

ENDL TEXAS

Date: 16 January 2009
To: T10 Technical Committee & SNIA OSD TWG
From: Ralph O. Weber
Subject: Response to T10 Letter Ballot comments on OSD-2

Introduction

This document reviews and responds to the comments included with votes submitted during the forwarding letter ballot on [OSD-2 r04](#) (project T10/1729-D).

Every effort has been exerted to make the comment numbers in this document match those in the Letter Ballot report document [T10/08-319r1](#).

Revision History

- r0 Initial revision with limited features, intended for preliminary review by the SNIA OSD TWG
- r1 All comments processed. Resolutions proposed for all agreements reached by the SNIA OSD TWG, except moving the object accessibility attributes to the Policy/Security attributes page. Many comments closed.
- r2 Resolutions proposed for all agreements reached by the SNIA OSD TWG. All comments likely to be rejected or deferred to OSD-3 have been so identified or marked for CAP discussion. All changes from SPC-3 to SPC-4 and SAM-3 to SAM-4 have been made. All comments resolutions are ready for SNIA OSD TWG and T10 CAP review.
- r3 Added five comments (i.e., Other-27 to Other-31) that prohibit timestamps bypass from affected the created time attributes. The changes requested by the T10 CAP WG (minutes in 08-429) were made. All comments that the editor marked for review by T10 were closed.
- r4 Completed resolution of all comments except removal of the revision history (the last act before forwarding).
- r5 Added a comment that changed all delimiters on ASCII character strings from " to '. Apparently, this has been the T10 convention since the Style Guide was published. This revision represents the T10 approved responses to the OSD-2 Letter Ballot comments.

All page number, clause number, table number, etc. references are to [OSD-2 r04](#).

Related Files Summary

To fully utilize the PDF linking features provided by this letter ballot comments review, the following files must be downloaded from the T10 web site. All files must be stored in the same directory:

- This file, which doubtless has already been downloaded.
- A fresh copy of the original [OSD-2 r04](#) PDF file.
- Each of the files in one row of the following table (note: a revision of this file is one member of each row):

This file and revision	Supplementary file and revision	OSD-2 revision	Changes Incorporated		
			Technical	Editorial	Total
08-380r1.pdf and 08-380r1.fdf	08-395r0.pdf	r04a	28	113	141
08-380r2.pdf and 08-380r2.fdf	08-395r1.pdf	r04b	12	13	25
08-380r3.pdf and 08-380r3.fdf	08-395r2.pdf	r04c	7	4	11
08-380r4.pdf and 08-380r4.fdf	08-395r3.pdf	r04d	8	2	10
08-380r5.pdf and 08-380r5.fdf	08-395r3.pdf	r04e	0	† 2	† 2
† Includes removal of the Revision History that was actually removed in r05.					

Import the downloaded FDF file into the freshly downloaded original [OSD-2 r04](#) PDF file.

The [navy](#) links in this file and the supplementary file connect the various PDF files that are stored in the same directory on your computer. Only the [dark green](#) links on the first few pages of this file connect to the T10 web site. No significant efforts have been made to cause one file to be comprehensible without the others, and the [navy](#) links are the glue that makes this practical.

Resolution Summary

The following table summarizes numbers of comments with specific types of resolutions by source company.

Company	Technical		Editorial		Rejected	Deferred or No Action Taken	Total
	As Is	Changed	As Is	Changed			
Dell, Inc.			9	4			13
ENDL Texas	4	5	10	7			26
Hewlett Packard Co.		5	25	12	4		46
IBM Corp.		4	2	7	5	1	19
LSI Corp.			4	1			5
Seagate Technology	1	19	15	27	1	3	66
Symantec		13	3	5			21
Late Comments	11	5	20	1			37
Total	16	51	88	64	10	4	233

The lists of comments on the following pages may be used to locate comments with specific types of resolutions and each entry is a PDF hot link to the comment and resolution information. The PDF bookmarks may be used to locate comments based on their source company.

Rejected Comments

HP 2) SPC-4 is published	22
HP 30) Add FUA_NV bit	28
HP 37) Object structure rebuilds not a RAID rebuild.....	31
HP 45) Add table footnote for Obsolete service actions	33
IBM 8) Explicate alternate implementations.....	35
IBM 11) Add Security Processing Flow Diagram.....	36
IBM 14) Identify where an ADDITIONAL LENGTH field appears	37
IBM 15) Explode SCSI Additional Sense Codes for unsupported OSD features.....	37
IBM 17) Explode SCSI Additional Sense Codes for unsupported OSD features.....	38
Seagate 14) C not defined until section 4.8.5	43

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Substantive Comments Accepted As Proposed

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ENDL 11) OSD-2 has specified a specific substitute for deferred error handling 18
ENDL 17) Specify alignment for attribute values that appear in the CDB 19
ENDL 19) Attribute lengths are 2 bytes, not 4 bytes 20
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Other 9) End REMOVE MEMBER OBJECTS ability to operate on LINKED collections 67
Other 17) Non-existent partition checking must be specified. 70
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Other 19) Non-existent partition checking must be specified. 70
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Other 27) Prohibit effects of timestamps bypass on created time 72
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HP 19) Partition_ID values are always assigned by the OSD logical unit	26
HP 26) Clarify data sharing relationship to error recovery	27
HP 31) Allow fixed format sense data	29
HP 33) DPO bit definition improperly aligned with SBC-3.	30
HP 38) OBJECT STRUCTURE CHECK interacts with snapshots and clones	31
IBM 7) Capability definition needs to cover partial-command error handling.	35
IBM 10) Only capability keys must be confidential.	36
IBM 18) Remove COPY USER OBJECTS command	38
IBM 19) CLEAR interactions w/ READ MAP	38
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Seagate 6) Data-area I/Os in non-data objects	41
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Seagate 23) Create permission for CREATE SNAPSHOT	45
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Seagate 28) Current Command attributes page permission bits requirements	47
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Dell 2) Unordered list missing a conjunction: `and`	13
Dell 3) Unordered list missing a conjunction: `and`	13
Dell 4) An ordered list should begin with 1) not a)	13
Dell 5) Unordered list needs a conjunction: `and`	13
Dell 6) An unordered list should have only one conjunction	14
Dell 7) Unordered list missing a conjunction: `and`	14
Dell 8) Unordered list entries other than the last end with a semi-colon, not a period	14
Dell 13) Unordered list entries end with a semi-colon, not a comma	15
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Other 10) `should be maintained to restarting of` is gibberish 68

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Accepted With Noted Changes Non-Substantive Comments

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ENDL 5) Match OSD-2 definition of device server to one in SAM-4	17
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HP 23) REFERESH s/b REFRESH	27
HP 32) Ensure consistent additional CDB length value everywhere	29
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HP 40) REFERESH s/b REFRESH	32
HP 43) Maximum CDB continuation field size is 4 bytes, not 8	33
IBM 1) A credential may contain more than one capability	34
IBM 2) Rationalize OSD-2 objects with SAM-4 objects	34
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IBM 9) Sentence is missing a verb: `is`	36
IBM 13) Reference SPC-4 globally, not SPC-3	37
LSI 4) Replace all SAM-3 references with SAM-4 references	39
Seagate 2) Delete a stray `of`	40
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Accepted With Noted Changes Non-Substantive Comments (continued)

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Symantec 7) Clarify source partition attribute's contents 60
Symantec 8) The IMMED_TR bit is described in 5.2.7, not 5.2.5 60
Symantec 10) `should be maintained to restarting of` is gibberish 61
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No Action Requested, No Action Taken Comments

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Seagate 45) The copy user object source CDB continuation descriptor length is fixed, not variable 51

1. Dell, Inc.

Kevin Marks of Dell, Inc. submitted the following comments on a Yes vote.

Dell 1) Reference SPC-4 globally, not SPC-3 (Accepted, Editorial) [1]

[PDF pg 1, pg i, Global](#)

See also: [ENDL-1](#) and [IBM-13](#)

I see both SPC-3 and SPC-4 referenced though out. Which is it?

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

The following changes will be made:

- SPC-3 will be removed from the approved references subclause
- SPC-3 will be removed from the acronyms list
- All other references to SPC-3 will be changed to SPC-4

Dell 2) Unordered list missing a conjunction: `and` (Accepted, Editorial) [2]

[PDF pg 25, pg 1, Clause 1, a,b,c list on this page](#)

See also: [LSI-2](#)

devices;
s/b
devices; and

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Dell 3) Unordered list missing a conjunction: `and` (Accepted, Editorial) [3]

[PDF pg 26, pg 2, Clause 1, a,b,c list on this page](#)

See also: [LSI-3](#)

commands;
s/b
commands; and

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Dell 4) An ordered list should begin with 1) not a) (Accepted, Editorial) [4]

[PDF pg 46, pg 22, 4.6.6.6, 1st ?,2,3 list in subclause](#)

a)
s/b
1)

I think

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Dell 5) Unordered list needs a conjunction: `and` (Accepted, Editorial) [5]

[PDF pg 59, pg 35, 4.11.1, list entry B\)](#)

(see 4.11.3.1);
s/b

(see 4.11.3.1); and

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Dell 6) An unordered list should have only one conjunction (Accepted, Editorial) [6]
[PDF pg 81, pg 57, 4.12.1, 1st a,b,c list on pg, list entry b\)](#)

Delete extra "and" in a,b,c list

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Dell 7) Unordered list missing a conjunction: `and` (Accepted, Editorial) [7]
[PDF pg 178, pg 154, 6.12, 2nd to last a,b,c list on pg](#)

undefined;

s/b

undefined; and

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Dell 8) Unordered list entries other than the last end with a semi-colon, not a period (Accepted, Editorial) [8]
[PDF pg 216, pg 192, 6.26.1, 1st a,b,c list on pg](#)

0000h.

s/b

0000h;

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Dell 9) Unordered list needs a conjunction (Accepted, Editorial) [9]
[PDF pg 260, pg 236, 7.1.3.4, 1st a,b,c list in subclause](#)
See also: [Dell-10](#), [Dell-11](#), and [Dell-12](#)

represents;

needs and/or?

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

The correct conjunction, [and](#), will be inserted.

Dell 10) Unordered list needs a conjunction (Accepted, Editorial) [10]
[PDF pg 261, pg 237, 7.1.3.5, 1st a,b,c list in subclause](#)
See also: [Dell-9](#), [Dell-11](#), and [Dell-12](#)

represents;

needs and/or?

The changes described below have been incorporated in OSD-2 [r04c](#), [r04d](#), and [r04e](#).

The correct conjunction, [and](#), will be inserted.

Dell 11) Unordered list needs a conjunction (Accepted, Editorial) [11]

[PDF pg 262, pg 238, 7.1.3.6, 1st a,b,c list in subclause](#)

See also: [Dell-9](#), [Dell-10](#), and [Dell-12](#)

represents;

needs and/or?

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

The correct conjunction, [and](#), will be inserted.

Dell 12) Unordered list needs a conjunction (Accepted, Editorial) [12]

[PDF pg 263, pg 239, 7.1.3.7, 1st a,b,c list in subclause](#)

See also: [Dell-9](#), [Dell-10](#), and [Dell-11](#)

represents;

needs and/or?

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

The correct conjunction, [and](#), will be inserted.

Dell 13) Unordered list entries end with a semi-colon, not a comma (Accepted, Editorial) [13]

[PDF pg 321, pg 297, 7.1.3.30, 2nd a,b,c list after table 222](#)

,
s/b
;

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

2. ENDL Texas

Ralph O. Weber of ENDL Texas submitted the following comments on a Yes vote.

ENDL 1) Reference SPC-4 globally, not SPC-3 (Accepted, Editorial) [14]

[PDF pg 25, pg 1, Global](#)

See also: [Dell-1](#) and [IBM-13](#)

SPC-3 s/b SPC-4

Editor's Notes

This comment is resolved by comment [Dell-1](#). The response to comment [Dell-1](#) has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

ENDL 2) Move SAM-4 to Normative References (Accepted, Editorial) [15]

[PDF pg 28, pg 4, 2.5](#)

SAM-4 is close enough to published to move it to normative references

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

ENDL 3) Rationalize OSD-2 objects with SAM-4 objects (Accepted, Editorial) [16]

[PDF pg 29, pg 5, Global in 3.1](#)

See also: [ENDL-5](#), [ENDL-6](#), [ENDL-7](#), [IBM-2](#), [LSI-5](#), [Other-22](#), [Other-24](#), and [Other-25](#)

Glossary entries that use 'object' in the SAM-3 sense are no longer correct. Reword them.

The changes described below have been incorporated in OSD-2 [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

As recommended in comment [LSI-5](#), the cited text will be modified as follows:

An object ([i.e., class](#)) that ...

ENDL 4) Replace all SAM-3 references with SAM-4 references (Accepted, Editorial) [17]

[PDF pg 29, pg 5, Global](#)

See also: [HP-1](#) and [LSI-4](#)

SAM-3 s/b SAM-4

Editor's Notes

This comment is resolved by the changes described in the response to comment [LSI-4](#). The response to comment [LSI-4](#) has been incorporated in OSD-2 [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

ENDL 5) Match OSD-2 definition of device server to one in SAM-4 (Accepted, Editorial) [18]

PDF pg 29, pg 5, 3.1.15

See also: [ENDL-3](#), [ENDL-6](#), [ENDL-7](#), [IBM-2](#), [LSI-5](#), [Other-22](#), [Other-24](#), and [Other-25](#)

SCSI tasks seems unlikely to appear in the SAM-4 definition of a device server.

The changes described below have been incorporated in OSD-2 r04b, r04c, r04d, and r04e.

Applying the suggestion in comment [LSI-5](#), and including other changes needed for consistency with SAM-4, the cited sentence will be modified as follows:

An object (i.e., class) within a logical unit that processes ~~SCSI tasks~~ [commands](#) according to the [requirements for command management](#) ~~rules-of task management~~.

ENDL 6) Rationalize OSD-2 objects with SAM-4 objects (Accepted, Editorial) [19]

PDF pg 30, pg 6, 3.1.26

See also: [ENDL-3](#), [ENDL-5](#), [ENDL-7](#), [IBM-2](#), [LSI-5](#), [Other-22](#), [Other-24](#), and [Other-25](#)

The definition of object needs to be updated to be consistent with the SAM-4 switch to UML.

The changes described below have been incorporated in OSD-2 r04b, r04c, r04d, and r04e.

Per comment [LSI-5](#), SCSI architecture model object will be changed to SCSI architecture model object (i.e., class)

ENDL 7) Match OSD-2 definition of task to SAM-4 (Accepted, Editorial) [20]

PDF pg 31, pg 7, 3.1.50

See also: [ENDL-3](#), [ENDL-5](#), [ENDL-6](#), [IBM-2](#), [LSI-5](#), [Other-22](#), [Other-24](#), and [Other-25](#)

What SAM-3 calls a task, SAM-4 calls a command. The 'task' definition needs to be restructured to coincide with SAM-4.

The changes described below have been incorporated in OSD-2 r04c, r04d, and r04e.

For consistency with SAM-4, and employing the nomenclature suggested in comment [LSI-5](#), the definition of task will be removed, and the glossary entry for command will be augmented as follows:

command: A request describing one or more command functions (see 3.1.10) to be performed by a device server. [Also the SCSI architecture model object \(i.e., class\) within a logical unit that represents the work associated with the command functions.](#) See ~~SAM-3~~ SAM-4.

ENDL 8) Task Priority s/b Command Priority [per SAM-4] (Accepted, Editorial) [21]

PDF pg 38, pg 14, 4.1

See also: [HP-4](#)

Task Priority s/b Command Priority [per SAM-4]

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

ENDL 9) Read-Only data object accessibility cannot be reversed (Accepted, Substantive) [22]

[PDF pg 48, pg 24, 4.7](#)

See also: [ENDL-26](#) and [Seagate-16](#)

After write access to an object has been denied, there appears to be no way to use a command to restore that access.

Editor's Notes

This comment is resolved by the changes described in the response to comment [Seagate-16](#). The response to comment [Seagate-16](#) has been incorporated in OSD-2 [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

ENDL 10) QUERY TASK s/b QUERY TASK, QUERY TASK SET, and QUERY ASYNCHRONOUS EVENT (Accepted, Substantive) [23]

[PDF pg 102, pg 78, 4.12.10, p3, s1](#)

QUERY TASK s/b QUERY TASK, QUERY TASK SET, and QUERY ASYNCHRONOUS EVENT

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

ENDL 11) OSD-2 has specified a specific substitute for deferred error handling (Accepted, Substantive) [24]

[PDF pg 112, pg 88, 4.14, p 4, s 2](#)

See also: [ENDL-13](#) and [Seagate-36](#)

reported as deferred errors (see SPC-3)

s/b

handled as described in 4.11.3.

The requested change has been incorporated in OSD-2 [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

ENDL 12) Support fixed format sense data (Accepted, Substantive) [25]

[PDF pg 117, pg 93, 4.16.1, p 1, s 1](#)

See also: [HP-31](#)

SPC-4 subclause 4.5.1 defines exceptions that make this "all errors" statement invalid. Resolve the conflict between OSD-2 and SPC-4.

Editor's Notes

This comment is resolved by the changes described in the response to comment [HP-31](#). The response to comment [HP-31](#) has been incorporated in OSD-2 [r04c](#), [r04d](#), and [r04e](#).

ENDL 13) OSD-2 has specified a specific substitute for deferred error handling (Accepted, Substantive) [26]

PDF pg 117, pg 93, 4.16.1, last p
See also: [ENDL-11](#) and [Seagate-36](#)

I believe that 4.11.3 defines the error recovery mechanism for errors that occur after a command has completed, and the mechanism does not involve deferred error reporting.

Editor's Notes

This comment is resolved by the changes described in the response to comment [Seagate-36](#). The response to comment [Seagate-36](#) has been incorporated in OSD-2 [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

ENDL 14) Align enabled task state discussion with SAM-4 (Accepted, Editorial) [27]
PDF pg 122, pg 98, 4.17, 2nd p before table 58

before the task containing that command enters the enabled task state
s/b
before that command enters the enabled command state [per SAM-4]

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

ENDL 15) Operation code structure defined in SPC-4, not SAM-4 (Accepted, Editorial) [28]
PDF pg 124, pg 100, 5.1, p 3

The structure of the operation code field is described in SPC-4, not SAM-4

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

As per [LSI-4](#), SAM-3 will be changed to SAM-4. In addition, the cited sentence will be modified as follows:

The general structure of the OPERATION CODE field ~~and control byte are~~ is defined in SPC-4. The general structure of the CONTROL byte is defined in ~~SAM-3~~ [SAM-4](#).

ENDL 16) Attributes CDB parameters start at byte 52, not 48 (Accepted, Editorial) [29]
PDF pg 127, pg 103, 5.2.6.2, table 62
See also: [Seagate-40](#), [Seagate-41](#), [ENDL-18](#), [Seagate-42](#), and [ENDL-20](#)

byte 47 s/b byte 51 [to match table 60]

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

ENDL 17) Specify alignment for attribute values that appear in the CDB (Accepted, Substantive) [30]
PDF pg 128, pg 104, 5.2.6.2, end of 2nd p on pg

[insert]If the ATTRIBUTE LENGTH field is set to a value that is less than 18, the unused attribute value bytes shall be placed at the highest offsets in the ATTRIBUTE VALUE field.

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

ENDL 18) Attributes CDB parameters start at byte 52, not 48 (Accepted, Editorial) [31]

[PDF pg 128, pg 104, 5.2.6.3, table 63](#)

See also: [Seagate-40](#), [ENDL-16](#), [Seagate-41](#), [Seagate-42](#), and [ENDL-20](#)

byte 47 s/b byte 51 [to match table 60]

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

ENDL 19) Attribute lengths are 2 bytes, not 4 bytes (Accepted, Substantive) [32]

[PDF pg 128, pg 104, 5.2.6.3, table 63](#)

The ATTRIBUTE LENGTH field s/b 2 bytes not 4 bytes. For compatibility, insert two reserved bytes before the field.

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

ENDL 20) Attributes CDB parameters start at byte 52, not 48 (Accepted, Editorial) [33]

[PDF pg 130, pg 106, 5.2.6.4, table 64](#)

See also: [Seagate-40](#), [ENDL-16](#), [Seagate-41](#), [ENDL-18](#), and [Seagate-42](#)

byte 47 s/b byte 51 [to match table 60]

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

ENDL 21) What is the IMMED_TR bit set to? (Accepted, Editorial) [34]

[PDF pg 131, pg 107, 5.2.7, last p in subclause](#)

bit being set s/b bit being set to one

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

ENDL 22) Per SAM-4, task tag s/b command identifier (Accepted, Editorial) [35]

[PDF pg 210, pg 186, 6.24, table 120](#)

See also: [ENDL-23](#) and [Other-13](#)

[field name] TASK TAG s/b COMMAND IDENTIFIER [per SAM-4]

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

ENDL 23) Per SAM-4, task tag s/b command identifier (Accepted, Editorial) [36]

[PDF pg 211, pg 187, 6.24, table 121](#)

See also: [ENDL-22](#) and [Other-13](#)

Task Tag Specified s/b Command Identifier Specified

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

ENDL 24) Per SAM-4, QUERY UNIT ATTENTION s/b QUERY ASYNCHRONOUS EVENT (Accepted, Editorial) [37]

[PDF pg 211, pg 187, 6.24, table 121](#)

See also: [HP-39](#)

QUERY UNIT ATTENTION s/b QUERY ASYNCHRONOUS EVENT

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

ENDL 25) Eight-byte align the ATTRIBUTE VALUE field (Accepted, Substantive) [38]

[PDF pg 328, pg 304, 7.1.4.3, table 229](#)

The attribute value field is not 8-byte aligned. Six bytes must be added before the field begins. Suggest adding these bytes before the attribute length field.

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

The six bytes will be added in the suggested location. This also changes the formula for computing the attribute length from ~~n-9~~ to [n-15](#).

ENDL 26) Read-Only data object accessibility cannot be reversed (Accepted, Substantive) [39]

[PDF pg 48, pg 24, 4.7, p 1, s 1](#)

See also: [ENDL-9](#) and [Seagate-16](#)

{from Panasas} Because of this, it is not possible to make a set of objects writable once the write prohibition has been set. If writing is prohibited, then writing of the object accessibility attribute is prohibited too.

Editor's Notes

This comment is resolved by the changes described in the response to comment [Seagate-16](#). The response to comment [Seagate-16](#) has been incorporated in OSD-2 [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

3. Hewlett Packard Co.

Rob Elliott of Hewlett Packard Co. submitted the following comments on a Yes vote.

HP 1) Replace all SAM-3 references with SAM-4 references (Accepted, Editorial) [40]

[PDF pg 27, pg 3, 2.2](#)

See also: [ENDL-4](#) and [LSI-4](#)

(global)

ISO/IEC 14776-413, SCSI Architecture Model - 3 (SAM-3) [ANSI INCITS 402-2005]

Upgrade all SAM-3 references to SAM-4, since SAM-4 is published.

Editor's Notes

This comment is resolved by the changes described in the response to comment [LSI-4](#). The response to comment [LSI-4](#) has been incorporated in OSD-2 [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

HP 2) SPC-4 is published (Rejected) [41]

[PDF pg 28, pg 4, 2.5](#)

T10/1731-D

s/b

ANSI INCITS xxx-2008

since SPC-4 is published

Reason for Rejection

SPC-4 is not published. It is not even in Letter Ballot.

HP 3) SAM-4 has a BSR number (Accepted, Editorial) [42]

[PDF pg 28, pg 4, 2.5](#)

T10/1683-D

s/b

ANSI INCITS xxx-2008

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

The cited text will be modified as follows:

ISO/IEC 14776-414 *SCSI Architecture Model - 4 (SAM-4)* [[ANSI INCITS 447-200x](#) ~~T10/1683-D~~]

HP 4) Task Priority s/b Command Priority [per SAM-4] (Accepted, Editorial) [43]

[PDF pg 38, pg 14, 4.1](#)

See also: [ENDL-8](#)

Task Priority

s/b

Command Priority

to match final version of sam4

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

HP 5) INQUIRY commands return several types of data; clarify which one applies here (Accepted, Editorial) [44]
[PDF pg 38, pg 14, 4.2, p 1, s 1](#)

response to an INQUIRY command
 s/b
 the standard INQUIRY data

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

The cited text will be modified as follows:

An OBSD (see 3.1.27) contains one or more logical units that return the OSD peripheral device type value in ~~response to an INQUIRY command~~ [their standard INQUIRY data](#) (see SPC-3).

HP 6) Delete extraneous `and` (Accepted, Editorial) [45]
[PDF pg 39, pg 15, 4.3, 3rd p after figure 2, s 1](#)

Delete
 and

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

HP 7) disc drives s/b disk drives (Accepted, Editorial) [46]
[PDF pg 40, pg 16, 4.4, 1 p after figure 3](#)

disc drives
 s/b
 disk drives

Only Seagate spells it "disc"

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

HP 8) Eliminate an ly word and make a clear sentence (Accepted, Editorial) [47]
[PDF pg 40, pg 16, 4.4, 2nd p after figure 3, s 1](#)

share directly access

does not parse

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

The cited text will be modified as follows:

Application clients using multiple SCSI initiator ports share ~~directly~~ access to an OBSD (see 3.1.27) via the service delivery subsystem.

HP 9) Insert `the` (Accepted, Editorial) [48]

[PDF pg 40, pg 16, 4.4, 2nd p after figure 3, s 2](#)

possibly
s/b
possibly the

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

HP 10) initiator devices s/b SCSI initiator devices (Accepted, Editorial) [49]

[PDF pg 40, pg 16, 4.4, 1st a,b,c list, and figure 3](#)

initiator devices
s/b
SCSI initiator devices

also in figure 3

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

HP 11) Insert `that` (Accepted, Editorial) [50]

[PDF pg 40, pg 16, 4.4, 3rd p after figure 3, s 1](#)

application clients place
s/b
that application clients place

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

HP 12) OBSD logical unit nomenclature is inconsistent with rest of OSD-2 (Accepted, Editorial) [51]

[PDF pg 41, pg 17, 4.5, p 1, s 1](#)

See also: [Other-6](#)

OBSD (see 3.1.27) logical unit
s/b
OSD logical unit

That's the phrase used in the next sentence, among other places

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

The comment correctly notes that OBSD logical unit is a non sequitur in this standard. The phrase occurs in only two locations in the entire document. The cited text will be modified as follows:

Data is stored in abstract containers by the OBSD (see 3.1.27) ~~logical unit~~.

HP 13) Clarify that multiple partitions are allowed (Accepted, Editorial) [52]

[PDF pg 41, pg 17, 4.6.1, b\) Partition](#)

See also: [HP-14](#) and [HP-15](#)

This OSD object
s/b
This type of OSD object

since there may be more than one. As written, it sounds like there is just one.

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

HP 14) Clarify that multiple collections are allowed (Accepted, Editorial) [53]

[PDF pg 41, pg 17, 4.6.1, c\) Collection](#)

See also: [HP-13](#) and [HP-15](#)

This OSD object

s/b

This type of OSD object

since there may be more than one. As written, it sounds like there is just one.

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

HP 15) Clarify that multiple user objects are allowed (Accepted, Editorial) [54]

[PDF pg 41, pg 17, 4.6.1, d\) User object](#)

See also: [HP-13](#) and [HP-14](#)

This OSD object

s/b

This type of OSD object

since there may be more than one. As written, it sounds like there is just one.

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

HP 16) Clarify `it` (Accepted, Editorial) [55]

[PDF pg 41, pg 17, 4.6.1, d\) User object](#)

it

s/b

the user object

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

HP 17) assigned by s/b are assigned by (Accepted, Editorial) [56]

[PDF pg 42, pg 18, 4.6.2, table 3, table footnote a](#)

See also: [HP-18](#)

assigned by

s/b

are assigned by

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

HP 18) assigned by s/b are assigned by (Accepted, Editorial) [57]

[PDF pg 42, pg 18, 4.6.2, table 3, table footnote c](#)

See also: [HP-17](#)

assigned by

s/b

are assigned by

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

HP 19) Partition_ID values are always assigned by the OSD logical unit (Accepted, Substantive) [58]
[PDF pg 42, pg 18, 4.6.2, table 3](#)

Footnote a also applies to "well known collections and "collection or user object", since those rows have multiple Partition_ID values to choose from as well.

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

It is not the intention of OSD-2 that the OSD logical unit should assign Partition_ID values in response to every application client request. Partition_ID values are assigned only in response to application client requests that create a Partition. The best way to clarify this is to add example application client requests to every table footnote in this table where application client requests are mentioned.

The text in table footnote a will be modified as follows:

... in response to application client requests ([e.g., the CREATE PARTITION command \(see 6.9\)](#)).

The text in table footnote c will be modified as follows:

... in response to application client requests ([e.g., the CREATE COLLECTION command \(see 6.8\)](#)).

HP 20) Consistency in table cell alignment, please (Accepted, Editorial) [59]
[PDF pg 44, pg 20, 4.6.6.3, table 4](#)

The "A CREATE USER" and "A REMOVE" cells should be left justified to match the column headers

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

The vast majority of cells in the table are centered. Therefore, it is the column headers that are wrong. All cells in table 4 will be changed to centered.

HP 21) which s/b thant (Accepted, Editorial) [60]
[PDF pg 45, pg 21, 4.6.6.5.2, p 1, s 1](#)

which
s/b
that

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

HP 22) REFERESH s/b REFRESH (Accepted, Editorial) [61]
[PDF pg 45, pg 21, 4.6.6.5.3, 1st a,b,c list](#)
See also: [Seagate-7](#), [HP-23](#), [Seagate-8](#), [Seagate-9](#), and [HP-40](#)

REFERESH
s/b

REFRESH

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

The cited text will be modified as follows:

C) ~~REFERESH~~ REFRESH SNAPSHOT OR CLONE command ...

HP 23) REFERESH s/b REFRESH (Accepted, Editorial) [62]

PDF pg 46, pg 22, 4.6.6.5.3, 1st a,b,c list on pg

See also: [Seagate-7](#), [HP-22](#), [Seagate-8](#), [Seagate-9](#), and [HP-40](#)

REFERESH

s/b

REFRESH

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

The cited text will be modified as follows:

~~REFERESH~~ REFRESH SNAPSHOT OR CLONE command, or ...

HP 24) device sever s/b device server (Accepted, Editorial) [63]

PDF pg 47, pg 23, 4.6.6.6, 2nd p after note 2, s 1

See also: [Seagate-12](#), [HP-28](#), [HP-42](#), and [Other-3](#)

device sever

s/b

device server

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

HP 25) Insert space before cross reference (Accepted, Editorial) [64]

PDF pg 59, pg 35, 4.11.1, list entry C)

conditions(

add space

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

HP 26) Clarify data sharing relationship to error recovery (Accepted, Substantive) [65]

PDF pg 77, pg 53, 4.11.3.1

With snapshots allowing partitions to share parts of their data, it is more likely that an error will affect multiple partitions. For c) A) c), it may be worth reporting all affected Partition_IDs rather than just one, or the extent of damage will be unclear.

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Reporting the full extent of the damage is impossible in the sense data alone. Therefore, the unit attention feature is designed to report only that some damage exists. The application client should detect the extent of the damage using the various Error Recovery attributes pages.

In the cited specific case, the number of damage partitions is reported by the number of damaged partitions attribute in the Root Error Recovery attributes page (see 7.1.3.26). The only thing that might be viewed as missing from 4.11.3.1 is specific mention of the number of damaged partitions attribute.

To remedy this, the list of recommendations to the application client will be updated as follows:

A policy/storage manager that receives notification of uncorrectable damaged storage should:

- a) If the root object and all partitions are not affected, determine how many partitions are affected from the number of damaged partitions attribute in the Root Error Recovery attributes page (see 7.1.3.26);
- b) ~~a)~~ Use any information ...

HP 27) SHAPSHOT s/b SNAPSHOT (Accepted, Editorial) [66]

[PDF pg 108, pg 84, 4.13.2.4, p 1](#)

SHAPSHOT
s/b
SNAPSHOT

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

HP 28) device sever s/b device server (Accepted, Editorial) [67]

[PDF pg 110, pg 86, 4.13.3, table 43, DO NOT CARE row](#)

See also: [Seagate-12](#), [HP-24](#), [HP-42](#), and [Other-3](#)

device sever
s/b
device server

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

HP 29) Delete `the` (Accepted, Editorial) [68]

[PDF pg 110, pg 86, 4.13.3, 2nd p after table 43](#)

Delete
the

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

HP 30) Add FUA_NV bit (Rejected) [69]

[PDF pg 112, pg 88, 4.14](#)

Should OSD add an FUA_NV bit to distinguish between these data locations:

FUA: data is safe on the medium. (if the OSD controller is using disk drives as its medium, the disk drives can be moved to another OSD controller)

FUA_NV: data is safe either in NV cache or on the medium. (disk drives cannot be moved without also moving the NV cache)

Reason for Rejection

OSD caches are defined in a way which makes the FUA_NV bit irrelevant, as per the following statement from the cited subclause: "Individual OBSD (see 3.1.27) implementations may use whatever technologies they choose to

implement stable storage (e.g., an OBSD may implement stable storage as a combination of non-volatile random access memory and disk devices)."

OSD intends that application clients not be able to distinguish between recording on the media and placement in non-volatile cache.

Adding non-volatile cache support is much more complicated than adding a bit to the CDB. Fundamental changes must be incorporated in the model, and as SBC-3 has learned recently, reporting about a non-volatile cache which has failed represents an additional problem that has been left unmentioned in the comment. Furthermore, the FUA_NV bit could not be placed in the same location as SBC-3 uses because that bit is part of the widely used ISOLATION field (see 5.2.8).

HP 31) Allow fixed format sense data (Accepted, Substantive) [70]

[PDF pg 117, pg 93, 4.16.1, p 1, s 1](#)

See also: [ENDL-12](#)

OSD logical units shall use descriptor format sense data (see SPC-3) to report all errors.

While the intent is admirable, this is a bit too aggressive (like SAT-2's attempt to mandate descriptor format for the ATA PASS-THROUGH commands).

1. OSD ought to honor the D_SENSE bit in the Control mode page. If fixed format is requested, then return very abbreviated (almost useless) fixed-format data rather than return another format.
2. SAM-4/SPC-4 require that fixed format be used to report reset unit attention conditions and the codes needed to run MODE SELECT to turn on fixed-format, so old software just doesn't get confused

The changes described below have been incorporated in OSD-2 r04c, r04d, and r04e.

The cited paragraph will be modified as follows:

~~OSD logical units shall use descriptor format sense data (see SPC-3) to report all errors.~~ Complete OSD error reporting depends on the use of descriptor format sense data (see SPC-4). However, device servers shall honor requests for fixed format sense data (see SPC-4). If this standard requires a device server to return one or more specific sense data descriptors but fixed format sense data has been requested, then the device server shall:

- a) Not return the data associated with any of the mandated sense data descriptors; and
- b) Return zero in the INFORMATION field and/or COMMAND-SPECIFIC INFORMATION field in place of data that is meaningless without reference to associated data that is available only in one or more sense data descriptors.

HP 32) Ensure consistent additional CDB length value everywhere (Accepted, Editorial) [71]

[PDF pg 124, pg 100, 5.1, 1st p after table 59, s 2](#)

See also: [Seagate-38](#)

216
s/b
228

to match the value in table 59.

May be better to say

"the value specified in table 59" to avoid this problem.

Editor's Notes

This comment is resolved by the changes described in the response to comment [Seagate-38](#). The response to comment [Seagate-38](#) has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

HP 33) DPO bit definition improperly aligned with SBC-3 (Accepted, Substantive) [72]

[PDF pg 126, pg 102, 5.2.3, p 1](#)

See also: [Other-20](#)

The definition of DPO in 4.14 and 5.2.3 is a bit misleading - it sounds like a weak "should" version of FUA, advising the device server to not put data in the cache.

Really, DPO signals that the application client does not expect to read the data again, so the device server need not retain the data in the cache in hopes of a cache hit on a read.

To maintain reasonable write performance, however, it is important that the device server temporarily put the data in its cache, performing the write to medium when convenient. DPO should not cause a drop to the FUA level of performance.

The changes described below have been incorporated in OSD-2 [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

The last sentence of the cited paragraph will be modified as follows:

If the DPO bit is set to one, the device server should not ~~place~~ [replace data in the volatile cache with data transferred as a result of this command](#) ~~in the volatile cache~~.

HP 34) ADDITIONAL LENGTH s/b smallcaps (Accepted, Editorial) [73]

[PDF pg 126, pg 102, 5.2.2, p 2, s 2](#)

ADDITIONAL LENGTH

s/b

smallcaps

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

HP 35) 0h s/b 00h (Accepted, Editorial) [74]

[PDF pg 134, pg 110, 5.2.13, table 67, 0h row](#)

0h

s/b

00h

to match width of other values in the table

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

HP 36) Table footnote is too inclusive (Accepted, Editorial) [75]

PDF pg 146, pg 122, 6.1, table 80, footnote a

Service action codes values between...

s/b

For the operation code 7Fh, service action codes values between...

and join with the next sentence to share that "For..."

There are some non-7Fh opcodes in the table, and this comment does not apply to their service action values.

The changes described below have been incorporated in OSD-2 r04a, r04b, r04c, r04d, and r04e.

Relying on the value range definition in 3.4, the cited sentences will be modified as follows:

~~Service~~ For operation code 7Fh, service action codes 8800h to 8F7Fh values between 8800h and 8F7Fh that are not listed in this table are reserved for future standardization. ~~Service~~ standardization and service action codes 8F80h to 8FFFh ~~code values between 8F80h and 8FFFh~~ may have vendor specific command assignments.

HP 37) Object structure rebuild is not a RAID rebuild (Rejected) [76]

PDF pg 205, pg 181, 6.22.2 & 6.22.3

See also: IBM-15 and IBM-17

REBUILD IN PROGRESS

was intended for SCC (RAID volumes) to report that they are rebuilding a RAID volume. OSD performing an object check seems a bit different. I think a new additional sense code is worth adding for this reason. The progress indicator will make more sense if the operation in progress is clearly identified. The time for OBJECT STRUCTURE CHECK to complete is based on the amount of metadata; the time for a RAID rebuild is based on the amount of data.

Same comment applies to 6.22.3.

Reason for Rejection

A rebuild is a rebuild is a rebuild. There is zero chance of an application client being confused between a RAID disk and an OBSD.

HP 38) OBJECT STRUCTURE CHECK interacts with snapshots and clones (Accepted, Substantive) [77]

PDF pg 206, pg 182, 6.22.3

With snapshots, several partitions might share the same data. It seems like OBJECT STRUCTURE CHECK might need to ensure that all commands to all such partitions are terminated in 6.22.3.

The changes described below have been incorporated in OSD-2 r04b, r04c, r04d, and r04e.

The cited text will be modified as follows:

While an OBJECT STRUCTURE CHECK command for a specified partition is being processed, the device server shall terminate all commands ~~addressed to that~~ that affect the partition with:

HP 39) Per SAM-4, QUERY UNIT ATTENTION s/b QUERY ASYNCHRONOUS EVENT (Accepted, Editorial)
[78]

[PDF pg 211, pg 187, 6.24, table 121](#)
See also: [ENDL-24](#)

QUERY UNIT ATTENTION
s/b
QUERY ASYNCHRONOUS EVENT

to match final SAM-4 terminology

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

HP 40) REFERESH s/b REFRESH (Accepted, Editorial) [79]

[PDF pg 228, pg 204, 6.30.1, table 136 title](#)
See also: [Seagate-7](#), [HP-22](#), [HP-23](#), [Seagate-8](#), and [Seagate-9](#)

REFERESH
s/b
REFRESH

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

The cited table title will be modified as follows:

~~REFERESH~~ REFRESH SNAPSHOT OR CLONE command

HP 41) There should be a space between the sentence text and the cross reference (Accepted, Editorial)
[80]

[PDF pg 240, pg 216, 6.35.1, p 1](#)

partition(

add space

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

HP 42) device sever s/b device server (Accepted, Editorial) [81]

[PDF pg 249, pg 225, 6.38.2, 1st p on pg](#)
See also: [Seagate-12](#), [HP-24](#), [HP-28](#), and [Other-3](#)

device sever
s/b
device server

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

HP 43) Maximum CDB continuation field size is 4 bytes, not 8 (Accepted, Editorial) [82]
[PDF pg 264, pg 240, 7.1.3.8, table 160, Maximum CDB continuation length row](#)

The field that the Maximum CDB continuation length field establishes the upper limit for is a 4-byte field. Should the length of this attribute be 4 bytes to match?

The changes described below have been incorporated in OSD-2 r04a, r04b, r04c, r04d, and r04e.

Previous versions of this working draft placed the CDB CONTINUATION LENGTH field in the continuation itself. That length field was 8 bytes. When the CONTINUATION LENGTH field was moved to the CDB, the field size was reduced to 4 bytes. This instance of that size change was not corrected.

The cited length of **8** will be changed to **4**.

HP 44) F1 s/b F1h (Accepted, Editorial) [83]
[PDF pg 332, pg 308, 7.5.2.1, table 234, last row](#)

F1
 s/b
 F1h

The requested change has been incorporated in OSD-2 r04a, r04b, r04c, r04d, and r04e.

HP 45) Add table footnote for Obsolete service actions (Rejected) [84]
[PDF pg 335, pg 311, B.1, table B.1, footnotes](#)

Consider adding a footnote explaining how all the OSD-1 opcodes were made obsolete and replaced in OSD-2. Item d) on page 2 already explains that, but this table listing opcodes would be a good place to highlight it.

Reason for Rejection

Years ago, T10 rejected text describing the past usage of Obsolete fields in the RESERVE and RELEASE commands. This request falls under the same rubric

HP 46) Multi-page table needs `(part n of m)` in title (Accepted, Editorial) [85]
[PDF pg 335, pg 311, B.1, table B.1 title](#)

Add "(part n of 2)" to table B.1 header

The requested change has been incorporated in OSD-2 r04a, r04b, r04c, r04d, and r04e.

4. IBM Corp.

Kevin Butt of IBM Corp. submitted the following comments on a No vote.

IBM 1) A credential may contain more than one capability (Accepted, Editorial) [86]
[PDF pg 29, pg 5, 3.1.11](#)

Here you talk about a single capability while in 3.1.16 you say "not the first". In credential you may want to say also a capability or several capabilities

The changes described below have been incorporated in OSD-2 r04a, r04b, r04c, r04d, and r04e.

The cited text will be modified as follows:

The credential includes ~~a capability~~ **one or more capabilities** (see 3.1.4) that ...

IBM 2) Rationalize OSD-2 objects with SAM-4 objects (Accepted, Editorial) [87]
[PDF pg 36, pg 12, 3.7.2](#)
 See also: [ENDL-3](#), [ENDL-5](#), [ENDL-6](#), [ENDL-7](#), [LSI-5](#), [Other-22](#), [Other-24](#), and [Other-25](#)

the use of term object is somewhat confusing here (as we talk about storage objects). You may want to consider "modules" or something else

The changes described below have been incorporated in OSD-2 r04b, r04c, r04d, and r04e.

To maintain consistency with SAM-4, the cited sentence will be modified as follows:

In this standard, the model for functional interfaces between ~~objects~~ **entities** is a procedure call.

Note: Entity is used in its common English meaning and has no glossary entry in SAM-4.

IBM 3) LBA is not defined in this standard (Accepted, Editorial) [88]
[PDF pg 41, pg 17, 4.5, p 1, s 1](#)

LBAs are not defined here. You may want to remove the statement that refers to LBAs (it contains no information)

The changes described below have been incorporated in OSD-2 r04a, r04b, r04c, r04d, and r04e.

The cited text will be modified as follows:

Data in the abstract containers is not addressable using **fixed length blocks as would be the case in the traditional model (see 4.3) ~~LBAs (Logical Block Addresses)~~**.

IBM 4) Run-on sentence (Accepted, Editorial) [89]
[PDF pg 41, pg 17, 4.6.1, c\) Collection](#)

This is hard to parse (can be parsed ambiguously)

The changes described below have been incorporated in OSD-2 r04a, r04b, r04c, r04d, and r04e.

The cited sentence will be revised as follows:

Each partition contains a list of User_Object_IDs and Collection_Object_IDs ~~contained that are present~~ in the **partition**. ~~partition that~~ **These lists** may be retrieved using the LIST command (see 6.20) and LIST COLLECTION command (see 6.21) command, respectively.

IBM 5) User_Object_IDs are unique within a partition (Accepted, Editorial) [90]

[PDF pg 43, pg 19, 4.6.5, p 1, s 2](#)

See also: [Other-7](#)

has to clarify uniqueness within a partition. The "assigned by OSD LU" is a bit confusing (perhaps explain)

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

The cited sentence will be modified as follows:

User objects have the Partition_ID of the partition to which they belong and a [unique](#) User_Object_ID (see 4.6.2) [within the partition](#) that is assigned by the OSD logical unit when the user object is created.

IBM 6) associated each s/b associated with each (Accepted, Editorial) [91]

[PDF pg 50, pg 26, 4.8.1, 4th p on pg, s 2](#)

See also: [Seagate-18](#)

with

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

IBM 7) Capability definition needs to cover partial-command error handling (Accepted, Substantive) [92]

[PDF pg 61, pg 37, 4.11.2.2.1, 1st p on pg](#)

I think that this formulation is problematic. I would like to see a clause that says that at least the effected changes are reflected in results (sense?)

The changes described below have been incorporated in OSD-2 [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

The following new paragraph will be added after the cited paragraph:

[If CHECK CONDITION status is returned due to failure to verify a capability and at least one command function has been completed before the problem was detected, then the sense data shall include the OSD error identification sense data descriptor \(see 4.16.2.1\).](#)

IBM 8) Explicate alternate implementations (Rejected) [93]

[PDF pg 80, pg 56, 4.12.1, last p on pg](#)

that statement is not completely correct. I would state it that "as a result of the communications between SM and client the client should be able to build a capability and should have the cap-key. The rest of the text calls a combination of those two a credential and uses for it a data-structure similar to those used in communications with the data server for ease of illustration"

Reason for Rejection

Discussion of this comment has suggested concerns about implementations not explicitly prohibited by the text (e.g., application clients *building* capabilities). This is already allowed by the following paragraph in clause 1:

The set of SCSI standards specifies the interfaces, functions, and operations necessary to ensure interoperability between conforming SCSI implementations. This standard is a functional description.

Conforming implementations may employ any design technique that does not violate interoperability.

No additional statements are needed.

IBM 9) Sentence is missing a verb: `is` (Accepted, Editorial) [94]

[PDF pg 81, pg 57, 4.12.1, 2nd p on pg, s 2](#)

See also: [Seagate-31](#)

missing "is"

Editor's Notes

This comment is resolved by the changes described in the response to comment [Seagate-31](#). The response to comment [Seagate-31](#) has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

IBM 10) Only capability keys must be confidential (Accepted, Substantive) [95]

[PDF pg 82, pg 58, 4.12.2, table 28](#)

should mention that only cap-keys have to be confidential

The changes described below have been incorporated in OSD-2 [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Table footnote a will be modified as follows:

^a Confidential communications shall be protected from eavesdropping by physical or cryptographic ~~means~~: means so that capability keys (see 3.1.5) are not disclosed to unauthorized entities.

IBM 11) Add Security Processing Flow Diagram (Rejected) [96]

[PDF pg 98, pg 74, 4.12.7.2, last p in subclause](#)

A flow diagram of the checks might help a lot the reader and perhaps replace the text

Reason for Rejection

A flow diagram would tend to be read as specifying a specific implementation. Since this is undesirable in a T10 standard, no flow diagrams will be added.

IBM 12) Discuss OSDs that run out of space (Deferred to next version) [97]

[PDF pg 112, pg 88, 4.13.5, 1st p on pg](#)

should not say something about "no space" as opposed to quota exhaustion.

Reason for Deferral

The cited paragraph is discussing all the inputs to quota computations. Therefore, its mention of quota errors is very appropriate.

No other part of OSD (e.g., CREATE PARTITION, WRITE, and SET ATTRIBUTES) makes any mention of an OSBD running out of space. If there is a desire to add such a discussion, the work should not be part of the OSD-2 Letter Ballot process. A proposal can be placed on the to-do list for OSD-3.

IBM 13) Reference SPC-4 globally, not SPC-3 (Accepted, Editorial) [98]

[PDF pg 117, pg 93, 4.16.1, last p](#)
See also: [Dell-1](#) and [ENDL-1](#)

are all references consistently to SPC3 or SPC4

Editor's Notes

This comment is resolved by comment [Dell-1](#). The response to comment [Dell-1](#) has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

IBM 14) Identify where an ADDITIONAL LENGTH field appears (Rejected) [99]

[PDF pg 126, pg 102, 5.2.2, p 2, s 2](#)

mention table at 172?

Reason for Rejection

In this standard, ADDITIONAL LENGTH fields occur in LIST parameter data (table 107), LIST COLLECTION parameter data (table 115), PERFORM TASK MANAGEMENT FUNCTION parameter data (table 122), Matches list parameter data (table 126), and READ MAP command and READ MAPS AND COMPARE command parameter data (table 130). Future OSD-n standards may ADDITIONAL LENGTH fields. The most that could be done would be to use one example of an ADDITIONAL LENGTH field, but doing that leads to the possibility that somebody will think that some ADDITIONAL LENGTH fields are covered whereas others are not.

IBM 15) Explode SCSI Additional Sense Codes for unsupported OSD features (Rejected) [100]

[PDF pg 132, pg 108, 5.2.8](#)
See also: [IBM-17](#) and [HP-37](#)

In 5.28 and others can't the error report be more specific - NOT supported xxx - or have the form major, minor with even more detail

Reason for Rejection

The OSD error reporting is more specific than it is for any other SCSI device type. This is accomplished by recommending use of the sense key specific sense data descriptor in 4.16.1. The sense key specific descriptor identifies the exact field in which the error was detected and thus identifies the unsupported feature.

The requested change is not needed and not appropriate for a SCSI standard.

IBM 16) shall updated s/b shall be updated (Accepted, Editorial) [101]

[PDF pg 134, pg 110, 5.2.13, table 67, 0h row](#)

be updated

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

IBM 17) Explode SCSI Additional Sense Codes for unsupported OSD features (Rejected) [102]

[PDF pg 144, pg 120, 4.5.4, 2nd to last p in subclause](#)

See also: [IBM-15](#) and [HP-37](#)

that is better but I would add UNSUPPORTED to all field that are illegal due to lack of a feature

Reason for Rejection

The specified error reporting mechanism is consistent with all other SCSI standards.

IBM 18) Remove COPY USER OBJECTS command (Accepted, Substantive) [103]

[PDF pg 153, pg 129, 6.4](#)

See also: [Seagate-44](#), [Seagate-45](#), [Seagate-46](#), [Seagate-48](#), and [Symantec-4](#)

I would prefer this command removed

Editor's Notes

This comment is resolved by the changes described in the response to comment [Seagate-48](#). The response to comment [Seagate-48](#) has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

IBM 19) CLEAR interactions w/ READ MAP (Accepted, Substantive) [104]

[PDF pg 221, pg 197, 6.28.1](#)

It should be stated explicitly that an area of an object cleared with a clear command or having as content the default value of 0 in all bytes may be reported as a data hole!

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

The CLEAR command, CREATE AND WRITE command, and WRITE command will be modified to indicate the special aspects of writing zeros. Table 133 will be amended to augment the definition of DATA_HOLE.

Details for these changes can be found in [08-395r3](#).

5. LSI Corp.

John Lohmeyer of LSI Corp. submitted the following comments on a Yes vote.

LSI 1) Remove Revision History (Accepted, Editorial) [105]

[PDF pg 3, pg iii, Revision History](#)

This needs be removed before public review.

The requested change has been incorporated in OSD-2 r05.

LSI 2) Unordered list missing a conjunction: `and` (Accepted, Editorial) [106]

[PDF pg 25, pg 1, Clause 1, 1st a,b,c list, item c\)](#)

See also: [Dell-2](#)

This should be << devices; and >>

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

LSI 3) Unordered list missing a conjunction: `and` (Accepted, Editorial) [107]

[PDF pg 26, pg 2, Clause 1, 1st a,b,c, list on pg, item c\)](#)

See also: [Dell-3](#)

This should be << commands; and >>

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

LSI 4) Replace all SAM-3 references with SAM-4 references (Accepted, Editorial) [108]

[PDF pg 41, pg 17, Global](#)

See also: [HP-1](#) and [ENDL-5](#)

Global - Change all references to SAM-3 to SAM-4.

The changes described below have been incorporated in OSD-2 [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

The following changes will be made:

- As per [ENDL-2](#), SAM-4 will be moved to the Normative References subclause
- SAM-3 will be removed from the Normative References subclause
- SAM-3 will be removed from the Acronyms subclause
- All instances of SAM-3 will be replaced with SAM-4

Note that numerous other comments deal with specific changes required to make some references to SAM-3 appropriate when the reference is changed to SAM-4 (e.g., [HP-4](#) and [ENDL-8](#) change task priority to command priority because that difference exists between SAM-3 and SAM-4).

LSI 5) Rationalize OSD-2 objects with SAM-4 objects (Accepted, Editorial) [109]

[PDF pg 41, pg 17, 4.5, p 2](#)

See also: [ENDL-3](#), [ENDL-5](#), [ENDL-6](#), [ENDL-7](#), [IBM-2](#), [Other-22](#), [Other-24](#), and [Other-25](#)

Change this to << In addition to the sets of objects (i.e, classes) defined in SAM-4, this >>

The requested change has been incorporated in OSD-2 [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

6. Seagate Technology

Gerry Houlder of Seagate Technology submitted the following comments on a No vote.

Seagate 1) 2004 s/b 2008 (Accepted, Editorial) [110]
[PDF pg 22, pg xxii, Foreword](#)

Should be 2008.

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Seagate 2) Delete a stray `of` (Accepted, Editorial) [111]
[PDF pg 22, pg xxii, Foreword](#)

Grammar. Either drop "of" or reword the sentence.

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

The cited text will be modified as follows:

At the time ~~of~~ it approved this standard, ...

Seagate 3) Data-area I/Os in non-data objects (Accepted, Substantive) [112]
[PDF pg 42, pg 18, 4.6.3, p 2](#)
 See also: [Seagate-4](#), [Seagate-5](#), [Seagate-6](#), and [Other-26](#)

The description of the root object lists several data manipulation commands that are not allowed (READ, WRITE, APPEND). There are now other data manipulation commands (CLEAR and PUNCH). Should these commands be added to the list? Or, maybe the description should be generalized, such as "The device server shall terminate all commands that are defined to manipulate user data (e.g., READ, WRITE, APPEND, ...) that are sent to the root object with CHECK CONDITION status, ..."

The changes described below have been incorporated in OSD-2 [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Using the table created in response to comment [Other-26](#), the cited paragraph will be revised as follows:

The root object does not contain a read/write data area. The device server shall terminate [any command listed in table x2 \(see 4.6.5\)](#) ~~all READ commands, WRITE commands, and APPEND commands~~ sent to the root object with CHECK CONDITION status, with the sense key set to ILLEGAL REQUEST and the additional sense code set to INVALID FIELD IN CDB.

Seagate 4) Data-area I/Os in non-data objects (Accepted, Substantive) [113]
[PDF pg 43, pg 19, 4.6.4, last p in subclause](#)
 See also: [Seagate-3](#), [Seagate-5](#), [Seagate-6](#), and [Other-26](#)

There are now other data manipulation commands (CLEAR and PUNCH). Should these commands be added to the list? Or, maybe the description should be generalized, such as "The device server shall terminate all

commands that are defined to manipulate user data (e.g., READ, WRITE, APPEND, ...) that are sent to the partition object with CHECK CONDITION status, ..."

The changes described below have been incorporated in OSD-2 r04b, r04c, r04d, and r04e.

Using the table created in response to comment [Other-26](#), the cited paragraph will be revised as follows:

A partition does not contain a read/write data area. The device server shall terminate ~~all READ-commands, WRITE-commands, and APPEND-commands~~ any command listed in table x2 (see 4.6.5) sent to a partition with CHECK CONDITION status, with the sense key set to ILLEGAL REQUEST and the additional sense code set to INVALID FIELD IN CDB.

Seagate 5) Data-area I/Os in non-data objects (Accepted, Substantive) [114]

PDF pg 43, pg 19, 4.6.6.1, p 6

See also: [Seagate-3](#), [Seagate-4](#), [Seagate-6](#), and [Other-26](#)

There are now other data manipulation commands (CLEAR and PUNCH). Should these commands be added to the list? Or, maybe the description should be generalized, such as "The device server shall terminate all commands that are defined to manipulate user data (e.g., READ, WRITE, APPEND, ...) that are sent to the collection object with CHECK CONDITION status, ..."

Editor's Notes

This comment is resolved by the changes described in the response to comment [Seagate-6](#). The response to comment [Seagate-6](#) has been incorporated in OSD-2 r04b, r04c, r04d, and r04e.

Seagate 6) Data-area I/Os in non-data objects (Accepted, Substantive) [115]

PDF pg 43, pg 19, 4.6.6.1, p 6

See also: [Seagate-3](#), [Seagate-4](#), [Seagate-5](#), and [Other-26](#)

There are now other data manipulation commands (CLEAR and PUNCH). Should these commands be added to the list? Or, maybe the description should be generalized, such as "The device server shall terminate all commands that are defined to manipulate user data (e.g., READ, WRITE, APPEND, ...) that are sent to the collection object with CHECK CONDITION status, ..."

The changes described below have been incorporated in OSD-2 r04b, r04c, r04d, and r04e.

Using the table created in response to comment [Other-26](#), the cited paragraph will be revised as follows:

A collection does not contain a read/write data area. The device server shall terminate ~~all READ-commands, WRITE-commands, and APPEND-commands~~ any command listed in table x2 (see 4.6.5) sent to the collection with CHECK CONDITION status, with the sense key set to ILLEGAL REQUEST and the additional sense code set to INVALID FIELD IN CDB.

Seagate 7) REFERESH s/b REFRESH (Accepted, Editorial) [116]

PDF pg 45, pg 21, 4.6.6.5.3, 1st a,b,c list

See also: [HP-22](#), [HP-23](#), [Seagate-8](#), [Seagate-9](#), and [HP-40](#)

Spelling error in "REFERESH"

Editor's Notes

This comment is resolved by the changes described in the response to comment [HP-22](#). The response to comment [HP-22](#) has been incorporated in OSD-2 r04a, r04b, r04c, r04d, and r04e.

Seagate 8) REFERESH s/b REFRESH (Accepted, Editorial) [117]

[PDF pg 46, pg 22, 4.6.6.5.3, 1st a,b,c list on pg](#)

See also: [Seagate-7](#), [HP-22](#), [HP-23](#), [Seagate-9](#) , and [HP-40](#)

Spelling error in "REFERESH"

Editor's Notes

This comment is resolved by the changes described in the response to comment [HP-23](#). The response to comment [HP-23](#) has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Seagate 9) REFERESH s/b REFRESH (Accepted, Editorial) [118]

[PDF pg 46, pg 22, 4.6.6.5.3, 1st a,b,c list on pg](#)

See also: [Seagate-7](#), [HP-22](#), [HP-23](#), [Seagate-8](#), and [HP-40](#)

Spelling error in "REFERESH"

Editor's Notes

This comment is resolved by the changes described in the response to comment [HP-23](#). The response to comment [HP-23](#) has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Seagate 10) other s/b other than (Accepted, Editorial) [119]

[PDF pg 46, pg 22, 4.6.6.6, p 2, s 2](#)

Should be "other than TRACKING"

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Seagate 11) a object s/b an object (Accepted, Editorial) [120]

[PDF pg 46, pg 22, 4.6.6.6, p 3, s 1](#)

Should be "an object"

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Seagate 12) device sever s/b device server (Accepted, Editorial) [121]

[PDF pg 47, pg 23, 4.6.6.6, 2nd p after note 2, s 1](#)

See also: [HP-24](#), [HP-28](#), [HP-42](#), and [Other-3](#)

Should be "server"

Editor's Notes

This comment is resolved by comment [HP-24](#). The response to comment [HP-24](#) has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Seagate 13) The IMMED_TR bit is described in 5.2.7, not 5.2.5 (Accepted, Editorial) [122]

PDF pg 47, pg 23, 4.6.6.6, 1st a,b,c list after note 2

See also: [Symantec-8](#), [Seagate-50](#), [Seagate-51](#), [Seagate-55](#), [Seagate-56](#), [Seagate-58](#), and [Seagate-59](#)

Wrong reference, should be 5.2.7, not 5.2.5

Editor's Notes

This comment is resolved by the changes described in the response to comment [Seagate-50](#). The response to comment [Seagate-50](#) has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Seagate 14) C not defined until section 4.8.5 (Rejected) [123]

PDF pg 48, pg 24, 4.6.6.6, table 6

This notation is not defined until section 4.8.5

Reason for Rejection

C is defined in 3.2 (Acronyms) as is +.

Seagate 15) Write access denial should include prohibiting object removal (Accepted, Substantive) [124]

PDF pg 49, pg 25, 4.7, 2nd p before table 7

See also: [Seagate-16](#)

States that the denial of write access to an object with members means denial of the ability to create new members in that object. It should also deny the ability to remove member objects.

The changes described below have been incorporated in OSD-2 [r04d](#), and [r04e](#).

The cited text should be modified as follows:

Denial of write access to an object with members means denial of the ability to create new members in that object [or remove existing members from that object](#) (e.g., denial of write access to the root object means denial of the ability to create [or remove new](#) partitions).

Note: The cited text has been moved to 4.11.3 as part of the resolution to comment [Seagate-16](#).

Seagate 16) Read-Only data object accessibility cannot be reversed (Accepted, Substantive) [125]

PDF pg 49, pg 25, 4.7, 1st p before table 7

See also: [ENDL-9](#), [ENDL-26](#), and [Seagate-15](#)

Once the object accessibility attribute is set to 1, can it be set to zero? Seems like this write protects the object AND ATTRIBUTES, preventing it from being set back to 0. That is, once an object is made read-only, it cannot be reverted back to read/write mode.

The changes described below have been incorporated in OSD-2 [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

This issue is being resolved by moving the object accessibility attributes to the Policy/Security attributes pages and ensuring that their values do not affect the Policy/Security attributes pages. Proper application client modifications to the object accessibility attributes is achieved by the usual requirement that the POL/SEC permissions bit be set to one in order to modify attributes in the Policy/Security attributes pages.

The following changes will be made:

- Remove the object accessibility attribute from the various Information attributes pages
- Add the object accessibility attribute to the various Policy/Security attributes pages
- Exempt Policy/Security attributes pages from object accessibility write access controls
- Make the Data object accessibility subclause a subclause of 4.11 (Policy/storage management)
- Change all cross references from an Information attributes page to a Policy/Security attributes page
- Reflect to above changes in Annex B.
- Note: Comment [Seagate-15](#) also effects changes in this subclause.

Details of these changes can be found in [08-395r3](#).

Seagate 17) Attribute setting in multiple user objects is limited to GET/SET MEMBER ATTRIBUTES commands (Accepted, Editorial) [126]
[PDF pg 50, pg 26, 4.8.1, 4th p on pg, s 2](#)

It is inconsistent that this paragraph indicates that multi-object commands can retrieve or store attributes to multiple objects, while table 6 indicates that only the GET and SET MEMBER OBJECTS command can do this.

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

The offending text will be modified as follows:

~~Commands that use collections to affect multiple user objects (see 4.6.6.6)~~ The GET MEMBER ATTRIBUTES command (see 6.19) and the SET MEMBER ATTRIBUTES command (see 6.39) allow application clients to retrieve and/or store attributes

Seagate 18) associated each s/b associated with each (Accepted, Editorial) [127]
[PDF pg 50, pg 26, 4.8.1, 4th p on pg, s 2](#)
 See also: [IBM-6](#)

Should be "associated with each"

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Seagate 19) invalid attribute length s/b invalid attribute number (Accepted, Editorial) [128]
[PDF pg 54, pg 30, 4.8.6, p 3 w/ its a,b,c list](#)

The error conditions described in subparagraphs "a" and "b" refer to an "invalid attribute length". This is not relevant to the error being described. The error is the attribute number.

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

To eliminate problems like this, an error reporting subclause was added to clause 7. Referencing that subclause is better than fixing the bugs in the existing description. The cited text will be modified as follows:

If a command attempts to set attribute number FFFF FFFFh, it shall be terminated [as described in 7.1.2.](#)
~~with CHECK CONDITION status, with the sense key set to ILLEGAL REQUEST and the additional sense code set as follows:~~

~~a) If the invalid attribute length is in a CDB field, the additional sense code shall be set to INVALID-FIELD-IN-CDB; or~~

~~b) If the invalid attribute length is in the Data-Out-Buffer, the additional sense code shall be set to INVALID-FIELD-IN-PARAMETER-LIST.~~

Seagate 20) Insert a space between sentences (Accepted, Editorial) [129]

[PDF pg 68, pg 44, 4.11.2.2.4, p 1, s 1 & s 2](#)

Leave a space between sentences.

The requested changes have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Seagate 21) Create permission for CREATE CLONE (Accepted, Substantive) [130]

[PDF pg 70, pg 46, 4.11.2.3, table 25, CREATE CLONE row](#)

See also: [Seagate-22](#) and [Seagate-23](#)

Shouldn't this [*the CREATE CLONE command*] require CREATE and WRITE permission bits for destination?

Editor's Notes

This comment is resolved by the changes described in the response to comment [Seagate-22](#). The response to comment [Seagate-22](#) has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Seagate 22) Create permission for CREATE CLONE (Accepted, Substantive) [131]

[PDF pg 70, pg 46, 4.11.2.3, table 25, CREATE CLONE row](#)

See also: [Seagate-21](#) and [Seagate-23](#)

Shouldn't this [*the CREATE CLONE command*] require CREATE and WRITE permission bits for destination?

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Yes. Since the CREATE CLONE command always creates the destination partition both create and write permission bits must be set. The cited table cell text will be changed from "WRITE" to "CREATE and WRITE".

Seagate 23) Create permission for CREATE SNAPSHOT (Accepted, Substantive) [132]

[PDF pg 70, pg 46, 4.11.2.3, table 25, CREATE SNAPSHOT row](#)

See also: [Seagate-21](#) and [Seagate-21](#)

Shouldn't this [*the CREATE SNAPSHOT command*] require CREATE and WRITE permission bits for destination?

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Yes. Since the CREATE SNAPSHOT command always creates the destination partition both create and write permission bits must be set. The cited table cell text will be changed from "WRITE" to "CREATE and WRITE".

Seagate 24) REFRESH SNAPSHOT OR CLONE should require write permission, not append (Accepted, Substantive) [133]

[PDF pg 72, pg 48, 4.11.2.3, table 25, REFRESH SNAPSHOT OR CLONE row](#)

Why is this APPEND and not WRITE?

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

When the snapshots document was converted to T10 text, the editor felt that there was a need to differentiate REFRESH SNAPSHOT OR CLONE from CREATE SNAPSHOT and CREATE CLONE as to the permissions required. The SNIA OSD TWG has determined that the addition of the create permission to the two CREATE commands accomplishes this. Thus the confusing usage of append for REFRESH SNAPSHOT OR CLONE can be removed. The cited table cell text will be changed from "APPEND" to "WRITE".

Seagate 25) RESTORE PARTITION FROM SNAPSHOT permissions are reversed (Accepted, Substantive)

[134]

[PDF pg 73, pg 49, 4.11.2.3, table 25, RESTORE PARTITION FROM SNAPSHOT row](#)

Looks like READ and WRITE are swapped here. Main partition should be WRITE and snapshot partition should be READ for the RESTORE PARTITION command.

The changes described below have been incorporated in OSD-2 r04a, r04b, r04c, r04d, and r04e.

Since the function of the RESTORE PARTITION FROM SNAPSHOT is to restore the contents of the *main partition* from the contents of the *snapshot partition*, WRITE permission is required for the *main partition* while only READ permission is needed for the *snapshot partition*. The cited table cells will be updated to reflect this.

Seagate 26) Current Command attributes page permission bits requirements (Accepted, Substantive)

[135]

[PDF pg 74, pg 50, 4.11.2.3, table 26, USER retrieve from Current Command page row](#)See also: [Seagate-27](#) and [Seagate-28](#)

The first rows indicate that the GET_ATTR bit is required to get attribute from the Current Command Page. The description of GET_ATTR in 4.11.2.2.1 specifically says that GET_ATTR is NOT required to access the Current Command Page attributes (see page 39, 3rd paragraph).

The changes described below have been incorporated in OSD-2 r04a, r04b, r04c, r04d, and r04e.

The text in the Permission Bits That Are Set To One column will be changed to `none` with a cross reference to a table footnote. The table foot note will state that attributes in the Current Command attributes page shall be retrieved even if the GET_ATTR permission bit is set to zero.

Details for these changes can be found in [08-395r3](#).

Seagate 27) Current Command attributes page permission bits requirements (Accepted, Substantive)

[136]

[PDF pg 74, pg 50, 4.11.2.3, table 26, COLLECTION retrieve from Current Command page row](#)See also: [Seagate-26](#) and [Seagate-28](#)

The first rows indicate that the GET_ATTR bit is required to get attribute from the Current Command Page. The description of GET_ATTR in 4.11.2.2.1 specifically says that GET_ATTR is NOT required to access the Current Command Page attributes (see page 39, 3rd paragraph).

Editor's Notes

This comment is resolved by the changes described in the response to comment [Seagate-26](#). The response to comment [Seagate-26](#) has been incorporated in OSD-2 r04a, r04b, r04c, r04d, and r04e.

Seagate 28) Current Command attributes page permission bits requirements (Accepted, Substantive)

[137]

PDF pg 74, pg 50, 4.11.2.3, table 26, PARTITION/ROOT retrieve from Current Command page row
See also: [Seagate-26](#) and [Seagate-27](#)

The first rows indicate that the GET_ATTR bit is required to get attribute from the Current Command Page. The description of GET_ATTR in 4.11.2.2.1 specifically says that GET_ATTR is NOT required to access the Current Command Page attributes (see page 39, 3rd paragraph).

Editor's Notes

This comment is resolved by the changes described in the response to comment [Seagate-26](#). The response to comment [Seagate-26](#) has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Seagate 29) Clarify how this unit attention condition is established (Accepted, Editorial) [138]

PDF pg 77, pg 53, 4.11.3.1, 1st B) on pg

Bad grammar: "established affected...".

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

The cited text will be modified as follows:

... then a unit attention condition shall be established ~~affected~~ **for every** partition with ...

Seagate 30) OBJECT STRUCTURE CHECK command must be allowed after a hard reset (Accepted, Substantive) [139]

PDF pg 79, pg 55, 4.11.3.3, 1st a,b,c list on pg

The OBJECT STRUCTURE CHECK command should be included in the list of allowed commands.

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Clearly, the application client cannot successfully initiate an OBJECT STRUCTURE CHECK command if the device server is obliged to reject it.

Two changes are needed in 4.11.3.3 to effect the requested correction. Details for these changes can be found in [08-395r3](#).

Seagate 31) Sentence is missing a verb and is confusing in other ways too (Accepted, Editorial) [140]

PDF pg 81, pg 57, 4.12.1, 2nd p on pg, s 2

See also: [IBM-9](#)

Bad grammar, missing word(s).

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

The cited sentence will be modified as follows:

An application client that has ~~just only~~ the capability (e.g., **a capability** obtained by monitoring CDBs sent to the OSD device server) but not the associated capability key or keys **is** unable to generate commands with valid integrity check value, meaning that application client is denied access to the OSD logical unit.

Seagate 32) unauthorized s/b authorized (Accepted, Editorial) [141]

PDF pg 85, pg 61, 4.12.4.1, table 30, footnote d

This should be "authorized", not "unauthorized".

The changes described below have been incorporated in OSD-2 r04b, r04c, r04d, and r04e.

The existing wording could be viewed as a double negative. Yes, one of the negatives needs to be removed, but removing the least wordy negative does not contribute as much as possible to the readability of the sentence. Therefore, the cited sentence will be modified as follows:

Optionally, a secure channel may provide a Data Confidentiality guarantee that if a message is read, it **can be understood only by authorized parties.** ~~cannot be understood other than by the unauthorized parties.~~

Seagate 33) contains s/b contents (Accepted, Editorial) [142]

PDF pg 88, pg 64, 4.12.4.5, 1st p on pg, s 3

Grammar: drop the word "contains"

The changes described below have been incorporated in OSD-2 r04a, r04b, r04c, r04d, and r04e.

Actually, the problem in this sentence is a spelling error. The cited sentence will be modified as follows:

If the CDB CONTINUATION LENGTH field (see 5.2.1) is not set to zero, application client computes the CDB CONTINUATION INTEGRITY CHECK VALUE field (see 5.3) ~~contains contents~~ using the same algorithm specified for the CMDRSP security method (see 4.12.4.4).

Seagate 34) One instance of "in the" is enough (Accepted, Editorial) [143]

PDF pg 96, pg 72, 4.12.6.3.2, 3rd B) on pg

Grammar: repeated words "in the in the".

The requested change has been incorporated in OSD-2 r04a, r04b, r04c, r04d, and r04e.

Seagate 35) show s/b shown (Accepted, Editorial) [144]

PDF pg 104, pg 80, 4.13.2.2, 1st p on pg

Replace the word "show" with "shown"

The requested change has been incorporated in OSD-2 r04a, r04b, r04c, r04d, and r04e.

Seagate 36) OSD-2 has specified a specific substitute for deferred error handling (Accepted, Substantive) [145]

PDF pg 117, pg 93, 4.16.1, last p
See also: [ENDL-11](#) and [ENDL-13](#)

This is no longer true. OSD-2 (section 4.11.3) defines a new exception management mechanism that should take care of deferred errors.

The changes described below have been incorporated in OSD-2 [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

The cited paragraph will be modified as follows:

Errors may occur after the command has completed. [Such errors shall be handled as described in 4.11.3.](#) ~~For such errors, SPC-4 defines a deferred error reporting mechanism.~~

Seagate 37) Acrobat Overhead Comment (No Action Taken) [146]

PDF pg 117, pg 93, 4.16.1, last p

Marked set by IrenS [Acrobat overhead from FDF file]

Seagate 38) Ensure consistent additional CDB length value everywhere (Accepted, Editorial) [147]

PDF pg 124, pg 100, 5.1, 1st p after table 59, s 2
See also: [HP-32](#)

States that Additional CDB Length should be 216. The table says it should be 228.

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Steps will be taken in the FrameMaker source to ensure that the two cited values change in unison, and the cited sentence will be revised as follows:

If the value in the ADDITIONAL CDB LENGTH field is not ~~216~~ [228](#), ...

Seagate 39) is designed to s/b should or shall (Accepted, Editorial) [148]

PDF pg 126, pg 102, 5.2.4, p 1, s 1
See also: [Symantec-2](#)

Can we use a defined verb (shall/should) instead of "is"?

Editor's Notes

Anything that even vaguely hints of a requirement forces 5.2.4 to explicitly state exactly how said requirement is implemented. It is not clear that OSD-2 explicitly describes **all** the enforcement actions necessary to ensure the cited statement, but 5.2.4 does not and should not contain them.

This comment is resolved by the changes described in the response to comment [Symantec-2](#). The response to comment [Symantec-2](#) has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Seagate 40) Attributes CDB parameters start at byte 52, not 48 (Accepted, Editorial) [149]
[PDF pg 127, pg 103, 5.2.6.2, table 62](#)
See also: [ENDL-16](#), [Seagate-41](#), [ENDL-18](#), [Seagate-42](#), and [ENDL-20](#)

Byte offset is incorrect. Should start at 52.

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Seagate 41) Attributes CDB parameters start at byte 52, not 48 (Accepted, Editorial) [150]
[PDF pg 128, pg 104, 5.2.6.3, table 63](#)
See also: [Seagate-40](#), [ENDL-16](#), [ENDL-18](#), [Seagate-42](#), and [ENDL-20](#)

Byte offset is incorrect. Should start at 52.

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Seagate 42) Attributes CDB parameters start at byte 52, not 48 (Accepted, Editorial) [151]
[PDF pg 130, pg 106, 5.2.6.4, table 64](#)
See also: [Seagate-40](#), [ENDL-16](#), [Seagate-41](#), [ENDL-18](#), and [ENDL-20](#)

Byte offset is incorrect. Should start at 52.

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Seagate 43) The user object CDB continuation descriptor length is fixed, not variable (Accepted, Editorial) [152]
[PDF pg 142, pg 118, 5.4.4, table 77](#)

The CDB Continuation Descriptor Length is a constant (16). It currently refers to "n", which is undefined in this table. The paragraph that describes the descriptor length can be specific - it must be 16.

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Seagate 44) The copy user object source CDB continuation descriptor length is fixed, not variable (No Action Taken) [153]
[PDF pg 143, pg 119, 5.4.5, table 78](#)
See also: [Seagate-45](#) and [Seagate-48](#)

The CDB Continuation Descriptor Length is a constant (20). It currently refers to "n", which is undefined in this table. The paragraph that describes the descriptor length can be specific - it must be 20.

Editor's Notes

This comment has been overtaken by events. As per comment [Seagate-48](#), the COPY USER OBJECTS command and everything related to it is being removed from OSD-2. The copy user object source CDB continuation descriptor applies only to the COPY USER OBJECTS command. Therefore, the cited text will be removed, not corrected.

Seagate 45) The copy user object source CDB continuation descriptor length is fixed, not variable (No Action Taken) [154]
[PDF pg 143, pg 119, 5.4.5, table 78](#)
 See also: [Seagate-44](#) and [Seagate-48](#)

The CDB Continuation Descriptor Length is a constant (20). It currently refers to "n", which is undefined in this table. The paragraph that describes the descriptor length can be specific - it must be 20.

Editor's Notes

This comment has been overtaken by events. As per comment [Seagate-48](#), the COPY USER OBJECTS command and everything related to it is being removed from OSD-2. The copy user object source CDB continuation descriptor applies only to the COPY USER OBJECTS command. Therefore, the cited text will be removed, not corrected.

Seagate 46) Remove COPY USER OBJECTS command (Accepted, Substantive) [155]
[PDF pg 143, pg 119, 5.4.5](#)
 See also: [Seagate-48](#), [Symantec-4](#), and [IBM-18](#)

We suggest the removal of COPY USER OBJECTS command from this specification as agreed in the OSD twg. This feature will be revisited for future versions of OSD.

Editor's Notes

This comment is resolved by the changes described in the response to comment [Seagate-48](#). The response to comment [Seagate-48](#) has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Seagate 47) REMOVE COLLECTION is mandatory if collections are supported (Accepted, Substantive) [156]
[PDF pg 147, pg 123, 6.1, table 80, REMOVE COLLECTION row](#)

REMOVE COLLECTION should have footnote "b".

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Seagate 48) Remove COPY USER OBJECTS command (Accepted, Substantive) [157]
[PDF pg 153, pg 129, 6.4](#)
 See also: [Seagate-44](#), [Seagate-45](#), [Seagate-46](#), [Symantec-4](#), and [IBM-18](#)

We suggest the removal of COPY USER OBJECTS command from this specification as agreed in the OSD twg. This feature will be revisited for future versions of OSD.

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

The COPY USER OBJECTS command and everything related to it will be removed.

- The COPY USER OBJECTS command definition (subclause 6.4) will be removed.
- The copy user object source CDB continuation descriptor (subclause 5.4.5) will be removed.
- The COPY USER OBJECTS entry will be removed from table 80.
- The copy user object source CDB continuation descriptor will be removed from table 71.
- COPY USER OBJECTS will be removed from table 21 (the list of required permissions bits for various commands).
- COPY USER OBJECTS will be removed from 4.13.1 (the overview of object duplication features).
- COPY USER OBJECTS will be removed from table 58 (the reservations conflicts table).

- The COPY_UO bit will be removed from table 164 (the supported object duplication methods table) and its accompanying text.
- The COPY_UO bit will be removed from table 165 (the supported time of duplication methods table) and its accompanying text.
- The COPY_UO bit will be removed from table 166 (the supported duplicated object freezing table) and its accompanying text.
- The default copy user objects objects duplication method and time of duplication attributes will be removed from the Partition Information attributes page.
- Service action 8893h will be marked reserved in table B.1.

Seagate 49) Attributes list type Fh is obsolete, type Eh is current (Accepted, Editorial) [158]

[PDF pg 156, pg 132, 6.5, last p on pg](#)

Indicates that attribute list type Fh should be used. The referenced section says that list type Fh is obsolete. It should be type Eh.

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Seagate 50) The IMMED_TR bit is described in 5.2.7, not 5.2.5 (Accepted, Editorial) [159]

[PDF pg 160, pg 136, 6.7.1, last p on pg](#)

See also: [Seagate-13](#), [Symantec-8](#), [Seagate-51](#), [Seagate-55](#), [Seagate-56](#), [Seagate-58](#), and [Seagate-59](#)

Wrong reference. Should be 5.2.7, not 5.2.5. Check all other places as well.

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

As recommended, all references to 5.2.7 and 5.2.5 will be scrubbed to be sure the associated text properly mentions either the IMMED_TR bit or the CDB CONTINUATION LENGTH field, respectively.

Seagate 51) The IMMED_TR bit is described in 5.2.7, not 5.2.5 (Accepted, Editorial) [160]

[PDF pg 169, pg 145, 6.10.1, 2nd p after table 89](#)

See also: [Seagate-13](#), [Symantec-8](#), [Seagate-50](#), [Seagate-55](#), [Seagate-56](#), [Seagate-58](#), and [Seagate-59](#)

Wrong reference. Should be 5.2.7, not 5.2.5

Editor's Notes

This comment is resolved by the changes described in the response to comment [Seagate-50](#). The response to comment [Seagate-50](#) has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Seagate 52) LIST does not set attributes (Accepted, Editorial) [161]

[PDF pg 194, pg 170, 6.20.1, table 104, 2nd description row](#)

See also: [Seagate-53](#)

This only really applies to the get attributes parameters. "Set" should be removed.

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Set cannot be removed because `get and set attributes parameters` is an exact match for the name given to a section of the CDB (see table 103). Some clarification can be provided, and to achieve this the cited sentence will be modified as follows:

The Partition_IDs in the root object and attributes specified by the [CDB](#) get and set attributes parameters (see 5.2.6) for each partition shall be returned in the parameter data.

Seagate 53) LIST COLLECTION does not set attributes (Accepted, Editorial) [162]

[PDF pg 200, pg 176, 6.21, table 113, 2nd description row](#)

See also: [Seagate-52](#)

This only really applies to the get attributes parameters. "Set" should be removed.

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Set cannot be removed because `get and set attributes parameters` is an exact match for the name given to a section of the CDB (see table 112). Some clarification can be provided, and to achieve this the cited sentence will be modified as follows:

The Collection_Object_IDs in the specified partition and attributes specified by the [CDB](#) get and set attributes parameters (see 5.2.6) for each collection shall be returned in the parameter data.

Seagate 54) LIST COLLECTION does not flush anything (Accepted, Editorial) [163]

[PDF pg 200, pg 176, 6.21, 5th p after table 113](#)

What does Flush have anything to do with this command?

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

This is an obvious cut and paste error from the FLUSH COLLECTION command. The cited paragraph will be corrected as follows:

The type of collection (see 4.6.6.1) being ~~flushed~~ [processed](#) shall not affect how the LIST COLLECTION command is processed (e.g., the attributes of the Command Tracking attributes page (see 7.1.3.20), if any, shall not be modified).

Seagate 55) The IMMED_TR bit is described in 5.2.7, not 5.2.5 (Accepted, Editorial) [164]

[PDF pg 215, pg 191, 6.26.1, 2nd p after table 125, s 1](#)

See also: [Seagate-13](#), [Symantec-8](#), [Seagate-50](#), [Seagate-51](#), [Seagate-56](#), [Seagate-58](#), and [Seagate-59](#)

Wrong reference. Should be 5.2.7, not 5.2.5

Editor's Notes

This comment is resolved by the changes described in the response to comment [Seagate-50](#). The response to comment [Seagate-50](#) has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Seagate 56) The IMMED_TR bit is described in 5.2.7, not 5.2.5 (Accepted, Editorial) [165]

[PDF pg 229, pg 205, 6.30.1, 1st p on pg](#)

See also: [Seagate-13](#), [Symantec-8](#), [Seagate-50](#), [Seagate-51](#), [Seagate-55](#), [Seagate-58](#), and [Seagate-59](#)

Wrong reference. Should be 5.2.7, not 5.2.5

Editor's Notes

This comment is resolved by the changes described in the response to comment [Seagate-50](#). The response to comment [Seagate-50](#) has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Seagate 57) What is the relationship between the FCR bit and the Command Tracking attributes page? (Accepted, Editorial) [166]

[PDF pg 236, pg 212, 6.32, 5th from last p on pg](#)

Not clear on what this paragraph is trying to address. The command tracking attributes page is removed by this command, which certainly qualifies as modifying them.

The changes described below have been incorporated in OSD-2 [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

The cited paragraph is a cut and paste from FLUSH COLLECTION and LIST COLLECTION. The cited e.g. text makes sense in the other command but is nonsense in the context of a REMOVE COLLECTION command. Unfortunately, there is no corollary action associated with REMOVE COLLECTION that can be used as an example in place of the existing text.

Therefore, the cited paragraph will be modified as follows:

Except for the processing of the fcr bit, the type of collection (see 4.6.6.1) being removed shall not affect how the REMOVE COLLECTION command is processed (~~e.g., the attributes of the Command Tracking attributes page (see 7.1.3.20), if any, shall not be modified~~).

Seagate 58) The IMMED_TR bit is described in 5.2.7, not 5.2.5 (Accepted, Editorial) [167]

[PDF pg 237, pg 213, 6.33, 3rd p after table 141](#)

See also: [Seagate-13](#), [Symantec-8](#), [Seagate-50](#), [Seagate-51](#), [Seagate-55](#), [Seagate-56](#), and [Seagate-59](#)

Wrong reference. Should be 5.2.7, not 5.2.5

Editor's Notes

This comment is resolved by the changes described in the response to comment [Seagate-50](#). The response to comment [Seagate-50](#) has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Seagate 59) The IMMED_TR bit is described in 5.2.7, not 5.2.5 (Accepted, Editorial) [168]

[PDF pg 240, pg 216, 6.35.1, last p on pg](#)

See also: [Seagate-13](#), [Symantec-8](#), [Seagate-50](#), [Seagate-51](#), [Seagate-55](#), [Seagate-56](#), and [Seagate-58](#)

Wrong reference. Should be 5.2.7, not 5.2.5

Editor's Notes

This comment is resolved by the changes described in the response to comment [Seagate-50](#). The response to comment [Seagate-50](#) has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Seagate 60) The Snapshots Information attributes page is omitted from the example Partition Directory attributes page (Accepted, Editorial) [169]

[PDF pg 261, pg 237, 7.1.3.5, table 157](#)

Missing the following entry: "P+7h"

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

A new last row will be added to table 157. The attribute number will be P+7h. The attribute value will be "INCITS T10 Snapshots Information".

Seagate 61) Default isolation method attribute should be 110h, not 111h (Accepted, Editorial) [170]

[PDF pg 267, pg 243, 7.1.3.8, 1st p on pg](#)

Default isolation method attribute should be 110h, not 111h.

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Seagate 62) Supported isolation methods attribute should be 111h, not 112h (Accepted, Editorial) [171]

[PDF pg 267, pg 243, 7.1.3.8, 2nd p after table 162](#)

Supported isolation methods attribute should be 111h, not 112h.

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Seagate 63) Attribute number C0h needs to be reserved too (Accepted, Editorial) [172]

[PDF pg 272, pg 248, 7.1.3.9, table 169, 10th row](#)

missing "C0h reserved".

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

The cited attribute number range will be modified as follows:

85h to ~~BFh~~ C0h

Seagate 64) 1FFh s/b 2FFh (Accepted, Editorial) [173]

[PDF pg 272, pg 248, 7.1.3.9, table 169, 19th row](#)

Should be 2FFh, not 1FFh.

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Seagate 65) Missing verb (Accepted, Editorial) [174]
[PDF pg 278, pg 254, 7.1.3.11, 1st full p on pg](#)
See also: [Symantec-3](#)

Grammar: missing "is" between "object" and "the"

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

The cited text will be modified as follows:

If the user object [is](#) the result of an object duplication (see 4.13), ...

Seagate 66) Add a Current Command change in used capacity attribute (Accepted, Substantive) [175]
[PDF pg 323, pg 299, 7.1.3.31](#)

On behalf of Panasas:

For purposes of capacity accounting, it is helpful to know how much space a given command has consumed. can we add (if we don't already have) a specific attribute on the "current command" page or some such thing which returns "capacity delta" for the given command [type = int64]? i realize this is a little late in the game, but this was pointed out to me pretty recently at panasas, and should be pretty simple and non-intrusive. i believe there are some commands which already return this as part of the standard response code, so having a common dropping area for this would be cleaner as well.

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

The requested attribute will be added. Details of changes needed to accomplish the addition can be found in [08-395r3](#).

7. Symantec

Roger Cummings of Symantec submitted the following comments on a No vote.

Symantec 1) Sequential read/write implication (Accepted, Substantive) [176]
[PDF pg 55, pg 31, 4.9.2, p 2](#)

i don't like the marked paragraph since it seems to imply that data must be read or written by the device sequentially, and that's not what higher performance disks do today.

for example, if you send a disk a full track write, it will typically start writing with whatever sector happens to be passing under the head (once the head reaches the appropriate track). it doesn't wait for the first sector of the write to appear.

bad block re-vectoring has a similar effect. if the 3rd sector in a write has been re-vectorred, it will be read or written after the other sectors in the read or write. so an i/o error may not be detected until all sectors other than the failed one have been transferred.

we can say that the atomicity guarantees affect the boundaries of how much data is affected by a media error detected when an operation is in progress (presumably the media error will occur at an atomic i/o boundary), but that's about it.

note that neither of the last two paragraphs really requires any particular behavior.

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

The cited text will be enhanced as follows:

If a media error is detected while a command is being processed, the atomicity guarantees affect how much data may have been transferred before the error was detected, [but control over these effects is outside the scope of this standard](#).

Symantec 2) `is design to` s/b will ... or at least `is designed to` (Accepted, Editorial) [177]
[PDF pg 126, pg 102, 5.2.4, p 1, s 1](#)
 See also: [Seagate-39](#)

"design" seems like a poor choice of word. i suggested "required", but according to Ralph Weber that's a bad idea:

> RE Q1: 'required' is a standards word that will cause T10 readers
 > to expect to see exactly how the security method other than NOSEC
 > returns an error ... inline ... in the same paragraph as the word
 > 'required'. Sorry, but 'designed' is the best word I can think of
 > to put in the cited text.
 perhaps "is design to" could be changed to "will"?

if Ralph (or anyone else) continues to object to making a change, then i can live with "designed". but please fix the tense.

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

The T10 Style Guide (see T10/05-085) explicitly prohibits the use of the word `will`. The misspelled word `design` will be changed to `designed`. That is all.

Symantec 3) Missing verb and wrong singular/plural usage (Accepted, Editorial) [178]

[PDF pg 273, pg 249, 7.1.3.9, 1st p after first a,b,c list on pg](#)

See also: [Seagate-65](#)

i think there's an "is" missing between "partition" and "the". probably "object duplications", in the same phrase, should be singular rather than plural.

The changes described below have been incorporated in OSD-2 r04a, r04b, r04c, r04d, and r04e.

The cited text will be modified as follows:

If any object in the partition **is** the result of **an** object ~~duplications~~ **duplication** (see 4.13), ...

Symantec 4) Remove COPY USER OBJECTS command (Accepted, Substantive) [179]

[PDF pg 153, pg 129, 6.4](#)

See also: [Seagate-44](#), [Seagate-45](#), [Seagate-46](#), [Seagate-48](#), and [IBM-18](#)

there are a number of questions that i raise, below, about the COPY USER OBJECTS command. i think the consensus of the group was that we would simply drop the command from the OSD-2 spec. regardless, i raise the individual issues here ...

4.1) in section `_6.4 COPY USER OBJECTS_` the command requires that the target object cannot previously exist (i.e. it's like create and write).

given that the command can copy multiple objects to the target object, and can pick out multiple ranges within each object, this seems like an odd restriction. it's not just a snapshot command, it's more of a general purpose copy command.

in it's current form my company doesn't have any particular use for the Copy User Objects command, regardless of whether or not it creates the target object, but if we work out the issues with OSD to OSD communication such that a Copy User Objects command can copy from one OSD to another, then i would very much like a Copy User Objects command that worked with pre-existing objects.

do we need a Copy User Objects command that works with existing objects? (my inclination would be to change this to require an existing object, but we could also add another copy command that works with existing objects.)

4.2) in section `_6.4 COPY USER OBJECTS_`, the command allows the user to specify the "duplication method". while i can imagine how a copy-on-write implementation of copying an entire object would work, i have a more difficult time imagining copy-on-write for a duplicated object that's composed of a bunch of pieces from a bunch of other source objects.

assuming a given OSD implementation can support a copy-on-write copy of one object to another, but cannot support copy-on-write for an object composed of pieces of 27 other objects, what should the implementation report for the "Supported object duplication method attributes" attribute on the root attributes page (Section 7.1.2.8)?

should it report that it only supports byte-by-byte copies for "Copy User Objects", or should it report that it supports many space efficient types, but then fail the "Copy User Objects" command if any kind of range based-copying is requested?

one possible solution is to have a "clone user object" that only makes a writable clone of an entire existing user object, and another command for "Copy Data", that simply copies data from one or more ranges in one or more user objects to a target object.

4.3) in section `_5.4.5 Copy user object source_`, the specification of the `CPY_ATTR` bit (set to copy user attributes), says:

... If the `CPY_ATTR` bit is set to one, all application client settable attributes (see 7.2.1) are copied from this source user object to the destination user object. ...

in the context of `COPY USER OBJECTS`, this is confusing. "Object Logical Length" is a client settable attribute. how is it treated? presumably, in the case where only part of the original object is copied, or multiple objects copied, we won't change the target object logical length to be the same as one of the source objects.

it seems to me that Object Logical Length should not be copied even if `CPY_ATTR` bit is set. if there's a single source object that's copied in it's entirety then it should be the same length as the source object anyway.

the draft does describe what happens for the "Reserved Data Space" attribute (it is not copied, it is added to what already exists for the duplicated object).

Editor's Notes

This comment is resolved by the changes described in the response to comment [Seagate-48](#). The response to comment [Seagate-48](#) has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Symantec 5) Time of Duplication DO NOT CARE makes no sense (Accepted, Substantive) [180]

[PDF pg 111](#), [pg 87](#), [4.13.4.2](#), [table 44](#), [DO NOT CARE row](#)

See also: [Symantec-6](#)

it's not clear to me how loose this is intended to be. is there a requirement that the duplicated object be a snapshot or not? in my view, a "snapshot" would represent the state of the source object at *some* point in the past, but i don't think this statement makes that a requirement. for example, on UNIX/LINUX systems if you copy a file that's being written to in a random fashion (say start of file, end of file, start of file, end of file, ...) using the `cp` command:

```
# cp busyfile busyfile_copy
```

the copy will consist of data that was in the source object at some point in time, but not all of the data will have been present at the same point in time (you'll get some of the writes to the end of the file, but not the corresponding writes to the beginning of the file).

i suggest that we clarify this and (possibly) add another Time of Duplication method such that one is "snapshot corresponds to the contents of the source object at some point in time while the copy operation was in progress", and `DO NOT CARE` is "snapshot may not correspond to any point in time".

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

The following changes will be made:

- In table 44 the name for code 8h will be changed from `DO NOT CARE` to `BEGINNING OR END`
- In table 44 the description for code 8h will be changed to limit the device server choices to the equivalent of code 1h (i.e., `BEGINNING`) or code Fh (i.e., `END`) for the object being duplicated by the command
- In 7.1.3.8 (Root Information attributes page) two instances of `DO NOT CARE` will be changed to `BEGINNING OR END`
- In 7.1.3.9 (Partition Information attributes page) three instances of `DO NOT CARE` will be changed to `BEGINNING OR END`

Details for these changes can be found in [08-395r3](#).

Symantec 6) Time of Duplication DO NOT CARE makes no sense (Accepted, Substantive) [181]

PDF pg 111, pg 87, 4.13.4.2, table 44, DO NOT CARE row

See also: [Symantec-5](#)

in the case where the object is duplicated using one of the above [see comment [Symantec-5](#)] methods (either DO NOT CARE or the new one that i suggested), is it reasonable to expect that the timestamps in the duplicated object will indicate the exact time that the copy occurred?

we should probably specify the behavior one way or the other. my preference, is for the object time stamp to represent the exact time that the copy occurred (assuming the copy is consistent).

Editor's Notes

This comment is resolved by the changes described in the response to comment [Symantec-5](#). The response to comment [Symantec-5](#) has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Symantec 7) Clarify source partition attribute's contents (Accepted, Editorial) [182]

PDF pg 103, pg 79, 4.13.2.1, table 36, 2nd to last row

[insert the following at the end of this text]

For snapshots, this indicates a primary or clone partition, and for clones this indicates a snapshot partition.

...

clones may have a primary or snapshot partion as their source and snapshots may have a primary or clone partion. i've added words to indicate that.

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Due to some T10 wording style dictates, the requested text will be incorporated as follows:

[For a snapshot partition, the source partition attribute indicates a primary partition or a clone partition.](#)

[For a clone partition, the source partition attribute indicates a snapshot partition.](#)

Symantec 8) The IMMED_TR bit is described in 5.2.7, not 5.2.5 (Accepted, Editorial) [183]

PDF pg 160, pg 136, 6.7.1, last p on pg

See also: [Seagate-13](#), [Seagate-50](#), [Seagate-51](#), [Seagate-55](#), [Seagate-56](#), [Seagate-58](#), and [Seagate-59](#)

the text indicates that The IMMED_TR bit is described in 5.2.5, but it is not. it it described in 5.2.7.

Editor's Notes

This comment is resolved by the changes described in the response to comment [Seagate-50](#). The response to comment [Seagate-50](#) has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Symantec 9) CREATE SNAPSHOT s/b CREATE CLONE (Accepted, Editorial) [184]

PDF pg 161, pg 137, 6.7.1, 1st p after 1st a,b,c list on pg, s 2

CREATE SNAPSHOT
s/b

CREATE CLONE

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Symantec 10) `should be maintained to restarting of` is gibberish (Accepted, Editorial) [185]

[PDF pg 164, pg 140, 6.7.3, p 2, s 1](#)

See also: [Other-10](#), [Other-11](#), and [Other-12](#)

be maintained to restarting

s/b

be maintained so as to facilitate restarting

...

the same wording exists in the CREATE SNAPSHOT section

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

The problem exists in four locations, not two, The cited text will be modified as follows:

The membership and attributes of the snapshot/clone tracking well known collection for the destination partition should be maintained [in a way that facilitates restarting](#) ~~to restarting of~~ an interrupted

Symantec 11) history change s/b history chain (Accepted, Editorial) [186]

[PDF pg 172, pg 148, 6.10.2, 1st p after 1st a,b,c list on pg](#)

See also: [Other-8](#)

change s/b chain

... check for similar errors globally

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Symantec 12) DETACH CLONE command interlocking (Accepted, Substantive) [187]

[PDF pg 178, pg 154, 6.12 DETACH CLONE](#)

See also: [Symantec-13](#), [Symantec-14](#), [Symantec-18](#), [Other-14](#) and [Other-15](#)

the DETACH CLONE, REFRESH SNAPSHOT OR CLONE, and RESTORE PARTITION FROM SNAPSHOT command have checks against create completion time and refresh completion time. i assume the reason for these checks is to try and interlock the operations (so a clone can't be detached while it's being created, refreshed, or restored).

unfortunately, the checks don't really accomplish this. for example, the DETACH CLONE command specifies that the command will fail if ...

c) The create completion time attribute is undefined (see 3.1.51) and the refresh completion time attribute is undefined

this serves to protect partition while it's being created (because both timestamps are undefined), but does nothing to interlock with a refresh operation (since the create completion time attribute remains unchanged throughout the operation).

for the most part, these checks would accomplish what i assume they're intended to do if we made the following changes:

- 1) set Refresh Completion Time and Restore Completion Time attributes to the creation time when a partition is created
- 2) continue the current behavior of making Refresh Completion Time undefined while the the refresh is in progress
- 3) make restore completion time undefined while a restore is in progress
- 3) change the checks for "refresh completion time is undefined *and* creation completion time attribute is undefined" to or instead, and add checks against the refresh completion time attribute

this would also require that primary partitions have a restore completion time attribute that is set when they are created, which may not be possible.

as a suggestion, instead of using the sundry completion times for the purpose of interlocking, it would probably be simpler to simply check if a tracking well known collection exists in the partition being detached, refreshed, or created and fail the operation if it exists.

or we could even leave the mechanism out entirely, and simply specify that if one of the other operations is in progress, the DEATCH CLONE operation will fail (no specification of how this is determined).

there is a generic mechanism described in 4.6.6.6 for to insure only one multi-object command is running on a partition (or is it collection), but the snapshot and clone commands are not multi-object commands.

The changes described below have been incorporated in OSD-2 r04d, and r04e.

The SNIA OSD TWG has determined that attempts to define specifically how the various snapshots commands are interlocked obfuscates the goal and lacks the clarity of intent mentioned in this comment. Therefore, new text is being proposed that specifies the required interlocks and any existing text that attempts to define how the interlocks are to be implemented is being removed. Both groups of changes are shown in detail in [08-395r3](#).

Symantec 13) CREATE SNAPSHOT command interlocking (Accepted, Substantive) [188]

[PDF pg 169, pg 145, 6.10 CREATE SNAPSHOT](#)

See also: [Symantec-12](#), [Symantec-14](#), [Symantec-18](#), [Other-14](#) and [Other-15](#)

like the issues raised in [Symantec-12](#), the CREATE SNAPSHOT command doesn't seem to have any interlocking with the REFRESH CLONE and RESTORE PARTITION FROM SNAPSHOT.

i think it should be an error to create a snapshot of a partition that is currently being modified by one of those other command.

The changes described below have been incorporated in OSD-2 r04d, and r04e.

The SNIA OSD TWG has determined that attempts to define specifically how the various snapshots commands are interlocked obfuscates the goal and lacks the clarity of intent mentioned in [Symantec-12](#). Therefore, new text is being proposed that specifies the required interlocks and any existing text that attempts to define how the interlocks are to be implemented is being removed. Both groups of changes are shown in detail in [08-395r3](#).

Symantec 14) REMOVE PARTITION command interlocking (Accepted, Substantive) [189]

[PDF pg 238, pg 214, 6.34 REMOVE PARTITION](#)

See also: [Symantec-12](#), [Symantec-13](#), [Symantec-18](#), [Other-14](#), and [Other-15](#)

there may be a race condition similar to the one described in [Symantec-12](#) with REMOVE PARTITION and RESTORE PARTITION FROM SNAPSHOT. what happens (i.e. what error is returned) if a REMOVE PARTITION is executed on a partition while RESTORE PARTITION FROM SNAPSHOT is running with the same partition as the target?

The changes described below have been incorporated in OSD-2 [r04d](#), and [r04e](#).

The SNIA OSD TWG has determined that attempts to define specifically how the various snapshots commands are interlocked obfuscates the goal and lacks the clarity of intent mentioned in [Symantec-12](#). Therefore, new text is being proposed that specifies the required interlocks and any existing text that attempts to define how the interlocks are to be implemented is being removed. Both groups of changes are shown in detail in [08-395r3](#).

Symantec 15) Duplication Method s/b a Snapshot Information page attribute (Accepted, Substantive) [190]

[PDF pg 320, pg 296, 7.1.3.30](#)

duplication method does not appear as an attribute in the Snapshots Information attributes page. i think it should.

adding this is also required in some later comments.

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

The requested attribute will be added. Rules for its use will be added to the definitions of the CREATE CLONE command, CREATE SNAPSHOT command, and DETACH CLONE command. Details for these changes can be found in [08-395r3](#).

Symantec 16) REFRESH/RESTORE duplication methods adjustments (Accepted, Substantive) [191]

[PDF pg 228, pg 204, 6.30](#)

in 6.30 "REFRESH SNAPSHOT OR CLONE" and 6.35 "RESTORE PARTITION FROM SNAPSHOT", the duplication method can be defined, which means that it can be different than the duplication method used originally to create the partition.

for refresh, we should require that the same duplication method be used to refresh the partition as was used to create. for restore, we should require that the same duplication method used to create the snapshot be used to restore the source partition.

(if someone believes that the REFRESH SNAPSHOT OR CLONE should also support changing the duplication method, then i might withdraw this objection. however, i think it would be better to have a separate command for that purpose since this one will both change the duplication method and, potentially, change the contents).

The changes described below have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

A lengthy discussion in the OSD TWG concluded that the RESTORE PARTITION FROM SNAPSHOT command should not be affected by the duplication method used to create the snapshot. Since the REFRESH SNAPSHOT OR CLONE command is designed as a restart mechanism for a CREATE SNAPSHOT command or CREATE CLONE command that was interrupted before completion, restricting the restart to the same duplication method as the original seems appropriate, but no other restrictions have been found acceptable.

Later it was noted that the REFRESH SNAPSHOT OR CLONE command and RESTORE PARTITION FROM SNAPSHOT command should use the original duplication method as their DEFAULT, instead of the currently specified value in the Partition Information attributes page.

Details for these changes resulting from these decisions can be found in [08-395r3](#).

Symantec 17) REFRESH SNAPSHOT OR CLONE restart mechanism is broken (Accepted, Substantive)
[192]

[PDF pg 231, pg 207, 6.30.2, last p in subclause](#)

in 6.30 "REFRESH SNAPSHOT OR CLONE", the mechanism whereby an incomplete command can be completed by the REFRESH SNAPSHOT OR CLONE command seems to have a flaw or two.

While the snapshot/clone tracking well known collection is, roughly speaking, supposed to contain the set of objects that still need processing, the highlighted text doesn't make sense if we're completing an operation that was already in progress. in particular, adding all of the objects back to the collection seems to preclude processing only the objects that weren't completed.

The changes described below have been incorporated in OSD-2 r04a, r04b, r04c, r04d, and r04e.

The cited text will be modified as follows:

Unless the REFRESH SNAPSHOT OR CLONE command is restarting an interrupted CREATE CLONE command (see 6.7) or an interrupted CREATE SNAPSHOT command (see 6.10), the ~~The~~ snapshot/clone tracking well known collection (see 4.6.6.5.3) shall be ...

Symantec 18) RESTORE PARTITION FROM SNAPSHOT command interlocking (Accepted, Substantive)
[193]

[PDF pg 241, pg 217, 6.35 RESTORE PARTITION FROM SNAPSHOT](#)
See also: [Symantec-12](#), [Symantec-13](#), [Symantec-14](#), [Other-14](#) and [Other-15](#)

in 6.35 "RESTORE PARTITION FROM SNAPSHOT", i don't see a mechanism to prevent a partition from being restored from two different snapshots at the same time. we should create such a mechanism, or at least define the error to be returned if this is attempted.

The changes described below have been incorporated in OSD-2 r04d, and r04e.

The SNIA OSD TWG has determined that attempts to define specifically how the various snapshots commands are interlocked obfuscates the goal and lacks the clarity of intent mentioned in [Symantec-12](#). Therefore, new text is being proposed that specifies the required interlocks and any existing text that attempts to define how the interlocks are to be implemented is being removed. Both groups of changes are shown in detail in [08-395r3](#).

Symantec 19) REFRESH/RESTORE and deleted object removal (Accepted, Substantive) [194]

[PDF pg 240, pg 216, 6.35 & 6.30](#)

in 6.35 "RESTORE PARTITION FROM SNAPSHOT" and 6.30 REFRESH SNAPSHOT OR CLONE, i don't see any clauses which require objects be removed from the target partition. i would assume that after the command

runs, the target partition is an exact duplicate of the original partition, which should include removing any objects that were created after the snapshot was created.

The changes described below have been incorporated in OSD-2 r04a, r04b, r04c, r04d, and r04e.

The simplest way to describe the need to remove objects is to add the concept to the list of initialization steps for the snapshot/clone tracking well known collection. Details for these changes resulting from these decisions can be found in [08-395r3](#).

Symantec 20) processing complete s/b processing is complete (Accepted, Editorial) [195]
[PDF pg 242, pg 218, 6.35.4, last p on pg](#)

processing complete
 s/b
 processing is complete

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Symantec 21) Too many attributes specifying REFRESH SNAPSHOT support (Accepted, Substantive) [196]
[PDF pg 268, pg 244, 7.1.3.8, 4th p on pg](#)

[see highlighted text]...however, there is a separate attribute, 311h Support for snapshot refreshing that is supposed to control whether or not snapshots can be refreshed (see text above Table 167):

"If it is defined (see 3.1.14), the support for snapshot refreshing attribute (number 311h) (see table 167) shall indicate how the REFRESH SNAPSHOT command (see 6.30) is supported. If the support for snapshot refreshing attribute is undefined (see 3.1.51), then the REFRESH SNAPSHOT command is not supported."

there are two obvious ways to fix this. because i think a proliferation of optional features is a bad idea, i'd suggest that we change the above text to require that the attribute be defined.

however, if we feel that this feature needs to be optional (separate from CREATE SNAPSHOT), then RESTORE PARTITION FROM SNAPSHOT should also be optional even when CREATE SNAPSHOT is defined. but we should lump REFRESH SNAPSHOT and RESTORE PARTITION FROM SNAPSHOT together (i.e. support both or neither).

The changes described below have been incorporated in OSD-2 r04a, r04b, r04c, r04d, and r04e.

The definition for the support for snapshot refreshing attribute will be corrected as follows:

If it is defined (see 3.1.14), the support for snapshot refreshing attribute (number 311h) (see table 167) shall indicate how the REFRESH SNAPSHOT command (see 6.30) is supported. [If the maximum snapshots count attribute is defined and contains a value other than zero, the support for snapshot refreshing attribute shall also be defined.](#) ~~If the support for snapshot refreshing attribute is undefined (see 3.1.51), then the REFRESH SNAPSHOT command is not supported.~~

8. Late Comments

The following issues were discovered during the letter ballot comments resolution process.

Other 1) Remove expected keyword (Accepted, Editorial) [197]

[PDF pg 33, pg 9, 3.3.1](#)

The expected keyword must be removed, per the decision of the September CAP working group (minutes in 08-354).

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Other 2) Bogus Partition Policy/Security attributes page format (Accepted, Substantive) [198]

[PDF pg 306, pg 282, 7.1.3.23, table 202](#)

See also: [Seagate-16](#)

64 s/b 52

144 s/b 151

150 s/b 157

The changes described below have been incorporated in OSD-2 [r04c](#), [r04d](#), and [r04e](#).

In addition to the changes mentioned in the comment, the page length should be [96h](#) not ~~8Fh~~. Also, comment [Seagate-16](#) adds two reserved bytes and a field to this page.

Other 3) device sever s/b device server (Accepted, Editorial) [199]

[PDF pg 293, pg 269, 7.1.3.20, last p on pg](#)

See also: [Seagate-12](#), [HP-24](#), [HP-28](#), [HP-42](#)

device sever s/b device server

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Other 4) shall be update s/b shall be updated (Accepted, Editorial) [200]

[PDF pg 231, pg 207, 6.30.2, last p in subclause, s 1](#)

shall be update s/b shall be updated

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Other 5) shall be update s/b shall be updated (Accepted, Editorial) [201]

[PDF pg 242, pg 218, 6.35.2, 3rd p on pg, s 1](#)

shall be update s/b shall be updated

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Other 6) OBSD logical unit nomenclature is inconsistent with rest of OSD-2 (Accepted, Editorial) [202]

PDF pg 38, pg 14, 4.2, p 1, s 2

See also: HP-5 and HP-12

'OBSD logical unit' is a non sequitur

The changes described below have been incorporated in OSD-2 r04a, r04b, r04c, r04d, and r04e.

This comment is consistent with the response to comment HP-12. Including the changes in HP-5, the cited text will be modified as follows:

An OBSD (see 3.1.27) contains one or more logical units that return the OSD peripheral device type value in ~~response to an INQUIRY command~~ their standard INQUIRY data (see SPC-3). From the perspective of the application client, ~~an OBSD logical unit~~ each logical unit in an OBSD contains OSD objects (see 3.1.29), not logical blocks (see 4.5).

Other 7) Collection_Object_IDs are unique within a partition (Accepted, Editorial) [203]

PDF pg 43, pg 19, 4.6.6.1, p 3, s 1

See also: IBM-5

For consistency with IBM-5: a Collection_Object_ID (see 4.6.2) s/b a unique Collection_Object_ID (see 4.6.2) within the partition ...

The requested change has been incorporated in OSD-2 r04a, r04b, r04c, r04d, and r04e.

Other 8) history change s/b history chain (Accepted, Editorial) [204]

PDF pg 231, pg 207, 6.30.2, 1st 2) on pg

See also: Symantec-11

history change s/b history chain

The requested change has been incorporated in OSD-2 r04a, r04b, r04c, r04d, and r04e.

Other 9) End REMOVE MEMBER OBJECTS ability to operate on LINKED collections (Accepted, Substantive) [205]

PDF pg 46, pg 22, 4.6.6.6, p 2, all

The notion that a REMOVE MEMBER OBJECTS command can process a LINKED collection predates the addition of the Command Tracking attributes page to TRACKING collections. Continuing to allow the REMOVE MEMBER OBJECTS to process LINKED collections will result in the need to explicitly add the Command Tracking attributes page to LINKED collections (in addition to the currently defined usage in TRACKING collections). This added complexity can be eliminated by ending the ability of the REMOVE MEMBER OBJECTS command to process LINKED collections.

Ending the ability of the REMOVE MEMBER OBJECTS command to process LINKED collections is a much simpler change. To accomplish this (and considering the added *than* requested command Seagate-10), the second paragraph of 4.6.6.6 needs to be modified as follows:

~~With the exception of the REMOVE MEMBER OBJECTS command (see 6.33), multi-object~~ Multi-object commands process only user tracking collections (see 3.1.55). If the COLLECTION_OBJECT_ID field in a multi-object command CDB ~~other than a REMOVE MEMBER OBJECTS command~~ specifies a collection for which the collection type attribute in the Collection Information attributes page (see 7.1.3.10) contains a value other than TRACKING, 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.

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Other 10) ` should be maintained to restarting of is gibberish (Accepted, Editorial) [206]

[PDF pg 173, pg 149, 6.10.3, p 2, s 1](#)

See also: [Symantec-10](#), [Other-11](#), and [Other-12](#)

As noted in comment [Symantec-10](#), should be maintained ~~to restarting of~~ an interrupted ... s/b should be maintained [in a way that facilitates restarting](#) an interrupted ...

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Other 11) ` should be maintained to restarting of is gibberish (Accepted, Editorial) [207]

[PDF pg 231, pg 207, 6.30.3, p 2, s 1](#)

See also: [Symantec-10](#), [Other-10](#), and [Other-12](#)

As noted in comment [Symantec-10](#), should be maintained ~~to restarting of~~ an interrupted ... s/b should be maintained [in a way that facilitates restarting](#) an interrupted ...

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Other 12) ` should be maintained to restarting of is gibberish (Accepted, Editorial) [208]

[PDF pg 242, pg 218, 6.35.3, p 2, s 1](#)

See also: [Symantec-10](#), [Other-10](#), and [Other-11](#)

As noted in comment [Symantec-10](#), should be maintained ~~to restarting of~~ an interrupted ... s/b should be maintained [in a way that facilitates restarting](#) an interrupted ...

The requested change has been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Other 13) Per SAM-4, task tag s/b command identifier (Accepted, Editorial) [209]

[PDF pg 211, pg 187, 6.24, p 2&3 after table 121](#)

See also: [ENDL-22](#) and [ENDL-23](#)

To account for the SAM-4 change from task tag to command identifier, the second paragraph after table 121 should be modified as follows:

The [contents of the ~~TASK TAG~~ COMMAND IDENTIFIER](#) field ~~contains the task tag that identifies the task identify the command~~ to be managed if the TASK MANAGEMENT FUNCTION field contains a value listed as specifying a [task tag command identifier](#) in table 121. If table 121 lists a task management function as not specifying a [task tag command identifier](#), then the contents of the [task tag COMMAND IDENTIFIER](#) field shall be ignored.

Also, the third paragraph after table 121 should be modified as follows:

The format of the [task tag command identifier](#) is specified in the applicable SCSI transport protocol standard and the length of the [task tag command identifier](#) may be less than eight bytes. Any bytes between the end of the [task tag command identifier](#) and the end of the [TASK TAG COMMAND IDENTIFIER](#) field shall be ignored (e.g., a two-byte [task tag command identifier](#) occupies the first two bytes of the [TASK TAG COMMAND IDENTIFIER](#) field and the remaining six bytes are ignored).

The requested changes have been incorporated in OSD-2 [r04a](#), [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Other 14) CREATE CLONE command interlocking (Accepted, Substantive) [210]

[PDF pg 160, pg 136, 6.7 CREATE CLONE](#)

See also: [Symantec-12](#), [Symantec-13](#), [Symantec-14](#), [Symantec-18](#) and [Other-15](#)

The SNIA OSD TWG has determined that attempts to define specifically how the various snapshots commands are interlocked obfuscates the goal and lacks the clarity of intent mentioned in [Symantec-12](#). Therefore, new text is being proposed that specifies the required interlocks and any existing text that attempts to define how the interlocks are to be implemented is being removed.

The changes described below have been incorporated in OSD-2 r04d, and r04e.

Both groups of changes are shown in detail in [08-395r3](#).

Other 15) REFRESH SNAPSHOT OR CLONE command interlocking (Accepted, Substantive) [211]

[PDF pg 230, pg 206, 6.30 REFRESH SNAPSHOT OR CLONE](#)

See also: [Symantec-12](#), [Symantec-13](#), [Symantec-14](#), [Symantec-18](#), and [Other-14](#)

The SNIA OSD TWG has determined that attempts to define specifically how the various snapshots commands are interlocked obfuscates the goal and lacks the clarity of intent mentioned in [Symantec-12](#). Therefore, new text is being proposed that specifies the required interlocks and any existing text that attempts to define how the interlocks are to be implemented is being removed.

The changes described below have been incorporated in OSD-2 r04d, and r04e.

Both groups of changes are shown in detail in [08-395r3](#).

Other 16) REMOVE PARTITION must unlink clones and snapshots (Accepted, Substantive) [212]

[PDF pg 239, pg 215, 6.34 REMOVE PARTITION](#)

See also: [Symantec-14](#)

A study of the problems described in [Symantec-14](#) has shown that the REMOVE PARTITION command fails to specify that snapshot and clone partitions must be disconnected from their parent partitions as part of the remove operation.

The changes described below have been incorporated in OSD-2 r04a, r04b, r04c, r04d, and r04e.

6.34 will be modified as follows:

If partition type attribute is defined (see 3.1.14) in the Snapshot Information attributes page (see 7.1.3.30) of the specified partition, then the following actions shall be performed:

- a) If the partition type is set to 01h (i.e., if the specified partition is a snapshot partition), then removal of the specified partition shall include unlinking the specified partition from the history chain (see 6.30.6); or
- b) If the partition type is set to 02h (i.e., if the specified partition is a clone partition), then removal of the specified partition shall include performing the equivalent of a DETACH CLONE command (see 6.12) on the specified partition.

GOOD status shall not be returned ...

Other 17) Non-existent partition checking must be specified (Accepted, Substantive) [213]

PDF pg 161, pg 137, 6.7.1, 6th p on pg

See also: The resolution for [Symantec-18](#), [Other-18](#), and [Other-19](#)

Since 5.2.10 is not referenced, the CREATE CLONE command needs to be modified as follows:

The SOURCE PARTITION_ID field contains the Partition_ID (see 4.6.4) of the source partition for the CREATE CLONE command. [If the partition identified by the SOURCE PARTITION_ID field does not exist, 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.](#)

The requested change has been incorporated in OSD-2 r04a, r04b, r04c, r04d, and r04e.

Other 18) Non-existent partition checking must be specified (Accepted, Substantive) [214]

PDF pg 170, pg 146, 6.10.1, 4th p on pg

See also: The resolution for [Symantec-18](#), [Other-17](#), and [Other-19](#)

Since 5.2.10 is not referenced, the CREATE SNAPSHOT command needs to be modified as follows:

The SOURCE PARTITION_ID field contains the Partition_ID (see 4.6.4) of the source partition for the CREATE SNAPSHOT command. [If the partition identified by the SOURCE PARTITION_ID field does not exist, 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.](#)

The requested change has been incorporated in OSD-2 r04a, r04b, r04c, r04d, and r04e.

Other 19) Non-existent partition checking must be specified (Accepted, Substantive) [215]

PDF pg 177, pg 153, 6.12, last p on pg

See also: The resolution for [Symantec-18](#), [Other-17](#), and [Other-18](#)

Since 5.2.10 is not referenced, the DETACH CLONE command needs to be modified as follows:

The CLONE PARTITION_ID field contains the Partition_ID (see 4.6.4) of the clone partition that the DETACH CLONE command is being requested to detach. [If the partition identified by the CLONE PARTITION_ID field does not exist, 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.](#)

The requested change has been incorporated in OSD-2 r04a, r04b, r04c, r04d, and r04e.

Other 20) DPO bit definition improperly aligned with SBC-3 (Accepted, Substantive) [216]

PDF pg 112, pg 88, 4.14, last line in subclause

See also: [HP-33](#)

The cited list entry should be modified as follows:

b) The DPO (Disable Page Out) bit recommends against [the use of replacing data in the volatile cache with transferred data.](#)

The requested change has been incorporated in OSD-2 r04b, r04c, r04d, and r04e.

Other 21) Update OSD object nomenclature (Accepted, Editorial) [217]

[PDF pg 30, pg 6, 3.1.22, meta data](#)

See also: [Other-23](#)

object s/b OSD object (see 3.1.29)

The requested change has been incorporated in OSD-2 [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Other 22) Update SAM-4 object nomenclature (Accepted, Editorial) [218]

[PDF pg 30, pg 6, 3.1.23, Nexus](#)

See also: [ENDL-3](#), [ENDL-5](#), [ENDL-6](#), [ENDL-7](#), [IBM-2](#), [LSI-5](#), [Other-24](#), and [Other-25](#)

objects s/b object (i.e. classes)

The requested change has been incorporated in OSD-2 [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Other 23) Update OSD object nomenclature (Accepted, Editorial) [219]

[PDF pg 30, pg 6, 3.1.27, OBSD](#)

See also: [Other-21](#)

objects s/b OSD objects (see 3.1.29)

The requested change has been incorporated in OSD-2 [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Other 24) Update SAM-4 object nomenclature (Accepted, Editorial) [220]

[PDF pg 31, pg 7, 3.1.38, SCSI initiator port](#)

See also: [ENDL-3](#), [ENDL-5](#), [ENDL-6](#), [ENDL-7](#), [IBM-2](#), [LSI-5](#), [Other-22](#), and [Other-25](#)

object s/b object (i.e., class)

The requested change has been incorporated in OSD-2 [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Other 25) Update SAM-4 object nomenclature (Accepted, Editorial) [221]

[PDF pg 31, pg 7, 3.1.39, SCSI target port](#)

See also: [ENDL-3](#), [ENDL-5](#), [ENDL-6](#), [ENDL-7](#), [IBM-2](#), [LSI-5](#), [Other-22](#), and [Other-24](#)

object s/b object (i.e., class)

The requested change has been incorporated in OSD-2 [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Other 26) Add table of end-user data commands (Accepted, Substantive) [222]

[PDF pg 43, pg 19, 4.6.5](#)

See also: [Seagate-3](#), [Seagate-4](#), [Seagate-5](#), and [Seagate-6](#)

Somewhere in the user objects subclause add a table that lists the commands that store or modify end-user data. This table is needed as a reference target for the responses to comments [Seagate-3](#), [Seagate-4](#), [Seagate-5](#), and [Seagate-6](#).

The changes described below have been incorporated in OSD-2 [r04b](#), [r04c](#), [r04d](#), and [r04e](#).

Finding wording that covered all the pertinent commands without implying others was tricky. Details of the changes made can be found in [08-395r3](#).

Other 27) Prohibit effects of timestamps bypass on created time (Accepted, Substantive) [223]

PDF pg 134, pg 110, 5.2.13, table 67

See also: [Other-28](#), [Other-29](#), [Other-30](#), and [Other-31](#)

There are at least two operations that depend on the create timestamp -- OSD security checks, and multi-object operations. If the create timestamp isn't set, security is compromised, and multi-object operations may easily be applied to the wrong object. Therefore they recommend that timestamp bypass should never disable the proper setting of the create time.

Add the following table footnote and apply it to 7Fh.

^a Created time attributes (e.g., the created time attribute in the User Object Timestamps attributes page (see 7.1.3.18)) shall always be updated, regardless of timestamps controls.

The requested change has been incorporated in OSD-2 r04c, r04d, and r04e.

Other 28) Prohibit effects of timestamps bypass on created time (Accepted, Substantive) [224]

PDF pg 284, pg 260, 7.1.3.15, table 180

See also: [Other-27](#), [Other-29](#), [Other-30](#), and [Other-31](#)

For the reasons described in [Other-27](#), add the following table footnote and apply it to 7Fh and FFh.

^b Timestamps updates shall never be bypassed for created time attributes (e.g., the created time attribute in the User Object Timestamps attributes page (see 7.1.3.18)).

The requested change has been incorporated in OSD-2 r04c, r04d, and r04e.

Other 29) Prohibit effects of timestamps bypass on created time (Accepted, Substantive) [225]

PDF pg 286, pg 262, 7.1.3.16, 2nd p after table 182

See also: [Other-27](#), [Other-28](#), [Other-30](#), and [Other-31](#)

[for the reasons described in [Other-27](#) insert at end of paragraph] Updating of the created time attribute shall not be affected by the contents of the TIMESTAMPS CONTROL field described in 5.2.13.

The requested change has been incorporated in OSD-2 r04c, r04d, and r04e.

Other 30) Prohibit effects of timestamps bypass on created time (Accepted, Substantive) [226]

PDF pg 288, pg 264, 7.1.3.17, 2nd p after table 184

See also: [Other-27](#), [Other-28](#), and [Other-31](#)

[for the reasons described in [Other-27](#) insert at end of paragraph] Updating of the created time attribute shall not be affected by the contents of the TIMESTAMPS CONTROL field described in 5.2.13.

The requested change has been incorporated in OSD-2 r04c, r04d, and r04e.

Other 31) Prohibit effects of timestamps bypass on created time (Accepted, Substantive) [227]

PDF pg 290, pg 266, 7.1.3.18, 2nd p after table 186

See also: [Other-27](#), [Other-28](#), and [Other-30](#)

[for the reasons described in [Other-27](#) insert at end of paragraph] Updating of the created time attribute shall not be affected by the contents of the TIMESTAMPS CONTROL field described in 5.2.13.

The requested change has been incorporated in OSD-2 r04c, r04d, and r04e.

Other 32) Remove the `ignored` keyword (Accepted, Editorial) [228]

[PDF pg 33, pg 9, 3.3.2](#)

Because the T10 Style Guide does not define an ignored keyword, the definition must be removed from OSD-2. All uses of ignored conform to the common English definition.

The requested change has been incorporated in OSD-2 [r04c](#), [r04d](#), and [r04e](#).

Other 33) Modernize the definition of the `restricted` keyword (Accepted, Editorial) [229]

[PDF pg 33, pg 9, 3.3.11](#)

The definition of the restricted keyword must be replaced with the definition that T10 approved in document [08-450r1](#).

The requested change has been incorporated in OSD-2 [r04c](#), [r04d](#), and [r04e](#).

Other 34) follow s/b following (Accepted, Editorial) [230]

[PDF pg 162, pg 138, 6.7.2, p 5, s 1](#)

The a,b,c list introduction should be modified as follows:

The command shall be terminated ... INVALID FIELD IN CDB, if any of the ~~follow~~ following conditions exist in the attribute values in the Snapshots Information attributes page

The requested change has been incorporated in OSD-2 [r04d](#), and [r04e](#).

Other 35) follow s/b following (Accepted, Editorial) [231]

[PDF pg 171, pg 147, 6.10.2, p 5, s 1](#)

The a,b,c list introduction should be modified as follows:

The command shall be terminated ... INVALID FIELD IN CDB, if any of the ~~follow~~ following conditions exist in the attribute values in the Snapshots Information attributes page

The requested change has been incorporated in OSD-2 [r04d](#), and [r04e](#).

Other 36) Make implementation of PUNCH command optional (Accepted, Substantive) [232]

[PDF pg 147, pg 123, 6.1, table 80, PUNCH row](#)

Practical implementation of the PUNCH command requires an OSD to use a specific data format and places an unfair burden on other, equally-valid data formats. Therefore, support for the PUNCH command should be optional.

The requested change has been incorporated in OSD-2 [r04d](#), and [r04e](#).

Other 37) ASCII strings must be enclosed in single quotes, not double quotes (Accepted, Editorial) [233]

[PDF pg 36, pg 12, Global](#)

The Style Guide says these double quotes should be single quotes. This change must be made globally.

The requested change has been incorporated in OSD-2 [r04e](#).