

To: INCITS Technical Committee T10

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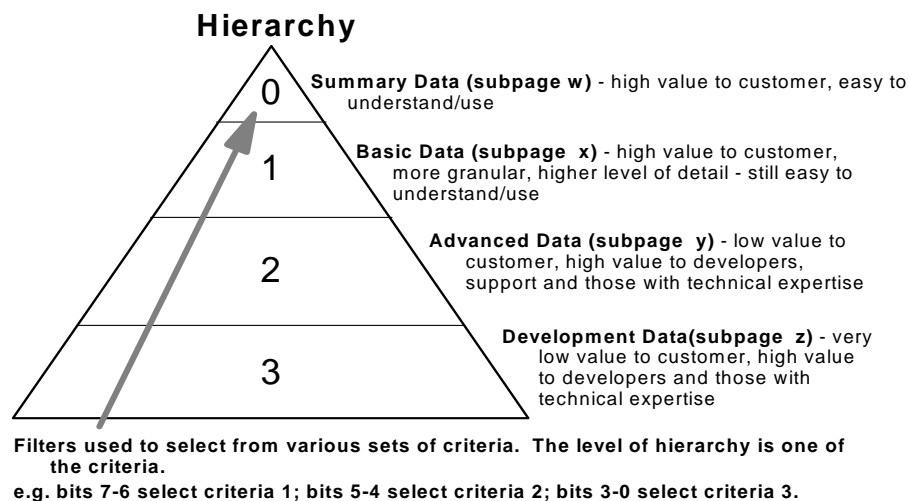
Document: T10/04-389r6

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		<a href="#">PAGE CODE</a>					
3	<a href="#">SUBPAGE CODE</a>							
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 bits is are

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>
0	-	1	00h	00h	all implemented cumulative and threshold parameters in all log pages with a subpage code of zero shall be set to vendor specific default values
				00h	all implemented cumulative and threshold parameters in log page n with subpage code of zero shall be set to vendor specific default values
			n > 00h	01h-FEh	all implemented cumulative and threshold parameters in log page n subpage specified by subpage code shall be set to vendor specific default values
				FFh	all implemented cumulative and threshold parameters in the log page n with subpage code of zero and all subpages shall be set to vendor specific default values
			00h	01h-FEh	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
			00h	FFh	all implemented cumulative and threshold parameters shall be set to vendor specific default values
		0	00h	00h	log parameters shall not be reset
			00h	all implemented cumulative parameters in log page n with a subpage code of zero shall be set to the default threshold values	
	n > 00h		01h-FEh	all implemented cumulative parameters in log page n subpage specified by subpage code shall be set to the default threshold values	
			FFh	all implemented cumulative parameters in log page n with subpage code of zero and all subpages shall be set to the default threshold values	
00h	01h-FEh		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		
		00h	FFh	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 &gt; 00h</u>	<u>00h</u>	<u>all implemented current threshold parameters in log page n with a 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 logpage n with subpage code of zero and all subpages shall be set to the default threshold values</u>
			<u>00h</u>	<u>01h-FEh</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>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>=</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 strikethrough text.

Note from CAP to Compare to Annex C to ensure it is correct.

~~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 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.

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					<a href="#">SPC</a>	PPC	SP
2	PC		PAGE CODE					
3	<a href="#">SUBPAGE CODE</a>							
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 7](#) 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>±</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>±</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>±</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>±</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	<a href="#">SUBPAGE CODE</a>							
2	PAGE LENGTH (n-3)							
3								
<b>Log parameter(s)</b>								
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 be 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 192.

**TABLE 192. Log page codes and subpage codes**

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

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

### 7.2.12 Supported Log Pages

The Supported Log Pages log page (see Table 193) the list of log pages implemented by the logical unit. Logical units that implement the LOG SENSE command shall implement this log page.

**TABLE 193. Supported Log Pages**

Bit Byte	7	6	5	4	3	2	1	0
0	Reserved		PAGE CODE (00h)					
1	<a href="#">SUBPAGE CODE (00h)</a>							
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 that [has a subpage code of zero](#) in ascending order beginning with page code 00h.

[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					

The page code field contains the page code.

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

[The Supported Log Pages and Subpages log page \(see Table 195\) returns the list of all page codes and subpage codes implemented by the logical unit. This log page is optional.](#)

**TABLE 195. Supported Log Pages and Subpages**

Bit Byte	7	6	5	4	3	2	1	0
0	Reserved		PAGE CODE (00h)					
1	<a href="#">SUBPAGE CODE (FFh)</a>							
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 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.

### 7.2.v Supported Subpages

The Supported Subpages log page (see Table 197) 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 197. 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 198.

**TABLE 198. 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.](#)