**********DEPRECATED**********

This document has been deprecated and should no longer be used. Reference the DFSMS Object Access Method Planning, Installation, and Storage Administration Guide for Object Support publication for the latest information on OAM's Cloud and File System Backup support.

********** DEPRECATED **********

Externals
(SPE OA59615)
OAM Cloud and File System Backup
PTFs V2R3 and V2R4
Base V2R5

Document Name:	OAM-Cloud-FS-Backup-Externals.docx
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Version:	V1.1

Note: Throughout this document, **red text** indicates the additions or changes for this support shown in the context of the current text for existing support. **Also refer to OA55700 for the initial OAM cloud support.**

Version	Date	Change Description	Revision Tag
1.0	03/24/2020	Initial version	None - this replaces earlier versions
1.1	01/27/2022	***Deprecated***	*None – no updates were made to content. Only added the deprecation statement to the front of the document to indicate this document should no longer be used.*

Table of Contents

1 Overview 3
1.1 Overview of the Support 3
1.2 Application Changes 3
1.3 Technical Overview 3
2 Platform Considerations 5
2.1 Installation Considerations 5
2.2 Migration Actions 5
2.3 Coexistence, Toleration and Fallback Considerations 5
2.4 Performance Considerations 5
2.5 Security/System Integrity Considerations 5
3 Functional Characteristics 6
3.0 Overview 6
3.0.1 New cloud and file system backup level 9
3.0.2 PARMLIB Statements 9
3.0.3 DB2 Databases 11
3.0.4 Operator Commands 11
3.0.5 Application Programming 13
3.0.6 OSMC Functions and Utilities 14
3.0.7 SMF 85 Record 15
3.0.8 IPCS Support 37
3.1 APIs, Callable Services, and Macros 38
3.2 Commands 38
3.3 System Library Updates (PARMLIB, PROCLIB, SAMPLIB, etc.) 38
3.4 Diagnostic Aids 38
3.4.1 System Completion Code 38
3.4.2 SMF Records 38
3.5 Messages 38
3.5.1 CBR0428I (Changed / Explanation Only) 38
3.5.2 CBR0429I (Changed / Explanation Only) 39
3.5.3 CBR0448I (New) 39
3.5.4 CBR0449I (New) 40
3.5.5 CBR1297I (New) 40
3.5.6 CBR1315D (New) 41
3.5.7 CBR1316I (New) 42
3.5.8 CBR1317I (New) 42
3.5.9 CBR1318I (New) 42
3.5.10 CBR6502I (Changed) 43
3.5.11 CBR6503I (Changed) 43
3.5.12 CBR6522I (Changed) 44
3.5.13 CBR9123I (Changed) 44

1 Overview

1.1 Overview of the Support

The following is an overview of the support provided:

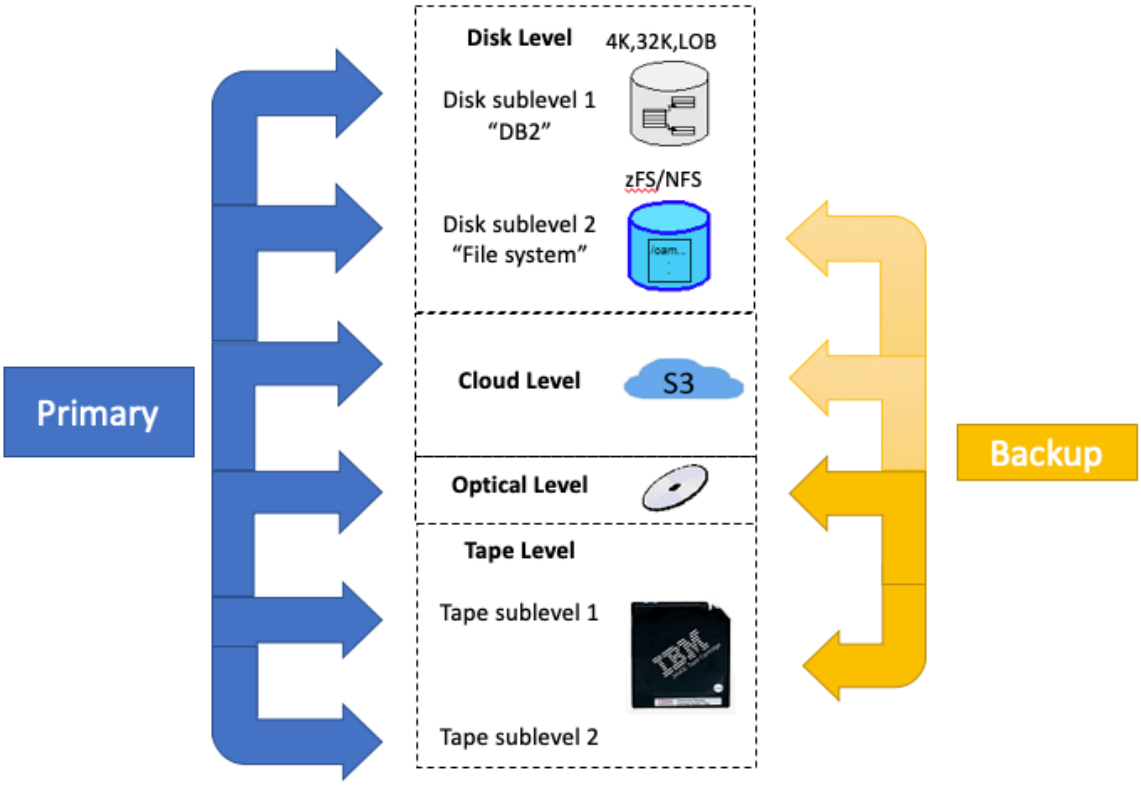
1. Ability to store immediate backup copies of OAM objects on cloud storage and file system storage in addition to removable media storage (optical or tape) today.
2. Ability for OSMC storage management cycle function to create and manage backup copies on cloud storage and file system storage in addition to removable media storage (optical or tape) today.
3. Ability to retrieve backup copies of an object by using OSREQ RETRIEVE command and using the Auto Access to Backup facility from cloud storage and file system storage.
4. Ability to delete the associated backup copies from cloud storage and file system storage when a primary object is being deleted by using OSREQ DELETE command.
5. Single object recovery from backup copies on cloud or file system.
6. Volume recovery utility can recover volumes containing primary objects from backup copies on cloud and file system. It can recover backup volumes to new backup location of cloud or file system.
7. MOVEVOL utility can move a backup volume to a new backup location of cloud or file system.
8. New display cloud task and cloud task cancel operator commands can be used to display cloud task information and cancel a cloud task.

1.2 Application Changes

The ability to support OAM managed backups on cloud and file system and OAM's integration with SMS policies result in no requirement for application updates/changes to utilize the new support.

1.3 Technical Overview

OAM will now allow backup copies to be made to the cloud and file system storage layers in addition to the existing support for removable medias (optical and tape). Refer to OA55700 for the initial OAM Cloud support.



All backup related OSMC functions currently available for optical and tape level backups will also be supported for backups on the cloud and file system levels.

New keywords have been added in the CBROAMxx member of PARMLIB to indicate the backup location (tape/optical, file system, or cloud) for a backup storage group. Some existing statements in the same member have also been enhanced to allow setup of cloud and file system backup storage groups.

Operator command keywords and output from display commands have been updated to accommodate the new and changed statements in the CBROAMxx member of PARMLIB. A new display cloud task operator command and task cancel operator command have also been added.

New messages have been implemented and existing messages have been updated to accommodate backups to cloud and file system.

Some existing SMF records type 85 subtypes have been updated to record additional information for backups to cloud and file system.

2 Platform Considerations

2.1 Installation Considerations

To enable this function, customers will need to:

- Have APAR OA55700 Cloud as a Tier installed. This support (APAR OA59615) will pre-REQ that APAR. For the initial file system support delivered in z/OS V1R13, refer to the OAM Planning Installation, and Storage Administration Guide for Object Support publication (SC23-6866).
- Ensure the file system and/or cloud tiers are properly configured and enabled.
- Add a BACKUPTIER keyword to the SETOSMC statement in the CBROAMxx member of SYS1.PARMLIB to specify the desired storage tier for a backup storage group. Add a SETDISK and/or SETCLOUD statement for the desired backup storage group.
- Optionally modify SETOPT in the CBROAMxx member of SYS1.PARMLIB to configure Automatic Access to Backup for newly supported backup tiers.

2.2 Migration Actions

There are no migration actions specific to this support, but as is the case with all new releases (and some PTFs), the DB2 database administrator must run the installation tailored BIND jobs as described in "Chapter 3. Migrating, Installing, and Customizing OAM" in the z/OS DFSMS OAM Planning, Installation, and Storage Administration Guide for Object Support publication.

2.3 Coexistence, Toleration and Fallback Considerations

This support will be available as an SPE on z/OS V2R3 and V2R4, and part of the base of V2R5. It will not be rolled back to any prior releases. There is no coexistence support needed for this support.

Note: The full support of cloud and file system backup must be applied to all systems in an OAMplex before enabling and using backups on cloud or file system on any system in an OAMplex.

2.4 Performance Considerations

The performance of storing backup copies to cloud or file system does not significantly differ from the performance of storing primary objects to cloud or file system.

2.5 Security/System Integrity Considerations

There are no changes to existing z/OS security characteristics for OAM with this support. See APAR OA55700 for security considerations related to OAM's cloud support.

3 Functional Characteristics

3.0 Overview

The following table provides a brief description of the changes to the functional characteristics within the OAM component.

Existing Environment	New Environment
GENERAL	
The OAM object backup storage levels: - Tape - Optical (supported only in a classic OAM configuration)	The OAM object backup storage levels will include cloud level and file system level with this support: - Cloud - File system - Tape - Optical (supported only in a classic OAM configuration)
PARMLIB	
The existing SETOSMC statement in the CBROAMxx member of PARMLIB doesn't include a keyword to specify backup locations for backup storage groups.	The existing SETOSMC statement in the CBROAMxx member of PARMLIB will have a new keyword to specify the backup location.
The existing SETDISK and SETCLOUD statements in the CBROAMxx member of PARMLIB do not allow object backup storage group to be specified since file system and cloud levels can only be used for the storage of primary copies of an object.	The existing SETDISK and SETCLOUD statements in the CBROAMxx member of PARMLIB will allow object backup storage groups to be specified.
OAM DATABASES / DB2	
The existing OAM DB2 Object Directory Table fields: ODBKLOC (CHAR(6)): optical or tape volume serial number for first object backup copy. ODBK2LOC (CHAR(6)): optical or tape volume serial number for second object backup copy. ODBKSEC (INTEGER): location token (optical volume sector number or tape block ID) for first object backup copy. ODBK2SEC (INTEGER): location token (optical volume sector number or tape volume block ID) for second object backup copy.	The existing OAM DB2 Object Directory Table fields: ODBKLOC (CHAR(6)): - optical or tape volume serial number - cloud location indicator ' C' + CLOUDID - file system location indicator ' E' + '0000' for first object backup copy. ODBK2LOC (CHAR(6)): - optical or tape volume serial number - cloud location indicator ' C' + CLOUDID - file system location indicator ' E' + '0000' for second object backup copy. ODBKSEC (INTEGER): location token (optical

	volume sector number or tape block ID) or cloud/ file system instance ID for first object backup copy. ODBK2SEC (INTEGER): location token (optical volume sector number or tape volume block ID) or cloud/ file system instance ID for second object backup copy.
OPERATOR COMMANDS	
The existing 'F OAMx,START,OBJRECV…', 'F OAMx,START,RECOVERY…', and 'F OAMx,START,MOVEVOL…' commands that start the Single Object Recovery, Volume Recovery, and MOVEVOL OSMC utilities work with backup location of tape or optical levels (classic OAM configuration only) of the OAM storage hierarchy.	The existing 'F OAMx,START,OBJRECV…', 'F OAMx,START,RECOVERY…', and 'F OAMx,START,MOVEVOL…' commands that start the Single Object Recovery, Volume Recovery, and MOVEVOL OSMC utilities work with a new backup location of cloud or file system level in addition to tape or optical levels (classic OAM configuration only) of the OAM storage hierarchy.
The existing 'F OAMx,DISPLAY,SETOSMC…' command displays the current supported keywords in the SETOSMC statement in the CBROAMxx member of PARMLIB on both storage group level and global level.	The existing 'F OAMx,DISPLAY,SETOSMC…' command displays the current supported keywords plus the new keyword BACKUPTIER in the SETOSMC statement in the CBROAMxx member of PARMLIB on storage group level.
N/A	A new command 'F OAMx,DISPLAY,CLOUD,TASK' has been added to display information for each cloud task.
N/A	A new command 'F OAMx,CANCEL,TASK,*taskname*' has been added to cancel a task with the specified task name. This command can only cancel a cloud task.
APPLICATION PROGRAMMING	
The existing OSREQ API can be used to store a primary object with an immediate backup copy storing to tape level or optical level (classic OAM configuration only) of the OAM storage hierarchy.	The existing OSREQ API can be used to store a primary object with an immediate backup copy storing to file system level or cloud level in addition to the existing tape level or optical level (classic OAM configuration only) of the OAM storage hierarchy.
The existing OSREQ API can be used to automatically access backup copies from tape level or optical level (classic OAM configuration only) of the OAM storage hierarchy when the primary copy of an object cannot be retrieved, and one or two backup copies exist. A "VIEW=BACKUP/VIEW=BACKUP2" option can be used during a RETRIEVE to retrieve the first/second backup copy from tape level or optical level (classic OAM configuration only) of the OAM storage hierarchy.	The existing OSREQ API can be used to automatically access backup copies from file system level and cloud level in addition to tape level or optical level (classic OAM configuration only) of the OAM storage hierarchy when the primary copy of an object cannot be retrieved, and one or two backup copies exist. A "VIEW=BACKUP/VIEW=BACKUP2" option can be used during a RETRIEVE to retrieve the first/second backup copy from file system level or cloud level in addition to the existing tape level or optical level (classic OAM configuration only) of the OAM storage hierarchy.
The existing OSREQ QUERY function obtains descriptive information about an object within a collection.	The existing OSREQ QUERY function obtains descriptive information including newly added first backup location and second backup location

	information about an object within a collection.
The existing OSREQ DELETE function removes an object from the object storage hierarchy including the primary object data and backup copies of data stored on optical or tape storage.	The existing OSREQ DELETE function removes an object from the object storage hierarchy including the primary object data and backup copies of data stored on cloud and file system in addition to optical or tape storage.
OSMC FUNCTIONS AND UTILITES	
The existing OSMC storage management cycle processing and storage group processing manage backup copies on tape level and optical level (classic OAM configuration only) of the OAM storage hierarchy.	The existing OSMC storage management cycle processing and storage group processing manage backup copies on file system level and cloud level in additional to tape level and optical level (classic OAM configuration only) of the OAM storage hierarchy.
The existing Single Object Recovery utility recovers a single primary object from a backup copy resided in optical level (classic OAM configuration only) or tape level of the OAM storage hierarchy.	The existing Single Object Recovery utility recovers a single primary object from a backup copy resided in file system level or cloud level in additional to optical level (classic OAM configuration only) or tape level of the OAM storage hierarchy.
The existing Volume Recovery utility recovers the objects on a primary volume (optical or tape) with the backup copies (resided on optical or tape) or the objects on a backup volume (optical or tape) with the primary copies (residing on any level of the storage hierarchy).	The existing Volume Recovery utility recovers the objects on a primary volume (optical or tape) with the backup copies (resided on optical, tape, cloud or file system). It also recovers the objects on a backup volume (optical or tape) using the primary copies (residing on any level of the storage hierarchy) with the new backups being written to the backup tier currently associated with the backup storage group. This can result in the recovery of the backups residing in a different storage tier.
The existing MOVEVOL utility is used to move objects from a primary or backup source volume to one or more target volume.	The existing OSMC MOVEVOL utility is used to move objects from a primary or backup source volume to one or more target volumes. In addition, objects from a backup source volume can be moved to the backup location of cloud or file system as a target.
SMF	
The existing OAM SMF records include a number of subtypes to provide information about the processing in the OSR, OSMC, and LCS components of OAM.	The existing OAM SMF records will include changes to existing fields and new fields associated with the new cloud and file system backup support are added within several existing subtypes to provide information about the processing in the OSR, OSMC, and LCS components of OAM.
IPCS	
The existing OAM “VERBEXIT OAMDATA…” IPCS command can be used to display OAM control block data.	The existing OAM “VERBEXIT OAMDATA…” IPCS command will be updated to also display data related to the new cloud and file system backup support.

3.0.1 New cloud and file system backup level

This APAR provides support for object backup copies to be written to the cloud and file system level of the OAM storage hierarchy. With this support, the OAM object backup levels will include:

- Disk sublevel 2 (file system level)
- Disk sublevel 3 (cloud level)
- Tape level
- Optical level

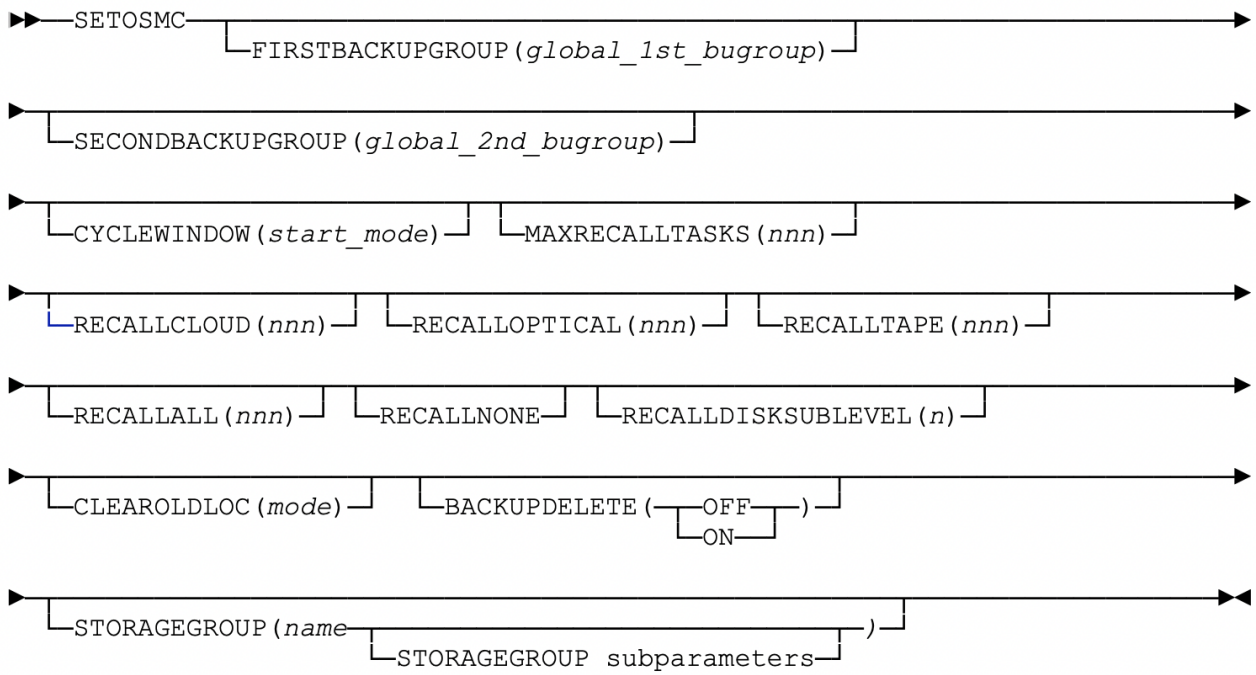
3.0.2 PARMLIB Statements

3.0.2.1 **SETOSMC Statement in CBROAMxx Member of PARMLIB:**

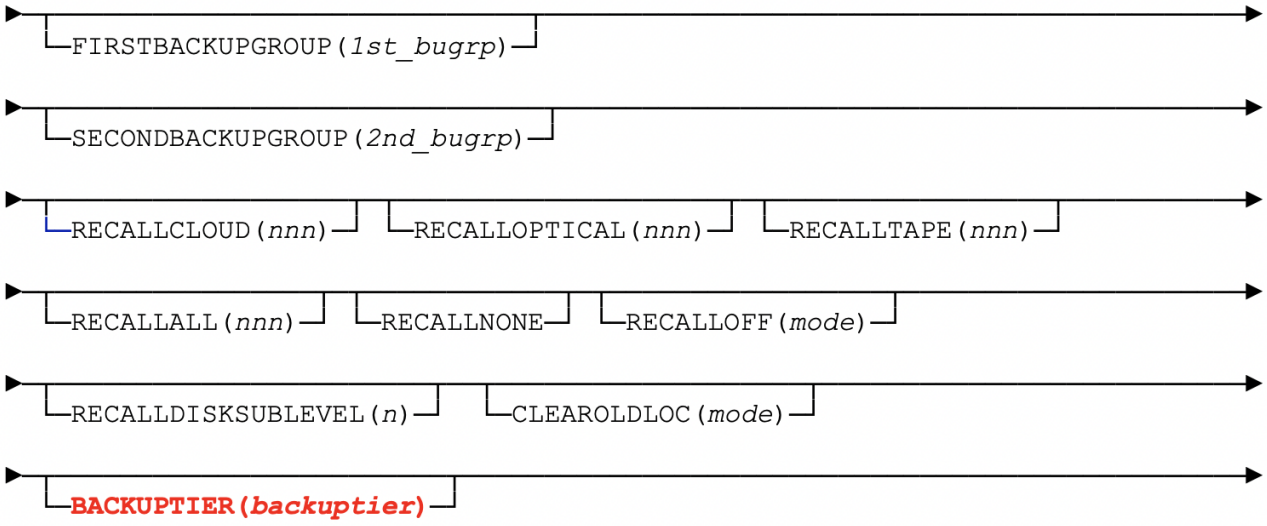
A new keyword BACKUPTIER is added to the SETOSMC statement to specify which object storage tiers the object backups are directed to for a backup storage group. Object storage tier values that can be specified with the new BACKUPTIER keyword are “TAPEOPT” for tape tier or optical tier (classic OAM configuration only) which is also the default value, “FS” for the file system tier, and “CLOUD” for the cloud tier.

The syntax for the SETOSMC statement with the new keyword is as follow:

SETOSMC Keyword Definitions:



STORAGEGROUP subparameters



The definition of the **STORAGEGROUP** keyword is modified as follows to reflect the new STORAGEGROUP subparameter added in this cloud and file system backup support:

STORAGEGROUP(*name***)**

Specifies the name of an object storage group that was previously defined using ISMF. If it is a primary object storage group, this is the name of the storage group to which the following subparameters apply:

FIRSTBACKUPGROUP(*1st_bugrp***)**

…

SECONDBACKUPGROUP(*2nd_bugrp***)**

…

…

If it is a backup storage group, this is the name of the backup storage group to which the following subparameters apply:

BACKUPTIER(*backuptier***)**

Specifies the backup storage tier to be used for this backup storage group. Valid values for *backuptier* are:

TAPEOPT

For tape tier or optical tier (classic OAM configuration only) which is also the default tier.

FS

For file system tier.

CLOUD

For cloud tier.

3.0.2.2 SETDISK and SETCLOUD statements

The disk sublevel 2 (file system level) and the disk sublevel 3 (cloud level) of OAM storage hierarchy can not only be used for the storage of the primary copy of an object, but also the storage of the backup copies of an object, therefore an object backup storage group will be allowed to be specified on the SETDISK and

SETCLOUD statements.

Note: The SETDISK and SETCLOUD statements specified at the global level will also implicitly apply to backup storage groups.

3.0.3 DB2 Databases

3.0.3.1 Object Storage Database – Object Directory Table

The Object Directory Table in the OAM Object Storage Database contains descriptive information for each OAM object. Although the columns within the Object Directory Table are not changing, the *contents* for several of the columns are changing for the cloud and file system backup support.

ODBKLOC

The backup location indicator for first object backup copy (ODBKLOC) indicates the backup location/storage tier for the first object backup copy. Two new location formats will be added to indicate a cloud backup location and a file system location as below:

- optical or tape volume serial number
- cloud location indicator ‘ C’ + CLOUDID
- file system location indicator ‘ E’ + ‘0000’

ODBK2LOC

The backup location indicator for second object backup copy (ODBK2OC) indicates the backup location/storage tier for the second object backup copy. Two new location formats will be added to indicate a cloud backup location and a file system location as below:

- optical or tape volume serial number
- cloud location indicator ‘ C’ + CLOUDID
- file system location indicator ‘ E’ + ‘0000’

ODBKSEC

The backup location token for the first object backup copy (ODBKSEC) can indicate the optical volume sector number for an optical backup copy or tape block ID for a tape backup copy. Two new backup location token values will be added to indicate cloud/ file system instance ID for a cloud or file system backup copy.

ODBK2SEC

The backup location token for the second object backup copy (ODBK2SEC) can indicate the optical volume sector number for an optical backup copy or tape block ID for a tape backup copy. Two new backup location token values will be added to indicate cloud/ file system instance ID for a cloud or file system backup copy.

3.0.4 Operator Commands

3.0.4.1 Starting Object Recovery for Single Objects, Volume Recovery, MOVEVOL commands

Additional functionality has been added to the following three commands. There are no syntax changes.

```
F oam,START,OBJRECV,collection-name,object-name[,BACKUP1|BACKUP2]
```

This command starts the Single Object Recovery utility for recovering a single object from a backup copy of the object (either from optical or tape), if any exist. One can select whether to use the first or second backup copy of the object for recovery by specifying BACKUP1or BACKUP2 on the F oam,START,OBJRECV command. The new cloud and file system backup support will add two new backup locations (cloud and file system) that the Single Object Recovery utility can recover a single object from.

```
F oam,START,RECOVERY,volser[,BACKUP1|BACKUP2][,DELETE]
```

This command starts the Volume Recovery utility for recovering a primary or backup volume. One can select whether to use the first or second backup copy for recovering a primary volume by specifying BACKUP1 or BACKUP2 on the F oam,START,RECOVERY command. The new cloud and file system backup support will add support of recovering a primary volume with backup on cloud or file system and recovering a backup volume to cloud or file system as a new backup location.

To recover a backup volume to cloud or file system, setup the SETOSMC BACKUPTIER keyword for the backup storage group of the target volume that needs to be recovered so that the backups will be directed to cloud and file system, then issue this command against the target volume.

```
F oam,START,MOVEVOL,volser[,RECYCLE|DELETE]
```

This command starts the MOVEVOL utility for migrating objects from a primary or backup source volume to one or more target volumes, or to delete a scratch volume from the OAM inventory. The new cloud and file system backup support will add support of moving a backup volume to a new backup location of cloud or file system.

To move a backup volume to cloud or file system, setup the SETOSMC BACKUPTIER keyword for the backup storage group of the target volume that needs to be moved so that the backups will be directed to cloud and file system, then issue this command against the target volume.

3.0.4.2 **Displaying SETOSMC Command**

The existing operator command F oam,DISPLAY will display the current setting of the SETOSMC statement at either storage group level or global level for the OAM address space. With the new cloud and file system backup support, if this SETOSMC command is issued for a backup storage group, the new SETOSMC keyword BACKUPTIER with potential keyword values “TAPEOPT”, “CLOUD”, and “FS” will be displayed as shown in the following example:

…

```
CBR1075I SBACKUP value for BACKUPTIER is CLOUD
```

…

Note: if no BACKUPTIER keyword is specified in SETOSMC statement, the default value “TAPEOPT” will be displayed within the output for SETOSMC as shown below:

…

```
CBR1075I SBACKUP value for BACKUPTIER is TAPEOPT
```

…

Note: The new BACKUPTIER keyword will not be displayed within the output for a primary object storage group. In addition, all SETOSMC keywords that are not applicable to a backup storage group will no longer be displayed within the output for a backup storage group.

3.0.4.3 Displaying Cloud Task Command

A new operator command “F OAMx,DISPLAY,CLOUD,TASK” displays the cloud task information including the task name and the task address using new message CBR1297I.

3.0.4.4 Task Cancel Command

A new operator command “F OAMx,CANCEL,TASK,*taskname*” can be used to cancel a task with the specified task name *taskname*.

Note:

- This command can only cancel a cloud task. If a non-cloud-task is specified, the task cancel request will be rejected with a new message CBR1318I.
- Before issuing this command, verify that the task cancelation is intended. The issuance of this command is to avoid having to cancel the entire OAM address space if only one task is under an abnormal situation and needs to be canceled. Any work being processed by the canceling task may be lost and unexpected results could occur.

If the command is issued with a valid cloud task, a new message CBR1315D will be issued to confirm the task cancel request. Once the operator confirms the request and the cloud task has been canceled without any error, a new message CBR1317I will be issued to inform the operator the task has been successfully canceled.

3.0.5 Application Programming

3.0.5.1 OSREQ Support for Cloud and File System Backup

OSREQ STORE with IMMEDIATE BACKUP

Currently the OSREQ application programming interface can be used to write an immediate backup copy of a primary object to the tape or optical (classic OAM configuration only) storage tier of the OAM storage hierarchy when the primary object is being stored. With the cloud and file system backup support, the immediate backup copy can be written to two additional storage tiers cloud and file system of the OAM storage hierarchy. No changes are needed to the OSREQ syntax. The immediate backup function is enabled by management class attribute AUTO BACKUP and BACKUP FREQUENCY. The new SETOSMC keyword BACKUPTIER specified under a backup storage group in the CBROAMxx PARMLIB member will determine which storage tier the immediate backup copy is directed to.

OSREQ RETRIEVE with AUTOMATIC ACCESS TO BACKUP

Currently on an object retrieval request issued by OSREQ application programming interface, if the primary copy of the object is unavailable for some specific reasons (DB2ERROR, FSERROR, LOST, etc.) and the automatic access to backup function is enabled by SETOPT statement or F oam,START,AB operator command on those reasons, OAM retrieves the object data from the first or second backup copy that is resident on tape or optical (classic OAM configuration only) storage tier of OAM storage hierarchy. With the cloud and file system backup support, cloud and file system storage tiers will be added to the backup storage tiers that the automatic access to backup function can access backups from.

With this support, on an OSREQ RETRIEVE request, VIEW(BACKUP) and VIEW(BACKUP2) keywords can be used to retrieve the first or second backup copy from the cloud and file system storage tiers in addition to tape and optical (classic OAM configuration only) storage tiers.

OSREQ QUERY Function

The existing OSREQ QUERY function obtains descriptive information about an object within a collection. With the new cloud and file system backup support, the first backup location and the second backup location information will be added to the output of OSREQ QUERY function.

Note: the backup retrieve key and backup2 retrieve key fields for an object that has backup copies on cloud or file system will be filled with binary zeros.

OSREQ DELETE Function

The existing OSREQ DELETE function removes an object from the object storage hierarchy including the primary object data stored on disk sublevel 1 (DB2), disk sublevel 2 (file system), disk sublevel 3 (cloud), optical, tape sublevel 1, or tape sublevel 2, and backup copies of data stored on optical or tape storage. With the new cloud and file system backup support, the OSREQ DELETE function will be able to remove backup copies residing on the cloud and file system level along with the primary object being removed.

3.0.5.2 OSREQ New Return/Reason Codes for Cloud and File System Backup Support

There are no new OSREQ return or reason codes for this cloud and file system backup support.

3.0.6 OSMC Functions and Utilities

3.0.6.1 OSMC Storage Management Cycle/Storage Group Processing

The OSMC storage management cycle processing and storage group processing are responsible for creating up to two backup copies or deleting backup copies if needed of primary objects that reside in the disk sublevel 1 (DB2), disk sublevel 2 (file system), disk sublevel 3 (cloud), tape level, or optical level of the OAM storage hierarchy as specified in the SMS management class. Currently OSMC can manage backup copies on tape or optical (classic OAM configuration only) storage tier of the OAM storage hierarchy.

With the cloud and file system backup support, OSMC storage management cycle processing can also create and delete backup copies on cloud and file system storage tiers of the OAM storage hierarchy.

3.0.6.2 OSMC Utilities

OSMC Single Object Recovery

The OSMC Single Object Recovery utility is used to recover a single primary object residing in the disk sublevel 1 (DB2), disk sublevel 2 (file system), disk sublevel 3 (cloud), tape level, or optical level (Classic OAM configuration only) of the OAM storage hierarchy. The utility reads one of the backup copies of the object on either the tape level or the optical level (Classic OAM configuration only) and stores a new primary copy in the desired level.

With the cloud and file system backup support, the OSMC Single Object Recovery utility can read one of the backup copies of the recovering primary object also from the cloud or file system storage level and store a new primary copy in the desired level.

OSMC Volume Recovery

The OSMC Volume Recovery utility is used to recover an entire primary volume (optical or tape) or an entire

backup volume (optical or tape).

In the case of recovery for a primary volume, the OSMC Volume Recovery utility reads a backup copy of each object on the volume to be recovered and writes the objects to a new primary volume. Currently the backup copy can be read from the optical level (Classic OAM configuration only) or the tape level in the OAM storage hierarchy. With the cloud and file system backup support, the OSMC Volume Recovery utility can read the backup copies from the cloud and the file system as well and write the objects to a new primary volume.

In the case of recovery for a backup volume, the OSMC Volume Recovery utility reads the primary copy of each object on the volume to be recovered and writes a new backup copy of the objects to a new backup volume. With the cloud and file system support, the new backup copy of the objects can also be written to the cloud and file system in addition to a new backup volume.

OSMC MOVEVOL

The OSMC MOVEVOL utility is used to move objects from a primary or backup source volume to one or more target volumes. With the cloud and file system backup support, objects from a backup source volume can be moved to the backup location of cloud or file system as a target in addition to a target volume.

3.0.7 SMF 85 Record

OAM issues SMF records with type 85 and many subtypes to provide information about the processing within the OSR, OSMC, and LCS components of OAM.

3.0.7.1 OAM SMF Record Subtypes

The following table identifies the changes to the size of the existing SMF record subtypes in OSR and OSMC as well as changes to the content being provided.

Record Subtype	Record Size	Description
1	388	OSREQ Access
2	388	OSREQ Store
3	388	OSREQ Retrieve
4	388	OSREQ Query
5	388	OSREQ Change
6	388	OSREQ Delete
7	388	OSREQ Unaccess
8	388	OSREQ STOREBEG
9	388	OSREQ STOREPRT
10	388	OSREQ STOREEND
32	992	OSMC Storage Group Processing
33	992	OSMC DASD Space Management
34	992	OSMC Volume Recovery Utility
35	992	OSMC Move Volume Utility
36	302	OSMC Single Object Recovery Utility
37	184	OSMC Library Space Management

38	290	OSMC Single Object Recall Utility
39	300	OSMC Immediate Backup
40	428	OSMC Tape Recycle
64	256	LCS Optical Drive Vary Online
65	256	LCS Optical Drive Vary Offline
66	256	LCS Optical Library Vary Online
67	256	LCS Optical Library Vary Offline
68	284	LCS Optical Cartridge Entry
69	284	LCS Optical Cartridge Eject
70	284	LCS Optical Cartridge Label
71	284	LCS Optical Volume Audit
72	284	LCS Optical Volume Mount
73	284	LCS Optical Volume Demount
74	variable (min =416, max = 32 664)	LCS Optical Write Request
75	416	LCS Optical Read Request
76	416	LCS Optical Logical Delete Request
77	variable (min =416, max = 32 664)	LCS Optical Physical Delete Request
78	variable (min =416, max = 32 664)	LCS Object Tape Write Request
79	416	LCS Object Tape Read Request
87	228	LCS Object Tape Volume Demount (OAM usage)
88	416	LCS Object Tape Logical Delete Request
90	324	LCS File System Write Request
91	324	LCS File System Read Request
92	324	LCS File System Physical Delete Request
93	324	LCS File System Physical Delete Request (Uncommitted Application Store Cleanup)
100	300	LCS Cloud Write Request
101	300	LCS Cloud Read Request
102	300	LCS Cloud Physical Delete Request
103	300	LCS Cloud Physical Delete Request (Uncommitted Application Store Cleanup)

3.0.7.2 OSREQ Activity (Subtypes 1-10)

For OSR, the cloud and file system support will set new bits in the existing records for subtypes 1-10. For subtypes 3 (RETRIEVE) and 6 (DELETE), new flags will be added to ST3FLGS and ST6FLGS respectively to indicate that actions were taken on cloud and file system backup as shown in the following table.

OFFSETS	NAME	LENGTH	FORMAT	DESCRIPTION
0 0	ST1COLN	44	EBCDIC	Collection name. Valid for subtypes 2, 3, 4, 5, 6, 8, 9, and 10.
44 2C	ST1OBJN	44	EBCDIC	Object name. Valid for subtypes 2, 3, 4, 5, 6, 8, 9, and 10.
88 58	ST1SGN	8	EBCDIC	Storage group name. Valid for subtypes 2, 3, 4, 5, 6, 8, 9, and 10.

96 60	ST1SCN	8	EBCDIC	Storage class name. Valid for subtypes 2, 4, 5, 8, 9, and 10.
104 68	ST1MCN	8	EBCDIC	Management class name. Valid for subtypes 2, 4, 5, 8, 9, and 10.
112 70	ST1OFF	4	binary	Offset for both partial object retrieve (subtype 3), and object store part (subtype 9). Zero for all others.
116 74	ST1LEN	4	binary	Length. Valid for subtypes 2, 3, 4, 6, 8, 9, and 10. **SUBTYPE MEANING** **1** Unused, contains binary zero. **2** Length of object stored. **3** Number of bytes retrieved. **4** Number of QEL elements returned to the application program. **5** Unused, contains binary zero. **6** Length of object deleted. **7** Unused, contains binary zero. **8** Total object length in bytes. **9** Length in bytes of the part of the object to be stored. **10** Total object length in bytes to complete storage of the object.
120 78	ST1TTOK	16	binary	OSREQ tracking token supplied with TTOKEN keyword on the OSREQ macro. Note: Any application programs that want to use the new TTOKEN keyword interface need to be recompiled with the new OSREQ macro.
136 88	ST1TOK	8	binary	OSREQ token.
144 90	ST1VSN	6	EBCDIC	Volume serial number. Valid for subtypes 2, 3, and 6. For an OSREQ STORE request (subtype 2), this field contains the volume serial number of the tape or optical volume to which the primary copy of the object was stored. Only valid if bit 1 or 2 is on in field ST2FLGS. For an OSREQ RETRIEVE request (subtype 3), this field contains the volume serial number of the tape or optical volume from which the copy of the object was retrieved. Either the first or the second backup copy is retrieved as determined by the VIEW=BACKUP | BACKUP2 option indicated on the RETRIEVE request. Valid if bit 1, 2, 3, 4, 5, or 6 is on in field ST3FLGS. For an OSREQ DELETE request (subtype 6), this field contains the volume serial number of the tape or optical volume from which the primary copy of the object was deleted. Valid if bit 1 or 2 is on in field ST6FLGS.
150 96	ST1VMT	2	EBCDIC	Volume media type. Valid for subtype 2, 3, and 6. If a volume serial number is contained in the previous field (ST1VSN), this field contains the media type of the volume whose volume serial number is in field ST1VSN as follows: **VALUE MEANING** **00** IBM 9247 12-inch 2000-MB optical disk media. **01** IBM 3995 5.25-inch 650-MB rewritable optical disk media. **02** IBM 3480 Cartridge System Tape. **03** IBM 3995 5.25-inch 650-MB WORM optical disk media. **04** IBM 3480 Enhanced Capacity Cartridge System Tape. **05** IBM High Performance Cartridge Tape. **06** IBM Extended High Performance Cartridge Tape. **07** IBM Enterprise Tape Cartridge.

				08 IBM Enterprise WORM Tape Cartridge. **09** IBM Enterprise Economy Tape Cartridge. **10** IBM Enterprise Economy WORM Tape Cartridge. **11** IBM 3995 5.25-inch 1300-MB rewritable optical disk media. **12** IBM Enterprise Extended Tape Cartridge. **13** IBM 3995 5.25-inch 1300-MB WORM optical disk media. **14** IBM Enterprise Extended WORM Tape Cartridge. **15** IBM 3995 5.25-inch 1300-MB CCW optical disk media. **16** IBM Enterprise 3592 Advanced Tape Cartridge. **17** IBM Enterprise 3592 Advanced WORM Tape Cartridge. **18** IBM Enterprise 3592 Advanced Short Tape Cartridge. **21** IBM 3995 5.25-inch 2600-MB rewritable optical disk media. **23** IBM 3995 5.25-inch 2600-MB WORM optical disk media. **25** IBM 3995 5.25-inch 2600-MB CCW optical disk media. **31** IBM 3995 5.25-inch 5.2-GB rewritable optical disk media. **33** IBM 3995 5.25-inch 5.2-GB WORM optical disk media. **35** IBM 3995 5.25-inch 5.2-GB CCW optical disk media. **Note:** CCW = continuous composite WORM media. WORM = write-once-read-many.
152 98	ST1RC	4	binary	OSREQ return code. Value in register 15 following the OSREQ macro invocation.
156 9C	ST1RS	4	binary	OSREQ reason code. Value in register 0 following the OSREQ macro invocation.
160 A0	ST1FLGS	4	binary	Processing flags. The meaning is dependent on the record subtype. Unless specified below, all bits are zero and reserved. For subtype 1, the following bit definitions apply: **BIT** **MEANING** **0** When on, the IADDRESS parameter was specified on the OSREQ request. **1-31** Reserved.
160 A0	ST2FLGS	4	binary	Processing flags. The meaning is dependent on the record subtype. Unless specified below, all bits are zero and reserved. For subtype 2, the following bit definitions apply: **BIT MEANING** **0** When on, the object is stored to disk. **1** When on, the object is stored to optical. **2** When on, the object is stored to tape. **3** When on, the object is stored to cloud. **4** Unused. **5** When on, the OSREQ STORE request resulted in the mounting of a shelf-resident removable media volume (tape or optical) by an operator. This bit is only valid if bit 1 or 2 is on. **6** When on, the OSREQ STORE request resulted in the mounting of a library-resident removable media volume (tape or optical) inside an automated storage library. This bit is only valid if bit 1 or 2 is on. **7** When on, the OSREQ STORE request was satisfied using an already mounted removable media volume (tape or

				optical). This bit is only valid if bit 1 or 2 is on. **8** When on, an immediate backup copy is scheduled for this object. **9** When on, the object is stored to LOB storage structure. **10** When on, the object is stored on sublevel 1. When bit 0 is on, the object is stored in DB2. When bit 2 is on, the object is stored to a sublevel 1 volume. **11** When on, the object is stored on sublevel 2. When bit 0 is on, the object is stored in a file system. When bit 2 is on, the object is stored to a sublevel 2 volume. **12** Unused. **13** When on, the OSREQ STORE request included a DELHOLD=HOLD parameter. A deletion-hold was in effect for this object when it was initially stored. **14** When on, the object was stored as a retention-protected object. **15** When on, the object was stored as a deletion-protected object. **16** When on, the object was stored as a event-based-retention object. **17** Reserved. **18** When on, a 64-bit virtual storage address was provided for the object data buffer
160 A0	ST3FLGS	4	binary	Processing flags. The meaning is dependent on the record subtype. Unless specified below all bits are zero and reserved. For subtype 3, the following bit definitions apply: **BIT MEANING** **0** When on, the primary copy of the object was retrieved from disk. **1** When on, the primary copy of the object was retrieved from optical. **2** When on, the primary copy of the object was retrieved from tape. **3** When on, either the first or the second backup copy of the object was retrieved from optical as a result of VIEW=BACKUP or VIEW=BACKUP2 being specified on the OSREQ macro. See bit 10 to indicate which backup copy was retrieved. **4** When on, either the first or the second backup copy of the object was retrieved from tape as a result of VIEW=BACKUP or VIEW=BACKUP2 being specified on the OSREQ macro. See bit 10 to indicate which backup copy was retrieved. **5** When on, either the first or the second backup copy of the object was retrieved from optical as a result of the primary copy of the object being unavailable and the automatic access to backup being active. See bit 10 for indication which backup copy was retrieved. **6** When on, either the first or the second backup copy of the object was retrieved from tape as a result of the primary copy of the object being unavailable and the automatic access to backup being active. See bit 10 for indication which backup copy was retrieved. **7** When on, the OSREQ RETRIEVE request resulted in the mounting of a shelf-resident removable media volume (tape or optical) by an operator. This bit is only valid if bit 1, 2, 3, 5, or 6 is on. **8** When on, the OSREQ RETRIEVE request resulted in the

				mounting of a library-resident removable media volume (tape or optical) inside an automated storage library. This bit is only valid if bit 1, 2, 3, 5, or 6 is on. **9** When on, the OSREQ RETRIEVE request was satisfied using an already mounted removable media volume (tape or optical). This bit is only valid of bit 1, 2, 3, 5, or 6 is on. **10** When on, the second backup copy of the object was retrieved. **11** When on, a recall is scheduled for this object. **12** When on, a recall was explicitly specified on the OSREQ RETRIEVE request. **13** When on, the primary copy of the object was retrieved from a LOB table. **14** When on, the object is retrieved from sublevel 1. When bit 0 is on, the object is retrieved from DB2. When bit 2 is on, the object is retrieved from a sublevel 1 volume. **15** When on, the object is retrieved from sublevel 2. When bit 0 is on, the object is retrieved from a file system. When bit 2 is on, the object is retrieved from a sublevel 2 volume. **16** Reserved. **17** When on, a 64-bit virtual storage address was provided for the object data buffer **18** When on, the primary copy of the object was retrieved from cloud. **19** When on, either the first or the second backup copy of the object was retrieved from cloud as a result of VIEW=BACKUP or VIEW=BACKUP2 being specified on the OSREQ macro. See bit 10 to indicate which backup copy was retrieved. **20** When on, either the first or the second backup copy of the object was retrieved from file system as a result of VIEW=BACKUP or VIEW=BACKUP2 being specified on the OSREQ macro. See bit 10 to indicate which backup copy was retrieved. **21** When on, either the first or the second backup copy of the object was retrieved from cloud as a result of the primary copy of the object being unavailable and the automatic access to backup being active. See bit 10 for indication which backup copy was retrieved. **22** When on, either the first or the second backup copy of the object was retrieved from file system as a result of the primary copy of the object being unavailable and the automatic access to backup being active. See bit 10 for indication which backup copy was retrieved.
160 A0	ST4FLGS	4	binary	Processing flags. The meaning is dependent on the record subtype. Unless specified below, all bits are zero and reserved. For subtype 4, the following bit definitions apply: **BIT MEANING** **0** When on, the QUERY BACKUP OPTION has been disabled by specifying QB=N in the IEFSSNxx PARMLIB member. When off, the QUERY BACKUP OPTION is enabled, either by default or by specifying QB=Y in the IEFSSNxx PARMLIB member. **1-31** Reserved.

160 A0	ST5FLGS	4	binary	Processing flags. The meaning is dependent on the record subtype. Unless specified below, all bits are zero and reserved. For subtype 5, the following bit definitions apply: **BIT MEANING** **0** When on, management class is specified on the OSREQ CHANGE macro. **1** When on, storage class is specified on the OSREQ CHANGE macro. **2** When on, retention period is specified on the OSREQ CHANGE macro. **3** When on, special retention period value of -1 is specified on the OSREQ CHANGE macro. **4** When on, special retention period value of -2 is specified on the OSREQ CHANGE macro. **5** When on, special retention period value of X'7FFFFFFF' is specified on the OSREQ CHANGE macro. **6** When on, event expiration (EVENTEXP) is specified on the OSREQ CHANGE macro. **7** When on, activate deletion hold (DELHOLD=HOLD) is specified on the OSREQ CHANGE macro. **8** When on, release deletion hold (DELHOLD=NOHOLD) is specified on the OSREQ CHANGE macro.
160 A0	ST6FLGS	4	binary	Processing flags. The meaning is dependent on the record subtype. Unless specified below, all bits are zero and reserved. For subtype 6, the following bit definitions apply: **BIT MEANING** **0** When on, the primary copy of the object is deleted from disk. **1** When on, the primary copy of the object is deleted from optical. **2** When on, the primary copy of the object is deleted from tape. **3** When on, the first backup copy of the object is deleted from optical. **4** When on, the first backup copy of the object is deleted from tape. **5** When on, the second backup copy of the object is deleted from optical. **6** When on, the second backup copy of the object is deleted from tape. **7** When on, the primary copy of the object is deleted from LOB table. **8** When on, the primary copy of the object is deleted from sublevel 1. When bit 0 is on, the object is deleted from DB2. When bit 2 is on, the object is deleted from a sublevel 1 volume. **9** When on, the primary copy of object is deleted from sublevel 2. When bit 0 is on, the object is deleted from a file system. When bit 2 is on, the object is deleted from a sublevel 2 volume. **10** Reserved. **11** When on, the primary copy of the object is deleted from cloud. **12** When on, the first backup copy of the object is

				deleted from cloud. **13** When on, the first backup copy of the object is deleted from file system. **14** When on, the second backup copy of the object is deleted from cloud. **15** When on, the second backup copy of the object is deleted from file system.
160 A0	ST7FLGS	4	binary	Processing flags. For subtype 7, all bits contain zero.
160 A0	ST8FLGS	4	binary	Processing flags. For subtype 8, all bits contain zero.
160 A0	ST9FLGS	4	binary	Processing flags. For subtype 9, all bits contain zero.
160 A0	ST10FLGS	4	binary	Processing flags. The meaning is dependent on the record subtype. Unless specified below, all bits are zero and reserved. For subtype 10, the following bit definitions apply: **BIT MEANING** **0** When on, the object is stored to disk. **1** Unused. **2** When on, the object is stored to tape. **3** When on, the object is stored to cloud. **4** Unused. **5** When on, the OSREQ STORE request resulted in the mounting of a shelf-resident tape volume by an operator. This bit is only valid if bit 2 is on. **6** When on, the OSREQ STORE request resulted in the mounting of a library-resident tape volume inside an automated storage library. This bit is only valid if bit 2 is on. **7** When on, the OSREQ STORE request was satisfied using an already mounted tape volume. This bit is only valid if bit 2 is on. **8** When on, an immediate backup copy is scheduled for this object. **9** When on, the object is stored to LOB storage structure. **10** When on, the object is stored on sublevel 1. When bit 0 is on, the object is stored in DB2. When bit 2 is on, the object is stored to a sublevel 1 volume. **11** When on, the object is stored on sublevel 2. When bit 0 is on, the object is stored in a file system. When bit 2 is on, the object is stored to a sublevel 2 volume. **12** When on, the CANCEL=YES keyword was specified indicating the store sequence was successfully cancelled. **13** When on, the OSREQ STORE request included a DELHOLD=HOLD parameter. A deletion-hold was in effect for this object when it was initially stored. **14** When on, the object was stored as a retention-protected object. **15** When on, the object was stored as a deletion-protected object. **16** When on, the object was stored as a event-based-retention object.
164 A4	ST1STOK	16	binary	OSREQ STOKEN. Valid for subtypes 8, 9, and 10.
180 B4	ST1RC2	4	binary	OSREQ Return Code 2. Valid for subtypes 2, 3, and 10.
184 B8	ST1STOUT	4	binary	STIMEOUT value specified on the STOREBEG request. Specifies the maximum interval in seconds between STOREBEG, STOREPRT, and STOREEND request that OAM

				should wait before OAM will assume that there will be no more activity for this store sequence. Valid for subtype 8.
188 BC	ST1OLRD	10	EBCDIC	Old Last Reference Date. Value contained in OLDREFDT prior to the OSREQ CHANGE or RETRIEVE request. Valid for subtypes 3 and 5.
198 C6	ST1NLRD	10	EBCDIC	New Last Reference Date. Value contained in ODLREFDT after the OSREQ CHANGE or RETRIEVE request has completed. Valid for subtypes 3 and 5.
208 D0	ST1INST	4	binary	Instance ID. Valid for subtypes 2,3,6, and 10.
212 D4	ST1CLDID	2	binary	ID of entry in CLOUDID table defining the provider and container name where the primary copy of the object is stored. Valid for: – Subtype 2 when ST2FLGS bit 3 is on – Subtype 3 when ST3FLGS bit 18 is on – Subtype 6 when ST6FLGS bit 11 is on – Subtype 10 when ST10FLGS bit 3 is on.
214 D6	*	2		Unused
216 D8	ST1CINST	4	binary	Cloud instance ID. Valid for: – Subtype 2 when ST2FLGS bit 3 is on – Subtype 3 when ST3FLGS bit 18 is on – Subtype 6 when ST6FLGS bit 11 is on – Subtype 10 when ST10FLGS bit 3 is on.
220 DC	ST1PRCAB	4	binary	OSREQ return code for a primary object retrieval failure only when the automatic access to backup is enabled and takes place. This field will be zero in any other cases.
224 E0	ST1PRSAB	4	binary	OSREQ reason code for a primary object retrieval failure only when the automatic access to backup is enabled and takes place. This field will be zero in any other cases.

3.0.7.3 OSMC Storage Management Activity (Subtypes 32-35)

For the OSMC subtypes 32 (Storage Group Processing), 33 (DASD Space Management), 34 (Volume Recovery Utility), and 35 (Move Volume Utility), existing statistics are provided for:

- Primary objects on DASD (i.e. disk sublevel 1)
- Primary objects on file system (i.e. disk sublevel 2)
- Primary objects on cloud
- Primary objects on optical
- Primary objects on tape (i.e. tape sublevel 1)
- Primary objects on tape sublevel 2
- Backup copy 1 objects on optical
- Backup copy 1 objects on tape
- Backup copy 2 objects on optical
- Backup copy 2 objects on tape

For the cloud support, new statistics will be added for:

- Backup copy 1 objects on cloud
- Backup copy 1 objects on file system
- Backup copy 2 objects on cloud
- Backup copy 2 objects on file system

OFFSETS	NAME	LENGTH	FORMAT	DESCRIPTION
0 0	ST32SGN	8	EBCDIC	Object or Object Backup storage group name.
8 8	ST32VSN0	6	EBCDIC	Volume serial number of a tape or optical volume. Valid for subtypes 34 and 35. This field contains blanks for all other subtypes. If the RECYCLE or DELETE option was specified, this field lists the volume serial number for the volume being recycled or deleted, and field ST32VSN1 lists the volume serial number for the opposite side of the optical volume.
14 E	ST32VSN1	6	EBCDIC	Volume serial number of the opposite side of the optical volume. Valid for subtypes 34 and 35. If the volume serial number contained in field ST32VSN0 is the volume serial number of a tape volume, this field contains blanks. This field contains blanks for all other subtypes. If the RECYCLE or DELETE option was specified, this field lists the volume serial number of the opposite side of the optical platter.
20 14	ST32OMT	2	EBCDIC	Media type of the volume identified in field ST32VSN0. Valid for subtypes 34 and 35. This field contains blanks for all other subtypes. **VALUE MEANING** **00** IBM 9247 12-inch 2000-MB optical disk media. **01** IBM 3995 5.25-inch 650-MB rewritable optical disk media. **02** IBM 3480 Cartridge System Tape. **03** IBM 3995 5.25-inch 650-MB WORM optical disk media. **04** IBM 3480 Enhanced Capacity Cartridge System Tape. **05** IBM High Performance Cartridge Tape. **06** IBM Extended High Performance Cartridge Tape. **07** IBM Enterprise Tape Cartridge. **08** IBM Enterprise WORM Tape Cartridge. **09** IBM Enterprise Economy Tape Cartridge. **10** IBM Enterprise Economy WORM Tape Cartridge. **11** IBM 3995 5.25-inch 1300-MB rewritable optical disk media. **12** IBM Enterprise Extended Tape Cartridge. **13** IBM 3995 5.25-inch 1300-MB WORM optical disk media. **14** IBM Enterprise Extended WORM Tape Cartridge. **15** IBM 3995 5.25-inch 1300-MB CCW optical disk media. **16** IBM Enterprise 3592 Advanced Tape Cartridge. **17** IBM Enterprise 3592 Advanced WORM Tape Cartridge. **18** IBM Enterprise 3592 Advanced Short Tape Cartridge. **21** IBM 3995 5.25-inch 2600-MB rewritable optical disk media. **23** IBM 3995 5.25-inch 2600-MB WORM optical disk media. **25** IBM 3995 5.25-inch 2600-MB CCW optical disk media.

				31 IBM 3995 5.25-inch 5.2-GB rewritable optical disk media. **33** IBM 3995 5.25-inch 5.2-GB WORM optical disk media. **35** IBM 3995 5.25-inch 5.2-GB CCW optical disk media. **Note:** CCW = continuous composite WORM media. WORM = write-once-read-many.
22 16	*	2	binary	Reserved.
24 18	ST32PDWO	4	binary	Number of primary objects written to disk sublevel 1 (DB2).
28 1C	ST32PDWK	4	binary	Number of kilobytes of primary object data written to disk sublevel 1 (DB2). X'FFFFFFFF' indicates the counter has overflowed.
32 20	ST32PDRO	4	binary	Number of primary objects read from disk sublevel 1 (DB2).
36 24	ST32PDRK	4	binary	Number of kilobytes of primary object data read from disk sublevel 1 (DB2). X'FFFFFFFF' indicates the counter has overflowed.
40 28	ST32PDDO	4	binary	Number of primary objects deleted from disk sublevel 1 (DB2).
44 2C	ST32PDDK	4	binary	Number of kilobytes of primary object data deleted from disk sublevel 1 (DB2). X'FFFFFFFF' indicates the counter has overflowed.
48 30	ST32POWO	4	binary	Number of primary objects written to optical.
52 34	ST32POWK	4	binary	Number of kilobytes of primary object data written to optical. X'FFFFFFFF' indicates the counter has overflowed.
56 38	ST32PORO	4	binary	Number of primary objects read from optical.
60 3C	ST32PORK	4	binary	Number of kilobytes of primary object data read from optical. X'FFFFFFFF' indicates the counter has overflowed.
64 40	ST32PODO	4	binary	Number of primary objects deleted from optical.
68 44	ST32PODK	4	binary	Number of kilobytes of primary object data deleted from optical. X'FFFFFFFF' indicates the counter has overflowed.
72 48	ST32PTWO	4	binary	Number of primary objects written to tape.
76 4C	ST32PTWK	4	binary	Number of kilobytes of primary object data written to tape. X'FFFFFFFF' indicates the counter has overflowed.
80 50	ST32PTRO	4	binary	Number of primary objects read from tape.
84 54	ST32PTRK	4	binary	Number of kilobytes of primary object data read from tape. X'FFFFFFFF' indicates the counter has overflowed.
88 58	ST32PTDO	4	binary	Number of primary objects deleted from tape.
92 5C	ST32PTDK	4	binary	Number of kilobytes of primary object data deleted from tape. X'FFFFFFFF' indicates the counter has overflowed.
96 60	ST32BOWO	4	binary	Number of backup objects written to optical.
100 64	ST32BOWK	4	binary	Number of kilobytes of backup object data written to optical. X'FFFFFFFF' indicates the counter has overflowed.
104 68	ST32BORO	4	binary	Number of backup objects read from optical.
108 6C	ST32BORK	4	binary	Number of kilobytes of backup object data read from optical. X'FFFFFFFF' indicates the counter has overflowed.
112 70	ST32BODO	4	binary	Number of backup objects deleted from optical.
116 74	ST32BODK	4	binary	Number of kilobytes of backup object data deleted from optical. X'FFFFFFFF' indicates the counter has overflowed.
120 78	ST32BTWO	4	binary	Number of backup objects written to tape.
124 7C	ST32BTWK	4	binary	Number of kilobytes of backup object data written to tape.

				X'FFFFFFFF' indicates the counter has overflowed.
128 80	ST32BTRO	4	binary	Number of backup objects read from tape.
132 84	ST32BTRK	4	binary	Number of kilobytes of backup object data read from tape. X'FFFFFFFF' indicates the counter has overflowed.
136 88	ST32BTDO	4	binary	Number of backup objects deleted from tape.
140 8C	ST32BTDK	4	binary	Number of kilobytes of backup object data deleted from tape. X'FFFFFFFF' indicates the counter has overflowed.
144 90	ST32B2OWO	4	binary	Number of BACKUP2 objects written to optical.
148 94	ST32B2OWK	4	binary	Number of kilobytes of BACKUP2 objects written to optical. X'FFFFFFFF' indicates the counter has overflowed.
152 98	ST32B2ORO	4	binary	Number of BACKUP2 objects read from optical.
156 9C	ST32B2ORK	4	binary	Number of kilobytes of BACKUP2 objects read from optical. X'FFFFFFFF' indicates the counter has overflowed.
160 A0	ST32B2ODO	4	binary	Number of BACKUP2 objects deleted from optical.
164 A4	ST32B2ODK	4	binary	Number of kilobytes of BACKUP2 objects deleted from optical. X'FFFFFFFF' indicates the counter has overflowed.
168 A8	ST32B2TWO	4	binary	Number of BACKUP2 objects written to tape.
172 AC	ST32B2TWK	4	binary	Number of kilobytes of BACKUP2 objects written to tape. X'FFFFFFFF' indicates the counter has overflowed.
176 B0	ST32B2TRO	4	binary	Number of BACKUP2 objects read from tape.
180 B4	ST32B2TRK	4	binary	Number of kilobytes of BACKUP2 objects read from tape. X'FFFFFFFF' indicates the counter has overflowed.
184 B8	ST32B2TDO	4	binary	Number of BACKUP2 objects logically deleted from tape.
188 BC	ST32B2TDK	4	binary	Number of kilobytes of BACKUP2 objects logically deleted from tape. X'FFFFFFFF' indicates the counter has overflowed.
192 C0	ST32DTUP	4	binary	Number of rows updated in the object directory table.
196 C4	ST32DTDE	4	binary	Number of rows deleted from the object directory table.
200 C8	ST324KIN	4	binary	Number of rows inserted into the 4 KB object storage table.
204 CC	ST324KDE	4	binary	Number of rows deleted from the 4 KB object storage table.
208 D0	ST3232KI	4	binary	Number of rows inserted into the 32 KB object storage table.
212 D4	ST3232KD	4	binary	Number of rows deleted from the 32 KB object storage table.
216 D8	ST32NCE	4	binary	Number of optical cartridges expired. Valid only for Subtype 32.
220 DC	ST32FLGS	4	binary	Processing flags. **BIT MEANING** **0** When on, the MOVEVOL was invoked automatically under software control as a result of RECYCLE. **1** When on, this process was invoked by a MODIFY OAM,START command issued from an MVS console. **2** When on, this process was invoked using an ISMF line operator. **3** When on, volume recovery was invoked with the BACKUP1 keyword or defaulted to BACKUP1. **4** When on, volume recovery was invoked with the BACKUP2 keyword. **5** When on, the DELETE option was specified for the RECOVER or MOVEVOL utility. **6** When on, the RECYCLE option was specified for the MOVEVOL utility.

				7 When on, the Object storage group was processed. **8** When on, the Object Backup storage group was processed. **9** When on, the storage group cycle ended because the CYCLE END TIME was exceeded. **10** When on, automatic backup deletion was enabled during the storage group cycle. **11–31** Reserved.
224 E0	ST32NTE	4	binary	Number of tape volumes expired. Valid only for subtype 32.
228 E4	ST32RCLD	4	binary	Number of recalled objects processed this storage group cycle. Valid only for subtype 32.
232 E8	ST32RCLK	4	binary	Number of kilobytes of recalled objects processed this storage group cycle. Valid only for subtype 32. X'FFFFFFFF' indicates the counter has overflowed.
236 EC	ST32LOBI	4	binary	Number of rows inserted into the LOB storage structure.
240 F0	ST32LOBD	4	binary	Number of rows deleted from the LOB storage structure.
244 F4	ST32PUWO	4	binary	Number of primary objects written to tape sublevel 2.
248 F8	ST32PUWK	4	binary	Number of kilobytes of primary objects written to tape sublevel 2. X'FFFFFFFF' indicates the counter has overflowed.
252 FC	ST32PURO	4	binary	Number of primary objects read from tape sublevel 2.
256 100	ST32PURK	4	binary	Number of kilobytes of primary objects read from tape sublevel 2. X'FFFFFFFF' indicates the counter has overflowed.
260 104	ST32PUDO	4	binary	Number of primary objects deleted from tape sublevel 2.
264 108	ST32PUDK	4	binary	Number of kilobytes of primary objects deleted from tape sublevel 2. X'FFFFFFFF' indicates the counter has overflowed.
268 10C	ST32PEWO	4	binary	Number of primary objects written to disk sublevel 2 (file system).
272 110	ST32PERO	4	binary	Number of primary objects read from disk sublevel 2 (file system).
276 114	ST32PEDO	4	binary	Number of primary objects deleted from disk sublevel 2 (file system).
280 118	ST32PDWB	8	binary	Number of bytes of primary object data written to disk sublevel 1 (DB2).
288 120	ST32PDRB	8	binary	Number of bytes of primary object data read from disk sublevel 1 (DB2).
296 128	ST32PDDB	8	binary	Number of bytes of primary object data deleted from disk sublevel 1 (DB2).
304 130	ST32POWB	8	binary	Number of bytes of primary object data written to optical.
312 138	ST32PORB	8	binary	Number of bytes of primary object data read from optical.
320 140	ST32PODB	8	binary	Number of bytes of primary object data deleted from optical.
328 148	ST32PTWB	8	binary	Number of bytes of primary object data written to tape.
336 150	ST32PTRB	8	binary	Number of bytes of primary object data read from tape.
344 158	ST32PTDB	8	binary	Number of bytes of primary object data deleted from tape.
352 160	ST32BOWB	8	binary	Number of bytes of backup object data written to optical.
360 168	ST32BORB	8	binary	Number of bytes of backup object data read from optical.
368 170	ST32BODB	8	binary	Number of bytes of backup object data deleted from optical.
376 178	ST32BTWB	8	binary	Number of bytes of backup object data written to tape.
384 180	ST32BTRB	8	binary	Number of bytes of backup object data read from tape.

392 188	ST32BTDB	8	binary	Number of bytes of backup object data deleted from tape.
400 190	ST32B2OWB	8	binary	Number of bytes of BACKUP2 object data written to optical.
408 198	ST32B2ORB	8	binary	Number of bytes of BACKUP2 object data read from optical.
416 1A0	ST32B2ODB	8	binary	Number of bytes of BACKUP2 object data deleted from optical.
424 1A8	ST32B2TWB	8	binary	Number of bytes of BACKUP2 object data written to tape.
432 1B0	ST32B2TRB	8	binary	Number of bytes of BACKUP2 object data read from tape.
440 1B8	ST32B2TDB	8	binary	Number of bytes of BACKUP2 object data deleted from tape.
448 1C0	ST32RCLB	8	binary	Number of bytes of recalled objects processed this storage group cycle. Valid only for subtype 32.
456 1C8	ST32PUWB	8	binary	Number of bytes of primary object data written to tape sublevel 2.
464 1D0	ST32PURB	8	binary	Number of bytes of primary object data read from tape sublevel 2.
472 1D8	ST32PUDB	8	binary	Number of bytes of primary object data deleted from tape sublevel 2.
480 1E0	ST32PEWB	8	binary	Number of kilobytes of primary objects written to disk sublevel 2 (file system).
488 1E8	ST32PERB	8	binary	Number of kilobytes of primary objects read from disk sublevel 2 (file system).
496 1F0	ST32PEDB	8	binary	Number of kilobytes of objects deleted from disk sublevel 2 (file system).
504 1F8	ST32BOAO	4	binary	Number of unneeded backup 1 copies deleted from optical. Valid for subtype 32 only. Note: These backup copies are also included in the count in the ST32BODO field.
508 1FC	ST32B2OAO	4	binary	Number of unneeded backup 2 copies deleted from optical. Valid for subtype 32 only. Note: These backup copies are also included in the count in the ST32B2ODO field.
512 200	ST32BTAO	4	binary	Number of unneeded backup 1 copies deleted from tape. Valid for subtype 32 only. Note: These backup copies are also included in the count in the ST32BTDO field.
516 204	ST32B2TAO	4	binary	Number of unneeded backup 2 copies deleted from tape. Valid for subtype 32 only. Note: These backup copies are also included in the count in the ST32B2TDO field.
520 208	ST32BOAB	8	binary	Number of bytes of unneeded backup 1 copies deleted from optical. Valid for subtype 32 only. Note: These bytes are also included in the count in the ST32BODB field.
528 210	ST32B2OAB	8	binary	Number of bytes of unneeded backup 2 copies deleted from optical. Valid for subtype 32 only. Note: These bytes are also included in the count in the ST32B2ODB field.
536 218	ST32BTAB	8	binary	Number of bytes of unneeded backup 1 copies deleted from tape. Valid for subtype 32 only. Note: These bytes are also included in the count in the ST32BTDB field.
544 220	ST32B2TAB	8	binary	Number of bytes of unneeded backup 2 copies deleted from tape. Valid for subtype 32 only. Note: These bytes are also included in the count in the ST32B2TDB field.
552 228	ST32PCWB	8	binary	Number of bytes of primary object data written to cloud.
560 230	ST32PCRB	8	binary	Number of bytes of primary object data read from cloud.
568 238	ST32PCDB	8	binary	Number of bytes of primary object data deleted from cloud.
~~576 240~~	~~*~~	~~48~~	~~binary~~	~~Reserved~~

576 240	ST32BCWB	8	binary	Number of bytes of backup object data written to cloud.
584 248	ST32BCRB	8	binary	Number of bytes of backup object data read from cloud.
592 250	ST32BCDB	8	binary	Number of bytes of backup object data deleted from cloud.
600 258	ST32B2CWB	8	binary	Number of bytes of backup2 object data written to cloud.
608 260	ST32B2CRB	8	binary	Number of bytes of backup2 object data read from cloud.
616 268	ST32B2CDB	8	binary	Number of bytes of backup2 object data deleted from cloud.
624 270	ST32PCWO	4	binary	Number of primary objects written to cloud.
628 274	ST32PCRO	4	binary	Number of primary objects read from cloud.
632 278	ST32PCDO	4	binary	Number of primary objects deleted from cloud.
636 27C	ST32BCWO	4	binary	Number of backup objects written to cloud.
640 280	ST32BCRO	4	binary	Number of backup objects read from cloud.
644 284	ST32BCDO	4	binary	Number of backup objects deleted from cloud.
648 288	ST32B2CWO	4	binary	Number of backup2 objects written to cloud.
652 28C	ST32B2CRO	4	binary	Number of backup2 objects read from cloud.
656 290	ST32B2CDO	4	binary	Number of backup2 objects deleted from cloud.
660 294	*	4	binary	Reserved
664 298	ST32BEWB	8	binary	Number of bytes of backup object data written to file system.
672 2A0	ST32BERB	8	binary	Number of bytes of backup object data read from file system.
680 2A8	ST32BEDB	8	binary	Number of bytes of backup object data deleted from file system.
688 2B0	ST32B2EWB	8	binary	Number of bytes of backup2 object data written to file system.
696 2B8	ST32B2ERB	8	binary	Number of bytes of backup2 object data read from file system.
704 2C0	ST32B2EDB	8	binary	Number of bytes of backup2 object data deleted from file system.
712 2C8	ST32BEWO	4	binary	Number of backup objects written to file system.
716 2CC	ST32BERO	4	binary	Number of backup objects read from file system.
720 2D0	ST32BEDO	4	binary	Number of backup objects deleted from file system.
724 2D4	ST32B2EWO	4	binary	Number of backup2 objects written to file system.
728 2D8	ST32B2ERO	4	binary	Number of backup2 objects read from file system.
732 2DC	ST32B2EDO	4	binary	Number of backup2 objects deleted from file system.
736 2E0	ST32BCAO	4	binary	Number of unneeded backup 1 copies deleted from cloud. Valid for subtype 32 only. Note: These backup copies are also included in the count in the ST32BCDO field.
740 2E4	ST32B2CAO	4	binary	Number of unneeded backup 2 copies deleted from cloud. Valid for subtype 32 only. Note: These backup copies are also included in the count in the ST32B2CDO field.
744 2E8	ST32BEAO	4	binary	Number of unneeded backup 1 copies deleted from file system. Valid for subtype 32 only. Note: These backup copies are also included in the count in the ST32BEDO field.
748 2EC	ST32B2EAO	4	binary	Number of unneeded backup 2 copies deleted from file system. Valid for subtype 32 only. Note: These backup copies are also included in the count in the ST32B2EDO field.
752 2F0	ST32BCAB	8	binary	Number of bytes of unneeded backup 1 copies deleted from cloud. Valid for subtype 32 only. Note: These bytes are also included in the count in the ST32BCDB field.
760 2F8	ST32B2CAB	8	binary	Number of bytes of unneeded backup 2 copies deleted from cloud. Valid for subtype 32 only. Note: These bytes are also

				included in the count in the ST32B2CDB field.
768 300	ST32BEAB	8	binary	Number of bytes of unneeded backup 1 copies deleted from file system. Valid for subtype 32 only. Note: These bytes are also included in the count in the ST32BEDB field.
776 308	ST32B2EAB	8	binary	Number of bytes of unneeded backup 2 copies deleted from file system. Valid for subtype 32 only. Note: These bytes are also included in the count in the ST32B2EDB field.
Note: For subtypes 32-35, the total value in fields that refer to 'number of kilobytes' or 'number of bytes' will be rounded up.				

3.0.7.4 OSMC Single Object Recovery Utility (Subtype 36)

For the OSMC subtype 36 (Single Object Recovery), the storage hierarchy level from which the backup copy of the object was read will also include cloud and file system levels.

OFFSETS	NAME	LENGTH	FORMAT	DESCRIPTION
0 0	ST36COLN	44	EBCDIC	Collection name.
44 2C	ST36CNID	4	binary	Collection ID.
48 30	ST36OBJN	44	EBCDIC	Object name.
92 5C	ST36SGN	8	EBCDIC	OBJECT storage group name.
100 64	ST36OLEN	4	binary	Object length.
104 68	ST36BVSN	6	EBCDIC	Volume serial number of the optical or tape volume from which the backup copy of the object was read. The backup copy can be either the first or the second backup copy as determined by options specified on the F OAM,START,OBJRECV command. The options are: BACKUP1 | BACKUP2. This field contains blanks if the backup location is not in the optical or tape level of the storage hierarchy.
110 6E	ST36BMT	2	EBCDIC	Media type of volume from which the backup copy of the object was read. This field contains blanks if the backup copy of the object is not in the optical or tape level of the storage hierarchy: **VALUE MEANING** **00** IBM 9247 12-inch 2000-MB optical disk media. **01** IBM 3995 5.25-inch 650-MB rewritable optical disk media. **02** IBM 3480 Cartridge System Tape. **03** IBM 3995 5.25-inch 650-MB WORM optical disk media. **04** IBM 3480 Enhanced Capacity Cartridge System Tape. **05** IBM High Performance Cartridge Tape. **06** IBM Extended High Performance Cartridge Tape. **07** IBM Enterprise Tape Cartridge. **08** IBM Enterprise WORM Tape Cartridge. **09** IBM Enterprise Economy Tape Cartridge. **10** IBM Enterprise Economy WORM Tape Cartridge. **11** IBM 3995 5.25-inch 1300-MB rewritable optical disk media. **12** IBM Enterprise Extended Tape Cartridge. **13** IBM 3995 5.25-inch 1300-MB WORM optical disk media. **14** IBM Enterprise Extended WORM Tape Cartridge. **15** IBM 3995 5.25-inch 1300-MB CCW optical disk media. **16** IBM Enterprise 3592 Advanced Tape Cartridge. **17** IBM Enterprise 3592 Advanced WORM Tape Cartridge. **18** IBM Enterprise 3592 Advanced Short Tape Cartridge. **21** IBM 3995 5.25-inch 2600-MB rewritable optical disk media. **23** IBM 3995 5.25-inch 2600-MB WORM optical disk media. **25** IBM 3995 5.25-inch 2600-MB CCW optical disk media. **31** IBM 3995 5.25-inch 5.2-GB rewritable optical disk

				media. **33** IBM 3995 5.25-inch 5.2-GB WORM optical disk media. **35** IBM 3995 5.25-inch 5.2-GB CCW optical disk media. **Note:** CCW = continuous composite WORM media. WORM = write-once-read-many.
112 70	ST36BTKN	4	binary	Volume location token associated with the backup copy of the object on the volume specified in the ST36BVSN field.
116 78	ST36TVSN	6	EBCDIC	Volume serial number of the target optical or tape volume to which the new primary copy of the object was written. This field contains blanks if the new location is not in the optical or tape level of the storage hierarchy.
122 7E	ST36TMT	2	EBCDIC	Media type of target optical or tape volume to which the new primary copy of the object was written. This field contains blanks if the new primary copy of the object is not in the optical or tape level of the storage hierarchy: **VALUE MEANING** **00** IBM 9247 12-inch 2000-MB optical disk media. **01** IBM 3995 5.25-inch 650-MB rewritable optical disk media. **02** IBM 3480 Cartridge System Tape. **03** IBM 3995 5.25-inch 650-MB WORM optical disk media. **04** IBM 3480 Enhanced Capacity Cartridge System Tape. **05** IBM High Performance Cartridge Tape. **06** IBM Extended High Performance Cartridge Tape. **07** IBM Enterprise Tape Cartridge. **08** IBM Enterprise WORM Tape Cartridge. **09** IBM Enterprise Economy Tape Cartridge. **10** IBM Enterprise Economy WORM Tape Cartridge. **11** IBM 3995 5.25-inch 1300-MB rewritable optical disk media. **12** IBM Enterprise Extended Tape Cartridge. **13** IBM 3995 5.25-inch 1300-MB WORM optical disk media. **14** IBM Enterprise Extended WORM Tape Cartridge. **15** IBM 3995 5.25-inch 1300-MB CCW optical disk media. **16** IBM Enterprise 3592 Advanced Tape Cartridge. **17** IBM Enterprise 3592 Advanced WORM Tape Cartridge. **18** IBM Enterprise 3592 Advanced Short Tape Cartridge. **21** IBM 3995 5.25-inch 2600-MB rewritable optical disk media. **23** IBM 3995 5.25-inch 2600-MB WORM optical disk media. **25** IBM 3995 5.25-inch 2600-MB CCW optical disk media. **31** IBM 3995 5.25-inch 5.2-GB rewritable optical disk media. **33** IBM 3995 5.25-inch 5.2-GB WORM optical disk media. **35** IBM 3995 5.25-inch 5.2-GB CCW optical disk media. **Note:** CCW = continuous composite WORM media. WORM = write-once-read-many.
124 80	ST36OVSN	6	EBCDIC	Volume serial number of the original optical or tape volume on

				which the primary copy of the object resided prior to the start of the single object recovery utility. This field contains blanks if the original location was not in the optical or tape level of the storage hierarchy.
130 82	ST36OMT	2	EBCDIC	Media type of the original optical or tape volume on which the primary copy of the object resided prior to the start of the single object recovery utility. This field contains blanks if the primary copy of the object is not in the optical or tape level of the storage hierarchy: **VALUE MEANING** **00** IBM 9247 12-inch 2000-MB optical disk media. **01** IBM 3995 5.25-inch 650-MB rewritable optical disk media. **02** IBM 3480 Cartridge System Tape. **03** IBM 3995 5.25-inch 650-MB WORM optical disk media. **04** IBM 3480 Enhanced Capacity Cartridge System Tape. **05** IBM High Performance Cartridge Tape. **06** IBM Extended High Performance Cartridge Tape. **07** IBM Enterprise Tape Cartridge. **08** IBM Enterprise WORM Tape Cartridge. **09** IBM Enterprise Economy Tape Cartridge. **10** IBM Enterprise Economy WORM Tape Cartridge. **11** IBM 3995 5.25-inch 1300-MB rewritable optical disk media. **12** IBM Enterprise Extended Tape Cartridge. **13** IBM 3995 5.25-inch 1300-MB WORM optical disk media. **14** IBM Enterprise Extended WORM Tape Cartridge. **15** IBM 3995 5.25-inch 1300-MB CCW optical disk media. **16** IBM Enterprise 3592 Advanced Tape Cartridge. **17** IBM Enterprise 3592 Advanced WORM Tape Cartridge. **18** IBM Enterprise 3592 Advanced Short Tape Cartridge. **21** IBM 3995 5.25-inch 2600-MB rewritable optical disk media. **23** IBM 3995 5.25-inch 2600-MB WORM optical disk media. **25** IBM 3995 5.25-inch 2600-MB CCW optical disk media. **31** IBM 3995 5.25-inch 5.2-GB rewritable optical disk media. **33** IBM 3995 5.25-inch 5.2-GB WORM optical disk media. **35** IBM 3995 5.25-inch 5.2-GB CCW optical disk media. **Note:** CCW = continuous composite WORM media. WORM = write-once-read-many.
132 84	ST36FLGS	4	binary	Processing flags. **BIT MEANING** **0** When on, object recovery was invoked with the BACKUP1 keyword or defaulted to BACKUP1. **1** When on, object recovery was invoked with the BACKUP2 keyword. **2** When on, the backup copy is retrieved from cloud.

				3 When on, the backup copy is retrieved from file system. **4–31** Reserved.
136 88	ST36DSL	2	EBCDIC	Disk sublevel associated with the recovered object. This field is only valid when the ST36TVSN field contains blanks and the ST36TCLID field is 0. **VALUE MEANING** **01** Recovered object on disk sublevel 1 (DB2). **02** Recovered object on disk sublevel 2 (file system).
138 8A	ST36TCLID	2	binary	ID of entry in CLOUDID table defining the provider and container name to which the new primary copy of the object was written. This field contains 0 if the new location is not in the cloud level of the storage hierarchy.
140 8C	ST36BCLID	2	binary	ID of entry in CLOUDID table defining the provider and container name from which the backup copy of the object was read. The backup copy can be either the first or the second backup copy as determined by options specified on the F OAM,START,OBJRECV command. The options are: BACKUP1 | BACKUP2. This field contains 0 if the backup location is not in the cloud level of the storage hierarchy.

3.0.7.5 OSMC Immediate Backup Copy (Subtype 39)

For the OSMC subtype 39 (Immediate Backup), the backup copies can be written to the cloud level and file system sublevel so this record will have new bits in an existing field to indicate these new possibilities.

OFFSETS	NAME	LENGTH	FORMAT	DESCRIPTION
0 0	ST39COLN	44	EBCDIC	Collection name.
44 2C	ST39CNID	4	binary	Collection ID.
48 30	ST39OBJN	44	EBCDIC	Object name.
92 5C	ST39SGN	8	EBCDIC	OBJECT storage group name.
100 64	ST39MCN	8	EBCDIC	Management Class name.
108 6C	ST39OLEN	4	binary	Object length.
112 70	ST39SVSN	6	EBCDIC	Source Volume serial number of the optical or tape volume on which the primary object was read. Only valid if the bit 1 or 2 is ON in field ST39FLGS.
118 76	ST39SMT	2	EBCDIC	Source volume Media type. Only valid if the bit 1 or 2 is ON in field ST39FLGS. **Value** **MEANING** **00** IBM 9247 12-inch 2000-MB optical disk media. **01** IBM 3995 5.25-inch 650-MB rewritable optical disk media. **02** IBM 3480 Cartridge System Tape. **03** IBM 3995 5.25-inch 650-MB WORM optical disk media. **04** IBM 3480 Enhanced Capacity Cartridge System Tape. **05** IBM High Performance Cartridge Tape. **06** IBM Extended High Performance Cartridge Tape. **07** IBM Enterprise Tape Cartridge. **08** IBM Enterprise WORM Tape Cartridge. **09** IBM Enterprise Economy Tape Cartridge. **10** IBM Enterprise Economy WORM Tape Cartridge. **11** IBM 3995 5.25-inch 1300-MB rewritable optical disk media. **12** IBM Enterprise Extended Tape Cartridge. **13** IBM 3995 5.25-inch 1300-MB WORM optical disk media. **14** IBM Enterprise Extended WORM Tape Cartridge. **15** IBM 3995 5.25-inch 1300-MB CCW optical disk media. **16** IBM Enterprise 3592 Advanced Tape Cartridge. **17** IBM Enterprise 3592 Advanced WORM Tape Cartridge. **18** IBM Enterprise 3592 Advanced Short Tape Cartridge. **21** IBM 3995 5.25-inch 2600-MB rewritable optical disk media. **23** IBM 3995 5.25-inch 2600-MB WORM optical disk media. **25** IBM 3995 5.25-inch 2600-MB CCW optical disk media. **31** IBM 3995 5.25-inch 5.2-GB rewritable optical disk media. **33** IBM 3995 5.25-inch 5.2-GB WORM optical disk media.

				35 IBM 3995 5.25-inch 5.2-GB CCW optical disk
120 78	ST39TVSN	6	EBCDIC	Target Volume serial number of the optical or tape volume on which the backup copy of the object was written.
126 7E	ST39TMT	2	EBCDIC	Target Volume Media type: Refer to ST39SMT for the values.
128 80	ST39BTKN	4	binary	Volume location token on the ST39TVSN.
132 84	ST39FLGS	4	binary	Processing flags: **Bit MEANING** **0** When on, the primary copy is stored to disk. **1** When on, the primary copy is stored to optical. **2** When on, the primary copy is stored to tape. **3** When on, the primary copy is stored to cloud. **4** Reserved. **5** When on, the backup copy is stored to optical. **6** When on, the backup copy is stored to tape. **7** Reserved**.** **8** When on, write to backup was successful. **9** Reserved. **10** When on, the primary copy is stored on sublevel 1. When bit 0 is on, the primary copy is stored in DB2. When bit 2 is on, the primary copy is stored to a sublevel 1 volume. **11** When on, the primary copy is stored on sublevel 2. When bit 0 is on, the primary copy is stored in a file system. When bit 2 is on, the primary copy is stored to a sublevel 2 volume. **12** When on, the backup copy is stored to cloud. **13** When on, the backup copy is stored to file system.
136 88	ST39SCLID	2	binary	ID of entry in CLOUDID table defining the provider and container name from which the primary copy of the object was read. Only valid if bit 3 is ON in field ST39FLGS.
138 8A	ST39BCLID	2	binary	ID of entry in CLOUDID table defining the provider and container name from which the backup copy of the object was written. Only valid if bit 12 is ON in field ST39FLGS.

3.0.8 IPCS Support

IPCS changes for cloud and file system backup support will be added including the following existing OAM control block IPCS mapping updates:

- IRWA (OSR Request Work Area)
- VSCB (Volume Set Control Block)

3.1 APIs, Callable Services, and Macros

There are no changes to APIs with this support.

3.2 Commands

A new task cancel command is added and additional keywords are supported on some commands and additional output is generated for some commands.

3.3 System Library Updates (PARMLIB, PROCLIB, SAMPLIB, etc.)

Refer to section **3.1.2 PARMLIB Statements** for updates to the CBROAMxx PARMLIB member.

3.4 Diagnostic Aids

3.4.1 System Completion Code

7D1 (New)

Explanation: An OAM task cancel command was issued to cancel an OAM task. The task is canceled, and the ABEND code associated with the task cancelation is x'7D1' (decimal 2001).

System action: The OAM task has been canceled and a dump is taken.

Source: Object Access Method (OAM)

3.4.2 SMF Records

Two new fields, ST1PRCAB and ST1PRSAB, have been added to Subtype 1-10 of the SMF 85 record. These fields will contain the original OSREQ return and reason code for an object retrieval when the automatic access to backup function is enabled and occurs. This can assist in diagnosing the problem that is happening when attempting to access the primary copy of an object.

3.5 Messages

3.5.1 CBR0428I (Changed / Explanation Only)

CBR0428I Backup retrieve key ='*backup-retrieve-key***'X**

Explanation: The OSREQ QUERY request was issued and completed successfully. *backup-retrieve-key* is the object's first backup copy retrieve order key. The backup retrieve order key is displayed in hexadecimal format. If QB=N in the IEFSSNxx PARMLIB**, a backup copy resides on cloud or file system level,** or a backup copy does not exist, the backup retrieval order key contains binary zeros.

If the backup copies of a group of OAM objects are to be retrieved, the group of objects to be retrieved should be sorted in ascending order by backup retrieve key. This ensures that the objects are retrieved in the most efficient manner possible.

System action: The OSREQ QUERY function completed successfully.

Source: Object Access Method (OAM)

Routing Code: -

Descriptor Code: -

3.5.2 CBR0429I (Changed / Explanation Only)

CBR0429I Backup2 retrieve key = '*backup2-retrieve-key***'X**

Explanation: The OSREQ QUERY request was issued and completed successfully. *backup2-retrieve-key* is the object's second backup copy retrieve order key. The backup2 retrieve order key is displayed in hexadecimal format. If QB=N in the IEFSSNxx PARMLIB**, a backup2 copy resides on cloud or file system level,** or a backup2 copy does not exist, the backup2 retrieval order key contains binary zeros.

If the second backup copy of a group of OAM objects is to be retrieved, the group of objects to be retrieved is sorted in ascending order by the backup2 retrieve key. This ensures that the objects are retrieved in the most efficient manner possible.

System action: The OSREQ QUERY function completed successfully.

Source: Object Access Method (OAM)

Routing Code: -

Descriptor Code: -

3.5.3 CBR0448I (New)

CBR0448I Backup location = *location-flag*

Explanation: The OSREQ QUERY request was issued and completed successfully. *location-flag* indicates where the first backup copy of the object resides.

location-flag values are interpreted as follows:
C backup copy resides on cloud level
E backup copy resides on file system level
M backup copy resides on removable media (tape or optical)
blank backup copy does not exist

System action: The OSREQ QUERY function completed successfully.

Source: Object Access Method (OAM)

Routing Code: -

Descriptor Code: -

3.5.4 CBR0449I (New)

CBR0449I Backup2 location = *location-flag*

Explanation: The OSREQ QUERY request was issued and completed successfully. *location-flag* indicates where the second backup copy of the object resides.

location-flag values are interpreted as follows:
C backup2 copy resides on cloud level
E backup2 copy resides on file system level
M backup2 copy resides on removable media (tape or optical)
blank backup2 copy does not exist

System action: The OSREQ QUERY function completed successfully.

Source: Object Access Method (OAM)

Routing Code: -

Descriptor Code: -

3.5.5 CBR1297I (New)

CBR1297I OAM Cloud Tasks:

Explanation: The OAM cloud task information is:

```
CBR1297I OAM Cloud Tasks:
OAM PROCNAME: procname   OAM TASKID: taskid
TASKNAME   TASKADDR   ACTIVE   DURATION
tskname1   tcbaddr1     a       tttttttt
tskname2   tcbaddr2     a       tttttttt
```

The operator has entered the following command:

F *oam*,DISPLAY,CLOUD,TASK

A display of cloud task information has been generated. For a multiple OAM configuration, a line is shown to indicate for which OAM instance the status is being displayed:

procname

The name of the procedure used to start the OAM address space.

taskid

The task identifier provided when the address space was started (or the procname if no task identifier

was provided).

tsknamex

The cloud task name.

tcbaddrx

The cloud task address.

a

The cloud active status:

Y

The cloud task is active and has a work element to process.

N

The cloud task is not active and does not have a work element to process.

tttttttt

The duration in milliseconds that the task has been in the active state.

System action: None.

Source: Object Access Method (OAM)

Routing Code: -

Descriptor Code: 5,8,9

3.5.6 CBR1315D (New)

CBR1315D Task cancel command issued to cancel *oam* **task** *taskname* **at address** *tcbaddr***. Reply 'U' to continue, 'C' to cancel.**

Explanation: The operator has entered a command of the form:

`MODIFY` *`oam`*`,CANCEL,TASK,`*`taskname`*

This message is issued to confirm that the task *taskname* in OAM address space *oam* at address *tcbaddr* is to be canceled. Before confirming the cancelation of the task, acknowledge that any work being processed by this task may be lost and unexpected results could occur. Verify that the task cancelation is intended.

Note: This command is currently only applicable to cancel a cloud task.

System action: The OAM operator command processing component waits for a response from the operator.

Operator response: Rely 'U' to confirm the task cancelation or 'C' to cancel the cancelation.

Source: Object Access Method (OAM)

Routing Code: -

Descriptor Code: 2

3.5.7 CBR1316I (New)

CBR1316I *oam* **task** *taskname* **at address** *tcbaddr* **cancel unsuccessful. CALLRTM macro return code =** *rtncode***.**

Explanation: Task cancelation request has been issued to cancel task *taskname* in OAM address space *oam* at address *tcbaddr*. The cancelation is unsuccessful and the CALLRTM macro used to cancel the task has a return code *rtncode*. For more details of the return code, refer to *z/OS MVS Programming: Authorized Assembler Services Reference ALE-DYN* for more information.

System action: None.

Source: Object Access Method (OAM)

Routing Code: -

Descriptor Code: 5

3.5.8 CBR1317I (New)

CBR1317I *oam* **task** *taskname* **at address** *tcbaddr* **has been canceled.**

Explanation: Task cancelation request has been issued to cancel task *taskname* in OAM address space *oam* at address *tcbaddr*. The cancelation is successful, and the task has been canceled.

System action: None.

Source: Object Access Method (OAM)

Routing Code: -

Descriptor Code: 5

3.5.9 CBR1318I (New)

CBR1318I Task name *taskname* **is not a valid cloud task name.**

Explanation: Task cancelation request has been issued to cancel task *taskname*. The task name *taskname* is not a valid cloud task name. The task cancelation request is rejected.

Note: the task cancel command is currently only applicable to cancel a cloud task.

System action: None.

Source: Object Access Method (OAM)

Routing Code: -

Descriptor Code: 5

3.5.10 CBR6502I (Changed)

CBR6502I *taskid* file system {write | read} request failed for collection *collectname*, object *object-name*, and {object | backup} storage group *storage-groupname*. L2TYPE or L2DIR is not specified for this storage group in SETDISK statement in PARMLIB member.

Explanation: During an attempt by OAM address space *taskid* to write or read an object to or from disk sublevel 2, an error occurred that prevented successful completion of the request. The failure occurred because keyword L2TYPE or L2DIR was not specified on a SETDISK statement in PARMLIB member CBROAMxx for the indicated storage group. You must specify both L2TYPE and L2DIR to configure disk sublevel 2.
The name of the collection is *collect-name*, the name of the object that was being processed is *object-name* and the name of the object or backup storage group is *storage-group-name*.

…

3.5.11 CBR6503I (Changed)

CBR6503I *taskid* file system {write | read | delete} request failed for file system task *task-name*, collection *collect-name*, object *object-name*, L2TYPE *l2type-name*, L2DIR *l2dir-name*, and {object | backup} storage group *storagegroupname*. OAM return code = *return-code*, reason code = *reason-code*, additional return code = *additional-return- code*, additional reason code = *additional-reason-code*.

Explanation: During an attempt by OAM address space *taskid* to write, read, or delete an object to or from disk sublevel 2, an error occurred that prevented successful completion of the write, read, or delete request. The file system task processing the request is *task-name*. For write and read requests, the task name is in the format of FST#*nn*, where *nn* is the file system task ID. For delete, the task name is CBREFSDT. The name of the collection is *collect-name*, the name of the object that was being written, read, or deleted is *object-name*, the disk sublevel 2 file system type is *l2type-name*, the disk sublevel 2 directory is specified as *l2dir-name*, and the name of the object or backup storage group is *storage-group-name*.

…

3.5.12 CBR6522I (Changed)

CBR6522I *taskid* **File Storage Delete Task has temporarily suspended processing file deletes for storage group** *group* **because the {storage | backup1 | backup2} group is {unknown | not file system enabled}.**

Explanation: One or more files associated with storage group *group* are scheduled for deletion, but the OAM File System Delete Task was unable to determine the ~~file system~~ path containing the files.

System action: OAM stops processing file ~~system~~ deletes for this storage group and continues with the next storage group. The file deletes which could not be processed will be attempted again on the next cycle of the File System Delete Task.

Operator response: Notify the system programmer.

System programmer response: Define the storage group and/or identify it as being file system enabled, then restart OAM. If the storage group is unknown, the most likely cause is that it is not defined to SMS. If it is not file system enabled, the most likely cause is that the CBROAMxx PARMLIB member does not contain a SETDISK statement defining the storage group as file system enabled.

~~**Programmer response:** None.~~

~~**Module:** None.~~

Source: Object Access Method (OAM)

Routing Code: 2,4,6

Descriptor Code: 4

3.5.13 CBR9123I (Changed)

CBR9123I A {Read | Write} error occurred during storage management processing for {PRIMARY|BACKUP|BACKUP2} for collection *collection-name***, object** *object-name***, with instance id** *inst-id***, in Storage Group** *storagegroup-name* **within file system directory** *dir-name***, of type** *dir-type***. The return code is** *return-code* **and the reason code is** *reason-code***.**

Explanation: An error was detected during processing in preparation of a file system read or write request. Retries were attempted and were also unsuccessful. The error may be due to a problem with the configuration database, the operating environment, or with the file system. If this was a write error, the *inst-id* will be N/A.

System action: OAM storage management component (OSMC) stops, except where otherwise noted.

Operator response: Refer to the “OAM Macro Return and Reason Codes” section under “OAM Diagnostic Aids” in *z/OS DFSMSdfp Diagnosis* and inspect other messages that are issued by OAM to aid in solving this problem. If necessary, contact your system programmer.

System programmer response: If necessary, contact your programming support personnel.

Source: Object Access Method (OAM)

Routing Code: 2