Updated Maximum Link Segment Delay Considerations

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5/12/2025

Supporters

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Background

- A contribution to the May 1 TF Interim meeting (gorshe_3dm_01a_250501) provided initial analysis for addressing the MultiG+100MBASE-V1 maximum link delay “tbd.”

- The focus of this contribution is to provide a more detailed analysis and proposal regarding the –V1 link segment delay, providing additional data and addressing comments that have been received since the original presentation.

Link Propagation Delay

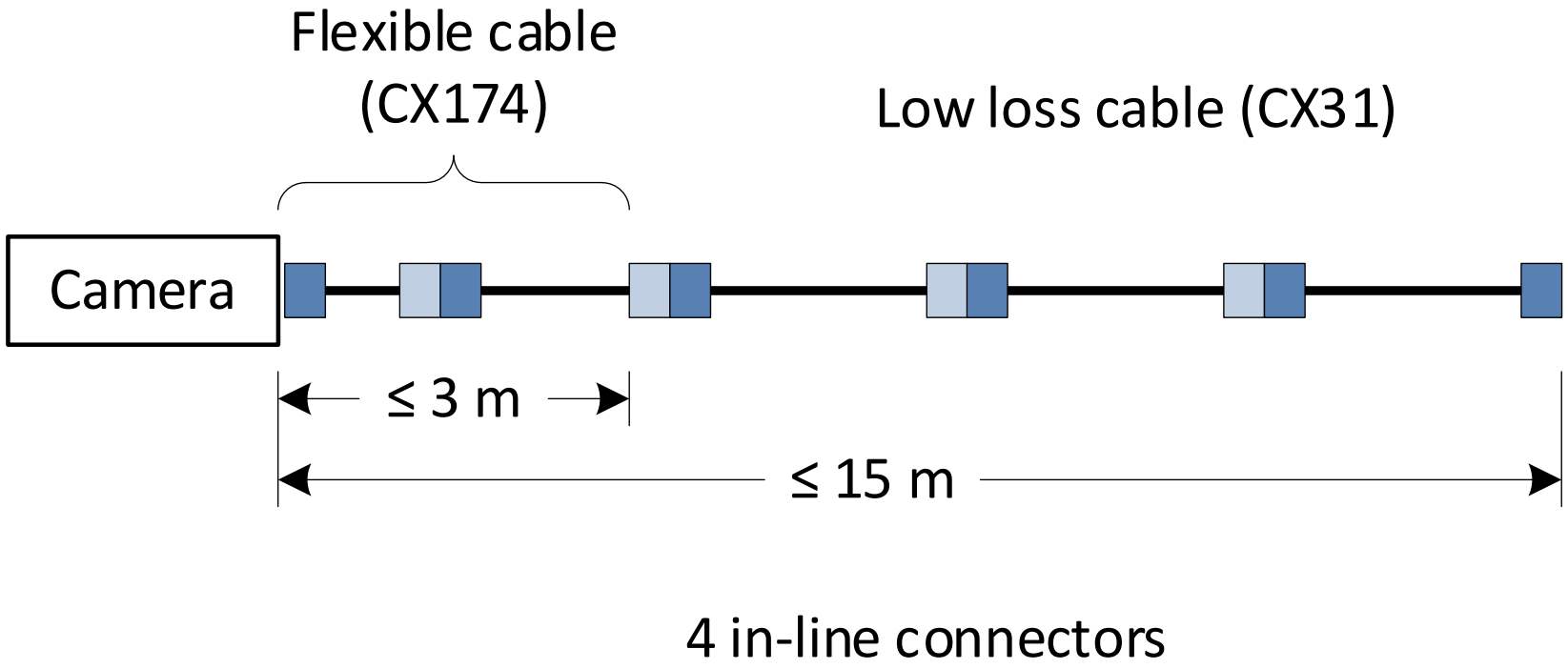
- **The previous contribution assumed a combination of CX174 and CX31 coaxial cable, with a worst-case velocity factor *n* of 0.66 for both. Additional data sheet study indicates:**
  - CX174 data sheets show $n = 0.66$
  - CX31 data sheets show $n = 0.66$ for some cables. Other cables have a range of $n = 0.75$ to 0.83, with 0.75 explicitly typically stated as the worst case. Consequently, while using 0.75 would be reasonable, I use the worst case 0.66 here
- **The previous contribution did not include delay associated with the up to 4 in-line connectors. Although I requested connector delay information from experts affiliated with connector vendors, none was received prior to the upload deadline.**
- **Per 802.3 clause 80.4,**

$$\text{cable delay} = 10^9 / nc = 10^9 / (n \times (3 \times 10^8)) \text{ ns/m} \qquad (80\text{–}1)$$

  - Yielding: 5.05 ns/m for CX174 and the worst case for CX31
    - CX31 with 0.75 would have 4.4 ns/m

MICROCHIP

Link Propagation Delay for –V1



Per the velocity factor assumptions of the previous slide , the worst case is:

- Total Delay = (5.05 × 3) + (5.05 × 12) + (connector delay) = 76 ns + **

Link Propagation Delay for –V1

- As previously noted:
  - Since coax has a single conductor, there is no need for margin to accommodate the added SDP length due to the cable twisting
  - Coaxial cables typically have low group delay variation (e.g., <50 ps/m at 1 MHz), which implies that an associated added margin of 1% would be adequate

- Consequently, a small additional margin of <tbd> should be added, giving a total link segment delay of **

Link Propagation Delay – Conclusions and Proposals

- **In summary, for 15 m coaxial cables:**
  - Based on the analysis in this contribution, we propose that the following text should be adopted for clause 200.12.1.6:
    "The propagation delay of a link segment shall not exceed ** ns at all frequencies between 2 MHz and 4000 MHz."

Thank You