To: INCITS Technical Committee T10

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Subject: SPC-4: Self Describing Command Timeouts

1. Revisions

1. Incorporated feedback received from Rob Elliott on July 21, 2005
2. Incorporate comments from George Penokie and Nov 2005 CAP meeting
3. Modify to use Report Supported Op Codes instead of descriptors. Suggested by George Penokie.

2. Introduction

The SMC working group has given me an action to create a method to describe the timeout values for each command. I believe this is a more general issue than SMC and belongs in SPC.

Additions by this proposal are in this color - blue.

Issues to work out are in this color - red.

3. Proposal

Add the following section to REPORT SUPPORTED OPERATION CODES command.

6.22.1 REPORT SUPPORTED OPERATION CODES command introduction

The REPORT SUPPORTED OPERATION CODES command (see table 154) requests information on commands the addressed logical unit supports. An application client may request a list of all operation codes and service actions supported by the logical unit or the command support data for a specific command.

The REPORT SUPPORTED OPERATION CODES command is a service action of the MAINTENANCE IN command. Additional MAINTENANCE IN service actions are defined in SCC-2 and in this standard. The MAINTENANCE IN service actions defined in SCC-2 apply only to

logical units that return a device type of 0Ch or the SCCS bit set to one in their standard INQUIRY data (see 6.4.2).

TABLE 154. REPORT SUPPORTED OPERATION CODES command

Bit Byte	7	6	5	4	3	2	1	0
0	OPERATION CODE (A3h)							
1	Reserved			SERVICE ACTION (0Ch)				
2	RCT	Reserved				REPORTING OPTIONS		
3	REQUESTED OPERATION CODE							
4	(MSB)	REQUESTED SERVICE ACTION						
5								(LSB)
6	(MSB)	ALLOCATION LENGTH						
9								(LSB)
10	Reserved							
11	CONTROL							

A Return Command Timeout (RCT) bit set to one indicates that the Command Timeouts descriptor (see Section 6.22.2) shall be appended to each Command descriptor that is returned and to the One_command parameter data that is returned. A RCT bit set to zero specifies that the Command Timeouts descriptor shall not be appended to any parameter data returned.

The REPORTING OPTIONS field (see table 155) specifies the information to be returned in the parameter data.

TABLE 155. REPORT SUPPORTED OPERATION CODES REPORTING OPTIONS field

Code	Description	Parameter Data Reference
000b	A list of all operation codes and service actions supported by the logical unit shall be returned in the all_commands parameter data format. The REQUESTED OPERATION CODE CDB field and REQUESTED SERVICE ACTION CDB field shall be ignored.	6.22.3
001b	The command support data for the operation code specified in the REQUESTED OPERATION CODE field shall be returned in the one_command parameter data format. The REQUESTED SERVICE ACTION CDB field shall be ignored. If the REQUESTED OPERATION CODE field specifies an operation code that has service actions, then 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.	6.22.4

TABLE 155. REPORT SUPPORTED OPERATION CODES REPORTING OPTIONS field

Code	Description	Parameter Data Reference
010b	The command support data for the operation code and service action specified in the REQUESTED OPERATION CODE CDB field and REQUESTED SERVICE ACTION CDB field shall be returned in the one_command parameter data format. If the REQUESTED OPERATION CODE CDB field specifies an operation code that does not have service actions, then 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.	6.22.4
011b-111b	Reserved	

The REQUESTED OPERATION CODE field specifies the operation code of the command to be returned in the one_command parameter data format (see 6.22.4).

The REQUESTED SERVICE ACTION field specifies the service action of the command to be returned in the one_command parameter data format.

The ALLOCATION LENGTH field is defined in 4.3.4.6.

6.22.2 Command Timeouts Descriptor

Help Needed: Starting time is an issue. How do we specify the queue delay sufficient to get it past the standards committee?

The Command Timeouts descriptor provides the means to retrieve timeout information for commands supported by the logical unit. The values provided in this descriptor are based on the time from the start of processing the command, to its reported completion. Since application clients are concerned with the time from the command being issued, to its reported completion, it should be noted that this overall time may be affected by currently processing operations (e.g. A prior command was issued with the Immediate bit set in the CDB, Multiple concurrent commands with queueing are processing, multi-initiator configurations without reservations, manual unloads, power-on self tests, commands issued shortly after certain aborted commands, commands which force flushes when unwritten write data is in the buffer). For commands that require a change in power condition (see 7.4.12), this time does not include the power condition transition time (e.g., the time to spinup rotating media).

The Command Timeouts descriptor is described in Table 156

TABLE 156 - Command Timeouts descriptor

Byte	7	6	5	4	3	2	1	0
0	(MSB)							
1				Timeouts Length (0Ah)				(LSB)
2				Reserved				

TABLE 156 - Command Timeouts descriptor

Byte	7	6	5	4	3	2	1	0
3	Restricted (Defined in command set specific standards)							
4	(MSB)							
7	COMMAND TIMEOUT - MINIMUM							(LSB)
8	(MSB)							
11	COMMAND TIMEOUT - ERROR RECOVERY PROCEDURE							(LSB)

The COMMAND TIMEOUT - MINIMUM field specifies the typical amount of time in seconds required to process the command specified by the CDB OPERATION CODE and CDB SERVICE ACTION fields. A non-zero value in the COMMAND TIMEOUT - MINIMUM field is the minimum amount of time the application client should wait prior to aborting the command. If an application client sets a time-out value less than this value, there is a significant probability that this command will not complete processing prior to being aborted. A value of zero in the COMMAND TIMEOUT - MINIMUM field indicates that no time is being specified.

Note: The value specified in the COMMAND TIMEOUT - MINIMUM field may include time required for typical error recovery procedures expected to occur on a regular basis.

The COMMAND TIMEOUT - ERROR RECOVERY PROCEDURE field specifies the maximum amount of time in seconds required to process the command specified by the CDB OPERATION CODE and CDB SERVICE ACTION fields. A non-zero value in the COMMAND TIMEOUT - ERROR RECOVERY PROCEDURE field is the amount of time in seconds the application client should wait prior to aborting the command. If an applicaiton client sets a timeout value less than the value specified in the COMMAND TIMEOUT - ERROR RECOVERY PROCEDURE field and greater than the value specified in the COMMAND TIMEOUT - MINIMUM field, if this command enters error recovery procedures it may not be able to complete processing prior to being aborted. A value of zero in the COMMAND TIME-OUT - ERROR RECOVERY PROCEDURE field indicates that no time is being specified.

6.22.3 All_commands parameter data format

The REPORT SUPPORTED OPERATION CODES all_commands parameter data format (see table 156) begins with a four-byte header that contains the length in bytes of the parameter data followed by a list of supported commands. Each command descriptor contains information about a single supported command CDB (i.e., one operation code and service action combination, or one non-service-action operation code). The list of command descriptors shall contain all commands supported by the logical unit.

TABLE 157. All_commands parameter data

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)							
3	COMMAND DATA LENGTH (n-3)							(LSB)

TABLE 157. All_commands parameter data

Bit Byte	7	6	5	4	3	2	1	0
	Command descriptors							
4			Command descriptor 0 (see table 158)					
			. . .					
n			Command descriptor x (see table 158)					

The COMMAND DATA LENGTH field indicates the length in bytes of the command descriptor list.

Each command descriptor (see table 158) contains information about a single supported command CDB.

TABLE 158. Command descriptor format

Bit Byte	7	6	5	4	3	2	1	0
0	OPERATION CODE							
1	Reserved							
2	(MSB)			SERVICE ACTION				
3								(LSB)
4	Reserved							
5	Reserved							SERVACTV
6	(MSB)			CDB LENGTH				
7								(LSB)
8	Command Timeouts descriptor (see Table 156)							
n								

The OPERATION CODE field contains the operation code of a command supported by the logical unit.

The SERVICE ACTION field contains a supported service action of the supported operation code indicated by the OPERATION CODE field. If the operation code indicated in the OPERATION CODE field does not have a service actions, the SERVICE ACTION field shall be set to 00h.

A service action valid (SERVACTV) bit set to zero indicates the operation code indicated by the OPERATION CODE field does not have service actions and the SERVICE ACTION field contents are reserved. A SERVACTV bit set to one indicates the operation code indicated by the

OPERATION CODE field has service actions and the contents of the SERVICE ACTION field are valid.

The CDB LENGTH field contains the length of the command CDB in bytes for the operation code indicated in the OPERATION CODE field, and if the SERVACTV bit is set to the service action indicated by the SERVICE ACTION field.

If the RCT bit of the REPORT SUPPORTED OPERATION CODES CDB is set to one, the Command Timeouts descriptor is returned. If the RTC bit of the CDB is set to zero, the Command Timeouts descriptor is not returned.

6.22.4 One_command parameter data format

The REPORT SUPPORTED OPERATION CODES one_command parameter data format (see table 159) contains information about the CDB and a usage map for bits in the CDB for the command specified by the REPORTING OPTIONS, REQUESTED OPERATION CODE, and REQUESTED SERVICE ACTION fields in the REPORT SUPPORTED OPERATION CODES CDB.

TABLE 159. One_command parameter data

Bit Byte	7	6	5	4	3	2	1	0
0	Reserved							
1	Reserved					SUPPORT		
2	(MSB)	CDB SIZE (n-3)						
3								(LSB)
4	CDB USAGE DATA							
n								
n+1	Command Timeouts descriptor (see Table 156)							
m								

The SUPPORT field is defined in table 160.

TABLE 160. SUPPORT values

Support	Description
000b	Data about the requested SCSI command is not currently available. All data after byte 1 is not valid. A subsequent request for command support data may be successful.
001b	The device server does not support the requested command. All data after byte 1 is undefined.
010b	Reserved
011b	The device server supports the requested command in conformance with a SCSI standard. The parameter data format conforms to the definition in table 159.
100b	Reserved

TABLE 160. SUPPORT values

Support	Description
101b	The device server supports the requested command in a vendor specific manner. The parameter data format conforms to the definition in table 159.
110b - 111b	Reserved

The CDB SIZE field contains the size of the CDB USAGE DATA field in the parameter data, and the number of bytes in the CDB for command being queried (i.e., the command specified by the REPORTING OPTIONS, REQUESTED OPERATION CODE, and REQUESTED SERVICE ACTION fields in the REPORT SUPPORTED OPERATION CODES CDB).

The CDB USAGE DATA field contains information about the CDB for the command being queried. The first byte of the CDB USAGE DATA field shall contain the operation code for the command being queried. If the command being queried contains a service action, then that service action code shall be placed in the CDB USAGE DATA field in the same location as the SERVICE ACTION field of the command CDB. All other bytes of the CDB USAGE DATA field shall contain a usage map for bits in the CDB for the command being queried.

The bits in the usage map shall have a one-for-one correspondence to the CDB for the command being queried. If the device server evaluates a bit in the CDB for the command being queried, the usage map shall contain a one in the corresponding bit position. If any bit representing part of a field is returned as one, all bits for the field shall be returned as one. If the device server ignores or treats as reserved a bit in the CDB for the command being queried, the usage map shall contain a zero in the corresponding bit position. The usage map bits for a given CDB field all shall have the same value.

For example, the CDB usage bit map for the REPORT SUPPORTED OPERATION CODES command is: A3h, 0Ch, 03h, FFh, FFh, FFh, FFh, FFh, FFh, FFh, 00h, 07h. This example assumes that the logical unit only supports the low-order three bits of the CDB CONTROL byte. The first byte contains the operation code, and the second byte contains three reserved bits and the service action. The remaining bytes contain the usage map.

If the RCT bit of the REPORT SUPPORTED OPERATION CODES CDB is set to one, the Command Timeouts descriptor is returned. If the RTC bit of the CDB is set to zero, the Command Timeouts descriptor is not returned.