



# Link segment requirements for 2.5Gbps operation

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# Supporters

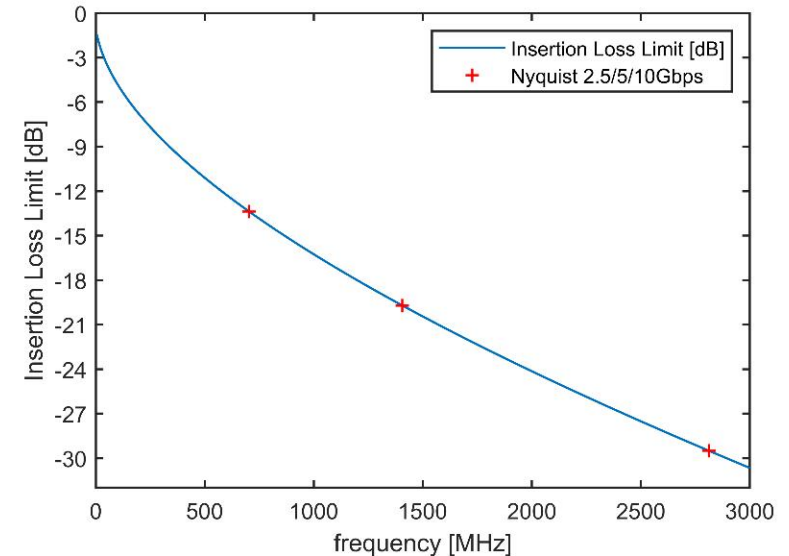
- ▶ Ricky Vernickel (LEONI Kabel GmbH)

# Contents

- ▶ Propose separate link segment specifications for 2.5Gbps
- ▶ Baseline proposal limits for
  - Insertion loss
  - Return loss
- ▶ Define way forward on
  - Mode-conversion
  - Shielding attenuation
  - Coupling attenuation

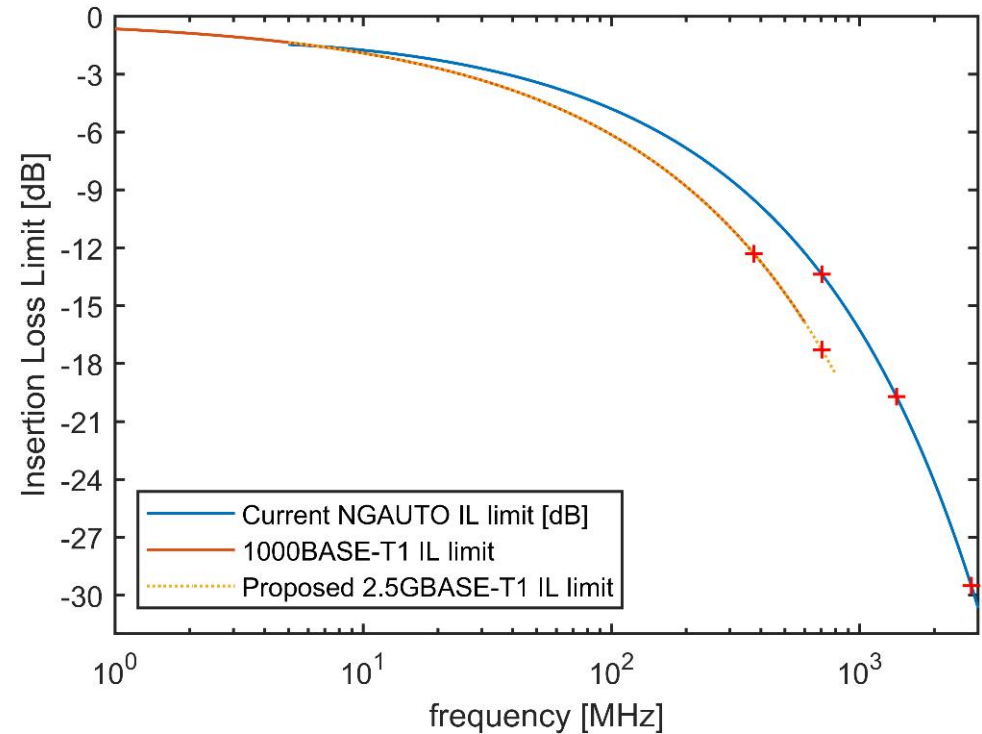
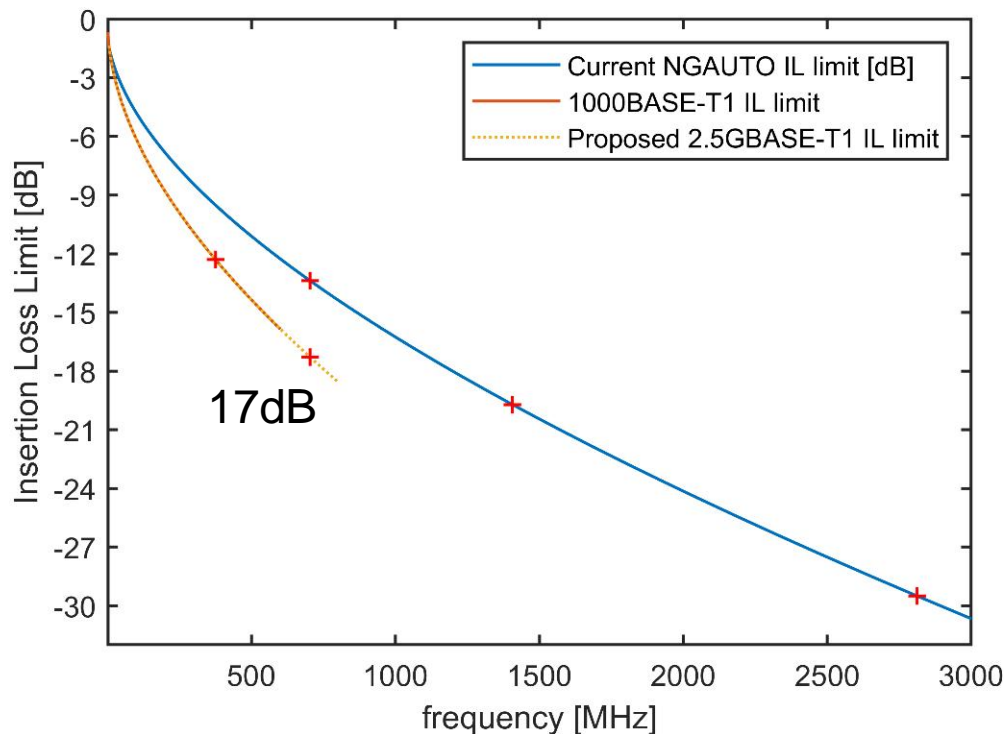
# Rationale

- ▶ A link operating at 2.5Gbps uses 4x less bandwidth
  - Nyquist frequency around 700MHz
- ▶ Nyquist insertion loss with current IL formula 13.4dB
- ▶ Note: this formula was set for 10Gbps capable high-quality shielded twisted-pair with braid
- ▶ At 2.5Gbps losses may be higher and shielding could be less 'perfect' = lower relative cost
- ▶ What if cables for 2.5Gbps could be an 'enhanced 1Gbps cable' instead of a downscaled 10Gbps cable?
- ▶ There will be 2.5Gbps transceivers that cannot do 10Gbps

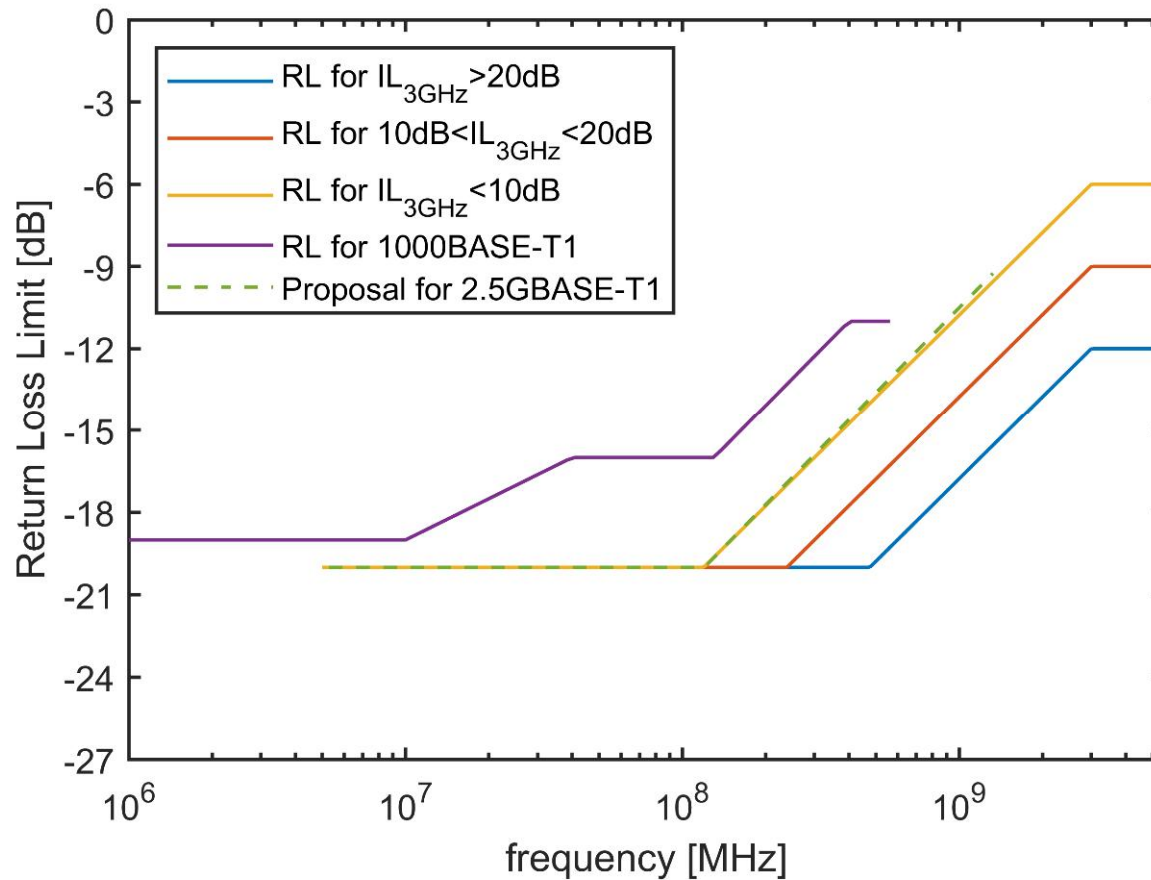


# Insertion loss

- ▶ 1000BASE-T1 IL limit:  $IL < 0.0023 \cdot f + 0.5907 \cdot \sqrt{f} + \frac{0.0639}{\sqrt{f}}$
- ▶ Baseline proposal: extended curve for 2.5Gbps
- ▶ Freq=5-800MHz (15% margin above Nyquist)



# Return Loss

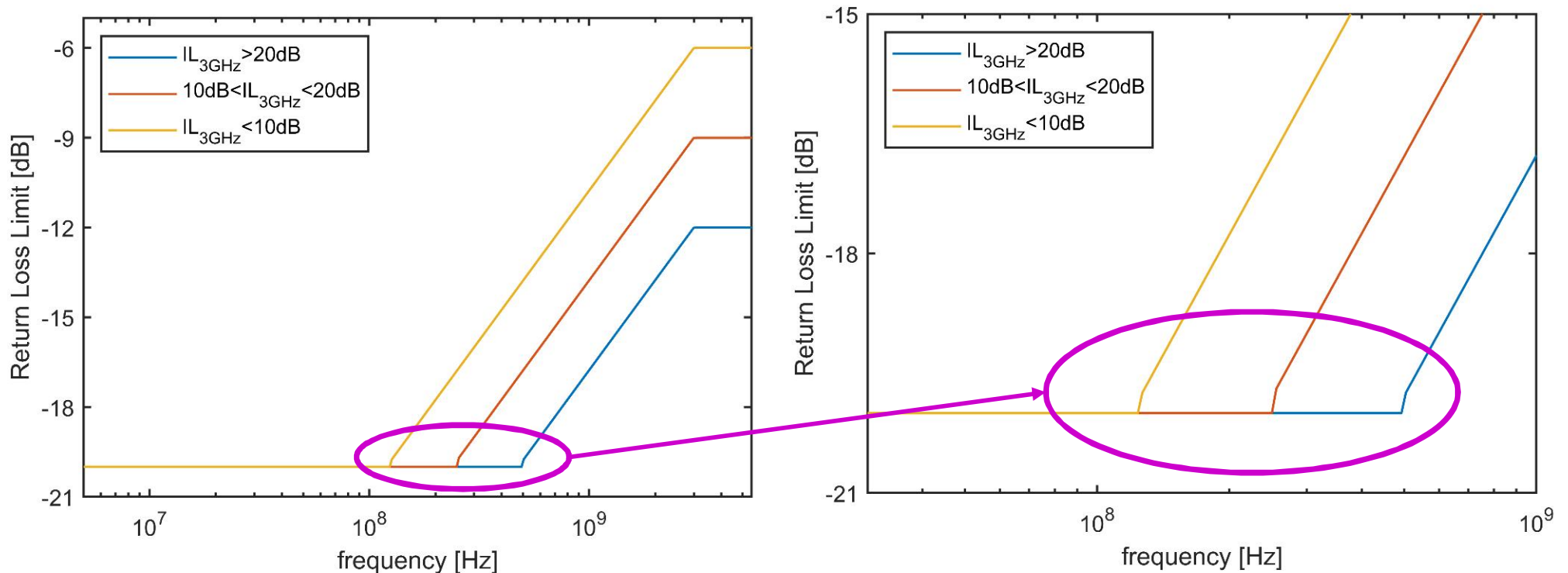


- ▶ 10dB/dec roll-up for 2.5Gbps ~2x higher than for 1Gbps results in a limit line close to the 10Gbps RL limit for  $IL < 10dB$

# UTP or STP?

- ▶ Leave both options open
- ▶ Define mode-conversion for UTP
- ▶ or
- ▶ Define coupling and shielding attenuation for lower cost STP types
- ▶ Provide two options in spec to enable cable innovation

# Discontinuity in current RL template



- ▶ 3GHz corner makes sense as this matches the IL range
- ▶ Best to fix the corner to 120/240/480 instead of 125/250/500MHz



# Motions

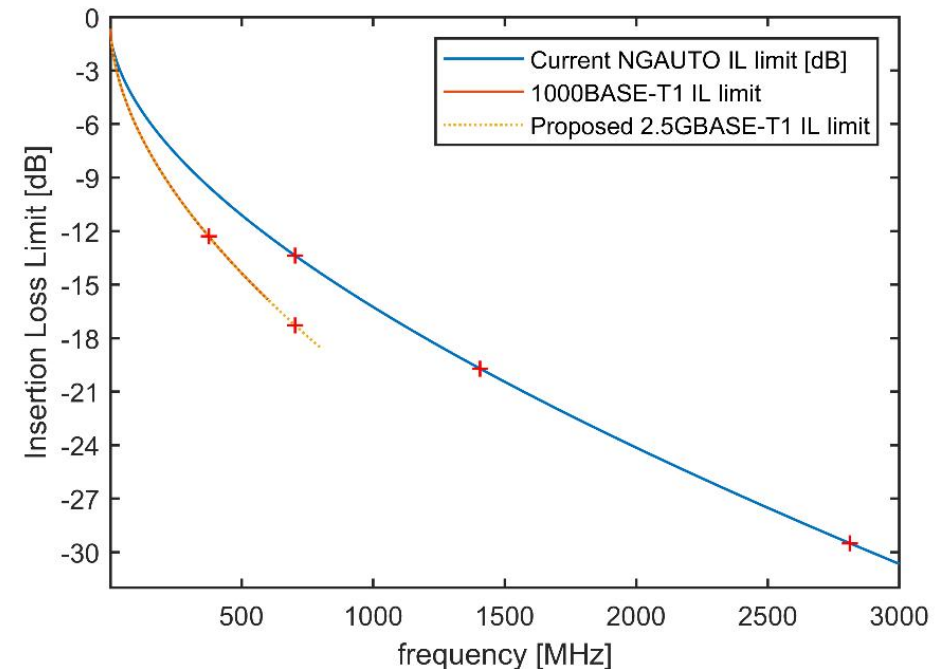
# Motion #

- ▶ Move to adopt baseline insertion loss limit for 2.5Gbps operation:

$$IL < 0.0023 \cdot f + 0.5907 \cdot \sqrt{f} + \frac{0.0639}{\sqrt{f}}$$

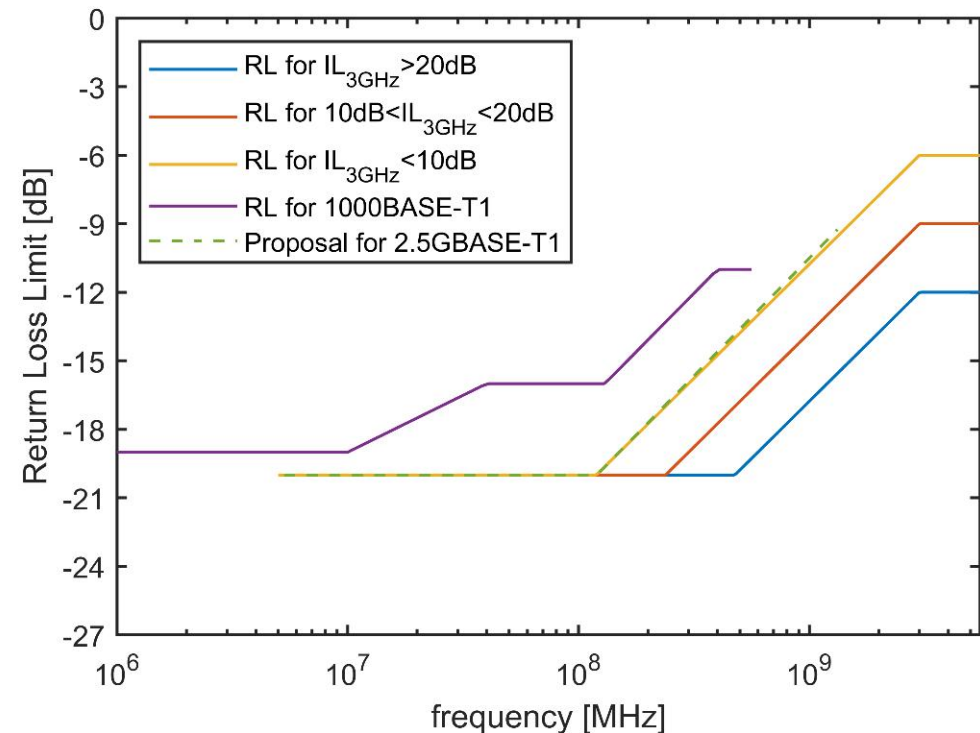
for  $f = 5\text{-}800$  MHz

- ▶ M: Gerrit den Besten
- ▶ S:
- ▶ Technical  $\geq 75\%$ )
- ▶ Y: N: A:
- ▶ Motion ...



# Motion #

- ▶ Move to adopt baseline return loss limit for 2.5Gbps:
  - 20 dB for  $f < 120\text{MHz}$
  - $20 - 10\log(f/120\text{M})$  dB for  $f = 120 - 1400\text{MHz}$
- ▶ M: Gerrit den Besten
- ▶ S:
- ▶ Technical  $\geq 75\%$ )
- ▶ Y: N: A:
- ▶ Motion ...



# Motion #

- ▶ Move to adopt changing the RL frequency corners at 125/250/500MHz to 120/240/480MHz
- ▶ M: Gerrit den Besten
- ▶ S:
- ▶ Technical  $\geq 75\%$ )
- ▶ Y: N: A:
- ▶ Motion ...

