

# Proposed Text for the IL Link Requirements of IEEE 802.3dm

Rohit Sharma – Molex

Rich Boyer- Aptiv

Contribution to IEEE 802.3dm 12 DEC 2024 Ad Hoc

# Supporters

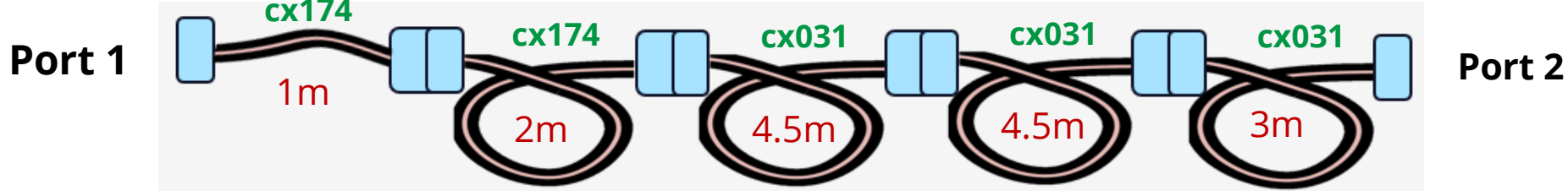
- Haysam Kadry (Molex)
- Erwin Koependoerfer (Leoni)
- Jorge Rodriguez (Condumex)
- Yunteng Huang (Aeonsemi)
- Abbas Alwishah (Molex)
- Hossein Sedarat (Ethernovia)
- Thomas Hogenmueller (Bosch)

## Past Presentation and Discussion

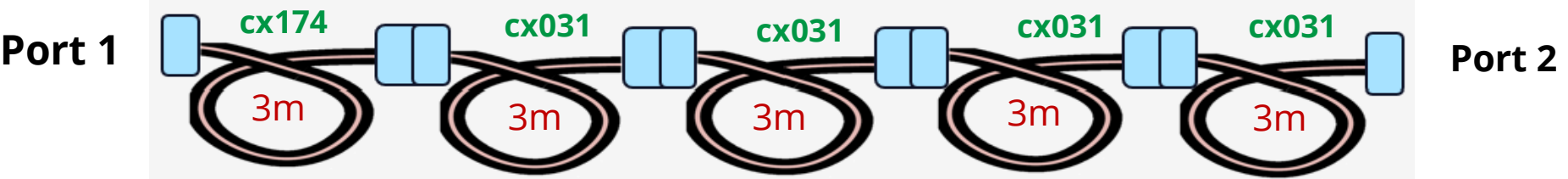
- IL and RL separate topics.
- The IL same for shielded balanced pairs and coaxial links.
- IL limits more restrictive from Vancouver proposal >200 MHz. This adjustment reflects the reduction of voltage by half on the single-ended coax assemblies.
- Relaxed IL limits <200 MHz based on experience with both coax and DP.
- These limits were adjusted following discussions in Vancouver that included input from multiple individuals. 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](https://www.ieee802.org/3/dm/public/1124/boyer_sharma-3dm_xx_11-12-24.pdf) .
- When adjusting the limits, a 15% performance degradation based on typical post-life scenarios has been considered. For informational purposes, a 30% degradation has also been shown to account for extreme or unforeseen cases due to potential changes in materials or future requirements.

# Measured Link Segment Topologies (Not Simulated)

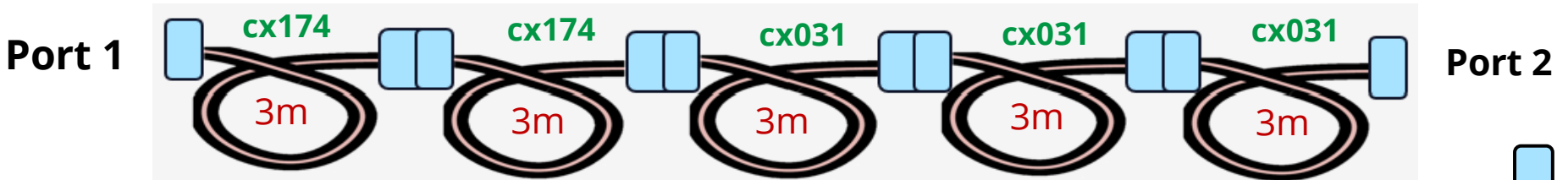
Topology 1



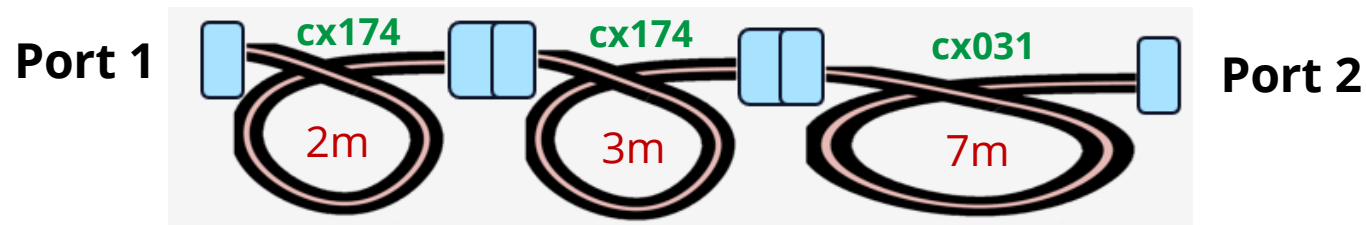
Topology 2



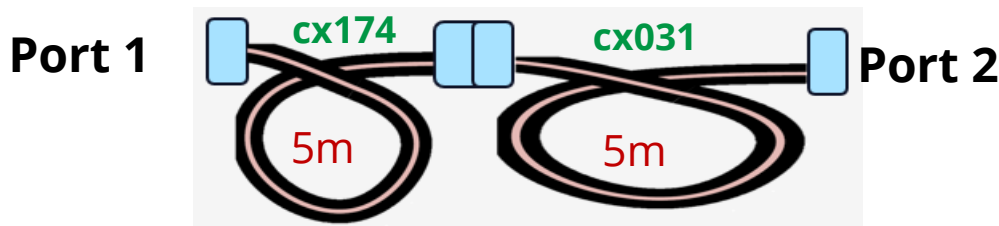
Topology 3



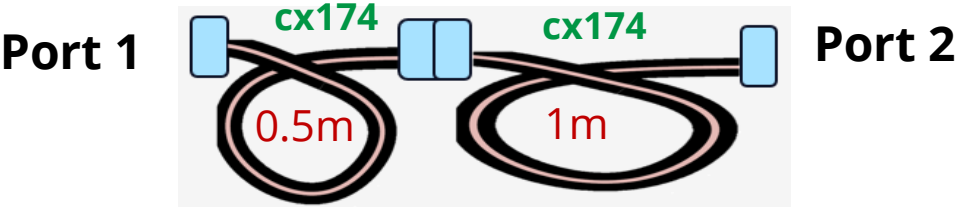
Topology 4



Topology 5



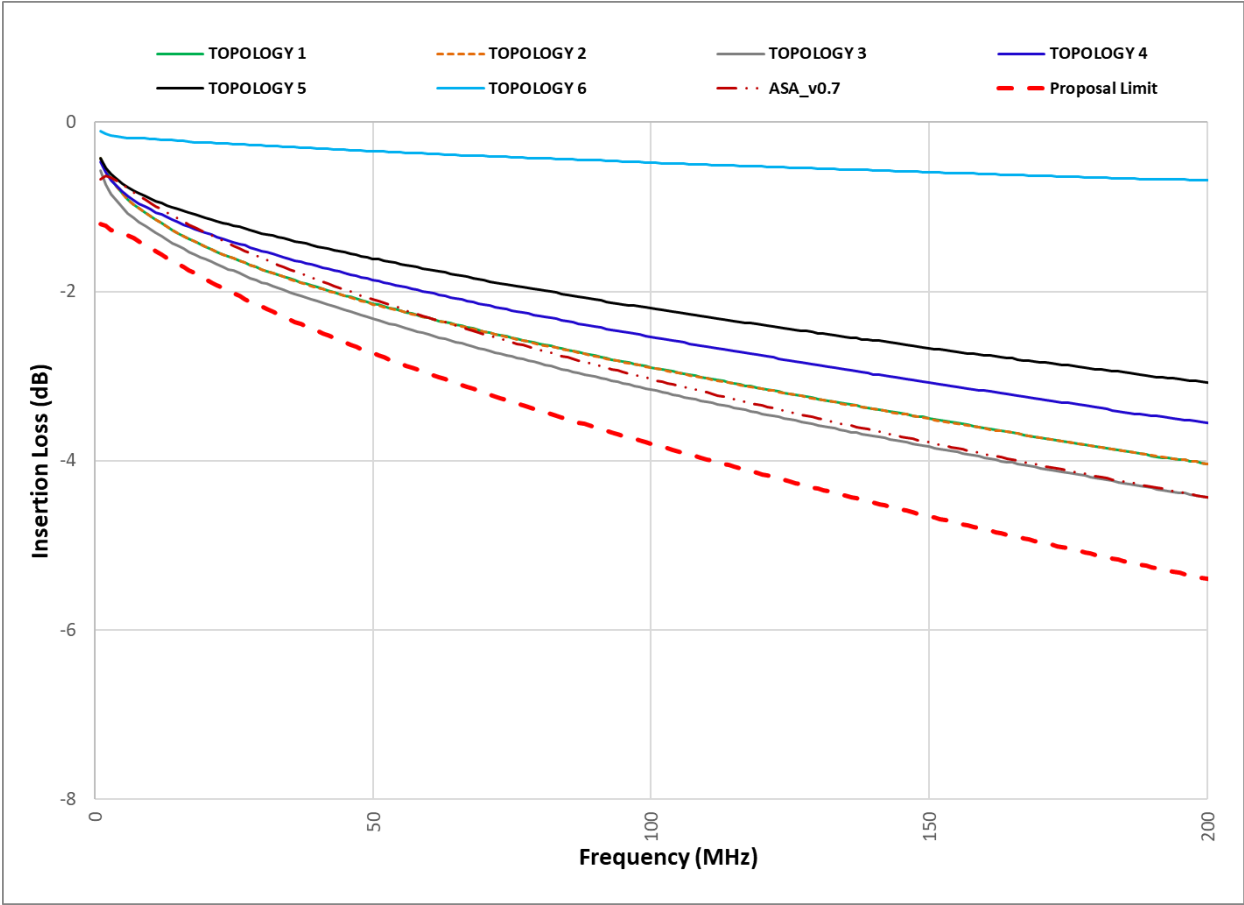
Topology 6



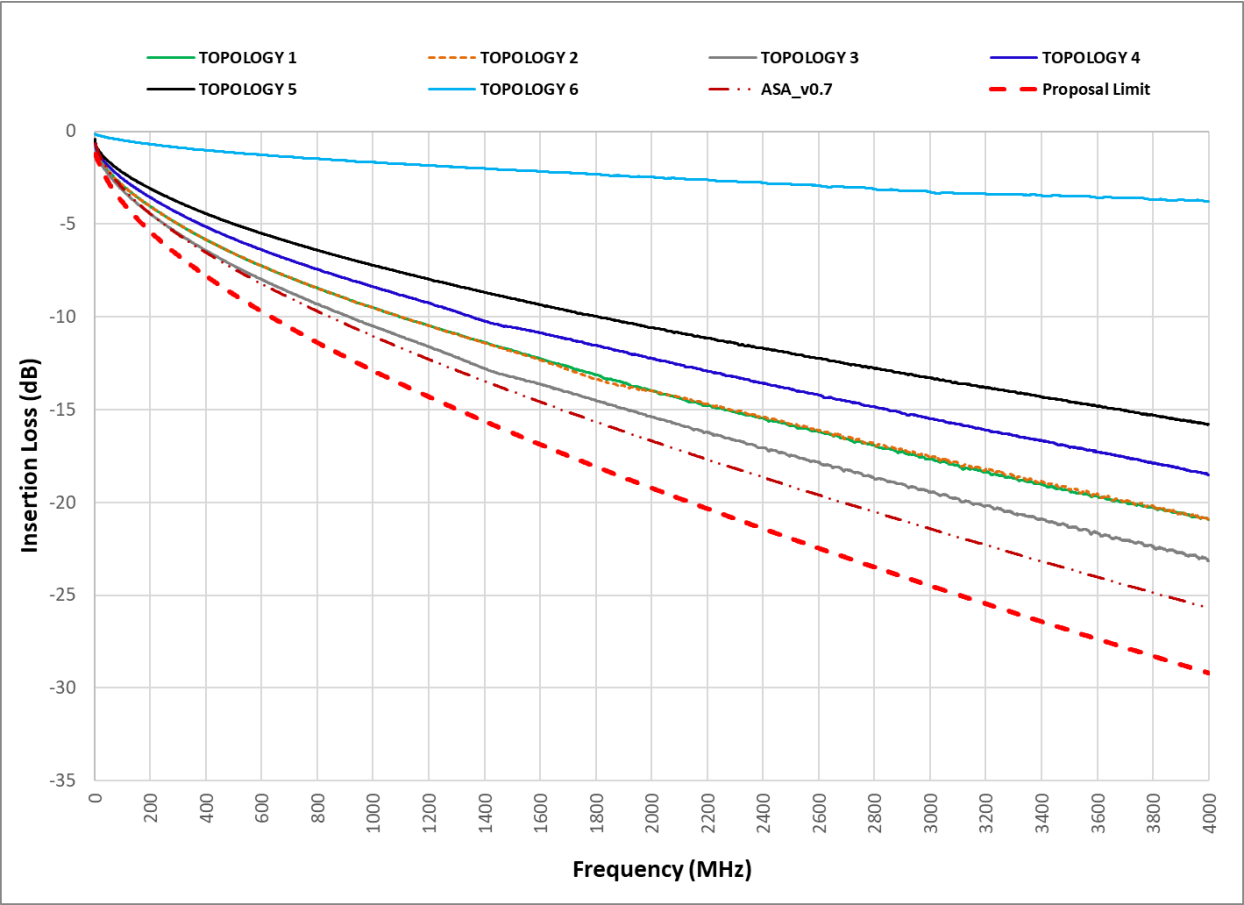
Connector & Mated Inline (USCAR-49)

# Measured IL Data at Ambient Temperature (Not Simulated)

## <200 MHz Zoom



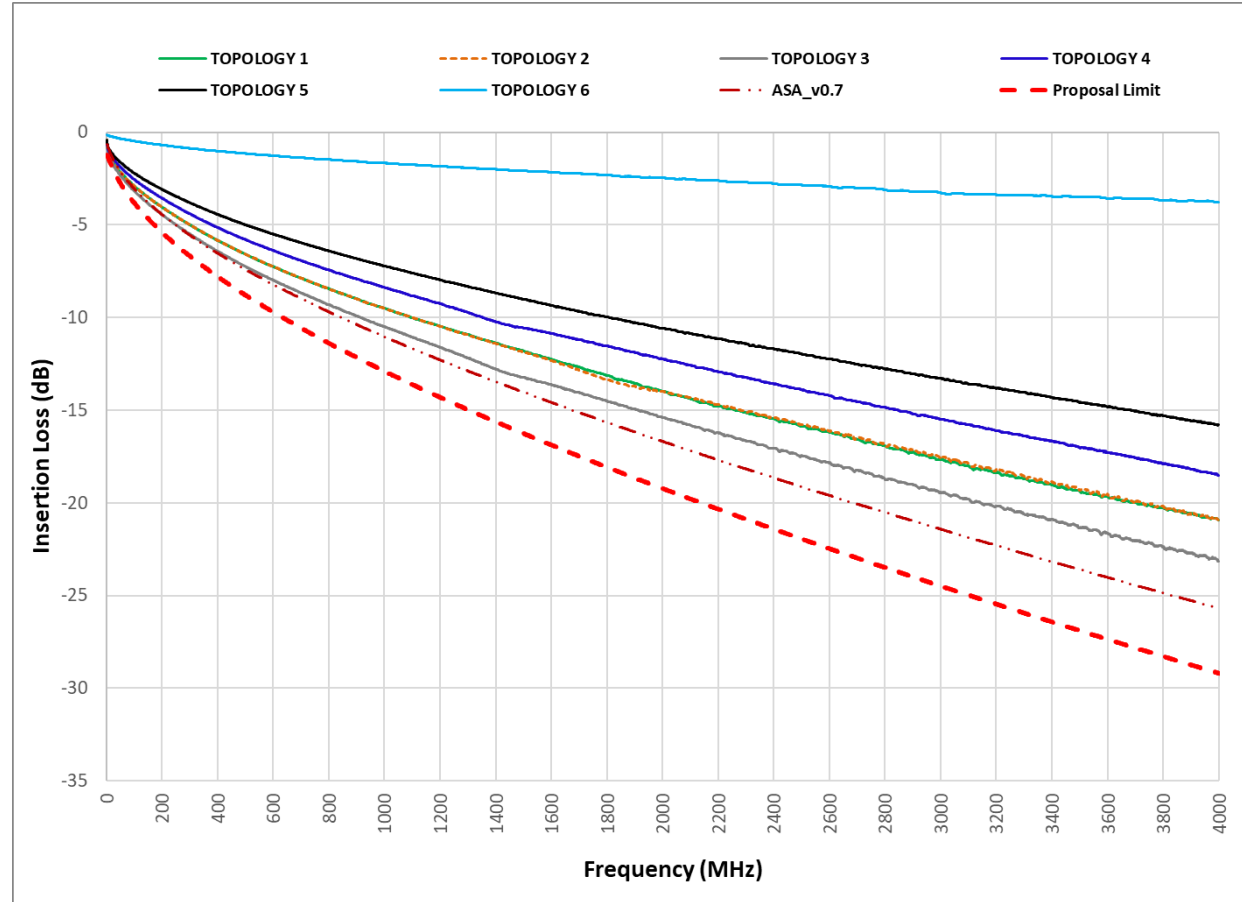
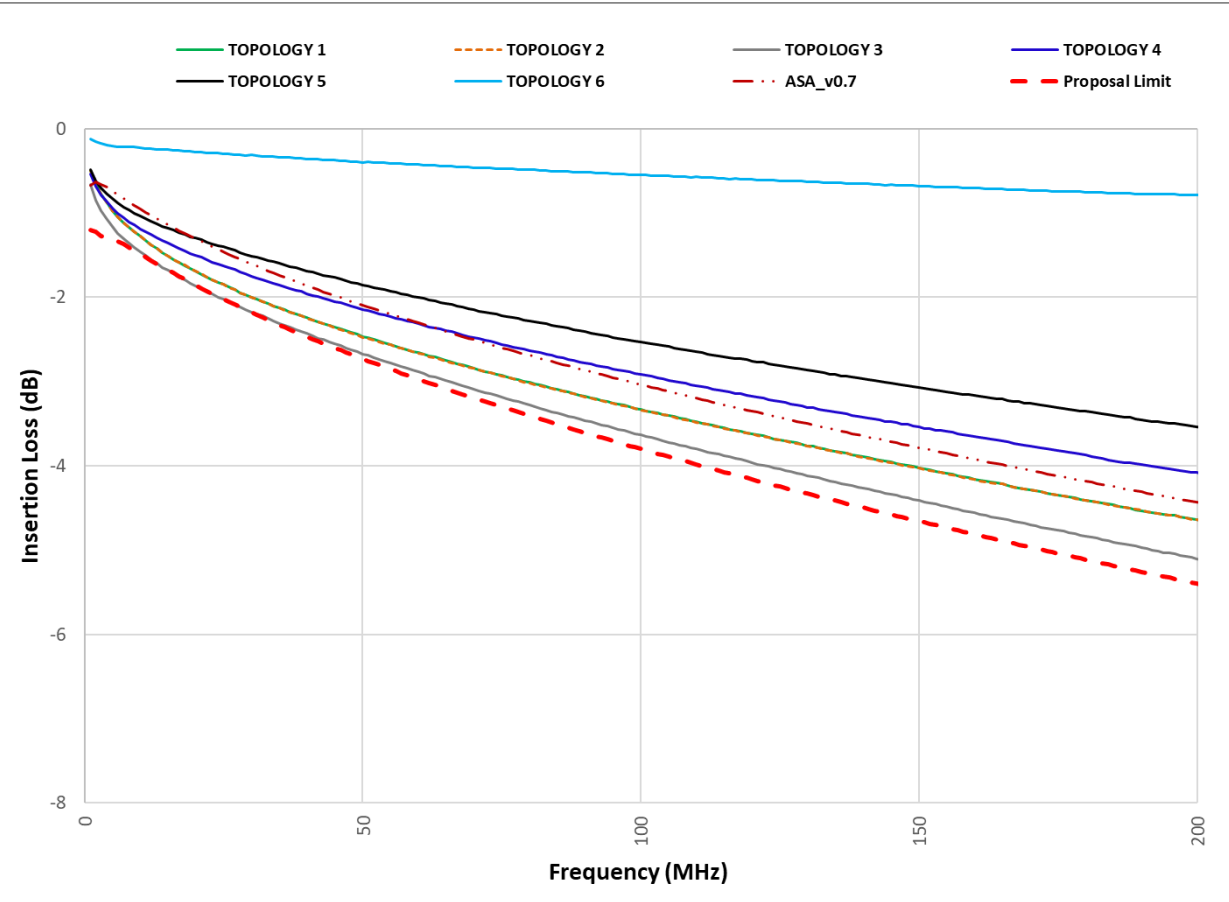
## Complete to 4 GHz



# Extrapolated IL Aged Data (15% Degradation Assumption)

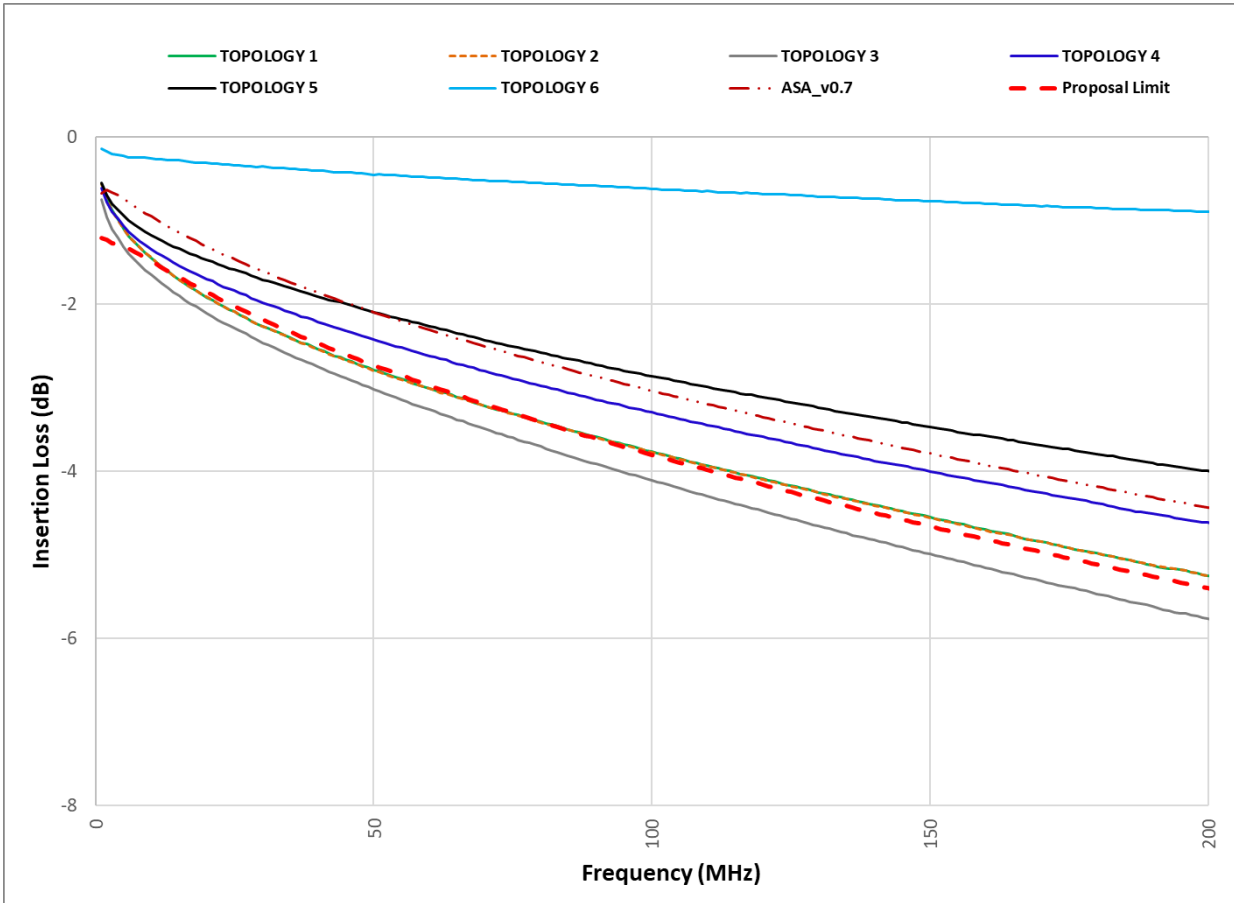
<200 MHz Zoom

Complete to 4 GHz

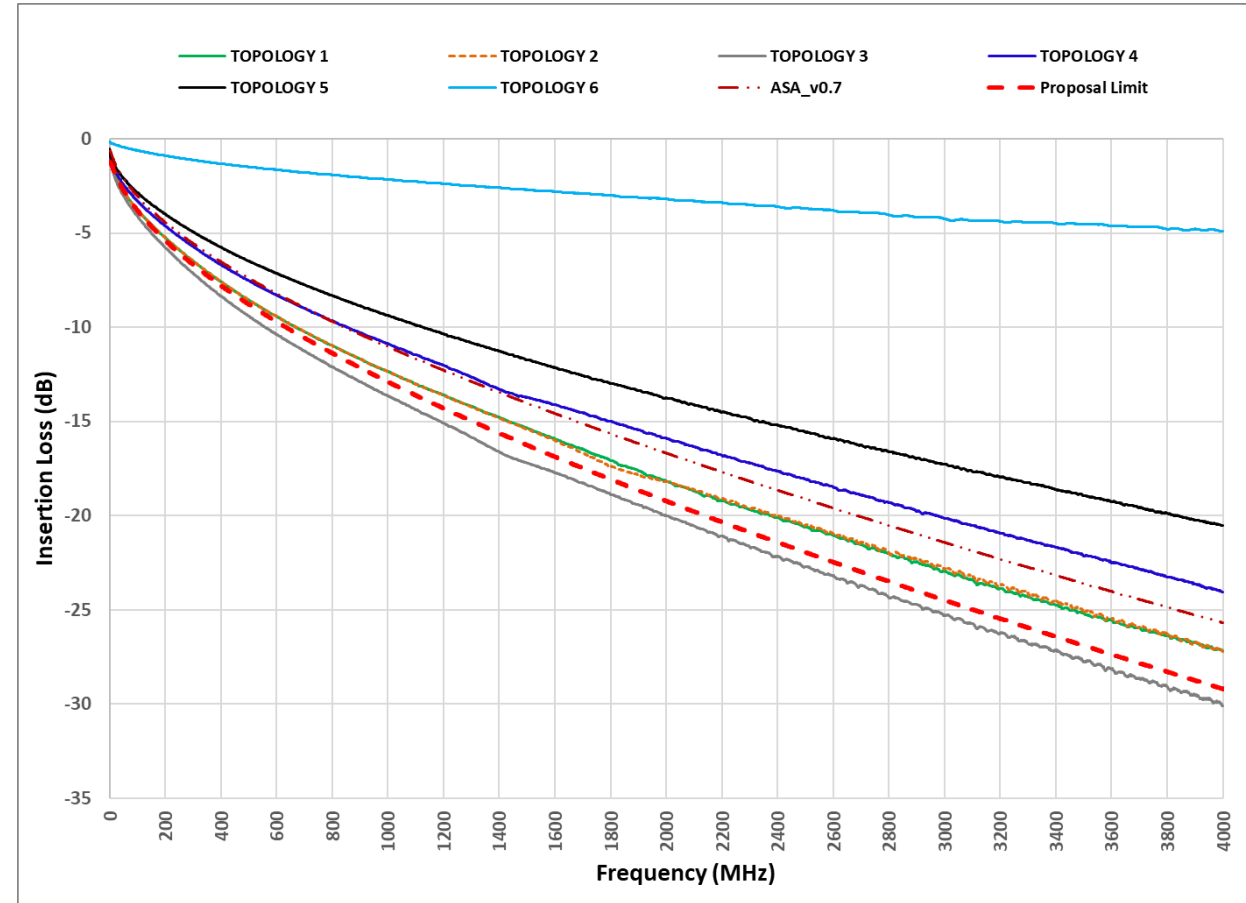


# Extrapolated IL Aged Data (30% Degradation Assumption)

## <200 MHz Zoom



## Complete to 4 GHz



# 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).

$$F_{max} = 4000 \times S \tag{xxx-01}$$

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

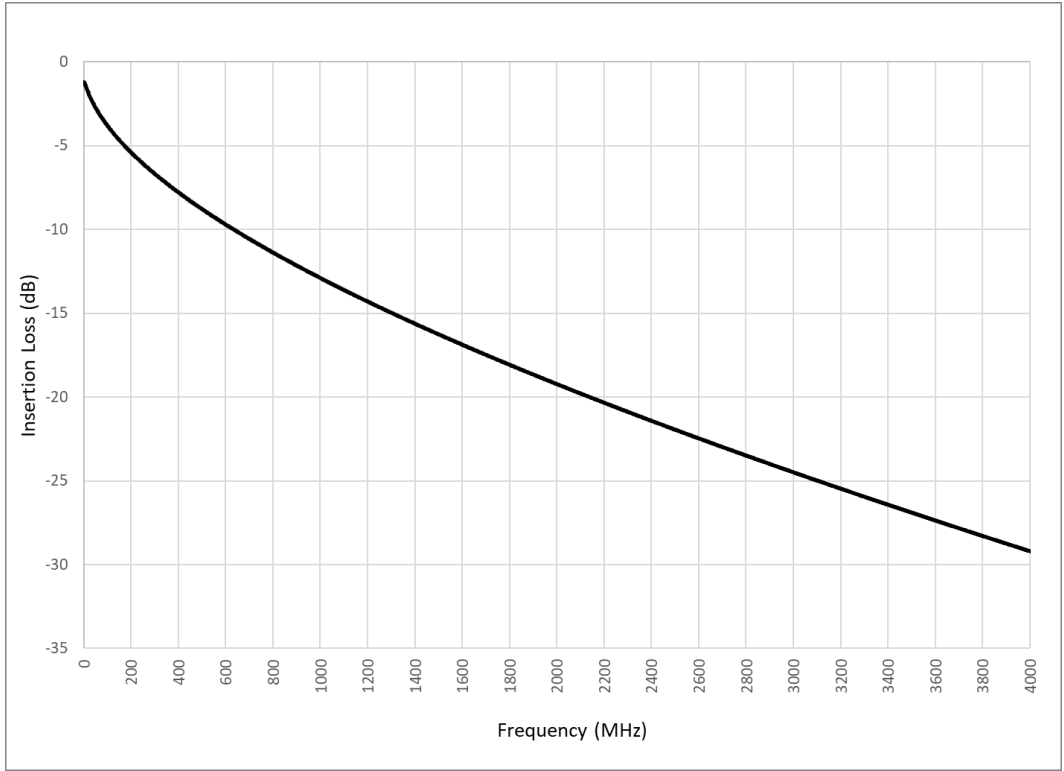
### xxx.x.x.x Link segment insertion loss

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) .

$$\text{Insertion loss}(f) \leq 0.015 - 0.001725 \cdot f - 0.3525 \cdot \sqrt{f} - 1.1685 / \sqrt{f} \text{ (dB)} \tag{2xx-TBD}$$

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

The insertion loss is illustrated in Figure 2xx-TBD





**Thank You**