DELL

To: T10 Technical Committee
From: Gary Lestage, Kyle Walczak and Kevin Marks - Dell, Inc.
Date: October 2, 2006
Subject: T10/06-395r1 - SMC-3: Diagnostic log pages for SMC

Revision History

Revision 0 (8/30/06) – Initial proposal
Revision 1 (10/2/06) – changes based on review and reverting back to SPC-3 log structure.

Related Documents

SCSI Media Changer Commands - 3 (T10/1730-D - SMC-3r02)

New text to be added to SSC-3
~~Text to be deleted from SSC-3~~
Editorial text

Overview

As part of the ISV feedback resolution and that Dell sees a need to standardize log pages that will allow for the collection of information required during field analysis and troubleshooting of media changer devices. This proposal is beneficial to those applications that report diagnostic information back via diagnostic software. Special code will no longer need to be written specific to the media changer device being used. This proposal defines a media changer diagnostics data log page that contains a collection of sense and diagnostics data used in field analysis and troubleshooting of media changer devices.

Suggested Changes to SMC-3:

<< Add new row to Table 30 - Log page codes >>

Table 30 — Log page codes

Page Code	Description	Reference
….	….	….
ZZh	Media Changer Diagnostic Data log page	7.2.z
….	….	….

<< Where ZZh is the assigned log pages. >>

7.2.z Media changer Diagnostic Data log page

The Media Changer Diagnostic Data log page (see table z) provides for a number of error-event records using the list parameter format. Each error-event record contains diagnostic information for a single error type encountered by the media changer device including data counters associated with the error event, sense data, operation code/service action, pick, place, barcode reader statistics and initial and target element addresses of move type operations etc. The Media Changer Diagnostic Data log page may be used to aid in field analysis and repair.

The Media Changer Diagnostic Data log page shall only include parameter entries for commands that terminated with a CHECK CONDITION status having the sense key set to NOT READY, HARDWARE ERROR or ABORTED COMMAND.

The parameter code value associated with an error-event indicates the relative time at which a command terminated with a CHECK CONDITION status. A lower parameter code indicates that the command terminated with a CHECK CONDITION status at a more recent time. The parameter code values returned shall be numbered consecutively from 0000h (i.e., the most recent) up to n, where n is the number of current parameter entries. The number of supported parameter entries, n, is vendor specific.

In each parameter (see table z+1) if the REPEAT bit is set to zero, then the parameter represents only a single event. If the REPEAT bit is set to one, then the parameter represents more than one consecutive events that had the identical values for the TARGET ADDRESS field, SENSE KEY field, ADDITIONAL SENSE CODE field and ADDITIONAL SENSE CODE QUALIFIER field in the parameter. If the REPEAT bit is set to one in the parameter, then other fields in the parameter shall be set to the values when the first of the consecutive events that had the identical values for the TARGET ADDRESS field, SENSE KEY field, ADDITIONAL SENSE CODE field and ADDITIONAL SENSE CODE QUALIFIER field occurred.

All parameter codes shall be persistent across I_T nexus losses, logical unit resets, and power-on. The parameter entries shall not be set to zero or changed with the use of a LOG SELECT command.

Table z - Media Changer Diagnostic Data log page

Byte\Bit	7	6	5	4	3	2	1	0
0	Reserved		PAGE CODE (ZZh)					
1	Reserved							
2	(MSB)	PAGE LENGTH (n-3)						
3								(LSB)
	Media changer diagnostic data log parameters							
4	First media changer diagnostic data log parameter (see table z+1)							
	:							
n	Last media changer diagnostic data log parameter (see table z+1)							

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

The media changer diagnostic data log parameter format is shown in table z+1.

Table z+1 – Media changer diagnostic data log parameter format

Byte\Bit	7	6	5	4	3	2	1	0
0	(MSB)	PARAMETER CODE						
1								(LSB)
2	DU (0b)	DS	TSD (0b)	ETC (0b)	TMC (00b)		LBIN(1b)	LP(1b)
3	PARAMETER LENGTH (n-3)							
4	Reserved							
5	REPEAT	Reserved				SENSE KEY		
6	ADDITIONAL SENSE CODE							
7	ADDITIONAL SENSE CODE QUALIFIER							
8	(MSB)	VENDOR SPECIFIC CODE QUALIFIER						
11								(LSB)
12	(MSB)	PRODUCT REVISION LEVEL						
15								(LSB)
16	(MSB)	NUMBER OF MOVES						
19								(LSB)
20	(MSB)	NUMBER OF PICKS						
23								(LSB)
24	(MSB)	NUMBER OF PICK RETRIES						
27								(LSB)
28	(MSB)	NUMBER OF PLACES						
31								(LSB)
32	(MSB)	NUMBER OF PLACE RETRIES						
35								(LSB)
36	(MSB)	NUMBER OF VOLUME TAGS READ						
39								(LSB)
40	(MSB)	NUMBER OF INVALID VOLUME TAGS RETURNED						
43								(LSB)
44	OPERATION CODE							
45	Reserved				SERVICE ACTION			
46	(MSB)	MEDIUM TRANSPORT ADDRESS						
47								(LSB)
48	(MSB)	INITIAL ADDRESS						
49								(LSB)
50	(MSB)	TARGET ADDRESS						
51								(LSB)
52	(MSB)	VOLUME IDENTIFIER						
:								
:								
83								(LSB)
84	Reserved					TIMESTAMP ORIGIN		
85	Reserved							
86	TIMESTAMP							
91								
92	Vendor specific							
n								

See SPC-3 for a description of the PARAMETER CODE field.

See SPC-3 for descriptions of the DU bit, DS bit TSD bit, ETC bit, TMC field, LBIN bit and LP bit. The DU bit, TSD bit, ETC bit, TMC field, LBIN bit and LP bit shall be set to the values shown in table z+1.

The PARAMETER LENGTH field indicates the number of bytes in the media changer diagnostic data log parameter data that follows.

The REPEAT bit set to one indicates this parameter represents more than one consecutive events that had identical values for the TARGET ADDRESS field, SENSE KEY field, ADDITIONAL SENSE CODE field, and ADDITIONAL SENSE CODE QUALIFIER field. The REPEAT bit set to zero indicates this parameter represents a single event.

See SPC-3 for descriptions of the SENSE KEY field, ADDITIONAL SENSE CODE field, and ADDITIONAL SENSE CODE QUALIFIER field. The SENSE KEY field, ADDITIONAL SENSE CODE field, and ADDITIONAL SENSE CODE QUALIFIER field shall contain the sense key and additional sense code values of the command that terminated with the CHECK CONDITION status.

The VENDOR SPECIFIC CODE QUALIFIER field is vendor specific. The VENDOR SPECIFIC CODE QUALIFIER may provide additional diagnostics information related to the command that terminated with the CHECK CONDITION status.

See SPC-3 for the descriptions of the PRODUCT REVISION LEVEL field. The PRODUCT REVISION LEVEL field shall contains the product revision level at the time the command terminated with the CHECK CONDITION status.

The NUMBER OF MOVES field contains the number of moves from all elements at the time the command terminated with the CHECK CONDITION status. The NUMBER OF MOVES field is equivalent to the value contained in the Media Changer Statistics log page (see x.x.x) with a parameter code of 0000h at the time the command terminated with the CHECK CONDITION status.

The NUMBER OF PICKS field contains the number of picks from all elements at the time the command terminated with the CHECK CONDITION status. The NUMBER OF PICKS field is equivalent to the value contained in the Media Changer Statistics log page (see x.x.x) with a parameter code of 0001h at the time the command terminated with the CHECK CONDITION status.

The NUMBER OF PICK RETRIES field contains the number of pick retries from all elements at the time the command terminated with the CHECK CONDITION status. The NUMBER OF PICK RETRIES field is equivalent to the value contained in the Media Changer Statistics log page (see x.x.x) with a parameter code of 0002h at the time the command terminated with the CHECK CONDITION status.

The NUMBER OF PLACES field contains the number of places to all elements at the time the command terminated with the CHECK CONDITION status. The NUMBER OF PLACES field is equivalent to the value contained in the Media Changer Statistics log page (see x.x.x) with a parameter code of 0003h at the time the command terminated with the CHECK CONDITION status.

The NUMBER OF PLACE RETRIES field contains the number of place retries to all elements at the time the command terminated with the CHECK CONDITION status. The NUMBER OF PLACE RETRIES field is equivalent to the value contained in the Media Changer Statistics log page (see x.x.x) with a parameter code of 0004h at the time the command terminated with the CHECK CONDITION status.

The NUMBER OF VOLUME TAGS READ field contains the number of volume tags read by the volume tag reader at the time the command terminated with the CHECK CONDITION status. The NUMBER OF VOLUME TAGS READ field is equivalent to the value contained in the Media Changer Statistics log page (see x.x.x) with a parameter code of 0005h at the time the command terminated with the CHECK CONDITION status. If the media changer device does not contain a volume tag reader (i.e., the Volume Tag Reader Present (VTRP) bit in the Device Capabilities mode page is set to zero), then the NUMBER OF VOLUME TAGS READ field should be set to zero.

The NUMBER OF INVALID VOLUME TAGS RETURNED field contains the number of invalid volume tags returned by the volume tag reader at the time the command terminated with the CHECK CONDITION status. The NUMBER OF INVALID VOLUME TAGS RETURNED field is equivalent to the value contained in the Media Changer Statistics log page (see x.x.x) with a parameter code of 0006h at the time the command terminated with the CHECK CONDITION status. If the media changer device does not contain a volume tag reader (i.e., the Volume Tag Reader Present (VTRP) bit in the Device Capabilities mode page is set to zero), then the NUMBER OF INVALID VOLUME TAGS RETURNED field should be set to zero.

See SPC-3 for descriptions of the OPERATION CODE field and SERVICE ACTION field. The OPERATION CODE field and SERVICE ACTION field if applicable contain the operation code and service action of the command that terminated with the CHECK CONDITION status.

If the command required motion by a medium transport element (e.g., MOVE MEDIUM), then:
  a) the MEDIUM TRANSPORT ADDRESS field contains the element address of the medium transport involved at the time the motion related command terminated with the CHECK CONDITION status;
  b) the INITIAL ADDRESS field contains the element address which the medium transport was at prior to the time the command terminated with the CHECK CONDITION status (i.e., the position of the robotics prior to moving to the element address required by the command.) If the medium transport is not at defined element address and media changer supports the ability to determine the element address closest to its initial location, then the INITIAL ADDRESS field should be set to that element address. If the element address defined by the INITIAL ADDRESS field is not known, the INITIAL ADDRESS field should be set to zero; and
  c) the TARGET ADDRESS field contains the element address which the medium transport was moving to prior to the time the motion related command terminated with the CHECK CONDITION status (i.e., the element address the robotics was moving to as required by the command.)

If the command did not require motion by a medium transport element, then the MEDIUM TRANSPORT ADDRESS field, INITIAL ADDRESS field and TARGET ADDRESS field should be set to zero.

The VOLUME IDENTIFER field contains the volume identifier from the volume tag information (see 5.4.3). If the media changer device does not contain a volume tag reader (i.e., the Volume Tag Reader Present (VTRP) bit in the Device Capabilities mode page is set to zero) or the volume identifier is unknown, then the VOLUME IDENTIFER field should be filled with ASCII space characters (i.e., 20h).

See SPC-3 for descriptions of the TIMESTAMP ORIGIN and TIMESTAMP fields. The TIMESTAMP ORIGIN field and TIMESTAMP field contain the timestamp origin and timestamp maintained by the device server at the time the command terminated with the CHECK CONDITION status. If a timestamp is not supported by the device server, the TIMESTAMP ORIGIN and TIMESTAMP fields shall be set to zero.