# Channel Modeling Ad Hoc Face-to-Face

IEEE P802.3bq 40GBASE-T Task Force

Brad Booth (Microsoft) & Pete Cibula (Intel), Channel Modeling Ad Hoc co-chairs

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# Agenda

- Roll call
  - Record attendance, attendees' names and affiliations
- Reminder of IEEE patent policy
  - www.ieee802.org/3/patent.html
- Housekeeping
  - Review & approve meeting agenda
- New business
  - Action Item:  Request from PHY Baseline Proposal ad hoc
  - Starting point – Initial assessment of background noise in 10GBASE-T systems (P. Cibula)
  - Discussion and future work for the February 4th channel modeling ad hoc meeting

Notes from the "discussion and future work" portion of the meeting are included for reference

# Action Item for the ad hoc

Action item (to be forwarded to 802.3bq Channel Modelling ad hoc chairs):

- Please solicit contributions on:
  - Measurement methodology for background noise in systems
  - Measurement results of background noise in systems
    - Including broadband, stationary, and nonstationary narrowband sources

# Background For Discussion

## Measurements Environment

- Live, operating systems
  - Servers running bus, memory, storage applications
  - Preferably with a 10GBASE-T port on a motherboard or daughter card
    - Not an isolated NIC or eval board
  - No network activity (not even autoneg) on 10GBASE-T port (port in PCS or other loopback with TX disabled preferred)
    - No need for connected cabling
  - Adjacent 10GBASE-T ports active is desirable
- Measurement as close to chip RX input as practical
  - Differential measurement, pref. referenced to PHY end of PCB model from Channel ad hoc

From zimmerman_3bq_02_0114.pdf, "Importance and Issues in Background Noise Measurement," p10.

# Discussion Notes (1/3) - Opening Discussion

- Requirement - The PHY ad hoc needs at least one measurement on Rx side of PCB traces (PHY Rx pins/balls) in order to be productive
- Initial discussion of/ideas on measurements
  - What is the reference plane for background noise measurements?
  - Rx pins/balls or MDI?

# Discussion Notes (2/3) – Measurement Challenges

- Measurement Location
  - Rx pins/balls – Requires fixturing/more challenging instrument connections
  - "Just plug in" (Connect to MDI at RJ45) - Includes isolation & MDI connector, not just the PCB
    - If at the plug, we do care about the transfer function between PHY and measurement plane (basically the RJ)

- Measurements with/without the PHY
  - Without the PHY - Destructive testing is a barrier.
  - With the PHY – May need additional PHY configuration to disable undesirable interferers
  - Suggestion made to do both; at least once.
    - One reference measurement, and then calibrate with/without PHY…

# Discussion Notes – Measurement Challenges (3/3)

- Impact of MDI filtering
  - Both the 10GBASE-T "800MHz cell phone filter" and ICMs roll off pretty good by the time we get to 1GHz)…
    - Another reason that it is desirable to be as near to the PHY end of the PCB trace as possible.
  - Is de-embedding possible?

- Measurement considerations
  - Required capability:  -150dBm/Hz with 0.5 dBm accuracy preferred
  - Bandwidth:  Would like to see measurements to 3GHz, calibrated to 2GHz
    - Caveat that calibration can get worse above 2GHz
  - Non-stationary (high-B/W, low level) – DSO, hand-held testers?

- Action Item - Call to reflector for help from others

# Thank You!