

Document: T10/00-359r2
To: T10 Committee Membership
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Subject: Unit Attention Issue

Date: July 11, 2001

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.

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 (sam2r18.pdf).

Clause 5.8.4.2, Asynchronous Event Reporting, bottom of page 64, pdf page 86:

An error condition **encountered after command completion** 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 **reported** only to the initiators that sent the affected task or tasks.

Clause 5.8.4.3, Autosense, top of page 65, pdf page 87:

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. Inclusion of autosense support in a SCSI protocol standard is optional.

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 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 66, pdf page 88, all paragraphs in that clause on that page:

If an INQUIRY command 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 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 is enabled while** a unit attention condition **exists for the initiator that sent the REQUEST SENSE command**, 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**, clear the reported unit attention condition for that initiator and discard any pending sense data.

If the logical unit has already generated the auto contingent allegiance or contingent allegiance condition for the unit attention condition, the logical unit shall perform the second action listed above.

If a command other than INQUIRY, REPORT LUNS, or REQUEST SENSE **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 report 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 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):

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.