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To: T10 Committee (SCSI)

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Subject: AEN on SAS

1 Asynchronous event reporting (for SAS)

SAS target ports shall send an AEN (asynchronous event notification) primitive when an asynchronous event has occurred in one of their logical units. Asynchronous events are defined in SAM-2 and the control mode page of SPC-3 and include initialization complete, other unit attention conditions, and deferred errors. The AEN primitive shall be sent by the expander device to all initiator ports at the next opportunity by replacing an idle dword.

SAS target ports shall only send AEN on a link that does not have an open connection.

SAS target devices shall generate an AEN whenever any of the conditions described in the control mode page (see SPC-3) occurs in the logical unit associated with that SSP target port.

AENs may be queued. After the first AEN is reported, another AEN may exist.

AENs shall persist on the REPORT AENs well known logical unit for each SAS initiator port until:

   a)   that SAS initiator port clears the AEN by issuing a REQUEST SENSE command to the REPORT AENs well known logical unit; or
   b)   the SAS target port returns information on the AEN in sense data for a pending command from that SAS initiator port.

Upon receipt of an AEN, an initiator port should then send a TEST UNIT READY or REQUEST SENSE command to the REPORT AENs well known logical unit (see xxxx) on each known target device to retrieve the sense data associated with the events.

2 New W-LUN table entry for SPC-3

The W-LUN field identifies well known logical unit to be addressed. See table 1 for a list of well know addresses.

Table 1 - W-LUN field values

W-LUN	Name	Subclause
00h	Reserved	
01h	REPORT LUNs	SPC-3
02h	REPORT AEN	SPC-3
02h-FFh	Reserved	

3 REPORT AENs for SAS

The REPORT AENs W-LUN shall only process the commands listed in table 2. If a command is received by the REPORT AENs well know logical unit that is not listed in table 2 the device server shall return CHECK CONDITION status with the sense key set to ILLEGAL REQUEST and an additional sense code of INVALID COMMAND OPERATION CODE.

After a REQUEST SENSE command is successfully completed the highest priority AEN for the initiator port that sent the REQUEST SENSE command shall be cleared for that initiator port.

The REQUEST SENSE command shall use the descriptor format (i.e., the DESC bit set to one) for returning sense data.

If a REQUEST SENSE command is received with the DESC bit set to zero the device server shall return CHECK CONDITION status with the sense key set to ILLEGAL REQUEST and an additional sense code of INVALID FIELD IN CDB.

The descriptor sense data shall, at a minimum, contain a sense data descriptor of type LUN.

Table 2 - REPORT AENs W-LUN commands

Command Name	Operation code	Type	Subclause
INQUIRY	12h	M	SPC-3
REQUEST SENSE	03h	M	SPC-2
TEST UNIT READY	00h	M	SPC-2
Key: M = Command implementation is mandatory.			

4 New Sense Data Descriptor (change for SPC-3)

Table 3 - Sense data descriptor types

Type	Descriptor	Reference
xxh	LUN	5

5 LUN sense data descriptor (change for SPC-3)

The LUN sense data descriptor (see table 4) indicates the logical unit to which the sense data applies.

Table 4 - LUN sense data descriptor

Bit Byte	7	6	5	4	3	2	1	0
0	DESCRIPTOR TYPE (xxh)							
1	ADDITIONAL LENGTH (0Ah)							
2	RESERVED							
3	RESERVED							
4	(MSB)							
				LOGICAL UNIT NUMBER				
11								(LSB)

The LOGICAL UNIT NUMBER field specifies the address of the logical unit of to which the sense data applies. The structure of the logical unit number field shall be as defined in the SCSI Architecture Model-2 standard.