

LASER MAGNETIC STORAGE  
INTERNATIONAL

MEMO

Optical Storage Division

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To: SCSI Standards Committee X3T9.2

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Subject: Asynchronous Event Notification Revision

*At the St. Petersburg Beach plenary in April, I accepted an action to expand on the description of AEN. This proposed text replaces that in S2R4 section 6.6. My objectives were to make clear that AEN is an alternative to the more traditional CHECK CONDITION / REQUEST SENSE protocol that may be useful in certain circumstances and to suggest that the use of this facility should be explicitly permitted by the processor and/or system integrator.*

*This revision includes changes to the text of the Unit Attention description to acknowledge that that state can be cleared by a successful AEN. 7/11/88*

*With the publication of S2R5 some of the terminology changed. The editors (Larry and John) discovered that at least ECA type AENs needed to have the LUN identified. This revision of the AEN section moves that format from the ECA section. prb 8/29/88*

*Text in italics is not to be added to the standard.*

## 6.6 Asynchronous Event Notification

Asynchronous event notification (AEN) is an optional protocol used to inform processor devices that an asynchronous event has occurred. Devices that respond to INQUIRY commands as a processor device type with asynchronous event notification capability may be notified of asynchronous events using AEN SEND commands. A SCSI device that is capable of acting as an initiator can perform asynchronous event notification.

Use of AEN is governed by the permissions fields in the Asynchronous Event Notification Parameters MODE SELECT page.

Three uses for AEN in a SCSI system are (1) for a device to inform a processor of an error condition encountered after command completion; (2) for a device newly initialized to inform all the processor devices on the bus of its availability; and (3) for a device to inform processor(s) of other Unit Attention conditions. An example of the first case is a tape that implements write caching. Notification of an unable to write condition can be sent to the processor that initiated the write via the AEN protocol. Any Unit Attention condition may appropriately be passed to processor devices with the AEN protocol. Devices that support removable media may use AEN to report media changed and operator initiated state changes (eg. write protect switch and media removal requests.)

An extended contingent allegiance condition may be reported (created ?) using an asynchronous event notification protocol.

IMPLEMENTORS NOTE: Asynchronous event notification cannot be used with a device that acts as a temporary initiator (e.g., devices executing third party COPY commands) since they are not identified as a processor device.

Notification of an asynchronous event is performed using the SEND command with the AEN bit set to one. The information identifying the condition being reported shall be returned during the DATA IN phase of the SEND command. The format of the AEN data is shown in Table 6-xx. The data sent beginning at byte 4 shall be the same as that which would have been returned to report the event in response to a REQUEST SENSE command.

Table 6-xx: AEN Data Format

Bit	7	6	5	4	3	2	1	0
Byte								
0	Identify	Reserved	LUNTAR	Reserved	Reserved	Logical Unit Number		
1	Sub-logical Unit Number							
2	Reserved							
3	Reserved							
4 to	Sense Data Byte (0)							
n+4	Sense Data Byte (n)							

The identify, LUNTAR, logical unit number, and sub-logical unit fields are defined in section 5.

The sense data bytes are defined in Table 7-58.

An error or unit attention condition successfully reported using the AEN protocol shall not also cause a CHECK CONDITION termination of a subsequent command. Similarly, if a CHECK CONDITION termination of a command from some processor is caused by an event a SEND command with the AEN bit set shall not be initiated to report that event to that processor. An event may be reported with either the CHECK CONDITION / REQUEST SENSE protocol or with the AEN protocol but shall not be reported to the same processor with both.

AEN protocol notification of command related exception conditions shall be sent only to the processor that initiated the operation.

Systems in which devices can become available independent of the rest of the system may use the AEN protocol to inform processors when they become ready. In this case the SEND command shall transfer a REQUEST SENSE data block with the UNIT ATTENTION sense key. Successful delivery of a unit attention condition notification via the AEN protocol shall clear the unit attention condition with respect to the receiving processor device.

At device initialization time, a SCSI device that wishes to perform asynchronous event notification conducts a survey to determine which processor devices have AEN capability. This survey is conducted by sending an INQUIRY command to logical unit 0 of each device that responds to selection.

After conducting the survey, the device verifies that each processor device with AEN capability is ready to receive asynchronous event notifications by issuing a TEST UNIT READY command. If a CHECK CONDITION status is returned a REQUEST SENSE command is issued. This procedure clears any pending UNIT ATTENTION conditions. If a processor device which reports AEN capability responds to a TEST UNIT READY with GOOD status it shall be ready to accept an AEN SEND command.

IMPLEMENTERS NOTE: A SCSI device which can use AEN at initialization time should provide means to defeat these notifications. This can be done with a switch or jumper. Devices which implement saved parameters may alternatively save the AEN permissions either on a per SCSI ID basis or as a system wide option. In any case, a device must conduct a survey with INQUIRY commands to be sure that the devices on the SCSI bus are appropriate destinations for AEN SEND commands. (The devices on the bus or the SCSI ID assignments may have changed.)

Related Sections: INQUIRY command — AENC bit in data block, MODE SENSE / MODE SELECT - AEN parameters page.

*The Asynchronous Event Notification Parameters MODE SELECT / MODE SENSE page is the means for a processor device to give explicit permission to a SCSI bus device for AEN SEND commands. This page is applicable to all device types. Devices that do not save mode select parameters save AEN will probably reject non zero RAENP and Ready AEN Holdoff fields. The following table and accompanying definitions are to be added to the MODE SELECT section of 7.2.x.*

Table 7-xx: Asynchronous Event Notification Parameters

Bit	7	6	5	4	3	2	1	0
Byte								
0	Reserved		Page Code (TBD)					
1	Parameter Length (06h)							
2	Reserved							
3	Reserved				RAENP	UAENP	EAENP	
4	Reserved							
5	Reserved							
6								
7	---		Ready AEN Holdoff Period (0 - 0FFFFh mS )				---	

The Asynchronous Event Notification Parameters Page (Table 7-xx) provides control over the use of the AEN protocol.

A Ready AEN Permission (RAENP) bit of one indicates that a device may initiate a SEND command with the AEN bit set upon completing its power up or hard reset initialization sequence. Note that this requires implementation of saved parameters.

A Unit Attention AEN Permission (UAENP) bit of one indicates that a device may initiate a SEND command with the AEN bit set upon sensing a Unit Attention Condition other than a reset.

An Error AEN Permission (EAENP) bit of one indicates that a device may initiate a SEND command with the AEN bit set upon sensing an error condition encountered while performing an operation initiated by a completed command (AEN deferred error reporting.)

The Ready AEN Holdoff Period field indicates the minimum number of milliseconds after starting its initialization sequence due to a reset condition or power-up before initiating a SEND command with the AEN bit. This parameter may be rounded up to the nearest capable value of the device. Note that this requires implementation of saved parameters.

#### 6.1.3 Unit Attention Condition

*Add the following new paragraph to the end of section 6.1.3.*

If a target issues a SEND Command with the AEN bit set which reports the Unit Attention condition to an initiator and the command executes with GOOD Completion Status, then the target shall clear the Unit Attention condition with respect to that initiator.

*The AEN Data Format table is moved to 6.6, the AEN section.*