



Low Frequency IL Proposal for P802.3cy

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Link Segment IL limit below 10 MHz?

- Link Segment Insertion Loss (IL) is not defined below 10 MHz
 - Concern from PHY designers that the IL could be excessive in this range with no limits
 - Physics of the cable and connectors don't allow for “high” IL at low frequencies
 - See next slide for data provided that shows there are no peaks or valleys below 10 MHz
 - Inclusion of passive parts, inductors and capacitors, can cause peaks, or valleys in the IL at low frequencies
 - Passive parts are not included in cable harness assemblies
 - Passive parts may be included on the printed circuit board (PCB), e.g. for PoDL



Cable IL Measurements

- https://www.ieee802.org/3/cy/public/adhoc/DiBiaso_Bergner_Cuesta_3cy_adhoc_01_091620.pdf
- https://www.ieee802.org/3/cy/public/adhoc/Patel_3cy_01a_0920.pdf
- https://www.ieee802.org/3/cy/public/adhoc/mueller_3cy_01_0920.pdf
- https://www.ieee802.org/3/cy/public/adhoc/boyer_3cy_01_10_14_20.pdf
- https://www.ieee802.org/3/cy/public/adhoc/mueller_3cy_01_10_14_20.pdf
- https://www.ieee802.org/3/cy/public/adhoc/koependoerfer_3cy_01_10_28_20.pdf
- https://www.ieee802.org/3/cy/public/adhoc/DiBiaso_Bergner_Cuesta_3cy_adhoc_01b_10_28_20.pdf
- https://www.ieee802.org/3/cy/public/adhoc/mueller_3cy_01_12_01_20.pdf
- https://www.ieee802.org/3/cy/public/adhoc/boyer_3cy_01_12_08_20.pdf
- https://www.ieee802.org/3/cy/public/adhoc/neulinger_3cy_01_12_15_20.pdf
- https://www.ieee802.org/3/cy/public/adhoc/mueller_3cy_01a_12_15_20.pdf
- https://www.ieee802.org/3/cy/public/adhoc/BergnerCuestaDiBiaso_3cy_01a_01_19_21.pdf
- https://www.ieee802.org/3/cy/public/jan21/neulinger_3cy_01_01_26_21.pdf
- https://www.ieee802.org/3/cy/public/adhoc/Gianordoli_Silvano_de_Sousa_3cy_01a_02_09_21.pdf
- NOTE: There may be others that I missed. This was not intentional. I didn't include the presentations that referred to these to suggest IL limits.



Link Segment IL limit below 10 MHz?

- Why not define link segment IL below 10 MHz
 - Every cable assembly is tested at End of Line (EoL) for quality
 - Minimum specified frequency for any s-parameter will be the step size used for EoL testing
 - 1 MHz minimum link segment IL frequency -> 10x as much memory to save EoL test data compared to 10 MHz minimum link segment IL frequency (this also applies to the raw cabling and connectors)
 - Test time is increased
 - More memory writes
 - More calculations are required
 - Testing with different step sizes over different frequency ranges is not practical



MDI Insertion Loss

- Passive parts may be included on the printed circuit board (PCB), e.g. for PoDL, EMC, etc.
- Low frequency IL limit should be defined
- Options for minimum frequency
 - 1 MHz, same as P802.3bp and P802.3ch
 - 2.5 MHz, scaled from P802.3ch as is the operating frequency
 - Less than 8.3 MHz, to accommodate 16.667 MHz Auto-Negotiation signals, e.g. 5 MHz to avoid awkward steps
- Γ will be used to represent the minimum frequency in the following slides as we haven't selected a specific frequency.



Proposed Change to P802.3cy D0.5

165.5.5.1 Host Test Fixture

- Add frequency range to equation 165-17

$$IL_{htfref}(f) = \left(0.09144 \left(\frac{f}{1000} \right) + 0.51054 \left(\frac{f}{1000} \right)^{0.45} \right) \times 0.3334 dB \quad (165-17)$$

where

f is the frequency in MHz: $\Gamma \leq f \leq 9000$



Proposed Change to P802.3cy D0.5

165.5.5.2 Link Segment Test Fixture

- Add frequency range to equation 165-18

$$IL_{lstfreq}(f) = \left(0.09144 \left(\frac{f}{1000} \right) + 0.51054 \left(\frac{f}{1000} \right)^{0.45} \right) \times 0.3334 dB \quad (165-18)$$

where

f is the frequency in MHz: $\Gamma \leq f \leq 9000$



Proposed Change to P802.3cy D0.5

165.5.5.3.1 Insertion loss

- Add frequency range to equation 165-21

$$IL_{mtfref}(f) = 0.06109\left(\frac{f}{1000}\right) + 0.3404\left(\frac{f}{1000}\right)^{0.45} + 0.2\sqrt{\left(\frac{f}{2500}\right)} \quad (165-21)$$

where

f is the frequency in MHz: $\Gamma \leq f \leq 9000$



Proposed Change to P802.3cy D0.5

165A

- Change minimum frequency in the following:
 - 165A.2.1 Host PCB trace loss on 165A-1 and 165A-2
 - Change “ $10 \leq f \leq 9000$ ” To “ $\Gamma \leq f \leq 9000$ ”
- Don't change minimum frequency in the following:
 - 165A.3 TP0 to TP5 channel insertion loss
 - Link Segment IL starts at 10 MHz so the complete channel is not defined in this range

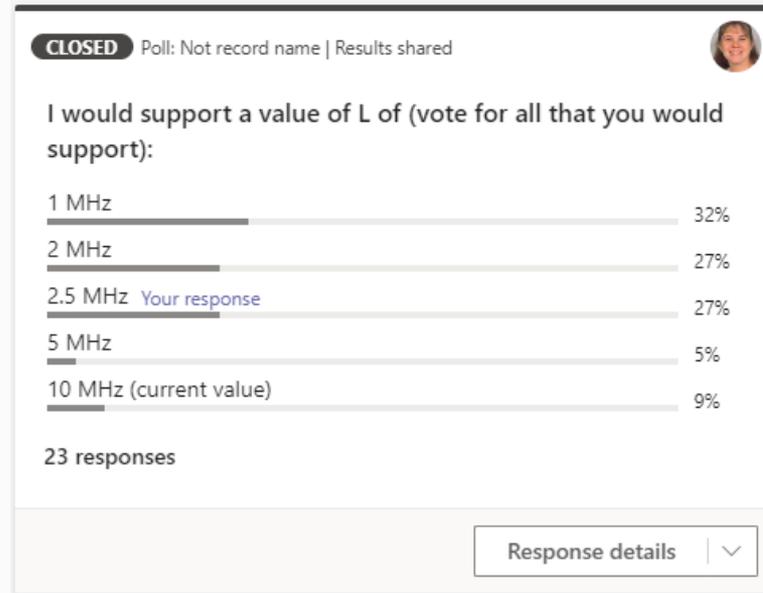
Questions?

Straw Poll

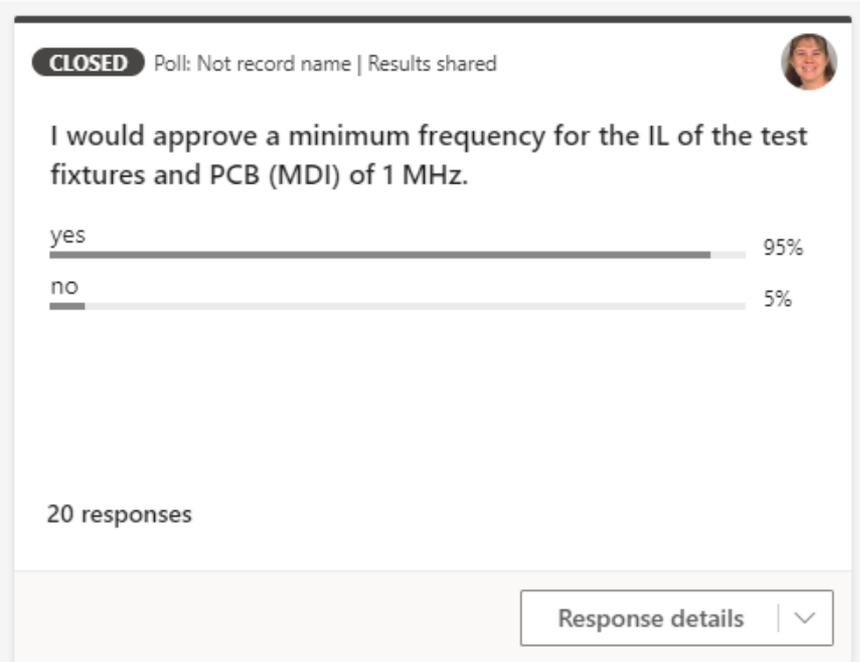
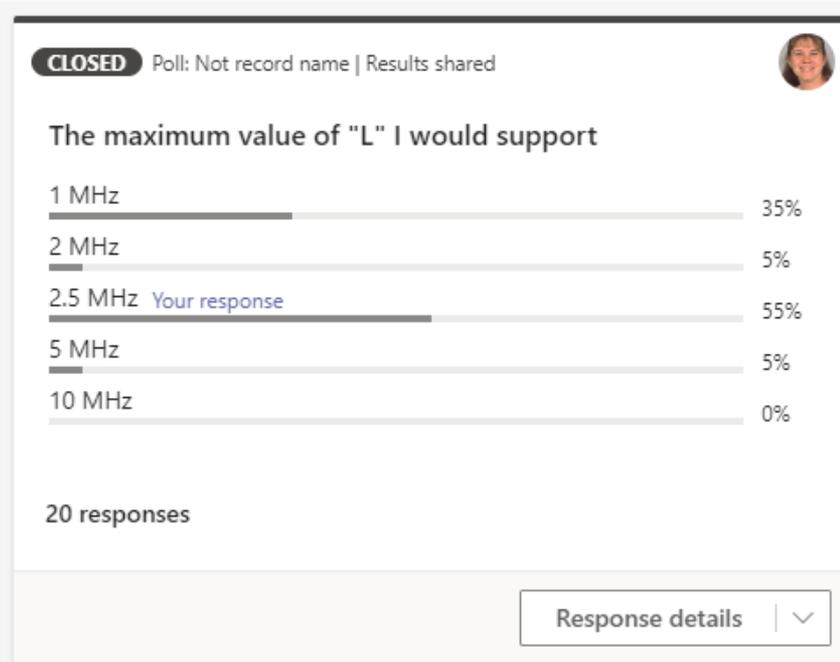


Straw Poll on value of Γ

- I would support a value of Γ of (vote for all that you would support):
 - 1 MHz
 - 2 MHz
 - 2.5 MHz
 - 5 MHz
 - 10 MHz (current value)



Straw polls created during meeting



Thank you