1. The meeting opened at 9:00 am
2. Attendance

Mr. Paul von Stamwitz	AMCC
Mr. Gregory McSorley	Amphenol Interconnect
Mr. Jaremy Flake	ATL Technology
Mr. Steve Robalino	Dallas Semiconductor
Mr. Kevin Witt	Dallas Semiconductor
Mr. Kevin Marks	Dell, Inc.
Mr. Mickey Felton	EMC Corp.
Mr. Douglas Wagner	FCI
Mr. David Freeman	Finisar
Mr. Elwood Parsons	Foxconn Electronics
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. George O. Penokie	IBM Corp.
Mr. Harvey Newman	Infineon Technologies
Dr. Mark Seidel	Intel Corp.
Mr. Robert Sheffield	Intel Corp.
Mr. Joel Silverman	Kawasaki Microelectronics Am
Mr. Michael Jenkins	LSI Corp.
Mr. Steven Schauer	LSI Corp.
Mr. David Geddes	Marvell Semiconductor, Inc.
Mr. Galen Fromm	Molex Inc.
Mr. Hock Seow	NEC Electronics America, Inc
Mr. Rick Hernandez	PMC-Sierra
Mr. Tim Symons	PMC-Sierra
Mr. Joseph Chen	Samsung
Mr. Alvin Cox	Seagate Technology
Mr. Bill Pagano	Seagate Technology
Mr. Benoit Mercier	STMicroelectonics
Mr. Stephen Finch	STMicroelectronics, Inc.
Mr. Scott Shuey	Tyco Electronics
Ms. Ashlie Fan	TycoElectronics
Mr. Dan Gorenc	TycoElectronics
Mr. Mahbubul Bari	Vitesse Semiconductor
Mr. Mark Evans	Western Digital
Mr. Larry McMillan	Western Digital

37 People Present

3. Approval of Agenda
4. Review of documents and proposals
4.1 SAS-2 Mini SAS 4x cable plug pull tab color (07-209) [Elliott and Neer]
http://www.t10.org/ftp/t10/document.07/07-209r0.pdf
After review of the SFF specification, SATA 2.6 (calls out red as mandatory), and the proposal
itself, a vote was taken and the PHY working group recommends 07-209r0 be included in SAS-2.
Vote results: 7 Yes, 1 No, 8 Abstain

4.2 SAS-2 10-meter miniSAS cable specification (06-499) [Fromm, Olawsky]
No update to share.

4.3 SAS-2 Zero-Length Test Load Characterization (07-013) [Olawsky]
http://www.t10.org/ftp/t10/document.07/07-013r6.pdf
Update shows measurements on various equipment and will include a recommendation (probably
S11 of -15dB) in the next update. Barry and Alvin will work on how to incorporate into the SAS
specification.

4.4 Loaded StatEye (07-227) [Newman]
This is a work in progress. XML files included except for the 10-meter cable which is available
separately on the T10 web site (07-193).
http://www.t10.org/ftp/t10/document.07/07-193r1.pdf
http://www.t10.org/ftp/t10/document.07/07-193r1.zip
Terminations for the reference transmitter and receiver are at the near end of the compliance
point to the silicon so that each connector at the compliance point is not included twice in the
simulation. This issue needs to be identified in the electrical specification. The channel model
includes both mated connectors and 2" of FR-4 on each end. Kevin Witt has tried to run the files
and it is not currently working. Harvey will fix the issue prior to posting.

4.5 SAS-2 Physical TCTF for receiver testing (07-236) [Bari]
The confidence level is based on 10-bit data on the wire. SAS doesn't currently have retimed
loopback. This type of test requires more time for overhead if retimed loopback or a vender-
specific method is not used. The document format should include additional times for if an error is
recorded so that an error-free test is not required for passing. This data is there if the two tables
are combined, but is awkward to determine.

4.6 6G SAS Jitter Definitions (07-237) [Marlett]
http://www.t10.org/ftp/t10/document.07/07-237r0.pdf
Reviewed the proposal concerning jitter measurement and issues in the current revision of 07-
063. The proposal points out several issues in 07-063 that have been or are being addressed and
provides some guidance regarding jitter measurement.

4.7 SAS-2: Improving a Jitter Definition (07-205) [Hill]
http://www.t10.org/ftp/t10/document.07/07-205r0.pdf
Reviewed some aspects of the proposal and voted to consider this as a starting point for how to
measure jitter when SSC is applied to the transmitted signal. Alvin will contact participating test
equipment manufacturers to provide feedback. Concern voiced about the precision of the
measurement versus the value being measured.

4.8   SAS-2 6Gbps PHY specification (07-063) [Cox]
Reviewed and worked on the r6 version that had not been posted yet. r6 will be posted on 5/9.
Discussed the concept of the simulation results providing a 10e-15 BER with 10e-12 BER
requirements on the transmitter jitter and the idea was determined to be reasonable since some
aspects of e modeling are ideal.
Looked at whether DJ should be included in the transmitter specification and the prevailing
opinion is to specify RJ instead. Since measurement equipment provides RJ as a 1 sigma value,
a note was added that the RJ value is 14 times the 1 sigma value (reflecting a BER o 10e-12).
Made several other corrections to the proposal.
Mike Jenkins will work on the table for receiver jitter tolerance. At 6Gbps, the total jitter value is
located after the receiver equalization rather than at the traditional compliance point.
Updated the reference receiver definition and followed up with a review to determine items
missing from the electrical specification.

4.9 Items missing from the electrical specification:

        Wording to include in standard.

Need hard data and simulations for 2 tap and 3 tap receiver devices, with ipass 10-meter cable and 2 dB transmitter equalization (reference transmitter settings) to determine the number of taps for the reference receiver.

Explain connector location or lack of in modeling.

Wording to describe channel compliance.

Cable specification

Incorporation of zero-length

Common mode pk-pk voltage or common power spectral density.

5. Protocol overlap topics

5.1 SAS-2 SMP function support for SNW-3 phy capabilities (07-091) [Elliott]
http://www.t10.org/ftp/t10/document.07/07-091r2.pdf
Not discussed.

5.2 SAS-2 Mode and log page support for SNW-3 phy capabilities (07-214) [Elliott]
http://www.t10.org/ftp/t10/document.07/07-214r0.pdf
Not discussed.

5.3 SAS-2 Far-end loopback phy test functions (07-119) [Elliott]
http://www.t10.org/ftp/t10/document.07/07-119r2.pdf
Briefly discussed the issues of training and changing the connection to a different phy than the training was done with.

6. Review of Recommendations

07-209r0 be included in SAS-2 (7/1/8)

7. Meeting Schedule

Weekly teleconference will resume on 5/17.

NOTE NEW PHONE NUMBER!

Toll Free Dial in Number: (877)810-9442
International Access/Caller Paid Dial In Number: (636)651-3190
PARTICIPANT CODE: 3243413

Webex information:
https://seagate.webex.com/seagate
Topic: SAS-2 PHY WG
Date: Thursday
Time: 10:00 am, Central Daylight Time (GMT -05:00, Chicago)
Meeting number: 826 515 680
Meeting password: 6gbpsSAS

8. Adjournment
The meeting adjourned at 4:30 pm.