### DICOM Correction Proposal

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<td>2021-09-03</td>
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<tr>
<td>Person Assigned</td>
<td>Clunie</td>
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<td>Jörg Riesmeier <a href="mailto:dicom@jriesmeier.com">dicom@jriesmeier.com</a></td>
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<td>Submission Date</td>
<td>2020-08-27</td>
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<tr>
<th>Correction Number</th>
<th>CP-2071</th>
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<tr>
<td>Log Summary</td>
<td>Clarify that Default Transfer Syntax can be rejected by an Association Acceptor</td>
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<td>Name of Standard</td>
<td>PS3.5 2021c</td>
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**Rationale for Correction:**

The DICOM standard clearly states that the Default Transfer Syntax (e.g. Implicit VR Little Endian for uncompressed pixel data) has to be supported by every DICOM Service Class Provider (SCP). However, this does not mean that this Transfer Syntax always has to be accepted by an Association Acceptor. It is proposed to add a Note that clarifies (based on an example) what is already defined in the standard. This seems to be required since some implementors mistakenly assume that the Default Transfer Syntax always has to be accepted.

*Editorial change:* the terms “Default Little Endian Transfer Syntax”, “Default Lossless JPEG Compression Transfer Syntax” and “Default Lossy JPEG Compression Transfer Syntax” should be used in a consistent manner.

*Editorial change:* The word “for” in the section titles of Section 10.2 to 10.17 should either be written with lower case “f” or upper case “F”. Currently, it is a mixture of both. It is proposed to use lower case.

**Correction Wording:**

**Change PS3.5 Section 10.1 to 10.4**

#### 10.1 DICOM Default Transfer Syntax

DICOM defines a default Transfer Syntax, the DICOM Implicit VR Little Endian 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 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 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 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, 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 form if the decompressed 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 that needs to re-send the Data Set is required to be able to decompress 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.

10.2 Transfer Syntax for a DICOM Default of Lossless JPEG Compression

DICOM defines a default for Lossless JPEG Image Compression, which uses a subset of coding Process 14 with a first-order prediction (Selection Value 1). It is identified by Transfer Syntax UID = "1.2.840.10008.1.2.4.70" and shall be supported by every DICOM implementation that chooses to support one or more of the lossless JPEG compression processes. This implies that:

a. If an Application Entity issues an A-ASSOCIATE request where any offered Abstract Syntaxes is associated in one or more Presentation Context with a JPEG lossless compression Transfer Syntax, at least one of the Presentation Contexts that include this Abstract Syntax, shall include the DICOM Default Lossless JPEG Compression Transfer Syntax and the DICOM Default Little Endian Transfer Syntax (uncompressed).

Note

Offering Abstract Syntax (AS1) in two Presentation Contexts with Transfer Syntaxes JPEG lossless (JL1) and (JL2) is not valid, but offering AS1-JL1, AS1-JL2, AS1-TSD, and AS1-JLD is valid because the DICOM Default JPEG Lossless JPEG Compression Transfer Syntax (JLD) and the DICOM Default Little Endian Transfer Syntax (TSD) are present in at least one of the Presentation Contexts that are based on Abstract Syntax (AS1).

b. If an Application Entity that supports one or more lossless JPEG Transfer Syntax receives an A-ASSOCIATE indication corresponding to a request that follows the requirements specified in Section 10.2 (a), every Presentation Context related to a given Abstract Syntax cannot be rejected in an A-ASSOCIATE response for the reason that the DICOM Default Lossless JPEG Compression Transfer Syntax is not supported.

Note

When Abstract Syntax (AS1) is offered in four Presentation Contexts with Transfer Syntaxes JPEG lossless (JL1) and (JL2) as well as (JLD) and (TSD), both the DICOM Default Lossless JPEG Compression Transfer Syntax (JLD) and 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.

10.3 Transfer Syntaxes for a DICOM Default of Lossy JPEG Compression

DICOM defines defaults for Lossy JPEG Image Compression, one for 8-bit images and the other for 12-bit images. JPEG coding Process 1 (identified by Transfer Syntax UID = "1.2.840.10008.1.2.4.50 ") is used for 8-bit images. JPEG coding Process 4 (identified by Transfer Syntax UID = "1.2.840.10008.1.2.4.51 ") is used for 12-bit images. This implies that:
a. If an Application Entity issues an A-ASSOCIATE request where any offered Abstract Syntaxes is associated in one or more Presentation Context(s) with a JPEG lossy compression Transfer Syntax, at least one of the Presentation Contexts that include this Abstract Syntax, shall include the appropriate DICOM Default Lossy JPEG Compression Transfer Syntax.

Note

1. Offering Abstract Syntax (AS1) in two Presentation Contexts with Transfer Syntaxes JPEG lossy (JL1) and (JL2) is not valid, but offering AS1-JL1, AS1-JL2 and AS1-JLD is valid because the DICOM Default JPEG Lossy JPEG Compression Transfer Syntax (JLD) is present in at least one of the Presentation Contexts that are based on Abstract Syntax (AS1).

2. The DICOM Default Little Endian Transfer Syntax (uncompressed) may be offered if the sender has access to the original pixel data in an uncompressed or lossless compressed form.

b. If an Application Entity that supports one or more Lossy JPEG Transfer Syntaxes receives an A-ASSOCIATE indication corresponding to a request that follows the requirements specified in Section 10.3 (a), every Presentation Context related to a given Abstract Syntax cannot be rejected in an A-ASSOCIATE response for the reason that the DICOM Default Lossy JPEG Compression Transfer Syntax is not supported.

Note

1. The 12 bit default Transfer Syntax 1.2.840.10008.1.2.4.51 can also be used to encode 8 bit images, but the bit stream required is not identical to that used in the 8 bit default Transfer Syntax 1.2.840.10008.1.2.4.50 (see A.4.1).

2. When Abstract Syntax (AS1) is offered in three Presentation Contexts with Transfer Syntaxes JPEG lossy (JL1) and (JL2) as well as (JLD), the DICOM Default JPEG Lossy Compression Transfer Syntax (JLD) can be rejected if at least one of the other Presentation Contexts for Abstract Syntax (AS1) is accepted.

10.4 Transfer Syntax for DICOM RLE Image Compression

DICOM defines the RLE Image Compression (see Annex G). This implies that:

a. If an Application Entity issues an A-ASSOCIATE request where any offered Abstract Syntaxes is associated in one or more Presentation Context(s) with RLE compression Transfer Syntax, at least one of the Presentation Contexts that include this Abstract Syntax, shall include the DICOM Default Little Endian Transfer Syntax (uncompressed).