



adaptec, inc.

X3T9.2/87-19

ANSI X3T9.2
Bill Burr, Chairman
National Bureau of Standards
Room A-216, Bldg 225
Gaithersburg, Maryland 20899

January 6, 1987

Subject: Consideration of deferred error presentation

Dear Mr. Burr:

The new draft of X3T9.2/86-109, dated Oct 31, 1986 describes Deferred Errors in section 7.1.2.1 on page 7-6. The capability of presenting deferred errors is very important, but a number of other factors must be considered in their definition and presentation.

a) It is very important that the initiator that generated the command that failed in a deferred manner be notified that the command failed. If it is not notified, the initiator may continue operating without taking appropriate recovery steps and may cause later system integrity failures. In addition, it is important that another initiator attempting a command after a deferred error be notified so that it will be aware that the data it is requesting may not be up to date or valid. In some implementations, there may not even be a valid record of which initiator generated the command that failed in the deferred manner. Considering these requirements, it is clear that deferred errors should be presented once to each attached initiator at the time the initiator next makes a request against the LUN for which a deferred error was detected. If the deferred error cannot be associated with a single LUN, it should be presented for all LUN's that may be affected.

b) A large class of deferred errors can be recovered completely by the SCSI target with no intervention required from the initiator. An example of such an error is a failure during cache write back, which can be recovered by writing to an alternate area from the still available cache information. In cases like these, the deferred errors should not be presented unless presentation is specifically enabled by the appropriate Mode Select parameters. If either statistical logging or individual error logging is supported by the target, such recoverable errors should be placed in the log.

c) A sufficiently sophisticated controller may choose to present only those errors which actually may affect requested data to initiators other than the initiator associated with the failing command. As an example, if a write back failure occurs to a certain block and the error is unrecoverable, accesses to data other than that failing block from initiators other than the initiator associated with the write command should complete normally. Any command from the initiator generating the write command should get a Check Condition with sense information of deferred error. Any command from any initiator that attempts to access the failing block should get a Check Condition with sense information of deferred error.

d) There does not appear to be any architecturally practical way to protect a system from errors that are associated with long past commands unless the system guarantees that critical information will be protected by write through, journaling, or other special actions until the successful completion of all commands is explicitly detected.

To reflect these considerations, I recommend modifying paragraph 7.1.2.1 on page 7-6 to read as follows:

7.1.2.1 Deferred Errors

Error Code 70h indicates that the CHECK CONDITION status returned is the result of an error or exception condition on the command that returned the CHECK CONDITION status. Error Code 71h indicates that the CHECK CONDITION status returned is the result of an error or exception condition on some previous command (a deferred error). If a CHECK CONDITION for a deferred error is presented, the current command has not been performed. After the target detects a deferred error condition on a logical unit, it shall present a CHECK CONDITION according to the rules described below. The sense information associated with the CHECK CONDITION shall begin with 71h and otherwise be identical in format to the extended sense format.

1) If a deferred error can be recovered with no external system intervention, a CHECK CONDITION indication will not be posted unless required by the error handling parameters of the Mode Select command. The occurrence of the error may be logged if statistical or error logging is supported.

2) If a deferred error can be associated with a causing initiator and with a particular function or a particular subset of data, a CHECK CONDITION indication shall be posted in response to the next command from the causing initiator. If an initiator other than the causing initiator attempts access to the particular function or subset of data associated with the deferred error, a CHECK CONDITION indication shall be posted in response to the command attempting the access. The deferred error information shall

be presented to the subsequent Request Sense command. Note that not all devices may be sufficiently sophisticated to identify the function or data that has failed. Those that cannot must treat the error in the following fashion.

3) If a deferred error cannot be associated with a causing initiator or with a particular set of data, a CHECK CONDITION indication shall be posted in response to the next command to the failing LUN from each initiator. The deferred error information will be posted to each initiator in the subsequent Request Sense commands. If multiple deferred errors have accumulated for some initiators, only the last error will be presented in the Request Sense command.

4) If a deferred error cannot be associated with a particular LUN, it shall be posted in the appropriate manner for all LUN's.

5) If a deferred error occurs while a current command is operating, the current command shall complete normally and the deferred error will be presented if appropriate in response to the next command. If a deferred error occurs while a current command is operating and the current command also has an error, the error for the current command will be presented. The deferred error will be presented in the first command after the command that requests or clears the sense information for the current commands error.

Thank you for your consideration of this proposal.

Sincerely,



Robert N. Srively