

DICOM Correction Item

Correction Number CP-548	
Log Summary: Notes on use of DS Value Representation for Large Arrays	
Type of Modification	Name of Standard
Clarification	PS 3 2004
<p>Rationale for Correction:</p> <p>The use of the DS value representation for arrays with large value multiplicity can result in data elements whose value exceeds the capacity of the 16-bit value length used for Explicit-VR transfer syntaxes.</p> <p>Data elements whose length is expected to exceed 65534 generally have one of the following VRs: OB, OW, OF, SQ, or UN. DICOM specifies the use of 32-bit value lengths for these VRs in Explicit-VR transfer syntaxes. For other VRs, value length is represented by only 16 bits in Explicit-VR transfer syntaxes. (For Implicit-VR transfer syntaxes, value length is always represented using 32 bits.)</p> <p>The "DVH Data" (3004,0058) data element in the RT DVH module (PS 3.3-2003 C.8.8.4) has a VR of DS (Decimal String). With each DS value using up to 16 bytes (plus one byte for delimiter), the largest number of elements that can be guaranteed to be represented safely with a 16-bit value length is 3855. When the maximum number of bytes is used for each value with a large number of DVH bins, this value can be exceeded.</p> <p>Other data elements which may also be vulnerable to the problem are the following: Compensator Transmission Data (300A,00EB) and Compensator Thickness Data (300A,00EC) in the RT PLAN module. Another, less likely, possibility is Block Data (300A,0106) in the RT PLAN and RT IMAGE modules.</p> <p>It is suggested that a note be added to the description of the DS value representation indicating this hazard.</p>	
<p>Sections of documents affected</p> <p>PS 3.3 Section C.7.6.5 (Cine Module) PS 3.3 Section C.8.6.4 (SC Multi-frame Vector Module) PS 3.3 Section C.8.8.4 (RT DVH Module) PS 3.3 Section C.8.8.6 (ROI Contour Module) PS 3.3 Section C.8.8.14 (RT Beams Module) PS 3.3 Section C.21.2 (Spatial Fiducials Module) PS 3.5 Section 6.2 (Value Representation)</p>	
Correction Wording:	

In PS 3.3, Table C.7-13 (CINE MODULE ATTRIBUTES), add the following note as indicated in bold:

Attribute Name	Tag	Type	Attribute Description
Frame Time Vector	(0018,1065)	1C	An array that contains the real time increments (in msec) between frames for a Multi-frame image. See C.7.6.5.1.2 for further explanation. Required if Frame Increment Pointer (0028,0009) points to Frame Time Vector. Note: Frame Time Vector arrays may not be properly encoded if Explicit-VR

			<u>transfer syntax is used and the VL of this attribute exceeds 65534 bytes.</u>
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In PS 3.3, Table C.8-25 (SC MULTI-FRAME VECTOR MODULE ATTRIBUTES), add the following note as indicated in bold:

Attribute Name	Tag	Type	Attribute Description
Frame Time Vector	(0018,1065)	1C	An array which contains the real time increments (in msec) between frames for a Multi-frame image. See C.7.6.5.1.2 for further explanation. Required if Frame Increment Pointer (0028,0009) points to Frame Time Vector (0018,1065). <u>Note: Frame Time Vector arrays may not be properly encoded if Explicit-VR transfer syntax is used and the VL of this attribute exceeds 65534 bytes.</u>

In PS 3.3, Table C.8-40 (RT DVH MODULE ATTRIBUTES), add the following note as indicated in bold:

Attribute Name	Tag	Type	Attribute Description
DVH Data	(3004,0058)	1	A data stream describing the dose bin widths D_n and associated volumes V_n in DVH Volume Units (3004,0054) in the order $D_1V_1, D_2V_2, \dots, D_nV_n$. <u>Note: DVH data arrays may not be properly encoded if Explicit-VR transfer syntax is used and the VL of this attribute exceeds 65534 bytes.</u>

In PS 3.3, Table C.8-42 (ROI CONTOUR MODULE ATTRIBUTES), add the following note as indicated in bold:

Attribute Name	Tag	Type	Attribute Description
Contour Data	(3006,0050)	1C	Sequence of (x,y,z) triplets defining a contour in the patient based coordinate system described in C.7.6.2.1.1 (mm). Required if Contour Sequence (3006,0040) is sent. See C.8.8.6.1 and C.8.8.6.3. <u>Note: Contour data may not be properly encoded if Explicit-VR transfer syntax is used and the VL of this attribute exceeds 65534 bytes.</u>

In PS 3.3, Table C.8-50 (RT BEAMS MODULE ATTRIBUTES), add the following note as indicated in bold:

Attribute Name	Tag	Type	Attribute Description
>>Compensator Transmission Data	(300A,00EB)	1C	A data stream of the pixel samples which comprise the compensator, expressed as broad-beam transmission values (between 0 and 1) along a ray line passing through the pixel, at the beam energy specified by

			<p>the Nominal Beam Energy (300A,0114) of the first Control Point of the Control Point Sequence (300A,0111). The order of pixels sent is left to right, top to bottom, i.e., the upper left pixel is sent first followed by the remainder of the first row , followed by the first pixel of the 2nd row, then the remainder of the 2nd row and so on) when viewed from the radiation source. Required if Compensator Sequence (300A,00E3) is sent and Material ID (300A,00E1) is zero length.</p> <p>Note: <u>Compensator Transmission Data arrays may not be properly encoded if Explicit-VR transfer syntax is used and the VL of this attribute exceeds 65534 bytes.</u></p>
>>Compensator Thickness Data	(300A,00EC)	1C	<p>A data stream of the pixel samples which comprise the compensator, expressed as thicknesses (in mm). The order of pixels sent is left to right, top to bottom, i.e., the upper left pixel is sent first followed by the remainder of the first row , followed by the first pixel of the 2nd row, then the remainder of the 2nd row and so on) when viewed from the radiation source. Required if Compensator Sequence (300A,00E3) is sent and Material ID (300A,00E1) is nonzero length. See C.8.8.14.9.</p> <p>Note: <u>Compensator Thickness Data arrays may not be properly encoded if Explicit-VR transfer syntax is used and the VL of this attribute exceeds 65534 bytes.</u></p>

In PS 3.3, Table C.21.2-1 (SPATIAL FIDUCIALS MODULE ATTRIBUTES), add the following note as indicated in bold:

Attribute Name	Tag	Type	Attribute Description
Contour Data	(3006,0050)	1C	<p>Specifies the coordinates of this item's fiducial. One triplet (x,y,z) shall be present for each point in the fiducial. See C.21.2.1.2 for further explanation. Required if Frame of Reference UID (0020,0052) is present in this item of the Fiducial Set Sequence (0070,031C). Shall not be present otherwise.</p> <p>Note: <u>Contour data may not be properly encoded if Explicit-VR transfer syntax is used and the VL of this attribute exceeds 65534 bytes.</u></p>

In PS 3.5, Table 6.2.1 (DICOM VALUE REPRESENTATIONS), add the following note as indicated in bold:

VR Name	Definition	Character Repertoire	Length of Value
DS	A string of charaters representing either a	"0"- "9", "+", "-",	16 bytes

Decimal String	<p>fixed point number or a floating point number. A fixed pointer number shall contain only the characters 0-9 with an optional leading "+" or "-" and an optional "." to mark the decimal point. A floating point number shall be conveyed as defined in ANSI X3.9, with an "E" or "e" to indicate the start of the exponent. Decimal Strings may be padded with leading or trailing spaces. Embedded spaces are not allowed.</p> <p><u>Note: Data Elements with multiple values using this VR may not be properly encoded if Explicit-VR transfer syntax is used and the VL of an attribute with this VR exceeds 65534 bytes.</u></p>	"E", "e", "." of Default Character Repertoire	maximum
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