Accredited Standards Committee
X3, Information Technology

To: Membership of X3T10

From: Ralph Weber, Secretary X3T10
               John Lohmeyer, Chair X3T10

Subject: Minutes of X3T10 SCSI SPI Futures Ad Hoc Meeting
               Newport Beach, CA -- March 6, 1995

Agenda

1. Opening Remarks

2. Attendance and Membership

3. Next-Generation SPI

4. Adjournment

Results of Meeting

1.   Opening Remarks

John Lohmeyer, the X3T10 Chair, called the SPI the meeting to order at 9:10 am. He thanked Skip Jones of QLogic for arranging and hosting the meeting. The meeting was held at the Hyatt Newporter, Newport Beach, CA.

As is customary, all those present introduced themselves. John noted that the meeting is an ad hoc meeting of the X3T10 committee. John reminded everyone of the X3T10 rules and noted that votes taken at this meeting (if any) have no binding effect on X3T10.

2.   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. Ron Roberts         A    Apple Computer          rkroberts@aol.com
Mr. Dennis R. Haynes    P    Burr-Brown Corp.        haynes_dennis@bbrown.com
Dr. William Ham         A#   Digital Equipment Corp. ham@subsys.enet.dec.com
Mr. Ralph O. Weber      A#   ENDL Associate          roweber@acm.com
Mr. Zane Daggett        O    Hitachi Cable           74354.2576@compuserve.com
                             Manchester,Inc
Mr. Dean Wallace        P    Linfinity Micro
Mr. Peter Gossler       O    NSM Jukebox GmbH        73503.3467@compuserve.com
Mr. Skip Jones          P    QLogic Corp.            sk_jones@qlc.com
Mr. Doug Prins          A#   QLogic Corp.            d_prins@qlc.com
```

Mr. Ting Li Chan	A	QLogic Corp.	
Mr. James McGrath	P	Quantum Corp.	JMCGRATH@QNTM.COM
Mr. Gene Milligan	P	Seagate Technology	Gene_Milligan@notes.seagate.com
Mr. Stephen G. Finch	P	Silicon Systems, Inc.	5723283@mcimail.com
Mr. Erich Oetting	P	Storage Technology Corp.	Erich_Oetting@Stortek.com
Mr. John Lohmeyer	P	Symbios Logic Inc.	john.lohmeyer@hmpd.com
Mr. Paul D. Aloisi	P	Unitrode Integrated Circuits	Aloisi@uicc.com
Mr. Tak Asami	A	Western Digital Corporation	asami@dt.wdc.com

17 People Present

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

3.   Next-Generation SPI

Paul Aloisi reminded the group of the list of potential SPI futures topics:

1. Incremental and/or replacement standards documents
2. Connectors (32-bit, ..., high-density)
3. Higher speeds
4. Lower voltage
5. Lower power
   a. termination
   b. silicon power for differential
6. Hot swap (tm?) ... further definition
7. System considerations
8. Ease of use
9. Cable specifications
10. Backplane specifications
11. Alternate topologies (bridges, routers)
12. Enhanced error detection/correction
13. Adaptive performance
14. Fair access
15. TERMPWR distribution
16. Shield effectiveness
17. Longer cable lengths
18. High density external connector

John noted that a significant question is whether the next SPI document will be a replacement for or addition to the existing SPI document.

John noted that Jim McGrath is advocating bridges and routers, particularly for transaction processing systems. Steve Finch raised concerns about low power differential (which caused the minutes to divide item 5 into a and b). The problem with low-power differential is backwards compatibility. Several electrical issues including termination, cable impedance, and common mode voltages prevent backwards compatibility in low-power differential.

Bill Ham asked for volunteers to work on low-power differential. He did not get a rousing show of support. John did note that a repeater design might be the interoperability solution for low-power differential. Ralph postulated that backwards compatibility is not really an issue. The gains might be sufficient to get people to make a non-compatible change in hardware.

During a discussion of cable length, it was noted that arbitration rules need to change to permit cable lengths much in excess of 25 meters. The signal settling times must be increased to allow arbitration signals to transit the longer cables.

The meeting next turned to issues of impedance and wire gauge. Higher impedance is needed to improve signal quality. Thinner wires (larger wire gauges) make the cables easier for people to handle and increase impedance.

Bill noted that the limits are lack of silicon and a defined termination scheme. The other key issue is accepting the choice for no backwards compatibility.

Paul Aloisi presented a proposed differential termination circuit that John, Bill, and Paul discussed in detail. The circuit reduced the d.c. power consumed by differential drivers without increasing the a.c. impedance.

Bill turned the discussion to 32-bit wide operation. The main problems seemed to be the cable and connector(s) required. John noted that some of the 32-bit proponents were planning on backplane implementations, which would not have cable problems. It was noted that 32-bit cables cannot accept 32 devices, due to loading problems.

Bill suggested adding "Reserved line definition" as a SPI futures topic (19). Bill suggested that at least some reserved lines would be needed for additional terminator power.

Eventually, Bill volunteered to lead a discussion to summarize the ideas expressed. With Bill's help, the group generated the following list of goals for SPI-of-the-future:

```
   - + performance parity with differential
       ++ length, device count, speed
     + cost parity with single ended
     = Single chip differential
   - Higher peak bandwidth
   - New devices capable of operating either
     low-power differential, or single-ended
     (a.k.a. backwards compatibility with old single-ended)
   - Backwards compatibility with old differential
     + cables, connectors, old devices the same (terminators different)
     + message protocol compatibility
     + arbitration protocol compatibility
```

Based on the above goals list, the group developed this following list of task items as the core focus for SPI-2:

 - Low power chips
 - Alternate differential termination
 - 32-bit (just how compatible is it?)
 - Fast 40

 Notes:
   - Bridges and repeaters are still valid
   - Smaller cables/connectors are ok
   - Status bus should still be compatible (if used)

Jim McGrath noted the need for a bus extender focus. Bill and Jim agreed that the bus extender focus could be undertaken as a separate study project. Jim felt that this is appropriate, because work on standards enhancements for bus extenders is a short-term work project.

Jim gave a presentation describing the needs for bus extenders. He also showed the basic mechanisms that are needed for bus extenders. Jim and Bill discussed the details of the electrical needs for bus extenders. In effect, Jim's bus extender needs can be met by publishing a spreadsheet developed by John for setting bus lengths based on various timing parameters.

Bill, Jim, and John agreed that the best format to publish the needed information is a technical report. A project proposal must be created for the bus extender information technical report. Jim will create a project proposal for forwarding later this week. John will provide Jim with a boiler-plate file for generating the project proposal. (Note: These two actions did not happen, so the project proposal will be generated later.)

In the process of discussing Jim's other desire for more than bus-width number of devices per bus, the group added mechanisms for this to the core features list.

The group discussed the entire list of projects. Marking those that cannot have a proposal ready by July and assigning persons to prepare proposals for the others.

The marked-up list thus produced was:

```
          1. Incremental and/or replacement standards documents
     x    2. Connectors (32-bit, ..., high-density) [McGrath]
 a   +    3. Higher speeds [*bundled with 5b]
 b   +    4. Lower voltage [Aloisi]
          5. Lower power
 b   +        a. termination [Aloisi]
 a   +        b. silicon power for differential
                                  [Aloisi/Gingerick/Jones/Symbios/Ham]
 e   +    6. Hot swap (tm?) ... further definition [Aloisi/McGrath/Ham]
     x    7. System considerations
     x    8. Ease of use
 b        9. Cable specifications [*bundled with 15*]
     x   10. Backplane specifications
 c   +   11. Alternate topologies (bridges, routers) [Ham/McGrath/Lohmeyer]
     x   12. Enhanced error detection/correction
     ?   13. Adaptive performance [Lohmeyer]
     ?   14. Fair access [Penman]
 b   +   15. TERMPWR distribution [Ham]
 d   +   16. Shield effectiveness [Ham]
 c   +   17. Longer cable lengths {TechReport} [McGrath/Lohmeyer/Ham]
 d   +   18. High density external connector [SFF]
     ?   19. Reserved line definition [SFF]
 a   +   20. >16 devices addressable on the same logical bus [McGrath]
 a   +   21. Alternate differential termination [Aloisi]
```

```
Keys:

 a High-Performance Server SPI
 b Portable SPI
 c Extended Topologies SPI
 d External Connections SPI
 e Hot Plugging
    + paper expected by July
```

```
? paper may be ready by July
x no paper ready by July
```

4.   **Adjournment**

The meeting was adjourned at 5:30 p.m. on Monday March 6, 1995.