Considerations of Technical Feasibility for Mated Compliance Fixtures

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References

• Short channel model from 802.3df (akinwale_3df_01_20220502)
Objective of this Contribution

• Show technical feasibility of continuing the use of an HCB/MCB-based test methodology for 224 Gb/s per lane compliance (802.3dj)
  – Demonstrating compliance fixture design which can emulate loss of a short C2M channel

• This contribution will not address:
  – Required minimum bandwidth for channel characterization & compliance test
    • (1.85 mm versus 1.00 mm connectors for TP1, TP1a, TP4, TP4a)
  – Test fixture impedance
    • (92 Ω versus 100 Ω)
Methodology

• As with 802.3ck, and previous projects, the IL of mated compliance test fixtures (MTF) for 802.3dj will be designed to emulate the shortest channels from the group of contributed channel models
  – Module receiver stressed input test will continue to test with MCB only for short channel test and MCB + Frequency Dependent Attenuator for longer channel test

• Short channel model selected was contributed by Femi Akinwale, et. al to the 802.3df Working Group (akinwale_3df_01_20220502)
  – IL is 10.32dB at 53.125 GHz

• MTF IL target to be agnostic to MDI form factor
  – OSFP, QSFP-DD, OSFP-XD were considered for this exercise
Proposed MTF Topology

- Dual-row form factors (-DD & -XD) have additional trace length beyond the legacy reference plane
  - Up to 6.5mm trace length $\approx 0.50$ dB @ 53.125 GHz

MCB PCB $\ell_{ldd}$ includes the RF connector (up to the RF connector reference plane)
MCB via allowance is 0.45 dB
Preliminary Fixture Design

• Practical design of 224 Gb/s per lane HCB/MCB have been completed
  – Detailed simulations of complete fixtures, including MCB connector have been completed (summary of results on following slides)
  – Prototype completion and characterization expected by mid-December

• Resulting IL budget at 53.125 GHz
  – MTF: 9.31 dB, MCB: 2.68 dB, HCB: 3.68 dB
  – Design characterized to 85 GHz

• Note: Design simulations show good return loss characteristics
Simulation Results: MCB only

![Graph showing MCB simulation results with a table comparing X and Y values for a specific case.](image-url)
Simulation Results: HCB only
Simulation Results: MTF IL

• Total Mated Test Fixture Insertion Loss breakdown at 53.125 GHz:

  Simulated Module Connector Loss (all MDI): 2.00 dB  
  HCB Loss Allocation: 3.68 dB  
  HCB DD/XD Row Trace Lead-In: 0.50 dB  
  MCB Loss Allocation: 2.68 dB  
  MCB Via Allowance: 0.45 dB

  Total Mated Test Fixture Insertion Loss: 9.31 dB (8.81 dB)
Conclusions and Next Steps

• Simulation of detailed 224 Gb/s HCB/MCB designs support technical feasibility of implementing an MTF below the total channel loss for the shortest channel model

• Next Steps:
  – Validate simulations with measurements from prototypes
  – Propose plots for MTF IL reference and provide equations for min/max limits
  – Propose requirements and equations for ERL, SCD21 (skew), ICN, etc.