Status	Final Text
Date of Last Update	2017/09/18
Person Assigned	David Clunie mailto:dclunie@dclunie.com
Submitter Name	David Clunie mailto:dclunie@dclunie.com
Submission Date	2016/12/05

Correction Number CP-1678
Log Summary: Use of JPEG Family Transfer Syntaxes rather than RLE for YBR_FULL
Name of Standard PS3.3, PS3.5 2017c
Rationale for Correction: Traditionally,the YBR_FULL Photometric Interpretation has been used only with the RLE Transfer Syntax and only for Ultrasound images. Further, for US images, the Planar Configuration for YBR_FULL is constrained to 1, since that is the only Planar Configuration used for RLE. The YBR_FULL Photometric Interpretation cannot be converted losslessly into RGB or YBR_RCT, so it is desirable to retain the YBR_FULL encoding when decompressing or recompressing with lossless/reversible JPEG family of Transfer Syntaxes. The JPEG family of Transfer Syntaxes use a Planar Configuration of 0, and there is no reason to constrain the Planar Configuration of uncompressed images. Accordingly, relax the constraint on US Planar Configuration in the IOD (but do not change the Media Application Profile). Note that there are currently no constrains on any other IODs wrt. use of YBR_FULL, only Ultrasound, and it is desirable that archives, toolkits and viewers be able to handle Photometric Interpretation, Planar Configuration and Transfer Syntaxes in a generic manner regardless of the IOD.
Correction Wording:

*Amend DICOM PS3.3 as follows (changes to existing text are bold and **underlined** for additions and ~~**struckthrough**~~ for removals):*

C.7.6.3.1.1 Samples Per Pixel

...

The data in each pixel may be represented as a "Composite Pixel Code". If Samples Per Pixel is one, the Composite Pixel Code is just the "n" bit pixel sample, where "n" = Bits Allocated. If Samples Per Pixel is greater than one, Composite Pixel Code is a "k" bit concatenation of samples, where "k" = Bits Allocated multiplied by Samples Per Pixel, and with the sample representing the vector color designated first in the Photometric Interpretation name comprising the most significant bits of the Composite Pixel Code, followed in order by the samples representing the next vector colors, with the sample representing the vector color designated last in the Photometric Interpretation name comprising the least significant bits of the Composite Pixel Code. For example, for Photometric Interpretation = "RGB", the most significant "Bits Allocated" bits contain the Red sample, the next "Bits Allocated" bits contain the Green sample, and the least significant "Bits Allocated" bits contain the Blue sample.

C.8.5.6.1.16 Planar Configuration

For US Images, Planar Configuration (0028,0006) is specified to use the following values for specific Photometric Interpretations:

Table C.8-23. US Planar Configuration

Photometric Interpretation	Planar Configuration Value
RGB	0 - color-by-pixel, or 1 - color-by-plane
YBR_FULL	**0 or 1 if uncompressed** **0 if lossless JPEG, lossless JPEG-LS or reversible JPEG 2000** 1 **if RLE**
YBR_FULL_422	0
YBR_PARTIAL_422	0
YBR_RCT	0
YBR_ICT	0
YBR_PARTIAL_420	0

For reference unchanged DICOM PS3.5:

A.4.2 RLE Compression

Annex G defines a RLE Compression Transfer Syntax. This transfer Syntax is identified by the UID value "1.2.840.10008.1.2.5". 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 Section 8.2).

G.2 Byte Segments

A Byte Segment is a series of bytes generated by decomposing the Composite Pixel Code (see PS3.3).

If the Composite Pixel Code is not an integral number of bytes in size, sufficient Most Significant zero bits are added to make it an integral byte size. This is known as the Padded Composite Pixel Code.

The first Segment is generated by stripping off the most significant byte of each Padded Composite Pixel Code and ordering these bytes sequentially. The second Segment is generated by repeating this process on the stripped Padded Composite Pixel Code continuing until the last Pixel Segment is generated by ordering the least significant byte of each Padded Component Pixel Code sequentially.

Note

1. If Photometric Interpretation (0028, 0004) equals RGB and Bits Stored equals 8, then three Segments are generated. The first one holds all the Red values, the second all the Green values, and the third all the Blue values.

2. The use of separate segments implies that the Planar Configuration (0028,0006) will always be 1 for RLE compressed images.

For reference unchanged DICOM PS3.11:

C.3.1.1 Ultrasound Single and Multi-frame Pixel Formats Supported

The STD-US application profile requires that all ultrasound image objects only be stored using the values described in PS3.3 US Image Module and the specializations used for the Ultrasound Single and Multi-Frame IODs.

In the role of FS-Updater or FS-Creator the application can choose any of the supported Photometric Interpretations described in PS3.3 US Image Module to create an IOD. In the role of FS-Reader, an application shall support all Photometric Interpretations described in PS3.3 US Image Module.

Table C.3-2 describes restrictions on the use of various Transfer Syntaxes with the supported Photometric Interpretations for both single and multi-frame images.

Table C.3-2. Defined Photometric Interpretation and Transfer Syntax Pairs

Photometric Interpretation Value	Transfer Syntax	Transfer Syntax UID
MONOCHROME2	Uncompressed RLE Lossless Image Compression	1.2.840.10008.1.2.1 1.2.840.10008.1.2.5
RGB	Uncompressed RLE Lossless Image Compression	1.2.840.10008.1.2.1 1.2.840.10008.1.2.5
PALETTE COLOR	Uncompressed RLE Lossless Image Compression	1.2.840.10008.1.2.1 1.2.840.10008.1.2.5
YBR_FULL	RLE Lossless Image Compression	1.2.840.10008.1.2.5
YBR_FULL_422	Uncompressed JPEG Lossy	1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50
YBR_PARTIAL_422	Uncompressed JPEG Lossy	1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50