

Document: T10/00-359r3
To: T10 Committee Membership
From: Edward A. Gardner, Ophidian Designs
Subject: Unit Attention Issue

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Previous revisions of this proposal discussed the detailed interaction between unit attention conditions and autosense. They concluded that when we introduced autosense delivery in FCP, we lost a significant piece of functionality. SCSI-2 ensured that an initiator could, if it so chose, guarantee it was aware of any unit attention conditions before issuing a command. That is, the protocol was interlocked between unit attention and command issuance. That capability still exists in SPI-n today provided data group transfers are used. It has been lost in all other SCSI protocols through their support of autosense. Note that SAM describes autosense delivery as an option that can be enabled or disabled on a command by command basis.

The January 17, 2001 CAP working group recommended that we use a bit in the Control mode page to control whether autosense clears a unit attention condition. This document describes the specific changes to SAM-2 and SPC-3 to accomplish that recommendation.

Revision 3 of this document includes changes from the July, 2001 CAP working group. It also references sam2r19.pdf instead of sam2r18.pdf.

This document also corrects what I believe is an error in SAM-2. This error comes from 97-225, which was approved and incorporated into sam2r05. I believe the error resulted from a trivial mistake by the author of 97-225 that was not caught by the working group. However this cannot be verified, as the author of 97-225 is no longer available.

The error concerns the situation when a unit attention condition has not yet been reported to an initiator (no ACA or CA exists) and the initiator issues an ordinary command (e.g. a READ or WRITE). SAM-2 currently specifies that the target **shall** return ACA ACTIVE (NACA=1) or BUSY (NACA=0) status. This is absurd. In the first case no ACA condition exists, yet the target is being required to return ACA ACTIVE. In the second case the target is being required to return BUSY for no reason. The proper response is for the target to return CHECK CONDITION and report the unit attention condition. This was the required response in sam2r04 and all prior versions back to SCSI-1.

Changes to SAM-2 (sam2r19.pdf).

Clause 5.8.4.2, Asynchronous Event Reporting, bottom of page 63, pdf page 85, last paragraph on that page. Change bars denote changes from sam2r19:

An error condition ~~encountered after command completion or unit attention condition~~ shall be reported to a specific initiator once per occurrence of the event causing it. The logical unit may choose to use an asynchronous event report or to return CHECK CONDITION status on a subsequent command, but not both. Notification of an error condition encountered after command completion shall be ~~returned-reported~~ only to the initiators that sent the affected task or tasks.

Clause 5.8.4.3, Autosense, top of page 64, pdf page 86, first two paragraphs of that clause. Change bars denote changes from sam2r19:

Autosense is the automatic return of sense data to the application client coincident with the completion of a SCSI command under the conditions described below. ~~The return of sense data in this way is equivalent to an explicit command from the application client requesting sense data immediately after being notified that an ACA condition has occurred.~~ Inclusion of autosense support in a SCSI protocol standard is optional.

~~As specified in clause 5,~~ The application client may request autosense service for any SCSI command. If supported by the protocol and logical unit and requested by the application client, the device server shall only return sense data in this manner coincident with the completion of a command with a status of CHECK CONDITION. After autosense

data is sent, ~~the sense data and~~ the CA (NACA equals zero), if any, shall then be cleared. Autosense shall not affect ACA (NACA equals one), see 5.8.1.

Clause 5.8.5, Unit Attention condition, top of page 65, pdf page 87, all paragraphs in that clause on that page. Change bars denote changes from 00-359r2:

If an INQUIRY command ~~enters the enabled task state-is-enabled~~, the logical unit shall perform the INQUIRY command and shall neither report nor clear any unit attention condition.

If a REPORT LUNS command ~~enters the enabled task state-is-enabled~~, the logical unit shall perform the REPORT LUNS command and shall not report any unit attention condition. The logical unit shall clear any unit attention condition established in response to a change in the logical unit inventory for all logical units for the initiator that sent the REPORT LUNS command.

If a REQUEST SENSE command ~~enters the enabled task state-is-enabled~~ while a unit attention condition exists for the initiator that sent the REQUEST SENSE command, ~~and the unit attention interlock (UAINTLCK) bit in the logical unit's control mode page contains zero (see SPC-3), then~~ the logical unit shall either:

- a) Report any pending sense data and preserve all unit attention conditions on the logical unit; or,
- b) Report a unit attention condition for the initiator that sent the REQUEST SENSE command.

~~If the logical unit reports a unit attention condition (the second option above), the logical unit may discard any pending sense data and may clear the reported unit attention condition for that initiator.~~

If the logical unit has already generated the auto contingent allegiance or contingent allegiance condition for ~~the-a~~ unit attention condition, the logical unit shall ~~report the unit attention condition (perform the second action listed above).~~

~~If a REQUEST SENSE command enters the enabled task state while a unit attention condition exists for the initiator that sent the REQUEST SENSE command, and the unit attention interlock (UAINTLCK) bit in the logical unit's control mode page contains one (see SPC-3), then the logical unit shall report a unit attention condition for the initiator that sent the REQUEST SENSE command. The logical unit shall clear the reported unit attention condition for that initiator.~~

If a command other than INQUIRY, REPORT LUNS, or REQUEST SENSE ~~enters the enabled task state-is-enabled~~ while a unit attention condition exists for the initiator that sent the command, the logical unit shall not perform the command and shall report CHECK CONDITION status. The logical unit shall provide sense data ~~and ASC/ASCQ codes~~ that reports a unit attention condition for the initiator that sent the command.

If a logical unit reports a unit attention condition with autosense or with an asynchronous event report, and the unit attention interlock (UAINTLCK) bit in the logical unit's control mode page contains zero, then the logical unit ~~shall~~ may clear the reported unit attention condition for that initiator on the logical unit (see 5.8.4.2, 5.8.4.3 and SPC-3). If the unit attention interlock (UAINTLCK) bit contains one, the logical unit shall not clear unit attention conditions reported with autosense or an asynchronous event report.

Changes to SPC-3 (spc3r00.pdf). Change bars denote changes from 00-359r2:

Clause 8.3.6, Control mode page, table 154, top of page 196, pdf page 215:

Define a reserved bit as UAINTLCK. I suggest bit 4 or 5 of byte 4.

Clause 8.3.6, Control mode page, top of page 198, pdf page 217, add the following paragraph:

A unit attention interlock (UAINTLCK) bit of zero specifies that the logical unit shall clear any unit attention condition reported with autosense or asynchronous event reporting

(see SAM-2). A unit attention interlock (UAINTLCK) bit of one specifies that the logical unit shall not clear any unit attention condition reported with autosense or asynchronous event reporting. **When the unit attention interlock (UAINTLCK) bit contains one, issuing a REQUEST SENSE command shall clear a unit attention condition.**