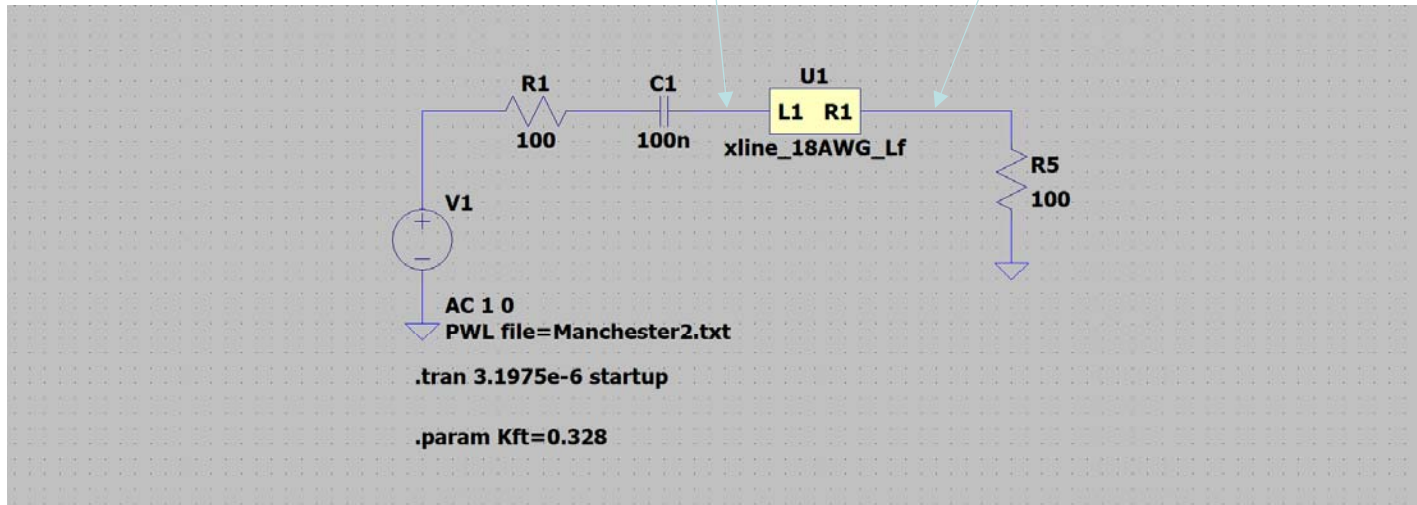by the Telegrapher's Method**
https://www.eetimes.com/spice-simulation-of-transmission-lines-by-the-telegraphers-method-part-1-of-3/

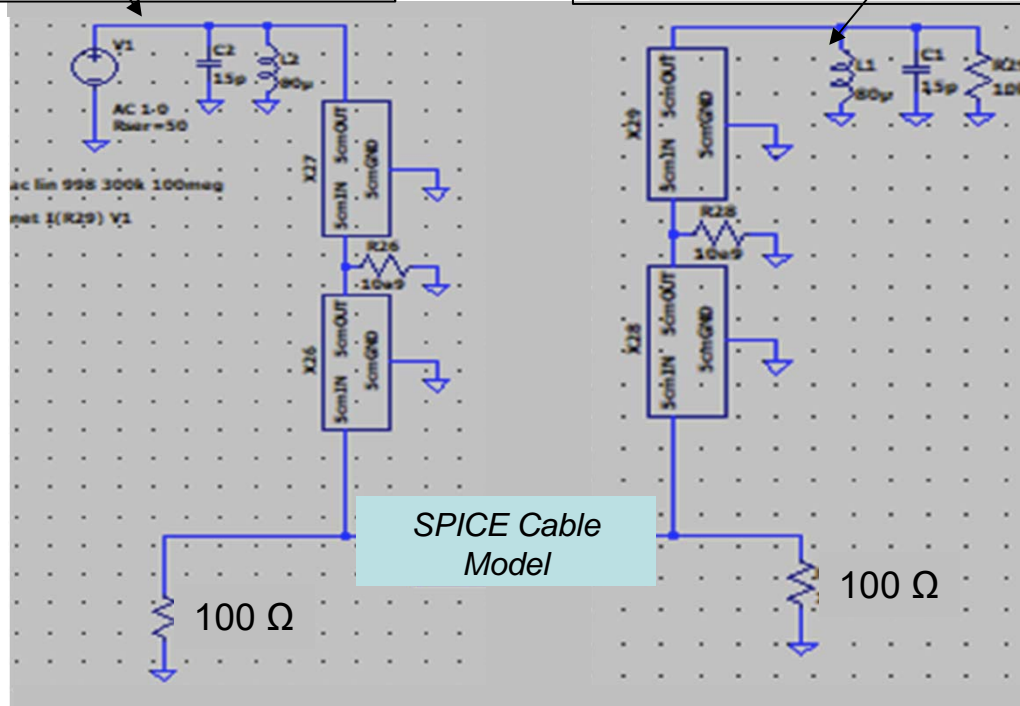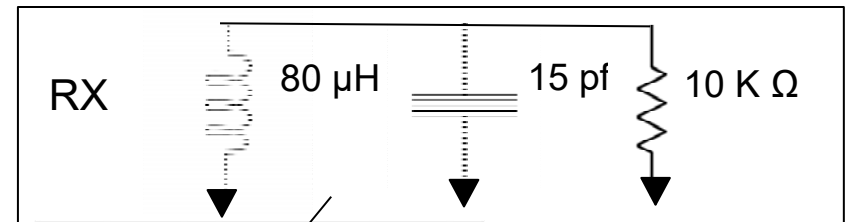# Analysis Cable model – New
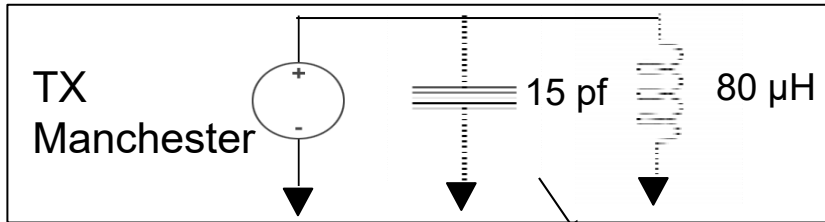
- ## SPICE Circuit Model

Analysis Cable model

10 Mb/s SPMD Enhancement TG

Source and Load with PoDL

SPICE Cable
Model

Summary recommendations

- Cable spice model introduced
- Analysis to follow

10 Mb/s SPMD Enhancement TG