

Accredited Standards Committee*
X3, Information Technology

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Project:

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Reply to: John Lohmeyer

To: Membership of X3T10

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

Subject: Minutes of SPI-2/ESPC Study Group Meeting
Colorado Springs, CO -- July 10, 1995

Agenda

1. Opening Remarks
2. Approval of Agenda
3. Attendance and Membership
4. Low Voltage / Low Power Differential Interface [Ham/Aloisi]
5. TIA/EIA SP-3357 Low Voltage Differential Signaling (LVDS) Specification [Goldie]
6. Should low-speed signals be single-ended? [McGrath]
7. Resolution of SPI-2 Project Proposal letter ballot comments (95-034r2) [Milligan]
8. Resolution of ESPC Project Proposal letter ballot comments (95-034r2) [Allan/Milligan]
9. Terminator Power Distribution [Aloisi/Ham]
10. Determining Differential vs. Singled-ended [Aloisi/Ham]
11. Propagation Delay Length Limit [Ham]
12. Pin-out Definitions [Ham/Lohmeyer]
13. SPI-2 Architecture [Ham]
14. EPI (formerly ESPC) Document Draft (Outline) [Ham]
15. Meeting Schedule
16. Adjournment

Results of Meeting

1. Opening Remarks

John Lohmeyer, the X3T10 Chair, called the meeting to order at 9:05 a.m., Monday July 10, 1995. 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. Copies of the draft agenda and general information on X3T10 were made available to those attending.

2. Approval of Agenda

The following items were added to the agenda.

- 4. Low Voltage / Low Power Differential Interface [Ham]
- 13. SPI-2 Architecture [Ham]
- 14. ESPC Document Draft (Outline) [Ham]

The agenda was approved with the changes noted above.

3. Attendance and Membership

Attendance at study group meetings does not count toward minimum attendance requirements for X3T10 membership. Study 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. Lawrence J. Lamers	A#	Adaptec, Inc.	ljlammers@aol.com
Mr. Wally Bridgewater	V	Adaptec, Inc.	wally@eng.adaptec.com
Mr. Dennis R. Haynes	P	Burr-Brown Corp.	haynes_dennis@bbrown.com
Mr. Louis Grantham	P	Dallas Semiconductor	grantham@dalsemi.com
Dr. William Ham	A#	Digital Equipment Corp.	ham@subsys.enet.dec.com
Mr. Tom Coughlan	V	Digital Equipment Corp.	coughlan@star.enet.dec.com
Mr. Ralph O. Weber	A#	ENDL Associate	roweber@acm.org
Mr. Stephen Holmstead	P	Hewlett Packard Co.	stephen@mail.boi.hp.com
Mr. George Penokie	P	IBM Corp.	gop@rchvmp3.vnet.ibm.com
Mr. Duncan Penman	P	IIX Consulting	penman@netcom.com
Mr. Lance Packer	V	Motorola	lance_packer@email.sps.mot.com
Ms. Shilpa Rad	V	Motorola	shilpa@hcd.sps.mot.com
Mr. John Goldie	V	National Semiconductor	cjfgsc@tevm2.nsc.com
Mr. Todd Nelson	V	National Semiconductor	ctwnsc@tevm2.nsc.com
Mr. Peter Gossler	O	NSM Jukebox GmbH	73503.3467@compuserve.com
Mr. Param Panesar	O	Pioneer Research	
Mr. Skip Jones	P	QLogic Corp.	sk_jones@qlc.com
Mr. James McGrath	P	Quantum Corp.	JMCGRATH@QNTM.COM
Mr. Edward A. Gardner	A	Quantum Corp.	gardner@acm.org
Mr. Richard Uber	V	Quantum Corp.	duber@tdh.qntm.com
Mr. Gerald Houl der	A	Seagate Technology	Gerry_Houl der@notes.seaga

Mr. Greg Alvey	V	Solution Technology	te. com
Mr. John Lohmeyer	P	Symbios Logic Inc.	john.lohmeyer@symbios.com
Mr. Bruce Grieshaber	V	Symbios Logic Inc.	bruce.grieshaber@symbios.com
Mr. Mark Jander	V	Symbios Logic Inc.	mark.jander@symbios.com
Mr. Frank Gasparik	V	Symbios Logic Inc.	frank.gasparik@symbios.com
Mr. Kevin Gingerick	V	Texas Instruments	4307725@mci mail . com
Mr. Paul D. Aloisi	P	Unitorde Integrated Circuits	Aloisi@ui cc. com

28 People Present

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

4. Low Voltage / Low Power Differential Interface [Ham/Aloisi]

Bill Ham presented a two-slide review of the current low-voltage low-power differential interface. He noted the hardware requirements implied by the current plans. Bill's slides can be found document 95-266r0.

Paul Aloisi described methods of making the multi-drop low-voltage low-power differential bus needed for the SPI-2 proposals. Paul's slides can be found in document 95-269r0. There was an extensive, highly technical, and detailed discussion of how to design the electronic circuits, chips, and terminators involved in low-power differential SCSI. Significant participants in the discussion were Kevin Gingerick, John Goldie, Wally Bridgewater, Bill Ham, Larry Lamers, and Paul Aloisi.

Paul Aloisi and Bill Ham took an action item to build a hardware test rig from which some waveform data can be taken. Adaptec and Symbios Logic will be modeling signal data and cable lengths.

5. TIA/EIA SP-3357 Low Voltage Differential Signaling (LVDS) Specification [Goldie]

John Goldie reported that SP-3357 is approved unanimously. One of the yes votes had an attached comment. The comment has been resolved. The document is expected to be published later this summer as TIA/EIA 644. Some present hoped that the TIA/EIA spec could be referenced by the SPI-2 document. However, the differences appeared to be overwhelming that hope. The major difference is that the TIA/EIA document is point-to-point, whereas SCSI is multi-drop. This difference produces several corollary differences that multiply to substantial problems. It was agreed that referencing a standard but attaching so many changes would not be practical.

John Lohmeyer asked about providing feedback to TIA/EIA that describes the SCSI requirements. John Goldie suggested that such communications could be arranged.

6. Should low-speed signals be single-ended? [McGrath]

Issues about the use of low-speed signals were discussed at length. The motivation is to reduce pin counts on protocol chips (one pin is saved for each single-ended signal used). Concerns were raised about backwards compatibility with Fast-20. Countervailing concerns were raised about optimal SPI-2 performance and having a single unified solution for SPI-2. No conclusions were reached as more data is need about LVDS before the tradeoffs are clear.

7. Resolution of SPI-2 Project Proposal letter ballot comments (95-034r2) [Milligan]

The letter ballot passed 55:0:0:4. One yes with comment was received.

Gene provided 5 letter ballot comments. The study group recommended that all comments except number 5 be accepted. Acceptance of comment number 3 makes the proposal in comment number 5 not applicable.

John said that a revised project proposal, reflecting the study group recommendations, would be generated for plenary approval.

8. Resolution of ESPC Project Proposal letter ballot comments (95-034r2) [Allan/Milligan]

The letter ballot passed 55:0:0:4. Yes comments were received from Dal Allan and Gene Milligan.

Dal raised the concern that ESPC looks like Enhanced SPC. After a brief discussion, the group recommended that X3T10 accept Dal's proposed acronym of EPI. Gene asked that the document name (not the acronym) contain SCSI, to simplify document ordering. As a result, the recommended name became SCSI Enhanced Parallel Interface (EPI).

To address Gene's comment number 4, the group recommended that the word "terminator" be added before the word "power" in item (g). The group recommended that Gene's comment number 11 be rejected, but the group also recommends that the question of the applicability of ANSI's patent policy to technical reports be raised with the X3 Secretariat.

In summary, the group recommended that 11 of Gene's 13 comments be accepted as written, 1 comment be revised slightly, and 1 comment be rejected.

John said that a revised project proposal, reflecting the study group recommendations, would be generated for plenary approval.

9. Terminator Power Distribution [Aloisi/Ham]

Bill Ham presented the chart on termination power distribution. The chart originally was presented at the May study group meeting and appears in the meeting minutes (95-209). At the request of the group, Bill reviewed the chart. Bill described his plans to put the entire chart in EPI (formerly ESPC) and parts of the chart in SPI-2.

10. Determining Differential vs. Singled-ended [Aloisi/Ham]

Paul Aloisi, while reviewing document 95-269r0, displayed a revised method for determining differential verses single-ended. The concepts are fundamentally the same as those discussed in May. However, many of the details have changed to accommodate the electronic realities.

11. Propagation Delay Length Limit [Ham]

Bill Ham quickly reviewed his proposal to define cable length based on total propagation delay. Then, he noted that substantial delay is introduced by the differential transceivers. Kevin Gingerick confirmed Bill's observation and stated that the nominal delay is 10 nanoseconds (20 nanoseconds per transaction, because there are two transceivers involved in any transaction). The group discussed whether to change the cable length formula or change the point at which the total delay is measured. Both choices had problems. Bill will study the issue further.

12. Pin-out Definitions [Ham/Lohmeyer]

Bill Ham reviewed the pin-out list. Larry asked about the allocation of pin 15, which he thought should be a ground. Bill agreed. Bill will prepare a formal pin-out chart for SCSI low-power differential.

13. SPI-2 Architecture [Ham]

Bill Ham presented his current thinking about the standards document framework for the proposed SPI-2 document. Bill noted the advantages of key SPI-2 proposals. Bill's slides can be found in 95-267r0.

14. EPI (formerly ESPC) Document Draft (Outline) [Ham]

Bill presented slides of his first draft of the EPI document structure. A couple of boiler-plate draft sections were reviewed and revised. The majority of the draft was an outline of the document contents. Bill's use of an SFF document as a reference was questioned. Such a reference definitely would be incorrect in a standard. But, the usage in a technical report might be acceptable.

Bill reviewed all the proposed sections (outline headings). A few questions were raised and addressed.

Bill proposed convening a study group to examine logical unit bridges and their relationships to RAID models. Unfortunately, the RAID experts were in a High-Availability study group meeting across the hall.

15. Meeting Schedule

Bill requested that a low-voltage differential driver/receiver/terminator issues meeting be duly authorized. John Lohmeyer (Symbios Logic) volunteered to host the interim meeting in Denver. August 14, 1995 was selected as the date. The next meeting of SPI-2/EPI Study Group will be September 11, 1995, in Bedford, NH at the Sheraton Tara Wayfarer Inn (603-622-3766), hosted by Digital Equipment Corp.

16. Adjournment

The meeting was adjourned at 3:49 p.m. on Monday July 10, 1995.