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Accredited Standards Committee*
InterNational Committee for Information Technology Standards (INCITS)

Doc. No.: T10/02-183r0

Date: May 6, 2002

Reply to: Alvin Cox

To: T10 Membership
From: Alvin Cox
Subject: Serial Attached SCSI PHY Study Group Meeting -- May 1-2, 2002
Nashua, NH

Agenda

1. Opening Remarks
2. Approval of Agenda
3. Attendance and Membership
4. Agenda items
 - 4.1 Internal connectors [Kachlic]
 - 4.1.1 Review device connector
 - 4.1.2 Review cable connector
 - 4.1.3 Review backplane connector
 - 4.1.4 Review electrical requirements
 - 4.1.5 Status of SFF proposal
 - 4.2 External connectors [Wagner]
 - 4.2.1 Review external connector
 - 4.2.2 Determine what should be specified in the electrical requirements
 - 4.2.3 What is the number of mating cycles required?
 - 4.2.4 Status of SFF proposal
 - 4.3 Form factor proposals [Cox]
 - 4.3.1 Review SFF proposal drafts for 2.5", 3.5", and 5.25" form factors
 - 4.4 OOB detection values [Brown]
 - 4.5 TBD's for 3 Gbps Y values
 - 4.5.1 Is this really a TBD or 20% overshoot & 10% undershoot enough?
 - 4.5.2 Measurements on simulation boards [Olawsky]
 - 4.5.3 Verification of simulation borad results [Brown]
 - 4.6 Should the eye diagrams be placed before the tables?
 - 4.7 Table 14 review
 - 4.7.1 Should Ir be included with Xr?
 - 4.7.2 Characteristic column items not necessarily characteristics
 - 4.7.3 Remove reference to SATA without spread spectrum clocking?
 - 4.8 Review latest SAS draft PHY section.
5. New Business
 - 5.1 SAS PHY Control Request Modification (02-174) [Roberts]
6. Meeting Schedule
7. Adjournment

Results of Meeting

1. Opening Remarks

Alvin Cox called the meeting to order at 9:00 a.m.,
Wednesday, May 1, 2002

As is customary, the people attending introduced themselves and a copy of the attendance list was circulated.

2. Approval of Agenda

The draft agenda was approved.

3. Attendance and Membership

Attendance at working group meetings does not count toward minimum attendance requirements for T10 membership. Working group meetings are open to any person or organization directly and materially affected by T10's scope of work. The following people attended the meeting:

Name	S	Organization	Electronic Mail Address
Mr. Vince Bastiani	V	Adaptec Consultant	bass.tech@gte.net
Mr. Carl Booth	V	Amphenol Spectra Strip	cbooth@spectra-strip.com
Mr. Bill Galloway	P	BREA Technologies, Inc.	billg@breatech.com
Mr. Barry Olawsky	V	Compaq Computer Co.	barry.olawsky@compaq.com
Mr. Titkwan Hui	P	Dallas Semiconductor	tk.hui@dalsemi.com
Mr. Douglas Wagner	P	FCI	dwagner@fciconnect.com
Mr. Joe Salamone	V	FCI	jsalamone@fciconnect.com
Ms. Martin Goldstein	V	Hewlett Packard Co.	martin_goldstein@hp.com
Mr. Randy Wasylak	A	Hitachi Cable Manchester	rwasyak@hcm.hitachi.com
Mr. Zane Daggett	V	Hitachi Cable Manchester	zdaggett@hcm.hitachi.com
Mr. Dan Colegrove	V	IBM Corp.	dcolegro@us.ibm.com
Mr. Andrew Cable	V	Intel Corp.	andrew.l.cable@intel.com
Mr. Rick Beckett	V	Intel Corp.	richard.c.beckett@intel.com
Ms. Jie Fan	P	Madison Cable Corp.	jie.fan@madisoncable.com
Mr. Mark Evans	P	Maxtor Corp.	mark_evans@maxtor.com
Mr. Russ Brown	V	Maxtor Corp.	russ_brown@maxtor.com
Mr. Richard Uber	V	Maxtor Corp.	richard_uber@maxtor.com
Mr. Jerry Kachlic	AV	Molex	jkachlic@molex.com
Mr. James R. (Bob) Davis	AV	Network Appliance Inc.	bob@netapp.com
Mr. Ting Li Chan	V	QLogic Corp.	ting.chan@qlogic.com
Mr. Umesh Chandra	V	Seagate Technology	umesh_chandra@seagate.com
Mr. Allen Kramer	V	Seagate Technology	allen.kramer@seagate.com
Mr. Alvin Cox	V	Seagate Technology	Alvin.Cox@seagate.com
Mr. Paul D. Aloisi	P	Texas Instruments	Paul_Aloisi@ti.com
Mr. Donald R. Getty	A	Texas Instruments	donald_getty@ti.com
Mr. Tom Hanan	V	Western Digital Corp.	

26 people present

Status Key: P - Principal
A,A# - Alternate
AV - Advisory Member
L - Liaison

4. Agenda items

Alvin Cox presented a brief PHY overview which was included in the presentation made by Rob Elliott on Monday.

4.1 Internal connectors [Kachlic]

Reviewed device connector, cable connector and backplane connector. Alvin Cox will draft an option table for cable configurations. Drawings with more definition than those posted on T10 were not available. Tom Hanan expressed concerns on incompatibility with SATA in a blind mating configuration. It was pointed out that a system architect could use the SAS backplane connector to avoid this problem. SFF number assigned to SAS internal connectors is SFF-8482. The majority of the connector work will be done in SFF.

4.2 External connectors [Wagner]

Reviewed the external connector drawings that are posted on T10. The connector is similar to (Infiniband) SFF-8470 and falls under the same licensing as that product. The housing has modifications to ensure that the 8470 connector will not plug into the SAS external connector. SFF number assigned to SAS external connectors is SFF-8483. The majority of the connector work will be done in SFF. Zane Daggett will help with specifications on the external cable assembly. SFF does not plan to include the cable performance specification in the connector document.

4.3 Form factor proposals [Cox]

Reviewed SFF proposal drafts for 2.5", 3.5", and 5.25" form factors. The mating connector clearance zone was added to these documents as a result of the review. SFF numbers are: SFF-8223 (2.5"), SFF-8323 (3.5"), and SFF 8523 (5.25").

4.4 OOB detection values [Brown]

Discussed OOB issues in how values are specified in the tables. A maximum OOB detect value is needed in addition to the minimum already specified. The group will look at min OOB, max OOB, noise level, and minimum signal requirements to determine new values.

4.5 TBD's for 3 Gbps Y values

The group felt that 20% is not enough pre-emphasis for 3.0 Gbps, but that values cannot be determined until actual measurements are made. Specification to remain TBD until data available.

4.6 Should the eye diagrams be placed before the tables?

The group decided it did not matter whether the eye diagrams came before or after the tables. It has done either way in other specifications. It was suggested to go ahead and move the eye diagrams before the tables per the SAS editor's comments.

4.7 Table 14 review

4.7.1 Should Ir be included with Xr? Group decision of no, keep them separate.

4.7.2 Characteristic column items not necessarily characteristics. Change labels in column to Data rate tolerance, Xr; Data rate tolerance, Dr, Cr, Ir; and Data rate tolerance, Dt, Ct, It, Xt.

4.7.3 Remove reference to SATA without spread spectrum clocking? Agreed. Drop Xr with reference to note 3 and note 3.

4.7.4 Miscellaneous table correction. Change note references from numbers to letters.

4.8 Review latest SAS draft PHY section.
Add text in section 5.2 describing various SAS cable configuration possibilities.
[Cox]

Table 9: Transmit and receive designations are backwards. S2 should be AR+, etc.
Update table for editor. [Cox]

Clarification needed in first note following Table 9 indicating that the SATA host is the different pinout configuration. [Cox]

Ready LED drive characteristics: Suggested change from 5.5V maximum voltage to 3.6V and >30mA sink capability to >24mA for compatibility with 3.3V IC's and possible adoption by SATA. LED availability investigation. [Olawsky]

Section 5.7.3: Remove the statement, "The system level BER requirements ..." (last sentence of the first paragraph on page 41), from the text and include in an informative PHY annex.

5.7.4 Add a statement concerning voltage levels changing to those in the tables after establishing the SAS connection at OOB.

Table 15:

The Ct values for Y1, Y2, Maximum rise/fall time, and Minimum rise/fall time also apply to Dt. Add these 4 lines in the Dt section.

Dt skew should reference note g instead of h.

Change Xr to Xt.

Add a note that states that the SATA 1.0 column does not apply to It.

Skew is not the proper term in this table. Signal characteristic name will be changed [Olawsky].

Table 16:

Add a note that states that the SATA 1.0 column does not apply to Ir.

Skew is not the proper term in this table. Signal characteristic name will be changed [Olawsky].

Table 17:

Remove last note and include in the informative PHY annex.

5.7.7

Remove "SERDES voltage ..." from the text preceding the table. This is the same as the note removed from table 17 to be included in the informative PHY annex.

In the text following Figure 22, remove "of 10%" and "of 20%", as these values will change with data rates.

Table 19:

Note f has a reference to note a (width) which still have a numeric reference designation (superscript 1).

5.7.11

In the paragraph just before Figure 27, remove "of 10%" and "of 20%", as these values will change with data rates.

Section 6:

Concern that during speed negotiation, sync may be lost by the PLO due to noise if the receiver is not receiving a valid signal. Check with PHY experts for possible behavior issues and time for resynchronization to drop back to a lower speed.

[Cox]

5. New Business:

- 5.1 SAS PHY Control Request Modification (02-174) [Roberts]
Document not available yet.

6. Meeting Schedule

Serial Attached SCSI Working Group meetings are scheduled for:

Wednesday-Thursday, June 5-6, 2002 commencing at 9:00 am on Wednesday and ending at noon on Thursday in Minneapolis, MN at the Hilton Inn (952-854-2100).

Monday-Wednesday, June 24-26, 2002:

No PHY meeting at this SAS working group.

Monday-Tuesday, July 15-16, 2002 commencing at 1:00 p.m. on Monday and ending at 5:00 pm on Tuesday in Colorado Springs, CO at the Wyndham Colorado Springs Hotel (719-260-1800).

Any teleconferences before the July 2002 T10 meeting will be announced on the T10 reflector. Currently there are none anticipated.

7. Adjournment

The meeting was adjourned at 11:55 a.m. on Thursday, May 2, 2002.