100GEL Cable Assembly Characteristics -06

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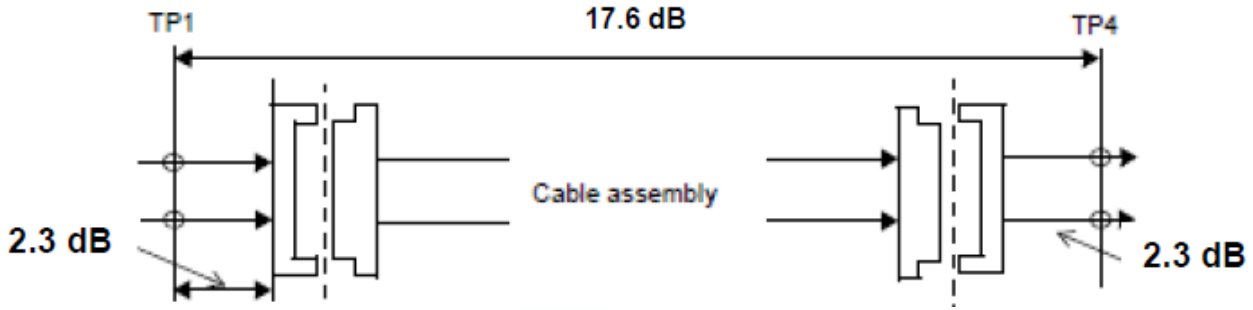
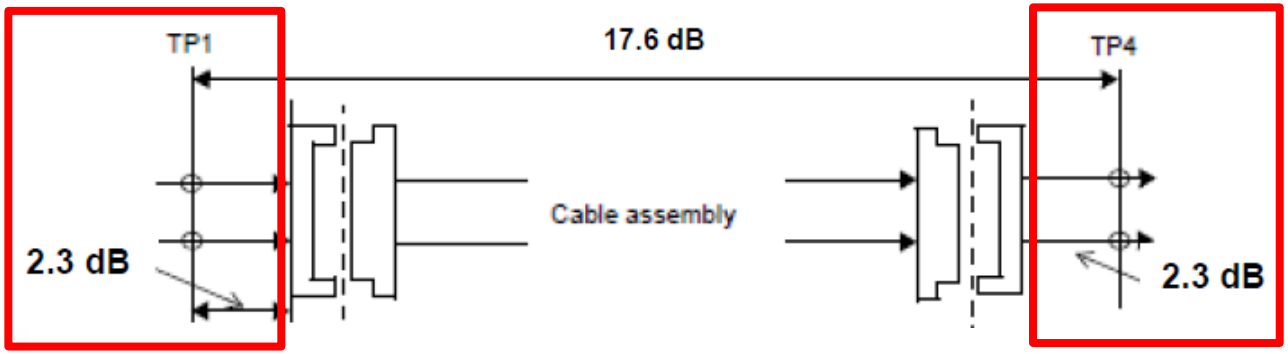
Proposed Cu Cable Spec



- Proposal based on the following assumptions
  - 2.3dB (@26.56GHz) for MCB IL
  - 1.5dB MAX (@26.56GHz) for Connector IL
  - 10.0dB for Cu Cable Assembly
- Cu Cable Assembly (expectations)
  - (2)pcs PCB paddle card, wire attachment, bulk cable
  - 2m bulk cable reach

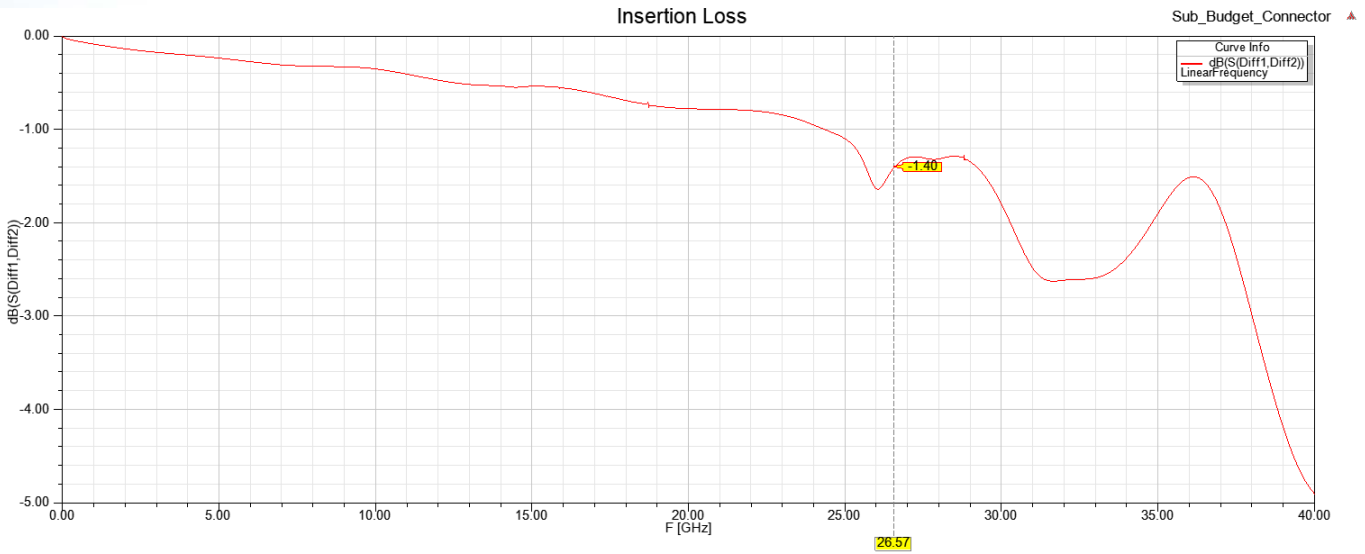
Budget Allocation - MCB

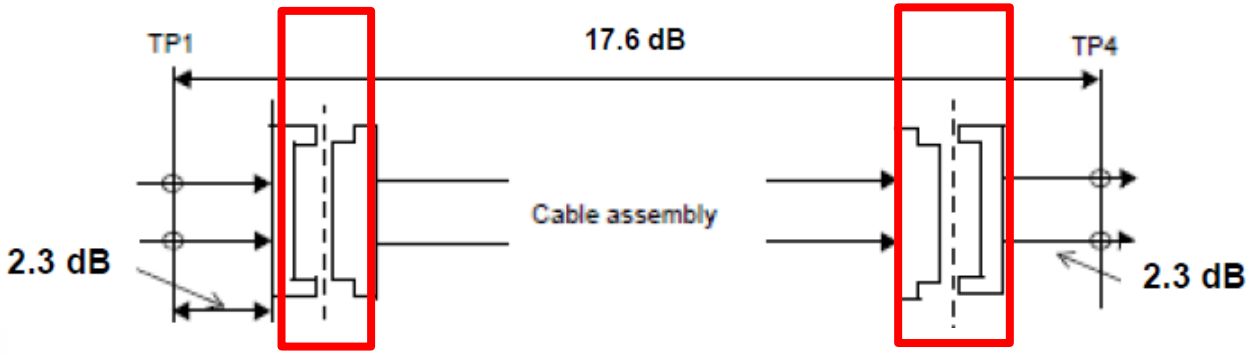
IL = 2.15dB



Budget Allocation - Connector

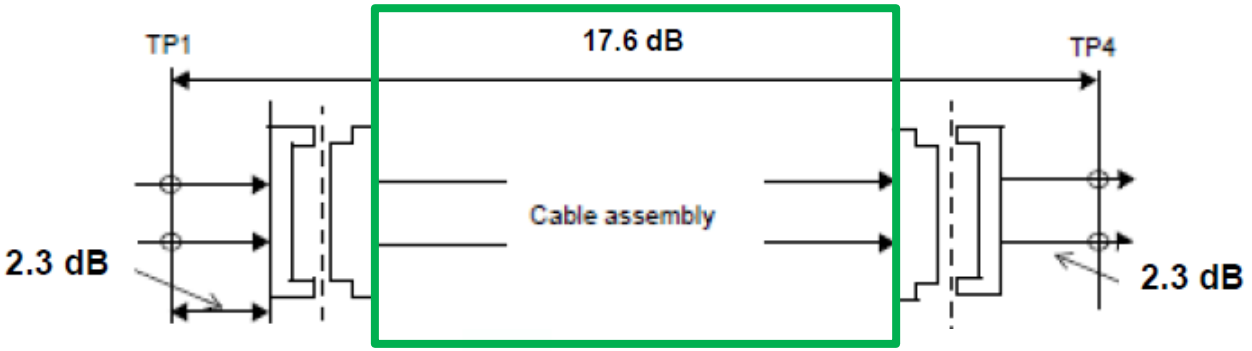
IL = 1.40dB





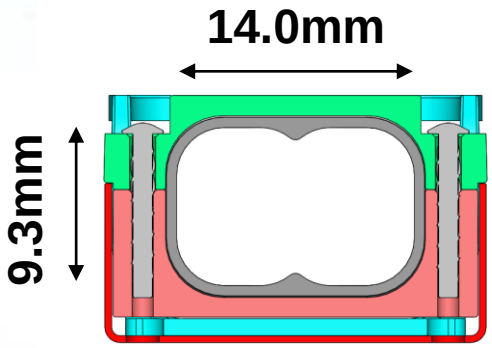
Budget Allocation – Cable Assembly

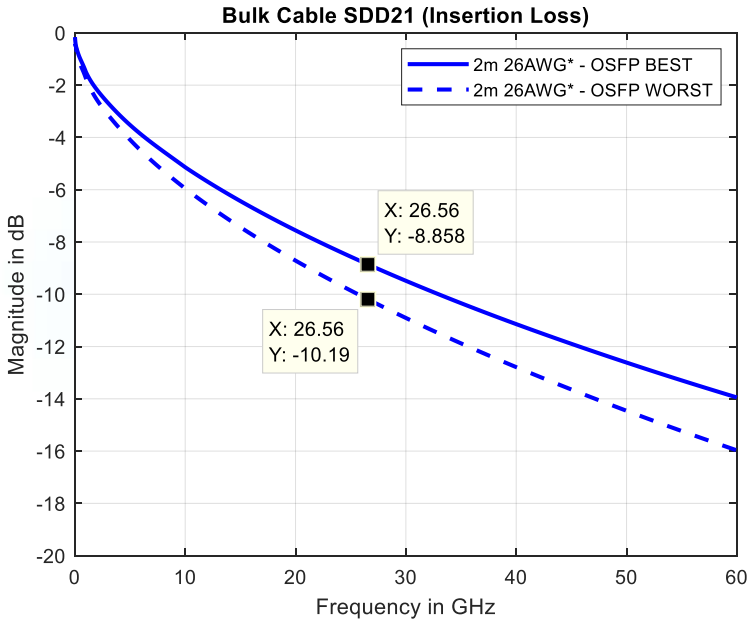
IL = 10.5dB



- Cu Cable Assembly (expectations)
  - (2)pcs PCB paddle card, wire attachment, bulk cable
  - 2m bulk cable reach
- **Assembly needs to be a functional external cable design**
- **Bulk wire needs to fit into SFP, SFP-DD, DSFP, QSFP, QSFP-DD, OSFP modules (OSFP shown as example)**
- **Paddle card needs to be manufacturable**

Bulk Cable Models





- "26AWG* " term defines the largest physical wire that can fit into OSFP
- "BEST" term represents the best achievable bulk cable process
- "WORST" term represents latest manufacturing tolerance
  - Pair-to-Pair deviation, "some" temperature variation

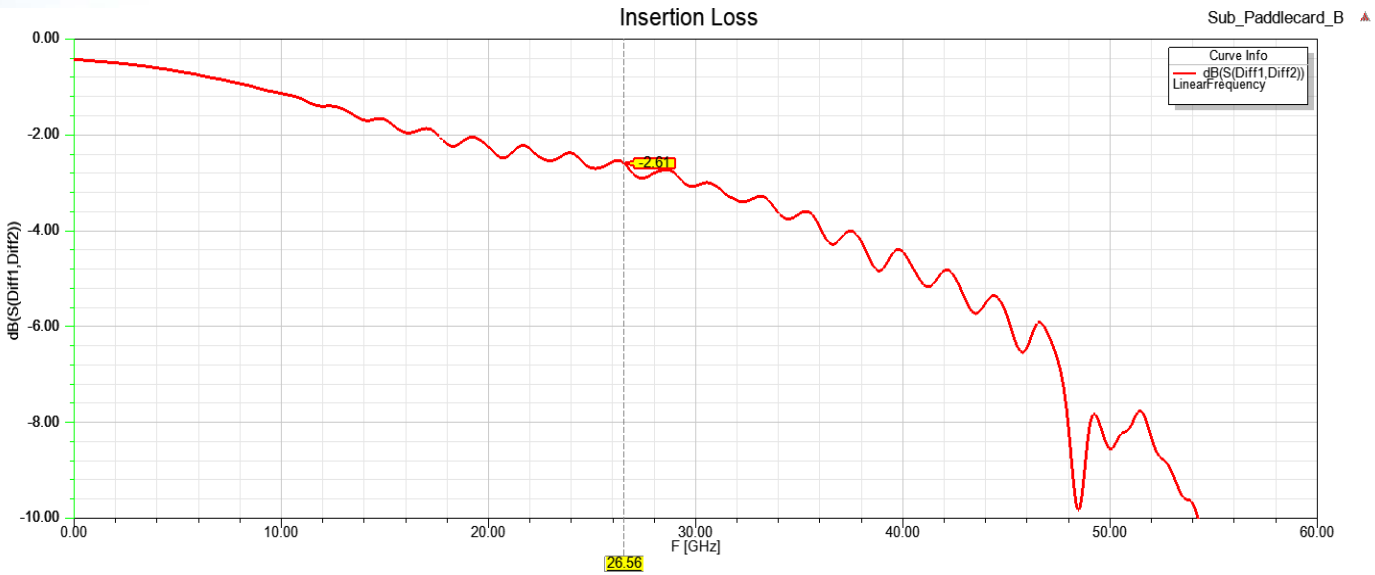
TP1-TP4 Budget

- Case A (OSFP Best-Case)
  - 2.15dB + 1.40dB + 8.86dB + 1.40dB + 2.15dB = **15.96dB**
- Case B (OSFP Worst-Case)
  - 2.15dB + 1.40dB + 10.19dB + 1.40dB + 2.15dB = **17.29dB**

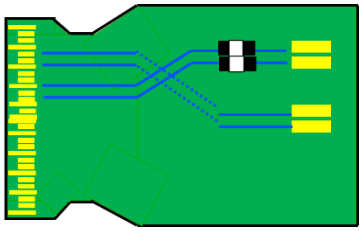
- Simulation models meet the proposed 802.3ck spec for IL
- **No allocation assigned for paddlecard or wire attachment**
- Budget allocations above give all of the cable assembly budget to the bulk cable
- Will the paddlecard design significantly impact the spec?

Paddlecard Models

IL = 2.61dB



- Data shown as typical case for **combined path** (TX+RX) in a single link
- Paddlecard characteristics are not negligible for 100GEL
  - PCB Etch (Stripline and Microstrip)
  - Transition Vias
  - AC Caps
  - Wire Attachment

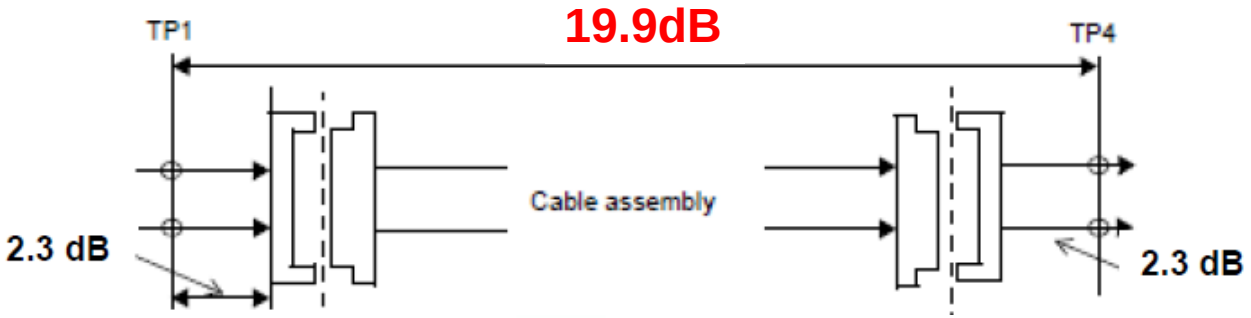


TP1-TP4 Budget (w/ Paddlecard)

- Case A (OSFP Best-Case)
  - 2.15dB + 1.40dB + **(8.86dB + 2.61dB)** + 1.40dB + 2.15dB = **18.56dB**
- Case B (OSFP Worst-Case)
  - 2.15dB + 1.40dB + **(10.19dB + 2.61dB)** + 1.40dB + 2.15dB = **19.90dB**

- Simulation models **do not** meet the proposed 802.3ck spec for IL
- More realistic models for bulk cable and paddlecard show significant impact on performance
- Should other parameters be included in the analysis?
  - Additional manufacturing tolerances, cable stress, temperature, etc.

Recommended Cu Cable Spec



- Based on OSFP analysis, it is recommended to change the TP1-TP4 requirement to <u>at least</u> 19.9dB
  - 2.3dB (@26.56GHz) for MCB IL
  - 1.5dB MAX (@26.56GHz) for Connector IL
  - 12.3dB for Cu Cable Assembly
- Impact to TP0-TP5 would be total IL of 30.3dB (@26.56GHz)
  - Assuming no other changes to the channel characteristics

Summary

- TP1-TP4 models showed higher IL than previously requested
- Current technology for bulk cable and paddlecard exceed the allowable budget
- COM analysis was not completely pessimistic, but depends on the settings in the COM spreadsheet
- Channels **Fail IL,** but **Pass COM**
- Before presenting a full dataset for possible channels and relevant IL, COM, ERL characteristics, we would like to see agreement on a COM script and format
- Recommend the group to consider options for extending the IL requirement for TP1-TP4