

Accredited Standards Committee\*  
INCITS, Information Technology

Doc. Number:  
Date: 3/5/06  
Project:  
Reply to: Mike Jenkins  
Dean Wallace

TO: MEMBERSHIP of T11.2

FROM: Mike Jenkins Chair Electrical Working Group  
Dean Wallace Vice-chair Electrical Working Group  
Dean Wallace Secretary Electrical Working Group

Subject: Draft minutes of electrical working group 3/5/06

#### AGENDA

1. Opening remarks and introductions
2. Attendance and membership
3. Approve agenda
4. Document Distribution
5. Review minutes of previous meeting
6. Review old action items
7. Call for patents
8. New business/presentations
  - 8.1 Differential Group Delay Impact on Uncscrambled 8GFC Electrical Links, 06-246v0, Dave Stauffer, IBM
  - 8.2 Unified Electrical Proposal for 8/10G, 06-271v0, Ali Ghiasi, Agere
  - 8.3 8GFC Delta Point Amplitude Spec Issues, 06-304v0, Mike Jenkins, LSI
9. Project review
  - 9.1 FC-PI-3
  - 9.2 FC-PI-4
10. Old business/presentations
11. New business
12. Review action items

---

\* Operating under the procedures of the American National Standards Institute. INCITS SECRETARIAT, Information Technology Industry Council (ITI), 1250 Eye street NW, Suite 200, Washington DC, 20005-3922, Email: [incits@itic.org](mailto:incits@itic.org) Telephone 202-737-8888, FAX 202-638-4922

- 13. Next meeting schedule
- 14. Adjourn

## RESULTS OF MEETING

### 1. Opening remarks and introductions\*

Mike Jenkins, chair, led the meeting. He opened the meeting at 9 am on Wednesday. Mike thanked the host Bob Snively of Brocade.. He then led a round of introductions.

### 2. Attendance and Membership

Attendance at plenary meetings does count toward minimum attendance requirements for T11.2 membership. Working group meetings are open to any person or organization directly and materially affected by T11.2's scope of work but do not count toward minimum attendance for T11.2 membership.

The following people attended this meeting:

NAME	COMPANY	TELEPHONE NUMBER
Adam Healey	Agere	978-691-3067
Mike Wingard	Amphenol	607-786-4241
Samar Dalal	Brocade	408-333-1955
Tom Lindsay	Clariphy Communications	425-608-0209
Greg McSorley	EMC	508-382-5928
Kim Gray	Emulex	425-806-4012
Hossein Hashemi	Emulex	714-885-3609
Kevin Oursler	FCI	503-709-3043
Richard Johnson	FINISAR	408-542-4233
Bill Ham	HP	978-828-9102
Dan Colegrove	HGST	702-614-6119
David Stauffer	IBM	802-769-6914
Robert Zona	Intel	510-578-5623
Schelto VanDoorn	Intel	510-497-7770
Dave Lewis	JDSU	408-546-5448
Mike Jenkins	LSI Logic	408-433-7901
Galen Fromm	MOLEX	630-718-5270
Joseph Berger	OPNEXT	310-301-6710
Christian Rookes	PHYWORKS	UK 117 974 9046
Mike Dudek	Picolight	303-530-3189

---

\* Operating under the procedures of the American National Standards Institute. INCITS SECRETARIAT, Information Technology Industry Council (ITI), 1250 Eye street NW, Suite 200, Washington DC, 20005-3922, Email: [incits@itic.org](mailto:incits@itic.org) Telephone 202-737-8888, FAX 202-638-4922

Brett Clark	PMC-SIERRA	610-289-5213
Larry Barnes	Qlogic	719-237-9822
Doug Hopperstead	Qlogic	952-932-4007
Dean Wallace	Qlogic	949-389-6480
Hitoshi Okamura	Samsung	82-31-209-5927
Bobby Nabili	Scintera Networks	408-557-2810
Al Kramer	Seagate	952-402-2624
Vit Novak	Sun	510-936-3284
Pavel Zivny	TEK	503-806-1758
Mike Fogg	Tyco	717-986-5802
Andrew Nowak	Tyco	508-752-2884
George Noh	Vitesse	805-445-2247
Tom Palkert	XILINX	952-401-7997

### **3. Approval of Agenda \***

The motion to approve the Agenda was made by Schelto VanDoorn (Intel) and seconded by Vit Novak (Sun).

### **4. Document distribution**

This section describes the availability of draft documents that are intended to be published as a result of work by the electrical working group.

Document distribution is now being done over the web. Documents relating to the electrical working group work can be found on the T11 website ([www.t11.org](http://www.t11.org)) by going to “documents” and searching on the key word electrical.

A summary of the presently active policy to document distribution is included for reference.

All presentations are posted electronically at the approved ftp within two weeks after the meeting. Format must be an approved electronic file format.

Presentations are defined as material shown publicly in the plenary or authorized working group meetings.

Submission of documents for T11 document numbers: An online system is now available to provide document numbers and accept the submission of documents. The system is accessed via the T11 web page at <http://www.t11.org>. Follow the “docs” link in the left hand frame, or at the bottom, and fill in a form giving details of the document. In order to

---

\* Operating under the procedures of the American National Standards Institute. INCITS SECRETARIAT, Information Technology Industry Council (ITI), 1250 Eye street NW, Suite 200, Washington DC, 20005-3922, Email: [incits@itic.org](mailto:incits@itic.org) Telephone 202-737-8888, FAX 202-638-4922

complete the form, it will be necessary to enter a password. The password is given out at T11 meetings, or can be obtained from the T11 chair. Instructions will then be given about uploading the file to the ftp site.

We now use all electronic document distribution.

A T11.2 reflector is operational over the T11 site.

The committee forms it's agenda by the following:

1. A call (reminder) for presentations by the chair three weeks in advance.
2. Those wanting to be on the agenda submit request including; title, presenter, time required, abstract.
3. Chair creates an agenda and posts two weeks before the meeting.
4. At the meeting it is the chair's discretion to allow additional presentations.
- 5. Review minutes of previous meeting\***

Motion to approve minutes from previous meeting Vit Novak (Sun), seconded by Dean Wallace (Qlogic). There was no objection to approving the minutes.

## **6. Review old action items**

There were no old action items.

## **7. Call for patents**

The chair noted that the formal call for patents is issues at the T11.2 and T11 plenary meetings. Companies with patents that may bear on the subject of this ad hoc are advised to consider this call for patents. There was no response for this call for patents.

## **8. New discussions/presentations**

### **8.1 Differential Group Delay Impact on Unscrambled 8GFC Electrical Links, 06-246v0, David Stauffer, IBM**

---

\* Operating under the procedures of the American National Standards Institute. INCITS SECRETARIAT, Information Technology Industry Council (ITI), 1250 Eye street NW, Suite 200, Washington DC, 20005-3922, Email: [incits@itic.org](mailto:incits@itic.org) Telephone 202-737-8888, FAX 202-638-4922

FC is the only standard not looking at scrambling. Scrambling is buying margin in your system. Went through an explanation of differential group delay. There is a difference in delay between the higher and lower frequencies, this takes away margin. This difference in delay can affect the CDR and takes away margin. CJTPAT specifically highlights this problem. Discussion about blocks of data that have long runs of 1010 etc and then have a different transition density can cause errors in the data recovery. One way to approach this would be to make a mandatory auto-negotiation scheme, or make a mandatory CDR design, or you can scramble the data.

Reviewed some simulation data, the margin is significantly reduced, a golden PLL was used in the simulation. Bob Snively (Brocade) contends that you really can't have B5 patterns in practice and that you can easily come up with a pattern that will also break a scrambler (killer pattern).

Reviewed what other standards are doing, 802.3ap, CEI, SAS, SATA, and PCI-E all scramble. SAS says they are doing it to reduce the probability of long strings of repeated patterns appearing on the physical link.

The easiest approach to adopt in FC seems to be similar to the SAS scheme. They are scrambling everything between SOF and EOF. Primitives between frames are not scrambled. Scrambling is done in the link layer.

Proposing scramble prior to the 8b/10b encoder similar to SAS. If you are doing 8Gb turn on the scramble, turn it off at 4/2/1. The question was how much improvement is gained by using scrambling. What is the set of assumptions that you would use to prove what advantage you gain by scrambling, what is the reference transmitter. Using transmit pre-emphasis you will solve some of the problem but not all of it.

You can bypass the scrambler even at 8.5Gb if you want to run particular patterns to test the system. If this is going to be done it must be done very quickly.

Should a self synchronizing scrambler be used instead of initializing the scrambler to FFFFh.

## **8.2 Unified Electrical Proposal for 8G/10G , 06-271v1, Ali Ghiasi, Broadcom\***

Goal is to provide compatibility with 4Gb SFP's. A survey was done on 4Gb SFP's that are shipping today, they can support 300mV minimum input level inside eye opening. The shipping SFP's have less than 1000mVpp VMA, the FC-PI-2 specification is 1600mVpp maximum. The proposed 8.5Gb channel loss budget is 10dB, at 4.25GHz the

---

\* Operating under the procedures of the American National Standards Institute. INCITS SECRETARIAT, Information Technology Industry Council (ITI), 1250 Eye street NW, Suite 200, Washington DC, 20005-3922, Email: [incits@itic.org](mailto:incits@itic.org) Telephone 202-737-8888, FAX 202-638-4922

total loss was 5dB. The question was asked if you would have both interconnect loss and reflection loss maximums at the same time, the answer is you probably won't. It was also suggested that crosstalk should be included in this model.

Mike Jenkins (LSI) doesn't like the proposed maximum deltaT output level of 900mVpp. It would seem that the correct number would be 1200mVpp, there was general agreement that 1200mVpp is a good number. The 180mVpp minimum deltaR number comes from a TIA output, it could probably go up to 200mVpp. It was suggested that maybe linear or copper cable version should be a beta spec not a delta spec. Is this minimum 180mVpp minimum to low to be received at the ASIC after some level of channel loss. Crosstalk at the ASIC needs to be considered.

The limiting and linear deltaR specifications need to be separated. A compliance test card was proposed. Tom Lindsay suggested using the XFP test card.

The 8GFC limiting jitter budget was proposed. The jitter budget needs more work, it appears to be to tight as deltaR.

### **8.3 8GFC delta point amplitude spec issues, 06-304v0, LSI, 06-304v0**

Mike reviewed the 1/2/4 eye diagram specs and the proposed 8Gb spec. Since Ali Ghiasi (Broadcom) agreed to 1200mVpp maximum output some of the slides aren't as relevant as before. The question was raised what does electrically compatible delta point specs mean from a host SERDES viewpoint. The idea is to combine the worst case of outer eye and inner eye. The TX will have the smallest maximum and the largest inner eye opening and the RX has the largest outer eye (maximum) and the smallest inner eye. Proposed 8Gb maximum amplitude is 1200mVpp, then nothing has to be done with 2/4Gb specs. The maximum RX would be 2000mVpp without damage. The rest of the specs are negotiable.

## **9. Project Review**

FC-PI-3:

FC-PI-4:

## **10. Old business/presentations**

No old business.

## **11. New business\***

---

\* Operating under the procedures of the American National Standards Institute. INCITS SECRETARIAT, Information Technology Industry Council (ITI), 1250 Eye street NW, Suite 200, Washington DC, 20005-3922, Email: [incits@itic.org](mailto:incits@itic.org) Telephone 202-737-8888, FAX 202-638-4922

## **12. Review action items**

David Stauffer IBM, run simulations with TX FFE being two tap, 1 pre and 1 post, the RX is two tap DFE. The granularity for the tap is 1T. Will use Broadcom package model, IBM will pick channel model. Compare CJTPAT to scrambled data, which is randomized 8b/10b.

David Stauffer IBM, will write scrambler draft text.

Mike Fogg, Tyco, will bring in connector crosstalk data.

## **13. Next meeting schedule**

Request interim meeting, face to face. Two phone calls.

The next meeting is Wednesday June 14 from 9am to 12:30 in Anchorage AK

## **14. Motion to adjourn**

Motion to adjourn: Vit Novak (Sun) seconded by Larry Barnes (Qlogic)