

1. Opening Remarks
2. Attendance

Mr. Paul von Stamwitz	AMCC
Mr. Gregory McSorley	Amphenol
Mr. Steve Robalino	Dallas Semiconductor
Mr. Kevin Marks	Dell, Inc.
Mr. Mickey Felton	EMC Corp.
Mr. Ramez Rizk	Emulex
Mr. Douglas Wagner	FCI
Mr. Nathan Hastad	General Dynamics
Mr. Rob Elliott	Hewlett Packard Co.
Mr. Barry Olawsky	Hewlett Packard Co.
Mr. Dan Colegrove	Hitachi Global Storage Tech.
Mr. James Rockrohr	IBM
Mr. George O. Penokie	IBM Corp.
Mr. Harvey Newman	Infineon Technologies
Dr. Mark Seidel	Intel Corp.
Mr. Pak Seto	Intel Corp.
Mr. Robert Sheffield	Intel Corp.
Mr. Joel Silverman	Kawasaki Microelectronics Am
Mr. David Uddenberg	LSI Logic
Mr. Praveen Viraraghavan	LSI Logic Corp
Mr. Brian Day	LSI Logic Corp.
Mr. Michael Jenkins	LSI Logic Corp.
Mr. Graeme Weston-Lewis	LSI Logic Corp.
Mr. David Geddes	Marvell Semiconductor, Inc.
Mr. Galen Fromm	Molex Inc.
Mr. Jay Neer	Molex Inc.
Mr. Hock Seow	NEC Electronics America, Inc
Mr. Rick Hernandez	PMC-Sierra
Mr. Tim Symons	PMC-Sierra
Mr. Alvin Cox	Seagate Technology
Mr. Benoit Mercier	STMicroelectronics
Mr. Stephen Finch	STMicroelectronics, Inc.
Mr. Doug Loree	Toshiba
Ms. Ashlie Fan	TycoElectronics
Mr. Dan Gorenc	TycoElectronics
Mr. John Dillard	Vitesse
Mr. Adrian Robinson	Vitesse Semiconductor
Mr. Kevin Witt	Vitesse Semiconductor
Mr. Mark Evans	Western Digital
Mr. Larry McMillan	Western Digital
Mr. Jeff Williams	Xiotech Corp.

41 People Present

3. Approval of Agenda
4. Review of documents and proposals
 - 4.1 SAS-2 Modifications to the SAS Speed Negotiation (06-515) [Finch, Wassal]
<http://www.t10.org/ftp/t10/document.06/06-515r0.pdf>

We had a short discussion regarding truncation of a training pattern if training is completed during the transmission. Specification interpretation is that the sequence must be completed and that truncation is not permitted under normal operation. Completion of other types is expected in other sequences also, so calling it out specifically here would possibly cause similar text to be added to several other sequence descriptions. Email and reflector traffic prior to the meeting indicated widespread interpretation of the specification as requiring completion of the sequence and that the addition of aligns in the training sequence was not permitted at this point in time. This item could be a letter ballot comment if further clarification I needed, however, most feel that the specification is clear on this issue.

06-515 approved for inclusion in SAS-2 as currently posted: 16/0/2 (Y/N/A).

4.2 SAS-2 Common Mode Generation Specification (07-037) [Witt & Bari]

<http://www.t10.org/ftp/t10/document.07/07-037r0.pdf>

Supports use of s-parameter for common mode specification over spectral analysis method. More data is needed to determine where to locate the curves. Concerned that short paths can exhibit a large amount of variation.

4.3 Proposed 6G SAS Phy Specs for EMI Reduction (07-007) [Jenkins]

<http://www.t10.org/ftp/t10/document.07/07-007r2.pdf>

Barry has seen issues on 3Gbps starting at 3 GHz and the harmonics above that, but the lower frequencies are not an issue.

4.7 SAS-2 Transmitter/Receiver S-Parameter Measurements (07-012) [Olawsky]

<http://www.t10.org/ftp/t10/document.07/07-012r0.pdf>

Performed a quick review since this proposal has previously been discussed on the PHY conference calls. Excellent resource document for defining what s-parameter measurements are and provides a verification of the methodology through an example.

4.4 SAS-2 Electrical Specification Proposal (06-496) [Witt]

<http://www.t10.org/ftp/t10/document.06/06-496r3.pdf>

Main difference between this proposal and 07-001 is the specification of a fixed de-emphasis value. Discussed this item after a review of the less-controversial items. This proposal and 07-001 are coming into good alignment. See additional comments below on 07-001 and 06-419.

4.5 Proposal for 6G SAS Phy Specification (07-001) [Jenkins]

<http://www.t10.org/ftp/t10/document.07/07-001r1.pdf>

Changing sign of the DFE tap weight increases complexity of the receiver. Mike would like to restrict this for the reference receiver to not change sign. Capacitance pushed to the limit rather than the resistance. In general, Mike considers this a more-stressed condition.

4.6 Zero-Length Test Load Characterization (07-013) [Olawsky]

<http://www.t10.org/ftp/t10/document.07/07-013r0.pdf>

Initial document points out issues and proposes some values to be reviewed. A few revisions are expected. Need to evaluate where the zero-length test loads are appropriate and if the values suggested are achievable.

5. New Business

5.1 SAS-2 10-meter miniSAS cable specification (06-499r1)[Fromm, Olawsky]

Need to replace intra-pair skew with some other parameter to avoid excessive signal distortion. This value stayed in the specification because there was nothing to replace it with. Barry will work with cable suppliers to determine what the parameter might be.

What range would a PHY hold to if at a set de-emphasis value? Bandwidth limits de-emphasis.

5.2 SAS-2 Reference Transmitter and Receiver Specification Proposal (06-419r1) [Witt]
<http://www.t10.org/ftp/t10/document.06/06-419r1.pdf>

Reviewed this proposal as background to our discussions on 06-496 and 07-001 concerning the fixed value for de-emphasis. The value of 6dB de-emphasis was based on certain assumptions that may not be valid for every configuration. The worst-case backplanes are not drive connections, therefore it would be possible to use a lower value of de-emphasis to fit "the vast majority" of applications. There is the possibility of establishing a default de-emphasis value of 3 dB +/- tolerance as a "plug-and-play" setting. This leaves the option for specific values to be specified for more-demanding applications. The tolerance on de-emphasis needs to be determined. Verification data is also needed.

Trace layout frequency response can influence the resulting de-emphasis, independent of the silicon capability. It was also stated that the peak value may increase as sample size increases. This indicates that a mode measurement may be best for the peak measurement as well as the de-emphasized value.

It was also suggested that a common mode impedance requirement be considered for the connector for use at 6gbps.

6. Review of Recommendations
06-515 approved for inclusion in SAS-2 (16-Y/0-N/2-A)

7. Meeting Schedule:

A possible face-to-face prior to the March T10 meeting is being considered.

Next conference call January 25, 2007

Weekly teleconferences scheduled for Thursdays at 10 am CST:

PARTICIPANT INFORMATION:

Toll Free Dial in Number: (866) 279-4742
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PARTICIPANT CODE: 3243413

Webex information:
<https://seagate.webex.com/seagate>

Topic: SAS-2 PHY WG
Date: Thursday
Time: 10:00 am, Central Standard Time
Meeting number: 826 515 680
Meeting password: 6gbpsSAS

8. The meeting adjourned at 6:17 pm.