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Correction Number CP-2280
Log Summary: Relax requirement to provide default Transfer Syntax if uncompressed encapsulated Transfer Syntax image is too large
Name of Standard PS3.5, PS3.18
Rationale for Correction: CP 2083 added an uncompressed encapsulated Transfer Syntax for encoding very large pixel data that exceeds the limits of a single Default Transfer Syntax image, but failed to update the requirements in PS3.5 and PS3.18 regarding the (lack of a) need to propose the Default Transfer Syntax in the manner that CP 1704 did for lossless compressed pixel data. Extend CP 1704 changes to include the uncompressed encapsulated Transfer Syntax and propagate corresponding changes to PS3.18 (in the manner of CP 1900).
Correction Wording:

*Amend DICOM PS3.5 as follows (changes to existing text are bold and **underlined** for additions and **~~struckthrough~~** for removals):*

10.1 DICOM Default Transfer Syntax

DICOM defines a Default Transfer Syntax, the DICOM Implicit VR Little Endian Transfer Syntax (identified by Transfer Syntax UID = "1.2.840.10008.1.2"), which shall be supported by every conformant DICOM Implementation. This implies that:

a. If an Application Entity issues an A-ASSOCIATE request, it shall offer the DICOM Implicit VR Little Endian Transfer Syntax in at least one of the Presentation Contexts associated with each offered Abstract Syntax.

Note

Offering Abstract Syntax (AS1) in two Presentation Contexts with Transfer Syntaxes (TS1) and (TS2) is not valid, but offering AS1-TS1, AS1-TS2 and AS1-TSD is valid because the DICOM Default Little Endian Transfer Syntax (TSD) is present in at least one of the Presentation Contexts that are based on Abstract Syntax (AS1).

b. If an Application Entity receives an A-ASSOCIATE indication corresponding to a request that follows the requirements specified in Section 10.1 (a), every Presentation Context related to a given Abstract Syntax cannot be rejected in an A-ASSOCIATE response for the reason that none of the Transfer Syntaxes are supported.

Note

When Abstract Syntax (AS1) is offered in three Presentation Contexts with Transfer Syntaxes (TS1), (TS2) and (TSD), the DICOM Default Little Endian Transfer Syntax (TSD) can be rejected if at least one of the other Presentation Contexts for Abstract Syntax (AS1) is accepted.

Both of these requirements, (a) and (b), are waived when the Application Entity sending the pixel data has only access to the pixel data in lossy compressed form or the pixel data in a lossless compressed **or encapsulated uncompressed** form that is of such length that it cannot be encoded in the Default Transfer Syntax, and a Transfer Syntax that uses a pixel data reference is not offered.

Requirement (b) to accept the Default Transfer Syntax is waived if a Transfer Syntax that uses a pixel data reference is offered.

Note

In other words, every sending AE is required to be able to convert any Data Set it is going to transmit into the Default Transfer Syntax, regardless of the form in which it originally received or stored the Data Set, except in the cases of when the decompressed **or unencapsulated** Pixel Data is too large to encode in the Default Transfer Syntax or is received in a lossy compressed form. In the case of lossy compressed Pixel Data, the sending AE is permitted to propose only the lossy compressed Transfer Syntax appropriate to the lossy form that was received. In the case of lossless compressed **or encapsulated uncompressed** Pixel Data that is too large to encode in the Default Transfer Syntax, the sending AE is permitted to propose any appropriate lossless compression Transfer Syntax **or encapsulated uncompressed Transfer Syntax**, not necessarily that in which the image was received, as an alternative to the Default Transfer Syntax.

This waiver does not apply to Data Sets received in a lossless compressed **or encapsulated uncompressed** form if the decompressed **or unencapsulated** Pixel Data is small enough to encode in the Default Transfer Syntax, which means that any AE receiving a Data Set in a lossless compressed Transfer Syntax **or encapsulated uncompressed Transfer Syntax** that needs to re-send the Data Set is required to be able to decompress **or unencapsulate** it in order to support (at least) the Default Transfer Syntax.

Similar concerns apply to the Web Services transactions and are addressed by specific requirements in PS3.18.

A.4.11 Encapsulated Uncompressed Explicit VR Little Endian

The DICOM Transfer Syntax for Encapsulated Uncompressed Explicit VR Little Endian encodes a stream of one or more frames of uncompressed pixel data as Encapsulated fragments, and shall be identified by a UID of "1.2.840.10008.1.2.1.98".

If the object allows multi-frame images in the pixel data field, then each frame shall be encoded separately. Each frame shall be encoded in one and only one Fragment (see ???).

Within the Item Value of each Fragment (frame), the PixelData shall be encoded in the same manner as if it were encoded in Native format, including byte order, and padding to an even Item Length. OB VR shall be used, as required for all Encapsulated Format Transfer Syntaxes.

*Amend DICOM PS3.18 as follows (changes to existing text are bold and **underlined** for additions and **~~struckthrough~~** for removals):*

8.7.3 DICOM Media Type Sets

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If a Transfer Syntax parameter for a DICOM Media Type is not specified in a request or response, the Transfer Syntax in the response shall be the Transfer Syntax specified as the default for the Resource Category and media type combination in ???, ??? or ???, unless the origin server has only access to the pixel data in lossy compressed form or the pixel data in a lossless compressed **or encapsulated uncompressed** form that is of such length that it cannot be encoded in the Explicit VR Little Endian Transfer Syntax.

???, ???, ???, and ??? specify the media types used to encode different representations of DICOM Instances. These media types apply to all Resource Categories and have default encodings for images and video data elements contained in the Instances.

8.7.3.1 Instance Media Types

...

??? specifies the default and optional Transfer Syntax UID combinations for each DICOM Resource Category (see ???). The default media type for the Resource Category shall be returned when the origin server supports none of the Acceptable Media Types, unless the origin server has only access to the pixel data in lossy compressed form or the pixel data in a lossless compressed **or encapsulated uncompressed** form that is of such length that it cannot be encoded in the Explicit VR Little Endian Transfer Syntax.

...

8.7.3.3 Bulkdata Media Types

...

The Selected Media Type will be the default media type for the Resource Category when the origin server supports none of the Acceptable Media Types, as described in ???, unless the origin server has only access to the pixel data in lossy compressed form or the pixel data in a lossless compressed **or encapsulated uncompressed** form that is of such length that it cannot be encoded in the Explicit VR Little Endian Transfer Syntax.

The origin server may support additional Transfer Syntaxes.

If no media type Transfer Syntax parameter is specified, then the Explicit VR Little Endian Transfer Syntax "1.2.840.10008.1.2.1" shall be used, unless the origin server has only access to the pixel data in lossy compressed form or the pixel data in a lossless compressed **or encapsulated uncompressed** form that is of such length that it cannot be encoded in the Explicit VR Little Endian Transfer Syntax.

...

8.7.3.4 Transfer Syntax

The Default Transfer Syntax for DICOM objects contained in a payload shall be Explicit VR Little Endian Uncompressed "1.2.840.10008.1.2.1". If the Transfer Syntax is not specified in a message, then the Default Transfer Syntax shall be used, unless the origin server has only access to the pixel data in lossy compressed form or the pixel data in a lossless compressed **or encapsulated uncompressed** form that is of such length that it cannot be encoded in the Explicit VR Little Endian Transfer Syntax.

Note

1. This is different from the Default Transfer Syntax defined in Section 10.1 “DICOM Default Transfer Syntax” in PS3.5, which is Implicit VR Little Endian.

2. Every origin server is required to be able to convert any Data Set it is going to return into the Explicit VR Little Endian Transfer Syntax, regardless of the form in which it originally received or stored the Data Set, except in the cases of

when the decompressed Pixel Data is too large to encode in the Explicit VR Little Endian Transfer Syntax or is received in a lossy compressed form. In the case of lossy compressed Pixel Data, the origin server is permitted to return the lossy compressed Transfer Syntax appropriate to the lossy form that was received. In the case of lossless compressed **or encapsulated uncompressed** Pixel Data that is too large to encode in the Explicit VR Little Endian Transfer Syntax, the origin server is permitted to return any appropriate lossless compression Transfer Syntax **or encapsulated uncompressed Transfer Syntax**, not necessarily that in which the image was received, as an alternative to the Explicit VR Little Endian Transfer Syntax.

3. If transcoding to the Explicit VR Little Endian Transfer Syntax, a VR of UN may be needed for the encoding of Data Elements with explicit VR whose value length exceeds 65534 (2^{16}-2) (FFFEH, the largest even length unsigned 16 bit number) but which are defined to have a 16 bit explicit VR length field. See Section 6.2.2 in PS3.5.

Implicit VR Little Endian, or Explicit VR Big Endian shall not be used.

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