

Approach for Link Segment Transmission Parameter Definition

Bert Bergner (TE Connectivity),
Eric DiBiaso (TE Connectivity), Chris Mandel (TE Connectivity)

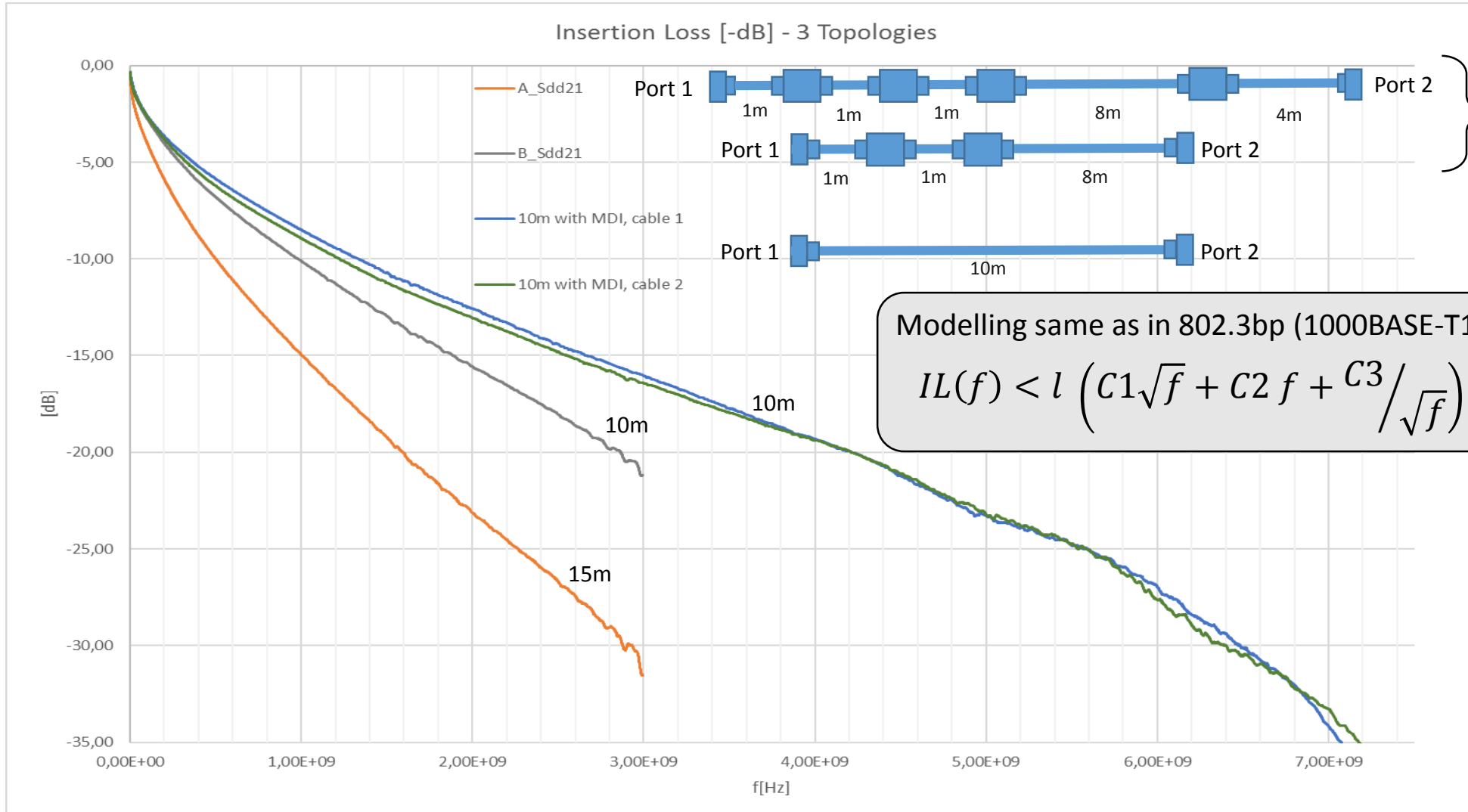
Supporters: Wayne Hopkinson (Commscope), Masood Shariff
(Commscope), Harsh Patel (Molex), Ricky Vernickel (LEONI)

IEEE 802.3ch Multi-Gig Automotive Ethernet PHY Task Force
Jan-25, 2018 – Interim Meeting – Geneva, Switzerland

Motivation – Modeling Approach for IL & RL

- Provide link segment measurement results with new components expanding upon previously presented data from existing automotive cabling and connectors
- Propose modeling approach for insertion loss and return loss link segment definitions
- Discuss possible next steps

Link Segment Insertion Loss



See DiBiaso_3ch_01a_0917.pdf

Modelling same as in 802.3bp (1000BASE-T1):

$$IL(f) < l \left(C1\sqrt{f} + C2 f + C3 / \sqrt{f} \right) + n \cdot C4 \sqrt{f} + C5\sqrt{f}$$

Link Segment Insertion Loss

- Modelling used in 802.3bp (1000BASE-T1) seems appropriate:

$$IL(f) < l \left(C1\sqrt{f} + C2 f + \frac{C3}{\sqrt{f}} \right) + n \cdot C4 \sqrt{f} + C5\sqrt{f}$$

Cable length

Cable parameter

- Conductive loss
- Dielectric loss

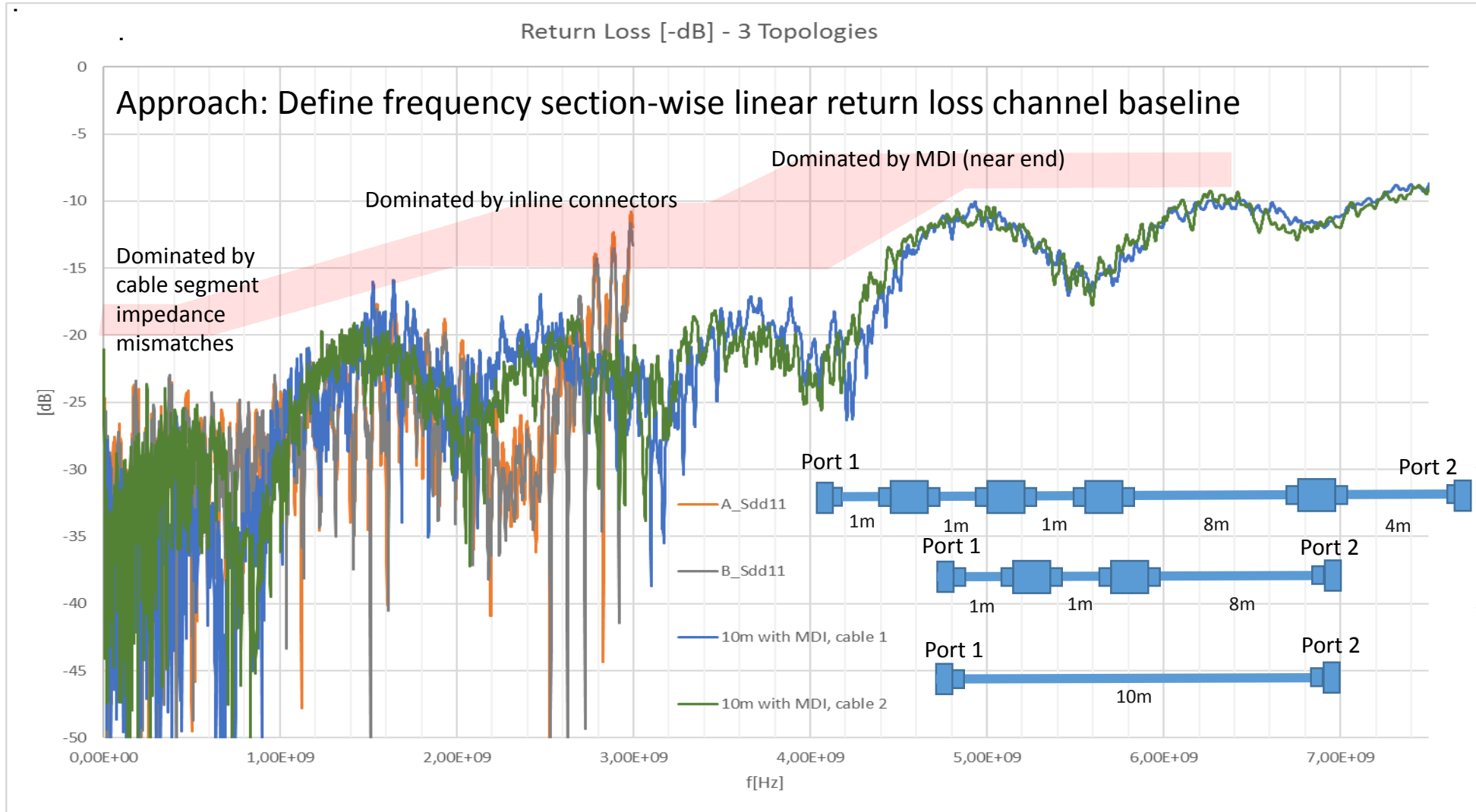
Connector Loss

Reflected power (caused by return loss)

Number of connectors

- Approach: Find reasonable values for C_x .

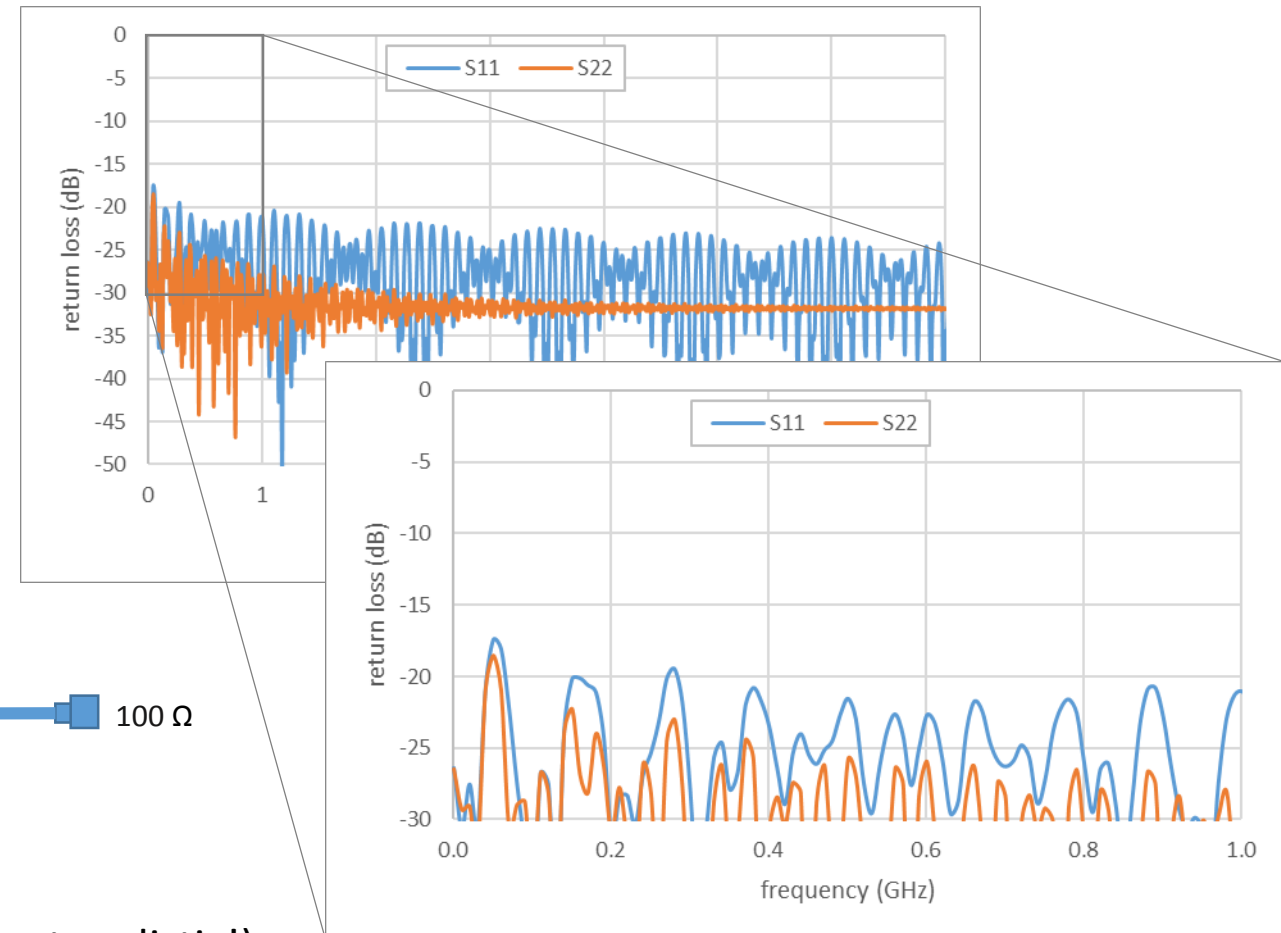
Link Segment Return Loss



See
DiBiaso_3ch_01a_0917.pdf

Impact of Cable Segment Impedance Mismatch

- Simulation based on deterministic cable model
- No connectors
- Ideal termination with $100\ \Omega$
- Alternating cable impedance $\pm 5\ \Omega$



(The 0.25 – 0.25 – 0.25 – 0.25 – 0.25 topology is worse but not realistic!)

Conclusions

- Insertion loss baseline model approach used in 802.3bp seems appropriate for higher frequencies
- Insertion loss model parameters C_x need to be proposed by cable and connector analysis
- Tolerances and environmental degradation are important and need to be considered
- Return loss baseline can be defined section-wise versus frequency
- Mixed approach for RL definition seems appropriate:
 - Simulation for worst case assessment at lower frequencies
 - Measurements for higher frequencies

Proposed Next Steps

- Propose Cx parameters for the insertion loss baseline model
- Provide simulation results and measurements for the return loss baseline and discuss realistic worst case topologies
- Propose reasonable maximum frequency

Thank You!!!