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To: Members of X3T10

Subject: X3T10/96-173R1 -- Proposal for Expanding the ACA Mechanism to All Command Exceptions

Discussion

This proposal defines an optional expansion of the ACA mechanism which prevents out of order command execution following the completion of a command with any failure status. This proposal addresses conditions that exist with full-duplex, non-interlocked I/O interconnects (although the mechanism can be used with any interconnect).

In a non-interlocked system., it is possible for several commands to be in flight at one time. When a command terminates with a failure status (other than CHECK CONDITION), other in-flight commands may be executed upon arrival, provided no other failure condition exists. When this happens, the order dependency among such commands is disrupted and may result in data corruption.

Currently, the ACA mechanism addresses this problem for commands that terminate with CHECK CONDITION or COMMAND TERMINATED status. In this case, the ACA condition blocks further command processing by the logical unit until the initiator clears the condition. In clearing the condition, the initiator can verify that all commands in-flight have been flushed from the transport layer before attempting to recover. The proposal described below optionally extends the ACA interlock to all other command failure conditions.

The proposed extension is as follows:

A new bit (ExpACA) is added to the (TBD) mode page. When set, this bit indicates that, in addition to the CHECK CONDITION and COMMAND TERMINATED statuses, the scope of the ACA interlock has been expanded to commands which complete with a status of QUEUE FULL, ACA ACTIVE, BUSY and RESERVATION CONFLICT. Except for the additional conditions causing the ACA, its behavior is identical to the existing mechanism. In particular, although the condition is set by any command failure status, sense data will only be available whenever a command completes with a status of CHECK CONDITION or COMMAND TERMINATED. No sense data is present otherwise. Also, the extended ACA interlock is only set when the ExACA bit is set to one in the appropriate mode page and the faulted command had the NACA bit set to one in the CDB control byte. Otherwise, there is no change in behavior.

Note that if the (ExpACA) is set to one in the mode page, the NormACA bit must also be set to one.

Proposed changes

SAM Revision 18

Subclause 5.2

Add the following sentence to the descriptions for BUSY, RESERVATION CONFLICT, and TASK SET FULL statuses:

If extended ACA processing is in effect, this status also indicates that an auto contingent allegiance condition has been established (see 5.6.1)."

Modify the description for ACA ACTIVE as described below:

Add the following after the last sentence:

"If expanded ACA processing is in effect (see 5.6.1), this status indicates that an ACA is also in effect for the initiator receiving the ACA ACTIVE status. Before reissuing the command, the initiator is required to clear the condition as described in subclause 5.6.1.2.."

Subclause 5.6.1

Current wording:

"The auto contingent allegiance condition shall exist within the task set when the logical unit completes a command by returning a COMMAND TERMINATED or CHECK CONDITION status (see 5.2).

In the following discussion, the term "faulting command" refers to the command that completed with a CHECK CONDITION or COMMAND TERMINATED status. The term "faulted initiator" refers to the initiator receiving the COMMAND TERMINATED or CHECK CONDITION status. The term "faulted task set" refers to the task set having the auto contingent allegiance condition."

Proposed new wording:

"The auto contingent allegiance condition shall exist within the task set when the logical unit completes a command by returning a COMMAND TERMINATED or CHECK CONDITION status (see 5.2).

If the logical unit supports expanded ACA processing (see the SPC standard), the auto contingent allegiance condition shall also exist if the logical unit completes a command with a BUSY, RESERVATION CONFLICT, TASK SET FULL or ACA ACTIVE status and the NACA bit was set to one in the control byte of the CDB for that command.

In the following discussion, the term "faulting command" refers to the command that completed with a CHECK CONDITION or COMMAND TERMINATED status. The term "faulted initiator" refers to the initiator receiving the COMMAND TERMINATED or CHECK CONDITION status. The term "faulted task set" refers to the task set having the auto contingent allegiance condition."

SPC Changes are TBD