Accredited Standards Committee*
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Date: February 3, 1999
Reply to: John Lohmeyer

To: T10 Membership
From: Larry Lamers / John Lohmeyer
Subject: SPI-3 Working Group Meeting -- January 26-27, 1999
Monterey, CA

Agenda

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3. Attendance and Membership
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   - 4.2 Cable Testing Requirements (99-116r0) [Fan]
   - 4.3 Staged Contact Resistance (98-240r0) [Herrmann]
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   - 4.20 Clarification of MODIFY DATA POINTER message (99-109r0) [Lohmeyer]
   - 4.21 Packetized CRC Proposal Merger (99-119) [Bruce Leshay]
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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., Tuesday January 26, 1999. He thanked Larry Lamers 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 draft agenda was approved with the following additions and changes:

Packetized CRC Proposal Merger (Bruce Leshay)

No agenda items were added during the course of the meeting.

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. Lawrence J. Lamers	P	Adaptec, Inc.	ljlamers@ieee.org
Mr. Vincent Bastiani	A#	Adaptec, Inc.	bastiani@corp.adaptec.com
Mr. Wally Bridgewater	A#	Adaptec, Inc.	wally@eng.adaptec.com
Mr. Tariq Abou-Jeyab	V	Adaptec, Inc.	tajeyab@corp.adaptec.com
Mr. Mohsin Husain	V	Adaptec, Inc.	mhusain@corp.adaptec.com
Mr. Robert Frey	O	Advansys	bobf@advansys.com
Mr. Charles Brill	A	AMP, Inc.	cebrill@amp.com
Mr. Gregg Neely	O	Andataco	greggn@andataco.com
Mr. Douglas Wagner	P	Berg Electronics	wagnerdl@bergelect.com
Mr. Bill Galloway	O	BREA Technologies, Inc.	billg@breatech.com
Mr. Edward Haske	P	CMD Technology	haske@cmd.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. Greg McSorley	P	Data General / Clariion	GMcSorley@Clariion.com
Mr. Bill Anderson	O	DDK Electronics	bill_anderson@ddkconnectors.com
Mr. Ben-Koon Lin	P	Fujitsu (FCPA)	blin@fcpa.fujitsu.com
Mr. Zane Daggett	P	Hitachi Cable Manchester, Inc	zdaggett@hcm.hitachi.com
Mr. George Penokie	P	IBM Corp.	gop@us.ibm.com
Mr. Dick Stack	V	Intel ESG	Dick.Stack@intel.com
Mr. John Lohmeyer	P	LSI Logic Corp.	lohmeyer@ix.netcom.com
Mr. Frank Gasparik	V	LSI Logic Corp.	frank.gasparik@lsil.com
Mr. Alan Littlewood	V	LSI Logic Corp.	alanl@lsil.com
Mr. David Steele	V	LSI Logic Corp.	david.steele@lsil.com
Mr. Steve Stefek	V	LSI Logic Corp.	steve.stefek@lsil.com
Ms. Jie Fan	P	Madison Cable Corp.	jfan@madisoncable.com
Mr. Charley Riegger	O	Maxtor Corp.	charles_riegger@maxtor.com
Mr. Jay Neer	A	Molex Inc.	jneer@molex.com

Mr. Martin Ogbuokiri	O	Molex Inc.	mogbuokiri@molex.com
Mr. Skip Jones	P	QLogic Corp.	sk_jones@qlc.com
Mr. Richard Moore	V	QLogic Corp.	r_moore@qlc.com
Mr. Mark Evans	P	Quantum Corp.	mark.evans@quantum.com
Mr. Patrick McGarrah	A	Quantum Corp.	pat.mcgarrah@quantum.com
Mr. James McGrath	A#	Quantum Corp.	JMCGRATH@QNTM.COM
Mr. Bruce Leshay	V	Quantum Corp.	bleshay@tdh.qntm.com
Mr. Richard Uber	V	Quantum Corp.	duber@tdh.qntm.com
Mr. Farrokh Mottahedin	V	Quantum Corp.	farrokh.mottahededin@quantum.com
Mr. Duncan Penman	V	Quantum Corp.	duncan.penman@qntm.com
Mr. John A. Fobel	O	Rancho Technology, Inc.	johnf@rancho.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. Smith	O	Seagate Technology	daniel_f_smith@notes.seagate.com
Mr. Mayank R. Patel	V	Seagate Technology	patel@cdg.stsv.seagate.com
Mr. Bill Gintz	V	Seus, Inc.	wcgintz@ix.netcom.com
Mr. Greg Alvey	O	Solution Technology	kd6hnm@aol.com
Mr. Franklin Ng	A	Sun Microsystems Computer Co	franklin.ng@ebay.sun.com
Mr. Vit Novak	A	Sun Microsystems, Inc.	vit.novak@sun.com
Mr. Kenneth J. Hallam	P	UNISYS Corporation	ken.hallam@unisys.com
Mr. Rick DeMars	V	Unitrode Corp.	demars@unitrode.com
Mr. Paul D. Aloisi	P	Unitrode Corporation	aloisi@unitrode.com
Mr. Donald R. Getty	A	Unitrode Corporation	gettd@unitrode.com
Mr. Praveen Viraraghavan	V	Western Digital Corp.	praveen@wdc.com
Mr. Jeffrey L. Williams	P	Western Digital Corporation	Jeffrey.L.Williams@wdc.com

52 People Present

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

4. SPI-3 Topics

4.1 Cable Testing Requirements (98-219r1, 99-111) [Daggett]

The proposal (document 99-111r0) recommends that tables 10 & 11 be combined in SPI-3. This bumps up the requirements by 5 ohms for differential for non-shielded cables. The specification on round external cables is different due to the expected loading on the cables. Bill Ham moved and Larry Lamers seconded that the technical content of this proposal be adopted for cable media and be incorporated into SPI-3. The motion carried 20:0:1.

Zane Daggett presented a revised proposal for cable testing requirements. The cable folks had held an interim meeting to develop the revision.

Bill Ham recommended that flat cables should be eliminated in SPI-3. The table recommends that flat cable not be used over a to-be-determined length. The premise is that the differential signaling needs balanced cabling and flat cables do not provide this. Crosstalk is excessive in flat cables; specifically, the ACK signal couples into the BSY signal, which creates problems when using LVD signals.

The specification is intended to give a more practical cable that is useful in both SE and LVD environments. However, typical cables shipping today do not meet the upper window of 96 ohms; they are in the range of 88-90 ohms.

Martin Ogbuokiri presented a test fixture and procedure for calibration and measurement. This fixture and procedure should ensure uniform cable measurements.

Zane stated that we need to define the attenuation of the cables. The suggestion is to make it 16 dB at 100 feet at 200 MHz amplitude loss for SPI-3. This may eliminate some of the 30 AWG stranded cables existing today. 200Mhz is the fifth harmonic. This is possible for solid cable; stranded cable has a more difficult time and is around 22 dB. Zane indicated that further testing is being conducted to test cables up to 2 GHz.

The controversial item is the skew limit, changing the differential propagation time, taking it from 48 to 25 picoseconds per foot. An attempt is also being made to specify crosstalk. Crosstalk is affected by shielding and wire lay-up; a measurement is needed to determine a value. Zane noted that there is a negative correlation between crosstalk and skew.

The next meeting of the cable measurement ad hoc group is March 2, 1999 in Manchester, NH at the Hitachi facility.

4.2 Cable Testing Requirements (99-116r0) [Fan]

Jie Fan presented a set of cable testing requirements.

Time Domain Reflectometer vs. frequency domain testing - TDR seems most appropriate for the impedance test, impedance is stable at high frequency, but is highly variable at low frequency. The cable test setup has a great impact on frequency domain testing; very short cable lengths are needed for high frequencies.

Frequency domain testing of 25 meters showed testing at wider frequencies has inconsistent results. A shorter cable, 10 feet, improved consistency.

The time window of the test needs to be specified as well as the rise time for the test. It is proposed to test with 0.5 and 3.0 ns rise time.

The TDR method when contrasted with frequency domain showed that the TDR method gives a more stable measurement of impedance. The frequency domain plots all approach the TDR value as frequency rises for a given length of cable.

The test data also showed no difference in testing 6 meters or 10 feet of cable. The cable vendors prefer to test at 10 feet since that is their normal method.

4.3 Staged Contact Resistance (98-240r0) [Herrmann]

Deferred to the March working group.

4.4 Load Compensation (98-238r0) [Novak]

Vit Novak addressed some issues brought up by Bill Ham in a prior meeting regarding his simulations. A revised proposal will be available for the March working group.

4.5 Setup and Hold Time Measurements (99-107r0) [Penman]

Duncan Penman presented test results of the Fast-80 testing from the target side. In general the test results were very positive.

4.6 Fast-80 Host side test results (99-123r0) [Bastiani]

Vince Bastiani presented test results of Fast-80 testing from the host side.

4.7 Packetized SCSI Issue (98-237r0) [Sippy]

At the November '98 meeting Chandru Sippy had thought there was an error in the packetized protocol because he thought that the MODIFY DATA POINTER message could not move the data pointer before the saved data pointer. John Lohmeyer took an action item to write a proposal for a clarification to the MDP wording to make it clearer that no such restriction existed. See agenda item 4.19.

4.8 QA and Glitch Filters (98-239r0) [Leshay]

Bruce reiterated that it is possible to build a glitch filter that is long enough to miss the QA message. Bruce stated that to avoid the glitch filter problem at least 50ns handshakes on messages would be required.

Bruce Leshay offered an alternative proposal that would include CRC protection on CDBs and messages. The intention is to use the high-byte of the 16-bit bus for an error code and to use the upper bits of the 16-bit bus as an alternative/enhancement to snooping for QA. LSI and Compaq supported this new initiative. See also agenda item 4.21.

4.9 Timing Specification on ATN during synchronous transfers (99-112r0/99-120r0) [Galloway/Milligan]

The last working group concluded that ATN should have 10 ns additional setup and hold time compared to data bits. Gene Milligan reviewed the proposed changes to accomplish this.

Bill Galloway proposed creating a new separate time for ATN.

The group agreed with the direction and Bill will work on the wording for the draft.

4.10 DIFFSENS Timing on bus mode changes (99-113r0) [Galloway]

The working group changed the timer value to 400 ms and modified the wording. Bill will prepare a new revision.

4.11 Signal Margining

This topic was covered as part of agenda item 4.14.

4.12 Echo Mode for READ and WRITE BUFFER (98-184r4) [Lamers]

The working group recommended that T10 accept the proposal (98-184r5) for echo mode for incorporation into SPC-2 in the absence of objection. A change was made to the last sentence to clarify that a command to any logical unit of a target may change the data in the echo buffer.

4.13 Unexpected Bus Free Timeout Function (99-102) [Lamers]

Larry Lamers presented a proposal to add an unexpected bus free timer to SPC-2 to aid in recovering from bus hangs that may occur during domain validation. The working group incorporated more specific rules for the timer function and changed the name to Synchronous Transfer Timeout (STT). See 99-102r2 for changes.

4.14 Proposed Domain Validation Annex (98-235r1) [Lohmeyer]

John Lohmeyer presented a paper on domain validation for consideration as an annex. There was a detailed review of the proposal and John plans to prepare rev 2 for consideration at Harrisburg.

4.15 Physical Testing Results

This topic was covered under agenda items 4.5 and 4.6.

4.16 Message Information Unit Definition (99-104) [Penokie]

George Penokie identified a problem with the existing packetized protocol that there is no way to negotiate out of packetized mode on the initial connection. George plans to prepare a proposal to fix the problem.

4.17 Review of SPI-3 Rev 2 [Penokie]

4.17.1 30 mV vs. 60 mV in figures 44 and 45 (99-114/99-122) [Galloway/Gasparik]

Frank Gasparik and Paul Aloisi volunteered to write up the discussion and a proposal to change the SPI-3 requirements. See 99-127r1.

4.17.2 "May not" clarifications in SPI-3 (98-246) [Elliott]

Rob Elliott presented 98-246. The working group agreed with Rob's clarifications and asked George Penokie to search SPI-3 for possible other occurences of "may not".

4.18 Removing SCAM from SPI-3 (98-244) [Elliott]

By unanimous consent, the working group recommended that T10 accept the proposal to make SCAM obsolete in SPI-3.

4.19 Clarification of interaction of SDTR/WDTR message with PPR message (99-108r0) [Lohmeyer]

John Lohmeyer presented his proposal. Rob Elliott recommended that we make the PPR message mandatory in SPI-3, which would simplify some of the wording. John plans to prepare rev 1 for the next meeting.

4.20 Clarification of MODIFY DATA POINTER message (99-109r0) [Lohmeyer]

The working group recommended that T10 accept the proposal for SPI-3.

4.21 Packetized CRC Proposal Merger (99-119) [Bruce Leshay]

Bruce Leshay made a proposal to change the packet protocol CRC operation to not use the packet CRC and to use the DT CRC. It was suggested to make a further modification to use the P1 line to delineate the packet instead of having a length field.

5. Meeting Schedule

The next meeting of the SPI-3 Working Group with T10 will be Tuesday, March 9, 1999 from 9 a.m. to 6 p.m. at the Radisson Penn Harris Hotel (717-763-7117) in Camp Hill, PA (near Harrisburg) hosted by AMP, Inc.

6. Adjournment

The meeting was adjourned at 5:30 p.m. on Wednesday January 27, 1999.