

Date: November 12, 1991

To: X3T9.2 Membership

From: Lawrence J. Lamers, X3T9.2 Secretary
George Penokie, Chair Queuing Working Group

Subject: November 12, 1991 Queuing Working Group Meeting Minutes

George Penokie called the meeting to order at 5:00 p.m. November 12, 1991. He thanked Don Tolmie of Los Alamos National Labs for hosting the meeting.

The final agenda was as follows:

1. IPI Command Queuing [Grivna] (91-193)
2. Level One Exception Conditions [McGrath] (91-163)
3. Reordering Rights [Cornaby] (91-160)
4. What's in a queue [Gardner] (91-195)
5. Meeting Schedule

The following people attended the meeting:

Name	Status	Organization
Mr. Thomas Newman	S	Adaptec, Inc.
Mr. Sassan Teymouri	A	Advanced Micro Devices
Mr. Scott Smyers	P	Apple Computer
Mr. Paul Wolf	A	Apple Computer
Mr. John Geldman	S	Cirrus Logic Inc.
Mr. Ed Grivna	V	Cypress Semiconductor
Mr. Norman H. Harris	P	Digital Equipment Corp.
Mr. Edward A. Gardner	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. George Penokie	P	IBM Corp.
Mr. Kevin R. Pokorney	A	Intellistor, Inc.
Mr. Geoff Barton	P	Iomega Corp.
Mr. Lawrence J. Lamers	P	Maxtor Corp.
Mr. John Lohmeyer	P	NCR Corp.
Mr. Eddie Williams	V	NCR Corp.
Mr. James McGrath	P	Quantum Corp.
Mr. Gerald Houlder	A	Seagate Technology
Mr. Robert N. Snively	P	Sun Microsystems, Inc.

23 People Present

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

Results of Meeting

1. IPI Command Queuing [Grivna] (91-193)

Dal Allan introduced Ed Grivna of Cypress Semiconductor. Dal noted that Ed has been involved with IPI for several years and had actually been through an implementation of command queuing using IPI.

Ed made a presentation on IPI command queuing. It is his view that command queuing is implemented in all systems, however in many the depth is one. Many host systems have a queue of several commands. Now queues are appearing in peripherals. The question is who manages the queue.

Ed went through the five types of queued commands present in IPI.

- 1) Individual commands are most common, has no bearing on other commands in queue, and no data dependencies exist.
- 2) Chained commands are done in FIFO order. This is equivalent to a linked command in SCSI, except that IPI allows all commands to be sent in the chain before any are executed.
- 3) Sequential commands are similar to chained commands except that the device can be accessed from other ports while they are being executed. Other individual commands can be interleaved within the sequence. These commands can span devices; this requires recognition of a separate slave controller.
- 4) Ordered commands are executed in FIFO order; other commands from the same port are not ordered can not be interleaved within the ordered commands.
- 5) Priority commands are executed in LIFO order; they terminate any chained, sequential or ordered set currently being sent. Priority chained, sequential and ordered command sets are allowed.'

2. Level One Exception Conditions [McGrath] (91-163)

Jim McGrath's level one queuing model states that the SCSI bus phases occur in order of the commands sent. This raises a question of what to do if an exception condition arises during the initial connection. Because of the host restrictions on handling a status phase out of sequence how does a target deal with the exception.

After some discussion the host's problem is not handling a status phase per se, but handling a CHECK CONDITION that would generate a contingent allegiance condition if there are queued commands in the target.

If there are no queued or active commands in the target, a CHECK CONDITION response is appropriate. If there are queued or active commands the only exception that demands an immediate response is a parity error during COMMAND phase. All other exceptions can be dealt with when the I/O process becomes active. For these exceptions sense data is not generated until the I/O process is active.

If a parity error occurs during command phase it can be handled either by 1) returning BUSY status; or 2) returning CHECK CONDITION status and clearing the queue. Returning BUSY status is the recommended action. The host should interpret this as an indication that the I/O process should be

retried. If the parity error was a random event the next command should not get an error and will then be added to the queue. If there is a hardware failure repeated BUSY status should cause the host to issue a SCSI bus reset.

A host vendor implementing level one command queuing should implement to these guidelines. If the host vendor has the option and inclination implementing to a level three model is the best choice.

Jim McGrath accepted an action item to incorporate option 1 (returning BUSY) into his document on queuing models for the next meeting.

3. Reordering Rights [Cornaby] (91-160)

Steve Cornaby was not present so this topic was not discussed.

4. What's in a queue [Gardner] (91-195)

Ed Gardner raised a question on linked commands. If what is in a queue is an I/O process then how can you see the list of linked commands to guarantee data integrity. Ed presented six solutions to this dilemma.

- 1) Remove queuing from SCSI-3.
- 2) Remove linked commands from SCSI-3.
- 3) Make it illegal to use queued and linked commands simultaneously.
- 4) Disallow using knowledge of command to affect execution order. Control is based just on the queue tags.
- 5) Requeue I/O processes for each linked command.
- 6) Pass all linked commands in the list to the device at one time.
- 7) Do not change anything, but document quirks of MODE SELECT command.

Of the six solutions presented Ed favored removing linked commands, but met a good deal of resistance. John Lohmeyer suggested adding two messages to allow traversing the linked list. It also was suggested that a linked I/O process be treated as an ordered I/O process.

No definitive consensus was reached as it was getting very late.

5. Meeting Schedule

The Queuing Working Group meeting for December is on Monday, December 9, 1991 at 6:00 pm at the Catamaran Hotel in San Diego, CA.

The meeting for January is on Monday, January 13, 1992 at 6:00 pm at the Holiday Inn Astrodome in Houston, TX.