Considerations for no-FEC with 3 m cable assembly

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Recap prior activities

- Project has two cable assembly PHY objectives, for 5 m and 3 m reaches.
- Progress towards the objectives:
  - Baseline proposal for RS, PCS, and FEC layers for 25G Ethernet (Baden), adopted Jan 2015, implemented in D0.1
    - Three FEC modes. BASE-R FEC used for 3 m reach.
  - Baseline Proposal for 25GBASE-CR PMD (DiMinico), adopted Jan 2015, implemented in D0.1
    - Two cable assembly types, CA-L and CA-S.
  - 2 Port types for 25GBASE-CR (Dudek), adopted March 2015, implemented in D1.0
    - Added CR-S PHY with no-FEC and BASE-R FEC modes (mandatory) but no RS-FEC.
    - Added CA-N for no-FEC.
- "3 m no FEC" discussion in May 2015 meeting
  - 7 related comments (86, 87, 78, 89, 93, 119, 120)
  - 3 presentations: brown_3by_04_0515, roth_3by_01a_0515, mellitz_3by_01_0515
  - No consensus to make any change that would enable CA-S (3 m) to operate with no FEC.
- "BTI list for 3 meter no FEC cable" consensus-building meeting hosted by Kapil Shrikhande
  - Seeking agreement on next steps

Considerations for consensus building

- **Question A** – Is there consensus that we need 3 m to work with no-FEC (is 3 m with BASE-R FEC not “good enough”)?
- **Question B** – Can we achieve no-FEC with 3 m cable assemblies with no change to the specifications?
  - Improved cables – current loss based on 26 AWG; What gauge is acceptable? Difference per Form Factor (CR, CR4, breakout)?
  - Engineered link – choose better-than-minimum devices
- **Question C** – If we decide to change the specifications – then how?

BTI list (Output of Kapil's meeting)

- Options to achieve 3 m no FEC
  - **Option 1** – change CA-S COM threshold from 3dB to a smaller value, e.g. 2, 2.2, 2.5dB etc.
    - Rx has to tighten up (RX interference tolerance kept in-line with cable assembly spec)
    - Why? ➔ Evidence that systems actually work
  - **Option 2** – apply statistical analysis for compliance
    - Baseline: TX/RX specs unchanged per current 802.3by draft.
    - Include statistical analysis in COM calculation to bound probability of link failure assuming some component variability
      - Questions: What is "acceptable" probability of link failure? How would component compliance work?
    - Why? ➔ Assumption: in practice, not all components in the link will be worst-case together
  - **Option 3** – re-open TX/RX/CA specs, build new consensus on how to meet 3 m with no FEC.
    - Why? ➔ 25G with no FEC is a new standard, not bound to use 802.3bj definitions.

BACKUP

Original summary of consensus-building meeting

Summary slide of consensus-building meeting

BTI list for 3m no FEC in 802.3by

- Comments from May rejected due to lack of consensus. Next steps?
- Editorial framework (Matt Brown's presentation from May)
- Technical framework / options to achieve 3m no FEC
  - Option 1 – change COM threshold from 3dB to a smaller value, e.g. 2, 2.2, 2.5dB etc.
    - Can we use existing specs for Tx, Rx, Cable, Hosts etc. in the current 802.3by draft?
      - Will either Rx or Tx spec. have to change ?
      - Rx interference tolerance test does change, i.e. Rx has to tighten up
  - Option 2 – leave COM = 3dB but apply statistical analysis for compliance
    - Assumption: not all components in the link will be operating at the "worst" case spec. point
    - Tx/Rx specs unchanged per current 802.3by draft is the basis.
    - Statistical analysis to bound probability of link failure assuming component level variability
      - What is "acceptable" probability of link failure?
      - How does component compliance work ?
  - Option 3 – change the Tx, Rx, or any other spec. to meet 3m no FEC.
    - Why? 25GE is a new spec.
- Additional considerations to achieve 3m no FEC.
  - Cables performance; Tx, and Rx specifications
  - What cable gauge is acceptable? Difference opinion based on Form Factor likely.
- Are we convinced that we need a 3m no FEC cable: 3m cable with BASE-R FEC not "good enough"