ENDL TEXAS

Date: 17 December 2008
To: T10 Technical Committee
From: Ralph O. Weber
Subject: Supplemental changes for OSD-2 Letter Ballot comments

Introduction

Using PDF annotations as the primary method for tracking changes that result from Letter Ballot comments has limitations in the detail to which modifications can be shown. For example, there is no practical way to show changes inside tables in a PDF annotation.

This document details the changes that cannot be detailed in 08-380. The changes are identified by the same format section headers as are found in 08-380.

Revision History

r0 Initial revision, which coordinates with 08-380r1 and OSD-2 r04a
r1 Revision which coordinates with 08-380r2 and OSD-2 r04b
r2 Corrected a couple of bogus r04b hyperlinks. The only changes made concerned hyperlinks.
r3 Completed the resolutions for all comments mentioned in this document.

Unless otherwise indicated additions are shown in blue, deletions in red strikethrough, and comments in green.

All page number, clause number, table number, etc. references are to OSD-2 r04.

Uncategorized OSD-2 Changes

IBM 19) CLEAR interactions w/ READ MAP

6.3 CLEAR

…

Bytes written by a CLEAR command may be represented as a DATA_HOLE (see 6.28.2) by the READ MAP command (see 6.28) or the READ MAPS AND COMPARE command (see 6.29).

If a CLEAR command causes the value in the user object logical length attribute …

{{This change can be found in OSD-2 r04a and later.}}

6.6 CREATE AND WRITE

…

Bytes written with zeros by a CREATE AND WRITE command may be represented as a DATA_HOLE (see 6.28.2) by the READ MAP command (see 6.28) or the READ MAPS AND COMPARE command (see 6.29).

If a CREATE AND WRITE command causes the value in the number of collections and user objects attribute …

{{This change can be found in OSD-2 r04a and later.}}

6.40 WRITE

…

Bytes written with zeros by a WRITE command may be represented as a DATA_HOLE (see 6.28.2) by the READ MAP command (see 6.28) or the READ MAPS AND COMPARE command (see 6.29).

If a WRITE command causes the value in the user object logical length attribute …

{{This change can be found in OSD-2 r04a and later.}}

6.28.2 READ MAP command and READ MAPS AND COMPARE command parameter data

…

Table 133 — MAP DESCRIPTOR TYPE field

Code	Name	Description
…	…	…
0002h	DATA_HOLE	This map descriptor indicates the byte offset and data length of a user data that lies between two WRITTEN_DATA regions, but for which no user data or user data in which all bytes are set to zero has been written.
…	…	…

{{This change can be found in OSD-2 r04a and later.}}

Seagate 16) Read-Only data object accessibility cannot be reversed

Information attributes pages deletions

7.1.3.8 Root Information attributes page

…

Table 160 — Root Information attributes page contents

Attribute Number	Length (bytes) [a]	Attribute	Application Client Settable	OSD Logical Unit Provided
…	…	…	…	…
81h	8	Used capacity	No	Yes
~~82h~~		~~Reserved~~		
~~83h~~	~~4~~	~~Object accessibility~~	~~Yes~~	~~No~~
~~84h~~ 82h to BFh		Reserved	No	
…	…	…	…	…

… {{These changes can be found in OSD-2 r04b and later.}}

~~The object accessibility attribute (83h) specifies the accessibly of the root object, all partitions, all collections, and all user objects using one of the values shown in table 161. The object accessibility attribute shall be enforced as described in 4.7. The object accessibility attribute in the Root Information attributes page shall be set to zero (i.e., allow all accesses) by a FORMAT OSD command.~~

Table 161 — ~~Object accessibility attribute values~~

~~Code~~	~~Description~~
~~0000 0000h~~	~~Allow all accesses~~
~~0000 0001h~~	~~Deny all write accesses and allow all read accesses~~
~~0000 0002h to FFFF FFFFh~~	~~Reserved~~

… {{This change can be found in OSD-2 r04b and later.}}

7.1.3.9 Partition Information attributes page

…

Table 169 — Partition Information attributes page contents

Attribute Number	Length (bytes) ^a	Attribute	Application Client Settable	OSD Logical Unit Provided
…	…	…	…	…
81h	8	Used capacity	No	Yes
82h to 83h		Reserved		
~~83h~~	~~4~~	~~Object accessibility~~	~~Yes~~	~~No~~
84h	0 or 8	Potential used capacity increment	No	Yes
…	…	…	…	…

… {{These changes can be found in OSD-2 r04b and later.}}

~~The object accessibility attribute (83h) specifies the accessibly of the partition, all collections in the partition, and all user objects in the partition using one of the values shown in table 161 (see 7.1.3.8). The object accessibility attribute shall be enforced as described in 4.7. The object accessibility attribute in the Partition Information attributes page shall be set to zero (i.e., allow all accesses) by a CREATE PARTITION command.~~

… {{This change can be found in OSD-2 r04b and later.}}

7.1.3.10 Collection Information attributes page

…

Table 170 — Collection Information attributes page contents

Attribute Number	Length (bytes)	Attribute	Application Client Settable	OSD Logical Unit Provided
…	…	…	…	…
81h	8	Used capacity	No	Yes
~~82h~~		~~Reserved~~		
~~83h~~	~~4~~	~~Object accessibility~~	~~Yes~~	~~No~~
~~84h~~ 82h to FFFF FFFEh		Reserved	No	

… {{These changes can be found in OSD-2 r04b and later.}}

~~The object accessibility attribute (83h) specifies the accessibly of the collection using one of the values shown in table 161 (see 7.1.3.8). The object accessibility attribute shall be enforced as described in 4.7. The object accessibility attribute in the Collection Information attributes page shall be set to zero (i.e., allow all accesses) by a CREATE COLLECTION command.~~

… {{This change can be found in OSD-2 r04b and later.}}

7.1.3.11 User Object Information attributes page

…

Table 172 — User Object Information attributes page contents

Attribute Number	Length (bytes) [a]	Attribute	Application Client Settable	OSD Logical Unit Provided
…	…	…	…	…
81h	8	Used capacity	No	Yes
82h	8	User object logical length	Yes	Yes
~~83h~~	~~4~~	~~Object accessibility~~	~~Yes~~	~~No~~
~~84h~~ 83h to D0h		Reserved	No	
…	…	…	…	…

… {{These changes can be found in OSD-2 r04b and later.}}

~~The object accessibility attribute (83h) specifies the accessibly of the user object using one of the values shown in table 161 (see 7.1.3.8). The object accessibility attribute shall be enforced as described in 4.7. The object accessibility attribute in the User Object Information attributes page shall be set to zero (i.e., allow all accesses) by a CREATE command or a CREATE AND WRITE command.~~

… {{This change can be found in OSD-2 r04b and later.}}

Policy/Security attributes pages additions

7.1.3.22 Root Policy/Security attributes page

…

Table 196 — Root Policy/Security attributes page contents

Attribute Number	Length (bytes) [a]	Attribute	Application Client Settable	OSD Logical Unit Provided
…	…	…	…	…
Ah	2	Boot epoch	Yes	Yes
Bh to 80h		Reserved	No	
81h	4	Object accessibility	Yes	No
~~Bh~~ 82h to 7FFCh		Reserved	No	
…	…	…	…	…

… {{These changes can be found in OSD-2 r04b and later.}}

The object accessibility attribute (81h) specifies the accessibly of the root object, all partitions, all collections, and all user objects using one of the values shown in table x1. The object accessibility attribute shall be enforced as

described in 4.11.3. The object accessibility attribute in the Root Information attributes page shall be set to zero (i.e., allow all accesses) by a FORMAT OSD command.

Table x1 — Object accessibility attribute values

Code	Description
0000 0000h	Allow all accesses
0000 0001h	a) Allow all read accesses, and write accesses to all Policy/Security attributes pages (e.g., this attributes page); and b) Deny all write accesses except write accesses to Policy/Security attributes pages
0000 0002h to FFFF FFFFh	Reserved

… {{This change can be found in OSD-2 r04b and later.}}

Table 199 — Root Policy/Security attributes page format

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)							
3			PAGE NUMBER (R+5h)					(LSB)
4	(MSB)							
7			PAGE LENGTH (46h 42h)					(LSB)
				⋮				
71				Reserved				
72	(MSB)							
75			OBJECT ACCESSIBILITY					(LSB)
76 72	(MSB)							
77 73			BOOT EPOCH					(LSB)

… {{These changes can be found in OSD-2 r04b and later.}}

The OBJECT ACCESSIBILITY field contains the value of the object accessibility attribute.

The BOOT EPOCH field contains the value of the boot epoch attribute.

… {{This change can be found in OSD-2 r04b and later.}}

7.1.3.23 Partition Policy/Security attributes page

…

Table 200 — Partition Policy/Security attributes page contents

Attribute Number	Length (bytes) [a]	Attribute	Application Client Settable	OSD Logical Unit Provided
…	…	…	…	…
4h	2	Request nonce list depth	No	Yes
5h	2	Frozen working key bit mask	No	Yes
6h to 80h		Reserved	No	
81h	4	Object accessibility	Yes	No
~~6h~~ 82h to 7FFEh		Reserved	No	
…	…	…	…	…

… {{These changes can be found in OSD-2 r04b and later.}}

The object accessibility attribute (81h) specifies the accessibly of the partition, all collections in the partition, and all user objects in the partition using one of the values shown in table x1 (see 7.1.3.22). The object accessibility attribute shall be enforced as described in 4.11.3. The object accessibility attribute in the Partition Information attributes page shall be set to zero (i.e., allow all accesses) by a CREATE PARTITION command.

… {{This change can be found in OSD-2 r04b and later.}}

Table 202 — Partition Policy/Security attributes page format

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)			PAGE NUMBER (P+5h)				
3								(LSB)
4	(MSB)			PAGE LENGTH (94h ~~8Fh~~)				
7								(LSB)
				⋮				
144	(MSB)			WORKING KEY IDENTIFIER (for attribute number 800Fh)				
150								(LSB)
151				Reserved				
152								
153	(MSB)			OBJECT ACCESSIBILITY				
156								(LSB)

{{Making the changes described in comment Other-2 (see 08-380r2) will cause the object accessibility field to start on byte 160 and thus be 4-byte aligned.}}

… {{These changes can be found in OSD-2 r04b and later.}}

The sixteen WORKING KEY IDENTIFIER fields contain the working key identifier attribute values in ascending attribute number order. If a working key identifier valid bit is set to one, the corresponding WORKING KEY IDENTIFIER field contains the value of the working key identifier attribute. Otherwise, the contents of the WORKING KEY IDENTIFIER field are undefined.

The OBJECT ACCESSIBILITY field contains the value of the object accessibility attribute.

{{This change can be found in OSD-2 r04b and later.}}

7.1.3.24 Collection Policy/Security attributes page

The Collection Policy/Security attributes page (C+5h) shall contain the attributes listed in table 203.

Table 203 — Collection Policy/Security attributes page contents

Attribute Number	Length (bytes)	Attribute	Application Client Settable	OSD Logical Unit Provided
0h	40	Page identification	No	Yes
1h to 80h		Reserved	No	
81h	4	Object accessibility	Yes	No
1h 82h to 4000 0000h		Reserved	No	
4000 0001h	4	Policy access tag	Yes	Yes
4000 0002h to FFFF FFFEh		Reserved	No	

…

The object accessibility attribute (81h) specifies the accessibly of the collection using one of the values shown in table x1 (see 7.1.3.22). The object accessibility attribute shall be enforced as described in 4.11.3. The object accessibility attribute in the Collection Information attributes page shall be set to zero (i.e., allow all accesses) by a CREATE COLLECTION command.

… {{These changes can be found in OSD-2 r04b and later.}}

Table 204 — Collection Policy/Security attributes page format

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)			PAGE NUMBER (C+5h)				
3								(LSB)
4	(MSB)			PAGE LENGTH (8h 4h)				
7								(LSB)
8	(MSB)			POLICY ACCESS TAG				
11								(LSB)
12	(MSB)			OBJECT ACCESSIBILITY				
15								(LSB)

… {{These changes can be found in OSD-2 r04b and later.}}

The POLICY ACCESS TAG field contains the value of the policy access tag attribute.

The OBJECT ACCESSIBILITY field contains the value of the object accessibility attribute.

{{This change can be found in OSD-2 r04b and later.}}

7.1.3.25 User Object Policy/Security attributes page

The User Object Policy/Security attributes page (5h) shall contain the attributes listed in table 205.

Table 205 — User Object Policy/Security attributes page contents

Attribute Number	Length (bytes)	Attribute	Application Client Settable	OSD Logical Unit Provided
0h	40	Page identification	No	Yes
1h to 80h		Reserved	No	
81h	4	Object accessibility	Yes	No
~~1h~~ 82h to 4000 0000h		Reserved	No	
4000 0001h	4	Policy access tag	Yes	Yes
4000 0002h to FFFF FFFEh		Reserved	No	

…

The object accessibility attribute (81h) specifies the accessibly of the user object using one of the values shown in table x1 (see 7.1.3.22). The object accessibility attribute shall be enforced as described in 4.11.3. The object accessibility attribute in the User Object Information attributes page shall be set to zero (i.e., allow all accesses) by a CREATE command or a CREATE AND WRITE command.

… {{These changes can be found in OSD-2 r04b and later.}}

Table 206 — User Object Policy/Security attributes page format

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)							
3				PAGE NUMBER (5h)				(LSB)
4	(MSB)							
7				PAGE LENGTH (8h ~~4h~~)				(LSB)
8	(MSB)							
11				POLICY ACCESS TAG				(LSB)
12	(MSB)							
15				OBJECT ACCESSIBILITY				(LSB)

…

The POLICY ACCESS TAG field contains the value of the policy access tag attribute.

The OBJECT ACCESSIBILITY field contains the value of the object accessibility attribute.

… {{These changes can be found in OSD-2 r04b and later.}}

Fix object accessibility attribute references and related subclause organization changes

4.11 Policy/storage management

4.11.1 Overview

The policy/storage manager:

a) Provides access policy controls to application clients via preparation of policy-coordinated capabilities (see 4.11.2); and
b) Manages read/write access to data objects (see 4.11.3); and
c) In concert with the OSD logical unit …

… {{These changes can be found in OSD-2 r04b and later.}}

4.11.2 Capabilities

…

4.11.3 4.7 Data object accessibility

Write access to …, may be controlled using:

a) Policy/storage manager capabilities (see 4.11.2); or
b) Object accessibility attributes in the following attributes pages:
    A) The User Object Information attributes page (see 7.1.3.11) User Object Policy/Security attributes page (see 7.1.3.25);
    B) The Collection Information attributes page (see 7.1.3.10) Collection Policy/Security attributes page (see 7.1.3.24);
    C) The Partition Information attributes page (see 7.1.3.9) Partition Policy/Security attributes page (see 7.1.3.23); and
    D) The Root Information attributes page (see 7.1.3.8) Root Policy/Security attributes page (see 7.1.3.22).

The object accessibility attributes form the following prioritized hierarchy:

… {{These changes can be found in OSD-2 r04b and later.}}

Changes of cross references equivalent to the ones shown above are required in the following subclauses (multiple entries for a single subclause indicate multiple locations on different pages that need updating):

• 4.13.4.3 (Source object freeze duplication management) — see OSD-2 r04b and later
• 6.7.1 (CREATE CLONE – Introduction) — see OSD-2 r04b and later
• 6.7.2 (CREATE CLONE – Processing before the IMMED_TR bit takes effect) — see OSD-2 r04b and later
• 6.7.2 (CREATE CLONE – Processing before the IMMED_TR bit takes effect) — see OSD-2 r04b and later
• 6.7.4 (CREATE CLONE – Command completion) — see OSD-2 r04b and later
• 6.7.4 (CREATE CLONE – Command completion) — see OSD-2 r04b and later
• 6.10.1 (CREATE SNAPSHOT – Introduction) — see OSD-2 r04b and later
• 6.10.2 (CREATE SNAPSHOT – Processing before the IMMED_TR bit takes effect) — see OSD-2 r04b and later
• 6.10.2 (CREATE SNAPSHOT – Processing before the IMMED_TR bit takes effect) — see OSD-2 r04b and later

- 6.10.4 (CREATE SNAPSHOT – Command completion) — see OSD-2 r04b and later
- 6.30.1 (REFRESH SNAPSHOT OR CLONE – Introduction) — see OSD-2 r04b and later
- 6.30.2 (REFRESH SNAPSHOT OR CLONE – Processing before …) — see OSD-2 r04c and later
- 6.30.2 (REFRESH SNAPSHOT OR CLONE – Processing before …) — see OSD-2 r04b and later
- 6.30.4 (REFRESH SNAPSHOT OR CLONE – Command completion) — see OSD-2 r04b and later
- 6.35.2 (RESTORE PARTITION FROM SNAPSHOT – Processing before …) — see OSD-2 r04b and later
- 6.35.4 (RESTORE PARTITION FROM SNAPSHOT – Command completion) — see OSD-2 r04b and later

Update annex B

All the object accessibility attributes need to be removed from the various Information attributes pages. No links are provided for these changes.

Then, the object accessibility attributes need to be inserted in the Policy/Security attributes pages with attribute number 81h, as follows:

- User object Policy/Security attributes page — see OSD-2 r04b and later
- Collection Policy/Security attributes page — see OSD-2 r04b and later
- Partition Policy/Security attributes page — see OSD-2 r04b and later
- Root Policy/Security attributes page — see OSD-2 r04b and later

Seagate 26) Current Command attributes page permission bits requirements
Seagate 27) Current Command attributes page permission bits requirements
Seagate 28) Current Command attributes page permission bits requirements

Table 26 — Attribute retrieving and setting function allowed by specific capability field values

Attribute-Related Functions Allowed	Capability Field values that allow attribute-related functions		
	Object Type Name	Permission Bits That Are Set To One	Object Descriptor Name
Retrieval of attributes from the Current Command attributes page (see 7.1.3.31)	USER	~~GET_ATTR~~ none [a]	USER
Retrieval of attributes from the Current Command attributes page ~~(see 7.1.3.31)~~	COLLECTION	~~GET_ATTR~~ none [a]	COL
Retrieval of attributes from the Current Command attributes page	PARTITION or ROOT	~~GET_ATTR~~ none [a]	PAR
…	…	…	…
Combinations of OBJECT TYPE field, PERMISSION BITS field, and OBJECT DESCRIPTOR TYPE field values not shown in this table and table 25 are reserved. The capability fields not shown in this table may place additional limits on the objects that are allowed to be accessed.			
[a] Attributes shall be retrieved from the Current Command attributes page (see 7.1.3.31) even if the GET_ATTR permission bit is set to zero.			

{{These changes can be found in OSD-2 r04a and later.}}

Seagate 30) OBJECT STRUCTURE CHECK command must be allowed after a hard reset

4.11.3.3 Storage damage detection and repair after a reset

After a hard reset SCSI device condition established in response to an event (see SAM-4), the device server may oblige the application client to send an OBJECT STRUCTURE CHECK command (see 6.22) for:

    a) One or more individual partitions; or
    b) The root object and all partitions.

If after a hard reset the device server has determined that processing of an OBJECT STRUCTURE CHECK command for the root object and all partitions is necessary to ensure proper OBSD storage integrity, then it shall:

    a) Terminate all received commands except INQUIRY, REPORT LUNS, and REQUST REQUEST SENSE,
        and OBJECT STRUCTURE CHECK with CHECK CONDITION status, with the sense key set to NOT
        READY, the additional sense code set to LOGICAL UNIT NOT READY, STRUCTURE CHECK REQUIRED,
        and the INFORMATION field set to zero; and
    b) Complete received REQUEST SENSE commands with GOOD status, with the sense key set to NOT
        READY, the additional sense code set to LOGICAL UNIT NOT READY, STRUCTURE CHECK REQUIRED,
        and the INFORMATION field set to zero.

The need to process an OBJECT STRUCTURE CHECK command for the root object and all partitions shall not affect the processing of the INQUIRY command and REPORT LUNS command.

If after a hard reset the device server has determined that processing of an OBJECT STRUCTURE CHECK command for a partition is necessary to ensure proper OBSD storage integrity, then it shall terminate all received commands addressed to that partition except OBJECT STRUCTURE CHECK commands with CHECK CONDITION status, with the sense key set to NOT READY, the additional sense code set to LOGICAL UNIT NOT READY, STRUCTURE CHECK REQUIRED, and the INFORMATION field set to the Partition_ID of a partition for which the processing of an OBJECT STRUCTURE CHECK command is needed.

{{These changes can be found in OSD-2 r04a and later.}}

Seagate 66) Add a Current Command change in space consumption attribute

7.1.3.31 Current Command attributes page

…

Table 223 — Current Command attributes page contents

Attribute Number	Length (bytes)	Attribute	Application Client Settable	OSD Logical Unit Provided
0h	40	Page identification	No	Yes
1h	32	Response integrity check value	No	Yes
2h	1	Object Type	No	Yes
3h	8	Partition_ID	No	Yes
4h	8	Collection_Object_ID or User_Object_ID	No	Yes
5h	8	Starting byte address of append	No	Yes
6h	8	Change in used capacity	No	Yes
6h 7h to FFFF FFFEh		Reserved	No	

{{This change can be found in OSD-2 r04a and later.}}

…

The change in used capacity attribute (number 6h) shall contain a signed integer (see 3.6) that when added to the used capacity attribute value for the object detected before processing was begun (e.g., the used capacity attribute in the Partition Information attributes page (see 7.1.3.9)) produces the used capacity attribute value detected at the time status was returned for the command. A value of zero indicates that no change in used capacity was detected during the processing of the command.

{{Warning to reviewers: Commands with the IMMED_TR bit set to one are very likely to return zero for the change in used capacity attribute because they do not make any changes in used capacity before status is returned.}}

{{This change can be found in OSD-2 r04a and later.}}

{{An update to Annex B can be found in OSD-2 r04b and later.}}

…

Table 224 — Current Command attributes page format

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)							
3			PAGE NUMBER (FFFF FFFEh)					(LSB)
4	(MSB)							
7			PAGE LENGTH (~~3Ch~~ 44h)					(LSB)
8	(MSB)							
39			RESPONSE INTEGRITY CHECK VALUE					(LSB)
40			OBJECT TYPE					
41								
43			Reserved					
44	(MSB)							
51			PARTITION_ID					(LSB)
52	(MSB)							
59			COLLECTION_OBJECT_ID OR USER_OBJECT_ID					(LSB)
60	(MSB)							
67			STARTING BYTE ADDRESS OF APPEND					(LSB)
68	(MSB)							
75			CHANGE IN USED CAPACITY					(LSB)

…

The CHANGE IN USED CAPACITY field contains the value of the change in used capacity attribute.

{{These changes can be found in OSD-2 r04a and later.}}

Symantec 5) Time of Duplication DO NOT CARE makes no sense

Table 44 — Time of duplication source object management

Name	Code [a]	Description
DEFAULT	0h	Used to specify one of the other codes in this table that is selected via a specified attribute value.
BEGINNING	1h	The duplicated object shall have the contents of the source object at the time the duplication was begun.
~~DO NOT CARE~~ BEGINNING OR END	8h	The duplicated object shall have the contents of the source object at the time the duplication was begun or the contents of the source object at the time the duplication was completed. ~~may have any contents of the source object, including contents that were not in effect at either the beginning or the end of the duplication.~~
END	Fh	The duplicated object shall have the contents of the source object at the time the duplication was completed.
[a] These codes are used in field, attribute numbers, and attribute values. All codes not listed in this table are reserved.		

{{These changes can be found in OSD-2 r04a and later.}}

…

7.1.3.8 Root Information attributes page

…

If any form of time of duplication source object management is supported (see 4.13.4.2), attribute number 300h (i.e., the supported time of duplication method attribute for the DEFAULT time of duplication method) and attribute number 308h (i.e., the supported time of duplication method attribute for the ~~DO NOT CARE~~ BEGINNING OR END time of duplication method) shall be defined (see 3.1.14) and the attribute value shall be FFFF FFFFh (i.e., all uses of the DEFAULT time of duplication method and the ~~DO NOT CARE~~ BEGINNING OR END time of duplication method) shall be supported if any time of duplication source object management is supported).

{{These changes can be found in OSD-2 r04a and later.}}

…

7.1.3.9 Partition Information attributes page

…

If snapshot object duplication is supported (see 4.13), the default snapshot time of duplication method attribute (number 300h) shall be defined (see 3.1.14) and shall contain one of the codes in table 44 (see 4.13.4.2) other than DEFAULT. A CREATE PARTITION command (see 6.9) shall set the default snapshot time of duplication method attribute to ~~DO NOT CARE~~ BEGINNING OR END (see table 44). If a command attempts to set the default snapshot time of duplication method attribute to DEFAULT or to a code that the supported object duplication method attributes in the Root Information attributes page (see 7.1.3.8) indicate is not supported, then the command shall be terminated as described in 7.1.2, and the value in the default snapshot time of duplication method attribute shall not be changed.

If clone object duplication is supported (see 4.13), the default clone time of duplication method attribute (number 301h) shall be defined (see 3.1.14) and shall contain one of the codes in table 44 (see 4.13.4.2) other than DEFAULT. A CREATE PARTITION command (see 6.9) shall set the default clone time of duplication method attribute to DO NOT CARE BEGINNING OR END (see table 44). If a command attempts to set the default clone time of duplication method attribute to DEFAULT or to a code that the supported object duplication method attributes in the Root Information attributes page (see 7.1.3.8) indicate is not supported, then the command shall be terminated as described in 7.1.2, and the value in the default clone time of duplication method attribute shall not be changed.

{{These changes can be found in OSD-2 r04a and later.}}

Symantec 15) Duplication Method s/b Snapshot Information page attribute

7.1.3.30 Snapshots Information attributes page

…

Table 221 — Snapshots Information attributes page contents

Attribute Number	Length (bytes) [a]	Attribute	Application Client Settable	OSD Logical Unit Provided
0h	0 or 40	Page identification	No	Yes
1h	0 or 1	Partition type	No	Yes
2h to 20h		Reserved	No	
21h	0 or 1	Duplication method	No	Yes
2h 22h to 7Fh		Reserved	No	
80h	0 or 8	Source partition	No	Yes
…	…	…	…	…
[a] A length of 0 in this column denotes an attribute that may be undefined (see 3.1.51).				

{{These changes can be found in OSD-2 r04a and later.}}

…

If it is defined (see 3.1.14), the duplication method attribute (number 21h) contains the code shown in table 43 (see 4.13.3) that indicates the duplication method used to create this snapshot partition or clone partition. If the command that created this snapshot partition or clone partition specified the DEFAULT duplication method, the duplication method attribute shall contain the actual duplication method used, not DEFAULT. If this partition is a primary partition (i.e., if the partition type attribute contains 00h) and the duplication method attribute is defined, then the duplication method attribute shall contain 00h (i.e., DEFAULT).

{{These changes can be found in OSD-2 r04a and later.}}

6.7 CREATE CLONE

…

6.7.2 Processing before the IMMED_TR bit takes effect

…

The following attributes in the Snapshots Information attributes page (see 7.1.3.30) of the destination partition shall be set as follows:

    a)   The partition type attribute shall be set to 02h (i.e., clone partition);
    b)   The duplication method attribute shall be set as follows:
        A)   If the duplication method field in the CDB contains a value other than DEFAULT, the value in the duplication method field shall be placed in the duplication method attribute; or
        B)   If the duplication method field in the CDB contains DEFAULT, the value in the default clone duplication method attribute in the Partition Information attributes page (see 7.1.3.9) shall be placed in the duplication method attribute;
    c)   The source partition attribute shall be set …

{{These changes can be found in OSD-2 r04a and later.}}

6.10 CREATE SNAPSHOT

…

6.10.2 Processing before the IMMED_TR bit takes effect

…

The following attributes in the Snapshots Information attributes page (see 7.1.3.30) of the destination partition shall be set as follows:

    a)   The partition type attribute shall be set to 01h (i.e., snapshot partition);
    b)   The duplication method attribute shall be set as follows:
        A)   If the duplication method field in the CDB contains a value other than DEFAULT, the value in the duplication method field shall be placed in the duplication method attribute; or
        B)   If the duplication method field in the CDB contains DEFAULT, the value in the default snapshot duplication method attribute in the Partition Information attributes page (see 7.1.3.9) shall be placed in the duplication method attribute;
    c)   The source partition attribute shall be set …

{{These changes can be found in OSD-2 r04a and later.}}

6.11 DETACH CLONE

…

In the Snapshots Information attributes page (see 7.1.3.30) of the clone partition, the following changes shall be made in attribute values:

    a)   The partition type attribute shall be set to 00h (i.e., primary partition);
    b)   The duplication method attribute shall be made undefined (see 3.1.51) or set to 00h;
    c)   The source partition attribute shall be made undefined (see 3.1.51);

   d)   The branch depth attribute shall be …

{{These changes can be found in OSD-2 r04a and later.}}

Symantec 16) REFRESH/RESTORE Duplication Methods

6.30 REFRESH SNAPSHOT OR CLONE

6.30.1 Introduction

…

The DUPLICATION METHOD field specifies which duplication method (see 4.13.3) applies to the REFRESH SNAPSHOT OR CLONE command. If the DUPLICATION METHOD field is set to DEFAULT (see table 43 in 4.13.3), then the REFRESH SNAPSHOT OR CLONE command shall use the duplication method specified by the dupli-cation method attribute in the Snapshots Information attributes page (see 7.1.3.30) of the destination partition. ~~which duplication method is used is specified as follows:~~

   a)   ~~If the partition type attribute in the Snapshots Information attributes page (see 7.1.3.30) of the destination partition is set to 01h (i.e., snapshot partition), then the default snapshot duplication method attribute in the Partition Information attributes page (see 7.1.3.9) of the source partition specifies which duplication method applies to the REFRESH SNAPSHOT OR CLONE command; or~~
   b)   ~~If the partition type attribute in the Snapshots Information attributes page (see 7.1.3.30) of the destination partition is set to 02h (i.e., clone partition), then the default snapshot duplication method attribute in the Partition Information attributes page of the source partition specifies which duplication method applies to the REFRESH SNAPSHOT OR CLONE command.~~

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 if all of the following are true:

   a)   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);
   b)   The DUPLICATION METHOD field is not set to DEFAULT; and
   c)   The contents of the DUPLICATION METHOD field do not match the contents of the duplication method attribute in the Snapshots Information attributes page (see 7.1.3.30) of the destination partition.

{{These changes can be found in OSD-2 r04a and later.}}

6.35 RESTORE PARTITION FROM SNAPSHOT

6.35.1 Introduction

…

The DUPLICATION METHOD field specifies which duplication method (see 4.13.3) applies to the RESTORE PARTITION FROM SNAPSHOT command. If the DUPLICATION METHOD field is set to DEFAULT (see table 43 in 4.13.3), then the RESTORE PARTITION FROM SNAPSHOT command shall use the duplication method specified by the duplication method attribute in the Snapshots Information attributes page (see 7.1.3.30) of the snapshot partition. t~~he default snapshot duplication method attribute in the Partition Information attributes page (see 7.1.3.9) of the main partition specifies which duplication method applies to the RESTORE PARTITION FROM SNAPSHOT command.~~

{{These changes can be found in OSD-2 r04a and later.}}

Symantec 19) REFRESH/RESTORE and deleted object removal

6.30 REFRESH SNAPSHOT OR CLONE

…

6.30.2 Processing before the IMMED_TR bit takes effect

…

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 updated in the destination partition to include at least the following:

  a) Every user object and collection in the source partition shall have their User_Object_ID (see 4.6.5) or Collection_Object_ID (see 4.6.6) inserted as a member of the TRACKING collection (see 4.6.6.3); ~~and~~
  b) Every user object and collection in the destination partition that does not have an equivalent user object or collection in the source partition shall have their User_Object_ID or Collection_Object_ID noted for removal from the destination partition; and
  c) The Command Tracking attributes page (see 7.1.3.20) shall be …

{{The above changes include changes made in response to comments Symantec-17 and Other-5 (see 08-380r1).}}

{{These changes can be found in OSD-2 r04a and later.}}

6.35 RESTORE PARTITION FROM SNAPSHOT

…

6.35.2 Processing before the IMMED_TR bit takes effect

…

The snapshot/clone tracking well known collection (see 4.6.6.5.3) shall be updated in the snapshot partition to include at least the following:

  a) Every user object and collection in the snapshot partition shall have their User_Object_ID (see 4.6.5) or Collection_Object_ID (see 4.6.6) inserted as a member of the TRACKING collection (see 4.6.6.3); ~~and~~
  b) Every user object and collection in the main partition that does not have an equivalent user object or collection in the snapshot partition shall have their User_Object_ID or Collection_Object_ID noted for removal from the main partition; and
  c) The Command Tracking attributes page (see 7.1.3.20) shall be …

{{The above changes include changes made in response to comment Other-5 (see 08-380r1).}}

{{These changes can be found in OSD-2 r04a and later.}}

Other 26) Add table of end-user data commands

4.6.5 User objects

User objects contain end-user data (i.e., the content of this data is owned by the applications that cause the creation, writing and reading the user objects). Application clients use the commands listed in table x2 to affect specified bytes in the end-user data.

Table x2 — Commands that affect specified end-user data bytes

Command	Reference
APPEND	6.2
CLEAR	6.3
CREATE AND WRITE	6.6
PUNCH	6.25
READ	6.27
WRITE	6.40

User objects have the Partition_ID of the partition …

…

{{These changes can be found in OSD-2 r04b and later.}}

Command Interlocking OSD-2 Changes

{{The following changes have been grouped together to simplify reviews and comparisons between them.}}

Other 14) CREATE CLONE command interlocking

4.7 CREATE CLONE

… {{The following additions are recommended.}}

4.7.2 Processing before the IMMED_TR bit takes effect

…

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, if any of the follow conditions exist in the attribute values in the Snapshots Information attributes page (see 7.1.3.30) of the source partition:

   a) The partition type attribute contains 00h (i.e., primary partition);
   b) The partition type attribute contains 02h (i.e., clone partition);
   c) The clones count attribute contains a value that is equal to the value in the maximum clones count attribute in the Root Information attributes page (see 7.1.3.8); or
   d) The branch depth attribute contains a value that is equal to the value in the maximum branch depth attribute in the Root Information attributes page.

The command may be terminated with CHECK CONDITION status, with the sense key set to ILLEGAL REQUEST and the additional sense code set to COMMAND SEQUENCE ERROR, if any of the following are true about the source partition:

a)   The source partition is the source partition for an active or interrupted CREATE CLONE command (see 6.7);
b)   The source partition is the source partition for an active or interrupted REFRESH SNAPSHOT OR CLONE command (see 6.30); or
c)   The source partition is the main partition for an active RESTORE PARTITION FROM SNAPSHOT command (see 6.35).

{{These changes can be found in OSD-2 r04d and later.}}

{{Note the **may** in the above statement. It seems unfair for the standard to prohibit implementations from devising ways to work around the complexities of having one partition participate in multiple object duplications concurrently. There appears to be nothing in the snapshot/clone model that necessitates such a restriction.}}

{{The same partition type cannot be the source for both snapshots and clones, so interlocking with the CREATE SNAPSHOT command is not a concern.}}

{{Removed partitions do not exist and as such generate errors elsewhere in the CREATE CLONE command processing, so interactions with the REMOVE PARTITION command are not a concern.}}

{{Interlocking problems with the CREATE CLONE command were ignored in OSD-2 r04, so no existing text needs to be excised. In many cases the problems cannot arise because the output of a CREATE CLONE command is a new partition, so other commands cannot reference the clone partition because it does not exist.}}

Symantec 13) CREATE SNAPSHOT command interlocking

4.10 CREATE SNAPSHOT

… {{The following additions are recommended.}}

4.10.2 Processing before the IMMED_TR bit takes effect

…

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, if any of the follow conditions exist in the attribute values in the Snapshots Information attributes page (see 7.1.3.30) of the source partition:

a)   The partition type attribute contains 01h (i.e., snapshot partition); or
b)   The snapshots count attribute contains a value that is equal to the value in the maximum snapshots count attribute in the Root Information attributes page (see 7.1.3.8).

The command may be terminated with CHECK CONDITION status, with the sense key set to ILLEGAL REQUEST and the additional sense code set to COMMAND SEQUENCE ERROR, if any of the following are true about the source partition:

a)   The source partition is the source partition for an active or interrupted CREATE SNAPSHOT command (see 6.10);
b)   The source partition is the source or destination partition for an active or interrupted REFRESH SNAPSHOT OR CLONE command (see 6.30); or

    c) The source partition is the snapshot partition for an active RESTORE PARTITION FROM SNAPSHOT command (see 6.35).

{{These changes can be found in OSD-2 r04d and later.}}

{{Note the **may** in the above statement. It seems unfair for the standard to prohibit implementations from devising ways to work around the complexities of having one partition participate in multiple object duplications concurrently. There appears to be nothing in the snapshot/clone model that necessitates such a restriction.}}

{{The same partition type cannot be the source for both snapshots and clones, so interlocking with the CREATE CLONE command is not a concern.}}

{{Removed partitions do not exist and as such generate errors elsewhere in the CREATE SNAPSHOT command processing, so interactions with the REMOVE PARTITION command are not a concern.}}

{{Interlocking problems with the CREATE SNAPSHOT command were ignored in OSD-2 r04, so no existing text needs to be excised. In many cases the problems cannot arise because the output of a CREATE SNAPSHOT command is a new partition, so other commands cannot reference the snapshot partition because it does not exist.}}

Symantec 12) DETACH CLONE command interlocking

4.12 DETACH CLONE

… {{The following additions and deletions are recommended.}}

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, if attributes in the Snapshots Information attributes page (see 7.1.3.30) of the clone partition have any of the following properties:

    a) The partition type attribute contains a value other than 02h (i.e., clone partition); or
    b) The source partition attribute is undefined (see 3.1.51).; or
    c) The create completion time attribute is undefined (see 3.1.51) and the refresh completion time attribute is undefined.

The command shall be terminated with CHECK CONDITION status, with the sense key set to ILLEGAL REQUEST and the additional sense code set to COMMAND SEQUENCE ERROR, if any of the following are true:

    a) The specified partition is the destination for an active or interrupted CREATE CLONE command (see 6.7);
    b) The specified partition is the destination for an active or interrupted REFRESH SNAPSHOT OR CLONE command (see 6.30); or
    c) The specified partition is the main partition for an active RESTORE PARTITION FROM SNAPSHOT command (see 6.35).

{{These changes can be found in OSD-2 r04d and later.}}

{{Clone partitions are not snapshot partitions, so interlocking with the CREATE SNAPSHOT command is not a concern.}}

{{Removed partitions do not exist and as such generate errors elsewhere in the DETACH CLONE command processing, so interactions with the REMOVE PARTITION command are not a concern.}}

Other 15) REFRESH SNAPSHOT OR CLONE command interlocking

4.30 REFRESH SNAPSHOT OR CLONE

…

4.30.2 Processing before the IMMED_TR bit takes effect

… {{The following additions and deletions are recommended.}}

No additional object duplications shall occur and the command shall be terminated with GOOD status, if any of the following are true about the destination partition:

a) The destination partition is the destination partition for an active CREATE CLONE command (see 6.7);
b) The destination partition is the destination partition for an active CREATE SNAPSHOT command (see 6.10); or
c) The destination partition is the destination partition for an active REFRESH SNAPSHOT OR CLONE command.

Interrupted object duplications shall be restarted, if any of the following are true about the destination partition:

a) The destination partition is the destination partition for an interrupted CREATE CLONE command (see 6.7);
b) The destination partition is the destination partition for an interrupted CREATE SNAPSHOT command (see 6.10); or
c) The destination partition is the destination partition for an interrupted REFRESH SNAPSHOT OR CLONE command.

The command shall be terminated with CHECK CONDITION status, with the sense key set to ILLEGAL REQUEST and the additional sense code set to COMMAND SEQUENCE ERROR, if all of the following are true:

a) The source partition is the main partition for an active RESTORE PARTITION FROM SNAPSHOT command (see 6.35); and
b) The destination partition is the snapshot partition for the same RESTORE PARTITION FROM SNAPSHOT command.

If the source partition is the main partition for an unrelated active RESTORE PARTITION FROM SNAPSHOT command, the command may be terminated with CHECK CONDITION status, with the sense key set to ILLEGAL REQUEST and the additional sense code set to COMMAND SEQUENCE ERROR.

~~If the active command status attribute is not set to zero in the Command Tracking attributes page (see 7.1.3.20) in snapshot/clone tracking well known collection (see 4.6.6.5.3) for the destination partition, then the command shall be terminated with CHECK CONDITION status, with the sense key set to ILLEGAL REQUEST and the additional sense code set to INVALID FIELD IN CDB.~~

{{These changes can be found in OSD-2 r04d and later.}}

{{A detached partition resulting from a DETACH CLONE command, is a primary partition and as such generates errors elsewhere in REFRESH SNAPSHOT OR CLONE processing.}}

{{Removed partitions do not exist and as such generate errors elsewhere when a REFRESH SNAPSHOT OR CLONE command references them as a destination partition and source partitions must have children which means they cannot be removed, so interactions with the REMOVE PARTITION command are not a concern.}}

Symantec 14) REMOVE PARTITION command interlocking

4.34 REMOVE PARTITION

… {{The following additions are recommended.}}

Duplication of data to the specified partition shall be aborted if any of the following are true:

a) The specified partition is the destination for an active or interrupted CREATE CLONE command (see 6.7);
b) The specified partition is the destination for an active or interrupted CREATE SNAPSHOT command (6.10); or
c) The specified partition is the destination for an active or interrupted REFRESH SNAPSHOT OR CLONE command (see 6.30).

The command shall be terminated with CHECK CONDITION status, with the sense key set to ILLEGAL REQUEST and the additional sense code set to COMMAND SEQUENCE ERROR, if any of the following are true:

a) The specified partition is being processed by a DETACH CLONE command (see 6.12); or
b) The specified partition is being used as the snapshot partition by a RESTORE PARTITION FROM SNAPSHOT command (see 6.35).

GOOD status shall not be returned …

{{The changes shown above should precede those shown in comment Other-16 (see 08-380r1).}}

{{These changes can be found in OSD-2 r04d and later.}}

{{Interlocking problems with the REMOVE PARTITION command were ignored in OSD-2 r04, so no existing text needs to be excised. In many cases the problems cannot arise because REMOVE PARTITION returns an error unless the specified partition has no snapshot or clone children.}}

Symantec 18) RESTORE PARTITION FROM SNAPSHOT command interlocking

4.35 RESTORE PARTITION FROM SNAPSHOT

… {{The following additions and deletions are recommended.}}

4.35.1 Introduction

…

The SNAPSHOT PARTITION_ID field contains the Partition_ID (see 4.6.4) of the snapshot partition for the RESTORE PARTITION FROM SNAPSHOT command.

~~If the source partition attribute in the Snapshots Information attributes page (see 7.1.3.30) of the snapshot partition is undefined (see 3.1.51), 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 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, if any of the following are true:

   a)   The partition specified by the SNAPSHOT PARTITION_ID field does not exist;
   b)   Any of the following are true about the attributes in the Snapshots Information attributes page (see 7.1.3.30) for the partition specified by the SNAPSHOT PARTITION_ID field:
        A)   The partition type attribute does not contain 01h (i.e., snapshot partition); or
        B)   The source partition attribute is undefined (see 3.1.51).

{{These changes can be found in OSD-2 r04d and later.}}

{{Item a) was overlooked when the Partition_ID field was not named PARTITION_ID. Item A) comes from the deleted text in 6.35.2 below. Item B) comes from the deleted text above.}}

…

4.35.2 Processing before the IMMED_TR bit takes effect

~~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, if attributes in the Snapshots Information attributes page (see 7.1.3.30) of the snapshot partition have any of the following properties:~~

   ~~a)   The partition type attribute contains a value other than 01h (i.e., snapshot partition);~~
   ~~b)   The create completion time attribute is undefined (see 3.1.51) and the refresh completion time attribute is undefined.~~

The command shall be terminated with CHECK CONDITION status, with the sense key set to ILLEGAL REQUEST and the additional sense code set to COMMAND SEQUENCE ERROR, if any of the following are true about the source partition:

   a)   The snapshot partition is the destination partition for an active or interrupted CREATE SNAPSHOT command (see 6.10);
   b)   The snapshot partition is the destination partition for an active or interrupted REFRESH SNAPSHOT OR CLONE command (see 6.30); or

    c)   The main partition is the main partition for another RESTORE PARTITION FROM SNAPSHOT command.

{{These changes can be found in OSD-2 r04d and later.}}

{{Since clone partitions cannot participate in RESTORE PARTITION FROM SNAPSHOT commands, interlocking with the CREATE CLONE command and DETACH CLONE command is not a concern.}}