

## DICOM Correction Proposal Form

Correction Number		CP-218
Log Summary: Compression Transfex Syntax for Structured Reporting		
Type of Modification	Name of Standard	
Addition	PS 3.5, 3.6	
Rationale for Correction		
<p>All existing compression transfer syntaxes only compress the pixel data.</p> <p>Structured reports are extremely redundant in their encoding, with considerable repetition of strings and tags. They can grow quite large, and may well be transmitted over lower bandwidth channels than used for images and stored in databases where size is a concern.</p> <p>Accordingly an existing, industry standard, compression process is proposed that is applied to the entire data set, not just the pixel data. The scheme proposed is the "deflate" algorithm widely used in the gzip and zip programs. It is not subject to any patent restrictions and requires no license fees. Freely available multi-platform implementations are available. The scheme is described in an Internet RFC.</p> <p>Experiments indicate that the scheme is extremely effective for structured reports, and moderately effective for waveforms, and given its universal availability, development of an alternative DICOM-specific scheme that understood and took advantage of the structure of the message (other than bulk data) cannot be justified. For images, it is not very effective.</p> <p>Examples of performance (testing deflate using "gzip -best"):</p> <ul style="list-style-type: none"><li>• A 36,112 byte structured report compressed to 3,014 bytes (11.98:1)</li><li>• A 62,450 12-lead ECG waveform compressed to 26,139 bytes (2.39:1)</li><li>• For a large range of images, deflate achieves 2.38:1 compression compared to lossless JPEG (SV 1) 2.79:1 and JPEG-LS 3.81:1.</li></ul> <p>A baseline requirement (on the network) for the uncompressed EVRLE transfer syntax is established above and beyond the existing requirement for the Default IVRLE transfer syntax, in order to ensure full-fidelity exchange of VR information.</p>		
Sections of documents affected		
PS 3.5 Section 2, Annex A		
PS 3.6 Annex A		
Correction Wording:		

### *Add to PS 3.5 Section 2, Normative References:*

RFC 1951

DEFLATE Compressed Data Format Specification version 1.3

Note: RFC 1951 is available from "<http://www.faqs.org/rfcs/rfc1951.html>".

*Add to PS 3.5 Annex A, Transfer Syntax Specifications:*

**A.5 DICOM DEFLATED LITTLE ENDIAN TRANSFER SYNTAX (EXPLICIT VR)**

This Transfer Syntax applies to the encoding of the entire DICOM Data Set.

The entire Data Set is first encoded according to the rules specified in Section A.2 DICOM Little Endian Transfer Syntax (Explicit VR).

The entire byte stream is then compressed using the “Deflate” algorithm defined in Internet RFC 1951.

- Notes:
1. The Pixel Data (7FE0,0010) is not handled in any special manner. The pixel data is first encoded as sequential uncompressed frames without encapsulation, and then is handled as part of the byte stream fed to the “defalte” compressor in the same manner as the value of any other attribute.
  2. This transfer syntax is particularly useful for compression of objects without pixel data, such as structured reports. It is not particularly effective at image compression, since any benefit obtained from compressing the non-pixel data is offset by less effective compression of the much larger pixel data.
  3. A freely available reference implementation of the “deflate” compressor may be found in the zlib package which may be downloaded from <ftp://ftp.uu.net/pub/archiving/zip/zlib/>.

In order to facilitate interoperability of implementations conforming to the DICOM Standard which elect to use this Transfer Syntax, the following policy is specified:

- Any implementation which has elected to support the Deflated Explicit VR Little Endian Transfer Syntax for any Abstract Syntax, shall also support the Explicit VR Little Endian Transfer for that Abstract Syntax

- Notes:
1. This requirement to support the (uncompressed) Explicit VR Little Endian Transfer Syntax is in order to ensure full-fidelity exchange of VR information in the case that the Association Acceptor does not support the Deflated Explicit VR Little Endian Transfer Syntax. The requirement specified in Section 10.1 of this part, that the Default Implicit VR Little Endian Transfer Syntax be supported by all implementations except those that only have access to lossy compressed pixel data, is not waived. In otherwords, an implementation must support all three transfer syntaxes.
  2. There are no such “baseline” requirements on media, since such requirements are at the discretion of the Media Application Profile. Furthermore, sufficient object “management” information should be present in the DICOMDIR even if an individual application cannot decompress an instance encoded with the deflated transfer syntax.

This DICOM Deflated Explicit VR Little Endian Transfer Syntax shall be identified by a UID of Value "1.2.840.10008.1.2.1.99"

*Add to PS 3.6 Annex A, Registry of UIDs:*

**Table A-1  
UID VALUES**

UID Value	UID NAME	UID TYPE	Part
1.2.840.10008.1.1	Verification SOP Class	SOP Class	PS 3.4

1.2.840.10008.1.2	Implicit VR Little Endian: Default Transfer Syntax for DICOM	Transfer Syntax	PS 3.5
1.2.840.10008.1.2.1	Explicit VR Little Endian	Transfer Syntax	PS 3.5
<b><u>1.2.840.10008.1.2.1.99</u></b>	<b><u>Deflated Explicit VR Little Endian</u></b>	<b><u>Transfer Syntax</u></b>	<b><u>PS 3.5</u></b>
1.2.840.10008.1.2.2	Explicit VR Big Endian	Transfer Syntax	PS 3.5
1.2.840.10008.1.2.4.50	JPEG Baseline (Process 1): Default Transfer Syntax for Lossy JPEG 8 Bit Image Compression	Transfer Syntax	PS 3.5
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