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

Doc. No.: T10/00-205r1

Date: June 2, 2000
Reply to: John Lohmeyer

To: T10 Membership
From: Ralph Weber & John Lohmeyer
Subject: Parallel SCSI Working Group Meeting -- May 16, 2000
             Nashua, NH

Agenda

1. Opening Remarks
2. Approval of Agenda
3. Attendance and Membership
4. SPI-4 Initial Review of Pre-Revision 0 [Penokie]
5. SPI-4 Physical Topics
    5.1   Free Running Clock
            5.1.1 SPI-4 clocking proposal (99-262) [Petty]
    5.2   Training Patterns
            5.2.1 Ultra320 SCSI Calibration Protocol (00-133) [Leshay]
            5.2.2 Proposal for training pattern to be included in SPI-4 (00-132) [Evans]
            5.2.3 Proposed Training for Skew Compensation (00-174) [Bastiani]
            5.2.4 Training pattern DC signal strengths (00-231r0) [Elliott]
            5.2.5 Training Performance (00-236) [Brown]
            5.2.6 Precompensation plus equalization (00-225r1) [Uber]
    5.3   Timings
    5.4   Test Configurations
            5.4.1 Requirements for Measuring Receive Signals in SPI-4 and beyond (00-149) [Ham]
            5.4.2 Receiver Input Voltage Budget for Eye Patterns (00-158) [Bridgewater]
            5.4.3 Specifying signals at receiver using receiver equalization (00-223) [Uber]
            5.4.4 Precompensation and test measurements (00-194) [Manildi]
            5.4.5 Cable Attenuation (00-235r0) [Uber]
    5.5   Other SPI-4 Physical Topics
            5.5.1 Expander Topics (00-199) [Ham]
            5.5.2 The zero offset problem for receiver equalization (00-201) [Bridgewater]
            5.5.3 Should QAS be obsoleted in SPI-4? (00-228) [Elliott]
            5.5.4 SPIP Report (Ham)
    5.6   Protocol
            5.6.1 Remove Data Groups from Fast-160 [Penokie]
            5.6.2 Flow Control & Read Streaming (00-142) [Lamers]
            5.6.3 PPR Message Enhancements (99-283) [Lamers]
    5.7   Receiver Issues
            5.7.1 Receiver Specifications [Ham]
            5.7.2 Calculated Signal Losses (00-227) [Aloisi]
6. Expanders and Domain Validation Topics
    6.1   SCSI out of band communications method (99-213) [Petty]

7. New Business
8. Meeting Schedule
9. Adjournment

Results of Meeting

1. Opening Remarks

John Lohmeyer, the T10 Chair, called the meeting to order at 9:00 a.m., Tuesday May 16, 2000. He thanked Zane Daggett of Hitachi Cable Manchester 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 draft agenda was approved with the following additions and changes:

4.   SPI-4 Initial Review of Pre-Revision 0 [Penokie]
5.2.4   Training pattern DC signal strengths (00-231) [Elliott]
5.2.5   Training Performance (00-236) [Brown]
5.2.6   Precompensation plus equalization (00-225r1) [Uber]
5.4.5   Cable Attenuation (00-235r0) [Uber]

During the course of the meeting, the following agenda items were added/revised:

5.5.4   SPIP Report (Ham)
5.6.3   PPR Message Enhancements (99-283) [Lamers]

3. Attendance and Membership

Attendance at working group meetings does not count toward minimum attendance requirements for T10 member-ship. 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. Lawrence J. Lamers P  Adaptec, Inc.            ljlamers@ieee.org
Mr. Vincent Bastiani   V  Adaptec, Inc.            bastiani@corp.adaptec.com
Mr. Charles Brill      P  AMP / Tyco Electronics   cebrill@ix.netcom.com
Mr. Douglas Wagner     P  Berg Electronics         wagnerdl@bergelect.com
Mr. Bill Galloway      P  BREA Technologies, Inc.  billg@breatech.com
Mr. Suren Shah         V  C&M Corp.                rgannon@cm-corp.com
Mr. Edward Haske       P  CMD Technology           haske@cmd.com
Mr. Robert C. Elliott  P  Compaq Computer Corp.    Rob_Elliott@compuserve.
                                                   com
Dr. William Ham        A  Compaq Computer Corp.    bill.ham@digital.com
Mr. Neil Wanamaker     P  Crossroads Systems, Inc. ntw20@netcom.com
Mr. John Tyndall       A  Crossroads Systems, Inc. jtyndall@crossroads.com
Mr. I. Dal Allan       P  ENDL                     endlcom@acm.org
Mr. Ralph O. Weber     A  ENDL Texas               roweber@acm.org
```

```
Mr. Eugene Lew          P  Fujitsu                 elew@fcpa.fujitsu.com
Mr. Zane Daggett        P  Hitachi Cable Manchester, zdaggett@hcm.hitachi.com
                           Inc
Mr. John Lohmeyer       P  LSI Logic Corp.         lohmeyer@t10.org
Mr. Andrew Brown        V  LSI Logic Corp.         andrew.brown@lsil.com
Mr. Mark Strauss        V  Lucent Technologies     msstrauss@lucent.com
Ms. Jie Fan             P  Madison Cable Corp.     jfan@madisoncable.com
Mr. Jay Neer            P  Molex Inc.              jneer@molex.com
Mr. Edward A. Gardner   P  Ophidian Designs        eag@ophidian.com
Mr. Skip Jones          P  QLogic Corp.            sk_jones@qlc.com
Mr. Richard Moore       A# QLogic Corp.            r_moore@qlc.com
Mr. Richard L.          V  QLogic Corp.            r_romaniec@qlc.com
Romaniec
Mr. Mark Evans          P  Quantum Corp.           mark.evans@quantum.com
Mr. Bruce Leshay        V  Quantum Corp.           bleshay@tdh.qntm.com
Mr. Richard Uber        V  Quantum Corp.           duber@tdh.qntm.com
Mr. Gene Milligan       P  Seagate Technology      Gene_Milligan@notes.
                                                   seagate.com
Mr. Gerald Houlder      A  Seagate Technology      gerry_houlder@notes.
                                                   seagate.com
Mr. Daniel (Dan) F.     O  Seagate Technology      daniel_f_smith@notes.
Smith                                              seagate.com
Mr. A. Bruce Manildi    V  Seagate Technology      bruce_manildi@notes.
                                                   seagate.com
Mr. Mayank R. Patel     V  Seagate Technology      mayank_r_patel@notes.
                                                   seagate.com
Mr. John Masiewicz      V  Seagate Technology      john_masiewicz@notes.
                                                   seagate.com
Mr. Erich Oetting       P  Storage Technology Corp. erich_oetting@stortek.com
Mr. Kenneth Moe         P  Sun Microsystems, Inc.  kenneth.moe@sun.com
Mr. Paul D. Aloisi      P  Texas Instruments       Paul_Aloisi@ti.com
Mr. Donald R. Getty     A# Texas Instruments       donald_getty@ti.com

37 People Present

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

4. SPI-4 Initial Review of Pre-Revision 0 [Penokie]

George Penokie projected a pre-revision 0 SPI-4 document. He explained that he had to make wording changes from the proposals recommended by the working group in developing the document. As an example, he noted that the term 'pacing' had been introduced. Because of that, he asked the group to review revision 0 of SPI-4 carefully.

The group requested many changes in the draft text and George took notes regarding corrections. George said he expects to have revision 0 prepared for the next mailing.

5.   SPI-4 Physical Topics

5.1 Free Running Clock

5.1.1   SPI-4 clocking proposal (99-262) [Petty]

Andy Brown asked that discussion of this topic be deferred to a subsequent meeting.

5.2 Training Patterns

5.2.1   Ultra320 SCSI Calibration Protocol (00-133) [Leshay]

Bruce Leshay asked that this topic be removed from this and future agendas.

5.2.2   Proposal for training pattern to be included in SPI-4 (00-132) [Evans]

Mark Evans asked that this topic be removed from this and future agendas.

5.2.3   Proposed Training for Skew Compensation (00-174) [Bastiani]

Vince Bastiani asked that this topic be removed from this and future agendas.

5.2.4   Training pattern DC signal strengths (00-231r0) [Elliott]

Rob Elliott proposed that precompensation not be used during the DC portion of the training pattern. He said this would assist in training an adjustable active filter (AAF). Gene Milligan questioned why there should be two ways to disable precompensation. Rob moved that 00-231r0 be recommended for inclusion in SPI-4. Mark Evans seconded the motion. The motion passed on a vote of 7:2:9.

5.2.5   Training Performance (00-236) [Brown]

Andy Brown presented theoretical data (00-236r0) showing the adverse impact of not doing QAS (quick arbitrate and select) and of training on each connection. George Penokie presented similar data (00-237r0) but preferred that training be retained on each connection and that QAS also be retained. After the presentations were completed, the question on the floor was making QAS obsolete (see item 5.5.3).

The group also considered changing when training is performed. John Lohmeyer moved that the only time training is performed is immediately following a PPR and that the training results be remembered after that. Bill Galloway seconded the motion. After discussing the motion, John withdrew the motion, stating that he needed to discuss the frequency of training with the LSI engineers.

5.2.6   Precompensation plus equalization (00-225r1) [Uber]

Dick Uber presented new data and eye diagrams showing the relationship between precompensation and receiver AAF (adjustable active filter). He noted that hold time issues dominate the eye diagram openings when the AAF boost is forced to values of 1.6 and 2.0. He concluded by showing that the best eye diagrams are obtained by disabling precompensation and having an AAF with a boost of 2.0.

5.3 Timings

No SPI-4 timing topics were brought before this meeting.

5.4 Test Configurations

5.4.1   Requirements for Measuring Receive Signals in SPI-4 and beyond (00-149) [Ham]

Bill Ham asked that this topic be deferred to a subsequent meeting.

5.4.2   Receiver Input Voltage Budget for Eye Patterns (00-158) [Bridgewater]

Vince Bastiani asked that this item be deferred to a subsequent meeting.

5.4.3   Specifying signals at receiver using receiver equalization (00-223) [Uber]

Dick Uber asked that this topic be deferred to a subsequent meeting.

5.4.4   Precompensation and test measurements (00-194) [Manildi]

John Masiewiez asked that this topic be deferred to a subsequent meeting.

5.4.5   Cable Attenuation (00-235r0) [Uber]

Dick Uber presented laboratory data on cable attenuation as related to SPI-4.

5.5 Other SPI-4 Physical Topics

5.5.1   Expander Topics (00-199) [Ham]

Bill Ham presented the latest revisions in 00-199r1. The group discussed how the content of 00-199r1 would be incorporated in SPI-4. Bill Ham moved that the technical contents of 00-199r2 (r1 as modified) be incorporated as normative additions to SPI-4. Gene Milligan seconded the motion. The group requested changes in the proposal and Bill agreed. The motion passed on a vote of 9:0:2.

5.5.2   The zero offset problem for receiver equalization (00-201) [Bridgewater]

Vince Bastiani asked that this topic be deferred to a subsequent meeting.

5.5.3   Should QAS be obsoleted in SPI-4? (00-228) [Elliott]

Based on the discussion in item 5.2.5, Rob Elliott asked the group to consider making QAS obsolete in SPI-4. He presented several reasons for making QAS obsolete (00-228). Rob Elliott moved that 00-228 be recommended for inclusion in SPI-4. Bill Galloway seconded the motion. The motion failed on a vote of 1:6:12.

5.5.4   SPIP Report (Ham)

Bill Ham reported on the activities SPIP (SCSI Passive Interconnect Performance) study group (minutes in 00-217). He emphasized the goals of the Technical Report that the group plans to propose as a new T10 project (see section 11 of the minutes in 00-217r0).

5.6 Protocol

5.6.1   Remove Data Groups from Fast-160 [Penokie]

George Penokie moved that the group recommend that data group transfers be prohibited from use with paced data transfers. Bill Galloway seconded motion. The motion passed on a vote of 7:3:9.

5.6.2   Flow Control & Read Streaming (00-142) [Lamers]

Larry Lamers reviewed changes in 00-142r3. The group requested some changes in the names of things in the proposal and Larry agreed. Larry Lamers moved that 00-142r4 (r3 as amended) be recommended for inclusion in SPI-4. Gene Milligan seconded the motion. Further wording changes were requested and agreed by Larry. The motion passed on a vote 9:1:6.

5.6.3   PPR Message Enhancements (99-283) [Lamers]

Larry Lamers presented a proposal to make several transfer period code values obsolete in SPI-4. Concerns were raised about the need for making the change and the response was that it simplifies aspects of SPI-4. A straw poll recommended no specific action on a vote of 4:4:8. Larry asked that this topic be removed from future agendas.

5.7 Receiver Issues

5.7.1   Receiver Specifications [Ham]

Bill Ham asked the group to consider how SPI-4 should specify receiver bandwidth and reviewed the basic issues of the problem. Bill asked that discussion of this topic be deferred to the next meeting, noting that this is a critical issue that needs closure.

5.7.2   Calculated Signal Losses (00-227) [Aloisi]

Paul Aloisi presented a calculated signal loss spreadsheet (00-227r1). Paul recommended changes in the percentage differences between the strong and weak drive requirements. Paul moved to recommend that the weak driver level range be changed to 60% - 75% (as opposed to the current 60% - 85%). George Penokie seconded the motion. John Masiewiez offered a friendly amendment to change to 60% - 78%, which Paul and George accepted. The amended motion passed on a vote of 8:1:3.

Paul also had concerns about the receiver mask. John Masiewiez expressed concerns that more study is required before making changes in this area. Better cables were offered as an alternative to changing the receiver mask, however, others felt that the cable has little to offer as a solution for the problems identified by Paul. George Penokie opened the SPI-4 revision 0 document and the group worked through where Paul thought TBD should be entered in place of values to avoid publishing values that are open to potential change. Gene Milligan was opposed to these changes noting that all values in a standard are subject to change. Paul Aloisi moved that until we have numbers add up to the worst case tolerancing the working group recommend T10 use TBD in SPI-4 revision 0 in the receiver threshold, driver asymmetry, and minimum drive level. George Penokie seconded the motion. The motion passed on a vote of 8:2:0.

6.   Expanders and Domain Validation Topics

6.1 SCSI out of band communications method (99-213) [Petty]

John Lohmeyer asked that this topic be deferred to a subsequent meeting.

7.   New Business

No new business was brought before this meeting.

8.   Meeting Schedule

The next meeting of the Parallel SCSI Working Group will be Tuesday July 11, 2000 commencing at 9:00 a.m. in Colorado Springs, CO. **NOTE: The group elected to NOT meet in Lisle, IL June 15-16**.

9.   Adjournment

The meeting was adjourned at 7:25 p.m. on Tuesday, May 16, 2000.