Date: July 19, 1991

To: X3T9.2 Membership

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

Subject: July 16-17, 1991 X3T9.2 Working Group Meeting

John Lohmeyer called the meeting to order at 9:00 a.m. July 16, 1991. He thanked Doug Morrissey of UNISYS 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 (91-056) [McGrath]
3.   Control of SCSI Device Power (91-014R5) [Penokie]
4.   Contingent Allegiance Handling [Lohmeyer]
5.   Review of ATA Rev 2.4 document changes [Allan]
6.   Review of CAM Rev 2.4 document changes [Allan]
7.   MEDIUM SCAN Command REQUEST SENSE response (91-90) [Stephens]
8.   Fast Single Ended Specification (91-64R1) [Steele]
9.   SCSI-3 Packetized Protocol
10.   Removable Media Support for SCSI-3 (91-88) [Wilhelm]
11.   SCSI Device Identifier (91-49R1, -63, -73) [Lohmeyer, Medlinski, Allan]
12.   Format Device Log Page (91-106) [Pickford]
13.   SCSI Device Profiles (91-105) [Gardner]
14.   Conflict in UNIT ATTENTION Condition Implementors note (91-107R0) [Lohmeyer]
15.   Adding a conformance clause to CAM (91-94) [Huntsman]
16.   Removing Assumptions About Target Devices (91-95) [Huntsman]
17.   Clarifying relationship of XPT to SIM (91-96) [Huntsman]
18.   Minor Problems with CAM (91-97) [Huntsman]
19.   Proposed Common Configuration Method for ATA (91-101) [Richins]
20.   Request for Two Tape Media Identifiers (91-102) [Hagerman]
21.   Proposed Tagged Queuing Model (91-098R0) [Penokie]
22.   Dual Porting () [Houlder]
23.   Review of project proposals (91-104R1, -108R0, -109R0) [Allan]
24.   SCSI-2 Queued I/O Processes [Lamers]

The following people attended the meeting:

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                Name               Status        Organization
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Mr. Ralph Schultz                 V
Mr. Robert C. Herron              A    3M Company
Mr. Thomas Newman                 S    Adaptec, Inc.
Mr. Percy R. Aria                 A    Advanced Micro Devices
Mr. Michael Wingard               P    Amphenol Interconnect
Mr. Dennis Pak                    O    Apple Computer
Mr. Scott Smyers                  O    Apple Computer
Mr. Ed Young                      P    Archive Corp.
Mr. George Zisk                   O    CW Industries
Mr. Bob Reago                     O    Dataram
Mr. John A. Gallant               A    Digital Equipment Corp.
Dr. William Ham                   A    Digital Equipment Corp.
Mr. Douglas Hagerman              A    Digital Equipment Corp.
Mr. Edward A. Gardner             A    Digital Equipment Corp.
Mr. Paul Hanmann                  P    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. Giles Frazier                 S    IBM Corp.
Mr. William Galloway              P    IGM Data Autoloader Div.
Mr. Lawrence J. Lamers            P    Maxtor Corp.
Mr. John Lohmeyer                 P    NCR Corp.
Mr. David Steele                  S    NCR Corp.
Mr. Grover Phillips               V    NCR Corp.
Mr. Bill Medlinski                A    Panasonic, MECA-BEC
Mr. James McGrath                 P    Quantum Corp.
Mr. Gerald Houlder                A    Seagate Technology
Mr. Robert L. Simpson             P    Sony Corp. of America
Mr. Robert N. Snively             P    Sun Microsystems, Inc.
Mr. Patrick Manley                O    SyQuest Technology
Mr. Harvey Waltersdorf            P    Thomas & Betts
Mr. Peter Dougherty               P    UNISYS
Mr. Doug Pickford                 A    Western Digital

37 People Present

Status Key:   P       Principal
              A       Alternate
              O       Observer
              S       Special Interest (frequent visitor)
              V       Visitor
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The following documents were discussed at the meeting:

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   Document    Doc Date     Author          Description of Document
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X3T9.2/91-14   6/4/91  G. Penokie      Control of SCSI Device Power
Rev 5                                  Consumption
X3T9.2/91-64  7/11/91  D. Steele       Fast Single-Ended and other Recommended
Rev 1                                  Changes to SCSI-3 Parallel I/F
X3T9.2/91-94  6/27/91  B. Huntsman     Adding a Conformance Clause to CAM
X3T9.2/91-95  6/27/91  B. Huntsman     Removing Assumptions about Target
                                       Devices
X3T9.2/91-96  6/27/91  B. Huntsman     Clarifying Relationship of XPT to SIM
X3T9.2/91-97  6/27/91  B. Huntsman     Minor Problems with CAM
X3T9.2/91-98   7/3/91  G. Penokie      Tagged Queuing Model
X3T9.2/91-101          R. Richens      Proposed Common Configuration Method
                                       for ATA
X3T9.2/91-102 7/17/91  D. Hagerman     Request for Two Tape Media Identifiers
Rev 1
X3T9.2/91-104 8/23/91  D. Allan        Project Proposal for ATA Extensions
Rev 1
X3T9.2/91-105 7/13/91  E. Gardner      Multi-Initiator, Enhanced Availability
                                       System Environments in SCSI-3
X3T9.2/91-106 7/12/91  D. Pickford     Format Status Log Page
X3T9.2/91-107 7/16/91  J. Lohmeyer     Error in Implementors Note 1) in
                                       section 6.9 of SCSI-2 Rev 10e
X3T9.2/91-108 8/23/91  D. Allan        Project Proposal for Memory Model
                                       Interface
X3T9.2/91-109 8/23/91  D. Allan        Project Proposal for Flat File Command
                                       Set
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Results of Meeting

1. IEEE/PCMCIA/SFF report [McGrath]

Dal Allan reported that the chairman of PCMCIA executive committee does not want to support disk drives on PCMCIA. Mr. Reimer is supposedly developing a report on the excessive failure rate of disk drives.

The vertical mounting issue for disk drives remains.

The Disk Attach Interface Project Approval Request (PAR) is stalled at IEEE due in part to a letter sent in by Dal. The letter maintains that the expertise for disk drive interfaces resides primarily in X3T9.2 and that it is appropriate place for the project.

2. Flat File System (91-056) [McGrath]

Jim McGrath said he nothing to add to his proposal at the meeting. Dal advocated advancing Jim's informal proposal to a formal project proposal. During the meeting, Dal prepared one -- see item 22.

3. Control of SCSI Device Power (91-014R5) [Penokie]

George Penokie reviewed the latest revision of his proposal which incorporated the recommendations from the June plenary meeting. These include changing target references to logical units.

Dal Allan commented on the PrairieTek patent. In light of their recent financial situation they do not want to make a decision until new management is in place. It is rumored that another vendor is trying to purchase the patent.

Dal also requested that all X3T9.2 standards should be reviewed for patent impacts by members of the committee. Maxtor holds a patent on spindle synchronization that needs to be reviewed. Quantum holds a patent on the HardCard design which may affect the Small Form Factor document.

The group working had several inputs to George's proposal. The major one is a way to force a selected timer to zero. This went through several iterations but wound up as an expansion of the power conditions to four bits and the addition of two codes.

Bob Snively asked for inclusion of a statement about the handling terminator power. If a device supplies termpower to the SCSI bus the power control options do not affect it because the RST signal needs to be terminated.

A new revision (91-014R6) will be in the next mailing.

The working group recommends the acceptance of 91-014R6 for inclusion in SCSI-3.

4. Contingent Allegiance Handling [Lohmeyer]

John reviewed the issue of whether or not a contingent allegiance should exist following an unexpected disconnect. The current document makes this optional. How does an initiator know whether to issue a REQUEST SENSE command following an unexpected disconnect? If the initiator guesses wrong, an incorrect initiator connection may result.

The working group recommended that the words "...and may optionally exist following an unexpected disconnect." in section 6.6 par 1 be deleted. The effect of this change is that a contingent allegiance condition does not exist following an unexpected disconnect, however a target is allowed to prepare sense data.

The following paragraph should be added to 5.1.1 par 6: "An unexpected disconnect does not generate a contingent allegiance condition, however, it is recommended that a REQUEST SENSE command be issued to obtain any sense data that may be available."

An implementors note also should be added as follows: "IMPLEMENTORS NOTE: If an unexpected disconnect occurs and tagged I/O processes are being used by the initiator, the REQUEST SENSE command should be issued with a HEAD OF QUEUE TAG message to avoid an incorrect initiator connection."

5. Review of ATA Rev 2.4 document changes [Allan]

The following changes to the ATA document revision 2.4 were agreed to by the working group:

1) A change to the illustration in FORMAT TRACK to reduce ambiguity of word versus byte usage.
2) Added to the IDENTIFY DRIVE INFORMATION (Table 9-3) fields for current cyl/hd/sector information and usable capacity. In addition the definitions in sections 9.4.1, 9.4.2, and 9.4.5 will return to using the "default translation mode" as they were in revision 2.3.
3) A change was made to 9.18 par 2 removing the phrase "...is for the host to issue a software reset." The ATA document will only require a hardware reset to recover from sleep mode. A note will be added to explain the segregation of ATA reset signal from system bus backplane reset signal. This allows notebook computers to achieve the lowest

power consumption state. This does not prevent an implementation that would use a software reset, however, such an implementation could not achieve the lowest power usage.

The working group recommends that these changes be accepted for inclusion in the ATA document as revision 2.5.

6. Review of CAM Rev 2.4 document changes [Allan]

See agenda items 15 through 18. Dal Allan planned to prepare a revision 2.5 of CAM for the mailing. A forwarding motion is planned for the August meeting.

7. MEDIUM SCAN Command REQUEST SENSE response (91-90) [Stephens]

There was no discussion on this item except to note that it needs a plenary vote for acceptance.

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

David Steele brought revision 1 of his proposal to the meeting. There were still objections to the three meter limit and the imposing of requirements that might exceed those absolutely necessary. David had done a lab analysis with 6 devices in middle of a cable and 5 feet of cable on each end using Alt 2 termination. The results indicated that a three meter cable seems to be a compromise that works best.

It was noted that in fast differential applications that mixed 8- and 16-bit devices a skew is introduced of about .8 ns skew for each 8-bit device that is present. This is on a well-designed bus with low-capacitance devices << 25 pF.

David stated his design uses a circuit to "eat" glitches on the bus. His proposal contains a requirement that 5 ns or smaller pulses reaching 1 volt or less not cause the receiver to change states. The use of active pull ups can make the glitch problem worse, and the slew rate needs to be controlled if those type drivers are used. It was noted that AMD's glitch eater circuit for the Apple serial interface handles glitches up to 18 ns.

The slew rate is the real culprit in that it causes the double clocking of signals. The proposal added requirement that it not exceed .5 volts/ns.

Several other inputs were taken by David for the next revision of the document.

9. SCSI-3 Packetized Protocol

There was a lengthy discussion of the differences between Gary Stephens' approach to SPP and Dal Allan's approach. Dal Allan presented a foil showing the overall Fiber Channel architecture:

```
              +----+  +---+  +---+  +---+
  FC-4        |SCSI|  |IPI|  |BMC|  |'X'|
              +----+  +---+  +---+  +---+

              +-------------------------+
              |      Common Services    |
  FC-3        |         Multiport       |
              |         Broadcast       |
              |         Striping        |
              +-------------------------+

              +-------------------------+
              |      Fiber Channel      |
  FC-2        |         Services        |
              +-------------------------+
```
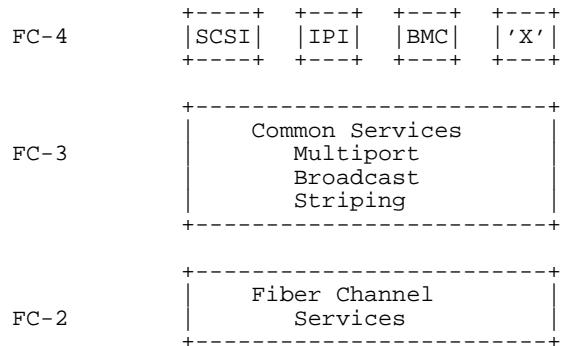
John Lohmeyer presented a foil showing his understanding of the differences between Gary's and Dal's architectures. Since color is not available for the minutes, two diagrams are used to show the differences:

```
              Gary's Model for SCSI Packetized Protocol

   +--------+   +--------+   +-------------------------+
   | HIPPI  |   |  IPI   |   | SCSI Packetized Protocol |
   +--------+   +--------+   +-------------------------+
   | FC I/F |   | FC I/F |            |         |
   +--------+   +--------+        Independent
       |            |              Services
        \           \               |         |
         \           \          +----------+
          \           \           |    /   |   |
           \           \         /     |   |    \
            \           \       /      |   |     \
             \           |     /       |   |      \
              \          |    /        |    \      \
               \         |   /         |     \      \
                \        |  |          |      \      \
                 \       |  |          |       \      \
                  \      |  |          |        \      |
                   |     |  |          |         \      \
                  +---------+          |          |      |
                  |   FC    |          |          |      |
                  |Transport|          |          |      |
                  |Services |          |          \      \
                  +---------+      +--------+   +----+  +---+
                  | Fiber   |      |Ethernet|   |FDDI|  |etc|
                  | Channel |      |        |   |    |  |   |
                  +---------+      +--------+   +----+  +---+
```

Dal's Model for SCSI Packetized Protocol
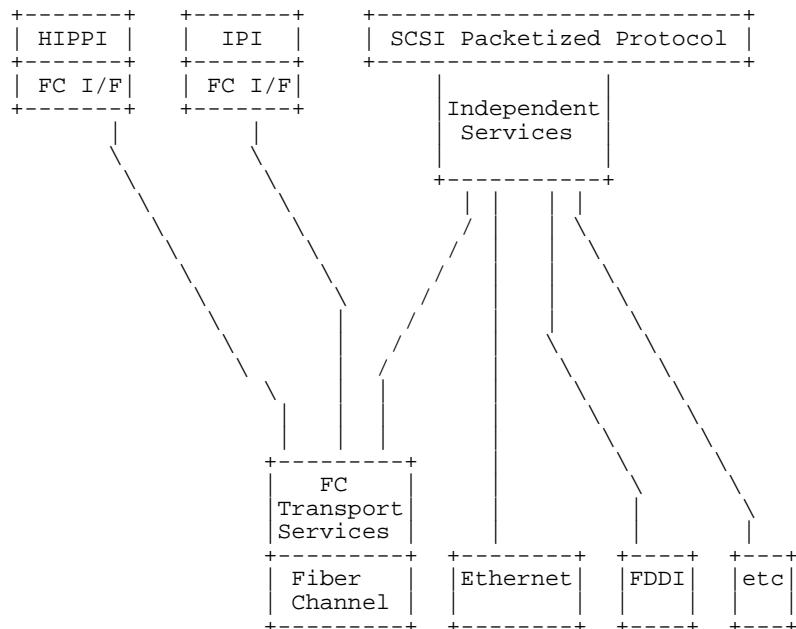
```
  +-------+   +-------+   +-------------------------+
  | HIPPI |   | IPI   |   | SCSI Packetized Protocol |
  +-------+   +-------+   +-------------------------+
  | FC I/F|   | FC I/F|   |FC I/F|
  +-------+   +-------+   +------+    +-----------+
       |           |         |       | Independent|
        \           \        |       |  Services  |
         \           \       |       |            |
          \           \      |       +-----------+
           \           \     |         |  |  |
            \           \    |         | / \
             \           \   |         |/   \
              \           \  |        /|     \
               \           \ |       / |      \
                \           \|      /  |       \
                 \           |     /   |        \
                  |          |    /    |         \
                +---------+        |         |
                |   FC    |        |         |
                |Transport|        |         |
                |Services |        |         |
                +---------+   +--------+  +-----+  +---+
                | Fiber   |   |Ethernet|  |FDDI |  |etc|
                | Channel |   |        |  |     |  |   |
                +---------+   +--------+  +-----+  +---+
```
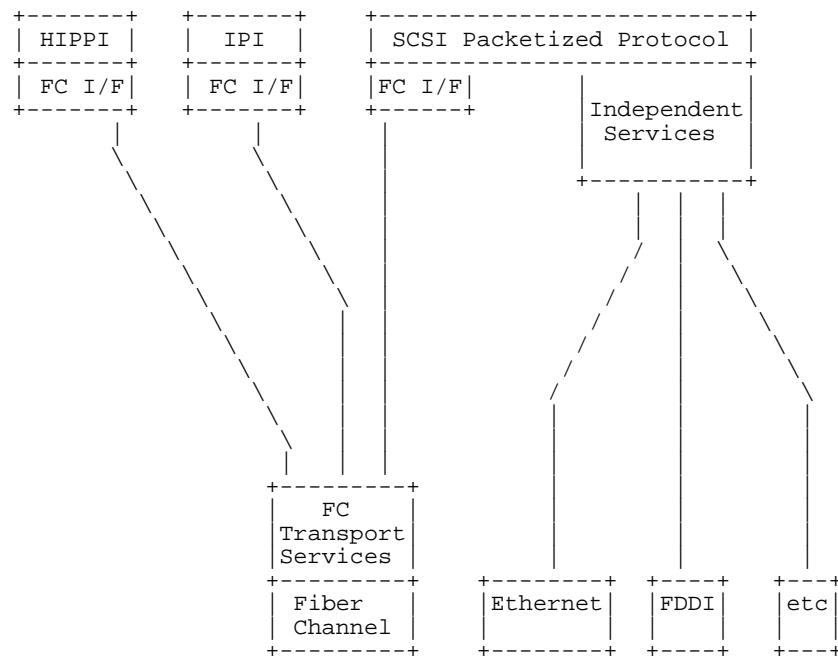
Both approaches were heatedly defended. Neither side convinced the other, however the majority of those expressing an opinion seemed to favor Dal's architecture. This much support might ordinarily be construed as dictating the direction. However, there is one problem: Gary has documented his approach, believes in it, and is unwilling to document the other approach. The debate was mercifully ended for lunch. It was hoped that the Fiber Channel meeting later in the week would shed additional light on the issue.

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

This item was deferred due Al Wilhelm's absence.

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

John gave a brief history of the subject. There was debate on whether graphic symbols or plain letters were appropriate. Even though there was not much agreement, graphic symbols seem to be favored. Getting a symbol for differential remains a problem.

It was agreed that the current SCSI icon indicates the use of a Small Computer System Interface, but not the type of transceiver used. Additional icons are needed to indicate transceiver type. The Apple (Scott Smyers), Sun (Robert Snively) and DEC (Doug Hagerman) members have an action item to get their icon folks to work in concert on developing appropriate icons.

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

Doug presented his proposal for a Format Status Log Page which captures the state of conditions under which the logical unit was formatted. In essence, it preserves the format information to allow later analysis of the data. Doug agreed to provide another revision dropping the spare blocks field and adding a count of reassignments since the last format.

13. SCSI Device Profiles (91-105) [Gardner]

Ed Gardner postulated the following scenario: a multi-initiator system, with limited hardware, that can tolerate some failures but not all. He wants to draw up common guidelines for devices in these systems on what is implemented, and how it is implemented. This started an immediate debate over time need by devices to respond following a reset or power on. Dal Allan asked for an example of what Ed is after to have a real target to shoot at. Ed agreed to do this, but indicated that it will take some time.

14. Conflict in UNIT ATTENTION Condition Implementors note (91-107R0) [Lohmeyer]

John Lohmeyer explained that a conflict exists in the SCSI-2 document between implementors note #1 in section 6.9, and with option 1 of paragraph #6 in section 6.9 and with the first implementors note in section 7.2.14.

The proposed solutions were to either:
      1)   Delete the entire third sentence in Implementors Note 1) in 6.9.
      2)   Replace the third sentence with: "The initiator can clear pending unit attention conditions by repeatedly issuing TEST UNIT READY commands followed by REQUEST SENSE commands until a sense key other than UNIT ATTENTION is returned by the target."

Complete agreement was not reached on which solution is best and the issue was added to August plenary meeting agenda.

15. Adding a conformance clause to CAM (91-94) [Huntsman]

This was a request for a CAM conformance statement. The working group recommends acceptance except for item four in list of conformation claims. This item is the binary format of all CCB fields.

16. Removing Assumptions About Target Devices (91-95) [Huntsman]

In response to the issue of implementation assumptions, CAM does not assume anything regarding the status of the command queue during a contingent allegiance condition.

In response to the issue of support for the extended contingent allegiance condition, it was not supported initially because of limited interest in ECA. There is still limited interest and adding support now would be difficult because there is no space provided for it in the CCB.

17. Clarifying relationship of XPT to SIM (91-96) [Huntsman]

The working group recognized the need for clarifying the relationship of the XPT to SIM, but recommended 91-96 change not be accepted. Instead, John Gallant accepted an action item to write alternative improved wording for the CAM Rev 2.5 document.

18. Minor Problems with CAM (91-97) [Huntsman]

This proposal contained eleven problems. The responses to the eleven items are as follows:

1)   The editor will add "for example" in appropriate places but not move the sections to the appendices.
2)   The working group disagrees with the given examples.
3)   DOS doesn't work that way; DOS does not supply a separate XPT because it uses linked list device drivers.
4)   This is due to the Intel addressing scheme.
5)   The structures can be vendor specific and still interoperate so they were not included in CAM.
6)   The "address of this CCB" field will documented better. The remainder of the comment is not accepted since it affects performance and is considered to be debugging option.
7)   The generic meaning of success and failure will be explained.
8)   The first question is yes, it is required by Unix, non-Unix environments do not care.
9)   No, do not want any vendor unique codes.
10)   The binary offsets will be consistent but not compatible.
11)   A nice request, but the editor is not going to provide an index due to the time required.

19. Proposed Common Configuration Method for ATA (91-101) [Richins]

The proposal sent to the working group by Royes Richins of Novell to include a definition of data to be contained in sector two of the user accessible data area for ATA drives was discussed. The last statement of the cover letter brought strong disagreement.

Scott Smyers of Apple objected to any standard that specified information contained within the user accessible data area. The chair stated that this proposal was not appropriate under current project proposal for ATA because it dealt with the data on the disk drive and not the ATA interface.

There was agreement that the IDENTIFY DRIVE INFORMATION in ATA was ambiguous. The working group addressed this issue; see item 5 for details.

The current ATA document does not contain any reference to I/O ports. Therefore it does not seem appropriate to specify additional I/O ports for extending the number of paddle boards in a system.

20. Request for Two Tape Media Identifiers (91-102) [Hagerman]

Doug Hagerman presented a proposal for two additional tape media identifiers. He stated that this should be considered for SCSI-3. One of these devices use a two-bit wide serial recording which raised a question regarding the table entry that specifies serial or parallel recording method. Also one device could use one or both heads at a time recording either 24 or 48 tracks which raised a question about track density.

The working group recommends acceptance of the proposal for SCSI-3.

21. Proposed Tagged Queuing Model (91-098R0) [Penokie]

George Penokie reviewed his proposed model for queued I/O processes in SCSI-3. In this model the REQUEST SENSE commands can be tagged or untagged - no problem. Due the nature of this topic only written comments will be accepted by George. Another debate on direction ensued, Bob Snively arguing for full backward compatibility, Larry Lamers arguing for exploration of all possibilities without restrictions.

John intervened with a stated intention of having a SSWG to address the issues. This will be done on-line through SCSI reflector, with a meeting planned for sometime during the Boulder Plenary. The information will also be available in File Area 10 on SCSI BBS. To participate on the SCSI Reflector send a message to scsiadm@WichitaKS.NCR.COM asking to be added to the SCSI Reflector. To send email to the SCSI Reflector, send the message to scsi@WichitaKS.NCR.COM.

22. Dual Porting () [Houlder]

The reason for dual-port is that the actions of one initiator does not affect the other port -- this from Gerry's customers. This is different from the currently accepted proposal for SCSI-3. Instead of interlocked ports they should be independent. Gerry will have paper at the next working group and be on the SCSI BBS ahead of that.

23. Review of project proposals (91-104R1, -108R0, -109R0) [Allan]

Dal had prepared three project proposals for consideration at the next plenary meeting. There was very little discussion on these proposals:
>   1)   A project proposal for ATA extensions to use this interface on memory card devices.
>   2)   A project proposal for a memory model interface.
>   3)   A project proposal for development of a flat file command set to support such features as data compression on direct-access devices.

All of these will be in the mailing for consideration at the August plenary meeting.

24. SCSI-2 Queued I/O Processes [Lamers]

This subject, as always, engendered significant debate. There was an initial objection from George Penokie on the deletion of "...for that initiator..." in section 7.3.3.1, par 4 when he read the minutes of the last plenary meeting. However upon further consideration George recognized the inconsistency of this objection with section 6.8.2.

With the exception of Robert Snively, there was consensus for the doing the following: In Section 7.3.3.1, par 4; delete "from each initiator" and "for that initiator" to make the definition of restricted re-ordering compatible with section 6.8.2.

This issue was added to the August plenary meeting agenda.