

Attendance:

Mr. Ziad Matni	Agere Systems
Ms. Fei Xie	Agilent Technologies
Mr. Bryan Kantack	Agilent Technologies
Mr. Paul von Stamwitz	AMCC
Mr. Kevin Marks	Dell, Inc.
Mr. David Freeman	Finisar
Mr. Rob Elliott	Hewlett Packard Co.
Mr. James Rockrohr	IBM
Mr. Schelto van Doorn	Intel Corp
Dr. Mark Seidel	Intel Corp.
Mr. Praveen Viraraghavan	LSI Logic Corp
Mr. Michael Jenkins	LSI Logic Corp.
Mr. David Geddes	Marvell Semiconductor, Inc.
Mr. Wei Zhou	Marvell Semiconductor, Inc.
Mr. Galen Fromm	Molex Inc.
Mr. Amr Wassal	PMC-Sierra
Mr. Robert Watson	PMC-Sierra
Mr. Yuriy Greshishchev	PMC-Sierra
Mr. Henry Wong	PMC-Sierra
Mr. Tim Symons	PMC-Sierra
Mr. Alvin Cox	Seagate Technology
Ms. Judy Westby	Seagate Technology
Mr. Benoit Mercier	STMicroelectronics
Mr. Stephen Finch	STMicroelectronics
Mr. Massimo Pozzoni	STMicroelectronics
Mr. Doug Loree	Toshiba
Mr. Adrian Robinson	Vitesse Semiconductor
Mr. Kevin Witt	Vitesse Semiconductor

28 in attendance

Agenda:

1. Reviewed 06-263r4 updates.

**Table 52 and note 7 were changed per discussion at the face-to-face meeting.**

**Receiver tables and transmitter tables updated**

**Table 56 buffer sizes doubled.**

**Section 7.3 renamed.**

**7.32 changed to minimum of 1 align for every 124 dwords. Rob will calculate the numbers to change the requirement to 1 align for every 128 dwords. This may reduce the SSC maximum value about 2400 ppm.**

**Concerns over the RESET sequence will be addressed in the future.**

**Clarifications discussion:**

**Center spreading or no spreading is transmitted to a SAS drive.**

**No spreading or down spreading to a SATA drive**

2. Speed negotiation sequence

During the face-to-ace meeting in Colorado Springs, a new proposal for the G3 window was introduced that uses an out of band communication to broadcast PHY capabilities. This method

preserves the existing speed negotiation window structure without depending on G1 or G2 capability to work in future generations. A preliminary list of considerations concerning 05-397r5 in the meeting minutes is included below. There have also been two additional proposals posted on the T10 site concerning how the out of band data could be configured. After the discussion on today's call, Steve Finch has decided to withdraw his proposal 06-354 in support of 06-355.

05-397r5 uses OOB at 1.5Gbps with a 9uS idle and a 10uS initial burst to "start the clock". The 59 10uS intervals start from the far end of the 609uS standard window. Later this was changed to a 10us idle at the end and 58 intervals for data.

9uS has been identified as marginal for changing transmission characteristics.

10uS is not a magic number and a shorter time could be used. PMC suggests using the existing RCDT with a COMSAS/COMWAKE combination. This allows 64 bits with CRC. The 4 of 6 rule applies to the recovery of the OOB signal.

Decided that COMWAKE should be used instead of COMSAS due to timing issues and the uncertainty of when the first interval starts when applying the 4 of 6 rule to the COMSAS signal.

Concerned that the negation time could be long before the end bits are read (check digit or CRC) and they may not be properly detected or the interval timing may get off with the long idle. One suggestion is that a bit be designated as active at every fifth interval. The choice of 5 designates groups of 4 bits. An alternative would be every ninth bit so that the bits are divided into groups of 8.

Transmitter should begin at the end of RCDT. The receiver should be ready since a reset sequence can be initiated at any time.

Is a check sum or CRC necessary? Requires extra logic but many are in favor the idea. What happens if there is a CRC error? If not there, would the speed negotiation window fail? One possible outcome is that an SSC bit gets misread and a system that requires SSC might not have it active. This would not fail the speed negotiation, but the system would not have SSC running in one direction on that particular link.

**Information transferred:**

**Speeds supported**

**SSC transmitter capabilities**

**SSC currently being used**

**Channel class (loss) – Initiator-type would only have knowledge; End device could use.**

**Additional suggestions?**

**New question that was not discussed: What voltage level will this OOB communication be done at? COMSAS has already been negotiated and the preceding two windows were done at SAS levels. G3 is expected to be specified at 1200mV pk-to-pk max with some minimum specified, so should that be the level used? Initial OOB is started at SATA levels of 400-600mV pk-to-pk if attachment to SATA is supported.**

Failure of the final speed negotiation window shall be handled by a higher-level layer or system administrator (not the PHY).

**Should there be an automatic rate or feature reduction?**

**6 in favor, 2 opposed – Worth pursuing at this point. Concerned that a link may not be performing at its highest potential, but it seems that the system could detect this and identify the issue. This is complicated in the fact that if a 6Gbps device failed at 6Gbps but worked at 3Gbps, how would the system know that it was a 6Gbps-capable device if the expander did the negotiation? Is this something that is available in a mode page or other identification?**

If there was a failure at the highest mutual speed and the initiator/expander changed the supported options, then how would it reset to full capability if the device was changed?

**Addressed by the automatic negotiation recovery.**

A concern was raised that using the scrambler in the training sequence may involve the link layer. **Seagate suggests that the 0 seed not be required with every window. Intel also expressed support.**

Since the last interval in the configuration window is idle, the training data may start at the beginning of the final speed negotiation window, but shall start by the end of a defined RCDT (not necessarily the same length of time as the previous RCDT's). Input is needed on how long this RCDT should be.

How is the final speed negotiation window completed? Should there be ALIGN0/ALIGN1 after TRAINdone is exchanged to verify dword sync?

Reference documents:

SAS-2 Start-up training sequence (05-397) [Newman]  
<http://www.t10.org/ftp/t10/document.05/05-397r5.pdf>

Proposal New Speed Negotiation for SAS-2 (06-354) [Finch]  
<http://www.t10.org/ftp/t10/document.06/06-354r0.pdf>

SAS-2 SNW-3 Definition (06-355) [Wassal & Watson]  
<http://www.t10.org/ftp/t10/document.06/06-355r0.pdf>

Next conference call July 27, 2006

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Webex information:

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

Topic: SAS-2 PHY WG

Date: Thursday, July 27, 2006

Time: 10:00 am, Central Daylight Time (GMT -05:00, Chicago)

Meeting number: 826 515 680

Meeting password: 6gbpsSAS