



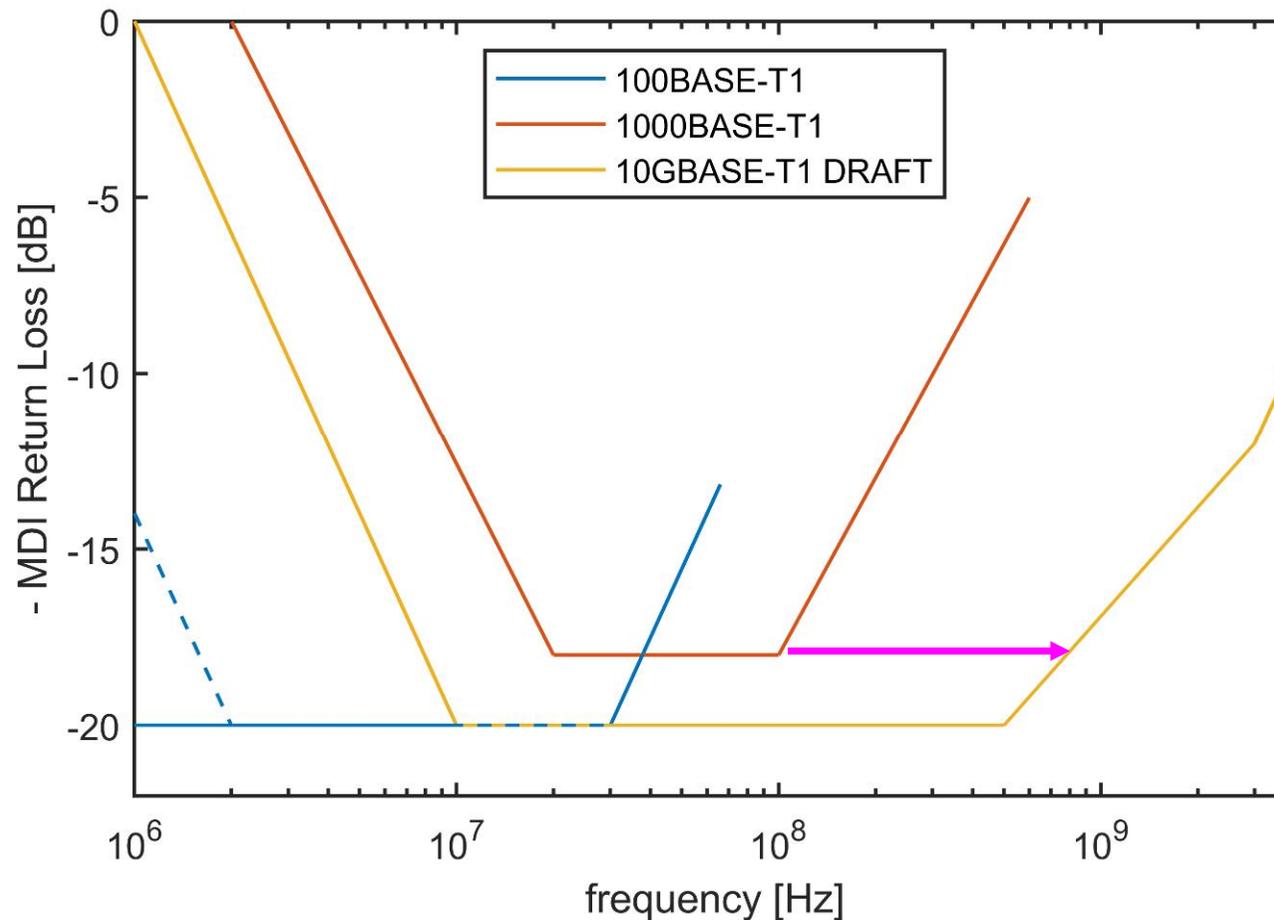
MDI Return Loss (part 1)

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NXP Semiconductors

Vienna, 15-18 July 2019

MDI Return Loss Comparison BASE-T1



- ▶ 1G→10G: Factor 7½ increase in baudrate (5625/750)
- ▶ Almost factor 8 increase of high corner

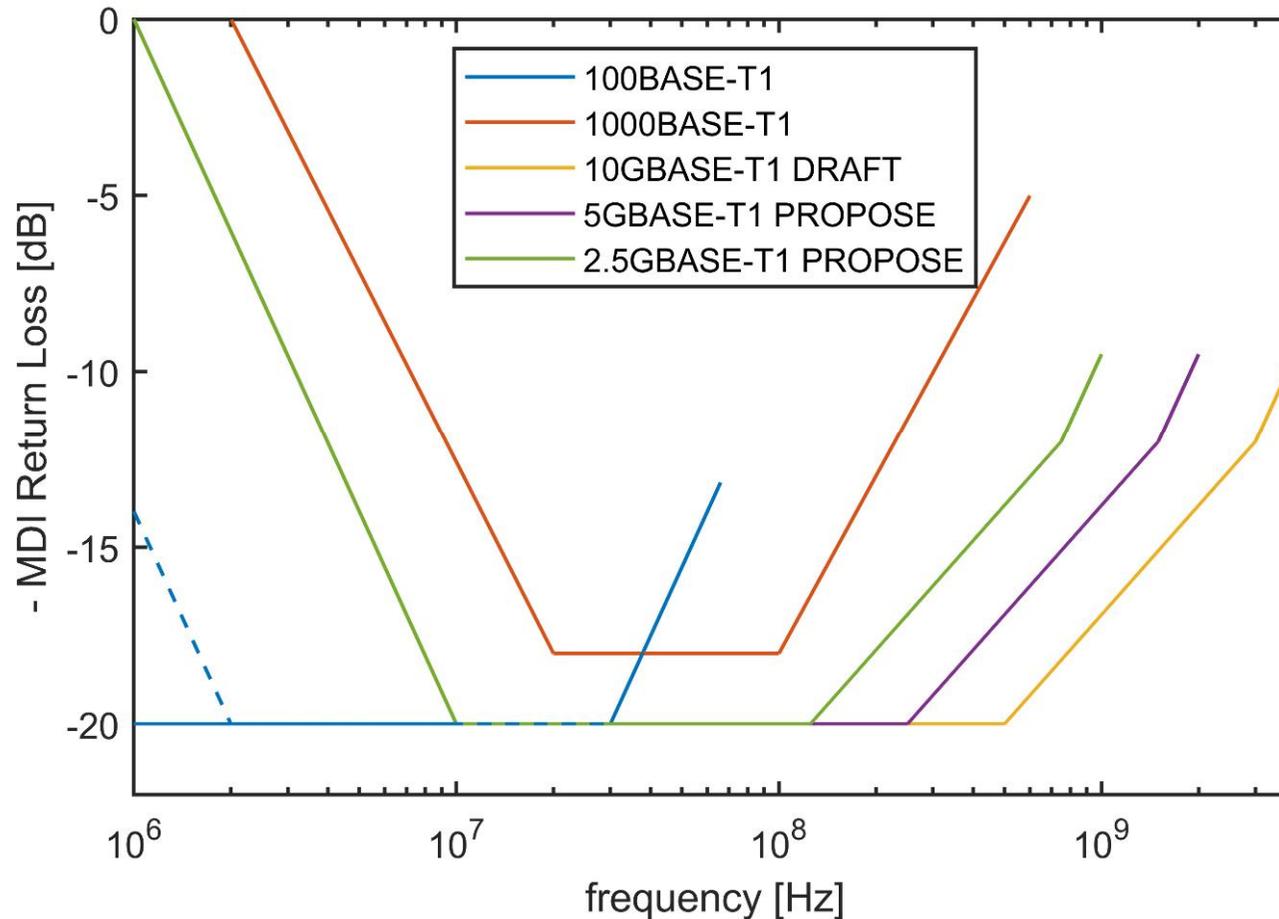
How about 2.5/5GBASE-T?

- ▶ There is only one MDI return loss limit in the draft spec
 - So this limit implicitly applies now to 2.5/5/10GBASE-T1 too
- ▶ However, this limit is strongly overspecifying what it actually needed for 2.5GBASE-T1 and 5GBASE-T1
- ▶ Propose to make the corner frequency [MHz] scaling with S

| Current | New | 2.5GBASE-T1 | 5GBASE-T1 | 10GBASE-T1 |
|---------|-------|-------------|-----------|------------|
| 500 | 500S | 125 | 250 | 500 |
| 3000 | 3000S | 750 | 1500 | 3000 |
| 4000 | Fmax | 1000 | 2000 | 4000 |

- ▶ No change to 10Gbps spec
- ▶ Lower speeds limit proportionally scaled

Proposal visualized



- ▶ 2.5GBASE-T1 >2x tighter than 1GBASE-T1, so sufficient

Additional remarks

- ▶ Keeping lower corner at 10MHz
 - comment shows incorrectly an S-scaling there too



MDI Return Loss (part 2)

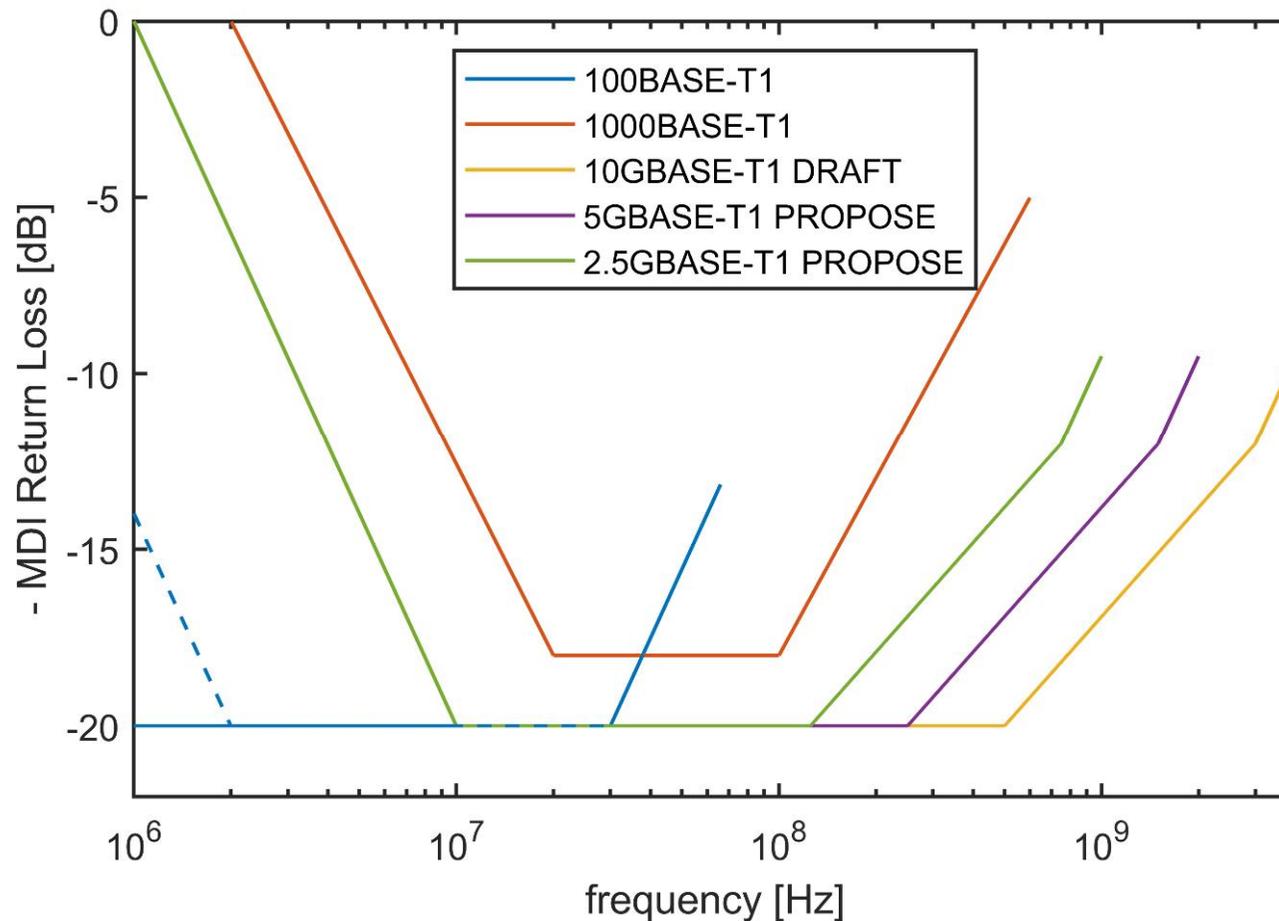
“testing the waters”

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Comparing high frequency limit

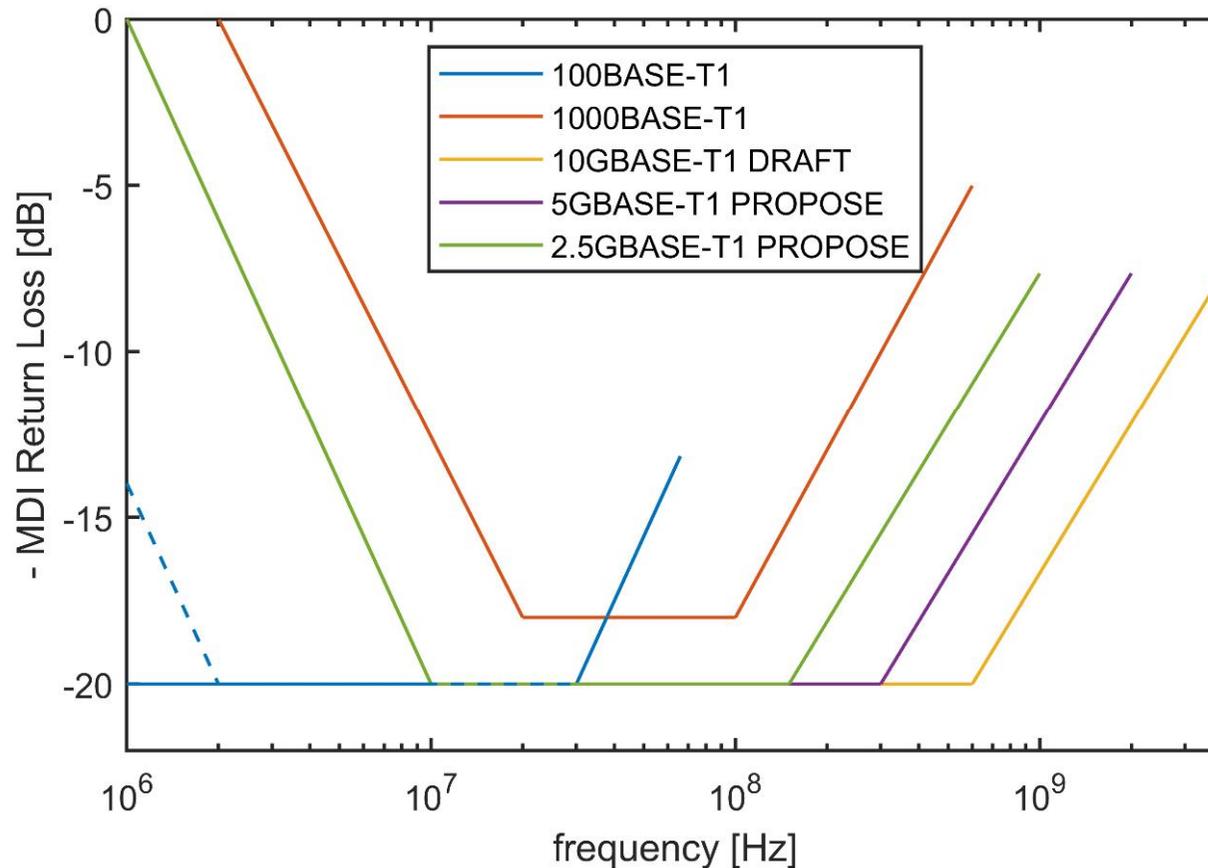


► Dual slope limit line

Further MDI return loss thoughts

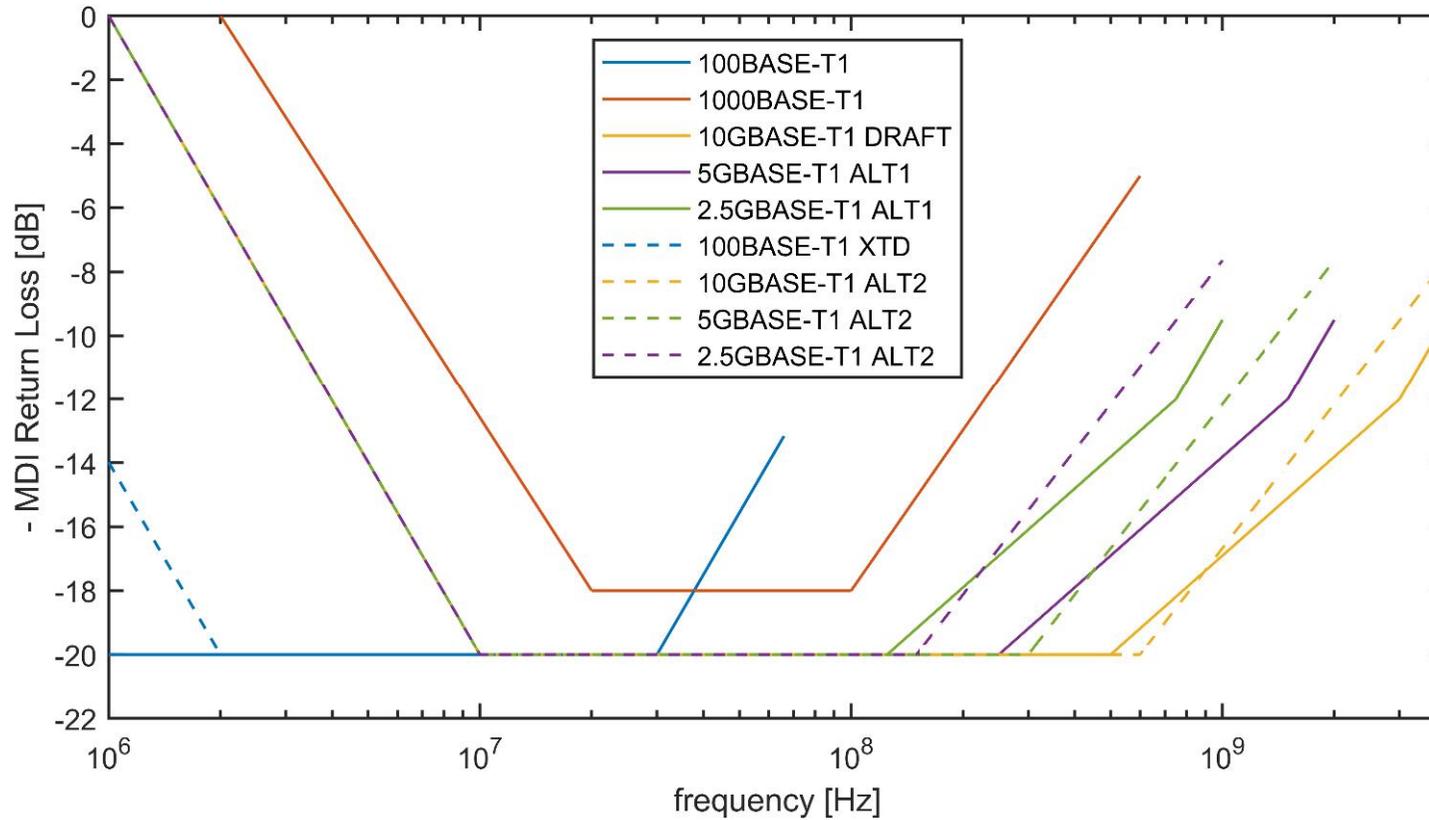
- ▶ The limit for the high-frequency seems tighter than necessary
 - Relatively much tighter than for 1000BASE-T1
- ▶ MDI return loss is far-end return loss, which gets twice attenuated by insertion loss
 - Worst $IL^2 * RL / IL$ for a low-loss link, improving for higher IL
 - In contrast to link segment return loss, with worst RL/IL for high IL
- ▶ PoDL experts have been driving this spec items so far, but PoDL is not the only reason for MDI return loss degradation
- ▶ What is the reason for the dual-slope in the HF roll-up?
 - Why not make a single slope roll-up like for the other speeds?

Example with single slope



- ▶ $F > 600S \rightarrow RL_{MDI} = 20 - 15 \cdot \log_{10}(freq/600S)$
- ▶ $\sim 10\text{dB}$ at Nyquist $\rightarrow \sim 750\text{ fF}$ for 5.625GBd

Comparison of limits



End