



Date: 24 January 2024  
 To: T10 Technical Committee  
 From: Ralph O. Weber  
 Subject: SPC-7 CDL Times and Policies Revisited

## Introduction

In response to customer inputs, more variations are needed in how the CDL time fields (and associated policies) are defined.

## Regarding the term 'index'

SBC-5 r06 does not use the term 'index' to describe how a T2 command duration limits descriptor is selected.

**Table 84 – Duration limit descriptor DLD bits**

Duration limit descriptor bits			Description
DLD2	DLD1	DLD0	
0b	0b	0b	Command is not a duration limited command (see SAM-6)
0b	0b	1b	First command duration limit descriptor
0b	1b	0b	Second command duration limit descriptor
0b	1b	1b	Third command duration limit descriptor
1b	0b	0b	Fourth command duration limit descriptor
1b	0b	1b	Fifth command duration limit descriptor
1b	1b	0b	Sixth command duration limit descriptor
1b	1b	1b	Seventh command duration limit descriptor

For consistency with SBC-5, this proposal removes the three instances of 'index' from the Command Duration Limit T2? mode pages.

## Revision History

- r0 Initial revision
- r1 Made changes requested by the 30 November T10 conference call, including...
  - 1) Clarifying that exceeding a Timeout time requires the device server to increment at least one log page statistic field.
- r2 Made changes requested after the posting of r1, including changes from the T13 review of its variation on this topic, specifically...
  - a) Two one-word typos reported via email were fixed.
  - b) Obsolete policy codepoints 0h to 2h.
  - c) Changing 'scheduling' wording back to the historically rooted (i.e., SPC-6) 'guideline' wording.

also including several ideas from [24-009r0](#), specifically ...

- d) Single-bit specification for which time is the guideline.
  - e) VPD page bits for which policies may result in termination of a MODE SELECT(10) command.
- r3 Made changes requested by the January CAP Ad Hoc. FWIW The CAP Ad Hoc noted that several instances of 'sever' needed to be changed to 'server', and a half dozen such gaffes were corrected. Updated the ... TIME POLICY SUPPORT bit definitions to improve forward compatibility from SPC-6 and to provide better consistency with similar bit definitions for other coded-value support bits.

Unless otherwise indicated additions are shown in underlined blue, deletions in ~~red strikethrough~~, and comments in green. The differences between the previous revision and this revision are highlighted with change bars.

## Proposed Changes in SPC-7 (based on SPC-6 r11)

### 1 Scope

...

The following commands, parameter data, and features defined in previous versions of this standard are made obsolete by this standard:

- a) ~~the MODE SENSE(6) command; and~~
- b) ~~the MODE SELECT(6) command.~~
- a) codes 1h and 2h in the COMMAND DURATION GUIDELINE POLICY field; and
- b) code 0h in the MAX INACTIVE TIME POLICY field, the MAX ACTIVE TIME POLICY field, and the COMMAND DURATION GUIDELINE POLICY field.

...

#### 7.5.11 Command Duration Limit T2A mode page

##### 7.5.11.1 Command duration limit mode page T2A overview ~~Overview~~

The Command Duration Limit T2A mode page (see table 453) provides controls for command duration limit (see ~~SAM-5~~ [SAM-6](#)) that are applicable to all device types, for commands for which the REPORT SUPPORTED OPERATION CODES command parameter data RWCDLP bit and CDLP field (see 6.32) indicate the Command Duration Limit T2A mode page. The mode page policy (see 7.5.3) for this mode page should be per I\_T nexus. The mode page policy may be shared. If a field in this mode page is changed while there is a command already in the task set, then the new value of the field shall not apply to that command.

If the QUEUE ALGORITHM MODIFIER field (see 7.5.13) is set to 0h (i.e., restricted reordering), then the device server shall process commands as described in 7.5.13 independent of the contents of the Command Duration Limit T2A mode page.

**Table 453 – Command Duration Limit T2A mode page**

Bit Byte	7	6	5	4	3	2	1	0							
0	PS	SPF (1b)	PAGE CODE (0Ah)												
1	SUBPAGE CODE (07h)														
2	(MSB)	PAGE LENGTH (00E4h)						(LSB)							
3															
4															
...															
6															
4															
5															
6	Reserved								GUIDELINE SELECTOR						
7	<del>PERF VERSUS COMMAND DURATION GUIDELINES</del> PERFORMANCE VERSUS COMMAND COMPLETION								Reserved						
	T2 command duration limit descriptor list														
	... <<<No other changes are proposed in table 453.>>>														

7.5.12).

**Table 454 – ~~PERF~~ PERFORMANCE VERSUS COMMAND ~~COMPLETION~~ DURATION-GUIDELINES field**

<<<No other changes are proposed in table 454.>>>

The Each T2 command duration limit descriptor (see 7.5.11.2) describes ~~the~~ command duration limit information that ~~corresponds to the duration limit descriptor index~~ is specified in the CDB defined by the applicable command standard (e.g. SBC-5) if the Command Duration Limit T2A mode page is indicated (see 5.2).

### 7.5.11.tu Time field usage

<<<All of 7.5.11.tu is new. The use of change markups is suspended for the remainder of 7.5.11.tu.>>>

#### **7.5.11.tu.1 Time field usage overview**

For INACTIVE TIME field, the ACTIVE TIME field, and the TOTAL TIME field in all the T2 command duration limit descriptors (see 7.5.11.2) in the Command Duration Limit T2A mode page (see 7.5.11) and in the Command Duration Limit T2B mode page (see 7.5.12):

- a) the ACTIVE TIME field and one other field specify timeouts (see 7.5.11.tu.2); and
- b) the one field that does not specify a timeout specifies a guideline (see 7.5.11.tu.2).

The GUIDELINE SELECTOR field (see 7.5.11.1) specifies which time field the device server processes as a guideline.

#### **7.5.11.tu.2 Timeout usage**

For timeouts, the device server shall not modify the specified time (i.e., the combination of an individual time field and the T2CDLUNITS field (see 7.5.11.2)), except to round the timeout time as described in 5.10.

If a timeout is exceeded, the device server:

- 1) shall not modify the command's guideline, if any, established as described in 7.5.11.tu.3;
- 2) shall increment the applicable statistics in the Command Duration Limits Statistics log (see 7.3.7); and
- 3) shall perform the actions specified by the applicable policy field (e.g., the ACTIVE TIME POLICY field for the ACTIVE TIME field).

The device server should restrict the T2 command duration limit descriptor (see 7.5.11.2) inputs to the processing of a command to the fields in:

- a) the T2 command duration limit descriptor specified by the command; or
- b) the T2 command duration limit descriptor specified in subsequent the T2 command duration limit descriptors specified by a policy field set to 3h (see 7.5.11.2), if any.

The requirements for the applicable time policies support descriptor (see 7.7.7) may affect the processing of the policy associated with a timeout time.

#### **7.5.11.tu.3 Guideline usage**

If a MODE SELECT(10) command (see 6.12) that specifies the Command Duration Limit T2A mode page (see 7.5.11) or the Command Duration Limit T2B mode page (see 7.5.12) specifies a non-zero guideline time (see 7.5.11.tu.1), then the device server shall associate a guideline with T2 command duration limit descriptor (see 7.5.11.2) that contains the specified guideline time.

As part of establishing a guideline during the processing of a MODE SELECT(10) command, device server may:

- a) compute a descriptor guideline by adding the specified time (i.e., the combination of an individual time field and the T2CDLUNITS field (see 7.5.11.2)) to the fastest time for completion of a read command for which the device server is able to return the requested data only by accessing the media; and
- b) modify the descriptor guideline associated with one or more T2 command duration limit descriptors based on comparisons between all the descriptor guidelines associated with all the T2 command duration limit descriptors.

The device server shall not apply parameter rounding (see 5.10) to guidelines or guideline times.

For each command that specifies a T2 command duration limit descriptor with a guideline, the device server shall:

- a) associate a command guideline with that command during the processing of the first T2 command duration limit descriptor that is referenced by that command using:
  - A) the guideline time and guideline policy in that T2 command duration limit descriptor; and
  - B) the descriptor guideline established during the processing of the most recent MODE SELECT(10) command for that mode page;
 and
- b) not change that command guideline as part of processing subsequent the T2 command duration limit descriptors specified by a policy field set to 3h (see 7.5.11.2), if any.

For the entire lifetime of a command, the command guideline shall affect device server processing of that command as follows:

- a) the length of time with which the device server completes that command is:
  - A) faster for a smaller command guideline; and
  - B) slower for a larger command guideline,
 in comparison to other command guidelines; and
- b) larger magnitudes of the difference between the command guidelines for two different commands result in larger probabilities of differences between the times in which those command are completed.

EXAMPLE – An application client may specify times in guideline times that are independent of a device server's performance characteristics by specifying 10 milliseconds as the time in one or more T2 command duration limit descriptors as a method of associating those descriptors with the most rapid preferred command completion (i.e., 10 milliseconds is the smallest guideline time specified by the application client in any descriptor). For all other descriptors, the equivalent guideline time is specified as the preferred number of 10 millisecond intervals minus the average number of milliseconds in which a seek finishes for a hypothetical hard disk drive (i.e., a time that is less than 10 milliseconds). The magnitude relationships computed in this way provide useful guideline time information to the device server.

The contents of the PERFORMANCE VERSUS COMMAND COMPLETION field (see 7.5.11.1) may affect the timing relationships between the processing of commands based on guidelines.

The requirements for the applicable time policies supported descriptor (see 7.7.7) may affect the processing of the policy associated with a guideline time.

If the device server does not terminate a MODE SELECT(10) command in which the policy associated with a guideline time is set to 3h, Dh, Eh, or Fh (e.g., based on the applicable time policies supported descriptor), then the device server shall establish a timeout (see 7.5.11.tu.2) that uses the specified time (i.e., the combination of an individual time field and the T2CDLUNITS field (see 7.5.11.2)) to determine when the time has been exceeded for that T2 command duration limit descriptor.

### 7.5.11.2 T2 command duration limit descriptor

The T2 command duration limit descriptor (see table 455) describes the command duration limit information that ~~corresponds to one duration limit descriptor index~~. is referenced as a descriptor in a CDB defined by an applicable command standard (e.g. SBC-5).

**Table 455 – T2 command duration limit descriptor format**

Bit Byte	7	6	5	4	3	2	1	0
0	Reserved				T2CDLUNITS			
1	Reserved							
2	(MSB)	<del>MAX-INACTIVE</del> <u>INACTIVE</u> TIME						(LSB)
3								
4	(MSB)	<del>MAX-ACTIVE</del> <u>ACTIVE</u> TIME						(LSB)
5								
6	<del>MAX-INACTIVE</del> <u>INACTIVE</u> TIME POLICY				<del>MAX-ACTIVE</del> <u>ACTIVE</u> TIME POLICY			
7	Reserved							
8								
9	Reserved							
10	(MSB)	<del>COMMAND-DURATION-GUIDELINE</del> <u>TOTAL TIME</u>						(LSB)
11								
12								
13	Reserved							
14	Reserved				<del>COMMAND-DURATION-GUIDELINE-POLICY</del> <u>TOTAL TIME POLICY</u>			
15	Reserved							BYP_SEQ
16								
...	Reserved							
31								

The T2CDLUNITS field (see table 456) specifies the time units for the ~~MAX-INACTIVE~~ INACTIVE TIME field, the ~~MAX-ACTIVE~~ ACTIVE TIME field, and the ~~COMMAND-DURATION-GUIDELINE~~ TOTAL TIME field. The default value for the T2CDLUNITS field is the smallest value that the device server allows for time units. Parameter rounding is not permitted (see 5.10) for this value.

**Table 456 – T2CDLUNITS field**

<<<No changes are proposed in table 456.>>>

The ~~MAX-INACTIVE~~ INACTIVE TIME field specifies ~~an upper~~ a limit on the time that elapses from the time at which the SCSI Command Received transport protocol service indication is invoked (see SAM-6) until the time at which the device server initiates actions to access, transfer, or act upon the specified data. Upon detecting that the specified time has been exceeded, the device server performs the action specified by the INACTIVE TIME POLICY field. ~~A-MAX-INACTIVE~~ An INACTIVE TIME field set to a non-zero value specifies the time ~~upper~~ limit in units indicated by the T2CDLUNITS field. ~~A-MAX-INACTIVE~~ An INACTIVE TIME field set to zero specifies that no time ~~upper~~ limit is specified by this T2 command duration limit descriptor. If the T2CDLUNITS field is set to 0h, the ~~MAX-INACTIVE~~ INACTIVE TIME field shall be ignored. What the device server does if the inactive time is exceeded is specified by 7.5.11.tu.2 and the INACTIVE TIME POLICY field. ~~This value may be rounded as described in 5.10.~~  
 <<<Parameter rounding is described in (see 7.5.11.tu).>>>

The ~~MAX-ACTIVE~~ ACTIVE TIME field specifies ~~an upper~~ a limit on the time that elapses from the time at which the device server initiates actions to access, transfer, or act upon the specified data until the time the device server returns status for the command. Upon detecting that the specified time has been exceeded, the device server performs the action specified by the ACTIVE TIME POLICY field. ~~A-MAX-ACTIVE~~ An ACTIVE TIME field set to a non-zero value specifies the time ~~upper~~ limit in units specified by the T2CDLUNITS field. ~~A-MAX-ACTIVE~~ An ACTIVE TIME field set to zero specifies that no time ~~upper~~ limit is specified by this T2 command duration limit descriptor. If the T2CDLUNITS field is set to 0h, the ~~MAX-ACTIVE~~ ACTIVE TIME field shall be ignored. What the device server does if the active time is exceeded is specified by 7.5.11.tu.2 and the ACTIVE TIME POLICY field. ~~This value may be rounded as described in 5.10.~~ <<<Parameter rounding is described in (see 7.5.11.tu).>>>

The ~~MAX-INACTIVE~~ INACTIVE TIME POLICY field (see table 457) specifies the policy action taken ~~if~~ upon the device server detecting that the ~~max~~ inactive ~~time~~ limit ~~is not met~~ has been exceeded (i.e., the time used to cause a command to become an enabled command exceeds the time specified by the ~~MAX~~ INACTIVE TIME field and the T2CDLUNITS field).

Table 457 – Policy fields ~~MAX-INACTIVE TIME POLICY field~~ (Sheet 1 of 2)

Code <sup>a</sup>	Description
<u>0h to 2h</u>	<u>Obsolete</u> <<<As of r2, the best way to make 0h a real NOP is unclear, maybe even impossible to specify.>>>
<u>0h</u>	<del>The device server shall complete the command at the earliest possible time (i.e., do nothing based on the max time limit not being met).</del>
<sup>a</sup> <u>Support for specific policy field codes is indicated by the inactive time policies supported descriptor, the active time policies supported descriptor, and the total time policies supported descriptor in the Extended INQUIRY Data VPD page (see 7.7.7).</u> <sup>b</sup> <u>If this value is set in the seventh T2 command duration limits descriptor, then the device server shall terminate the MODE SELECT(10) command with CHECK CONDITION status, with the sense key set to ILLEGAL REQUEST, and the additional sense code set to INVALID FIELD IN PARAMETER LIST.</u> <sup>c</sup> <u>For the INACTIVE TIME POLICY field, there is no difference between policy Eh and policy Fh.</u>	

Table 457 – [Policy fields](#) ~~MAX INACTIVE TIME POLICY field~~ (Sheet 2 of 2)

Code <sup>a</sup>	Description
<a href="#">3h</a> <sup>b</sup>	<p>&lt;&lt;&lt;This is intended to say the same thing 3h in 24-009r0, but without using the poorly defined term 'index'.&gt;&gt;&gt;</p> <p>If the specified time has been exceeded, then the device server shall apply the T2 command duration limits descriptor in which the T2CDLUNITS field (see table 456) is located in the byte whose location is 32 (i.e., the size of a T2 command duration limits descriptor) plus the location of the T2CDLUNITS field in this T2 command duration limits descriptor. The accumulated time that is used to determine whether the time has been exceeded shall not be modified as a result of processing this policy. If this results in the time being exceeded at the time when processing is begun for the specified T2 command duration limits descriptor, then the device server shall begin the processing of that T2 command duration limits descriptor by performing the policy specified by that T2 command duration limits descriptor.</p>
<a href="#">4h</a>	<p>&lt;&lt;&lt;This is intended to say the same thing 4h in 24-009r0.&gt;&gt;&gt;</p> <p>If the specified time has been exceeded, then the device server shall complete the command at the earliest possible time after the exceeded time (i.e., the latency of completion for the affected command continues to be a factor in the processing of that command).</p>
<a href="#">5h</a>	<p>&lt;&lt;&lt;This is intended to say the same thing 5h in 24-009r0.&gt;&gt;&gt;</p> <p>If the specified time has been exceeded, then the device server shall continue to process the command as a command that is not duration limited (i.e., the latency of completion for the affected command stops being a factor in the processing of that command).</p> <p>&lt;&lt;&lt;The 'not duration limited' wording better matches SBC-5 r06 (see page 1).&gt;&gt;&gt;</p>
<del>4h</del> <a href="#">6h</a> to Ch	Reserved
Dh	The device server shall complete the command with GOOD status, with the sense key set to COMPLETED and the sense code set to DATA CURRENTLY UNAVAILABLE.
<a href="#">Eh</a> <sup>c</sup>	<p>&lt;&lt;&lt;This inserted text is the Eh definition from table 458 without any changes.&gt;&gt;&gt;</p> <p>The device server shall terminate the command with CHECK CONDITION status, with the sense key set to ABORTED COMMAND and the additional sense code set to COMMAND TIMEOUT DURING PROCESSING or COMMAND TIMEOUT DURING PROCESSING DUE TO ERROR RECOVERY. If that command is a read command and any data has been transferred to the application client, then the device server may indicate the contiguous range of LBAs that have been transferred to the application client, starting with the LBA specified by that read command and ending with the LBA indicated by the value in the INFORMATION field of the sense data.</p>
Fh	If the specified time has elapsed, then the device server shall terminate the command with this with CHECK CONDITION status, with the sense key set to ABORTED COMMAND and the additional sense code set to COMMAND TIMEOUT DURING PROCESSING.
<p><sup>a</sup> <a href="#">Support for specific policy field codes is indicated by the inactive time policies supported descriptor, the active time policies supported descriptor, and the total time policies supported descriptor in the Extended INQUIRY Data VPD page (see 7.7.7).</a></p> <p><sup>b</sup> <a href="#">If this value is set in the seventh T2 command duration limits descriptor, then the device server shall terminate the MODE SELECT(10) command with CHECK CONDITION status, with the sense key set to ILLEGAL REQUEST, and the additional sense code set to INVALID FIELD IN PARAMETER LIST.</a></p> <p><sup>c</sup> <a href="#">For the INACTIVE TIME POLICY field, there is no difference between policy Eh and policy Fh.</a></p>	



The ~~MAX ACTIVE~~ ACTIVE TIME POLICY field (~~see table 458~~) (see table 457) specifies the policy action taken upon the device server detecting that the ~~max~~ active time limit ~~is not met~~ has been exceeded (i.e., the time used to complete the processing of ~~process~~ a command exceeds the time specified by the ~~MAX~~ ACTIVE TIME field and the T2CDLUNITS field).

**Table 458—MAX ACTIVE TIME POLICY field**

<<<Remove all of table 458.>>>

The TOTAL TIME field specifies a limit on the time that elapses from the time at which the SCSI Command Received transport protocol service indication is invoked until the time the device server returns status for the command. A TOTAL TIME field set to a non-zero value specifies the time limit in units specified by the T2CDLUNITS field. Upon detecting that the specified time has been exceeded, the device server performs the action specified by the TOTAL TIME POLICY field. A TOTAL TIME field set to zero specifies that no time limit is specified by this T2 command duration limit descriptor. If the T2CDLUNITS field is set to 0h, the TOTAL TIME field shall be ignored. What the device server does if the total time is exceeded is specified by 7.5.11.tu.2 and the TOTAL TIME POLICY field.

The TOTAL TIME POLICY field (see table 457) specifies the policy action taken upon the device server detecting that the total time limit has been exceeded (i.e., the time used to process a command exceeds the time specified by the TOTAL TIME field and the T2CDLUNITS field).

<<<Most of the text below, up to table 459 has been cloned in 7.5.11.tu.3.>>>

The ~~COMMAND DURATION GUIDELINE~~ field specifies the preferred length of time for the completion of a command. The preferred length of time for the command completion is specified as the non-zero time in units indicated by the T2CDLUNITS field to be added to fastest time for completion of a read command for which the device server is able to return the requested data only by accessing the media. If the T2CDLUNITS field is set to 0h, the ~~COMMAND DURATION GUIDELINE~~ field shall be ignored. Parameter rounding is not permitted (see 5.10) for this value.

A ~~COMMAND DURATION GUIDELINE~~ field set to zero indicates that no command completion guidance is provided by this T2 command duration limits descriptor.

The combination of ~~COMMAND DURATION GUIDELINE~~ field and the T2CDLUNITS field (i.e., the command duration guideline) shall affect device server processing of a command that selects a T2 command duration limits descriptor as follows:

- a) the length of time with which the device server completes that command is:
  - A) faster for smaller non-zero command duration guideline values; and
  - B) slower for larger non-zero command duration guideline values;
 in comparison to the non-zero command duration guideline values specified by other T2 command duration limits descriptors; and
- b) larger magnitudes of the difference between the non-zero command duration guideline values in two different T2 command duration limits descriptors result in larger probabilities of differences between the length of time of command completions for the commands that select those descriptors.

**EXAMPLE**—A host may specify a set of command duration guidelines that is independent of a device server's performance characteristics by specifying 10 milliseconds as the command duration guideline in one or more T2 command duration limits descriptors as a method of associating them with the most rapid preferred command completion. For all other T2 command duration limits descriptors, the command duration guideline is specified as the preferred number of 10 millisecond intervals for command completion minus the average number of milliseconds in which a seek finishes for a hypothetical, average hard disk drive. If for any other T2 command duration limits descriptor, the computed command duration limits guideline value is less than 10 milliseconds, then 10 milliseconds is used as the command duration guideline for that T2 command duration limits descriptor. The magnitude relationships computed in this way provide useful guidance to the device server.

~~The contents of the PERF VERSUS COMMAND DURATION GUIDELINES field (see 7.5.11.1) may affect the timing relationships between the processing commands based on the specified command duration guideline and the contents of the COMMAND DURATION GUIDELINE POLICY field.~~

~~The command duration guideline interacts with the processing of the COMMAND DURATION GUIDELINE POLICY field.~~

~~The COMMAND DURATION GUIDELINE POLICY field ((see table 459) specified the policy action taken if a non zero COMMAND DURATION GUIDELINE field specifies a command duration guideline that the device is unable to achieve for a command.~~

**Table 459—COMMAND DURATION GUIDELINE POLICY field**

<<<Remove all of table 459.>>>

A bypass sequestration (BYP\_SEQ) bit set to zero specifies that the device server processes a command associated with this T2 command duration limit descriptor as a non-sequestered command or a sequestered command as described in 5.16. A BYP\_SEQ bit set to one specifies that the device server processes a command associated with this T2 command duration limit descriptor as a non-sequestered command (see 5.16).

### 7.5.12 Command Duration Limit T2B mode page

The Command Duration Limit T2B mode page (see table 460) provides controls for command duration limit (see ~~SAM-5~~ [SAM-6](#)) that are applicable to all device types, for commands for which the REPORT SUPPORTED OPERATION CODES command parameter data RWCDLP bit and CDLP field (see 6.32) indicate the Command Duration Limit T2B mode page. The mode page policy (see 7.5.3) for this mode page should be per I\_T nexus. The mode page policy may be shared. If a field in this mode page is changed while there is a command already in the task set, then the new value of the field shall not apply to that command.

If the QUEUE ALGORITHM MODIFIER field (see 7.5.13) is set to 0h (i.e., restricted reordering), then the device server shall process commands as described in 7.5.13 independent of the contents of the Command Duration Limit T2B mode page.

If the Command Duration Limit T2B mode page is supported, the Command Duration Limit T2A mode page (see 7.5.11) shall be supported.

**Table 460 – Command Duration Limit T2B mode page**

<<<No changes are proposed in table 460.>>>

The PS bit, SPF bit, PAGE CODE field, SUBPAGE CODE field, and PAGE LENGTH field are described in 7.5.8.

The SPF bit, PAGE CODE field, SUBPAGE CODE field, and PAGE LENGTH field shall be set as shown in table 460 for the Command Duration Limit T2B mode page.

~~The [Each](#) T2 command duration limit descriptor (see 7.5.11.2) describes the command duration limit information that corresponds to the duration limit descriptor index is specified in the CDB defined by the applicable command standard (e.g. SBC-5) if the Command Duration Limit T2B mode page is indicated (see 5.2).~~ <<<Change the right parenthesis to a period at the end of this sentence.>>>

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## 7.7.7 Extended INQUIRY Data VPD page

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Table 553 – Extended INQUIRY Data VPD page

Bit Byte	7	6	5	4	3	2	1	0
...	...							
12	POA_SUP	HRA_SUP	VSA_SUP	DMS_VALID	TPSBV	Reserved		
...	...							
20	Inactive time policies supported descriptor							
21								
22	Active time policies supported descriptor							
23								
24	Total time policies supported descriptor							
25								
2629								
...	Reserved							
31								

...

A DMS\_VALID bit set to one indicates that the download microcode support byte is valid. A DMS\_VALID bit set to zero indicates that the download microcode support byte is not valid.

If the time policies supported bits valid (TPSBV) bit is set to zero, then the support for individual time policies is not indicated. If the TPSBV bit is set to one, then:

- the inactive time policies supported descriptor indicates which policy codes the device server supports in the INACTIVE TIME POLICY fields in all T2 command duration limit descriptors;
- the active time policies supported descriptor indicates which policy codes the device server supports in the ACTIVE TIME POLICY fields in all T2 command duration limit descriptors; and
- the total time policies supported descriptor indicates which policy codes the device server supports in the TOTAL TIME POLICY fields in all T2 command duration limit descriptors.

...

The download microcode support byte (see table 553) indicates the WRITE BUFFER microcode download modes (see 5.5.1) that the device server supports. If the DMS\_VALID bit is set to one, then each of the DM\_MD\_4 bit, the DM\_MD\_5 bit, the DM\_MD\_6 bit, the DM\_MD\_7 bit, the DM\_MD\_D bit, the DM\_MD\_E bit, and the DM\_MD\_F bit being set to:

- one indicates that the corresponding microcode download mode is supported; and
- zero indicates that the corresponding microcode download mode is not supported.

The inactive time policies supported descriptor indicates how the device server processes an INACTIVE TIME POLICY field (see 7.5.11.2) that is set to a define code as shown in table x2. If the device server terminates a MODE SELECT(10) command based on a bit in the inactive time policies supported descriptor, 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 PARAMETER LIST.

The active time policies supported descriptor indicates how the device server processes an ACTIVE TIME POLICY field (see 7.5.11.2) that is set to a define code as shown in table x2. If the device server terminates a MODE SELECT(10) command based on a bit in the active time policies supported descriptor, 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 PARAMETER LIST.

The total time policies supported descriptor indicates how the device server processes an TOTAL TIME POLICY field (see 7.5.11.2) that is set to a define code as shown in table x2. If the device server terminates a MODE SELECT(10) command based on a bit in the total time policies supported descriptor, 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 PARAMETER LIST.

The bits in the inactive time policies supported descriptor, the active time policies supported descriptor, and the total time policies supported descriptor indicate how the device server processes the indicated policy field for the associated time policy field as shown in table x2.

**Table x2 – Time policies supported descriptors**

Bit Offset	7	6	5	4	3	2	1	0
0	P7S	P6S	P5S	P4S	P3S	DESCRIPTOR FORMAT		
1	PFS	PES	PDS	PCS	PBS	PAS	P9S	P8S

Within each time policies supported descriptor, the policy code 3 supported (P3S) bit indicates device server support for the 3h policy code, the policy code 4 support (P4S) bit indicates device server support for the 4h policy code, and so forth to the policy code F support (PFS) bit that indicates device server support for the Fh policy code.

For each policy code supported bit (e.g., P3S, PDS), if that bit is set to:

- zero, then the device server does not support the associated policy code in the associated time policy fields and shall terminate any MODE SELECT(10) command that specifies the associated policy code in an associated time policy field with CHECK CONDITION status, with the sense key set to ILLEGAL REQUEST, and the additional sense code set to INVALID FIELD IN PARAMETER LIST; or
- one, then the device server supports the associated policy code in the associated time policy fields.

Although a policy code supported bit indicates device server support for an indicated policy code, some situations may result in the device server terminating MODE SELECT(10) command that specifies the associated policy code in one of the associated time fields (e.g., a policy code set to 3h in the seventh T2 command duration limit descriptor).

The device server shall set the DESCRIPTOR FORMAT field to 001b to indicate that this time policies supported descriptor has the format defined by this standard.