Accredited Standards Committee*
National Committee for Information Technology Standards (NCITS)

To: Membership of T10

From: Ralph Weber, Secretary T10
            Larry Lamers, Vice-chair T10
            John Lohmeyer, Chair T10

Subject: Minutes of Fast-xx Study Group and SPI-2 Working Group
            July 14, 1997 -- Colorado Springs, CO

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Agenda

1. Opening Remarks

2. Approval of Agenda

3. Attendance and Membership

4. Fast-xx Study Group {Monday Morning}
    4.1 Cable Company's Presentations for Low-Attenuation Cables (97-213) [Rogers]
    4.2 Cable Attenuation & Margin Budget Analysis at 80 MHz (97-207) [Gintz]
    4.3 Bias Reduction Proposal (97-214) [Bridgewater]
    4.4 Dual Clocking Proposal (97-208) [Bastiani]

5. SPI-2 Working Group {Monday Afternoon}
    5.1 SPI-2 Revision 12 Review [Penokie]
    5.2 Single-ended termination (96-245r2 and 97-174r0) [Wallace, Aloisi]
    5.3 Capacitance Measurement at 2 Volts [Wallace/Ham]
    5.4 Universal Backplane Annex (97-121r0) [Wallace]
    5.5 Bus Set Delay Reduction (97-116) [Ham]
    5.6 REQ/ACK Glitch Filters [Ham]
    5.7 Latching and Counting (97-182) [Novak/Ham]
    5.8 Double ACK [Williams]

6. Meeting Schedule

7. Adjournment

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Results of Meeting

1. Opening Remarks

John Lohmeyer, the T10 Chair, called the meeting to order at 9:00 a.m., Monday July 14, 1997. He thanked Symbios Logic 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 and changes:

Items:
>   4.2 First Pulse Compensation - Inter-Symbol Interference (ISI) [Lamers]
>   4.3 Modeling Assumptions [Schneider]
>   4.4 Figure 25 Timing for Ultra-3 [Bastiani]
>   5.4 SPI-2 Integration Issues [Lamers]

were replaced with:

>   4.2 Cable Attenuation & Margin Budget Analysis at 80 MHz [Gintz]
>   4.3 Bias Reduction Proposal [Bridgewater]
>   4.4 Dual Clock Proposal [Bastiani]
>   5.1 SPI-2 Revision 12 Review [Penokie]

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:

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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. Vincent Bastiani    A# Adaptec, Inc.            bastiani@corp.adaptec.com
Mr. Lawrence J. Lamers  A  Adaptec, Inc.            ljlamers@ix.netcom.com
Mr. Tak Asami           V  Adaptec, Inc.            asami@itc.adaptec.com
Mr. Bill Gintz          V  Adaptec, Inc.            bgintz@corp.adaptec.com
Mr. Wally Bridgewater   V  Adaptec, Inc.            wally@eng.adaptec.com
Mr. Tom Schneider       V  Adaptec, Inc.            schneid@itc.adaptec.com
Mr. Michael Wingard     P  Amphenol Interconnect    mikwingard@aol.com
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Mr. Greg McSorley       P  Data General / Clariion  greg_mcsorley@dgc.ceo.dg.
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Dr. William Ham         A# Digital Equipment Corp.  ham@subsys.enet.dec.com
Mr. Roger Cummings      P  Distributed Processing   cummings_roger@dpt.com
                           Tech.
Mr. Don Vohar           A  Fujitsu (FCPA)           dvohar@fcpa.fujitsu.com
Mr. Zane Daggett        P  Hitachi Cable            zdaggett@hcm.hitachi.com
                           Manchester,Inc
Mr. Kirk Rogers         A  Hitachi Cable            krogers@hcm.hitachi.com
                           Manchester,Inc
Mr. George Penokie      P  IBM Corp.                gop@us.ibm.com
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Mr. Dan Colegrove      A# IBM Corp.                colegrov@us.ibm.com
Mr. Barry H. Wiley     V  IMP, Inc.                bhwiley@impinc.com
Mr. Dean Wallace       P  Linfinity Micro          75671.3443@compuserve.com
Mr. Louis Grantham     A  Linfinity Micro          lgdatcom@ix.netcom.com
Mr. Alan Littlewood    P  LSI Logic Corp.          alanl@lsil.com
Mr. Pete McLean        P  Maxtor Corp.             pete_mclean@maxtor.com
Mr. Edward A. Gardner  P  Ophidian Designs         eag@ophidian.com
Mr. Skip Jones         P  QLogic Corp.             sk_jones@qlc.com
Mr. James McGrath      P  Quantum Corp.            JMCGRATH@QNTM.COM
Mr. Richard Uber       V  Quantum Corp.            duber@tdh.qntm.com
Mr. Pat McGarrah       V  Quantum Corp.            pmcgarra@tdh.qntm.com
Mr. Gene Milligan      P  Seagate Technology       Gene_Milligan@notes.
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Mr. Daniel (Dan) F.    A# Seagate Technology       daniel_f_smith@notes.
Smith                                              seagate.com
Mr. Gerald Houlder     A  Seagate Technology       Gerry_Houlder@notes.
                                                   seagate.com
Mr. Dave Guss          P  Silicon Systems, Inc.    dave.guss@tus.ssil.com
Mr. John Lohmeyer      P  Symbios Logic Inc.       john.lohmeyer@symbios.com
Mr. Ralph O. Weber     A  Symbios Logic Inc.       roweber@acm.org
Mr. Frank Gasparik     V  Symbios Logic Inc.       frank.gasparik@symbios.com
Mr. Tracy Spitler      V  Symbios Logic Inc.       tracy.spitler@symbios.com
Mr. Andy Brown         V  Symbios Logic Inc.       andrew.brown@symbios.com
Mr. Bill Schmitz       V  Symbios Logic Inc.       bill.schmitz@symbios.com
Mr. Graeme             V  Symbios Logic Inc.       gwl@symbios.com
Weston-Lewis
Mr. Kevin Gingerich    O  Texas Instruments, Inc.  k-gingerich@ti.com
Mr. Paul D. Aloisi     P  Unitrode Corporation     aloisi@unitrode.com
Mr. Gregory Kapraun    V  Western Digital Corp.    kapraun@wdroc.wdc.com

43 People Present

Status Key:  P   -  Principal
             A,A# - Alternate
             O   -  Observer
             L   -  Liaison
             V   -  Visitor
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4. Fast-xx Study Group {Monday Morning}

4.1 Cable Company's Presentations for Low-Attenuation Cables (97-213) [Rogers]

Kirk Rogers (Hitachi Cable) presented 97-213 showing test results for several types of cables as a function of transmission frequency. The group discussed choices and options for cable configurations for high-bandwidth SCSI signal transmission. Kirk noted that he has no conclusions based on the data presented. He said that, in the absence of in guidance from T10, he will continue the investigation with the effects of insulation on transmission performance.

4.2 Cable Attenuation & Margin Budget Analysis at 80 MHz (97-207) [Gintz]

Bill Gintz presented 97-207, an analysis of amplitude and skew budgets at 80 mega-transfers per second. He offered clocking on the leading and trailing edge of signals (double clocking, or dual clocking) as a viable (perhaps preferred) method for reaching 80 mega-transfers per second. Bill Ham, Bill Gintz, and a few others discussed the electronics design and signaling properties behind the values in the overview table presented. Gene Milligan and John Lohmeyer agreed that double clocking should be considered seriously by the group.

4.3 Bias Reduction Proposal (97-214) [Bridgewater]

Wally Bridgewater presented a proposal that the bias voltage be reduced, 97-214. He cited several other data transmission methods as evidence that the bias voltage should be kept as small as possible. From his literature search, Wally concluded that the desirable ratio is 10 to 1. Wally presented a table of four specific items, whose

sum defines bias voltage. The group discussed the specific values Wally gave for each of the four items and adjusted some of the values. Wally agreed revise his proposal based on the group's discussion.

4.4 Dual Clocking Proposal (97-208) [Bastiani]

Vince Bastiani presented a detailed proposal containing four specific items leading to using dual clocking (a.k.a. double clocking) as the mechanism for reaching a total bandwidth of 80 mega-transfers per second (97-208). Gene Milligan asked that the group begin calling the "first pulse problem" the inter-symbol interference (ISI) problem, thus using the more commonly accepted terminology, and there were no objections. Vince proposed reducing the multi-point cable distance to 6 m and the group discussed the proposed reduction.

The group got bogged down in the nomenclature for dual clocking, but agreed to defer the discussion to later in the agenda, or another agenda (possibly the STA Technical Committee meeting).

Several edits were made to Vince's slides during the presentation (e.g. the ISI change). Vince agreed to provide a revised copy of the presentation for the mailing, with help from Larry Lamers.

5. SPI-2 Working Group {Monday Afternoon}

5.1 SPI-2 Revision 12 Review [Penokie]

John announced that George Penokie had completed the first draft the fully integrated SPI-2 document (SPI-2 revision 12). George led a review of the document, with a particular focus on the 35 editor's notes identifying areas where he found issues during the integration process. George asked all reviewers to inspect carefully for errors in the tables he added to summarize the characteristics of the several transfer-rate variations of parallel SCSI.

Bill Ham asked the group to consider the goal for the contents of SPI-2. He started the postulate that only the highest performance properties (cable capacitance, terminator construction, et. al.) be present in SPI-2. George represented the opposing view that all defined properties be included and properly identified with the particular SCSI variation (or variations) to which they apply. Gene Milligan, Larry Lamers, Dean Wallace, and several others discussed aspects of this goal. At some times during the discussion, the question was stated in terms of whether SPI-2 will supersede all previous parallel SCSI documents. With regard to superseding previous documents, it was noted that the T10 Plenary has taken no action regarding retiring older parallel SCSI documents and that the SPI-2 project was set up as a new standards project, not a revision to SPI. Consequently, none of the existing standards will be automatically withdrawn upon SPI-2's approval.

No specific resolution was reached regarding the goal for SPI-2. George asked the group press on with the review and consider what information should be included in SPI-2 on a case-by-case basis.

George received many comments and suggestions for improvements, noted corrections for the next SPI-2 revision, and agreed to provide the next SPI-2 revision containing all noted corrections prior to the next meeting.

The working group recommended that the plenary approve removal of the cable impedance requirements for Slow parallel SCSI from SPI-2. In addition, Bill Ham strongly recommended that the Fast-10 cable impedance data be removed too.

5.2 Single-ended termination (96-245r2 and 97-174r0) [Wallace, Aloisi]

Dean and Paul agreed to defer this topic to the next meeting.

5.3 Capacitance Measurement at 2 Volts [Wallace/Ham]

Dean agreed to defer this topic to the next meeting.

5.4 Universal Backplane Annex (97-121r0) [Wallace]

Dean agreed to defer this topic to the next meeting.

5.5 Bus Set Delay Reduction (97-116) [Ham]

Bill Ham described the need for reducing Bus Set Delay from 1800 nsec to 1600 nsec. Bill explained how the effect of Bus Set Delay concerns only bus configurations that contain repeaters, i.e., how traditional single-segment busses cannot be affected by the change in Bus Set Delay. The only case that might lead to trouble is when an old device with a Bus Set Delay of 1800 nsec is used in a maximum-length expander application. EPI will make such configurations illegal by requiring that all devices used in a maximum-length expander application have a Bus Set Delay of 1600 nsec or less. However, if an old device is used anyway, it could lead to more than one device assuming it won arbitration (an infrequent failure mode).

Jim McGrath walked the group through the cases of what will happen when multiple devices 'win' arbitration. He strongly suggested that all the cases work out to recoverable errors, where either a functional selection occurs or a selection timeout occurs.   Larry Lamers noted that the requirement in clause 6.1.3 in SCSI-2 (which prohibits proceeding with a selection when three IDs are asserted or parity is incorrect) forms the basis of the assurance that the proposal has no adverse affects on old devices.

The group unanimously recommended that the plenary approve reducing Bus Set Delay from 1800 nsec to 1600 nsec in SPI-2.

5.6 REQ/ACK Glitch Filters [Ham]

Bill Ham agreed to include this topic in the EPI discussion on Tuesday morning.

5.7 Latching and Counting (97-182) [Novak/Ham]

Vit Novak was unable to attend this meeting. Bill Ham agreed to include this topic in EPI discussion on Tuesday morning.

5.8 Double ACK [Williams]

Bill Ham agreed to include this topic in the EPI discussion on Tuesday morning.

6. Meeting Schedule

The next meeting of Fast-xx Study Group and SPI-2 Working Group will be September 8, 1997, in Nashua, NH at the Crowne Plaza Nashua Hotel (603-886-1200), hosted by Unitrode.

7. Adjournment

The meeting was adjourned at 6:50 p.m. on Monday July 14, 1997.