P802.3ck C2C AUI Small Group Update

July 2019 Plenary

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C2C Small Group Participants

- Ali Ghiasi, Ghiasi Quantum
- Kapil Shrikhande, Innovium
- Pirooz Tooyserkani, Cisco
- Jane Lim, Cisco
- Rick Rabinovich, Keysight
- Ted Sprague, Infinera
- Brandon Gore, Samtec
- Mike Li, Intel
- Masashi Shimanouchi, Intel
- Hsinho Wu, Intel
- Matt Brown, Independent
- Rich Mellitz, Samtec
- Arturo Pachon Munoz, Cisco
- Mike Dudek, Marvell

Please let me know if you want to join the offline consensus calls

Agenda

- Summary of small group progress
- Next steps

July 2019 Goals for C2C AUI

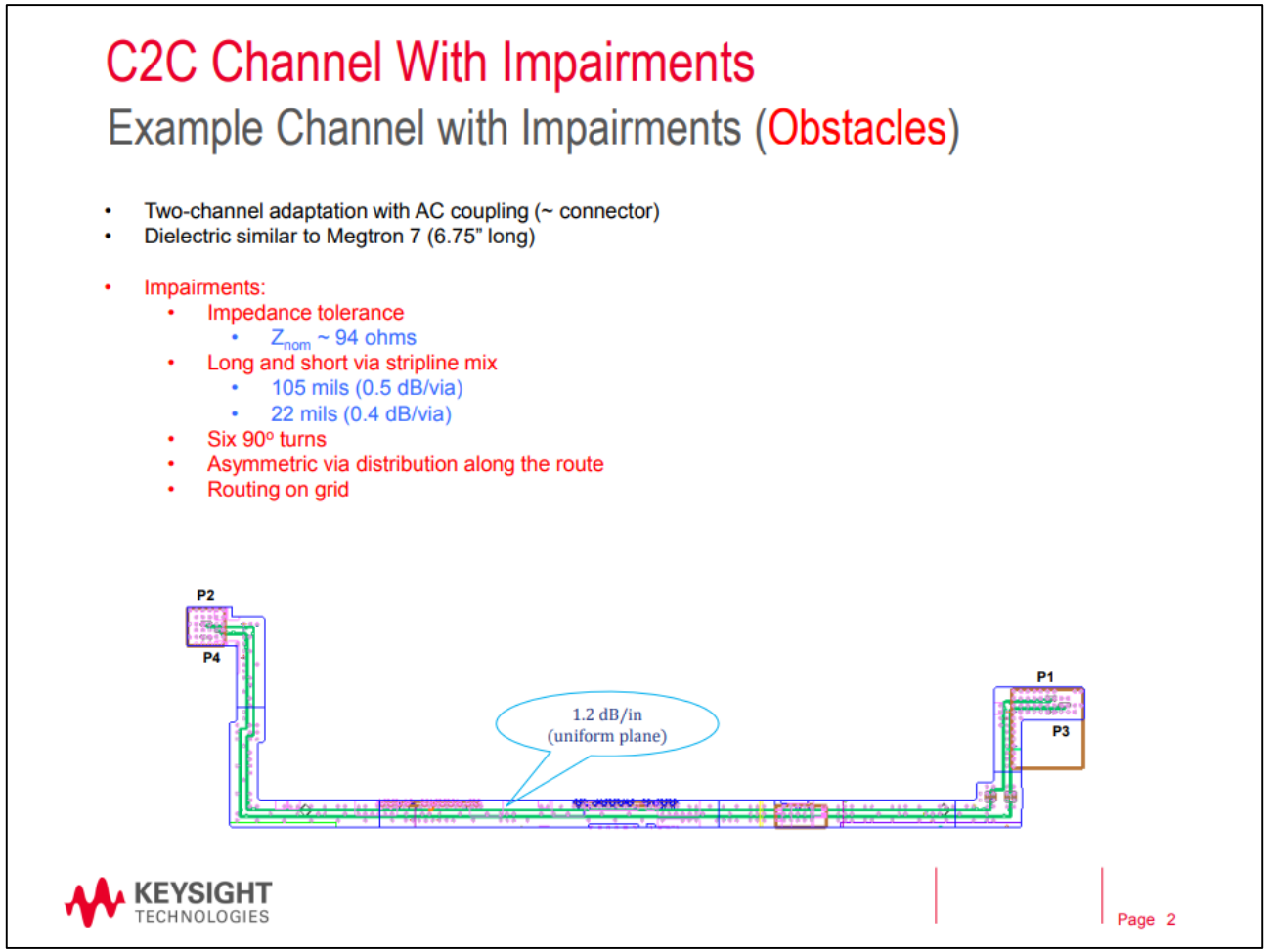
- Primary Goal:
  - Update the Task Force on the work of the small group
- Secondary Goal:
  - Secure direction from the Task Force on the proposed C2C “no FEC termination” parameters

Overview

- Small group met 4 times since the May 2019 interim meeting.
- Discussed the work and contributions needed to progress this interface type towards a baseline proposal
  - The group currently estimates to have a baseline proposal for consideration at the September 2019 interim meeting
- Reviewed and discussed some C2C usage models and technical details that are summarized in the subsequent pages

An Example C2C Channel Contribution

- Rick Rabinovich contributed a C2C channel with impairments
- Reviewed in July 10, 2019 ad hoc
- Channel was posted to the Task Force website
  - http://www.ieee802.org/3/ck/public/tools/c2c/rabinovich_3ck_informal_02a_062119.zip



http://www.ieee802.org/3/ck/public/tools/c2c/rabinovich_3ck_informal_01a_062119.pdf

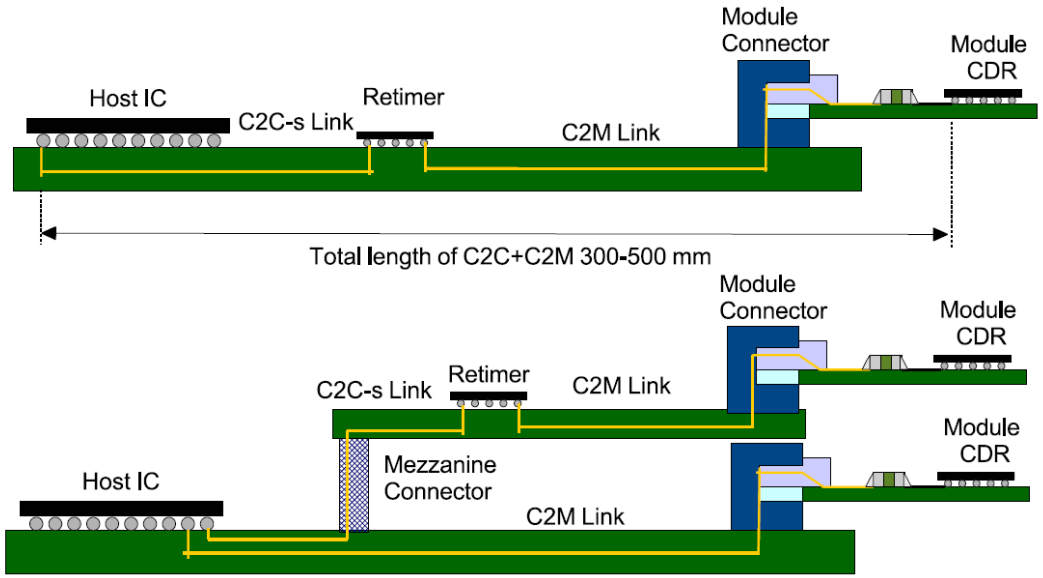
Current Status (1/2)

- There was fervent discussion on the perceived need for one C2C vs. two C2C types (i.e. C2C-S and C2C-L).
  - There is agreement on the need for a C2C interface within the “no FEC termination” (a.k.a. “end-end FEC”) envelope.
  - As to whether there is a need for a second reach (that may be beyond the “end-end FEC” envelope), the group requires further discussion and requests broader input from Task Force participants.
- There is general agreement that the C2C interface(s) complexity will be somewhere between C2M and Backplane/CopperCable

Proposed “No FEC Termination” Case Topologies

Two Common C2C-S Applications

- **These two common C2C-S applications can satisfied with ~300 mm trace and by repurposing 16 dB C2M budget**
  - Connecting to far-side of the ASIC IO may require retimer
  - Modules mounted on mezzanine card.

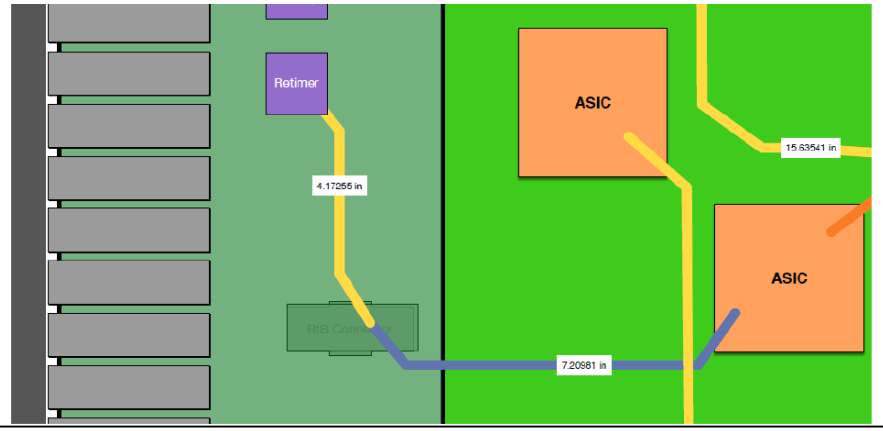


Source: ghiasi_3ck_01_0719

Example System Trace Lengths for Consideration

PCB Trace Length Estimate

- ASIC <-> Connector trace length, min= 3.3”, max=7.2”
- Connector <-> Retimer trace length, min=2.5”, max=4.2”
- Total PCB trace loss, 7.3dB – 14.4dB @ 26.56 GHz (Assume Meg7N material, 1.26dB/in)



Source: Jane Lim

Proposed C2C Assumptions
(“no FEC termination” case)

- Ball-ball IL: up to 16dB, maybe 20?dB
  - Potential 250-300mm reach (to be confirmed by channel contributions)
- Two connection models:
  - ASIC (“big”) to ASIC (“big”)
  - ASIC (“big”) to CDR (“small”)
- ASIC (“big”) package. Follow TF baseline direction
- CDR (“small”) package. Assume 19x19mm size.
    - Estimate max of 2dB package loss
    - 4-16mm pkg trace length (scanning 15-16mm to check for worst COM values)
    - Pkg PTH assumption: ~0.4mm
- Connectors in the path: [0, 1]
  - Connector z-height 7.5-27mm (12-15mm mezz)
  - Max IL 2.5dB? (pending outcome of Jane/Brandon work)
- DER: 1E-5

Current Status (2/2)

- There was discussion on which type of reference receiver to use for the C2C interface COM analysis (‘higher performance” or “lower performance”).
  - The “higher performance” category is generally implied to be a reference receiver model similar to the backplane choice.
  - “Lower performance” is generally implied to be reference receiver model similar to the C2M choice
  - This discussion topic and the COM analysis is subject to the direction of the reference receiver model and parameters for backplane and C2M.
  - The group is initially trying to maximize reach without exceeding “end-end FEC” capability
- Precoding is TBD.

Next Steps

- The C2C small group kindly requests more example channels to help with decision making towards baseline proposals.
- Perform more COM analysis as the C2M and backplane reference receiver model and parameters become more clear

Proposed Straw Poll

- I would support the “no FEC termination” C2C interface parameters proposed in lusted_3ck_01_0719 slide 10. Y/N/A

Thanks!

BACKUP