Date: September 18, 1991

To: X3T9.2 Membership

From: Lawrence J. Lamers, X3T9.2 Secretary
John B. Lohmeyer, X3T9.2 Chair

Subject: September 17-18, 1991 X3T9.2 Working Group Meeting

John Lohmeyer called the meeting to order at 9:00 a.m. September 17, 1991. He thanked Jim Hughes of Network Systems for hosting the meeting.

As is customary, the people attending introduced themselves. A copy of the X3T9.2 membership list was circulated for attendance and corrections. Copies of the draft agenda and the recent document register were made available to those attending. Information on X3T9.2 and Mailing Subscription Forms were made available.

The final agenda was as follows:

1. IEEE/PCMCIA/SFF report [McGrath]
2. Flat File System Project Proposal (91-109R1) [Allan]
3. Fast Single Ended Specification (91-64R1) [Steele]
4. SCSI-3 Packetized Protocol (SPP) (91-13) [Stephens]
5. Fiber Channel SCSI Protocol SCSI FC-4 (91-122) [Snively]
6. Removable Media Support for SCSI-3 (91-88) [Wilhelm]
7. SCSI Device Identifier (91-49R1, -63, -73) [Lohmeyer, Medlinski, Allan]
8. Format Device Log Page (91-106R2) [Pickford]
9. SCSI-3 dual porting (91-143, -149) [Kolansky, Houlder]
10. SCSI-3 Queuing Model (91-98R1, -127) [Penokie]
11. Medium Changer functions... (91-72, - 121) [Therrien, Raudebaugh]
12. Additional Target Routine Commands (91-76) [Dougherty]
13. Should SCSI-3 SPI require fully populated cables? () [Lamers]
14. SCSI-3 S/E Cable/Terminator requirements (91-126, -130) [Spence, Chan]
15. Dealing with multi-initiator issues (91-118, -150) [Hahn, Lohmeyer]
16. To continue or not to continue...that is the question () [Penokie]
17. Request for INCOMPATIBLE MODE PARAMETERS ASC/ASCQ () [Racelo]
18. AEN via Request Sense (91-148) [Williams]
19. CAM Issues (91-140) [Smyers]
20. DIFFSENS loading issue () [Lohmeyer]

The following people attended the meeting:

Name	Status	Organization
Mr. Robert C. Herron	A	3M Company
Mr. Thomas Newman	S	Adaptec, Inc.
Mr. Sassan Teymouri	A	Advanced Micro Devices
Mr. Charles Brill	P	AMP, Inc.
Mr. Bob Whiteman	A	AMP, Inc.
Mr. Scott Smyers	P	Apple Computer
Mr. Paul Wolf	A	Apple Computer
Mr. Sheldon Kolansky	V	Concurrent Computer Corp.
Mr. Edward A. Gardner	A	Digital Equipment Corp.
Dr. William Ham	A	Digital Equipment Corp.
Mr. Douglas Hagerman	A	Digital Equipment Corp.
Mr. Paul R. Nitza	A	Emulex Corp.
Mr. Skip Jones	A	Emulex Corp.
Mr. I. Dal Allan	P	ENDL
Mr. Robert Liu	P	Fujitsu America, Inc.
Mr. Kurt Chan	P	Hewlett Packard Co.
Mr. Jeffrey L. Williams	A	Hewlett Packard Co.
Mr. Howard Wang	O	Hitachi Computer Products
Mr. George Penokie	P	IBM Corp.
Mr. Gary R. Stephens	A	IBM Corp.
Mr. Geoff Barton	P	Iomega Corp.
Mr. Robert D. Allgood	V	Iomega Corp.
Mr. Steve Powell	V	Iomega Corp.
Mr. Lawrence J. Lamers	P	Maxtor Corp.
Mr. John Lohmeyer	P	NCR Corp.
Mr. Bill Medlinski	A	Panasonic, MECA-BEC
Mr. James McGrath	P	Quantum Corp.
Mr. Gene Milligan	A	Seagate Technology
Mr. Gerald Houlder	A	Seagate Technology
Mr. Forrest Crowell	O	SGS-Thomson Microelectronics
Mr. D. W. Spence	P	Texas Instruments
Mr. Doug Pickford	A	Western Digital

32 People Present

Status Key:
- P Principal
- A Alternate
- O Observer
- S Special Interest (frequent visitor)
- V Visitor

The following documents were discussed at the meeting:

Document	Doc Date	Author	Description of Document
X3T9.2/91-13	4/22/91	G. Stephens	draft working document SCSI-3 Packetized Protocol (SPP)
X3T9.2/91-88	6/13/91	A. Wilhelm	Proposal to modify Device Type 0 to support Media Interchange
X3T9.2/91-106 Rev 2	9/6/91	D. Pickford	Format Status Log Page
X3T9.2/91-109 Rev 1	8/23/91	D. Allan	Project Proposal for Flat File Command Set
X3T9.2/91-118	7/25/91	G. Hahn	Dealing with multi-initiator issues
X3T9.2/91-126 Rev 1	9/9/91	B. Spence	Comparison of S/E Cable/Terminator Options
X3T9.2/91-130 Rev 1	9/1/91	K. Chan	Active Negation Drivers and Alt-2 Termination
X3T9.2/91-140	8/28/91	Abilay et al	Proposed Additions and Modifications to CAM interface
X3T9.2/91-143	8/27/91	S. Kolansky	ltr to G. Houlder re SCSI-3 dual port issues
X3T9.2/91-148	9/4/91	J. Williams	AEN via Request Sense
X3T9.2/91-150	9/9/91	J. Lohmeyer	SDTR and WDTR Clarification
X3T9.2/91-151	9/9/91	B. Spence	Possible S/E Active-Negation Driver Requirements for SCSI-3

Results of Meeting

1. IEEE/PCMCIA/SFF report [McGrath]

Jim McGrath reported on the status of the IEEE Disk Attach Study Group (DASG). The majority of the members of DASG have voted to disband the committee. There is a project proposal (DADI) for doing this work in X3T9.2.

The chairman of the DASG had changed the meeting date and location without making an effort to notify the participants. Several people arrived in St. Paul only to find that the meeting was now supposed to be in Cupertino on Friday. The DASG members met anyway and called the Chairman of the IEEE MSC who confirmed that the members present constituted a DASG ad hoc (same status as the DASG). The members present affirmed the following motion by a vote of 14 to 0:

> The Disk Attach Study Group after due study, has identified X3T9.2, specifically the Small Form Factor projects, as the proper body for standardization of small I/O peripheral interfaces and recommends to reform itself as a cooperative part of these projects.

The PCMCIA folks seem to have had a change of opinion on working with the disk drive people and are now more supportive of including disk drives on PCMCIA. The next meeting of PCMCIA is the last week of September in San Francisco.

The SFF now plans to focus on 1.8-inch disk drives (and smaller) exclusively. 2.5-inch drives will be deleted from the document. The letter ballot on the edge connector, the ribbon connector, and the power plug was disappointing in that only 8 organizations voted. The other 20 did not vote. From the comments made at the meeting this was not apathy, but uncertainty about the direction the market will take on these connectors.

In addition to horizontal connectors, the PCMCIA connector is likely to be used and a third connector

using 2-mm pins is being used. People are seriously looking for a vertical connector solution. The connector vendors were challenged to provide proposals within 60 days.

2. Flat File System Project Proposal (91-109R1) [Allan]

Jim McGrath asked whether we need a new project proposal for this work or could it be done under the SCSI-3 Command Set project. The answer was not immediately obvious. The consensus was that the group should investigate this concept further, under the SCS project, before submitting a new project proposal, which may not be necessary.

Jim McGrath said that the flat file command set for SCSI would probably require considerably larger CDBs than are currently supported. John suggested that as long as Jim was contemplating longer CDBs, he should consider using a reserved group code to define a variable-length CDB and perhaps extend the number of opcodes too.

Jim was concerned that longer CDBs would have adverse effects on SCSI protocol chips. The group expected that some chips could work around the problem, but with firmware rather than hardware. In any case, the best thing to do is define the variable-length CDB structure as soon as possible to give the silicon designers as much lead time as possible.

Jim McGrath wanted to publicize the flat file work to attract participants that normally do not attend X3T9 meetings. Dal suggested that Jim consider writing an article for the trade press as a better alternative to the typical CBEMA press releases which do not seem to be published in the trade press.

3. Fast Single Ended Specification (91-64R1) [Steele]

This topic was deferred since David Steele was not present.

4. SCSI-3 Packetized Protocol (SPP) (91-13) [Stephens]

Kurt Chan showed a somewhat controversial foil on the layout of the SCSI-3 documents structure. It showed both Gary Stephens's SPP document and Bob Snively's SCSI FC-4 document. John pointed out that we are currently only authorized to develop one such document. If we cannot agree on which one and we cannot merge them into one document, then we must get another project proposal approved to develop a second document.

John contrasted Gary Stephens's Packetized Protocol to Bob Snively's SCSI FC-4 protocol. How the information is transmitted is the difference. Bob's document uses the Fiber Channel hardware steering bits to identify the type of information in the Sequence. Gary's SPP embeds this information in the packets so that the packets could be transmitted over any interface, not just Fiber Channel.

This issue has become almost religious, but both solutions may be needed with the market making the ultimate decision. The group needs to review both proposals further before deciding on the direction to take.

There were several folks who felt that a 200-page SPP document was too much to tackle, but Gary's 40-page version is mostly a commercial. Scott Smyers pointed out that Gary's large version could be pared back by removing descriptions of the Fiber Channel interface. Another problem is that the latest version is not available electronically.

Everyone, especially Gary, recognized that Gary's document had not received enough review. John pressured Gary Stephens into agreeing to prepare another revision of his SPP document for the November mailing, trying to address the size issue.

It was suggested that single sections of the document be targeted for review, instead of tackling the whole thing head on.

5. Fiber Channel SCSI Protocol SCSI FC-4 (91-122) [Snively]

This item was deferred since Bob Snively was not present.

6. Removable Media Support for SCSI-3 (91-88) [Wilhelm]

Tom Newman substituted for Al Wilhelm. He gave a quick overview of document 91-88 and the changes to the commands needed to work with removable media devices.

Dal stated that what is needed can be derived from the tape model, a media and a format are defined for each media. The same media can have several formats. Gary Stephens explained removable tape devices.

John noted that Jerry Armstrong of NCR had several comments on the proposal and suggested that Tom arrange for Al Wilhelm to talk directly with Jerry. There was no other objection to adding the MI bit to the commands. George Penokie cited 91-071 as having addressed the ASC/ASCQ needs.

Gary asked what the partition bit has to do with SCSI. It seems that we already know this information. Tom responded that this bit addresses an operating system issue.

Dal noted that the proposal was too DOS specific and did not address the general SCSI issues needed for all operating systems. He suggested that the tape model be used as a model.

7. SCSI Device Identifier (91-49R1, -63, -73) [Lohmeyer, Medlinski, Allan]

Scott Smyers sketched a proposed icon that he had recently received from Bob Snively. Doug Hagerman noted that the Digital person assigned to this activity has been out of the country. The icon people still need some time to develop the proposal which should be based on the direction from the Valley Forge meeting.

8. Format Device Log Page (91-106R2) [Pickford]

Doug Pickford presented his Rev. 2 document. It was noted that the log page should be defined in Section 8 instead of Section 7 because the page does not apply to all device types.

John Lohmeyer pointed out that the log page table was too long to fit on one page and he requested that the table be reformatted in the style used elsewhere in SCSI-2.

Several other suggestions were offered and Doug agreed to prepare a Rev 3 document for the Ft. Lauderdale meeting.

9. SCSI-3 dual porting (91-143, -149) [Kolansky, Houlder]

Gerry Houlder briefed the group on the new dual porting issues. The main changes were in how a reset affects the other port and a new command to enable and disable the other port. Part of this proposal has previously been accepted for SCSI-3.

Gene Milligan asked about the effect of this change on current silicon. Gerry pointed out that two SCSI silicon sets are needed to meet the requirement of responding with at least a BUSY status when the other port is in use.

Sheldon Kolansky said that his biggest problem implementing IPI is the handling of resets. This problem also exists in the current definition of handling reset conditions in SCSI-3.

Dal repeated the reason for making a reset on one port not affect the other port: If a sick host is constantly resetting the bus on port A, a well host will not be able to access the device on port B.

The question of why only dual ports and not multiple ports was raised again. The document was limited to two ports because a previous working group felt that more than two ports would be better served by the multi-pathing functions proposed by Gary Stephens in his SPP document. Also, there remains the practical issue of fitting more than two connectors on today's small devices.

Jim McGrath expressed concern that there is no SCSI-3 Command Set draft document even though several proposals have been accepted for the document. John Lohmeyer noted that a document cannot be prepared without a volunteer to be the editor.

10. SCSI-3 Queuing Model (91-98R1, -127) [Penokie]

George Penokie reviewed the events of Monday's SCSI-3 Queuing Working Group meeting. Jim McGrath had presented his multi-level queuing definition. Ed Gardner had requested status information on enqueued I/O processes. All the work is focused on SCSI-3. The first order of business is to get the model defined.

Future SCSI-3 Queuing Working Group meetings are scheduled for Monday night of the Ft. Lauderdale plenary meeting and for Tuesday night of the Albuquerque Working Group meeting. *Note: The Albuquerque Queuing meeting was moved from Monday afternoon to Tuesday evening.*

11. Medium Changer functions... (91-72, - 121) [Therrien, Raudebaugh]

This topic was deferred because none of the concerned people were present.

12. Additional Target Routine Commands (91-76) [Dougherty]

This topic was deferred because Peter Dougherty was not present.

13. Should SCSI-3 SPI require fully populated cables? () [Lamers]

This topic was deferred because Larry was not ready.

14. SCSI-3 S/E Cable/Terminator requirements (91-126, -130) [Spence, Chan]

Kurt stated that he believes that Bill Spence, David Steele, and he are in agreement with document 91-151. The question is the feasibility of implementation.

Robert Allgood presented his findings over the last year at Iomega. His results were in agreement with those presented in previous Cable Working Group meetings. Bob pointed out that the need to use high-frequency bypass capacitors and to keep trace lengths short to avoid inductance. Bob agreed to provide a copy of his foils for the November committee mailing.

Bill Spence presented 91-126R1. Figure 1 shows the V-I curves for the various SCSI terminators and sheds some light on why the Forced Perfect Termination works as well as it does. Bill has identified what he calls the "ideal" terminator. Bill stated it is more important to talk about voltage and current limits in the standard rather than impedance.

Bill pointed out that the worst-case signal quality problems occur for two devices in the middle of bus. As long as one of the devices is at the end of the cable, the stepped voltage signal problems are avoided.

Bill noted that there may be driver issues with some of the newer termination schemes and that agreement needs to be reached on what parameters should go into the SCSI-3 document. There was agreement to have a Special Working Group meeting to be arranged by Bill, hopefully prior to the October plenary meeting. Bill planned to contact the semiconductor people directly and to post a meeting announcement on the SCSI BBS and on the SCSI reflector.

15. Dealing with multi-initiator issues (91-118, -150) [Hahn, Lohmeyer]

George Hahn had discovered that SCSI-2 does not make it clear that SDTR is a device-to-device negotiation and it applies to all the logical units on that device in both roles. John Lohmeyer prepared a clarification to the SDTR and WDTR wording for SCSI-3. The working recommends that 91-150 be included in the SCSI-3 Interlocked Protocol document.

16. To continue or not to continue...that is the question () [Penokie]

In the document (90-62R4) describing the TTD and CONTINUE I/O PROCESS messages there is no description of what a target should do if a CONTINUE I/O PROCESS message is received for an I/O Process that did not include a TTD message.

There was considerable debate with the final consensus being:

> If the CONTINUE I/O PROCESS message occurs on an initial connection then the target should go to BUS FREE phase (unexpected disconnect).
>
> If the CONTINUE I/O PROCESS message occurs on an subsequent connection then the target may either treat this as a dynamic head-of-queue request or it may reject the message with a MESSAGE REJECT message. An initiator that gets rejected should assert the ATN signal and send an ABORT TAG message on the resulting MESSAGE OUT phase. Otherwise, the target would treat the connection as an incorrect initiator connection.

17. Request for INCOMPATIBLE MODE PARAMETERS ASC/ASCQ () [Racelo]

John Lohmeyer related a series of messages he had exchanged with Mike Racelo on the SCSI BBS. Mike had requested the addition of an INCOMPATIBLE MODE PARAMETERS ASC/ASCQ. The working group response was that such an ASC/ASCQ is not necessary and that Mike should consider using either RECOVERED ERROR sense key with ROUNDED PARAMETERS ASC/ASCQ or ILLEGAL REQUEST sense key with PARAMETER VALUE INVALID ASC/ASCQ.

18. AEN via Request Sense (91-148) [Williams]

Jeff Williams proposed adding a bit to the REQUEST SENSE command CDB to poll for AEN date. Paul Nitza stated that this is already available in SCSI-2 as one of the options. The mechanism is to use UNIT ATTENTION is the device does not support AEN. After taking several rounds of flak, Jeff withdrew his request.

19. CAM Issues (91-140) [Smyers]

Scott Smyers presented several concerns with CAM that have arisen at Apple. His comments were reviewed and Scott agreed to document the results. A letter requesting that X3T9 return CAM for revision to include these changes will be drafted for X3T9.2 approval at the October plenary meeting.

20. DIFFSENS loading issue () [Lohmeyer]

John Lohmeyer presented a foil showing a problem with the current recommended circuit for the DIFFSENS signal. The power isolating diode only works if the receiver does not include an ESD diode to Vcc. The recommended change, for SCSI-3, is that the diode be moved to the DIFFSENS input and that a low forward-drop diode be recommended.

John Lohmeyer accepted an action item to update the pertinent figure and to send it to Kurt Chan.