

To: INCITS Technical Committee T10

From: Kevin Butt, IBM

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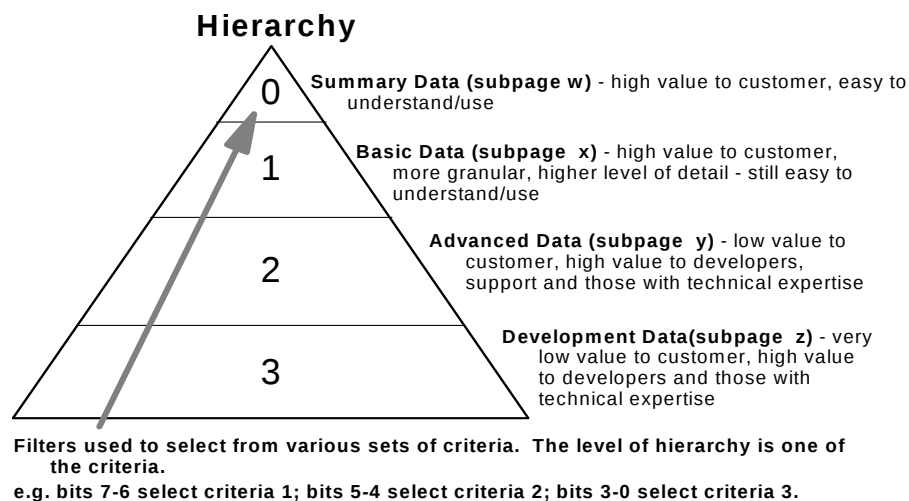
Document: T10/04-389r5

Subject: SPC-4: Log Parameter Subpages

1. Revisions

2. Introduction

Some of our products make extensive use of Log Pages. Currently there are only 15 Vendor-Reserved log pages available. We are already using 13 of those and have plans to use more in the future. Additionally, we would like to be able to have a hierarchical structure or filtering structure available in log pages. We would like to extend Log Pages to use subpage codes like already exists in Mode pages. This will increase the number of log pages available and allow us to use a



filter mechanism on the subpage to specify a specific hierarchy of what we return. That is, we would like to have a large set of parameters. Depending on the subpage selected, we would return a specific level of parameters. The parameter definition and value would be the same in different subpages. While this commonality of parameter definitions

and value are not necessary for this proposal it is mentioned to give background on the purpose of this proposal. Also, we could use the same parameter value in different subpages that have different meanings.

While these pages are vendor-specific, the log page format is not necessarily vendor-specific, and we believe that these modifications are better done by modifying the standard.

Additionally, we would like to extend Log Select to have a page code and subpage code fields in the CDB to allow for resetting all counters in that one page/subpage combination.

3. Proposal

6.5 LOG SELECT command

The LOG SELECT command (see table 89) provides a means for an application client to manage statistical information maintained by the device about the device or its logical units. Device servers that implement the LOG SELECT command shall also implement the LOG SENSE command. Structures in the form of log parameters within log pages are defined as a way to manage the log data. The LOG SELECT command provides for sending zero or more log pages via the Data-Out Buffer. This standard defines the format of the log pages, but does not define the exact conditions and events that are logged.

TABLE 89. LOG SELECT command

Bit Byte	7	6	5	4	3	2	1	0
0	OPERATION CODE (4Ch)							
1	Reserved						PCR	SP
2	PC		PAGE CODE					
3	SUBPAGE CODE							
4	Reserved							
5	Reserved							
6	Reserved							
7	PARAMETER LIST LENGTH							
8								
9	CONTROL							

~~A parameter code reset (PCR) bit set to one and a parameter list length of zero shall cause all implemented parameters to be set to the vendor specific default values (e.g., zero). If the PCR bit is set to one and the parameter list length is greater than zero, the command shall be terminated with CHECK CONDITION status, with the sense key set to ILLEGAL REQUEST, and the additional sense code set to INVALID FIELD IN CDB. A PCR bit set to zero and PAGE CODE and SUBPAGE CODE are zero specifies that the log parameters shall not be reset.~~

The parameter code reset (PCR) bit used in conjunction with the parameter list length, page code, and subpage code defines the reset behavior for page codes and subpage codes. The PCR bit is defined in Table 90.

TABLE 90. Subpage code and parameter code reset bit

<u>parameter list length</u>	<u>PC</u>	<u>PCR</u>	<u>page code</u>	<u>subpage code</u>	<u>result</u>
<u>0</u>	<u>0</u>	<u>1</u>	<u>00h</u>	<u>00h</u>	all implemented cumulative and threshold parameters in all legacy log pages (i.e. subpage code of zero) shall be set to vendor specific values
			<u>n > 00h</u>	<u>00h</u>	all implemented cumulative and threshold parameters in legacy log page n (i.e. subpage code of zero) shall be set to vendor specific values
				<u>01h-FFh</u>	all implemented cumulative and threshold parameters in log page n subpage specified by subpage code shall be set to vendor specific values
				<u>FFh</u>	all implemented cumulative and threshold parameters in the legacy page n and all subpages shall be set to vendor specific values
			<u>00h</u>	<u>FFh > n > 00h</u>	the command shall be terminated with CHECK CONDITION status, with the sense key set to ILLEGAL REQUEST, and the additional sense code set to INVALID FIELD IN CDB
			<u>00h</u>	<u>FFh</u>	all implemented cumulative and threshold parameters shall be set to vendor specific values
	<u>01b or 11b</u>	<u>0</u>	<u>00h</u>	<u>00h</u>	log parameters shall not be reset
			<u>n > 00h</u>	<u>00h</u>	all implemented cumulative parameters in legacy log page n (i.e. subpage code of zero) shall be set to the default threshold values
				<u>01h-FFh</u>	all implemented cumulative parameters in log page n subpage specified by subpage code shall be set to the default threshold values
				<u>FFh</u>	all implemented cumulative parameters in the legacy page n and all subpages shall be set to the default threshold values
			<u>00h</u>	<u>FFh > n > 00h</u>	the command shall be terminated with CHECK CONDITION status, with the sense key set to ILLEGAL REQUEST, and the additional sense code set to INVALID FIELD IN CDB
			<u>00h</u>	<u>FFh</u>	all implemented cumulative parameters shall be set to the default threshold values

TABLE 90. Subpage code and parameter code reset bit

<u>parameter list length</u>	<u>PC</u>	<u>PCR</u>	<u>page code</u>	<u>subpage code</u>	<u>result</u>
<u>0</u>	<u>00b or 10h</u>	<u>0</u>	<u>00h</u>	<u>00h</u>	<u>log parameters shall not be reset</u>
			<u>n > 00h</u>	<u>00h</u>	<u>all implemented current threshold parameters in legacy log page n (i.e. subpage code of zero) shall be set to the default threshold values</u>
				<u>01h-FEh</u>	<u>all implemented current threshold parameters in log page n subpage specified by subpage code shall be set to the default threshold values</u>
				<u>FFh</u>	<u>all implemented current threshold parameters in the legacy page n and all subpages shall be set to the default threshold values</u>
			<u>00h</u>	<u>FFh > n > 00h</u>	<u>the command shall be terminated with CHECK CONDITION status, with the sense key set to ILLEGAL REQUEST, and the additional sense code set to INVALID FIELD IN CDB</u>
			<u>00h</u>	<u>FFh</u>	<u>all implemented current threshold parameters shall be set to the default threshold values</u>
<u>non-zero</u>	<u>=</u>	<u>1</u>	<u>=</u>	<u>=</u>	<u>the command shall be terminated with CHECK CONDITION status, with the sense key set to ILLEGAL REQUEST, and the additional sense code set to INVALID FIELD IN CDB</u>
		<u>0</u>	<u>non-zero</u>	<u>=</u>	
			<u>=</u>	<u>non-zero</u>	
			<u>00h</u>	<u>00h</u>	<u>log parameters as specified by the PC field shall be modified as specified by the parameter data.</u>

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Editors Note: There is conflict between the PCR bit and the PC field in SPC-3r22a when Parameter List Length is set to 0. This had been resolved in the table and textual resolution is noted in the strikeout text.

~~The device server shall set the current threshold parameters to the default threshold values in response to a LOG SELECT command with the PC field set to 00b or 10b and the parameter list length field set to zero.~~

~~The device server shall set all cumulative parameters to their default values in response to a LOG SELECT command with the PC field set to 01b or 11b and the parameter list length field set to zero.~~

The application client should send log pages in ascending order by page code value and subpage code value if the Data-Out Buffer contains multiple log pages. If the Data-Out Buffer contains multiple log parameters within a log page, then they should be sent in ascending order by param-

eter code value. If the application client sends log pages out of order or parameter codes out of order, the command shall be terminated with CHECK CONDITION status, with the sense key set to ILLEGAL REQUEST, and the additional sense code set to INVALID FIELD IN PARAMETER LIST.

The application client should send log pages in ascending order by page code value [then subpage code value](#) if the Data-Out Buffer contains multiple log pages. If the Data-Out Buffer contains multiple log parameters within a log page, then they should be sent in ascending order by parameter code value. If the application client sends log pages out of order, or parameter codes out of order, the command shall be terminated with CHECK CONDITION status, with the sense key set to ILLEGAL REQUEST, and the additional sense code set to INVALID FIELD IN PARAMETER LIST.

6.6 LOG SENSE command

The LOG SENSE command (see table 91) provides a means for the application client to retrieve statistical or other operational information maintained by the device about the device or its logical units. It is a complementary command to the LOG SELECT command.

TABLE 91. LOG SENSE command

Bit Byte	7	6	5	4	3	2	1	0
0	OPERATION CODE (4Dh)							
1	Reserved					SPC	PPC	SP
2	PC		PAGE CODE					
3	SUBPAGE CODE							
4	Reserved							
5	PARAMETER POINTER							
6								
7	ALLOCATION LENGTH							
8								
9	CONTROL							

[A subpage control \(SPC\) bit is used to control the use of subpages.](#)

The parameter pointer control (PPC) bit controls the type of parameters requested from the device server: [If the PPC bit is set to one, the value of the subpage code field shall not be FFh.](#)

[Table 92 on page 6 defines the use of the SPC and PPC bits.](#)

TABLE 92. Definition of SPC and PPC bits

<u>PARAMETER POINTER</u>	<u>PPC</u>	<u>SPC</u>	<u>Description</u>
<u>0000h—FFFFh</u>	<u>1</u>	<u>0</u>	<u>The device server shall return a log page with parameter code values that have changed since the last LOG SELECT or LOG SENSE command. The device server shall return only those parameter codes that are greater than or equal to the contents of the PARAMETER POINTER field in ascending order of parameter codes from the specified log page.</u>
		<u>1</u>	<u>The device server shall return a log subpage with parameter code values that have changed since the last LOG SELECT or LOG SENSE command. The device server shall return only those parameter codes that are greater than or equal to the contents of the PARAMETER POINTER field in ascending order of parameter codes from the specified log subpage.</u>
	<u>0</u>	<u>0</u>	<u>The device server shall return those parameter codes that are greater than or equal to the contents of the PARAMETER POINTER field in ascending order of parameter codes from the specified log page.</u>
		<u>1</u>	<u>The device server shall return those parameter codes that are greater than or equal to the contents of the PARAMETER POINTER field in ascending order of parameter codes from the specified log subpage.</u>
<u>0000h</u>	<u>0</u>	<u>0</u>	<u>The device server shall return all available log parameters from the specified log page.</u>
		<u>1</u>	<u>The device server shall return all available log parameters from the specified log subpage.</u>

a) A PPC bit set to one specifies that the device server shall return a log page with parameter code values that have changed since the last LOG SELECT or LOG SENSE command. The device server shall return only those parameter codes that are greater than or equal to the contents of the PARAMETER POINTER field in ascending order of parameter codes from the **specified** log page [specified by the page code field and subpage code field](#);

b) A PPC bit set to zero specifies that the device server shall return those parameter codes that are greater than or equal to the contents of the PARAMETER POINTER field in ascending order of the log page parameter codes from the **specified** log page [specified by the page code field and subpage code field](#); and

c) A PPC bit set to zero and a PARAMETER POINTER field set to zero specifies that the device server shall return all available log parameters from the **specified** log page [specified by the page code field and subpage code field](#).

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The PAGE CODE [and SUBPAGE CODE fields](#) identify which log page of data is being requested (see 7.2). If the log page code [subpage code combination](#) is reserved or not implemented, the command shall be terminated with CHECK CONDITION status, with the sense key set to ILLEGAL REQUEST, and the additional sense code set to INVALID FIELD IN CDB.

7.2 Log parameters

7.2.1 Log page structure and page codes for all device types

This subclause describes the log page structure and the log pages that are applicable to all SCSI devices. Log pages specific to each device type are described in the command standard (see 3.1.18) that applies to that device type. The LOG SELECT command (see 6.5) supports the ability to send zero or more log pages. The LOG SENSE command (see 6.6) returns a single log page specified in the PAGE CODE [and SUBPAGE CODE](#) field [combination](#) of the CDB. [Subpages are identical to log pages except that they include a SUBPAGE CODE field that further differentiates the log page contents.](#)

Each log page begins with a four-byte page header followed by zero or more variable-length log parameters defined for that log page. The log page format is defined in table 191.

TABLE 191. Log Page format

Bit Byte	7	6	5	4	3	2	1	0
0	PAGE CODE							
1	SUBPAGE CODE							
2	PAGE LENGTH (n-3)							
3								
Log parameter(s)								
4	Log parameter (First) (Length x)							
x+3								
:								
n-y+1	Log parameter (Last) (Length y)							
n								

[The PAGE CODE and SUBPAGE CODE fields identify which log page is to being transferred. Some page codes are defined as applying to all device types and other page codes are defined for the specific device type. The page codes that apply to a specific device type are defined in the command standard \(see 3.1.18\) for that device type. The applicability of each subpage code matches that of the page code with which it is associated.](#)

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The page code assignments for the log pages are listed in table 194.

TABLE 192. Log page codes and subpage codes

Page Code	Subpage Code	Log Page Name	Reference
0Fh	00h	Application Client	7.2.2
01h	00h	Buffer Over-Run/Under-Run	7.2.3
2Fh	00h	Informational Exceptions	7.2.5
0Bh	00h	Last <i>n</i> Deferred Errors or Asynchronous Events	7.2.6
07h	00h	Last <i>n</i> Error Events	7.2.7
06h	00h	Non-Medium Error	7.2.8
18h	00h	Protocol Specific Port	7.2.9
03h	00h	Read Error Counter	7.2.4
04h	00h	Read Reverse Error Counter	7.2.4
10h	00h	Self-Test Results	7.2.10
0Eh	00h	Start-Stop Cycle Counter	7.2.11
00h	00h	Supported Log Pages	7.2.12
00h	FFh	Supported Log Pages and Subpages	7.2.x
01h - 3Eh	FFh	Supported Subpages	7.2.y
0Dh	00h	Temperature	7.2.13
05h	00h	Verify Error Counter	7.2.4
02h	00h	Write Error Counter	7.2.4
00h - 07h	01h - FEh	Reserved	
0Bh	01h - FEh	Reserved	
0Dh - 10h	01h - FEh	Reserved	
18h	01h - FEh	Reserved	
2Fh	01h - FEh	Reserved	
08h - 0Ah	00h - FEh	Reserved (may be used by specific device types)	
0Ch	00h - FEh	Reserved (may be used by specific device types)	
11h - 17h	00h - FEh	Reserved (may be used by specific device types)	
19h - 2Eh	00h - FEh	Reserved (may be used by specific device types)	
3Fh	00h - FEh	Reserved	
30h - 3Eh	00h - FEh	Vendor specific	
All page code and subpage code combinations not shown in this table are reserved.			

[The editor shall add the subpage code field to all log pages.](#)

[7.2.x Supported Log Pages and Subpages](#)

[The Supported Log Pages and Subpages log page \(see Table 193\) returns the list of all page codes and subpage codes implemented by the logical unit. This log page is optional.](#)

TABLE 193. Supported Log Pages and Subpages

Bit Byte	7	6	5	4	3	2	1	0
0	Reserved		PAGE CODE (00h)					
1	SUBPAGE CODE (FFh)							
2	(MSB) PAGE LENGTH (n-3)							
3	(LSB)							
4	SUPPORTED PAGE LIST							
n								

This log page is not defined for the LOG SELECT command.

The PAGE LENGTH field indicates the length in bytes of the following supported log page list.

The SUPPORTED PAGE LIST field shall contain a list of all log page codes implemented by the logical unit in ascending order sorted by page code then subpage code value.

The format of an entry in the supported page list is shown in table 194.

TABLE 194. Supported page list entry

Bit Byte	7	6	5	4	3	2	1	0
0	Reserved		PAGE CODE					
1	SUBPAGE CODE							

The page code field contains the page code.

The subpage code field contains the subpage code.

7.2.y Supported Subpages

The Supported Subpages log page (see Table 195) returns the list of all subpage codes of the specified page code that are implemented by the logical unit. This log page is optional.

TABLE 195. Supported Subpages

Bit Byte	7	6	5	4	3	2	1	0
0	Reserved		PAGE CODE					
1	SUBPAGE CODE (FFh)							
2	(MSB) PAGE LENGTH (n-3) (LSB)							
3								
4	SUPPORTED PAGE LIST							
n								

[The PAGE LENGTH field indicates the length in bytes of the following supported log page list.](#)

[The SUPPORTED PAGE LIST field shall contain a list of all log page codes of the specified page code implemented by the logical unit in ascending order sorted by page code then subpage code value.](#)

[The format of an entry in the supported page list is shown in Table 196.](#)

TABLE 196. Supported page list entry

Bit Byte	7	6	5	4	3	2	1	0
0	Reserved		PAGE CODE					
1	SUBPAGE CODE							

[The page code field contains the page code.](#)

[The subpage code field contains the subpage code.](#)