MDI Return Loss (part 1)

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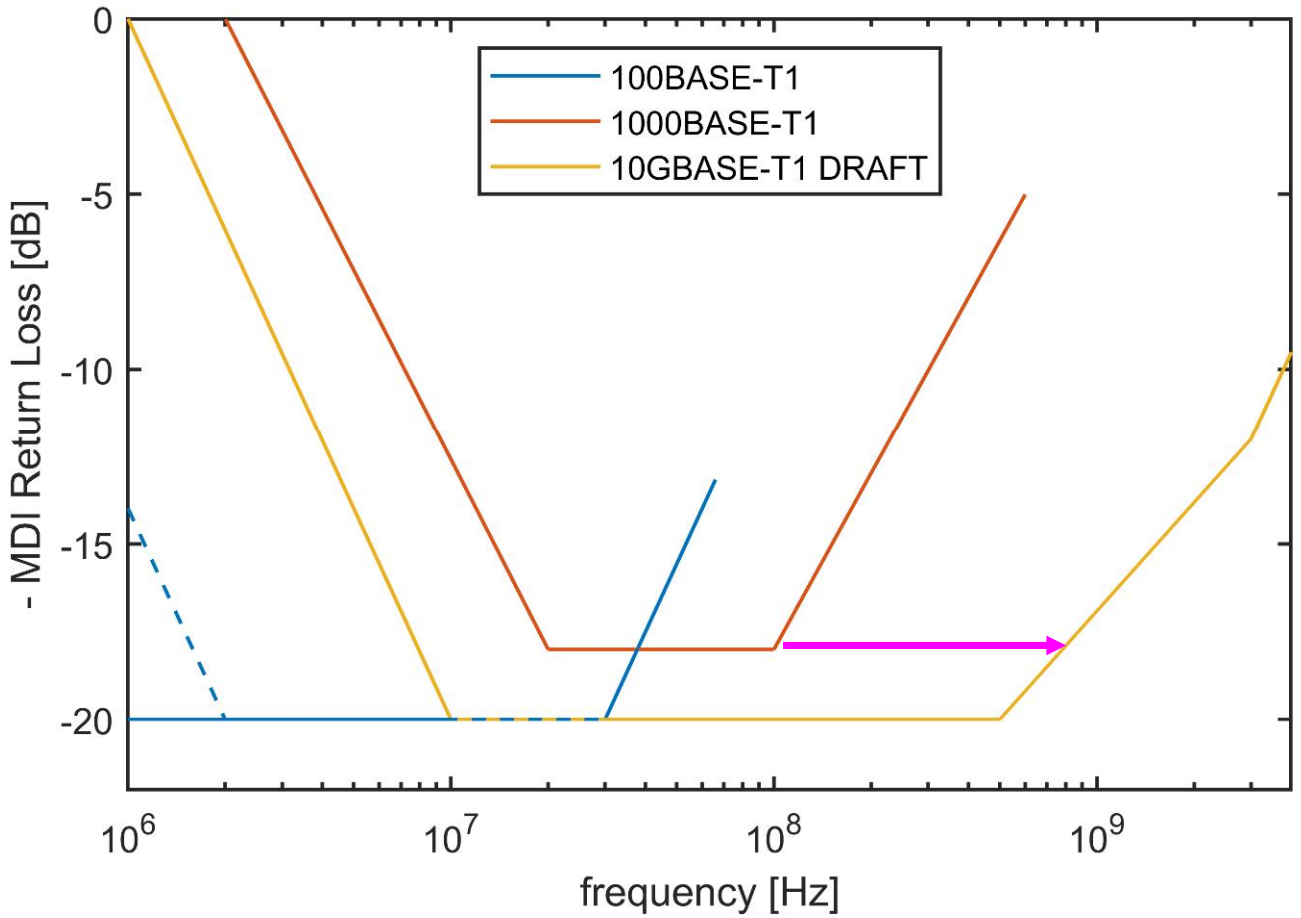
Vienna, 15-18 July 2019

MDI Return Loss Comparison BASE-T1



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

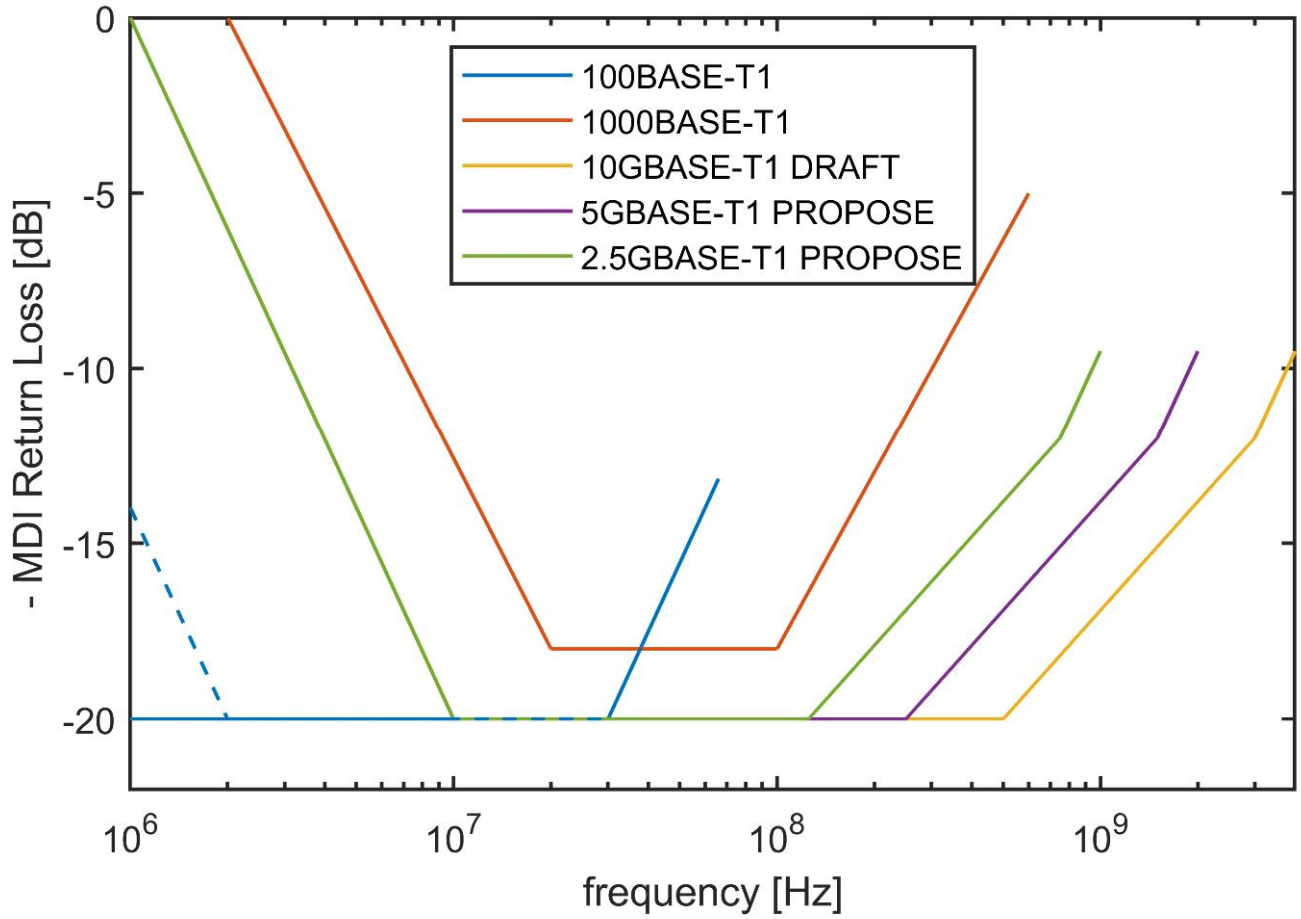
How about 2.5/5GBASE-T?

- 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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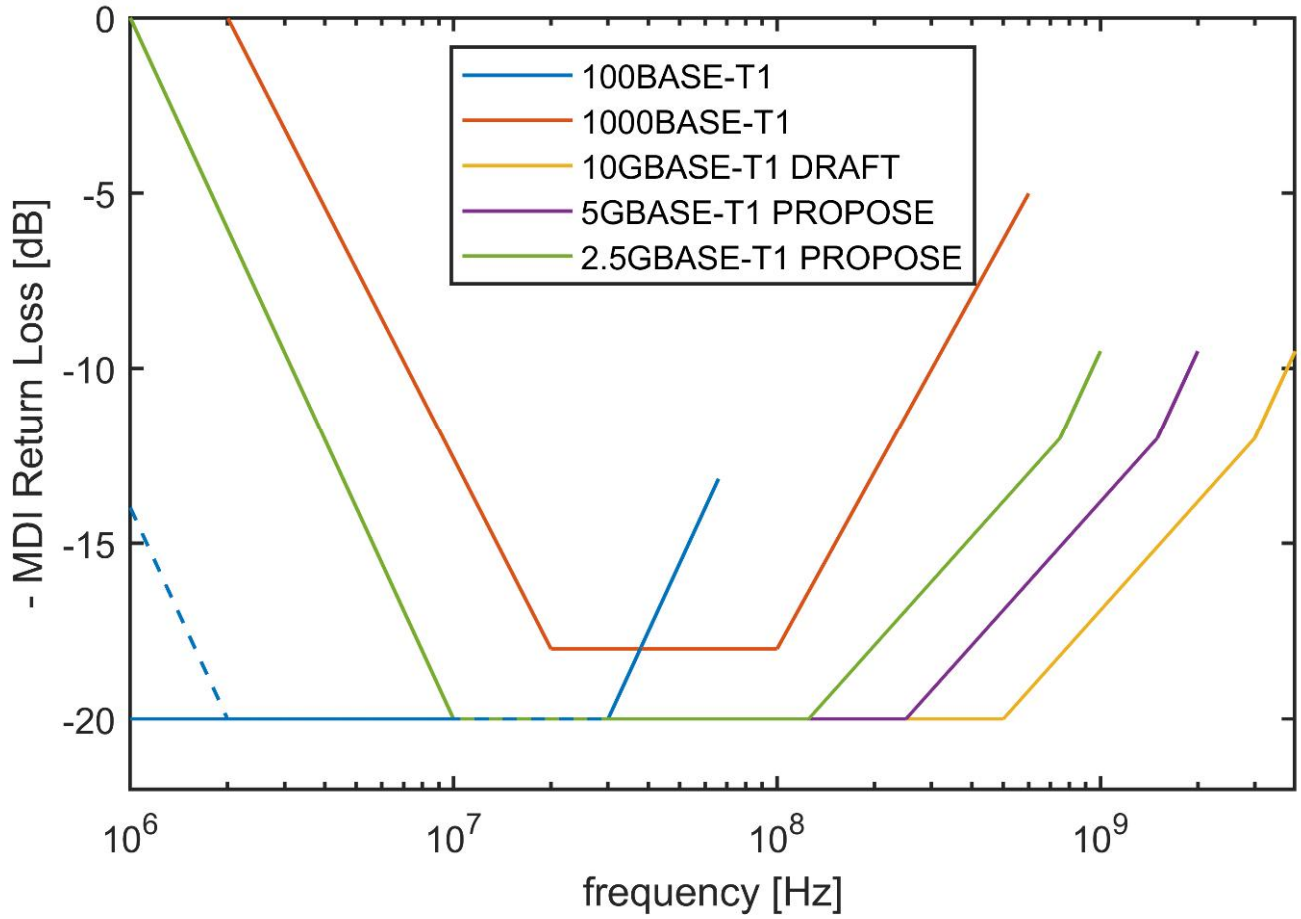
Comparing high frequency limit

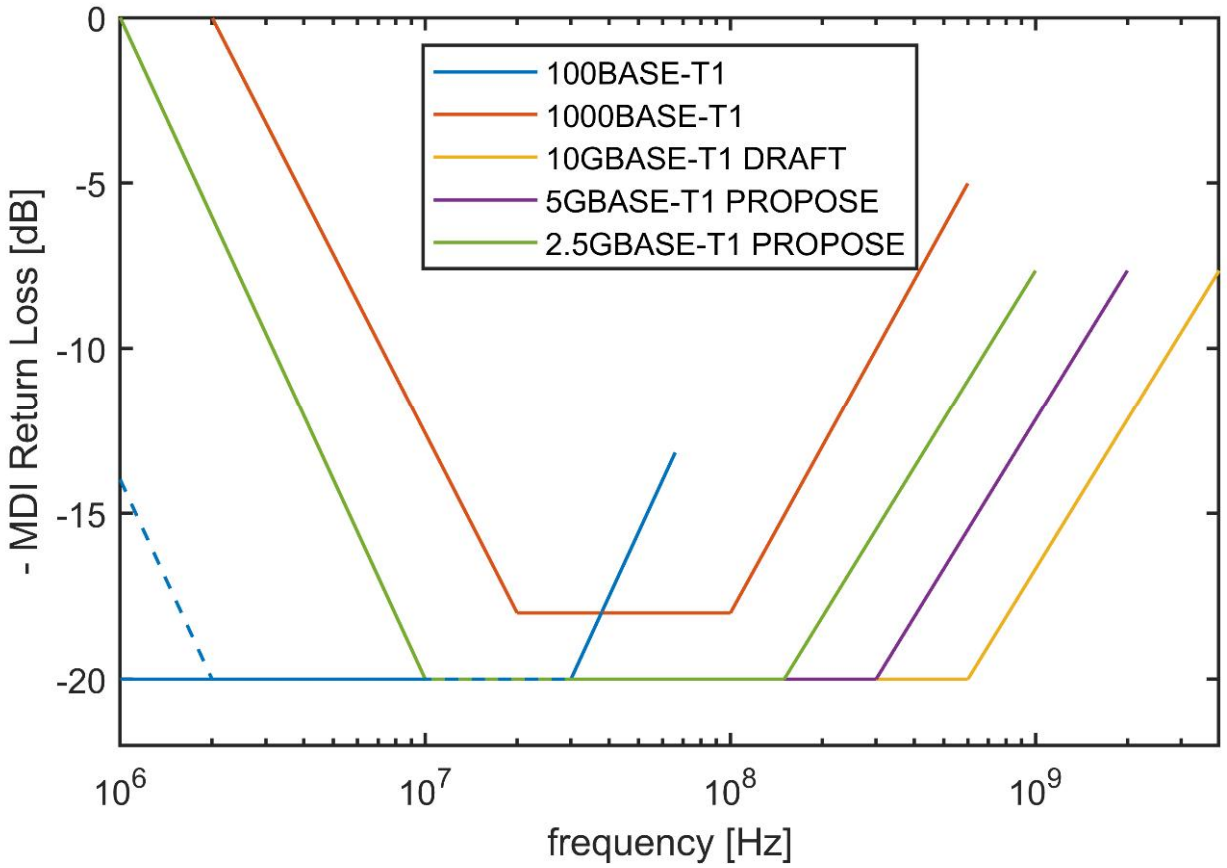


- Dual slope limit line

Further MDI return loss thoughts

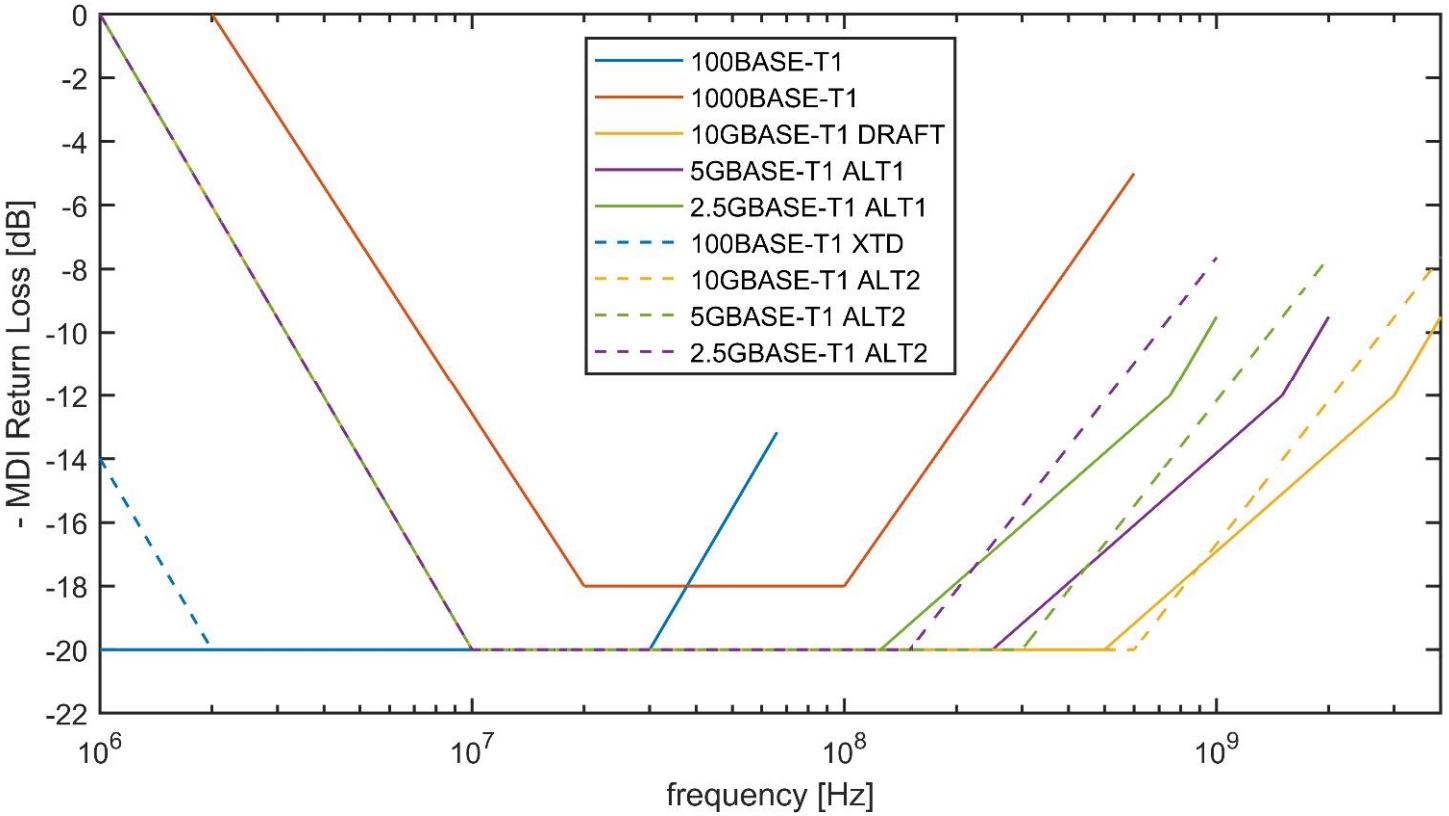
- The limit for the high-frequency seems tighter than necessary
  - Relatively much tighter than for 1000BASE-T1
- MDI return loss is far-end return loss, which gets twice attenuated by insertion loss
  - Worst IL^2*RL/IL for a low-loss link, improving for higher IL
  - In contrast to link segment return 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

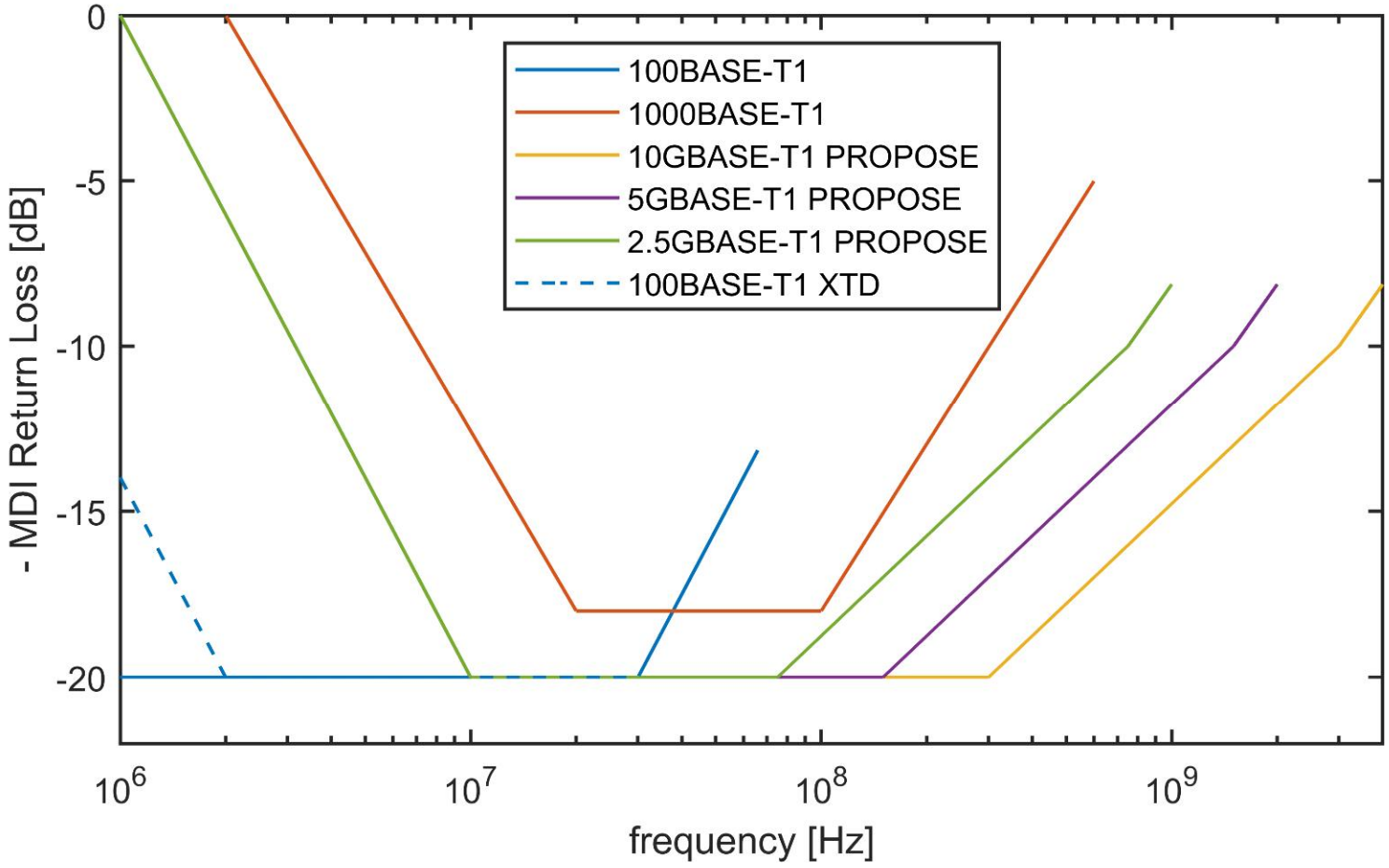


- F>600S → RL_{MDI} = 20-15*$\log_{10}$(freq/600S)
- ~10dB at Nyquist → ~750 fF for 5.625GBd

Comparison of limits

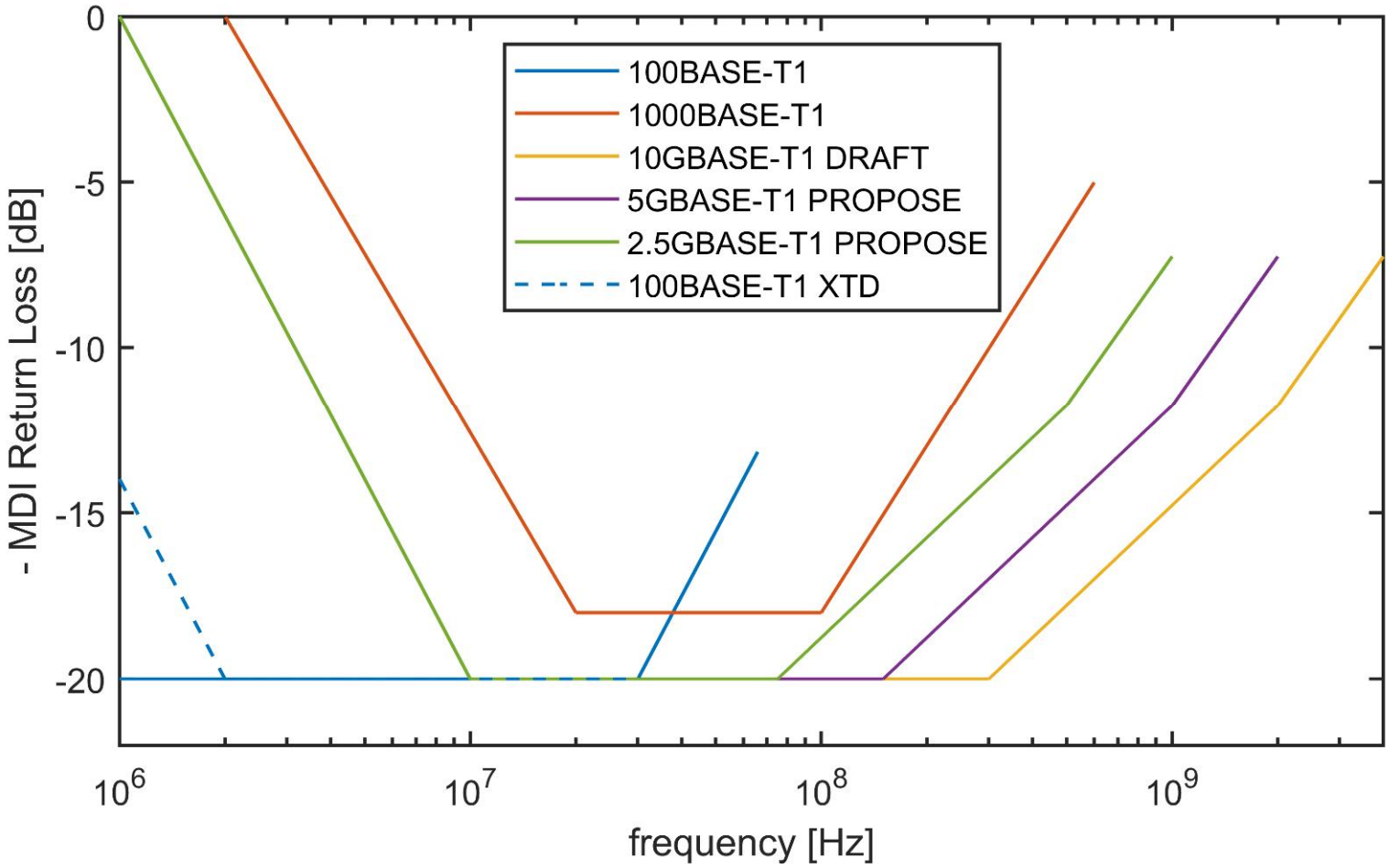


My comment version



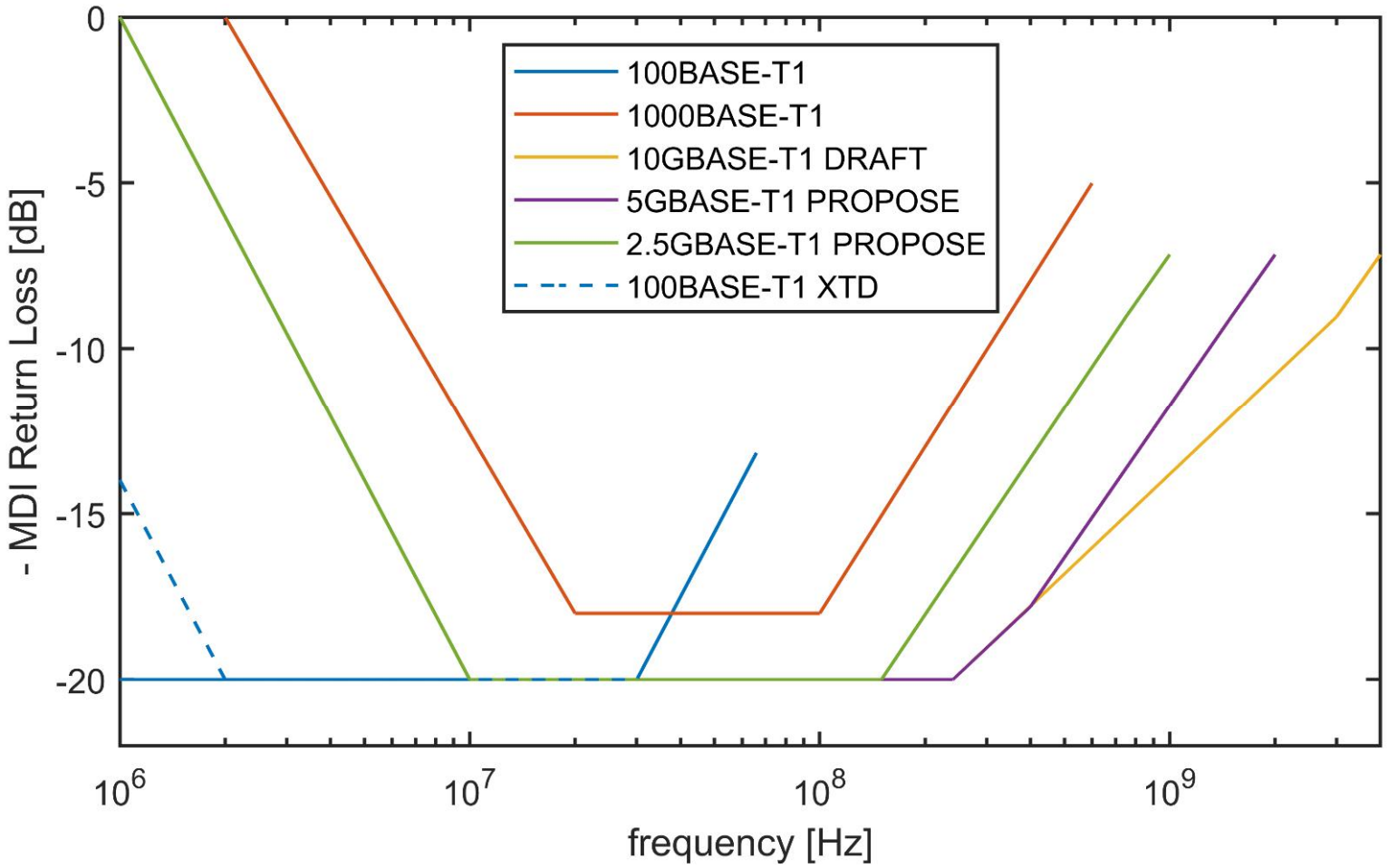
- 10dB/dec from 300S to 3000S, 15dB/dec from 3000S to Fmax

Alternate 1



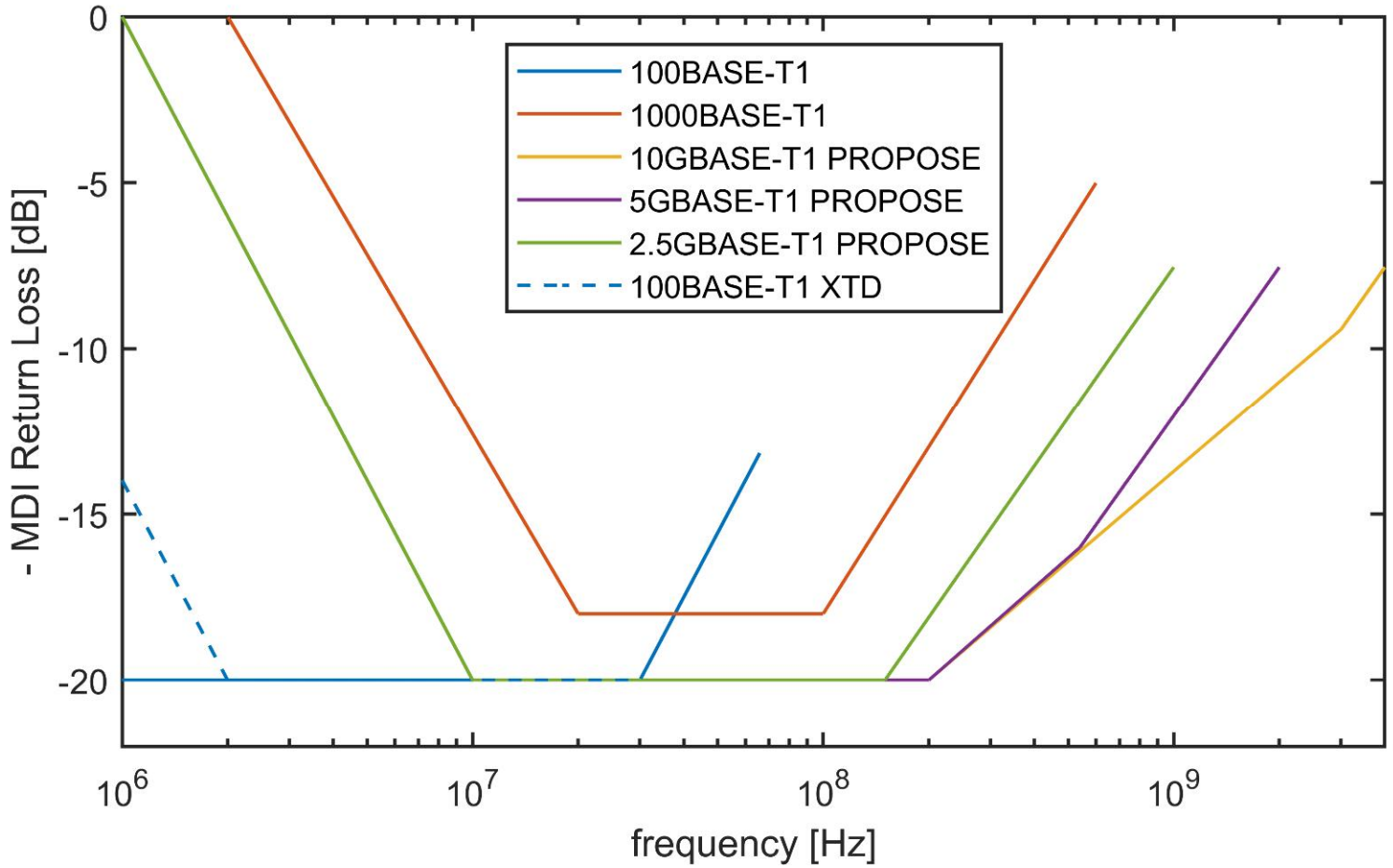
- 10dB/dec from 300S MHz, 15dB/dec from 2000S MHz

Alternate 2



- 10dB/dec starting at 240MHz
- 15dB/dec from 600S MHz, obeying above 10dB/dec limit

Alternative 3



- 9dB/dec above 200MHz
- 15dB/dec from 600S MHz, obeying 9dB/dec limit

End