IEEE 802.3dg Task Force

Insertion Loss Proposal

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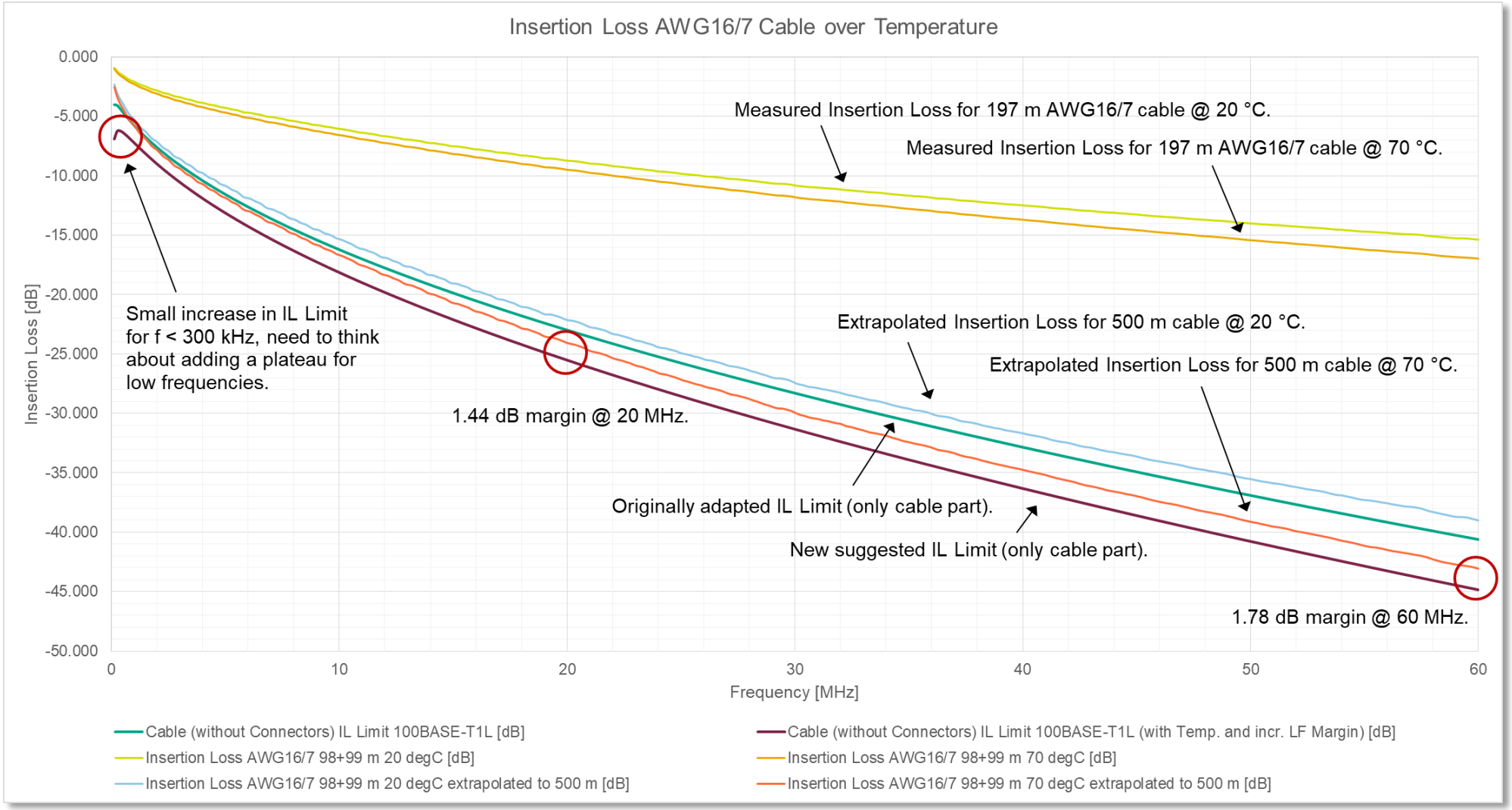
Cable Insertion Loss Measurements over Temperature

- According to TIA-568.2 the insertion loss for **shielded cables** over temperature can be calculated with the following formula:

$$IL(T) = IL(20\,°C) \times \left(1 + 0.002 \times (T - 20\,°C)\right)$$

- For a maximum copper temperature of 70 °C this increases the insertion loss in dB by 10 %.
- The AWG16 cable measurements (98 m + 99 m cable) on the next slide show a behavior very similar to the expected IL change.

Cable Insertion Loss Measurements over Temperature



Cable Insertion Loss Measurements over Temperature

- Therefore a correction factor of 1.1 has been applied to the cable part of the previously adapted IL limit curve.
- Additionally a correction factor of 2 has been added in the term for the low frequency behavior of the cable, to provide a better fitting of the limit line to the cable measurements.
- The following formula shows the new IL limit for the link segment with the mentioned modifications (including the connectors):

$$IL(f) = \left(5.42 \times \sqrt{f} + 0.044 \times f + \frac{1.76}{\sqrt{f}}\right) + 5 \times 0.02 \times \sqrt{f} \; with \; 0.1\,MHz \leq f \leq 60\,MHz$$

- At a frequency of 20 MHz (about $f_{Nyquist}$ /2) this leads to an increase in IL of about 2.5 dB (this is adding a significant burden to the PHY implementation for the given noise environment, so likely additional measures are necessary).
- The margin of the limit line for the cable (excluding the connectors), compared to the measured cable is 1.44 dB @ 20 MHz and 1.78 dB @ 60 MHz.

Thank you!