Using COM to calibrate the interference tolerance test for 100GBASE-CR4

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Background.

- This presentation is in support of comment i-136.
- Draft 3.0 of 802.3bj uses an interference tolerance test to test the host Rx for 100GBASE-CR4. The interference tolerance test uses the test system below.

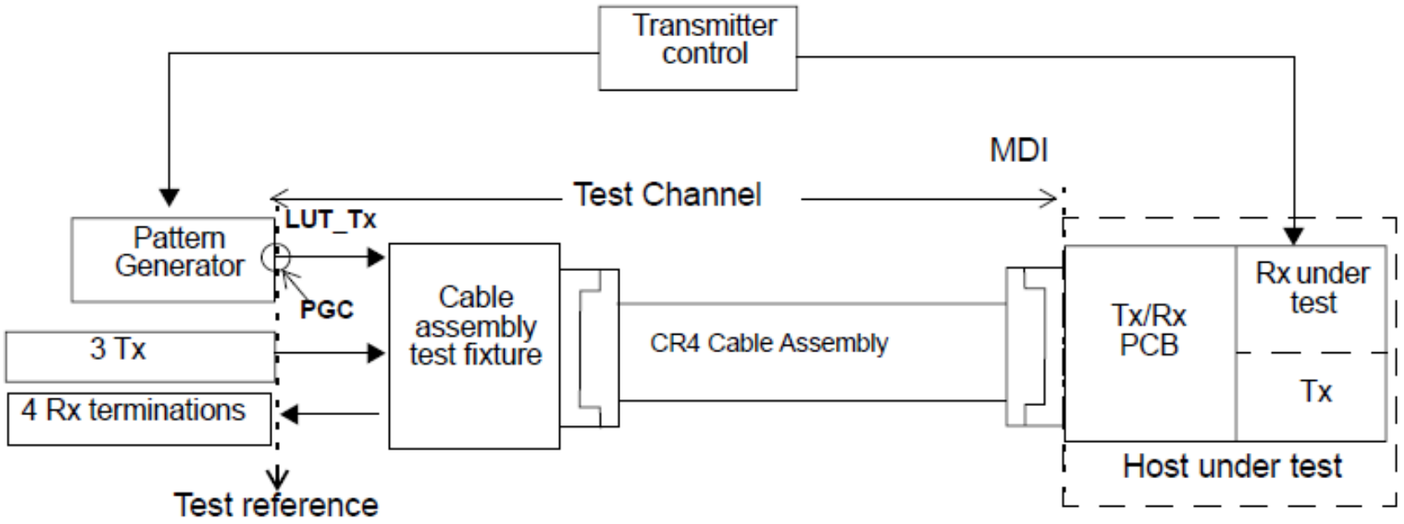

Figure 92–8—Interference tolerance test setup

Test description.

- **There are 3 key items in the test.**
  - The Pattern Generator whose Sj, Rj,even-odd jitter and risetime are specified. (No suggestion to change this).
  - The Cable assembly which has to meet the cable COM spec.
  - The crosstalk generators (3Tx) whose amplitude/risetimes/equalizations are adjusted to produce a specified FEXT.
- **The test channel is specified using the test system below**

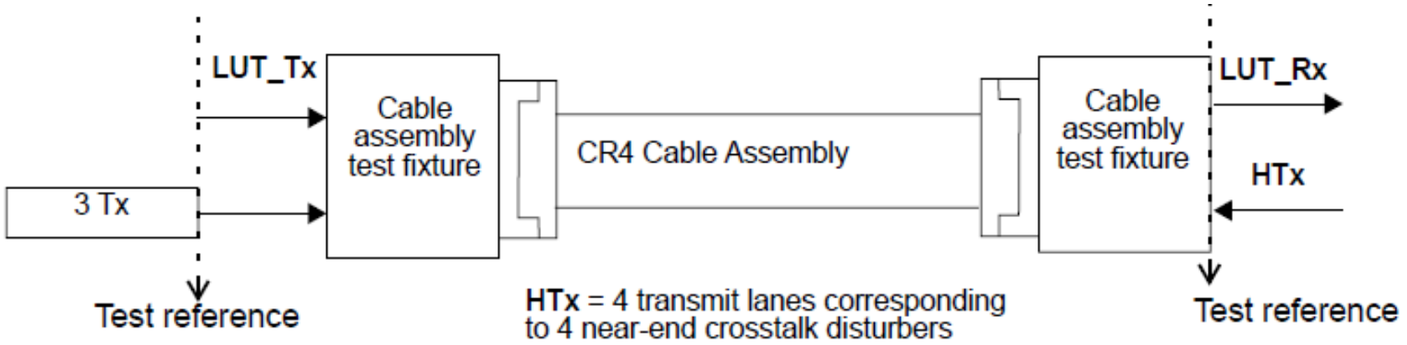

Figure 92–9—Test channel calibration

Problem statement.

- **The description of the channel states that the lane under test shall meet a specified fitted insertion loss curve but then states** “It is recommended that the deviation between the insertion loss and the fitted insertion loss be as small as practical and that the fitting parameters be as close as practical to the values given in Table 92-8”. **Unfortunately it is unlikely that the fitted insertion loss will be exactly as specified with zero Insertion Loss deviation. Any deviations from this will result in variability in the test.**

Proposed solution.

- Use COM to calibrate the interference tolerance test similar to how it is done in Clause 93.
- The existing test setup can be used but instead of adjusting FEXT to a given fixed value the FEXT would be adjusted to create the required COM.
- The appropriate COM uses a channel that is the test channel plus the extra loss that is the TP4 to TP5 loss representing the allocated additional loss in the DUT Host Rx.

Detailed solution implementation.

- **In table 92-8 replace the calibrated far-end crosstalk row with “COM, including the effect of adjusted FEXT” with value to match the allowed cable COM value (3dB in draft 3.0)**
- **On page 210 line 5 replace “and far-end crosstalk with “and S parameters”**
- **On page 210 line 35 Replace “**The amplitudes of each of the disturbers should not deviate more than 3 dB from the mean of the disturber amplitudes. The amplitudes of the disturbers should be such that the calibrated far-end crosstalk in Table 92–8 is met in the calibration setup at the LUT point with no signal applied at the PGC,and HTx and PGC terminated in 100 Ohms differentially.” **With “**The amplitudes of each of the disturbers should be set to the value that results in the COM value given in table 92-8 when calculated by the method given below

Detailed solution implementation (cont).

- Insert a new paragraph on page 210 at line 39. “The COM shall be calculated using the method and parameters of section 92.10.7 with the following exceptions.
  - The Channel signal path is cascade(cascade($S^{(CTSP)}$,$S^{(HOSP)}$) where $S^{(CTSP)}$ is the measured channel between the test references for the LUT in figure 92.9
  - The Channel far end crosstalk path is cascade(cascade($S^{(CTFXTk)}$,$S^{(HOSP)}$) where $S^{(CTFXTk)}$ is the measured FEXT channel between the test references in figure 92.9 between the 3Tx and the LUT_Rx
  - The value of the far-end aggressor amplitude (A_{fe}) is adjusted until the required COM is achieved. The far end aggressors peak to peak amplitude (3Tx in figure 92.8) is set to twice the resulting value for the test.”

Additional discussion.

- In an Ad-hoc call it was suggested that additional noise may be needed to achieve the required COM value beyond the amount that can be created by FEXT. If this is the case it implies that the test in draft 3.0 is significantly under-stressing the receiver. However if it were the case it would be possible to add the noise generator and combining network as part of the connection between the pattern generator and the cable assembly test fixture, and calibrate the noise amplitude in a similar way to that used in clause 93. I don't think this is necessary however as using a more stressful cable (worse FEXT coupling, higher loss, or more ILD) would enable the calibration with FEXT and is a simpler solution.

Additional issue that is not part of the original comment.

- **On page 210 line 29 draft 3.0 says that the integrated MDNEXT crosstalk noise shall meet the value in Table 92-8. However there is no value for MDNEXT in Table 92-8.**
  - Suggested remedy - in Table 92-8 change Calibrated ICN (RMS) – σ_{ANX} [c] to $\underline{\sigma_{ANX}}$ and delete note c.
  - (Note that this section effectively requires a choice of test cable assembly that has the correct integrated NEXT). I think this is marginally acceptable but will certainly be a nuisance.