

1.0 The meeting opened at 10:00 am but material discussion started after about 15 minutes of "technical difficulties and enlightenment".

2.0 Attendance:

Mr. Bernhard Laschinsky	Agere Systems
Mr. Ken Paist	Agere Systems
Mr. Paul von Stamwitz	AMCC
Mr. Dan Crain	Dell
Mr. Minchuan Wang	Dell
Mr. Rob Elliott	Hewlett Packard Co.
Dr. William Ham	Hewlett Packard Co.
Mr. Barry Olawsky	Hewlett Packard Co.
Mr. James Rockrohr	IBM
Mr. Harvey Newman	Infineon
Dr. Mark Seidel	Intel Corp.
Mr. Michael Jenkins	LSI Logic Corp.
Mr. Richard Uber	Maxtor Corp.
Mr. Galen Fromm	Molex Inc.
Mr. Yuriy Greshishchev	PMC-Sierra
Mr. Tim Symons	PMC-Sierra
Mr. Alvin Cox	Seagate Technology
Mr. Bruce Johnson	Seagate Technology
Mr. Dan Smith	Seagate Technology
Mr. Kevin Witt	Vitesse Semiconductor
Mr. Michael Yeager	Vitesse Semiconductor
Mr. Adrian Roberts	Vitesse Semiconductor

22 People Present

3. Agenda

3.1 Reschedule next call due to host conflict with proposed time.
Next call moved to 2:00 pm Central time, December 15, 2005.

Details:

Teleconference 2:00 pm Central Time December 15, 2005 concerning SAS 2 PHY specification:

PARTICIPANT INFORMATION:

All Participants should use the following information to reach the conference calls:

Toll Free Dial in Number: (866) 279-4742

International Access/Caller Paid Dial In Number: (309) 229-0118

PARTICIPANT CODE: 3243413

url: seagate.webex.com (no www)

Topic: SAS 6Gbps PHY

Date: Thursday, December 1, 2005 and December 15, 2005

Time: 10:00 am, Central Standard Time (GMT -06:00, Chicago)

Meeting number: 823 657 596

Meeting password: 6gigabit

3.2. PHY specification development draft 06-011r0
<http://www.t10.org/ftp/t10/document.06/06-011r0.pdf>

Many thanks to Kevin Witt for preparing this starting-point document for development of the 6 Gbps SAS 2 PHY specification.

Discussion:

The proposal was reviewed page by page.

Page 2:

The specification needs to be at separable connectors. The draft was written by an IC vendor and has that perspective in the wording. The “at connectors” comment is made later in the document, but at least one person felt strongly that it should be made clear in the beginning. The actual specification will address the issue so the chairman is not too concerned about comment at this time although there are places in the document that tend to indicate alpha points rather than at the connectors.

Page 3:

Statement of work.

Page 4:

Controversy over closed eye. S-parameters of existing systems were evaluated with simulation tools and it was determined that the worst of these systems do produce a closed eye at the receiver prior to equalization. Pre-emphasis (term will be used in this document for pre-emphasis or de-emphasis) can open the eye prior to receiver equalization. The concern voiced was that the closed eye specification may promote sloppy channel design that could introduce additional performance degradation and jeopardize interoperability.

Transmit pre-emphasis could change to this to an open eye specification. Concern that uncontrolled (no specified limits) pre-emphasis could result in problems on low loss channels. Trade-offs need to be considered on pre-emphasis versus receiver equalization complexity. It is expected that the next generation (12Gbps?) will require both transmit pre-emphasis and receive equalization, so it would be advantageous to determine how to set both during training.

External equalized cables may interfere with transmitter and receiver equalization and are not encouraged.

Channel models supported were discussed. External may be different than internal, but unknown at this time. Since there is no SATA specification for 6Gbps, a low loss specification may be required. This situation is similar to the OIF CEI SR and LR specifications. It should be noted that between the two OIF CEI specifications that the transmitter voltage levels are different and the SR version does not assume receiver equalization. If SATA chooses a low-cost 1-meter cable version (the vast majority of SATA applications and similar to SR) without receiver equalization, backplane usage may be limited to low loss channels. This is consistent with the current SATA usage model that includes a buffer IC to compensate for the signal loss of long backplanes. If the buffer IC is used, it will probably need some sort of training sequence that will need to be specified by SATA.

A BER higher than $10e-12$ is desirable but testing of this is a concern. Also discussed aspect that some patterns are worse than others, but the “bad patterns” are sometimes dependent on channel characteristics rather than just a standard bit sequence. Test patterns should be characteristic of actual data rather than biased to stress conditions (e.g., CJTPAT cannot be used with StatEye).

Page 5:

Fibre Channel was not included in specifications reviewed.

Pages 6-8:

Side-by-side comparison of OIF CEI-6G-LR (6G Backplane), IEEE 10GBase-LRM (10GbE MMF), and IEEE 10GBase-KR (10GbE Backplane).

Page 9:

Comments made indicated that Fibre channel may be very similar to OIF CEI regarding closed eye specification.

Pages 10 and 11:

Transmitter specification

Option for adaptive transmitter?

Return loss is a complicated issue. Look at Fibre Channel as far as looking at transmitter versus receiver.

Question about transmitter jitter requirements.

Rise and fall time: Is a maximum needed?

5 ohm matching may be too loose.

Pre-emphasis limit may be too high.

How much of the transmitter device characteristic should be specified?

Is a reference link for the transmitter device a right approach? FCAL has been working on this.

Reference T11 05-346v1.

Pages 12 and 13:

Channel specification.

Need to improve current compliance channel requirement of SAS 1.1.

Question about S-parameter repeatability and correlation.

Need much effort in this area.

Pages 14 and 15:

Receiver specification.

Reference receiver implies need for reference transmitter de-emphasis

Reference receiver does not imply implementation, only a performance requirement. Same comment applies to transmitter.

Proposed receiver test device to be updated.

Page 16:

Summary: We are just beginning. Lots of work to be done.

4.0 Meeting ended at 12:22 pm. Next call December 15, 2005, 2:00 pm CST.