SAS Physical Working Group Minutes – July 10, 2007 T10/07-338r0

Attendance:

Mr. Charles Hill	Alta Engineering
Mr. Paul von Stamwitz	AMCC
Mr. Gregory McSorley	Amphenol Interconnect
Mr. Jaremy Flake	ATL Technology
Mr. Kevin Witt	Dallas Semiconductor
Mr. Kevin Marks	Dell, Inc.
Mr. Mickey Felton	EMC Corp.
Mr. Ramez Rizk	Emulex
Mr. Douglas Wagner	FCI
Mr. Chris Cicchetti	Finisar Corp.
Mr. David Freeman	Finisar Corp.
Mr. Mike Lawson	Finisar Corp.
Mr. Elwood Parsons	Foxconn Electronics
Mr. Mike Fitzpatrick	Fujitsu
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. Joel Silverman	Kawasaki Microelectronics Am
Mr. Michael Jenkins	LSI Corp.
Mr. Gabriel Romero	LSI Corp.
Mr. Steven Schauer	LSI Corp.
Mr. Jason Stuhlsatz	LSI Corp.
Mr. David Geddes	Marvell Semiconductor, Inc.
Mr. Galen Fromm	Molex Inc.
Mr. Rick Hernandez	PMC-Sierra
Mr. Tim Symons	PMC-Sierra
Mr. Yuming Tao	PMC-Sierra
Mr. Joseph Chen	Samsung
Mr. Alvin Cox	Seagate Technology
Mr. Martin Czekalski	Seagate Technology
Mr. Bill Pagano	Seagate Technology
Mr. Tom Skaar	Seagate Technology
Mr. Daniel F. Smith	Seagate Technology
Mr. Stephen Finch	STMicroelectronics, Inc.
Mr. Doug Loree	Toshiba
Dr. Sanjay Sethi	Toshiba
Mr. Dan Gorenc	TycoElectronics
Mr. Scott Shuey	TycoElectronics
Mr. Bill Leake	Vitesse
Mr. Mahbubul Bari	Vitesse Semiconductor
Mr. Stephen Simmons	Vitesse Semiconductor Corp
Mr. Mark Evans	Western Digital
Mr. Larry McMillan	Western Digital
Mr. Duncan Penman	Western Digital

49 People Present

4. Review of documents and proposals

4.1 SAS-2 Zero-Length Test Load Characterization (07-013) [Olawsky]
http://www.t10.org/ftp/t10/document.07/07-013r6.pdf
No updates since last face-to-face. See 07-304 for incorporation into SAS-2.

4.2 SAS-2 Zero-Length Test Load (07-304) [Olawsky]
http://www.t10.org/ftp/t10/document.07/07-304r0.pdf
We reviewed the text and discussed how to handle changes from previous versions of the standard. This discussion gave excellent insight in how to incorporate 6G into SAS-2. Significant editorial changes were made to a couple of paragraphs in this proposal.

From a technical content standpoint, the equation defining the worst case zero-length test load needs work to allow for physical implementation. Barry will investigate the instrumentation aspect to determine a realistic specification.

4.3 SAS-2 CJTPAT usage (07-297) [Elliott]
http://www.t10.org/ftp/t10/document.07/07-297r0.pdf
Several comments were made concerning this proposal. Rob made an additional edit to correct the number of dwords in the header frame. The main topic of controversy was sections A3 and A4. Steve Finch felt that these informative sections promoted specific methods of implementation rather than simply state considerations. Some editorial comments were added, but the sections remained in the proposal. It was suggested that a file be made available, as is being done for s-parameter data of the reference channel, which provides the CJTPAT data pattern in an electronic format.

A vote was taken regarding recommendation to the plenary for inclusion is SAS-2 as edited.
Result: Yes/No/Abstain; 10/4/8

4.4 Minimizing Delay in Electrically Long Touchstone Files (07-252) [Jenkins]
http://www.t10.org/ftp/t10/document.07/07-252r0.pdf
http://www.t10.org/ftp/t10/document.07/07-252r0.zip
We quickly reviewed this proposal, as it had been previously discussed on a teleconference.
Description: Background information and files for simulations.

4.5 6G SAS RX Tolerance, Reference RX & Reference TX (07-259) [Jenkins]
http://www.t10.org/ftp/t10/document.07/07-259r1.pdf
We quickly reviewed this proposal, as it had been previously discussed on a teleconference. One significant detail that was pointed out to consider as we covered different simulation results was that when compared to a CJTPAT data pattern, the PRBS 10 pattern produced significantly more eye closure.

4.6 6G SAS Reference TX & RX Termination Networks (07-267) [Jenkins]
http://www.t10.org/ftp/t10/document.07/07-267r0.pdf
http://www.t10.org/ftp/t10/document.07/07-267r0.zip
Clarification should be made in the SAS-2 specification that the channel includes the connectors and that these termination models do not. The transmitter device return loss requirements need to clarify where the values apply. Alvin included a note in transmitter specifications for return loss in 07-063.

4.7 6G SAS Self-Consistency of Reference TX, Channel & RX (07-329) [Jenkins]
http://www.t10.org/ftp/t10/document.07/07-329r0.pdf
This proposal requested the reference transmitter amplitude setting be changed to 1000mV pk-pk. It also changes the reference receiver performance characteristic to a 3 tap DFE. These two items provide additional eye opening vertical amplitude. After review of simulation and actual test

data proposals, these changes were voted on by straw pole and accepted (amplitude 11/4, 3-tap 9/2). These new values will be in the next revision of 07-063.

4.8 8G Fibre Channel Backplane ('Epsilon Point') Proposal (07-333) [Healey, Marlett]
http://www.t10.org/ftp/t10/document.07/07-333r0.pdf

4.7 SAS-2 10m Cable Results (Stateye Analysis) (07-227) [Newman]
http://www.t10.org/ftp/t10/document.07/07-227r1.pdf
We did not review this document, but the table at the end of the document has been revised to clarify some questioned raised during review of the previous revision.

We had hoped to review simulations from StatEye version 5 that incorporates 8b10b data encoding. This data was not available yet, but was promised for the next conference call on 7/19/07. Harvey did indicate that StatEye is simulating a 2V pk-pk signal rather than a 1V pk-pk. This explains the factor of two discrepancies that have been noticed in some simulation comparisons.

4.9 SAS-2 Channel StatEye Simulation Results (07-253) [Witt]
http://www.t10.org/ftp/t10/document.07/07-253r1.pdf
Results indicate that a 3 tap DFE is a minimum requirement based on simulations with StatEye. The vertical eye opening is small. Need to see the influence of 8b10b encoding.

4.10 SAS-2 Virtual Probing and Equalizer Emulation (07-323) [Pupalaikis, Schnecker]
http://www.t10.org/ftp/t10/document.07/07-323r0.pdf
This presentation explains how LeCroy implements simulation of equalization and provides a calculated eye simulation at various areas (virtual probing) with their test hardware. It should be noted that some patented IP is involved with virtual probing. This presentation is background for understanding the information provided in 07-327 and 07-326.

4.11 SAS2 - Compare Lab Measurement and Simulation Data (07-327) [Bari, Witt]
http://www.t10.org/ftp/t10/document.07/07-327r0.pdf
Demonstrates capabilities of existing equipment for taking measurements and simulating results. Good Correlation demonstrated between virtual probe and physical measurements. Supports the concept that simulation is the right approach for SAS-2.

4.12 SAS2 - Phy Interoperability Empirical Data (07-326) [Bari]
http://www.t10.org/ftp/t10/document.07/07-326r0.pdf
Physical testing with an actual transmitter device sending CJTPAT and 10 meter mini SAS cable indicates that three taps of DFE is the point where additional taps provide diminishing returns.

4.13 SAS-2 10 Meter Cable Specification Issues (06-499) [Olawsky]
http://www.t10.org/ftp/t10/document.06/06-499r4.pdf
The latest revision includes observations regarding termination influences on intra-pair amplitude mismatch. Barry will look at the existing cable specification to see if we are specifying the right values.

4.14 SAS-2 6Gbps PHY specification (07-063) [Cox]
http://www.t10.org/ftp/t10/document.07/07-063r9.pdf
The next revision has been assigned proposal number T10/07-339r0 due to the number of revisions.
Added a comment to indicate that the transmitter device return loss is on the transmitter side of the connector at the compliance point rather than the standard compliance point location (after the mated connector).
A description has been added for JTF. The discussion of 07-304 has provided insight on how to incorporate.

Increased the reference transmitter voltage to 1000mV differential pk-pk since worst case channels are used for simulations. The reference receiver number of DFE taps was increased from two to three.
Mike Jenkins to provide a new transmitter device common mode graph with a scale for dBm on he right side and definitions for dBmV and dBm. He will also provide an update for the receiver tolerance table regarding 6Gbps requirements.
Reviewed changes made to Annex B.

5. Protocol WG overlap topics

No overlap proposals were discussed.
5.1 SAS-2 SMP function support for SNW-3 phy capabilities (07-091) [Elliott]
http://www.t10.org/ftp/t10/document.07/07-091r3.pdf

5.2 SAS-2 Mode and log page support for SNW-3 phy capabilities (07-214) [Elliott]
http://www.t10.org/ftp/t10/document.07/07-214r1.pdf

5.3 SAS-2 Far-end loopback phy test functions (07-119) [Elliott]
http://www.t10.org/ftp/t10/document.07/07-119r3.pdf

6. New Business

6.1 SAS-2 Mini SAS 4x cable plug pull tab (07-294) [Neer]
This proposal was discussed in concept rather than the actual details of the proposal. It was determined that the SFF-8088 is the controlling document and any efforts concerning the pull tab need to be addressed in the SFF Committee.

7. Review of Recommendations

For inclusion in SAS-2:		
07-297r1	CJTPAT usage [Elliott]	r0 as modified, 10:4:8

8. Meeting Schedule
Weekly teleconferences will continue on Thursdays.
There will be no teleconference on 7/26 or 8/16.

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

Interim face-to-face meeting (PHY WG only)
An interim face-to-face PHY WG meeting is planned for August 15 and 16.
The meeting will be held at the Molex campus in Lisle, IL.

Date:
8am – 5pm day Wednesday August 15th

8am - noon Thursday August 16th

Address:
Molex
2222 Wellington Court
Lisle, IL 60532

It takes approx 1/2 hour to drive from either O'Hare or Midway airport to the facility.
From O'Hare there are two $0.80 tolls, I believe it is the same from Midway.

Molex uses the following three hotels and they are all about a mile from the facility.

WY 34617 WYNDHAM LISLE-CHICAGO HOTEL
ADDRESS: 3000 WARRENVILLE ROAD FROM: DPA 012M SE
LISLE IL 60532 US CKIN: 3PM
CKOUT: 12N
PHONE: 1 630-505-1000 FAX: 1 630-505-1165
RATING: AAA-3 DIAMONDS
Rate is $92.00 molex based on availability

HY 09967 HYATT LISLE
ADDRESS: 1400 CORPORETUM DRIVE FROM: DPA 014M SE
LISLE IL US 60532 CKIN: 3PM
CKOUT: 12N
PHONE: 1-630-852-1234 FAX: 1-630-8521260
RATING: AAA-3 DIAMONDS
Rate is $99.00 molex based on avilability

HI 03435 HOLIDAY INN SELECT NAPERVILLE
ADDRESS: 1801 Naper Blvd FROM: DPA 013M SE
Naperville IL 60563 US CKIN: 3PM
CKOUT: 12N
PHONE: 1 630-505-4900 FAX: 1 630-505-8239
RATING: AAA-3 DIAMONDS
$99.00 molex based on avilability

Please note prices are not guaranteed until ticketed and can change at any time.

9. Adjournment
The meeting was adjourned at 5:05 pm.