

## Notes From CX-4 Study Group 12-16-02

### Agenda / Other Housekeeping Issues:

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- Bob Grow requested nominations for chair of study group.
- Dan Dove was unanimously elected chair 36-0.
- Herb Van Deusen agreed to act as secretary for the meeting.
- Howard Baumer was appointed document editor. Peter Bradshaw offered to help as comment editor.
- Based on attendance at this meeting Bob Grow will have to get a larger room for Vancouver

### Comments from Presentations:

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#### Bill Hoppin --Pre-Emphasis and Equalization for 10GBASE-CX4

- Questions about how short cables can be.
- Specifications should be created around 90 nm and 130 nm IC technology.

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#### Dr. Ramin Farjad-Rad -- Optimizing TX/RX implementation for 10GBASE-CX4

- Passive EQ can be added on chip.
- Emphasized reducing offset of transmitter is most efficient way to get longer distance.
- Passive filtering can be accomplished with just one pole.

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#### Dr. Ze'ev Roth --Proposal for definition of Pre emphasis

- Substituting for Dimitry Taich
- Described 3 definitions to describe amount of pre-emphasis
- Need for adopting one.
- Each following presentation should state which definition is being used

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#### Dr. Ze'ev Roth -- Jitter and Crosstalk effects using InfiniBand Cables

- Models did not include reflections
- Suggest specifying transmitter and channel, then specify bit error rate with worst case channel

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#### Aaron Buchwald -- CX-4 Measurements, Simulations, Specification

- Proposed using template for Step Response as a means to define transmitter or transmitter and channel
- Broadcom Results show that cables work at short lengths with pre emphasis
- Return Loss Needs to be specified

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Chris Diminico- 10 GBASE CX-4 Channel Spec

- Outlining a method to write channel spec
- Showed data for a cable deliberately designed to have worst case variability as typical in marketplace
- Did not specifically address cost implications around improving cable performance
- Return loss must be added to model to address short length links
- Work of the committee must be to balance cost of cables vs. cost of silicon

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Herb Van Deusen -- Considerations and Proposal for Compliance Channel

- Important to note that crosstalk measurements in time domain should reflect only the frequency components that will affect the system performance
- If time domain measurements are specified for crosstalk, edge control and filters must be employed
- Edge speeds will impact crosstalk values

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Peter Bradshaw -- Tradeoffs and Benefits of Equalization

- No comments

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Howard Baumer -- Clause 54 and Clauses to edit

- New Clause 54 will be added for CX-4
- Plea for More Editors
- Several Comments about test points were made as to which ones to include, what they mean and which ones are for reference.
- Issue raised about InfiniBand 4X connector. Has it been approved? Is "SFF" approval adequate? If SFF approves connector, how long would it take to get IEC approval? Decision made to proceed as if connector will be approved by the time of specification release. Bob Grow will investigate this issue.
- Do cables need isolation spec?
- Can the whole link be accomplished with pre-emphasis only?
- The Clause 54 draft put together by Howard should not be used outside of this meeting in any way due to incorrect markings. Dan Dove will get a revised version which is correctly marked for general distribution.

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Bob Grow - PAR and Objectives

- Bob will provide a draft PAR in readable form for group review
- List of objectives was clarified with input from the Group. Bob edited the list.
- A motion was made and seconded (P. Bradshaw, K. Dalmia) for the group to formally approve the edited list of objectives. The motion passed 30 to 0 with 2 abstentions.

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## Dan Dove – Five Criteria

### Comments:

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#### Broad Market Potential

- Add Applications typically seen for box to box connections within data centers
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#### Compatibility

- Remove reference to 802 FR
  - Remove second bullet
  - Correct Shading on diagram
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#### Distinct Identity

- No Copper PMD Exists
  - Shorten first bullet to stop at “copper media types.”
  - Remove second bullet
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#### Technical Feasibility

- Add bullet to state that similar technology has already been deployed for InfiniBand at a slightly lower data rate and longer distance
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#### Economic Feasibility

- Focus on reduction of cost for overall 10GBE system
  - Simple statement about how CX-4 is a fraction of the cost of implementing 10GigE over optics
  - Mention that costs for cable assemblies are well understood
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#### Dan Dove -- Schedule Review

- People should review WP 1.0 prepared by Howard Bauman and give feedback.
- Need to get inputs from “slideware” into working document to meet aggressive time line.
- Need to quickly get to specific agreements on technical content to have any chance of gaining quick approval.
- Possibly schedule another interim meeting in mid-February.

#### **12-17-02**

- Developed list of Technical Directions for Editors
- Signed up names for editorial review of various clauses
- Adjourned at 3:45p