SPE Multidrop Enhancements
Mixing Segment Considerations

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Background

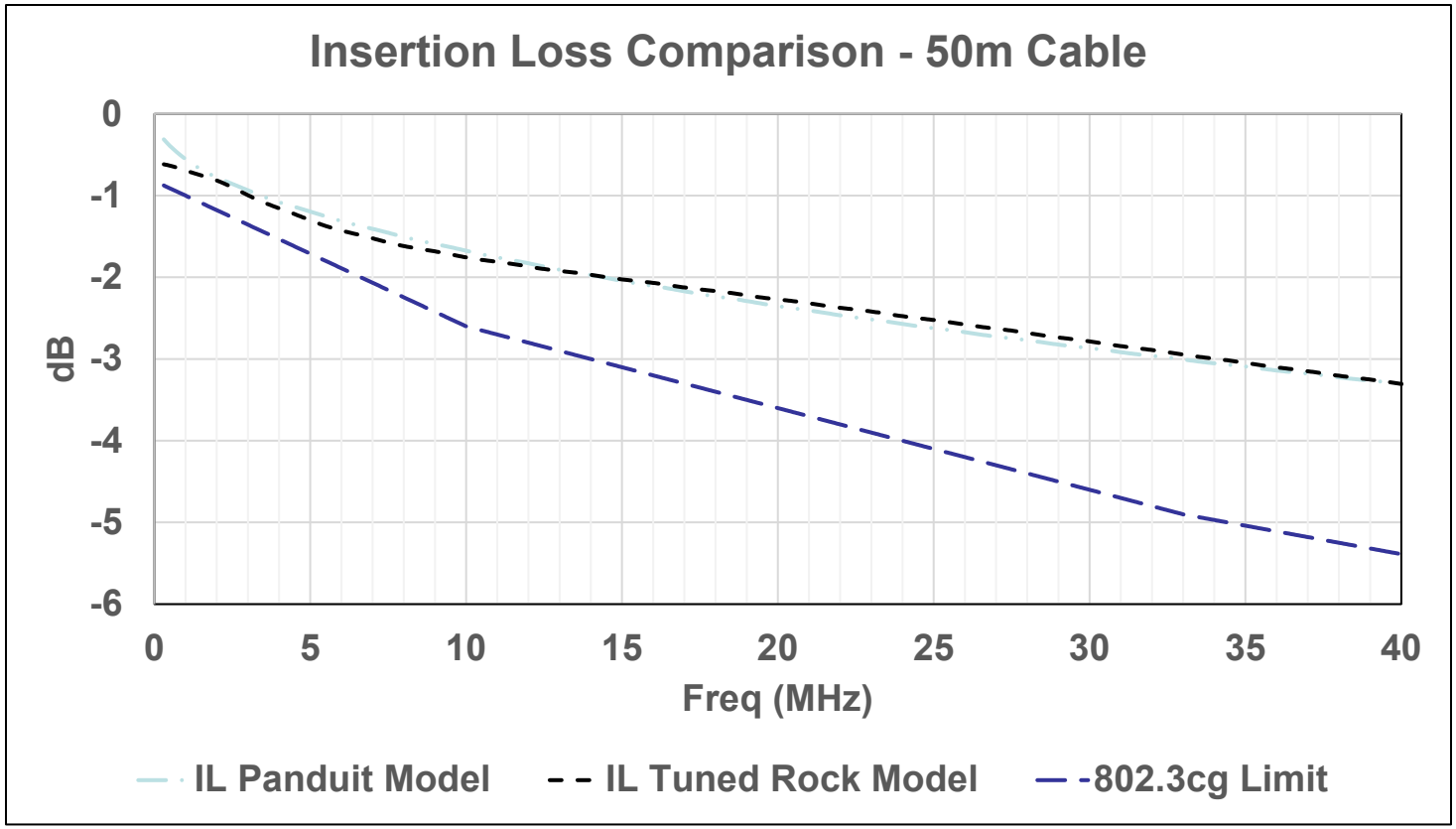
- Measurement configuration results for LTspice model validation demonstrated.
  https://www.ieee802.org/3/da/public/051921/diminico_SPMD_01_0521.pdf
- Transient analysis for RX eye
- New cable model developed to use with transient analysis for RX eye
  - Cable model transmission characteristics consistent with cable model developed.
    https://www.ieee802.org/3/da/public/0721/diminico_SPMD_01_0721.pdf

Purpose

- New cable model developed consider Link Segment Node Distribution with transient analysis for RX eye
  - Cable model transmission characteristics consistent with prior 18 AWG cable model
  - Transient analysis of 75 m node distributions
    - https://grouper.ieee.org/groups/802/3/SPMD/usecase/SPMD_Usecase_Library.pdf

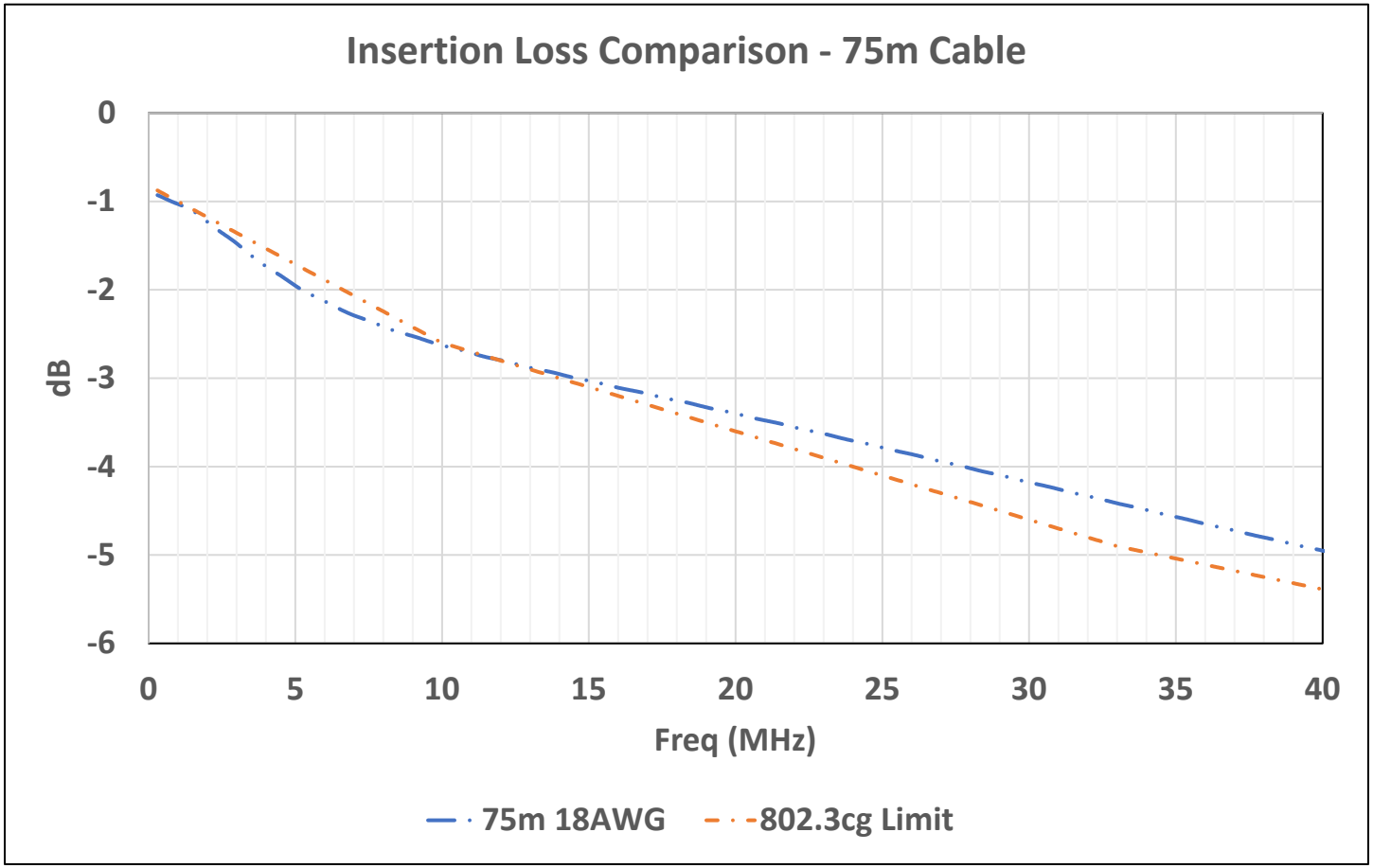
Cable Model – 50 m – Panduit

- Cable model transmission characteristics consistent with referenced cable model



Cable Model – 75 m – Panduit

- Cable model transmission characteristics consistent with referenced cable model



Link Segment Node Characteristics

- **802.3cg - backward compatibility**

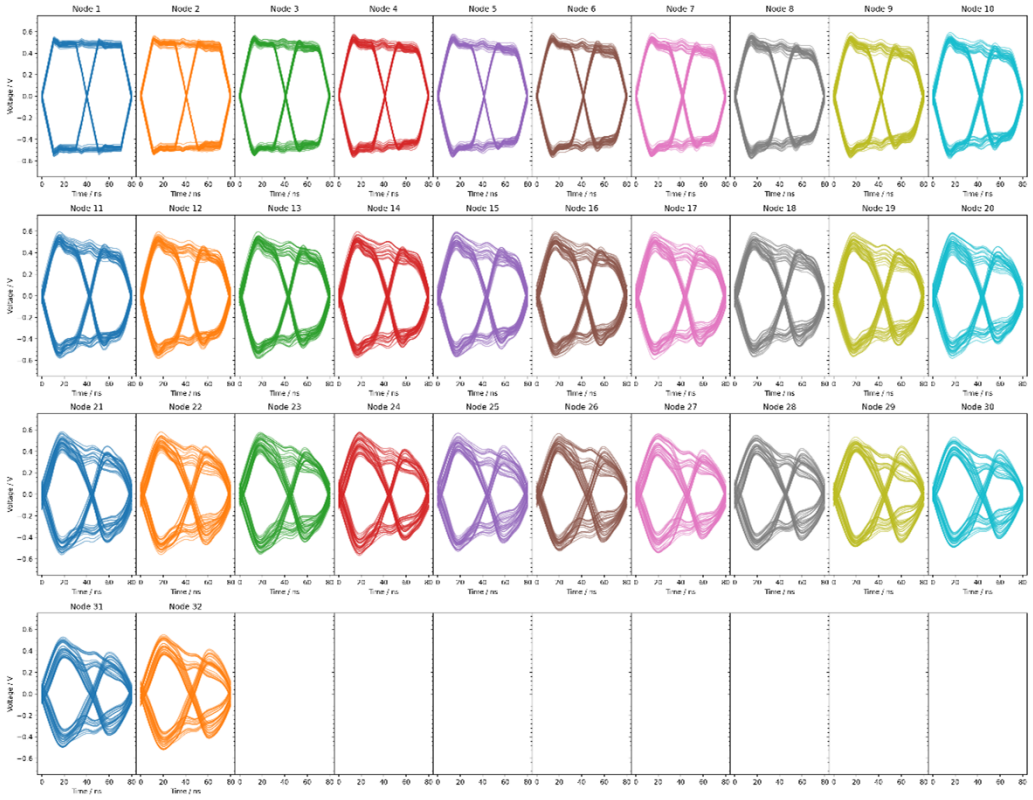
-MDI impedance limit parameters

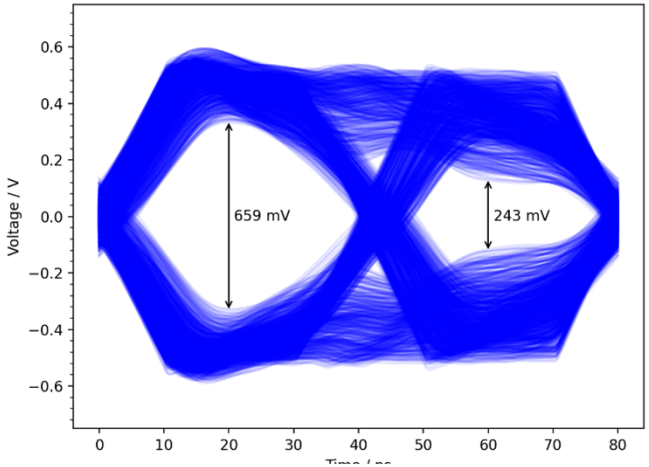
Parameter name	Unit of measure	Minimum value	Maximum value
R	kΩ	10	—
L	μH	80	—
C_{tot}	pF	—	180
C_{node}	pF	—	15

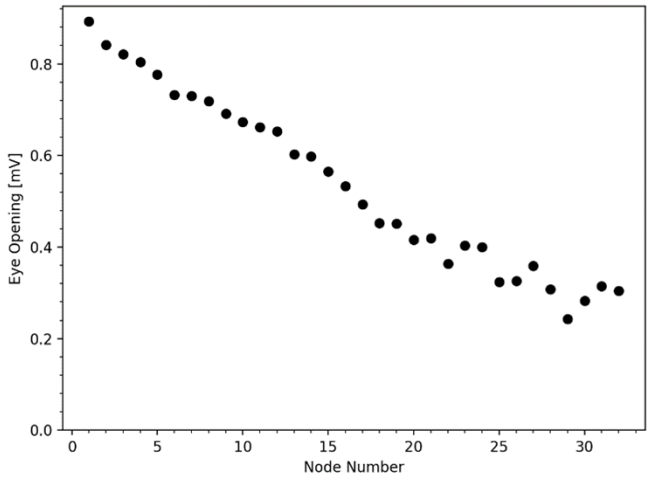
Source: IEEE Std 802.3cg™-2019

Link Segment Node Distribution

- 75m 18AWG cable, 32 nodes,10 cm stub lengths,80 uH, 15 pF, evenly spaced (2.419 m)

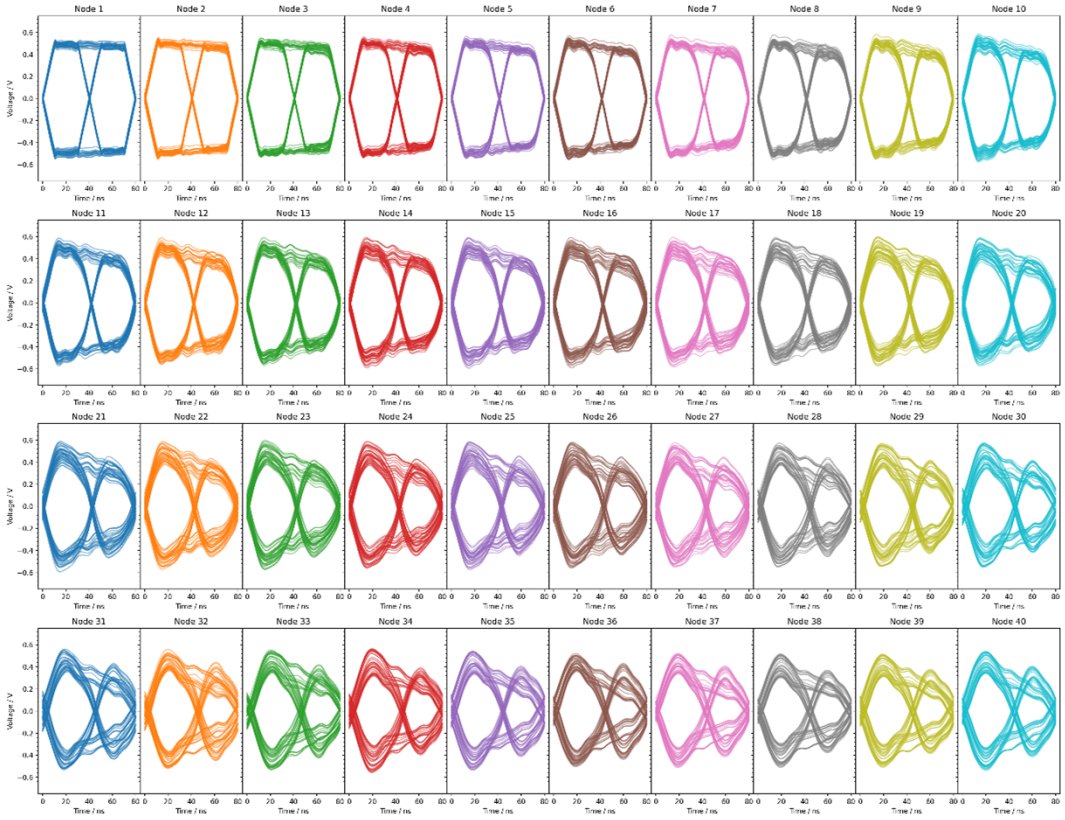


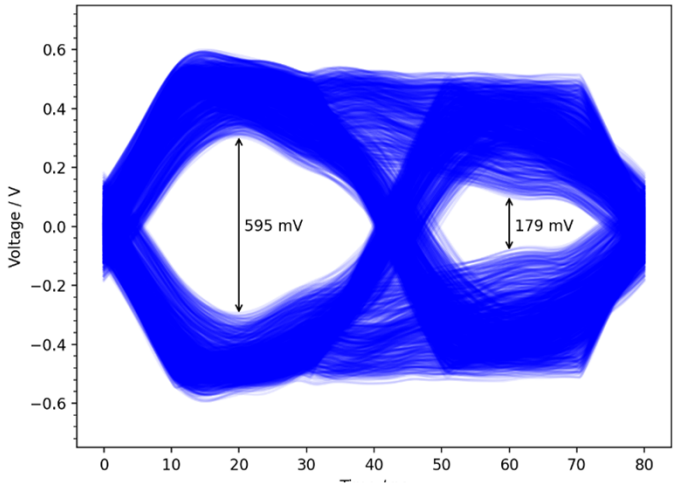


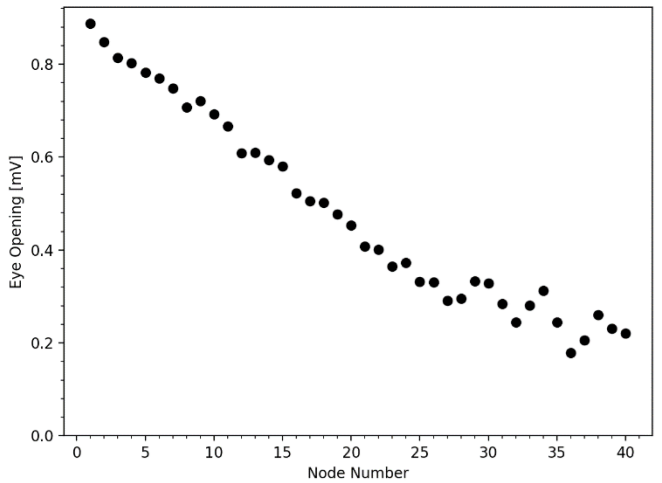


Link Segment Node Distribution

- 75m 18AWG cable, 40 nodes,10 cm stub lengths,80 uH, 15 pF, evenly spaced 1.923 m

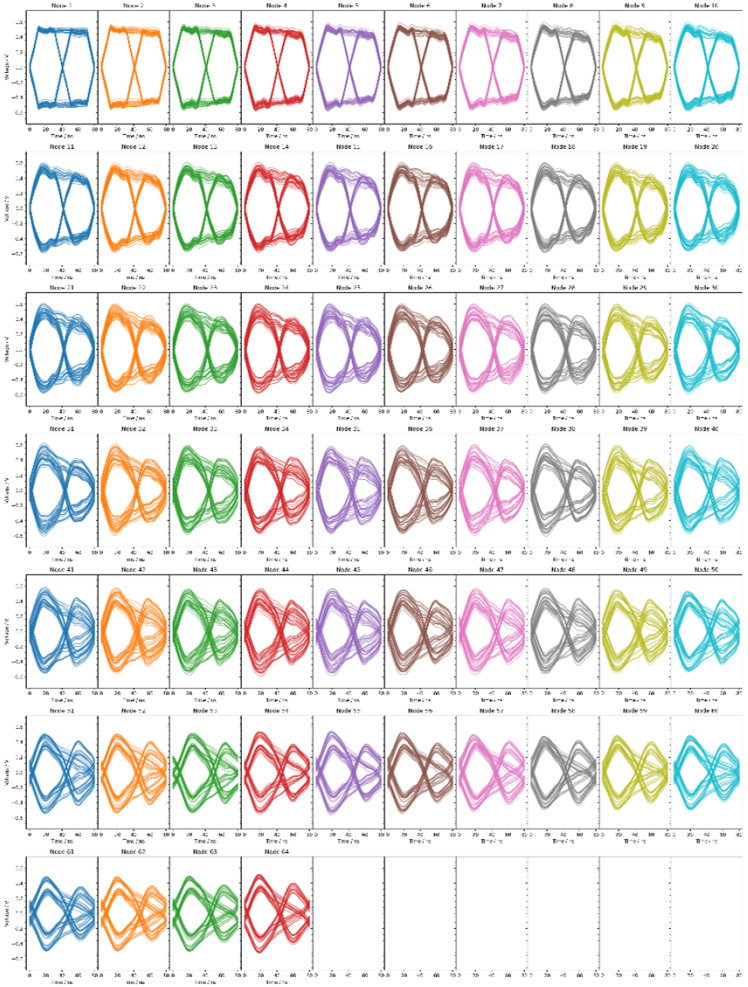


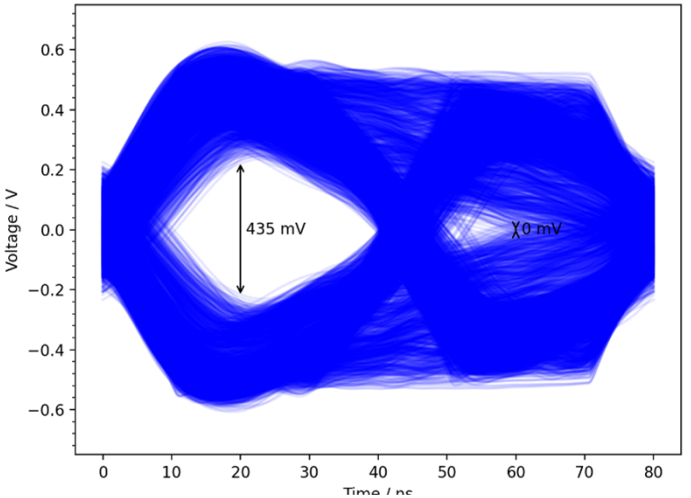


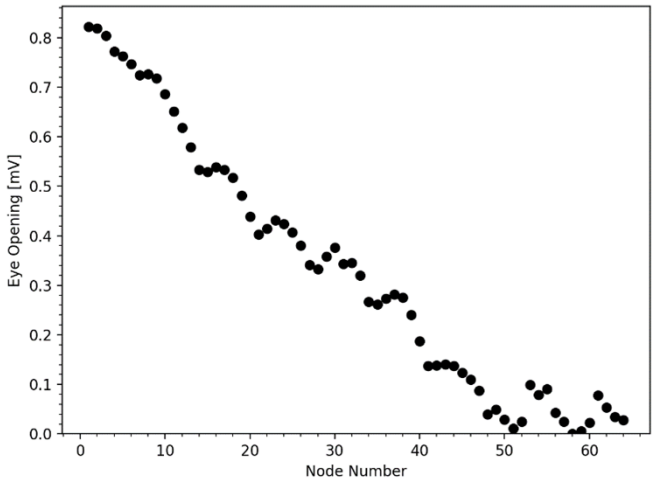


Link Segment Node Distribution

- 75m 18AWG cable, 64 nodes,10 cm stub lengths,80 uH, 15 pF, evenly spaced 1.91 m

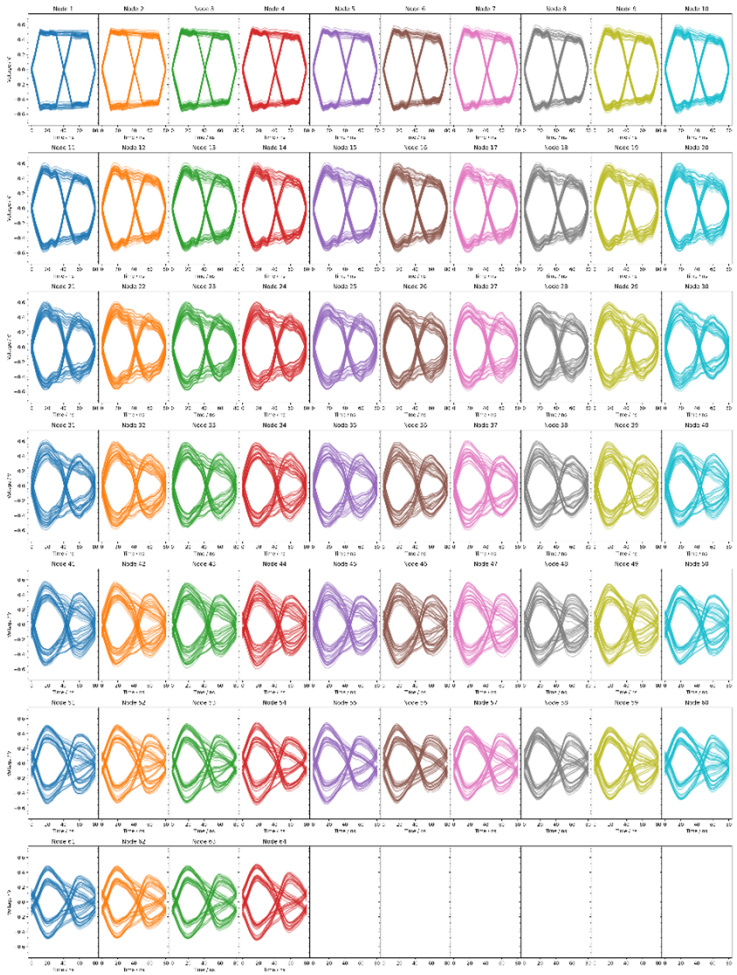


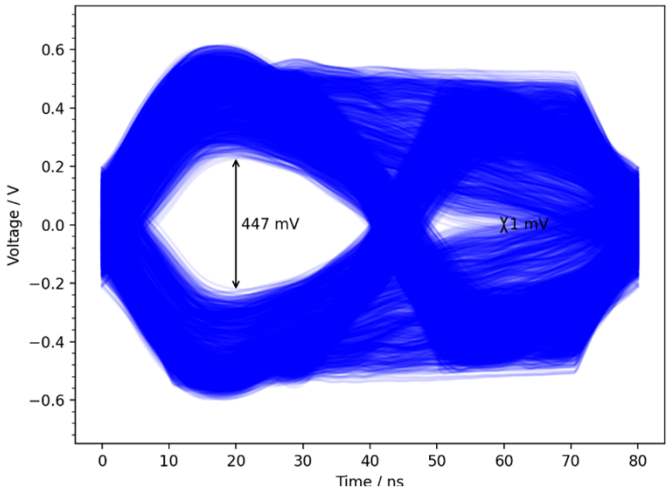


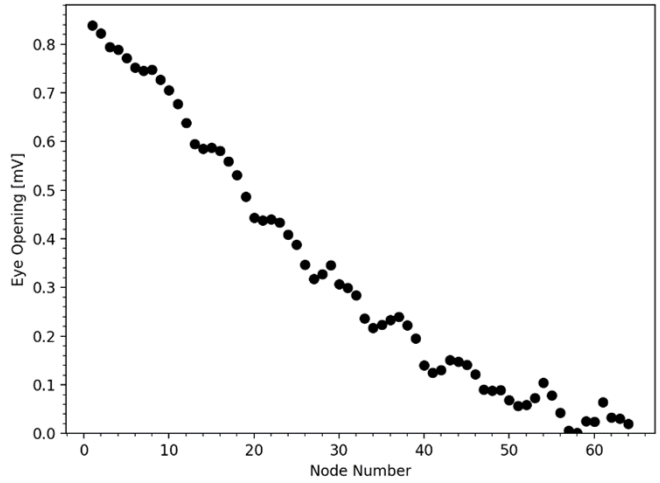


Link Segment Node Distribution

- 75m 18AWG cable, 64 nodes, 5 cm stub lengths,80 uH, 15 pF, evenly spaced 1.91 m







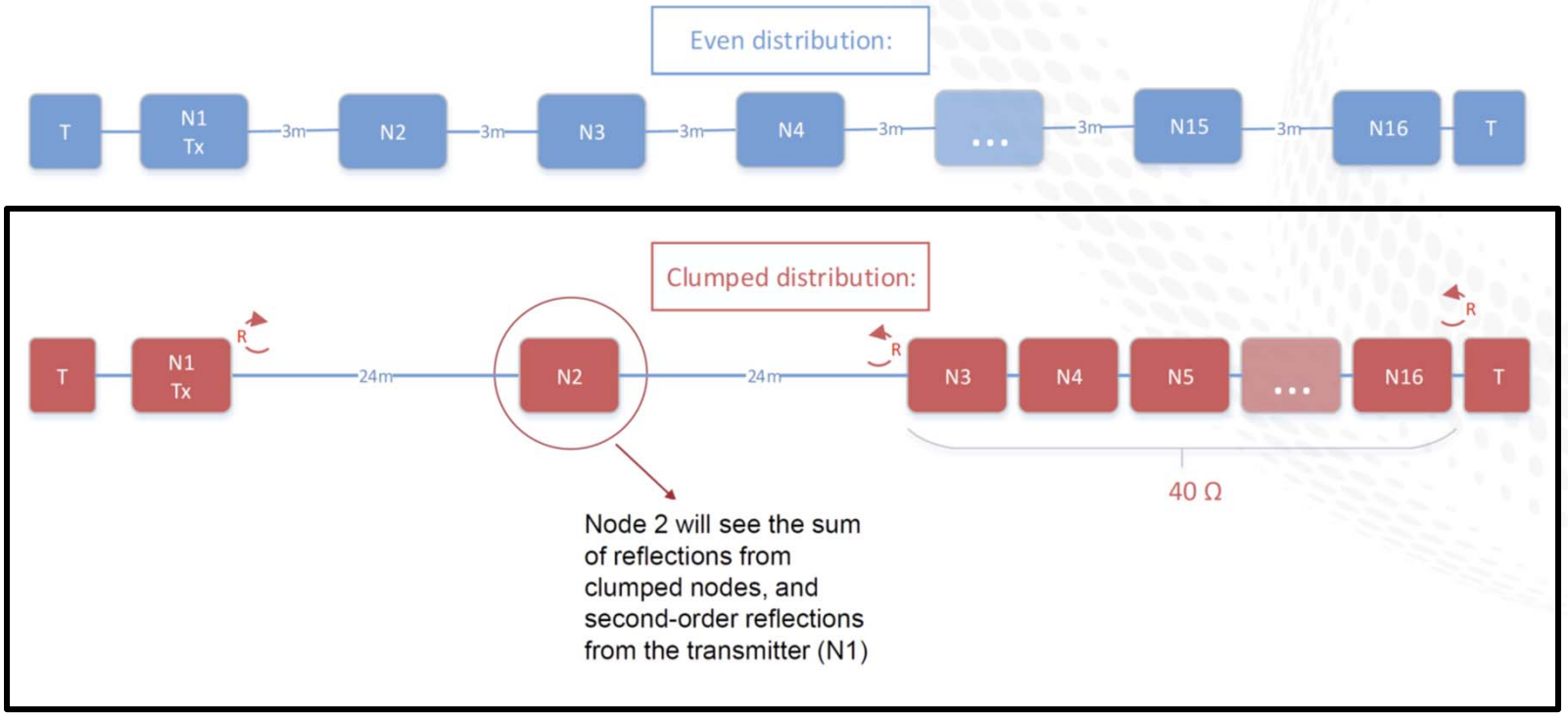
Summary

- 75 m cable model with 802.3cg compatible node characteristics used for transient analysis RX eye

Backup

Clumped Distribution Analyzed

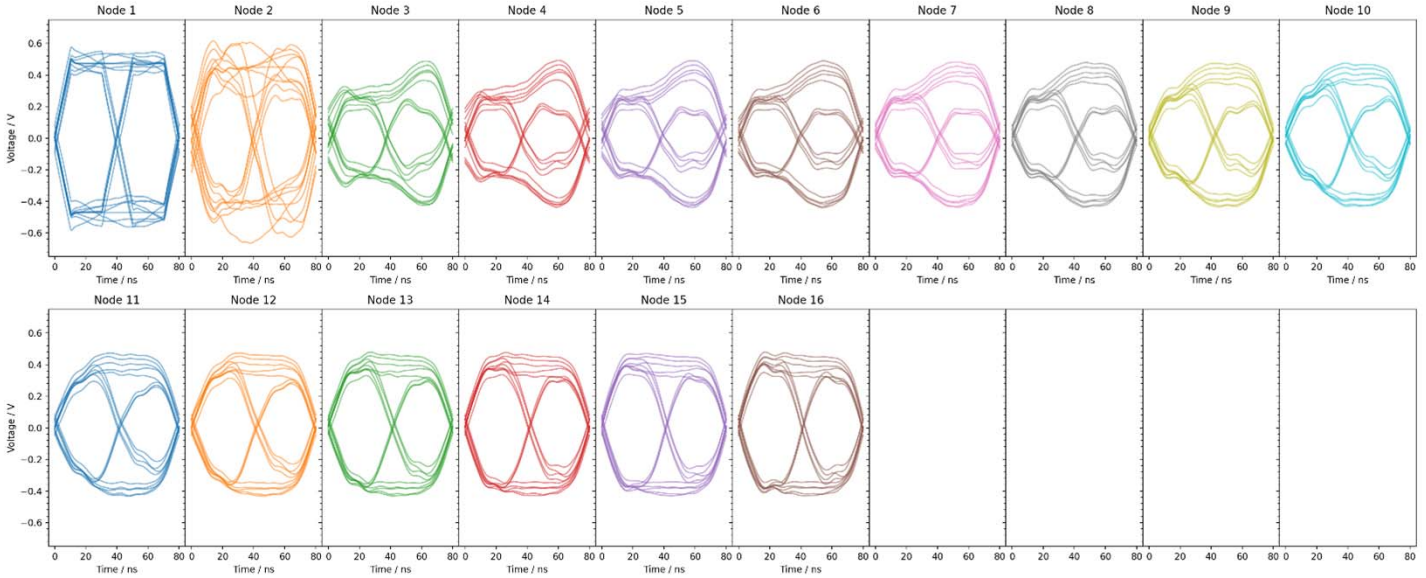
Node distribution – time domain simulation



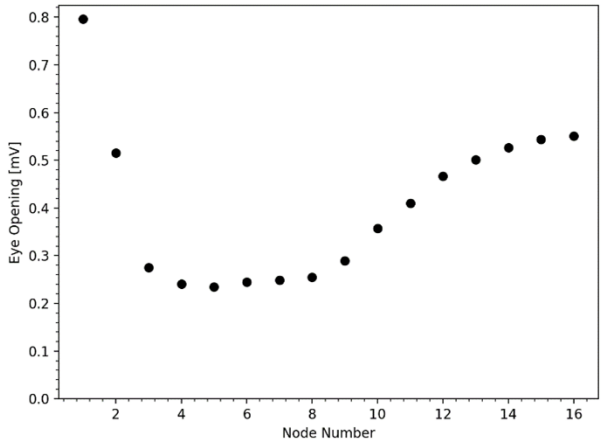
Source:
Koczwara_Griffiths_Brandt_MultidropNodeDistributionChallenges_20201202_v1.1.pdf

Clumped Distribution Transient results – 50 m Limit Cable

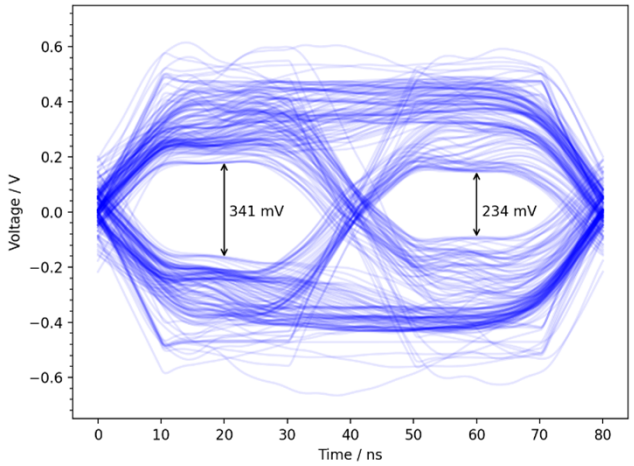
Multi-eye



Multi-eye distribution

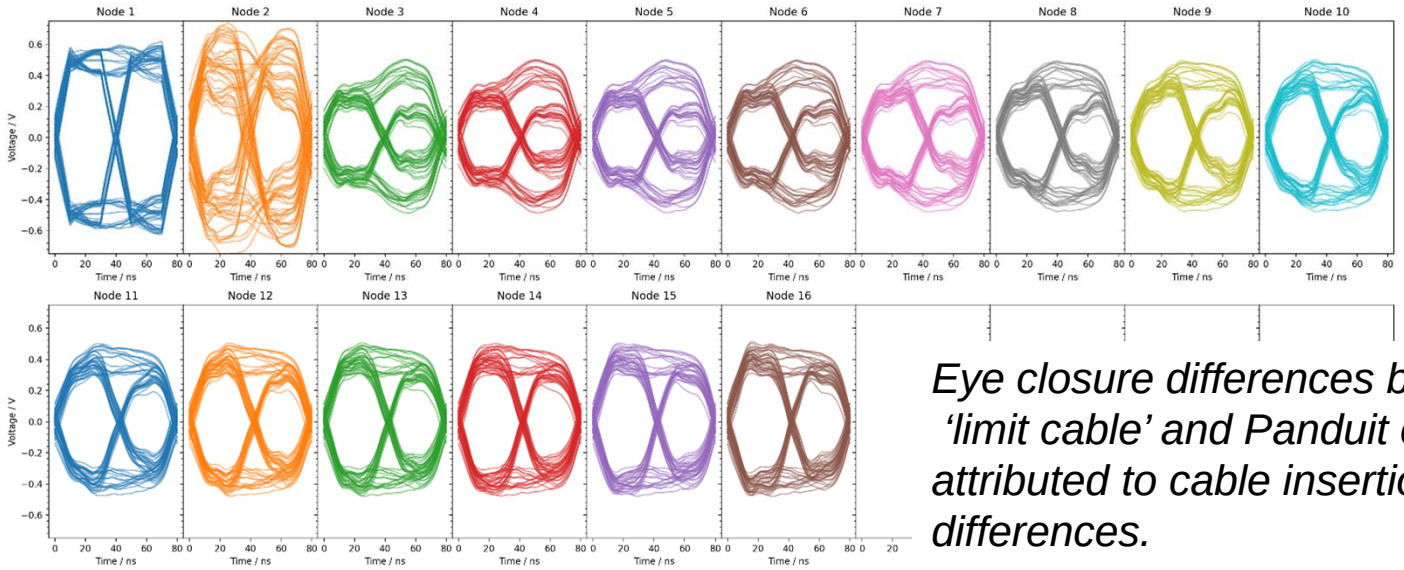


Combined-eye



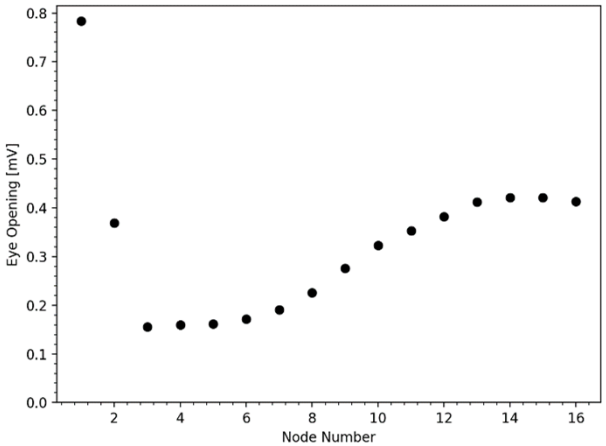
Clumped Distribution Transient results – 50 m Panduit Cable

Multi-eye

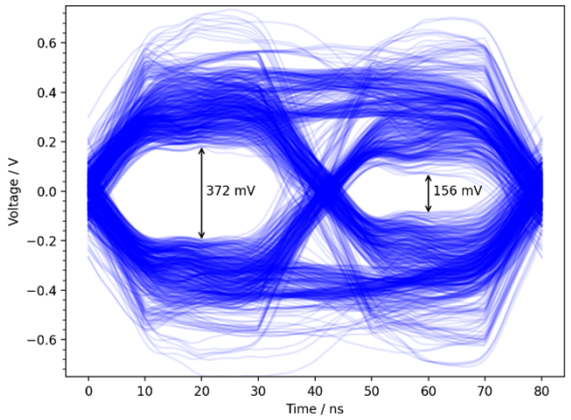


Eye closure differences between 'limit cable' and Panduit cable attributed to cable insertion loss differences.

Multi-eye distribution



Combined-eye



Summary

- New cable model developed to use with transient analysis for RX eye
  - Cable model transmission characteristics consistent with prior cable model
- Eye closure differences between ‘limit cable’ and Panduit cable attributed to cable insertion loss differences.
- Validated cable models with transient results to be applied to mixing segment proposal(s)