

Accredited Standards Committee\*

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

Doc. No.: T10/00-102r0
------------------------

Date: December 3, 1999

Reply to: John Lohmeyer

To: T10 Membership  
From: John Lohmeyer  
Subject: SCSI Physical Working Group Meeting -- December 2-3, 1999  
Rochester, MN

## Agenda

1. Opening Remarks
2. Approval of Agenda
3. Attendance and Membership
4. SPI-3 Topics
  - 4.1 SPI-3 Letter Ballot Comments Review [Penokie]
5. SPI-4 Topics
  - 5.1 Load Compensation [Novak]
  - 5.2 SCSI out of band communications method (99-213) [Petty]
  - 5.3 Extended Addressing for SPI-4 (99-249, 99-250) [Monia]
  - 5.4 SPI-4 ISI reduction via transmit pre-compensation (99-260, 99-332) [Petty]
  - 5.5 SPI-4 timing budget utilizing receiver signal deskew method (99-261) [Petty]
  - 5.6 SPI-4 clocking proposal (99-262) [Petty]
  - 5.7 Margin Control (99-264) [Lamers]
  - 5.8 Flow Control & Continue I/O Process Flag (99-142) [Lamers]
  - 5.9 Proposal for Fast-160 to be included in SPI-4 (99-295) [Milligan]
  - 5.10 Proposal for turn-on/turn-off of a free-running clock (99-298) [Evans]
  - 5.11 Physical Configuration Testing and Methodology
  - 5.12 Fast-160 Phase Encoded Data Enabling (99-323) [Moore]
  - 5.13 ISI Measurements for Ultra4 Discussion (99-326) [Smith]
  - 5.14 ISI Measurements (99-337) [Bridgewater/Bastiani]
  - 5.15 Measurements of Compensation Schemes (99-335) [Bishop]
  - 5.16 Expander Guidelines (99-282) [Lamers]
  - 5.17 Echo Buffer Considerations (99-306r0) [Lamers]
  - 5.18 Compensation Techniques (00-104) [Bishop] {Thursday a.m.}
  - 5.19 Implementing Transmit Precompensation (00-103) [Uber] {Thursday a.m.}
  - 5.20 Ultra 320 Calibration Strategy (00-105) [Brown] {Thursday a.m.}
  - 5.21 Ultra 320 Summary and Conclusions (00-106) [McGarrah] {Thursday a.m.}
  - 5.22 Use of eye measurements [Bastiani]
  - 5.23 SPI-4 Cable Requirements Report [Ham]

\*Operating under the procedures of The American National Standards Institute.

**NCITS Secretariat, Information Technology Industry Council (ITI)**

1250 Eye Street NW, Suite 200, Washington, DC 20005-3922

Email: [ncits@itic.org](mailto:ncits@itic.org) Telephone: 202-737-8888 FAX: 202-638-4922

6. Domain Validation Technical Report Topics
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 9:07 a.m., Thursday December 2, 1999. He thanked Jeff Williams, Praveen Viraraghavan, and Jonathan Fasig of Western Digital 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:

- 5.22 Use of eye measurements [Bastiani]
- 5.23 SPI-4 Cable Requirements Report [Ham]

The following agenda items were added or revised during the course of the meeting:

none.

### 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:

Name	S	Organization	Electronic Mail Address
Mr. Vincent Bastiani	A#	Adaptec, Inc.	bastiani@corp.adaptec.com
Mr. Tariq Abou-Jeyab	O	Adaptec, Inc.	tajeyab@corp.adaptec.com
Mr. Bill Galloway	P	BREA Technologies, Inc.	billg@breatech.com
Mr. Robert C. Elliott	P	Compaq Computer Corp.	Robert.Elliott@compaq.com
Dr. William Ham	A	Compaq Computer Corp.	bill.ham@digital.com
Mr. George O. Penokie	P	IBM Corp.	gop@us.ibm.com
Mr. John Lohmeyer	P	LSI Logic Corp.	lohmeier@t10.org
Mr. Alan Littlewood	V	LSI Logic Corp.	alanl@lsil.com
Mr. William Petty	V	LSI Logic Corp.	william.petty@lsil.com
Mr. Sriram Srinivasan	V	LSI Logic Corp.	srirams@lsil.com
Mr. Richard Moore	A#	QLogic Corp.	r_moore@qlc.com
Mr. Patrick McGarrah	A	Quantum Corp.	pat.mcgarrah@quantum.com
Mr. Richard Uber	V	Quantum Corp.	duber@tdh.qntm.com
Dr. Andrew Bishop	V	Quantum Corp.	andrew.bishop@quantum.com

Mr. Russ Brown	V	Quantum Corp.	russ.brown@quantum.com
Mr. Daniel (Dan) F. Smith	O	Seagate Technology	daniel_f_smith@notes.seagate.com
Mr. Mayank R. Patel	V	Seagate Technology	mayank_r_patel@notes.seagate.com
Mr. Paul D. Aloisi	P	Texas Instruments	Paul_Aloisi@ti.com
Mr. Praveen Viraraghavan	A	Western Digital Corp.	Praveen.Viraraghavan@wdc.com
Mr. Jonathan Fasig	V	Western Digital Corporation	Jonathan.L.Fasig@wdc.com
Mr. Robert Groschen	V	Western Digital Corporation	robert.p.groschen@wdc.com

#### 21 People Present

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

## 4. SPI-3 Topics

### 4.1 SPI-3 Letter Ballot Comments Review [Penokie]

George Penokie noted that he had posted rev 11 of SPI-3 and a draft comments resolution document (99-350r0) earlier in the week. He expects to revise both documents further prior to completing the SPI-3 letter ballot comments resolution.

George reviewed many of the comments that had not yet been resolved. These changes will be reflected in rev 12 of SPI-3 and 99-350r1.

One significant change made was that when targets start a speed/width re-negotiation (because they detect a change in the width and/or synchronous data transfer rate). In this case, wide targets will be required to send a WDTR message with a 00h transfer width exponent. Narrow targets will be required to send an SDTR message with a REQ/ACK offset of 00h. This will force the devices to use asynchronous narrow transfers for the current I/O process. It is expected that the initiator will, on the next I/O process, re-negotiate for the width and speed settings it prefers.

## 5. SPI-4 Topics

### 5.1 Load Compensation [Novak]

This topic was deferred to a subsequent meeting.

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

This topic was deferred to a subsequent meeting.

**5.3 Extended Addressing for SPI-4 (99-249, 99-250) [Monia]**

This topic was deferred to a subsequent meeting.

**5.4 SPI-4 ISI reduction via transmit pre-compensation (99-260, 99-332) [Petty]**

This topic was deferred to a subsequent meeting.

**5.5 SPI-4 timing budget utilizing receiver signal deskew method (99-261) [Petty]**

This topic was deferred to a subsequent meeting.

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

This topic was deferred to a subsequent meeting.

**5.7 Margin Control (99-264) [Lamers]**

This topic was deferred to a subsequent meeting.

**5.8 Flow Control & Continue I/O Process Flag (99-142) [Lamers]**

This topic was deferred to a subsequent meeting.

**5.9 Proposal for Fast-160 to be included in SPI-4 (99-295) [Milligan]**

Mayank Patel presented 99-295r2, "Proposal for Fast-160 to be included in SPI-4". Some minor changes were made and Mayank plans to prepare a rev 3 document.

**5.10 Proposal for turn-on/turn-off of a free-running clock (99-298) [Evans]**

This topic was deferred to a subsequent meeting.

**5.11 Physical Configuration Testing and Methodology**

Vince Bastiani requested that this topic be removed in favor of item 5.22.

**5.12 Fast-160 Phase Encoded Data Enabling (99-323) [Moore]**

Richard Moore reviewed his 99-323r1 document, "Fast-160 Phase Encoded Data Enabling". The group pointed out a race condition that could be solved by a minor change that Richard agreed to make in the next revision. Other issues were also noted. Richard agreed to prepare a rev 2 document for the February meeting.

**5.13 ISI Measurements for Ultra4 Discussion (99-326) [Smith]**

Dan Smith requested that this topic be deferred to a subsequent meeting.

**5.14 ISI Measurements (99-337) [Bridgewater/Bastiani]**

This topic was deferred to a subsequent meeting.

**5.15 Measurements of Compensation Schemes (99-335) [Bishop]**

Pat McGarrah requested that this topic be removed in favor of items 5.18 - 5.21.

**5.16 Expander Guidelines (99-282) [Lamers]**

This topic was deferred to a subsequent meeting.

**5.17 Echo Buffer Considerations (99-306r0) [Lamers]**

This topic was deferred to a subsequent meeting.

**5.18 Compensation Techniques (00-104) [Bishop] {Thursday a.m.}**

Andy Bishop presented 00-104, Compensation Techniques. He concluded that transmit pre-compensation schemes do not give sufficient margin to reliably receive signals. He proposed that we focus on receiver equalization schemes to get better margin. The only significant objection voiced about receiver equalization was that it can take significant die area. Andy responded that in a .35 micron process, the die area for the third-order adaptive equalizer is approximately the size of a bond pad (80 microns squared) for each signal. Bill Petty noted that dual-channel initiators will need 40 equalizer circuits.

Bill Ham pointed out that using adaptive equalizers in the receiver carries with it a requirement to provide a separate equivalent function for purposes of measuring signals in a way that is relevant to the receivers. This may be a separate piece of hardware or a processing algorithm in the instrument.

**5.19 Implementing Transmit Precompensation (00-103) [Uber] {Thursday a.m.}**

Richard Uber presented 00-103r0, "Implementing Transmit Precompensation". He noted a typographical error (decimal in wrong place) on the y-axis labels in slide 5 that will be corrected in rev 1.

**5.20 Ultra 320 Calibration Strategy (00-105) [Brown] {Thursday a.m.}**

Russ Brown presented 00-105r1, "Ultra 320 Calibration Strategy". He concluded that the best scheme is to calibrate infrequently (power-up, timer, detected errors) and have the devices remember the settings.

**5.21 Ultra 320 Summary and Conclusions (00-106) [McGarrah] {Thursday a.m.}**

Pat McGarrah presented 00-106r0, "Ultra 320 Summary and Conclusions". His main point was that Quantum believes that transmit pre-compensation will not work for Ultra 320 and that receiver adaptive equalization will be necessary.

**5.22 Use of eye measurements [Bastiani]**

Vince asked that this item be deferred to the January meeting.

**5.23 SPI-4 Cable Requirements Report [Ham]**

Bill Ham reported on the progress of the SCSI Cable Performance working group meeting held on Tuesday (minutes in 00-110r0).

**6. Domain Validation Technical Report Topics**

This topic was deferred to a subsequent meeting.

## **7. New Business**

### **7.1 Ultra 320 Demonstration [Bastiani]**

Vince Bastiani briefly described test boards Adaptec had built to demonstrate LVD signals running at the Fast-160 data rate using a training technique like the one used in HIPPI 6400.

## **8. Meeting Schedule**

The next meeting of the SCSI Physical Working Group will be Monday, January 10, 2000 commencing at 1 p.m. recessing on Monday evening and resuming at 9 a.m. until 6 p.m. on Tuesday, January 11, 2000 at the Marriott Resort (+61-7-5592-9800) in Surfer's Paradise, Queensland, Australia hosted by ENDL Pacific Technologies.

The subsequent meeting of this group is Wednesday, February 9, 2000 commencing at 1 p.m. recessing on Wednesday evening and resuming at 9 a.m. until 6 p.m. on Thursday, February 10, 2000 at the Hilton Waterfront Hotel (714-960-7873) in Huntington Beach, CA hosted by QLogic Corp.

## **9. Adjournment**

The meeting was adjourned at 12:30 p.m. on Friday December 3, 1999.