

Accredited Standards Committee\*  
**X3, Information Processing Systems**

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**Date:** May 24, 1994  
**Project:**  
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**Reply to:** J. Lohmeyer

To: Membership of X3T10  
From: Weber/Lohmeyer  
Subject: Minutes of X3T10 SCSI Working Group May 18, 1994

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**Agenda**

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2. Attendance and Membership
3. Approval of Agenda
4. Physical Topics
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  - 4.2 SPI Rev 12c Review [Lamers]
  - 4.3 Proposed changes to SPI (94-038) [Aloisi]
5. Protocol Topics
  - 5.1 SAM Forwarding Comments (Project 994D) [Monia]
  - 5.2 Optional and Mandatory in SAM (94-081) [McGrath]
  - 5.3 SBP Forwarding Comments (Project 992D) [Lamers/Roberts]
  - 5.4 FCP Comments Resolution (Project 993D) [Snively]
  - 5.5 Message Handling Chart for SIP (94-032) [Houlder]
6. Command Set Topics
  - 6.1 SCSI-3 Download Microcode (94-80r1, 94-104r0) [McGrath, Cummings]
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  - 6.3 Data Recovery on Deferred Errors (94-067) [Houlder]
  - 6.4 RAID 5 Support on SCSI Disk Drives (94-111) [Houlder]
  - 6.5 Proposal on the READ POSITION command (93-187R0) [Lappin]
  - 6.6 SPC Topics [Weber]
  - 6.7 Placing the Processor Device Commands in SPC (94-018) [Weber]
7. Miscellaneous Topics
  - 7.1 AIIM C21 Liaison [Podio]
8. Meeting Schedule
9. Adjournment

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## **Results of Meeting**

### **1. Opening Remarks**

John Lohmeyer the Chair, called the meeting to order at 9:10 a.m., Wednesday, May 18, 1994. He thanked Chuck Brill of AMP for hosting the meeting.

As is customary, the people attending introduced themselves. A copy of the attendance list was circulated for attendance and corrections.

It was stated that the meeting had been authorized by X3T10 and would be conducted under the X3 rules. Ad hoc meetings take no final actions, but prepare recommendations for approval by the X3T10 task group. The voting rules for the meeting are those of the parent committee, X3T10. These rules are: one vote per company; and any participating company member may vote.

The minutes of this meeting will be posted to the SCSI BBS and the SCSI Reflector and will be included in the next committee mailing.

### **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 company to attend and to express their opinion on the subjects being discussed.

The following people attended the meeting:

Name	S	Organization	Electronic Mail Address
Mr. Norm Harris	P	Adaptec, Inc.	nharris@adaptec.com
Mr. Lawrence J. Lamers	A#	Adaptec, Inc.	ljlammers@adaptec.com
Mr. Fernando L. Podio	L	AIIM C21 Chair	fernando@pegasus.nist.ncs l.gov
Mr. Neil T. Wanamaker	P	Amdahl Corp.	ntw20@eng.amdahl.com
Mr. Michael Wingard	O	Amphenol Interconnect	
Mr. Ken Scherzinger	V	Amphenol Spectra Strip	
Mr. Jerry Fredin	V	AT&T Global Info. Solutions	Jerry.Fredin@WichitaKS.NC R.COM
Mr. John Lohmeyer	P	AT&T/ NCR Microelectronics	john.lohmeyer@ftcollinsco .ncr.com
Mr. Joe Stoupa	O	Burr-Brown Corp.	
Mr. Bob Gannon	O	C&M Corp.	
Mr. Ian Morrell	A	Circuit Assembly Corp.	
Mr. Joe Chen	P	Cirrus Logic Inc.	chen@cirrus.com
Mr. Peter Johansson	O	Congruent Software, Inc.	
Mr. Michael Bryan	P	Conner Peripherals	Mike_Bryan+aDevelopment+a Colorado%conner@mcimail.c om
Mr. Louis Grantham	P	Dallas Semiconductor	grantham@dalsemi.com
Mr. Charles Monia	P	Digital Equipment Corp.	monia@starch.enet.dec.com
Dr. William Ham	A#	Digital Equipment Corp.	ham@subsys.enet.dec.com
Mr. William Dallas	A#	Digital Equipment Corp.	dallas@wasted.enet.dec.co m
Mr. Ralph Weber	A#	Digital Equipment Corp.	weber@star.enet.dec.com
Mr. Edward A. Gardner	A	Digital Equipment Corp.	gardner@ssag.enet.dec.com
Mr. Kenneth J. Hallam	A	ENDL	khallam@endlas.com
Mr. Edward Lappin	P	Exabyte Corp.	tedl@exabyte.com
Mr. Gary R. Stephens	P	FSI Consulting Services	6363897@mcimail.com
Mr. Robert Liu	P	Fujitsu Computer Products, Am	74503.1610@compuserve.com
Mr. Jeffrey L. Williams	P	Hewlett Packard Co.	jlw@hpdmd48.boi.hp.com
Mr. Paul Boulay	A#	Hitachi Computer Products	p_boulay@hitachi.com
Ms. Nancy Cheng	O	Hitachi Computer Products	n_cheng@hitachi.com
Dr. Sam Karunanithi	P	Hitachi Micro Systems, Inc.	skarunan@hmsi.hitachi.com
Mr. George Penokie	P	IBM Corp.	gop@rchvmp3.vnet.ibm.com
Mr. Ken Cummings	O	IBM Corp.	kcummings@vnet.ibm.com
Mr. Giles Frazier	O	IBM Corp.	gfrazier@ausvm6.vnet.ibm. com
Dr. Gerald Marazas	A#	IBM PC Company	marazas@bcrvmpc2.vnet.ibm .com
Mr. Dean Wallace	P	Linfinit Micro	
Mr. Chuck Grant	A	Madison Cable Corp.	
Mr. Robert J. Gallenberger	O	NCCOSC RDTE DIV 821	gallenbe@nosc.mil
Mr. Clifford Carlson	O	NCCOSC RDTE DIV 821	wcarlson@nosc.mil
Mr. Skip Jones	P	QLogic Corp.	sk_jones@qlc.com
Mr. Gerald Houlder	A	Seagate Technology	Gerry_Houlder@notes.seaga te.com
Mr. David Deming	O	Solution Technology	
Mr. Erich Oetting	P	Storage Technology Corp.	Erich_Oetting@Stortek.com
Mr. Robert N. Snively	P	Sun Microsystems, Inc.	Bob.Snively@sun.com
Mr. Vit Novak	A	Sun Microsystems, Inc.	vit.novak@sun.com
Mr. Paul D. Aloisi	P	Unitrode Integrated Circuits	Aloisi@uicc.com
Mr. Gerald Root	V	Voltex Interconnect Systems	
Mr. Tak Asami	A	Western Digital Corporation	asami@dt.wdc.com

45 People Present

Status Key: P - Principal  
A, A# - Alternate  
O - Observer

L - Liaison  
S,V - Visitor

### 3. Approval of Agenda

The proposed agenda was approved.

### 4. Physical Topics

#### 4.1 Fast-20 Progress Report (94-98, -061r4) [Ham/Lohmeyer]

Bill Ham reported on the results of a meeting in Milpitas. He indicated that the group wanted to get the fast SCSI cable length up to 3 meters. He reported that 16 devices represent too large a load on a 1.5 meter single ended bus. 8 devices will work on a 1.5 meter bus, but the receiver specifications will need some adjustment. Stub length plays only a minor role. Bill suggested that the 3:1 stub length be changed to a 2:1. Also the discussion suggested that the stub length be changed to a recommendation (from a requirement).

Bill showed a series of single-ended waveform slides. Many of the waveforms showed a pronounced shelf at the receiver. Bill was asked about the cause of the shelf. He attributed it to impedance effects of the device loads. Bill discussed the tradeoffs between cable length and receiver thresholds.

The data Bill presented led him to the following proposals regarding the receiver threshold. On the assertion edge, 'may detect' changes to 1.4 volts and 'must detect' changes to 1.1 volts. On the negation edge, 'may detect' changes to 1.6 volts and 'must detect' changes to 1.9 volts. The hysteresis should change to 200 millivolts minimum.

John pointed out that the chip folks were reluctant to change the threshold values at the previous meeting. John also noted that the chip folks did not have the data Bill just finished showing to this meeting. Most of the chip folks were not present to comment on Bill's presentation.

Several other options were discussed. Bill was concerned about the closest possible compatibility with existing hardware. Different slew rates and different pin capacitance for device chips were discussed. Since there are several options for compatible changes, the discussion was lengthy.

Noting that chip changes had not been anticipated for this meeting, John recommended that a decision wait for the June 2nd Fast-20 Study Group meeting. Finally, Bill put in a plug for the very clean fast performance of differential buses.

Bill turned to the name for the project. Bill noted that using megabits per sec as a naming base produces identical names for different configurations. John expressed a concern over an apparently continuous series of name changes. In the end, the group elected to stay with "Fast-20".

Vit Novak presented a proposal for an annex in the Fast-20 proposal (94-103r0). The proposed annex would contain informative data regarding Fast SCSI Node Capacitance. The May 5th Fast-20 Study Group had agreed to specify 25 pF node capacitance provided a note or annex were included recommending that lower capacitance parts be used in maximum configuration systems.

Vit's proposal reopened the capacitance debate because it contained a node capacitance budget that totaled 20 pF. Jim McGrath wanted to stay with 25 pF because his market rarely includes more than a couple devices per bus and there is a cost penalty for lower capacitance devices. Ed Gardner and Larry Lamers proposed 15 pF devices. John suggested deferring the food fight to the June 2nd meeting.

John suggested adding a recommendation that synchronous transfer parameters be negotiated lower if fast parameters produce errors. This produced a discussion of how initiators know what to do and how to get this information to host software developers.

Norm Harris and Paul Aloisi discussed maximum voltage levels in an active negation. Norm proposed reducing the maximum from 3.7 volts to 3.5 or 3.24 volts. John recalled that the 3.7 volt number had been a "top-of-the-head" suggestion from Mark Knecht and probably needed refinement. This topic was also deferred to the June 2nd meeting.

The group discussed specific wording changes in 94-061r4. Larry Lamers plans to issue a rev 5 for the next mailing.

The location of terminators (in the device or not) was discussed at length. A straw vote slightly favored (10 for, 8 opposed) striking the sentence "SCSI devices shall not include termination."

Stub length was discussed as follows. Changing from 1:3 to 1:2 and from a requirement to a suggestion were the issues. The ensuing straw poll produced the following result

- 1) 5 - leave it alone
- 2) 7 - shall to should
- 3) 5 - shall to should & 1:3 to 1:2

After that, the consensus favored changing from shall to should.

#### **4.2 SPI Rev 12c Review [Lamers]**

Larry reported that in SPI 12c he included SCAM (93-109r5) into the document as a normative annex. That caused changes in the lettering of the annexes. Larry also added information accepted at earlier meetings; for example, Gene Milligan's comments on connectors, ISO editor's comments, and "release" instead of "negate."

Larry made some changes to make SPI more consistent with SIP. Also, Larry expressed discomfort with some terminology aspects of the SCAM annex. John noted that Ed Gardner's SCAM clarifications from November (93-173) needs to be included in the SCAM annex.

Bill Ham raised concerns about the differential capacitance data in the informative annex. Larry suggested making a public review comment on the matter.

Larry noted that the revised SPI will need a second public review.

#### **4.3 Proposed changes to SPI (94-038) [Aloisi]**

Paul Aloisi presented two options for handling hot-plugging devices with TermPwr. The options were not supplying TermPwr to hot-pluggable devices or limiting TermPwr bypass capacitors to 10 microfarads for hot-plugging devices. Bob Snively recommended adding the following: "Power cycling includes TermPwr, including terminators." Paul will bring a specific proposal to the Plenary.

Paul also raised a concern about the Voh definitions in SPI. This issue was brought up at the Fast-20 study group meeting, but it really relates to making SCSI compatible with 3.3 volt devices. Paul also raised concerns about SCSI termination in a 3.3 volt environment. Paul expressed concern about SCSI with PCMCIA (where 3.3 volt is about to become the only legal voltage).

## 5. Protocol Topics

### 5.1 SAM Forwarding Comments (Project 994D) [Monia]

In Charles' review SAM comments, the difference between HEAD OF QUEUE and HEAD OF TASK SET was the first discussion topic. HEAD OF QUEUE is the only usage of the word queue. However, HEAD OF QUEUE is a proper name. So, there is no need for defining "queue" as a term.

The definition and usage of the word "response" was discussed next. Many present brought similar usages of "response" and "confirmation" from other communications definitions. Work progressed through the Hewlett Packard comments. Significant discussion was produced by the definition of "task ended." The events following an abort task operation greatly complicated reaching a consensus definition of the end of a task.

After much discussion, Charles agreed to define task management functions as being confirmed but not necessarily with the benefit of a response. In this context, definitions for "confirmed" and "response" must be taken from figure 18 in revision 13 of the SAM.

The requirements for targets supporting the ACA bit in the CDB surfaced for discussion based on Charles' desire for a recorded opinion from the group. Most of the speakers said that ACA=1 must be supported and ACA=0 can optionally be unsupported. George Penokie noted that the ACA bit is overloaded because it is thought to control a compatibility operation and to control automatic clearing the ACA condition. This produced a lengthy discussion of whether a second control bit is needed.

The discussion was inconclusive in several different ways. Charles requested a Plenary vote on whether ACA=1 must be supported by SCSI-3 devices.

George Penokie presented a discussion regarding the ACA bit in the CDB. The presentation began with a quiz about the SCSI-2. The question was "According to the SCSI-2 standard, what action is the target supposed to take if it received a queued command during a contingent allegiance condition?" George proposed at least a half dozen actions, many of which are done and several of which are of debatable validity.

George's point was that having the ACA bit set to zero does not provide a defined basis for specific requirements text in the SAM standard. Referencing the SCSI-2 standard is the only operable definition for the SAM. The Hewlett Packard comment #50 brought this discussion to the floor. After some discussion, Charles agreed to make SAM state that ACA=0 means operate like SCSI-2 (without any attempt to translate or codify SCSI-2 operation in such cases).

Most of the remaining HP comments were resolved without significant discussion. Next, Charles turned to resolving the IBM comments. Most of the IBM comments were resolved with minimal discussion. Then, the group began discussing the usefulness of the state definitions and tables as a definition of the queuing model behavior.

Jim McGrath complained the state-based model cannot easily be translated into requirements on a target implementation. Jim wished that the translation be performed as part of the SAM document, not left as an exercise for the reader. Comments to the effect of, "I cannot understand this," were made frequently (relative to each of the queuing models). Charles said that the queuing model (X3T9.2/92-141r8) cannot be inserted directly in SAM because it defines observable states on the parallel bus. SAM must also work for the serial interfaces.

No consensus was reached when the discussion was closed. Jim McGrath summarized the areas of disagreement as revolving around suspended data, which he always felt was a bad idea. Jeff Williams

summarized the problems as being the complexity and testability of the overall queuing model.

### **5.2 Optional and Mandatory in SAM (94-081) [McGrath]**

The group agreed that there are several different types of requirements expressed in the SAM: mandatory or optional for the protocols, mandatory or options for targets, and the matrix of combinations of these. Jim has proposed some terms that work toward explicitly naming each (or most) of the requirements types. Charles was generally in agreement with the group. However, the previous issue of Fibre Channel host adapters not supporting linked commands (in Charles' mind) still bothered Charles.

The need for a upper-layer protocol service to return supported options information was discussed. After the usual amount of vocal disagreement, Charles agreed to put words suggesting that hosts provided methods for determining what options are supported.

### **5.3 SBP Forwarding Comments (Project 992D) [Lamers/Roberts]**

Responses with comments on the SBP (revision 16) letter ballot have been received from:

- o Giles Frazier, IBM Corporation
- o Charles Monia, DEC
- o Scott Smyers, Apple Computer
- o Jim McGrath, Quantum Computer

Gerald Marazas has discussed these comments with each of the originating parties above, and secured tentative resolution, mutually agreeable, on each comment item. There remain no known open (unresolved) technical issues being raised against SBP. The resolution is listed as tentative pending examination next week by these parties of the specific text changes relative to the SBP, revision 16, document.

The comments cited above will be documented along with proposed disposition in a SBP resolution document. Additionally, revision 17 of SBP will be produced consistent with the proposed disposition. Both the resolution document and the SBP revision 17 document will be made available to the X3T10 secretary in time for the June mailing deadline. Gerald Marazas will request a meeting vote at the July X3T10 meeting for acceptance of both the proposed disposition and the revision 17 of SBP.

### **5.4 FCP Comments Resolution (Project 993D) [Snively]**

Bob Snively presented FCP revision 008a to the group. Bob also distributed 94-109r0, the document listing the comments resolution for all review comments on FCP 008.

### **5.5 Message Handling Chart for SIP (94-032) [Houlder]**

Gerry Holder led a discussion of his message handling chart. Questions were raised about the single-choice nature of the document. Jeff Williams noted that the standard allows for several message/circumstances implementations. The document, as last revised, seemed to be ready for a Plenary vote.

## **6. Command Set Topics**

### **6.1 SCSI-3 Download Microcode (94-80r1, 94-104r0) [McGrath, Cummings]**

Jim McGrath described the two proposals for using WRITE BUFFER to download microcode. Jim noted that Ken Cumming's proposal uses new WRITE BUFFER mode values to uniquely identify the new function. On the negative side, Jim noted that Ken's proposal only supports download microcode and save. Jim would like to add a download (and not save) mode.

The mechanics of downloading microcode were discussed. Jim and Ken wanted to verify the completeness of the proposal, by virtue of holding a large public discussion. Ken took the action item to make a revised 94-104r0. John noted that final action on Ken's proposal will be placed on the July Plenary agenda.

### **6.2 SCSI-3 Inquiry Command (94-079r1) [McGrath]**

Jim proposed defining vital product data (VPD) pages for each standard document, in which details of supported features can be returned. Jeff Williams supported the need for attributes reporting, but said that the proposal is overly complex and detailed.

After a lengthy discussion of the details, Jim listed the options as:

1) design an extension of the INQUIRY data that reports supported options (like but not necessarily the same as 94-079r1), 2) choose to freeze options at their current definitions, 3) hack and whack on the current INQUIRY data. Jim wanted to hold a plenary vote to select from among the choices.

### **6.3 Data Recovery on Deferred Errors (94-067) [Houlder]**

Gerry Houlder presented the customer requirement regarding cached data that compelled him to propose the caching feature described in 94-067r1. Ed Gardner asked if the proposal for a mandatory (or optional) write caching feature. Giles was concerned about non-sequential disk write processing in the target, which prevent returning unwritten information in a simple LBA/size pair. Gerry received lots of advice on implementation details.

When asked for his perception of the resolution of the proposal, Gerry said that he will proceed toward getting the document approved for inclusion in the direct-access device commands document.

### **6.4 RAID 5 Support on SCSI Disk Drives (94-111) [Houlder]**

This item was deferred to the July working group. Gerry suggested scheduling an ad hoc meeting in June.

### **6.5 Proposal on the READ POSITION command (93-187R0) [Lappin]**

Edward Lappin presented a proposal for increasing the amount of position data reported by the READ POSITION command. When activated, Ted's version of the READ POSITION command would report file number and set number in addition to block number. Bill Dallas started a chorus of concern about the four-byte size of the block number field. So, Ted was pressed to increase all parameter data field sizes to eight-bytes. There were several other detailed comments. Ted agreed to revised the proposal and return to the working group.

### **6.6 SPC Topics [Weber]**

Owing to the late hour, Ralph simply waved a couple of foils at the overhead, mumbled something about wanting time on the plenary agenda, and called for adjournment.

## **6.7 Placing the Processor Device Commands in SPC (94-018) [Weber]**

Ralph noted that this is a proposal made at the January plenary meeting and that a plenary vote would be appropriate this month. There was some discussion about how much of the processor device model belongs in SPC. However, not enough people were participating to make the discussion worthwhile.

## **7. Miscellaneous Topics**

### **7.1 AIIM C21 Liaison [Podio]**

Fernando Podio presented ANSI/AIIM MS59-199x, a Media Error Monitoring and Reporting Technique for Verification of Information Stored on Optical Digital Data Disk. Fernando noted that the AIIM committee has made some changes based on comments from the March X3T10 meeting. Particularly, Fernando described the use of log pages for delivery of media condition data. The working group pointed Fernando toward using existing mode pages for bad sector recovery and toward defining log pages for early warning functions.

Fernando was advised to prepare a changes proposal for mode and log pages that will be applied to the SBC. Fernando sought advice about the specific details of defining for defining log page parameters.

## **8. Meeting Schedule**

The next working group meetings will be July 18-22 1994 at the Sheraton Tara Wayfarer Inn (603-622-3766) in Bedford, NH hosted by Digital. The room rates are \$93.00 plus tax. The reservation deadline for these rates is June 29, 1994. The group name is ANSI or X3T10. The host contact is Ralph Weber at TEL: 603-881-1497, FAX: 603-881-0189, (Weber@star.enet.dec.com).

## **9. Adjournment**

The meeting was adjourned at 8:45 p.m. on Wednesday May 18, 1994.