

DICOM Correction Proposal Form

Correction Number CP-309	
Log Summary: Query for SOP Instance UID of alternate lossy compressed image	
Type of Modification Addition	Name of Standard PS3.3, PS3.4, PS3.6, PS3.16 2003
Rationale for Correction <p>When an image is lossy compressed, e.g., for long term archive purposes, its SOP Instance UID must be changed. However, all references to the image from other DICOM objects, e.g., from SR, KIN, GSPS, etc., are to the old UID. A mechanism is needed to effectively manage the traceability from the original UID to the UID of the lossy compressed version of the image, and vice versa.</p> <p>This Change Proposal adds a reference to an alternate encoding of the object to the query response at the Image level. It also allows the Query SCP to indicate that an image is not available.</p> <p>Note that the Source Image Sequence (0008,2112) allows the compressed image to point back to the source, but there is no attribute that encodes the reverse source to compressed image pointer, which is the critical attribute for tracing from a dead reference to a live one.</p>	
Sections of documents affected PS 3.3 Annex C PS 3.4 Annex C PS3.6 Section 6 PS3.16 Annexes B and D	
Correction Wording:	

Modify Note in PS3.3 Section C.7.6.1.1.3:

C.7.6.1.1.3 Derivation Description

...

- Notes: **1.** Examples of Derived Images that would normally be expected to affect professional interpretation and would thus have a new UID include:
- images resulting from image processing of another image (e.g. unsharp masking),
 - a multiplanar reformatted CT image,
 - a DSA image derived by subtracting pixel values of one image from another.
 - an image that has been decompressed after having been compressed with a lossy compression algorithm. To ensure that the user has the necessary information about the lossy compression, the approximate compression ratio may be included in Derivation Description (0008,2111).

An example of a Derived Image that would normally not be expected to affect professional interpretation and thus would not require a new UID is an image that has been padded with additional rows and columns for more display purposes.

2. An image may be lossy compressed, e.g., for long term archive purposes, and its SOP Instance UID changed. PS3.4 provides a mechanism by which a query for the original image Instance may return a reference to the UID of the lossy compressed version of the image using the Alternate Representation Sequence (0008,3001). This allows an application processing a SOP Instance that references the original image UID, e.g., a

Structured Report, to obtain a reference to an accessible version of the image even if the original SOP Instance is no longer available.

Modify PS3.4 Section C.3.4:

C.3.4 Additional Query/Retrieve Attributes

Some optional attributes ~~which that~~ may be used in Query/Retrieve Information Models that are not Attributes of an Information Object Definition and, therefore, are not defined in PS 3.3. These attributes are defined in Table C.3-1.

**Table C.3-1
ADDITIONAL QUERY/RETRIEVE ATTRIBUTES**

Attribute Name	Tag	Attribute Description
Number of Patient Related Studies	(0020,1200)	The number of studies that match the Patient level Query/Retrieve search criteria
Number of Patient Related Series	(0020,1202)	The number of series that match the Patient level Query/Retrieve search criteria
Number of Patient Related Instances	(0020,1204)	The number of composite object instances that match the Patient level Query/Retrieve search criteria
Number of Study Related Series	(0020,1206)	The number of series that match the Study level Query/Retrieve search criteria
Number of Series Related Instances	(0020,1209)	The number of composite object instances in a Series that match the Series level Query/Retrieve search criteria
<u>Alternate Representation Sequence</u>	<u>(0008,3001)</u>	<u>A Sequence of Items, each identifying an alternate encoding of an image that matches the Instance level Query/Retrieve search criteria (see C.6.1.1.5.1)</u>

Note: — ~~The use of the word “Images” rather than “composite object instances” is historical, and should not be taken to mean that composite object instances of other than image type are not included in the number.~~

If the SCP manages images in multiple alternate encodings, only one of the alternate encodings of an image is included in the number of object instances.

Modify PS3.4 Section C.4.1.1.3.2:

C.4.1.1.3.2 Response Identifier Structure

...

The C-FIND SCP may also, but is not required to, support the Instance Availability (0008,0056) Data Element. This Data Element shall not be included in a C-FIND request. An Identifier in a C-FIND response may contain:

- Instance Availability (0008,0056) which defines how rapidly composite object instance(s) become available for transmission after a C-MOVE or C-GET retrieval request. This element pertains to the set of composite object instances available at

the Query/Retrieve Level specified in the Identifier of the C-FIND request (e.g. Patient, Study, Series, Composite object instance). When some composite instances are less rapidly available than others, the availability of the least rapidly available shall be returned. If this Data Element is not returned, the availability is unknown or unspecified. A null value (Data Element length of 0) is not permitted. The Enumerated Values for this Data Element are:

- “ONLINE” which means the instances are immediately available,
- “NEARLINE” which means the instances need to be retrieved from relatively slow media such as optical disk or tape,
- “OFFLINE” which means the instances need to be retrieved by manual intervention.
- **“UNAVAILABLE” which means the instances cannot be retrieved. Note that SOP Instances that are unavailable may have an alternate representation that is available (see section C.6.1.1.5.1).**

Modify PS3.4 Section C.4.1.3.1:

C.4.1.3.1 Baseline behavior of SCP

...
An SCP conveys the following semantics with a C-FIND response:

- ...
- If the SCP receives C-FIND-CANCEL indication before it has completed the processing of the matches it shall interrupt the matching process and return a status of Canceled.
- **If the SCP manages images in multiple alternate encodings (see C.6.1.1.5.1), only one of the alternate encodings of an image shall be included in the set of matches for a C-FIND request at the Instance level.**

Note: **For query of images with alternate encodings, the SCP may select the appropriately encoded Instance for the request response based on identity of the SCU or other factors.**

Modify PS3.4 Section C.4.2.3.1:

C.4.2.3.1 Baseline Behavior of SCP

An SCP conveys the following semantics with a C-MOVE response:

- ...
- The SCP may receive a C-MOVE-CANCEL request at any time during the processing of the C-MOVE. The SCP shall interrupt all C-STORE sub-operation processing and return a status of Canceled in the C-MOVE response. The C-MOVE response with a status of Canceled shall contain the number of Successful, Failed, and Warning C-STORE sub-operations. If present, the Remaining sub-operations count shall contain the number of C-STORE sub-operations which were not initiated due to the C-MOVE-CANCEL request.
- **If the SCP manages images in multiple alternate encodings (see C.6.1.1.5.1), only one of the alternate encodings of an image shall be included in the set of object instances retrieved by a C-MOVE request at the Patient, Study, or Series level.**

Notes: **1. For retrieval of images with alternate encodings using a C-MOVE request at the Patient, Study, or Series level, the SCP may select the appropriately encoded Instance for the retrieval based on identity of the SCU, transfer syntaxes accepted in the C-STORE Association Negotiation, or other factors.**

2. If the association on which the C-MOVE operation was issued is abnormally terminated, then it will not be possible to issue any further pending responses nor a final response, nor will C-MOVE-CANCEL requests be received. The behavior of the C-MOVE SCP acting as a C-STORE SCU is undefined in this condition. Specifically, whether or not any uncompleted C-STORE sub-operations continue is undefined.

Modify PS3.4 Section C.4.2.3.1:

C.4.3.3.1 Baseline Behavior of SCP

An SCP conveys the following semantics with a C-GET response:

- ...
- The SCP may receive a C-GET-CANCEL request at any time during the processing of the C-GET request. The SCP shall interrupt all C-STORE sub-operation processing and return a status of Canceled in the C-GET response. The C-GET response with a status of Canceled shall contain the number of Successful, Failed, and Warning C-STORE sub-operations. If present, the Remaining sub-operations count shall contain the number of C-STORE sub-operations which were not initiated due to the C-GET-CANCEL request.
- **If the SCP manages images in multiple alternate encodings (see C.6.1.1.5.1), only one of the alternate encodings of an image shall be included in the set of object instances retrieved by a C-GET request at the Patient, Study, or Series level.**

Note: For retrieval of images with alternate encodings using a C-GET request at the Patient, Study, or Series level, the SCP may select the appropriately encoded Instance for the retrieval based on identity of the SCU, transfer syntaxes accepted in the C-STORE Association Negotiation, or other factors.

Modify PS3.4 Table C.6-4:

**Table C.6-4
 COMPOSITE OBJECT INSTANCE LEVEL KEYS FOR THE PATIENT
 ROOT QUERY/RETRIEVE INFORMATION MODEL**

Description	Tag	Type
...		
SOP Instance UID	(0008,0018)	U
<u>Alternate Representation Sequence</u>	<u>(0008,3001)</u>	<u>O</u>
<u>>Series Instance UID</u>	<u>(0020,000E)</u>	<u>O</u>
<u>>SOP Class UID</u>	<u>(0008,1150)</u>	<u>O</u>
<u>>SOP Instance UID</u>	<u>(0008,1155)</u>	<u>O</u>
<u>>Purpose of Reference Code Sequence</u>	<u>(0040,A170)</u>	<u>O</u>
<u>>>Code Value</u>	<u>(0008,0100)</u>	<u>O</u>
<u>>>Coding Scheme Designator</u>	<u>(0008,0102)</u>	<u>O</u>
<u>>>Coding Scheme Version</u>	<u>(0008,0103)</u>	<u>O</u>
<u>>>Code Meaning</u>	<u>(0008,0104)</u>	<u>O</u>
...		

All Other Attributes at composite object instance Level		O
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Add new subsection to PS3.4 Annex C

C.6.1.1.5.1 Alternate Representation Sequence

The Alternate Representation Sequence (0008,3001) encodes a reference to an alternate encoding of the composite image identified in the Query response item. This alternate encoding may utilize a different SOP Class or have different image quality characteristics, but it shall be the same image.

Note: The Alternate Representation Sequence allows the query response about an original image to reference a lossy compressed version, and vice versa.

An image may be lossy compressed, e.g., for long-term archive purposes, and its SOP Instance UID changed. An application processing a SOP Instance that references the original image UID, e.g., a Structured Report, may query the C-FIND SCP for the image. The SCP returns a reference to an accessible version of the image even if the original SOP Instance is no longer available.

The Alternate Representation Sequence, if present in a Query Request Identifier, shall be zero-length, or shall contain a single zero-length Item. That is, only Universal Matching is defined for this attribute.

The Alternate Representation Sequence, if present in the Query Response Identifier, may include zero or more Items. Each Alternate Representation Sequence Item in the Query Response Identifier shall include

- the Series Instance UID if the alternately encoded image is in a different Series.
- the SOP Class and Instance UIDs of the alternately encoded image.
- the Purpose of Reference Code Sequence (0040,A170), which shall describe the nature of the alternate encoding of the image. The Purpose of Reference Code Sequence shall include only one Item. The Baseline Context Group for this Code Sequence is CID 7205.

Add new data element to PS3.6 Section 6

(0008,3001) Alternate Representation Sequence SQ 1

Add new Context Group to PS3.16 Annex B

Context ID 7205

PURPOSE OF REFERENCE TO ALTERNATE REPRESENTATION

Type: Extensible

Version: 2004mdd

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
DCM	121324	Source image
DCM	121325	Lossy compressed image
DCM	121326	Alternate SOP Class instance
DCM	121327	Full fidelity image
DCM	121328	Alternate Photometric Interpretation image

Add new Controlled Terminology to PS3.16 Annex D

121324	Source Image	Image used as the source for a derived or compressed image
121325	Lossy compressed image	Image encoded with a lossy compression transfer syntax
121326	Alternate SOP Class instance	SOP Instance encoded with a different SOP Class but otherwise equivalent data
121327	Full fidelity image	Full fidelity image, uncompressed or lossless compressed
121328	Alternate Photometric Interpretation image	Image encoded with a different photometric interpretation