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T10/06-420r0

To	From	Subject	Date
INCITS T10 Committee	Michael Banther, HP	SMC-3 TapeAlert enhancements	10 September 2006

Revision History

Revision 0 – Initial document.

Background

The TapeAlert feature suffers from several deficiencies. These deficiencies have inhibited its adoption by application clients.

Table 1 lists the known deficiencies (SMC3r02) and HP's proposed changes or enhancements:

Table 1 - TapeAlert Deficiencies and Proposed Corrections or Enhancements

	Deficiency	Proposed Correction or Enhancement
a	Clause 5.4.1 *TapeAlert introduction* exceeds the scope of the standard (see 1, *Scope*) in the constraints it seeks to place on application clients.	This proposal adds a clearly labelled Usage Model clause to 5.4. The new clause will describe the expected usage without mandating it.
b	Clause 5.4.1 *TapeAlert introduction* hints that an application client can configure a device server to report a TapeAlert flag state change as an informational exception. The standard does not include a clause describing the TapeAlert specific use of the Informational Exceptions Control mode page. The lack of detail makes it impossible to discover the usage model for this form of reporting. Reporting a TapeAlert flag state change as an informational exception may clash with reporting one using thresholds, yet an application client may wish to receive non-TapeAlert informational exceptions.	This proposal adds an explicit description of the informational exception usage model to 5.4. This proposal defines the TapeAlert specific functions of the Informational Exceptions Control mode page. This proposal defines the Device Configuration Extension mode page. To this page, this proposal adds a mode bit that controls whether or not a TapeAlert flag state change results in an informational exception condition.
c	Clause 5.4.2 *TapeAlert log sense format* requires de-activation of all active TapeAlert flags on a per-initiator basis when a LOG SENSE command returns the TapeAlert log page. De-activating flags when read has not had the benefit to application clients originally anticipated as it requires the application client to remember the state of previously read flags. Keeping the log page on a per-initiator basis uses substantial memory in Fibre Channel devices.	To the Device Configuration Extension mode page, this proposal adds a mode bit that controls whether or not a LOG SENSE command for the TapeAlert log page de-activates all active flags. A bit value of zero causes de-activation of all active flags; a bit value of one prohibits de-activation. This proposal alters the existing text in SMC3r02, 5.4 to strongly recommend keeping the TapeAlert log page on a per I_T nexus basis when the new mode bit equals zero and to permit keeping it on either a per I_T nexus or shared basis when the new mode bit equals one.
d	Clauses 5.4.2 *TapeAlert log sense format* and 7.2.2 *TapeAlert log page* define each TapeAlert flag as a separate log parameter. This format is inefficient and inconvenient for application clients that poll the TapeAlert log page.	This proposal adds an additional, optional TapeAlert log page with all flags in one parameter similar to the TapeAlert Response log page in ADC2r06, 6.1.3.
e	The existing definition of TapeAlert does not provide the application client with information about which flags a device server supports.	This proposal defines the TapeAlert Supported Flag VPD page

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	Deficiency	Proposed Correction or Enhancement
f	Clause 5.4.2 *TapeAlert log sense format* states that "the page control bits in the LOG SENSE command are not applicable and shall be ignored by the device server." Nowhere does the standard state what value the device server assumes for the PC field of a LOG SENSE command. If the device server assumes Cumulative values (i.e., PC equal to 01b; the most likely choice), 7.2.2 *TapeAlert log page* requires the device server to contradict the behaviour for the DU bit required by SPC-3 (SPC4r06, 7.2.1 *Log page structure and page codes for all device types*).	To the Device Configuration Extension mode page, this proposal adds a mode bit that controls whether or not the device server ignores the PC field. A bit value of zero causes the device server to ignore the PC field and to behave as though the PC field were set to 01b. A bit value of one causes the device server to respond to the command consistent with the setting of the PC field. This proposal also removes the fixed value of zero from the DU bit of every parameter in the TapeAlert log page so that the device server can set DU to one when a parameter reaches its maximum value.
g	Clause 7.2.2 *TapeAlert log page* does not define the contents of the VALUE OF FLAG field.	This proposal adds a sentence in 7.2.2 to define that an activated flag is represented by the value 1b and a deactivated flag is represented by the value 0b.
h	Clause 7.2.2 *TapeAlert log page* requires the device server to set the value of the TSD bit to zero. This value indicates that the device server, "implicitly saves the TapeAlert flag at vendor specific intervals" (SPC4r06, 7.2.1 *Log page structure and page codes for all device types*). Saving TapeAlert flags doesn't make very good sense.	This proposal changes the mandated value for the TSD bit of every parameter in the TapeAlert log page. The mandated value changes to one.
i	Clause 7.2.2 *TapeAlert log page* unnecessarily prohibits a device server from implementing threshold values for TapeAlert flags.	This proposal removes the mandated value for the ETC bit and the TMC field of every parameter in the TapeAlert log page. This proposal also redefines the VALUE OF FLAG field of every parameter in the TapeAlert log page to reserve the most significant seven bits of the byte. Restricting the field to a single bit limits the maximum parameter value to 1b.
j	Annex A is labelled as normative and contains a combination of normative and informative text for 32 of the 64 TapeAlert flags. Some of the informative text may exceed the scope of the standard. The text in Annex A needs clear labelling of what is normative and what is informative. Separation of the normative text – including the Code, Flag, Type, and Flag type columns – from the informative text may be in order.	This proposal moves the normative text from Annex A into the TapeAlert model clause, 5.4.

In the proposed text, text that is new compared to SMC-3 appears in blue, text that is deleted from SMC-3 appears in ~~red strikeout~~, and editorial comments appear in pink.

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Changes to SMC-3

5.4 TapeAlert ~~introduction~~ application client interface (a, b, c, d, f, i, j)

Replace all of 5.4.1 and 5.42 with:

5.4.1 TapeAlert introduction

TapeAlert provides an application client with the capability to receive notification of various events and conditions arising in the target device. This standard defines 64 unique TapeAlert flags for a media changer device. Other standards (e.g. SSC-3) may define other TapeAlert flags.

TapeAlert flags fall into three categories of severity (see table x+1).

Table x+1 — TapeAlert flag severity

Severity	Code	Definition
Critical	C	Either a failure has already occurred or a failure is likely to occur immediately. Continued operation without corrective action is likely to cause a failure. The condition should be logged and/or an operator informed.
Warning	W	If this condition is not corrected a data loss failure may occur. Continued operation without corrective action may possibly cause a failure. The condition should be logged and/or an operator informed.
Information	I	The condition should be logged and/or the operator informed. No guidance about continued operation without corrective action is given by this standard.

Editorial Note: The definition of Warning only makes sense for sequential-access devices. How should this definition change for media changer devices?

Table x+2 defines the 64 TapeAlert flags for a media changer device. See Annex A for additional information about each TapeAlert flag.

Table x+2 — TapeAlert flags

Flag	Name	Type	Severity	Deactivation condition
01h	Library Hardware A	O	C	
02h	Library Hardware B	M	W	
03h	Library Hardware C	O	C	
04h	Library Hardware D	M	C	
05h	Library Diagnostics Required	O	W	
06h	Library Interface	O	C	
07h	Predictive Failure	O	W	
08h	Library Maintenance	O	W	
09h	Library Humidity Limits	O	C	
0Ah	Library Temperature Limits	O	C	
0Bh	Library Voltage Limits	O	C	
0Ch	Library Stray Tape	O	C	
0Dh	Library Pick Retry	M	W	
0Eh	Library Place Retry	M	W	
0Fh	Library Load Retry	M	W	
10h	Library Door	M	C	
11h	Library Mailslot	O	C	
12h	Library Magazine	O	C	
13h	Library Security	O	W	
14h	Library Security Mode	O	I	
15h	Library Offline	O	I	
16h	Library Drive Offline	O	I	
17h	Library Scan Retry	M	W	

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18h	Library Inventory	O	C	
19h	Library Illegal Operation	O	W	
1Ah	Dual-port Interface Error	O	W	
1Bh	Cooling Fan Failure	O	W	
1Ch	Power Supply	O	W	
1Dh	Power Consumption	O	W	
1Eh	Pass-through Mechanism Failure	O	C	
1Fh	Cartridge in Pass-through Mechanism	O	C	
20h	Unreadable Barcode Labels	O	I	
21h– 40h	Reserved			
Type Key:	M=Mandatory O=Optional			

Editorial Note: For each TapeAlert flag, what condition(s) deactivate it?

5.4.2 TapeAlert usage model

5.4.2.1 TapeAlert usage model introduction

This standard describes three methods for an application client to monitor activation of TapeAlert flags:

a) Polling either the TapeAlert log page or the TapeAlert Response log page;
b) Configuring the device server to establish an informational exception condition upon activation of one or more TapeAlert flags.
c) Establishing a threshold for one or more of the parameters in the TapeAlert log page.

An application client may use any of these methods or a mixture of them.

Prior to using the TapeAlert Response log page with method (a), an application client should determine whether the device server supports the TapeAlert Response log page. An application client may determine if a device server supports a log page by issuing a LOG SENSE command with the PAGE CODE field set to 00h and examining the data returned.

5.4.2.2 TapeAlert polling usage model

The application client configures the device server for the TapeAlert polling usage model by:

a) Setting the TASER bit in the Device Configuration Extension mode page to one (see 7.3.y); and
b) Setting the ETC bit of every parameter in the TapeAlert log page to zero (see 7.2.2).

NOTE: Devices that comply with earlier generations of this standard set the ETC bit in each TapeAlert log parameter to zero and do not allow the application client to change this value.

If using the TapeAlert polling usage model, the application client reads the TapeAlert log page or the TapeAlert Response log page without receiving notification from the device server that a TapeAlert flag has changed state. The application client may read the TapeAlert log page or the TapeAlert Response log page at any time (e.g. polled at a regular interval of 60 seconds). The application client should read either the TapeAlert log page or the TapeAlert Response log page following an error.

Editorial Note: SSC-3 recommends four conditions for reading the TapeAlert flags. Should SMC-3 include anything more specific than 'following an error'?

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5.4.2.3 TapeAlert informational exception usage model

The application client configures the device server for the TapeAlert informational exception usage model by:

a) Setting the TASER bit in the Device Configuration Extension mode page to zero (see 7.3.y);

b) Setting the DEXCPT bit in the Informational Exceptions Control mode page to zero and the TEST bit in the Informational Exceptions Control mode page to zero (see 7.3.y+1);

c) Setting the MRIE field in the Informational Exceptions Control mode page to a supported value greater than zero (see 7.3.y+1); and

d) Setting the ETC bit of every parameter in the TapeAlert log page to zero (see 7.2.2).

NOTE: Devices that comply with earlier generations of this standard set the ETC bit in each TapeAlert log parameter to zero and do not allow the application client to change this value.

If using the TapeAlert informational exception usage model, the application client receives TapeAlert flag information after receiving notification from the device server that an informational exception has occurred. The device server generates an informational exception condition due to an activated TapeAlert flag. The device server does not generate an informational exception condition due to a de-activated TapeAlert flag. The method used by the device server to report the informational exception condition depends on the value of the MRIE field (see SPC-3). The application client should read the TapeAlert log page to retrieve the state of the TapeAlert flags.

If the TEST bit is set to zero, a device server reporting an informational exception condition for a TapeAlert flag sets the additional sense code to FAILURE PREDICTION THRESHOLD EXCEEDED.

5.4.2.4 TapeAlert threshold usage model

The application client configures the device server for the TapeAlert threshold usage model by:

a) Setting the TASER bit in the Device Configuration Extension mode page to one (see 7.3.y);

b) Setting to one the ETC bit of each parameter in the TapeAlert log page for which the application client wishes to receive a unit attention condition (see 7.2.2);

c) Setting to zero the ETC bit of each parameter in the TapeAlert log page for which the application client does not wish to receive a unit attention condition (see 7.2.2); and

d) Establishing a threshold value and a threshold met criteria (TMC) value for each TapeAlert log page parameter with the ETC bit set to one (see SPC-3).

NOTE: Devices that comply with earlier generations of this standard set the ETC bit in each TapeAlert log parameter to zero and do not allow the application client to change this value. These devices do not support the TapeAlert threshold usage model.

If using the TapeAlert threshold usage model, the application client receives a unit attention when a TapeAlert log page parameter meets its threshold criteria. The application client should read the TapeAlert log page to retrieve the state of the TapeAlert flags.

The threshold and TMC values determine whether the device server generates a unit attention condition on TapeAlert flag activation or de-activation.

5.4.3 TapeAlert flag activation and deactivation

The device server shall activate a TapeAlert flag upon detecting the condition or event specified in table x+3.

Table x+3 — TapeAlert flag activation conditions

Flag	Name	Activation condition

Editorial Note: Unlike SSC-3, SMC-3 does not include mandatory activation conditions for any TapeAlert flag. Should it?

The device server may activate a TapeAlert flag not listed in table x+3 upon detection of a vendor-specific condition.

Initialization processing due to a power-on condition may activate some TapeAlert flags.

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The device server shall deactivate a TapeAlert flag upon detecting the condition or event specified for that flag in table x+2. The device server shall not deactivate any TapeAlert flag due to a vendor-specific condition/event. The device server shall deactivate all TapeAlert flags:

a) Upon processing a LOG SENSE command with the PAGE CODE field set to 2Eh if the TAPLSD bit is set to zero (see 7.3.y); or
b) Upon detecting a logical unit reset condition (see SAM-3).

The device server may deactivate any TapeAlert flag on a vendor-specific basis due to:

a) Processing a LOG SELECT command with the PCR field set to one (see SPC-3); or
b) Processing a LOG SELECT command with the PARAMETER LIST LENGTH field set to zero and the PC field set to 11b.

If the device server deactivates a TapeAlert flag by processing a LOG SENSE command with the PAGE CODE field set to 2Eh, the device server shall not activate the flag again until the device server:

a) Detects the deactivation condition given in table x+2;
b) Detects a logical unit reset condition; or
c) Processes a LOG SELECT command with the PCR field set to one.

If the device server deactivates a TapeAlert flag through some other mechanism, the device server may activate the flag before

a) Detecting the deactivation condition given in table x+2;
b) Detecting a logical unit reset condition; or
c) Processing a LOG SELECT command with the PCR field set to one.

If the TAPLSD in the Device Configuration Extension mode page (see 7.3.y) is set to zero, the device server should de-activate flags on a per I_T nexus basis such that active flags are available for reading by other I_T nexuses. If the TAPLSD in the Device Configuration Extension mode page (see 7.3.y) is set to one, the device server may de-activate flags on a per I_T nexus basis.

NOTE: The device server de-activating TapeAlert flags on any basis other than per I_T nexus if the TAPLSD bit is set to zero violates backwards compatibility with previous versions of this standard.

5.4.5 TapeAlert Response log page

The TapeAlert flags reported through the TapeAlert Response log page (see 7.2.1) represent states. This approach facilitates accurate reporting of the conditions encountered by the device and allows the application client to manage the information directly. The device server does not maintain unique TapeAlert information for each initiator port, and the state flags are not affected by port events (e.g., port logins).

The application client is responsible for determining which flags have changed state upon subsequent retrieval of the TapeAlert Response log page, requiring the application client to maintain at least one previously retrieved TapeAlert Response log page in order to detect differences. The application client may maintain a state change history.

If the TAPLSD bit (see 7.3.y) is set to one, the device server shall maintain the value of the flags in the TapeAlert Response log page independently of the TapeAlert flags reported through the TapeAlert log page (see 7.2.2). A LOG SENSE command that retrieves the TapeAlert Response log page shall not set the flags in that page to zero and shall not set the flags in the TapeAert log page to zero. A LOG SENSE command that retrieves the TapeAlert log page shall not set the flags in the TapeAert Response log page to zero.

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7.2.1 Log page codes (d)

Table 30 – Log page codes

Page code	Description	Reference
	. . .	
11h	Reserved	
12h	TapeAlert Response log page	ADC
~~11h~~13h – 2Dh	Reserved	
	. . .	

7.2.2 TapeAlert log page (f, g, h, i)

The TapeAlert log page (see table 31) defines error and informational flags used for detailed device diagnostics and management (see 5.4 and Annex A). ~~Refer to table A.1 (see Annex A) for a description of the flags. Refer to SPC-3 for a description of the log page fields.~~

Support for the TapeAlert log page ~~(see table 31)~~ is optional for media changers. If supported, the TapeAlert log page shall operate using the flag definitions in ~~Annex A~~ clause 5.4.1 of this standard.

Table 31 – TapeAlert log page

Byte \ Bit	7	6	5	4	3	2	1	0
0	Reserved		PAGE CODE (2Eh)					
1	Reserved							
2	(MSB)		PAGE LENGTH (n-3 ~~140h~~)					
3								(LSB)
TapeAlert log parameters								
4	First TapeAlert log parameter							
	. . .							
n	Last TapeAlert log parameter							
~~5n+1~~	~~(MSB)~~		~~PARAMETER CODE (n)~~					
~~5n~~								~~(LSB)~~
~~5n+1~~	~~DU (0)~~	~~DS (1)~~	~~TSD (0)~~	~~ETC (0)~~	~~TMC (0)~~		~~LBIN (0)~~	~~LP (0)~~
~~5n+2~~	~~PARAMETER LENGTH (1)~~							
~~5n+3~~	~~VALUE OF FLAG~~							

See SPC-3 for a description of the PAGE CODE and PAGE LENGTH fields.

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Table x+4 defines the format of a TapeAlert log parameter.

Table x+4 – TapeAlert parameter format

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)			PARAMETER CODE				
1								(LSB)
2	DU	DS (1)	TSD (1)	ETC	TMC		LBIN (0)	LP (0)
3	PARAMETER LENGTH (01h)							
4	Reserved							FLAG

The value of the parameter code field shall range from 1 to 64.

See SPC-3 for a description of the DU bit, DS bit, TSD bit, ETC bit, TMC field, LBIN bit, and LP bit. The DS bit, TSD bit, LBIN bit, and LP bit shall be set to the value shown in table x+4.

An active TapeAlert flag has the FLAG bit set to one. An inactive TapeAlert flag has the FLAG bit set to zero.

If processing a LOG SELECT command and if the application client sends parameter data for the TapeAlert log page with the TSD or DS bits set to zero, the LP, LBIN or FLAG bits set to one, or the PARAMETER LENGTH field set to a value other than 01h, the device server shall:

a) Terminate the command with CHECK CONDITION status;
b) Set the sense key to ILLEGAL REQUEST; and
c) Set the additional sense code to INVALID FIELD IN PARAMETER LIST.

If the TASER bit is set to zero (see 8.3.y), the device server shall, upon processing a LOG SELECT command where the application client has sent parameter data for the TapeAlert log page with an ETC bit set to one:

a) Terminate the command with CHECK CONDITION status;
b) Set the sense key to ILLEGAL REQUEST; and
c) Set the additional sense code to INVALID FIELD IN PARAMETER LIST.

7.3.1 Mode page codes (b)

Table 32 – Mode page codes

Page code	Subpage code	Mode page codes	Reference
		. . .	
0Bh – 0Fh	00h – FEh	Reserved	
10h	01h	Device Configuration Extension mode page	7.3.y
~~0Bh~~ 11h – 17h	00h – FEh	Reserved	
		. . .	
1Ch	00h	Informational Exceptions Control	~~SPC-2~~ 7.3.y+1
		. . .	

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8.3.y Device Configuration Extension mode page (b, c, f)

The Device Configuration Extension mode page (see table x+5), a subpage of the Device Configuration mode page, provides control over SCSI features specific to Media Changer devices. If a device server supports the Device Configuration Extension mode page, then the device server shall provide access to the mode page using the shared mode page policy (see SPC-3).

Table x+5 – Device Configuration Extension mode page

Byte \ Bit	7	6	5	4	3	2	1	0
0	PS	SPF (1b)	PAGE CODE (10h)					
1	SUBPAGE CODE (01h)							
2	(MSB)	PAGE LENGTH (1Ch)						
3								(LSB)
4	Reserved				TARPF	TASER	TARPC	TAPLSD
5	Reserved							
31								

See SPC-3 for a description of the PS bit, SPF bit, PAGE CODE field, SUBPAGE CODE field, and PAGE LENGTH field.

A TapeAlert Prevent LOG SENSE De-activation (TAPLSD) bit set to one specifies that the device server shall not alter the value of implemented TapeAlert FLAG parameters (see 7.2.2) due to processing of a LOG SENSE command with the PAGE CODE field set to 2Eh. A TAPLSD bit set to zero specifies that, as part of the processing of a LOG SENSE command with the PAGE CODE field set to 2Eh, the device server shall deactivate every supported TapeAlert flag.

A TapeAlert Respect Page Control (TARPC) bit set to one specifies that the device server shall select the type of parameter values for the TapeAlert log page (see 7.2.2) using the value of the page control field in a LOG SELECT or LOG SENSE CDB (see SPC-3). A TARPC bit set to zero specifies that the device server shall select cumulative parameter values for the TapeAlert log page regardless of the value of the page control field in a LOG SELECT or LOG SENSE CDB.

NOTE: An application client using the TapeAlert threshold usage model (see 5.4.2.4) should set the TARPC bit to one.

A TapeAlert Select Exception Reporting (TASER) bit set to one specifies that:

a) Activation of a TapeAlert flag shall not result in an informational exception condition (see 7.3.y+1); and
b) Activation or deactivation of a TapeAlert flag may result in the generation of a unit attention condition with the additional sense code set to THRESHOLD CONDITION MET depending on the value of the ETC bit in each parameter in the TapeAlert log page.

A TASER bit set to zero specifies that:

a) Activation of a TapeAlert flag shall result in an informational exception condition (see 7.3.y+1);
b) Activation or deactivation of a TapeAlert flag shall not result in the generation of a unit attention condition with the additional sense code set to THRESHOLD CONDITION MET; and
c) The device server shall set the ETC bit in each parameter of the TapeAlert log page to zero.

The device server may provide independent sets of TapeAlert log parameters for each I_T nexus (see SPC-3). If the device server does not support independent sets of TapeAlert log parameters and the processing of a MODE SELECT command with the TASER bit set to zero results in a change in the value of the ETC bit in a TapeAlert log parameter, then the device server shall establish a unit attention condition (see SAM-3) for the initiator port associated with every I_T nexus, except the I_T nexus on which the MODE SELECT command was received, with the additional sense code set to LOG PARAMETERS CHANGED.

A TapeAlert Respect Parameter Fields (TARPF) bit set to one specifies that the device server shall select the parameters of the TapeAlert log page (see 7.2.2) to report in response to a LOG SENSE command using the values of the PPC bit and the PARAMETER POINTER field (see SPC-3). A TARPF bit set to zero specifies that the device server shall report all TapeAlert log page parameters regardless of the values of the PPC bit and the PARAMETER POINTER field.

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8.3.y+1 Informational Exceptions Control mode page (b)

In addition to support for all device types (see SPC-3), the Informational Exceptions Control mode page (see table x+6) specifies parameters for the control of TapeAlert specific informational exception conditions for a sequential-access device.

Table x+6 – Information Exceptions Control mode page

Byte \ Bit	7	6	5	4	3	2	1	0
0	PS	spf (0b)	PAGE CODE (1Ch)					
1	PAGE LENGTH (0Ah)							
2	PERF	Rsvd	EBF	EWASC	DEXCPT	TEST	Rsvd	LOGERR
3	Reserved				MRIE			
4	(MSB)	INTERVAL TIMER						
5								
6								
7								(LSB)
8	(MSB)	REPORT COUNT/TEST FLAG NUMBER						
9								
10								
11								(LSB)

See SPC-3 for a description of the PS bit SPF bit, PAGE CODE field, PAGE LENGTH field, PERF bit, EBF bit, EWASC bit, LOGERR bit, and INTERVAL TIMER field.

SPC-3 defines the effect of setting the TEST bit to one if the REPORT COUNT/TEST FLAG NUMBER field is set to zero. In response to a MODE SENSE command reporting parameters from the Informational Exceptions Control mode page, the device server shall set the value of the TEST bit to zero. The device server shall not alter the value of any TapeAlert flags in response to an application client setting the TEST bit to one and the REPORT COUNT/TEST FLAG NUMBER field to zero.

Table x+7 defines the effect of setting the TEST bit to one if the REPORT COUNT/TEST FLAG NUMBER field is set to a non-zero value. In response to a MODE SENSE command reporting parameters from the Informational Exceptions Control mode page, the device server shall set the value of the TEST bit to zero. If both the TEST bit and the DEXCEPT bit are set to one, the device server shall terminate the MODE SELECT command with CHECK CONDITION status, shall set the sense key set to ILLEGAL REQUEST, and shall set the additional sense code set to INVALID FIELD IN PARAMETER LIST.

Table x+7 – TEST bit and TEST FLAG NUMBER field definition

TEST FLAG NUMBER	Description
1 to 64	Activate the TapeAlert flag specified by the TEST FLAG NUMBER field. Report the informational exception condition for the TapeAlert flag with an additional sense code of FAILURE PREDICTION THRESHOLD EXCEEDED (FALSE) and based on the DEXCPT, MRIE, INTERVAL TIMER, and REPORT COUNT values.
-1 to -64	Deactivate the TapeAlert flag specified by the absolute value of the TEST FLAG NUMBER field. Deactivating the flag in this way is equivalent to performing the specified corrective action for that flag.
32767	Activate all supported TapeAlert flags. Report the informational exception condition for the TapeAlert flags with an additional sense code of FAILURE PREDICTION THRESHOLD EXCEEDED (FALSE) and based on the DEXCPT, MRIE, INTERVAL TIMER, and REPORT COUNT values.
all others	Return CHECK CONDITION status. Set the sense key to ILLEGAL REQUEST and the additional sense code to INVALID FIELD IN PARAMETER LIST.

SPC-3 defines the effect of setting the TEST bit to zero.

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See SPC-3 for a description of the DEXCPT bit. A device server shall not report non-TapeAlert informational exceptions with an additional sense code of FAILURE PREDICTION THRESHOLD EXCEEDED if the DEXCPT bit is set to zero and the TASER bit in the Device Configuration Extension mode page is set to zero (see 7.3.y).

See SPC-3 for a description of the MRIE field. For MRIE modes 02h to 06h, an additional sense code of FAILURE PREDICTION THRESHOLD EXCEEDED specifies a TapeAlert event has occurred on the device. Detailed information about the event is stored in the TapeAlert log page. If multiple TapeAlert flags are active simultaneously, the device server shall report a single informational exception condition.

NOTE: The value of the MRIE field does not affect parameters in the TapeAlert log page or the TapeAlert Response log page.

The REPORT COUNT/TEST FLAG NUMBER field has a dual purpose:

a) SPC-3 defines the operation of the REPORT COUNT/TEST FLAG NUMBER field if the TEST bit is set to zero. When reporting an informational exception condition associated with TapeAlert flags, upon activation of a TapeAlert flag the device server shall report to the application client the informational exception condition the number of times indicated by the value of the REPORT COUNT/TEST FLAG NUMBER field.

b) If the TEST bit is set to one, the value of the REPORT COUNT/TEST FLAG NUMBER field represents the test flag number. In response to a MODE SENSE command reporting parameters from the Informational Exceptions Control mode page, the device server shall set the value of the REPORT COUNT/TEST FLAG NUMBER field to zero. Table x+7 defines valid values for the TEST FLAG NUMBER field. Negative numbers shall be represented using the 2's complement notation and shall be sign extended to 4 bytes.

7.4 Vital product data (VPD) parameters (e)

7.4.1 VPD parameters overview and page codes

This subclause defines the VPD pages used with media changer device types. See SPC-4 for VPD pages used with all device types. The VPD page codes specific to media changer devices are specified in table x+8.

Table x+8 – Sequential-access device VPD page codes

Page code	VPD page name	Reference	Support Requirements
B0h – B1h	Reserved for this device type		
B2h	TapeAlert supported flags VPD page	7.4.2	Optional
B2h – BFh	Reserved for this device type		

7.4.2 TapeAlert supported flags VPD page

Table x+9 specifies the TapeAlert supported flags VPD page. This page provides the application client with the means to determine the TapeAlert flags supported by the device server.

Table x+9 TapeAlert Supported Flags VPD page

Bit / Byte	7	6	5	4	3	2	1	0
0	PERIPHERAL QUALIFIER			PERIPHERAL DEVICE TYPE				
1	PAGE CODE (B2h)							
2	Reserved							
3	PAGE LENGTH (08h)							
4	FLAG01h	FLAG02h	FLAG03h	FLAG04h	FLAG05h	FLAG06h	FLAG07h	FLAG08h
5	FLAG09h	FLAG0Ah	FLAG0Bh	FLAG0Ch	FLAG0Dh	FLAG0Eh	FLAG0Fh	FLAG10h
6	FLAG11h	FLAG12h	FLAG13h	FLAG14h	FLAG15h	FLAG16h	FLAG17h	FLAG18h
7	FLAG19h	FLAG1Ah	FLAG1Bh	FLAG1Ch	FLAG1Dh	FLAG1Eh	FLAG1Fh	FLAG20h
8	FLAG21h	FLAG22h	FLAG23h	FLAG24h	FLAG25h	FLAG26h	FLAG27h	FLAG28h
9	FLAG29h	FLAG2Ah	FLAG2Bh	FLAG2Ch	FLAG2Dh	FLAG2Eh	FLAG2Fh	FLAG30h
10	FLAG31h	FLAG32h	FLAG33h	FLAG34h	FLAG35h	FLAG36h	FLAG37h	FLAG38h
11	FLAG39h	FLAG3Ah	FLAG3Bh	FLAG3Ch	FLAG3Dh	FLAG3Eh	FLAG3Fh	FLAG40h

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The PERIPHERAL QUALIFIER field and the PERIPHERAL DEVICE TYPE field are defined in SPC-3.

The PAGE LENGTH field specifies the length of the following VPD page data. If the allocation length value in the INQUIRY command descriptor block is too small to transfer all of the VPD page data, the page length shall not be adjusted to reflect the truncation.

Each FLAGXX bit indicates whether the device server supports the corresponding TapeAlert flag or not. A supported TapeAlert flag has the corresponding FLAGXX bit set to one. A TapeAlert flag that the device server does not support has the corresponding FLAGXX bit set to zero.

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Annex A

(~~normative~~ informative)

A.1 Application client recommendations for using TapeAlert

A.1.1 Introduction to application client recommendations for using TapeAlert

The previous version of this standard included some recommendations for application clients that use TapeAlert. This standard deprecates these recommendations as they fall outside of its scope. To minimise the effort of referencing these recommendations for those application client designers that have incorporated them into products, this standard gathers them together and presents them below.

A.1.2 Recommendations for using TapeAlert

Upon detecting an active TapeAlert flag, the application client should:

a) Communicate an error message (see A.2), the flag's severity (see table x+2), and the applicable description for that severity (see table x+1) to the user interface; and

b) Store the error message, the flag's severity, and the applicable attributes for that severity in a log.

At the beginning of each set of TapeAlert error messages, the application client should identify the target device that initiated them. Each time the application client reads the TapeAlert log page or the TapeAlert Response log page, it should check all returned flags (see table x+2) to detect active flags. More than one flag may be active at a time.

A.~~1~~2 TapeAlert flags associated information (j)

Table A.1 ~~is a listing of~~ lists the TapeAlert flags and associated information in numeric order.

Table A.1 — TapeAlert ~~for media changers~~ associated information

EDITORIAL NOTE: Delete the Type and Flag Type columns from the table that follows.