Accredited Standards Committee*
X3, Information Technology

To: Membership of X3T10

From: Ralph Weber, Secretary X3T10
             Larry Lamers, Vice-chair X3T10
             John Lohmeyer, Chair X3T10

Subject: Minutes of SPI-2, SPI-Amendment, & SES Working Group
             November 4, 1996 -- Palm Springs, CA

Agenda

1. Opening Remarks

2. Approval of Agenda

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5. SPI Amendment #1 review [Lamers]

6. SES document review (96-249r0) [Snively]

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Results of Meeting

1.   Opening Remarks

John Lohmeyer, the X3T10 Chair, called the meeting to order at 9:00 a.m., Monday November 4, 1996. He
thanked Norm Harris of Adaptec for hosting 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:

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:

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        Name            S        Organization        Electronic Mail Address
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Mr. Norm Harris         P   Adaptec, Inc.            nharris@eng.adaptec.com
Mr. Tak Asami           A#  Adaptec, Inc.            asami@itc.adaptec.com
Mr. Lawrence J. Lamers  A   Adaptec, Inc.            ljlamers@aol.com
Mr. Wally Bridgewater   V   Adaptec, Inc.            wally@eng.adaptec.com
Mr. Richard Moore       V   Adaptec, Inc.            richard_moore@corp.adaptec
                                                     .com
Mr. Edward Fong         P   Amdahl Corp.             esf10@amail.amdahl.com
Ms. Lisa Huff           V   AMP, Inc.                lisa.huff@amp.com
Mr. Louis Grantham      P   Dallas Semiconductor     grantham@dalsemi.com
Mr. Greg McSorley       O   Data General Corp.       greg_mcsorley@dgc.ceo.dg.
                                                     com
Dr. William Ham         A#  Digital Equipment Corp.  ham@subsys.enet.dec.com
Mr. Douglas Hagerman    A#  Digital Equipment Corp.  hagerman@starch.enet.dec.
                                                     com
Mr. Roger Cummings      P   Distributed Processing   cummings_roger@dpt.com
                            Tech.
Mr. George Penokie      P   IBM Corp.                gop@rchvmp3.vnet.ibm.com
Mr. Dan Colegrove       A#  IBM Corp.                colegrove@vnet.ibm.com
Mr. Dean Wallace        P   Linfinity Micro          75671.3443@compuserve.com
Mr. Evgeny Jake Berzon  O   NEC Electronics, Inc.    jberzon@asic.mtv.nec.com
Mr. Edward A. Gardner   P   Ophidian Designs         gardner@acm.org
Mr. Tom Jones           A#  QLogic Corp.             t_jones@qlc.com
Mr. John A. Fobel       O   Rancho Technology, Inc.  johnf@rancho.com
Mr. Gene Milligan       P   Seagate Technology       Gene_Milligan@notes.
                                                     seagate.com
Mr. Dave Guss           P   Silicon Systems, Inc.    dave.guss@tus.ssi1.com
Mr. Robert N. Snively   P   Sun Microsystems Computer bob.snively@eng.sun.com
                            Co
Mr. Vit Novak           A   Sun Microsystems, Inc.   vit.novak@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. Larry Barnes        V   Symbios Logic Inc.       larry.barnes@symbios.com
Mr. Kenneth J. Hallam   P   UNISYS Corporation       ken.hallam@mv.unisys.com
Mr. Paul D. Aloisi      P   Unitrode Corporation     aloisi@unitrode.com
Mr. Gregory Kapraun     V   Western Digital Corp.    kapraun@wdroc.wdc.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
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4.　　SPI-2 Topics
4.1　　Universal backplane [Wallace/Barnes]

Larry Barnes presented background information necessary to understand the design of signal carrying backplanes. He showed how differential signals are affected by a signal coupling effect, which affects the signal impedance. He noted the different coupling properties of the single-ended and differential signaling technologies. The distance between the traces appeared to be the major variable in the design. The group needed a lengthy discussion to become educated in the electrical subtleties electro-mechanical properties of circuit boards and the computer programs that model them. Larry's concluding statement was, "Without violating any standard construction practices, we can develop a backplane design that supports both single-ended and differential signaling."

Bill Ham complemented Dean Wallace on the stacked trace design, shown in his handouts. Bill also noted that two organizations have independently established the feasibility of designing a universal backplane. Bill noted that established the general practicality of the concept.

Noting that standards committees do not design products, John questioned what the goal of the committee should be in this case. Bill proposed that an informative annex or even a brief paragraph of informative exposition should be added to the standard. Gene Milligan said he, in general, is opposed to adding annexes to standards. It was not clear from the discussion who, if anyone, would carry this idea further.

4.2　　LVD case 4 hot plugging [Barnes]

Larry Barnes stated that his simulation results would have to be postponed due to a simulator failure over the weekend. The committee reviewed the results of the last meeting (96-253) and Bill Ham's document (96-252) describing three ways to do case 4 hot plugging in LVD SCSI.

4.3　　Changing driver modes when hot plugging [Penokie]

George Penokie reviewed problems in the description of how the DIFFSENS line affects operation of a SCSI device. The focal point of George's concern is that an LVD device must be able to continue to operating when a single ended device is connected to the bus. George agreed to write a proposal for consideration at the next meeting calling for establishment of a Unit Attention condition when a change in the DIFFSENS state is detected.

John Lohmeyer asked a question about the 100 msec driver mode change timing specification. The group discussed the intent of the current wording, reviewed past arguments in this area, and did not reach a conclusion.

4.4　　LVD SCAM issues [Penokie]

George Penokie had questioned via a reflector message whether SCAM will work on LVD SCSI. John reported that his colleagues have tested SCAM on LVD SCSI and it works. George noted that wording to this effect should be added to the SCAM description in SPI-2.

It was noted that the SPI-2 technical editor should review table 14, for its relationship to SCAM and active/passive negation. Possibly, a row needs to be added covering SCAM, which requires passive-negation on additional signals (including MSG, C/D, I/O, and the data bus).

4.5　　Mixing 8- and 16-bit buses at Fast-40 speeds [Bridgewater]

Wally Bridgewater raised a concern about capacitance matching when 8-bit devices are installed in the middle of a 16-bit bus. Bill Ham noted that EPI is addressing these issues. Bill felt that no additional wording is needed in the current standards (Note: EPI is a technical report that provides an additional description of the existing standards but does not standardize any new requirements). The group discussed how best to inform the world-at-large of the challenges in mixing 8-bit devices and 16-bit devices on a single bus. It was noted that bus expanders are particularly helpful in this area.

The group generally disliked including an outright prohibition on mixing 8-bit and 16-bit devices in SPI-2. However, the group desired that suitable pointers to the EPI discussions of mixed bus widths be added to SPI-2.

4.6 HVD Fast-40 (96-190) [Gingerich]

In Kevin Gingerich's absence, the group discussed what they thought was Kevin's issue. With little hard information to discuss, Gene Milligan proposed this item be dropped from the agenda. In the absence of any objections, this item will be removed from future agendas.

4.7 Single-ended termination (96-245) [Wallace]

Dean Wallace presented a proposal for changes in SPI-2 regarding sink currents (96-245), which addresses concerns raised by Gene Milligan at the September meeting (96-232r1). The group discussed Dean's proposal. Dean noted several changes in the proposal and agreed to bring a revised proposal to the next meeting.

4.8 SPI-2 Unified Document (SPUD) Integration Issues (see 96-253)

The group discussed the following issues related to integrating all of the parallel bus signaling standards into a single standard. The below list was developed during the recent SPI-2 editing sessions. John stated his desire that a broader group should review these issues.

1. Active negation - map of existence (see X3T10/95-295); map of intensity (use F20 envelope)

   The group agreed that the wire-or'ed lines should not be actively negated. None of the signals used for SCAM protocol should be actively negated during the SCAM protocol. The group reviewed the map of existence. The group agreed to remove the setup phase from the table.

2. SE termination, max/min current & sinking of current (see X3T10/96-222r1); suggest min current 20 milliamps at 0.2 v DC and a max of 25.4 milliamps at 0.2 v DC; don't require driver to sink this to avoid re-qualify; add a min at 0.5 v DC; how to deal with non-linear terminators; do we need a duty-cycle spec? suggest 20 asserted signals for wide, 12 on narrow, 37 on 32-bit. Add exception for a contained bus (e.g., laptop) of less than 0.3 meters. Add a 12.5 pf max capacitance for terminator.

   Dean Wallace and Paul Aloisi agreed to work on a duty cycle proposal, to be incorporated in Dean's other termination proposal.

3. Leakage spec increased for LVD multi-mode drivers to 20 micro-amps - Resolve by specifing one for each driver type.

   The group agreed that leakage current needs to be specified for LVD multi-mode drivers.

4. Latching & counting - require that they be an atomic action for hot plugging - possibly an annex or implementation note.

   The group discussed the proposal and agreed to review the wording, when someone brings it in.

5. Ground - power, logic & ground drivers (25-pin power & ground connected (SFF-8040)), signal ground and ground ground for tables defining SE signals.

   The group discussed how various ground lines are named in the standard and how that can be tied together.

   At this point, the group deferred action on the remaining items (shown below), so that work could proceed on the SES review.

6.   SE Receiver - hysterisis (.3), input levels (adopt F20), pin leakage (same), glitch filtering (enable of first detection of a transition for 'x' duration). Need an algorithm to determine 'x'.
7.   SE Drivers - slew rate (use F20 specs);
8.   16 or 32 devices? 32-bit data path? Is it a single segment draft? Should expanders be included? Suggest that SPI-2 is 16 loads per segment max; allow 32-bit data path and 32 SCSI IDs addressability when using VHDCI connectors with primary and secondary cables
9.   Case 4 hot plugging - requires SCA-2 connectors to allow pre-charge, a resistive contact may also work, needs research to determine max disturbance.
10. Cable specifications - impedance (loaded & unloaded), skew, wire gauge, attenuation
11. Add Q-cable pinouts
12. Micro SCSI pinouts
13. Reserved lines

4.9   Error in the thresholds specified in Fig. 24 (reflector message) [Moore]

Richard Moore discussed concerns in table 19 with Bill Ham. Wally Bridgewater, Larry Barnes, and several others joined the discussion, all trying to show how table 19 and figure 24 contents may or may not need revision. Richard agreed to reconsider his concerns, and possibly post a counter-example on the SCSI reflector. Throughout the discussion, Bill Ham remained unconvinced that any substantial changes are needed.

Gene noted that there is an assumption that the signal will continue into the transition region, as it really started in the transition region.

4.10   LVD Testing Results [Ham]

Bill Ham presented his first test results with "real, full protocol" LVD parts. Bill noted that this was his first chance to examine the operation of fully asymmetrical drivers. As expected, the asymmetrical drivers produced symmetrical signals when used with biased terminators.

Bill noted that the capacitance of the test board exceeded the SPI-2 (LVD) requirements. Because of the capacitance problem, Bill showed how the signal quality is degraded and, in some cases, fails to meet the necessary signaling properties. Bill went on to show how even the capacitance problem data from a flawed configuration demonstrates the correctness of the specified capacitance requirements. Bill also demonstrated how the data suggests ultimate successful operation of LVD SCSI in our specified configurations (when the capacitance problem is factored out).

Bill's summary points were: 1) Asymmetric signaling compensates for the terminator bias, 2) misconfigured termination resulting from excessive capacitance dominates performance, and 3) the configuration rules in the draft standard are confirmed by this testing.

5.   SPI Amendment #1 review [Lamers]

The group agreed to hold a walk-through review of the SPI Amendment during the general working group meeting.

6.   SES document review (96-249r0) [Snively]

Bob Snively led a review of the letter ballot comments and on the proposed resolutions. The first topic to generate significant discussion was whether to require the use of FC-PH world-wide unique identifiers in several key diagnostic page formats. It was agreed to continue requiring the use of FC-PH identifiers.

7.   Meeting Schedule

The next meeting of SPI-2 Working Group is scheduled for Thursday December 5, 1996 in Bloomington , MN with X3T11 hosted by IBM. A subsequent meeting is planned for Monday January 6, 1997 in Dallas, TX.

8.   Adjournment

The meeting was adjourned at 5:17 p.m. on Monday November 4, 1996.