

**NOTES FROM IEEE 802.3ak  
10GBASE-CX4 Task Force Interim Meeting  
May 20-21, 2003**

**INTRODUCTION and OVERVIEW**

Herb Van Deusen volunteered to be secretary for this meeting

Agenda was reviewed. Dan emphasized the importance of meeting attendees being present for the entire meeting so that enough group members are available to approve any actions at the end of the meeting.

Minutes of the February interim approved by voice affirmation.

Dan reviewed guidelines for IEEE meetings regarding patents and appropriate areas of discussion.

Meeting Objectives were presented.

Dan reviewed the schedule/ timeline:

- Schedule is pretty much on track.

**PRESENTATIONS REGARDING RECOMMENDATIONS ON COMMENTS**

Concern raised about presentations not being on the web site prior to the meeting. Presentations were interrupted while electronic copies were made available to attendees

Purpose of the meeting should be to resolve comments so presentations must be aimed at helping to clarify issues raised by the comments.

Bob Grow presented information on how to become part of the ballot pool to be eligible to vote on ballots. IEEE membership and Standards association membership are required.

**Loss Compensation using Analog Pre-emphasis (Clark Foley)**

Addresses comments on Transmit Template Section 54.7.3.6

- Clark showed that data could be transmitted with little increase in jitter using analog preemphasis and fixed receive equalization.
- Characterization of transmitter output template must consider acquisition technique
- Suggest that the spec should not exclude this type of implementation. Clark has a proposed template.

**10GBASE-CX4 Link Analysis (Howard Baumer)**

Addressed comments made by Kevin Brown re: comment 388

- Questions raised about return loss specification

- Questions about formula for determining Multi Disturber Equi-Level Far End Crosstalk (MDELFext) may not represent worst case crosstalk.
- Insertion loss plots of bulk cable seemed atypical for cables. Asserted that loss curves don't show square root of frequency dependency for skin effect.
- MDELFext specification too high to have link work
- Return loss too high
- Transmit amplitude range is too large creating too much Next
- Transmit amplitude is too large. creating too much Fext
- Proposes adoption of transmit template back to 36% pre-emphasis.

#### 10GBASE-CX4 Crosstalk Impact on System Performance (Petre Popescu)

- Recommends restricting the output level of the driver to 1000 mV max in order to reduce crosstalk.

#### 10GBASE-CX4 Full System Performance (Ze'ev Roth)

- Analysis here leads to recommendation to increase pre-emphasis to 55%
- Recommends improving connector immunity to crosstalk.

#### Jitter Budget (Steve Dreyer)

Addresses comment 500 regarding jitter specification

- Different combinations of  $R_j$  and  $D_j$  with the same  $T_j$  will yield the same statistics in terms of impact on bit error rate based on the analysis at BER of  $1 \times 10^{-12}$ .
- Recommends keeping current spec for  $T_j$  and  $D_j$  components.

#### Characterization of 802.3ak cable assemblies (Dean Vermeersch, Henri Merkelo)

- Tyco has done some connector and cable assembly modeling and offers those assemblies free of charge by contacting Dean.
- Measurements made at high frequencies are very fixture dependent.
- Showed software based eye pattern measurement technique which uses only the pulse generator from a Tektronix 11801 TDR output. Results correlate well with measurements made using true pattern generators. Likewise, through software, frequency domain characteristics can be derived from using just the 11801 pulse generator.
- Dean is having trouble finding a cable supplier that can supply cables where each pair in the cable is good and consistent with the other lines in the cable.
- Recommendation made that it may be necessary to put a limit on the range of loss values that may exist in a cable. Also suggested that a spec be put around phase in addition to loss.
- Dean recommends a measurement of differential to common mode conversion spec.

## Comment Resolutions

Decision was made to resolve TR comments first followed by T Comments

- Comment made not to include any company names on documents that are found on the web site.
- Question about MAU type for Section 30B was raised but deferred until it could be clarified
- Tuesday session was adjourned at 8:15 PM

### TR comments (not complete listing)

• <b>C 58</b>	Section 44.1.2 Comments were made about objective f) & g). Proposal made to delete objective g) and rewrite g). A small group will go off and wordsmith some proposed language. (Wording was determined)
• <b>C 62</b>	Table 45.7
• <b>C 45</b>	Table 45.8 was in question and will be modified per P. Bradshaw recommendation
• <b>C 331</b>	Accepted in principle
• <b>C 64</b>	withdrawn
• <b>C 448</b>	Accept
• <b>C 462</b> • <b>C 487</b> • <b>C 511</b> <b>Transmit Template</b>	Discussion around whether proposed new template can include recommendations from 3 task force members who had proposed a change to the original template. Plan to incorporate files from these three members. Discussion ensued around need to specify the pre-emphasis level. No consensus was reached. Comments were accepted in principle.
• <b>C346</b>	Not accepted until new draft is completed for review.
• <b>C 110</b>	Accept in Principle will need confirmation from commentor
• <b>C 287</b> • <b>C 335</b>	C 287 in principle, Accept 335 as is
• <b>C401</b>	Accept in Principle
• <b>C 307</b>	Accept in Principle
• <b>C 290</b>	Eliminate references to cable time delay
• <b>C 116</b> • <b>C 410</b> • <b>C 411</b>	Reject with explanation
• <b>C 452</b>	Reject with explanation
• <b>C 357</b>	Accept in Principle with rewording
• <b>C 295</b>	
• <b>C 388</b>	Much discussion ensued around this issue. It is unclear if suppliers could meet the revised specifications proposed in the presentation made by Howard Baumer. It was suggested that at smaller group which includes cable manufacturers get together to make a proposal to improve the specification with challenging yet realistic values. New values for crosstalk and return loss will be

	entered as suggested in Howard Baumer's presentation.
• <b>C 469</b>	Accept in Principle. Test fixture Impedance currently spec'd at $50 \pm 1\%$ . Issue deferred for later discussion and consensus. (Dan has analyzed the fixture design and has made suggestions to modify current wording)
• <b>C 467</b>	Accept in Principle. Response will be addressed with responses to C 469
• <b>C 498</b> • <b>C 487</b>	Accept in Principle. Add specification and base numbers from presentations given at this meeting.
• <b>C 257</b>	
• <b>C 465</b>	Transmitter Jitter. Much discussion around this issue. Accept in principle. Changes made to numbers and wording for Sect 54.7.3.8.
•	Table 54-10 will be modified to address several comments
• <b>C 432</b>	Test Point specification on Figure 54-2. Add sentence to first paragraph of Section 54.8
• <b>C 484</b>	Reject. Characteristic Impedance is not a complex quantity
• <b>C 351</b> • <b>&amp; other similar</b>	Clarify if figures or formula take precedence
• <b>C299</b>	assembly shielding specification. Accept. Shield transfer Impedance is specified in the specified in the referenced documents
• <b>C 36</b> • <b>C 100</b> • <b>C 459</b>	Accept IEC 61706-3-113 will be the reference document for the connectors
• <b>C442</b>	Reject. Pins numbering shown in the reference doc.
• <b>C 37</b>	Printing problem with page 39. Accept. Problem may be with connector figures on that page. Will be redrawn in framemaker including pin numbers.
• <b>C124</b>	Jitter Test method. Accept in Principle. Specified method is consistent with method in existing IEEE specification. Annex 48B will be modified to call out CX4
• <b>C 101</b>	Accept. Covered by C 388 response
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