Proposed Text for the IL Link Requirements of IEEE 802.3dm

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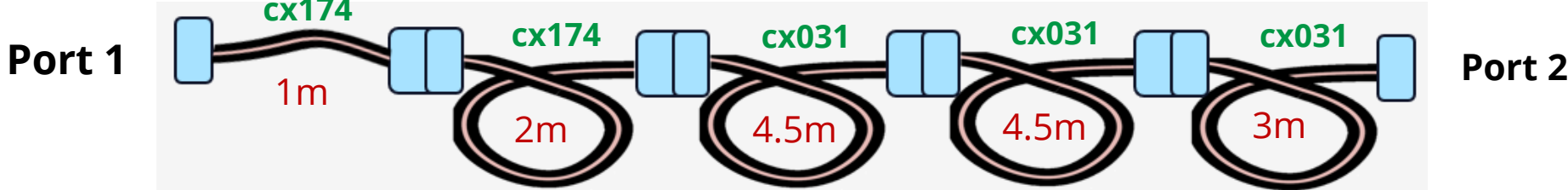Contribution to IEEE 802.3dm January Interim in Phoenix AZ

Supporters

- Haysam Kadry (Molex)
- Erwin Koeppendoerfer (Leoni)
- Jorge Rodriquez (Condumex)
- Yunteng Huang (Aeonsemi)
- Abbas Alwishah (Molex)
- Hossein Sedarat (Ethernovia)
- Thomas Hogenmueller (Bosch)
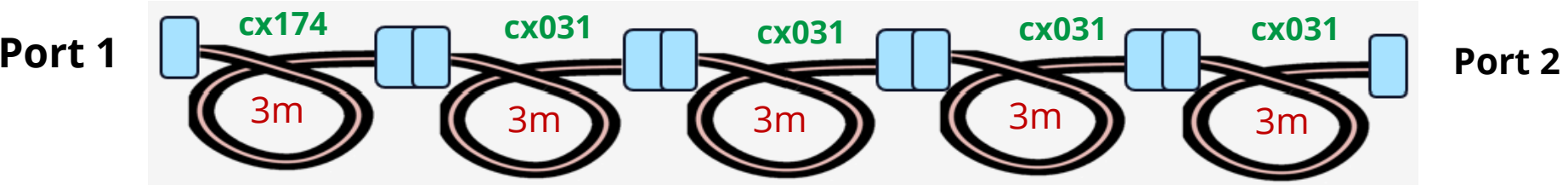
Past Presentation and Discussion

- IL and RL separate topics.

- The IL same for shielded balanced pairs and coaxial links.

- Link to proposal for text made in November Plenary in Vancouver.

- https://www.ieee802.org/3/dm/public/1124/boyer_sharma-3dm_xx_11-12-24.pdf .

- From Vancouver presentation, this presentation adjusted proposed limit based on input from Conrad Zerna of the latest ASA ML limits.

- This PPT includes extrapolated 15% performance degradation based on typical post-life scenarios.

- This PPT adds additional measured data at temperature.

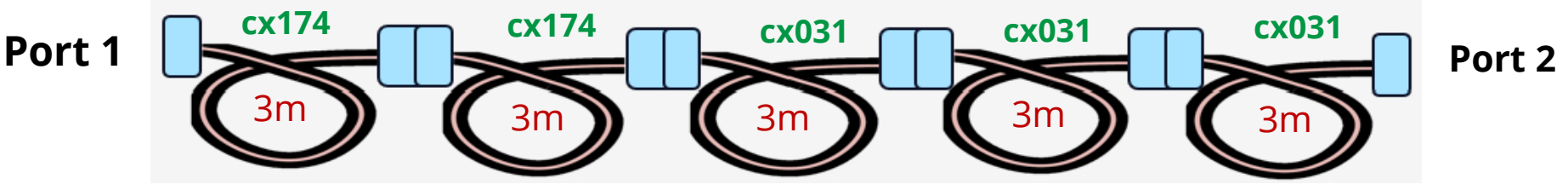# Measured 15m Link Segment Topologies (Not Simulated)

Topology 1   **Port 1**

cx174   cx174   cx031   cx031   cx031   **Port 2**

1m   2m   4.5m   4.5m   3m

Topology 2   **Port 1**

cx174   cx031   cx031   cx031   cx031   **Port 2**

3m   3m   3m   3m   3m

Topology 3   **Port 1**

cx174   cx174   cx031   cx031   cx031   **Port 2**
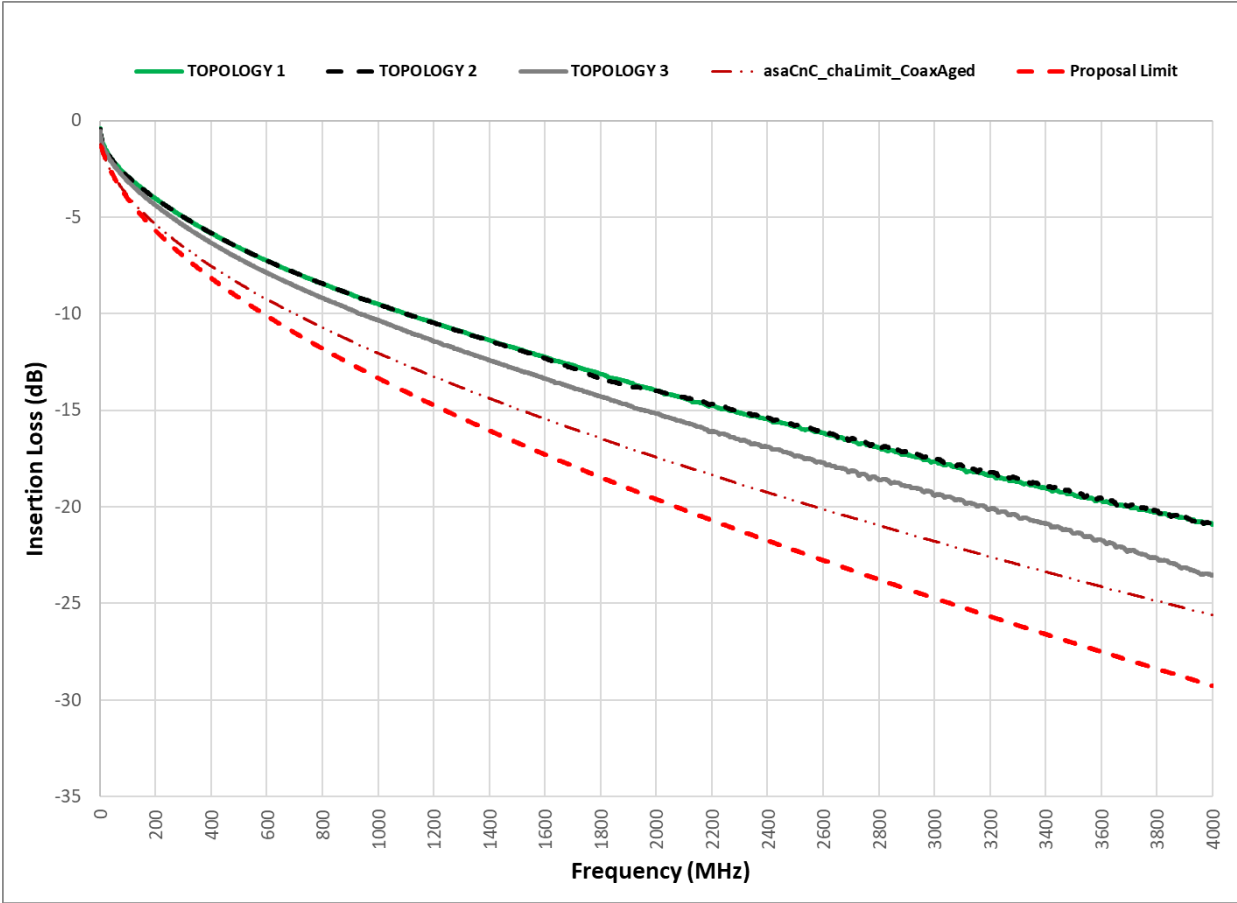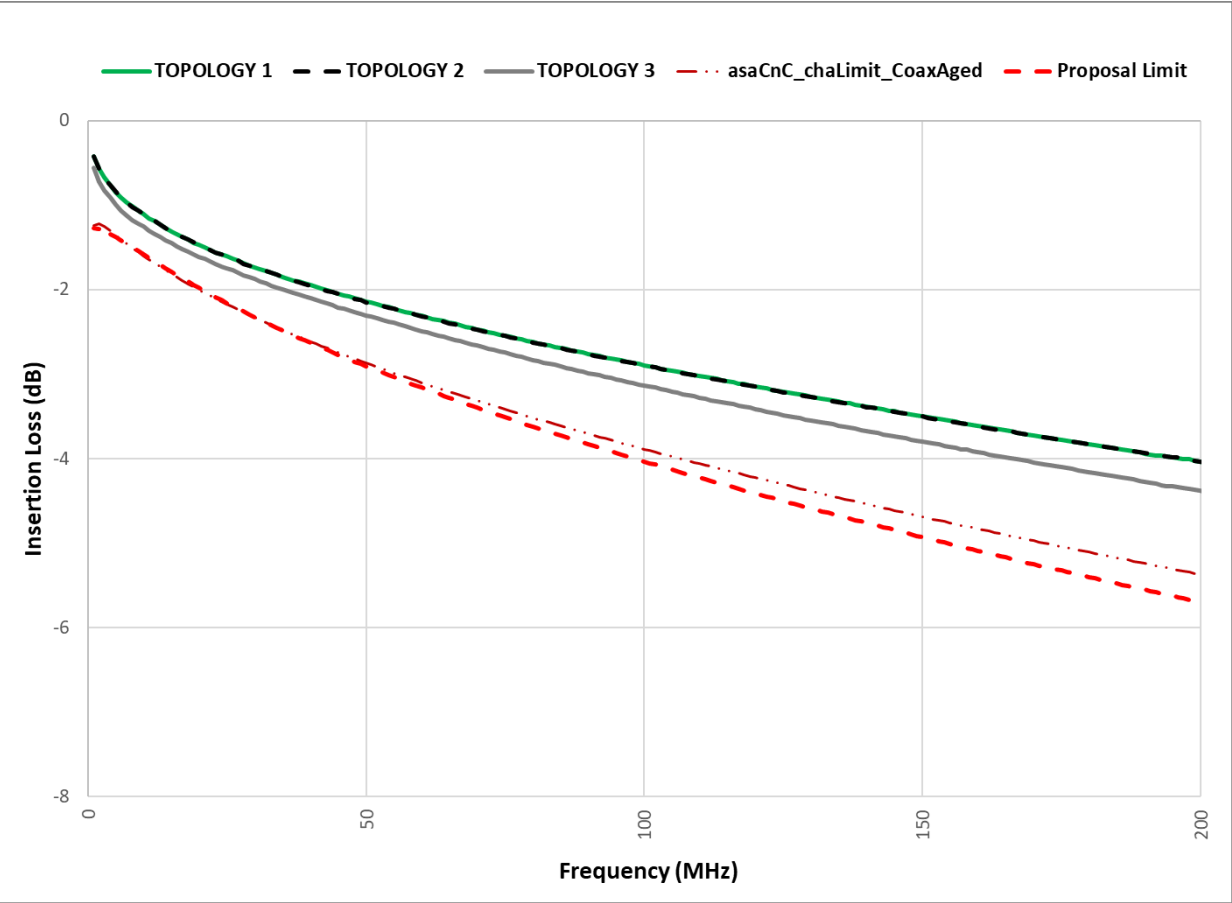
3m   3m   3m   3m   3m

Connector & Mated Inline
(USCAR-49)
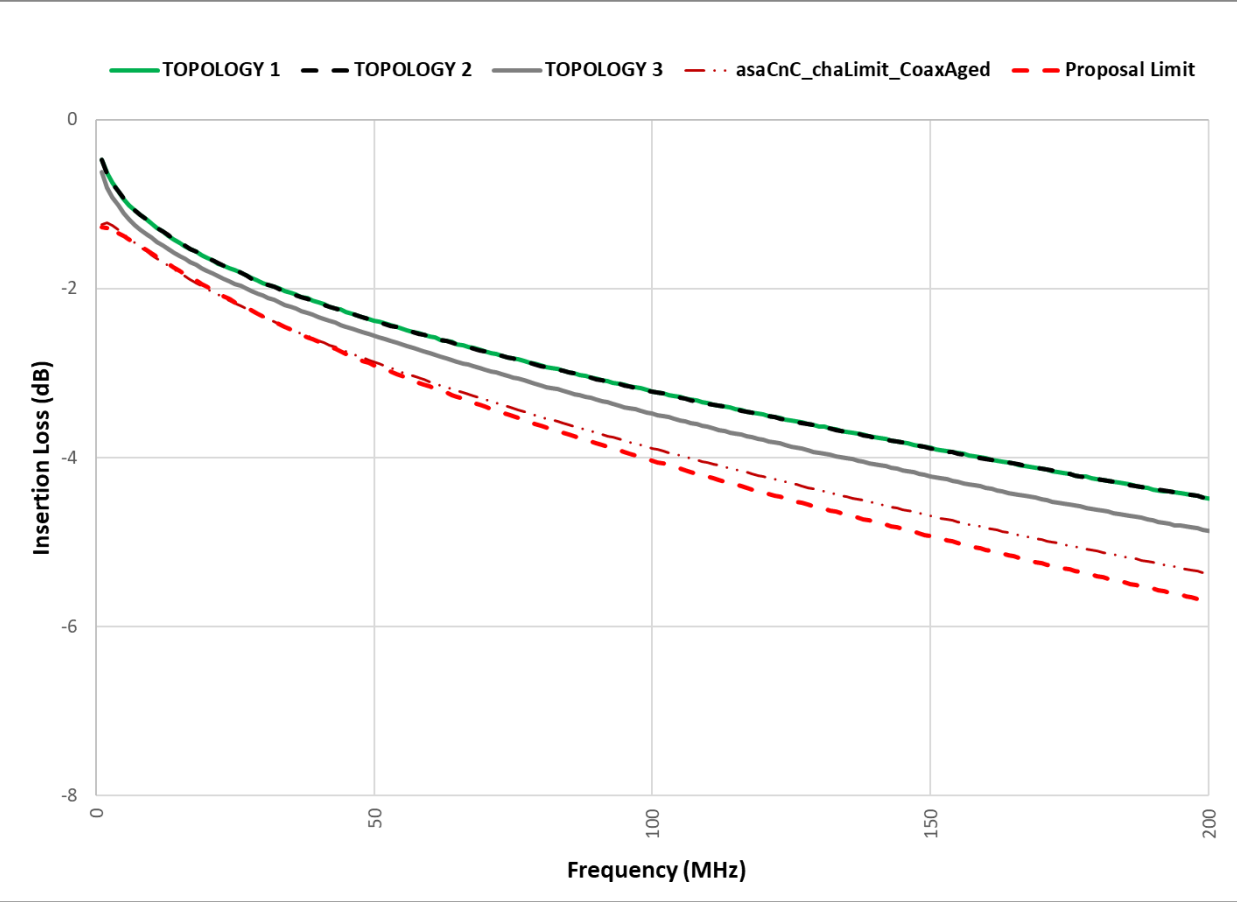
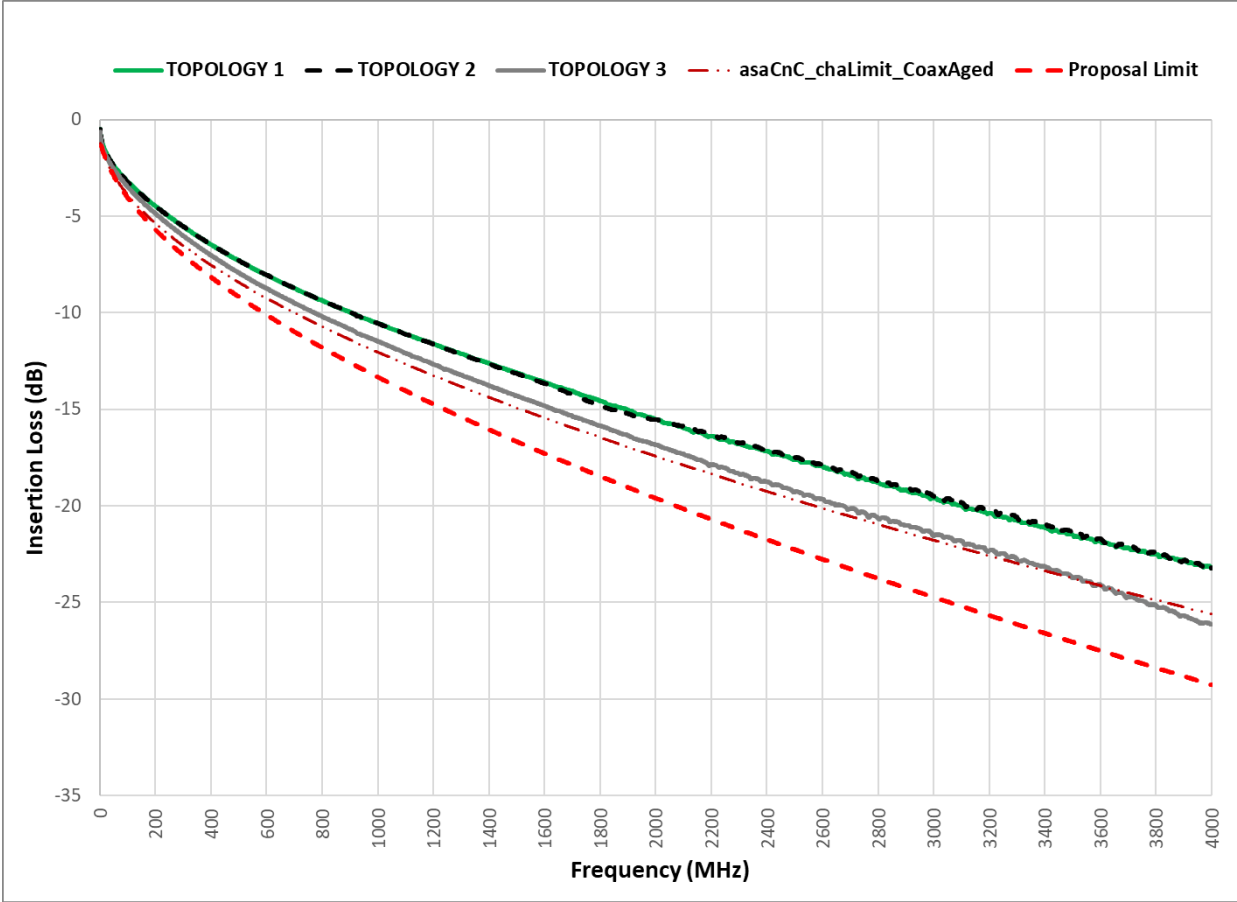# Measured IL Data at 23°C (Not Simulated)

<200 MHz Zoom

Complete to 4 GHz

Measured IL Data at 105°C (Not Simulated)
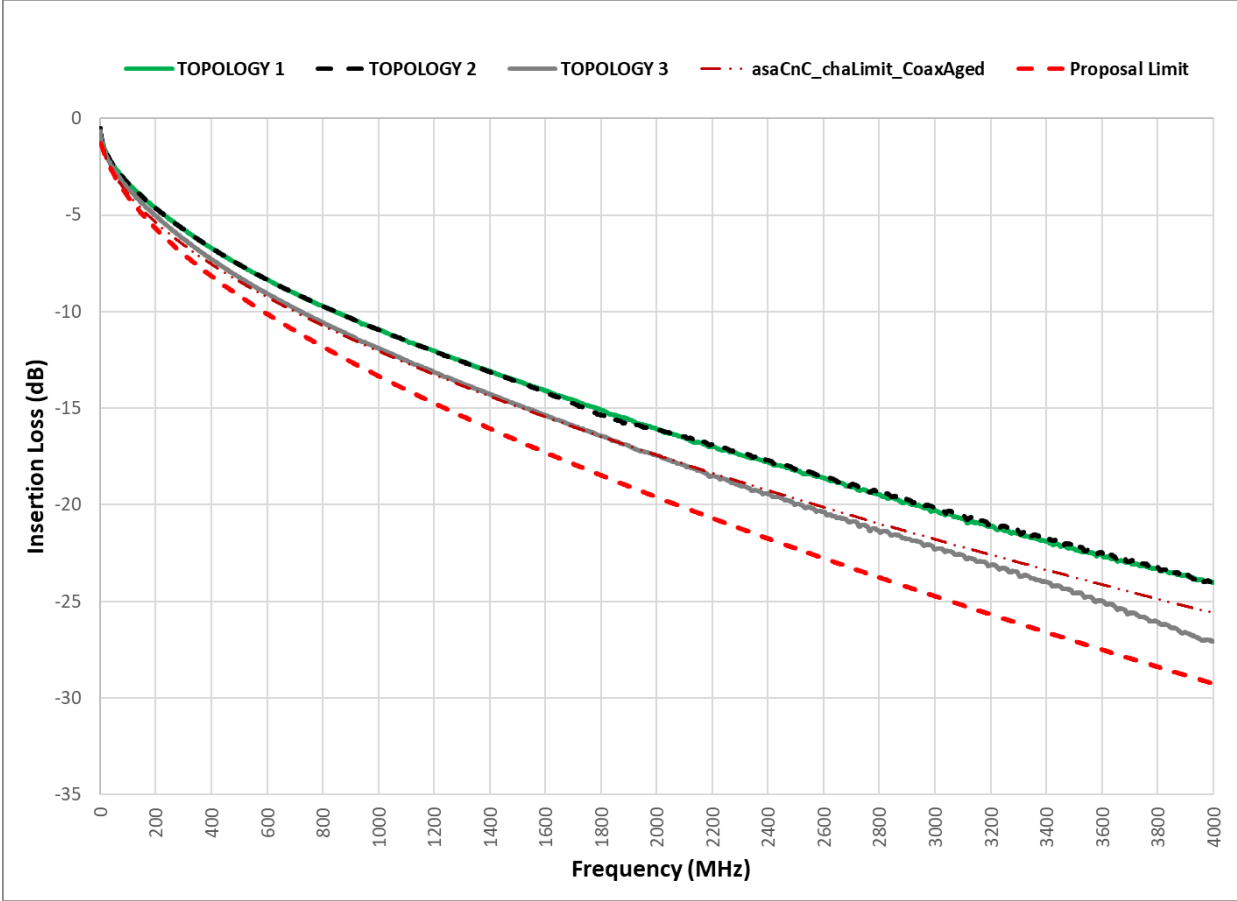
Extrapolated IL Aged Data (15% Degradation Assumption)
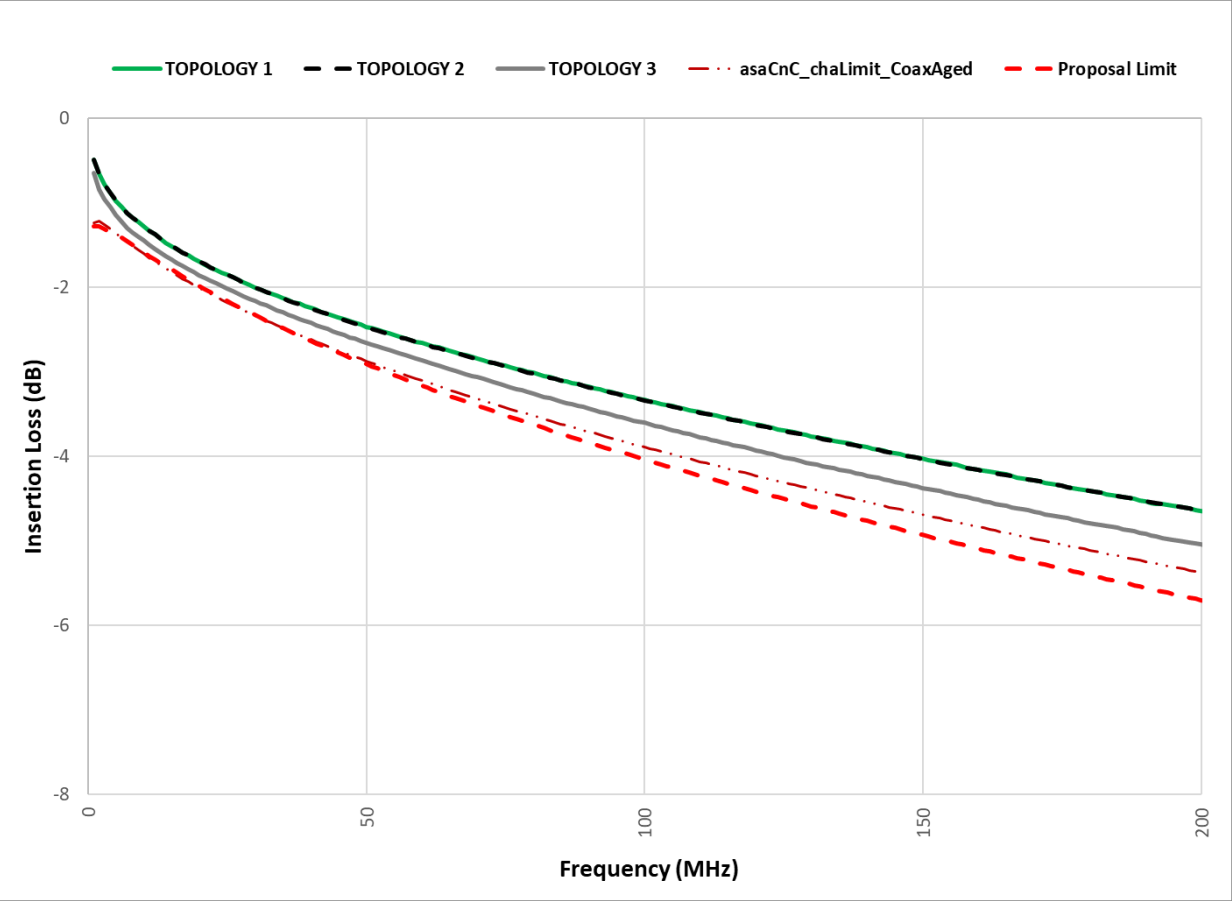
Measured Automotive 15m cable only
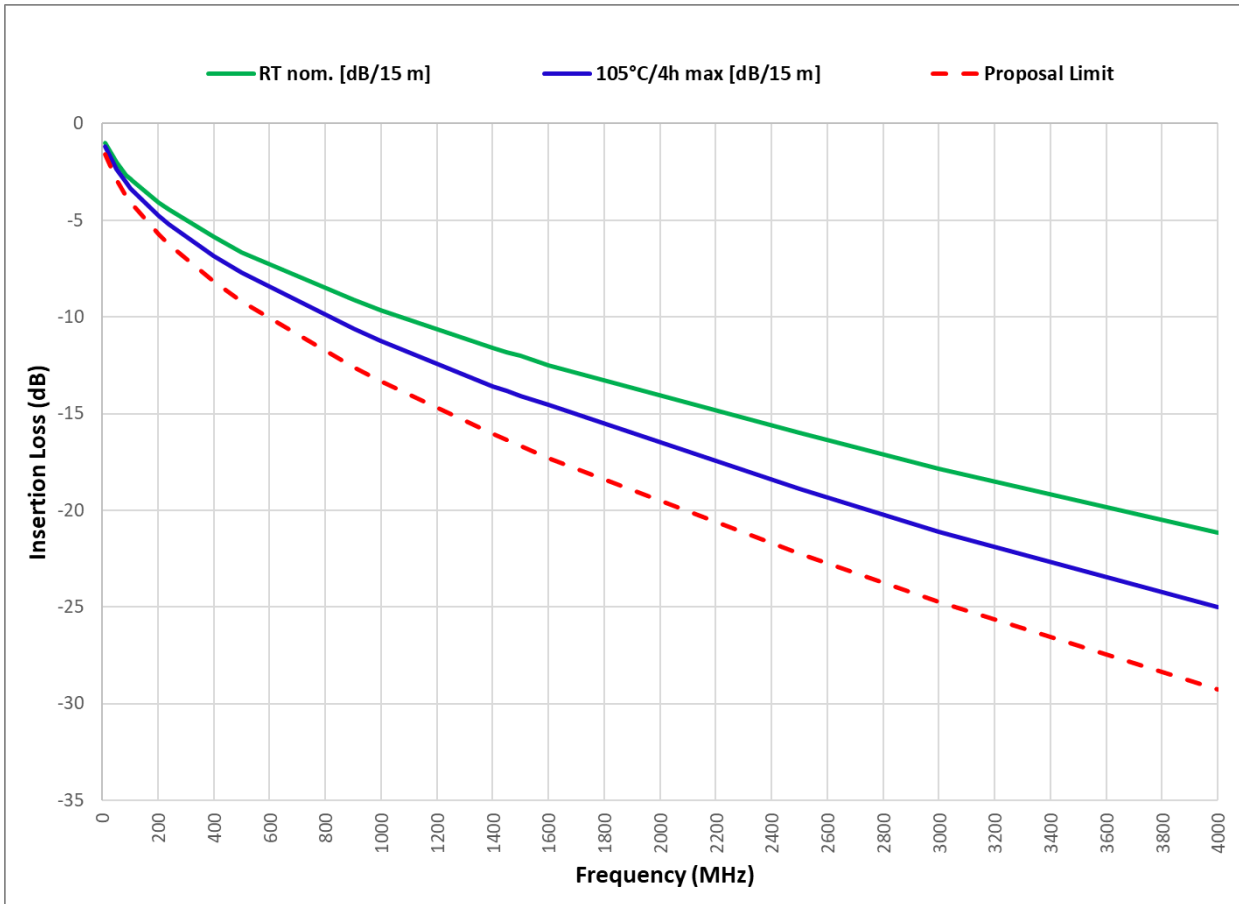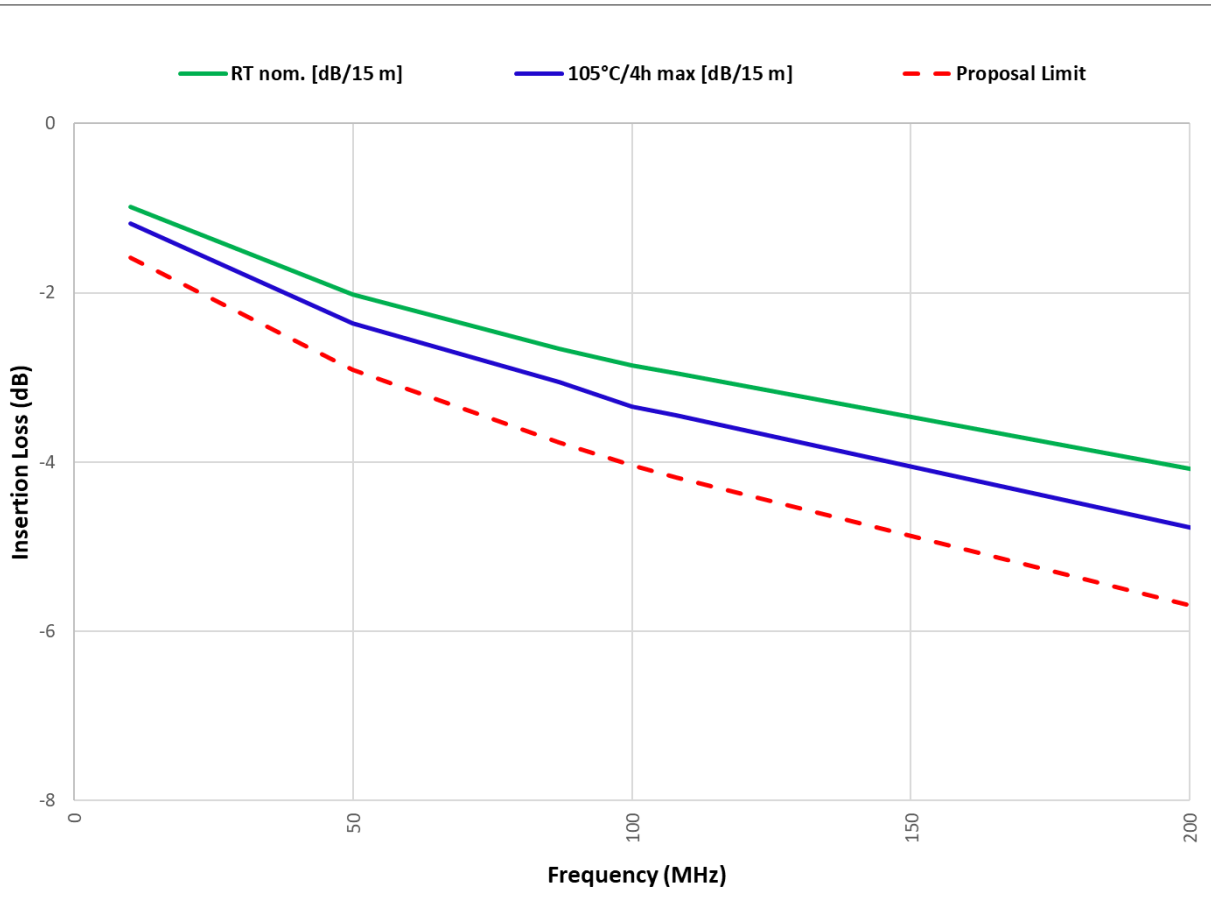
Proposed Text for Insertion Loss

XXX.X Link Segment Characteristics

2.5GBASE-T1, 5 GBASE-T1, and 10GBASE-T1 in one direction with 100 Mb/s in the opposite direction are designed to operate over a single shielded balanced pair of conductors or a single coaxial cable that meet the requirements specified in this subclause. The single shielded balanced pair of conductors or coaxial cable support an effective data of 2.5 Gb/s, 5 Gb/s. and 10 Gb/s in one direction and 100 Mb/s in the opposite direction. The term link segment used in this clause refers to a single balanced pair of conductors (cable or backplane) or a single coaxial cable operating in TBD duplex.

For the 3 different PHY types, link segment parameters are specified to different upper frequencies, given by the parameter F_{max} shown in Equation (xxx-01).

$$F_{max} = 4000 \times S \qquad\qquad\qquad (xxx\text{-}01)$$

See Table xxx-01 for the definition of S. (noted here for ease of use S = 0.25, 0.5, and 1)

xxx.x.x.x Link segment insertion loss

The insertion loss of each MultiG/100MBASE-T1/V1 link segment, whether single shielded balanced pair of conductors or a single coaxial cable, shall meet the values determined using Equation (2xx-TBD) .

Insertion loss(f) $\leq$ 0.0015 - 0.001325*f- 0.3785*$\sqrt{f}$ - 1.1785/ $\sqrt{f}$ (dB)   (2xx-TBD)

Where; f is in MHz; $1 \leq f \leq F_{max}$

The insertion loss is illustrated in Figure 2xx-TBD
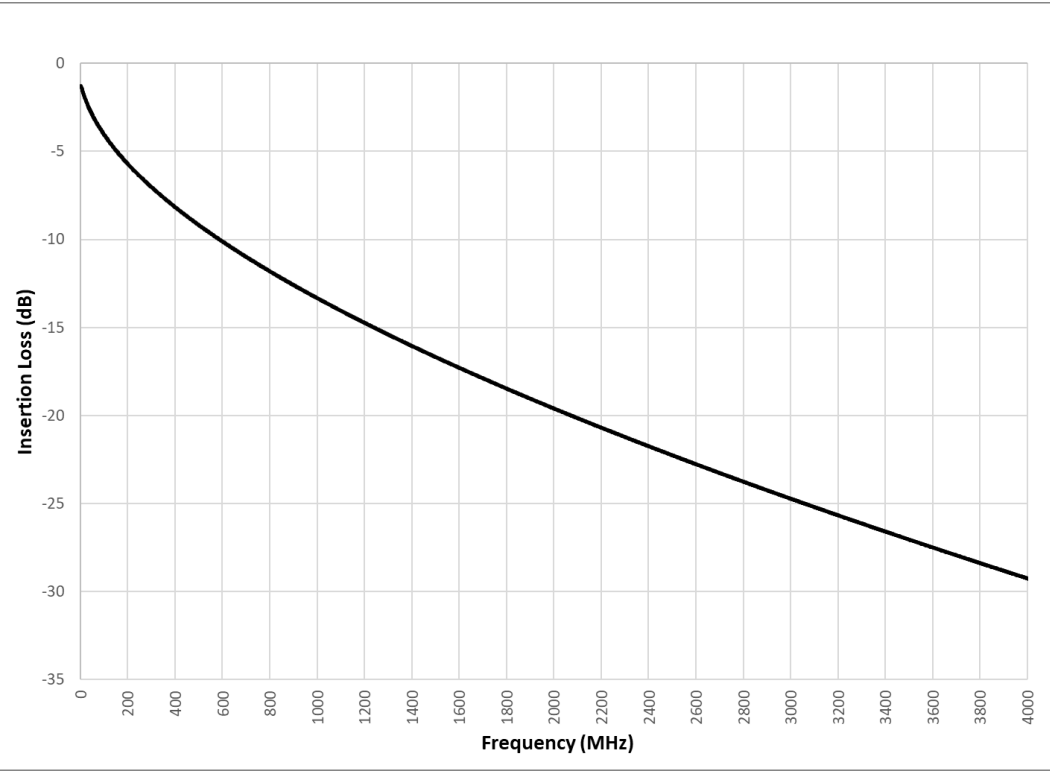
Thank You

Consideration for Proposed Text for Return Loss. Discussion for ATL in March.

xxx.x.x.x Characteristic impedance

The nominal differential characteristic impedance of the single shielded balanced pair of conductors of the link segment is 100 Ω. The nominal characteristic impedance of the coaxial cable link segment is 50 Ω.

xxx.x.x.x.x. Link segment return loss

In order to limit the noise the receiver due to impedance mismatches each of the speeds of the link segment shall meet the values das listed such that F_{max} as listed above. The reference impedance for the return loss is listed in previous section. Note difference for balanced pair and coaxial links.
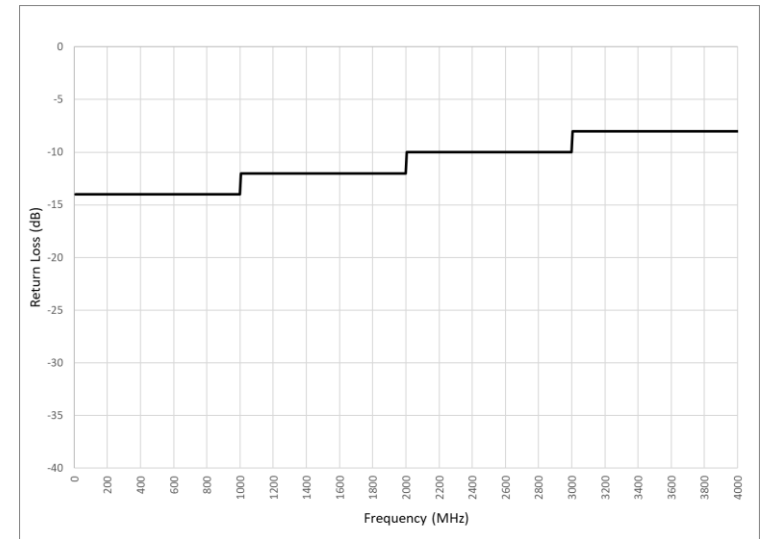
Return loss ≥
    14 dB 1 MHz to 1 GHz
    12 dB 1 GHz to 2 GHz
    10 dB 2 GHz to 3 GHz
    8 dB 3 GHz to 4 GHz

The 2.5 Gb/s has Fmax of 1.0 GHz, the 5.0 Gb/s has Fmax of 2.0 GHz and the 10 Gb/s has Fmax of 4 GHz.