On the Test Modes

Alireza Razavi, Infineon

Objective of this discussion

- Review why test modes were introduced
- Identify gaps/limitations
- Drive consensus on next steps

- This presentation is motived by recent presentation on test modes for 802.3dm
  - https://www.ieee802.org/3/dm/public/0725/sedarat_3dm_03_202507.pdf
  - Tests in 802.3ch are adjusted for different cable types(STP, and coax), change in modulation, and power levels

Why Test modes?

- Provide repeatable, simple, standardized condition to validate PHY transmitter and receiver
- Enable objective measurements independent of other complex system factors
- Ensure the baseline interoperability across the venders and labs

Essential PMA Test Modes

- Timing tests
  - Test mode 1 : transmitter timing jitter (leader and follower)
  - Test mode 2 : transmit MDI random jitter at Leader mode
- Spectrum test
  - Test mode 5: PSD mask test
- Signal integrity test
  - Test mode 4 : linearity test
  - Test mode 6 : droop test

Tests that can be revisited

-Test mode 3: Precoder test mode

- To test precoder in one of 4 valid settings
- However, precoding is not the only requirement of signal in data mode, and there are no extra test modes to test those requirements.
- Not a simple test: test requires another PHY to test

- Test mode 7: BER test
  - Interoperability test with the particular PHY in the test equipment
    - Enables the PHY venders to test interoperability with another PHY in early days of development
    - In many cases, It is not easy to say which side is the source of problem

Crystall-less, and test modes

- Known technical challenges
  - Define the right jitter tests
  - How to test in crystal-less mode? Test mode 4,5
  - What is right transmitter clock frequency range?
- Decisions needed
  - Right transmitter clock frequency range:
    - one for crystal-less, and one for system with crystal
    - Or a single range for both cases
  - Crystal less operation for low data rate transmitter?
  - Which tests are relevant?

Conclusion

- Test modes should
  - be simple, repeatable, and focused on interoperability
  - be removed if they have no clear benefit
  - support new use-cases such as crystal-less mode

- Let’s define a lean, effective set of test modes