

To: Membership of X3T10

From: Bill Ham, SPI-2 Technical Editor
Ralph Weber, Secretary X3T10
Larry Lamers, Vice-chair X3T10
John Lohmeyer, Chair X3T10

Subject: Minutes of SPI-2/EPI Working Group
July 15, 1996 -- Colorado Springs, CO

Agenda

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Results of Meeting

1. Opening Remarks

John Lohmeyer, the X3T10 Chair, called the meeting to order at 9:03 a.m., Monday July 15, 1996. He thanked Symbios Logic for allowing him to host the meeting.

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

2. Approval of Agenda

The agenda was approved with the following additions:

- 5.8 Fast-80 Test Results [Ham]
- 5.9 Frequency Range on Terminators [?]
- 8. Universal Includes HVD [Ham]

3. Attendance and Membership

Attendance at working group meetings does not count toward minimum attendance requirements for X3T10 membership. Working group meetings are open to any person or organization directly and materially affected by X3T10's scope of work. The following people attended the meeting:

Name	S	Organization	Electronic Mail Address
Mr. Norm Harris	P	Adaptec, Inc.	nharris@eng.adaptec.com
Mr. Lawrence J. Lamers	A	Adaptec, Inc.	ljlammers@aol.com
Mr. Richard Moore	V	Adaptec, Inc.	richard_moore@corp.adaptec.com
Mr. Wally Bridgewater	V	Adaptec, Inc.	wally@eng.adaptec.com
Mr. Tom Schneider	V	Adaptec, Inc.	schneid@itc.adaptec.com
Mr. Louis Farshee	V	Aeronics, Inc.	
Mr. Charles Brill	P	AMP, Inc.	cebrill@amp.com
Mr. Ron Roberts	A	Apple Computer	rkroberts@aol.com
Mr. Borden Moller	A	CMD Technology	borden@cmd.com
Mr. Louis Grantham	P	Dallas Semiconductor	grantham@dalsemi.com
Mr. Siegfried Schmalz	V	Dallas Semiconductor	schmalz@dalsemi.com
Mr. Greg McSorley	O	Data General Corp.	greg_mcsorley@dg.com
Mr. Roger Cummings	P	Distributed Processing Tech.	cummings_roger@dpt.com
Mr. Dean Wallace	P	Linfinity Micro	75671.3443@compuserve.com
Mr. Pete McLean	P	Maxtor Corp.	pete_mclean@maxtor.com
Mr. Edward A. Gardner	P	Ophidian Designs	gardner@acm.org
Mr. Tom Jones	V	QLogic Corp.	t_jones@qlc.com
Mr. Gene Milligan	P	Seagate Technology	Gene_Milligan@notes.seagate.com
Mr. Gerald Houlder	A	Seagate Technology	Gerry_Houlder@notes.seagate.com
Mr. Dave Guss	P	Silicon Systems, Inc.	dave.guss@tus.ssi1.com
Mr. Robert N. Snively	P	Sun Microsystems Computer Co	bob.snively@eng.sun.com

Mr. John Lohmeyer	P	Symbios Logic Inc.	john.lohmeyer@symbios.com
Mr. Ralph O. Weber	A#	Symbios Logic Inc.	roweber@acm.org
Mr. Mark Jander	V	Symbios Logic Inc.	mark.jander@symbios.com
Mr. Frank Gasparik	V	Symbios Logic Inc.	frank.gasparik@symbios.com
Mr. Kevin Bruno	V	Symbios Logic Inc.	kevin.bruno@symbios.com
Mr. Brian Day	V	Symbios Logic Inc.	brian.day@symbios.com
Mr. Kevin Gingerich	O	Texas Instruments, Inc.	k-gingerich@ti.com
Mr. Paul D. Aloisi	P	Unitrode Integrated Circuits	Aloisi@uicc.com
Mr. Doug Piper	P	Woven Electronics	549.9900@mcimail.com

30 People Present

Status Key: P - Principal
 A,A# - Alternate
 O - Observer
 L - Liaison
 V - Visitor

4. Documentation Strategy [Lamers/Ham]

John reported on the history of the debate about the contents of the SPI-2 document. John focused on events that occurred during the last two months. There was a brief discussion of the political issues. But, John asked that the discussion focus on technical issues and recognize that the political debate will be held during the plenary.

John also reviewed the results of the recent STA meeting. The STA opinions on Fast-80, when to Migrate to Encoded SCSI, and Hot Plugging were presented and discussed. In summary, STA would like to see Fast-80 and Hot Plugging case 4 work, but will accept other situations in order to get LVD SCSI finished promptly. STA postponed answering the migration to encoded SCSI question.

5. LVD Topics

5.1 Test Circuit Considerations for Voltage Mode Drivers [Bridgewater]

Wally questioned the dynamic output signal balance test for LVD drivers. After some discussion, the group decided to add a note allowing 120 mv peak-to-peak voltage for high-to-low and low-to-high transitions; and 400 mv peak-to-peak voltage for transitioning into and out of the high impedance state.

5.2 Standing Waves [Bridgewater]

Wally stated that he has not been able to detect standing waves in his testing. The group agreed to drop this item from future agendas.

5.3 Should Fast-80 be included in SPI-2? SUPR? [Milligan]

The group agreed that Fast-80 should be dropped from SPI-2. It was further agreed that Fast-80 should be included in a future document, as appropriate.

5.4 Fast-80 Deskew Delay [Moore]

Based on the decision to drop Fast-80 from SPI-2, concerns over the Fast-80 deskew delay were thought to be academic.

5.5 Hot Plugging [Bridgewater]

Bill Ham described a possible connector design that has split contacts. The initial lead-in portion of the contacts would have high-impedance while the final portion would be low-impedance. This contact design could alleviate the spiking problems that occur in hot plugging case four by allowing the contacts to charge at a slower rate. With single-ended, the signal levels were large enough to mask the spikes. LVD signal levels are much lower and could be adversely affected by the spikes.

Another approach to reduce the problem would be to bias the contacts to a voltage approximately half-way between the high and low signal levels. Bill noted that he believes that there is a patent on this approach. Bill is still investigating. Both methods would require a sequenced connector (i.e., one that has split contacts).

A simulated case four, with the software handling the bus interruption also is possible.

5.6 Universal Backplane [Ham]

Bill described the impedance issues related to building cables and backplanes. He described the impedance ratios that naturally occur in cables, but do not occur in backplanes. He then asked the group to confirm that the needed ratios can be achieved on backplanes, and if possible, to describe how to build such backplanes. Dean Wallace volunteered to run some sample calculations to demonstrate how universal backplanes could be made.

5.7 SPI-2 Document Review (X3T10/1142D) [Ham]

Mark Jander and Brian Day raised questions about the DIFFSENS circuit. They noted that a 10% power supply combined with a voltage divider would push levels in the circuit outside those shown in SPI-2, as currently written. This produced a lengthy discussion that resulted in several changes to table 6. The group then turned to the issue of how devices should respond to change in the DIFFSENS line level. While the discussion was lengthy, no substantial changes were made.

5.8 Fast-80 Test Results (96-200r0) [Ham]

Bill Ham presented test data intended to provide guidance on the standardization process to be followed for Fast-80. Bill's data was developed using symmetric transmitters and terminators based on Fast-40 test transmitters provided by TI.

In summary, Bill noted that Fast-80 probably will not work on the same cabling/protocol system as used by Fast-40. Bill showed several specific scope trace pictures proving his contention that changes beyond just timing will be required to transition from Fast-40 to Fast-80. Bill noted that the major problem is ISI (inter-symbol interference). He expressed the belief that, if the ISI could be reduced enough, Fast-80 could work made to work on Fast-40 configurations.

Many questions were asked to help clarify Bill's views about issues.

Bill concluded that work on Fast-80 should be deferred to a future document. He further noted that Fast-100 should be the next goal. Bill was asked what changes he expected to be needed for Fast-100. Bill stated that more "clock like" REQ/ACK signals appear to be necessary -- i.e., the REQ and ACK streams cannot be started and stopped instantly as is presently the case.

5.9 Frequency Range on Terminators [Schmalz]

Siegfried Schmalz of Dallas Semiconductor presented an analysis on the frequency range of terminators. Concerns were raised that the parasitic capacitance will cause problems with meeting the terminator requirements specified. The issue was the nature of the parasitic capacitance when measured at request frequencies (120 Mhz).

What is the maximum parasitic capacitance at a given frequency that can be allowed? At 120 Mhz the calculations show that c1 and c2 are 0.7 pf and c3 is 0.3 pf. Bill Ham suggested that a note be added to table 7 stating that the requirements only apply to the real value (not the imaginary value) when the measurements are made at frequency. Another approach is to make table 7 DC numbers and allow looser AC numbers.

6. High-Voltage Differential Fast-40 (96-190) [Gingerich]

Discussion of this topic was deferred to the next meeting.

7. EPI Topics

7.1 Arbitration Fairness (96-172) [Lohmeyer]

The proposal is a reintroduction of a 1989 proposal from IBM (X3T9.2/89-061). The proposal was not discussed in detail at this meeting, however there was general agreement that it should be documented in a future standard as opposed to a technical report.

7.2 Document Review [Ham]

Bill Ham reviewed EPI rev 6.

8. Universal Definition [Ham/Milligan]

Bill started the discussion by stating that connector definitions in SPI-2 already coordinate with HVD (High-Voltage Differential) SCSI. The SCA-2 connector has defined compatible pin-outs for single-ended, HVD, and LVD SCSI. Later in the meeting Bill was persuaded that while a three-way universal backplane might be possible, other necessary components to build a complete three-way universal system might be impossible (at least practically impossible). It was suggested that the SPI-2 document references to devices that support both single-ended and LVD should be changed from 'universal' to 'dual-mode' to avoid the implication that HVD also is supported.

Gene Miligan expressed concern that building a universal driver that meets the 20 pf will be difficult and may be impossible. Ultimately, this was a marketing discussion and no resolution reached. Bill Galloway said he would like to take an existing single-ended subsystem and put universal drives in it, but fears that devices with more than 15 pf node capacitance will not work.

9. Meeting Schedule

The next meeting of SPI-2 Working Group is scheduled for August 13-14, 1996 in Milpitas, CA hosted by Technology Forums. Another meeting is scheduled for September 9th in Natick, MA. The group recommended that October and December meetings be held with X3T11 on Thursday (October 10th in St. Petersburg Beach, FL and December 5th in Bloomington, MN).

10. Adjournment

The meeting was adjourned at 7:30 p.m. on Monday July 15, 1996.