VelocityAIS

DICOM Conformance Statement

1. Introduction

1.1 Purpose

Medical imaging devices claiming conformance to the DICOM standard must indicate in sufficient detail the service classes and information objects, as defined by the standard, to which they conform. This conformance statement specifies the conformance of the Velocity Medical Solutions' Velocity product line with the DICOM V 3.0 standard. The Velocity product family is a comprehensive suite of integrated applications, which cover aspects of medical imaging and radiotherapy. To support those functions, the most important diagnostic Imaging modalities as well as some of the radiotherapy (RT) objects defined by the DICOM standard are supported.

The VelocityAIS software application is used for the registration, fusion, annotation and display of medical images from multi-modalities. The VelocityAIS application supports the import of CT, MR, PT, and NM images; and supports the export of CT, MR, PT, and NM. VelocityAIS also supports import and export of RT Structure Sets.

VelocityAIS does not support any DICOM networking, either as SCU or SCP.

1.2 Scope

The scope and format of this document from chapter 2 onwards are defined by Part 2 of the DICOM V3.0 standard. Some sections defined in the standard that are not applicable to the software described herein are left out for clarity. This conformance statement can help the user understand the level of connectivity between VelocityAIS and other DICOM compatible devices

This conformance statement is written in accordance with Part 2 of DICOM, NEMA Standards Publication No. PS 3.2-2006.

1.3 Intended Audience

The intended audience is:

- Customers, who want to use DICOM with VelocityAIS
- Marketing and Sales persons
- System Integrators of medical equipment
- Other vendors offering interfacing via DICOM

It is assumed that the reader is familiar with the DICOM standard.

1.4 Definitions

This section provides the definitions of terms, acronyms, and abbreviations, which are used throughout the document.

AE	Application Entity
CT	Computed tomography images
DB	VelocityAIS application database
DICOM	Digital Imaging and Communications in Medicine, a standard on image communications in medical applications
DIMSE	DICOM Message Service element
FSC	File-set Creator
FSR	File-set Reader
IE	Information Entity
IOD	Information Object Definition
MR	Magnetic resonance imaging
NEMA	National Electrical Manufacturers Association
NM	Nuclear medicine imaging
PDU	Protocol Data Unit
PT	Positron emission tomography imaging
SCU	Service Class User
SCP	Service Class Provider
SOP	Service-Object-Pair, a definition of an information object (like an image) and of a service (like storage) that can be performed for the object
SPECT	Single photon emission computed tomography
TCP/IP	Transmission Control Protocol / Internet Protocol, a widely used computer networking protocol
VR	Value Representation, a data encoding method in DICOM; Multi-frame ImageImage that contains multiple two-dimensional pixel planes
UID	Unique Identifier used to identify an object by a worldwide unique identifier

1.5 Related Documents

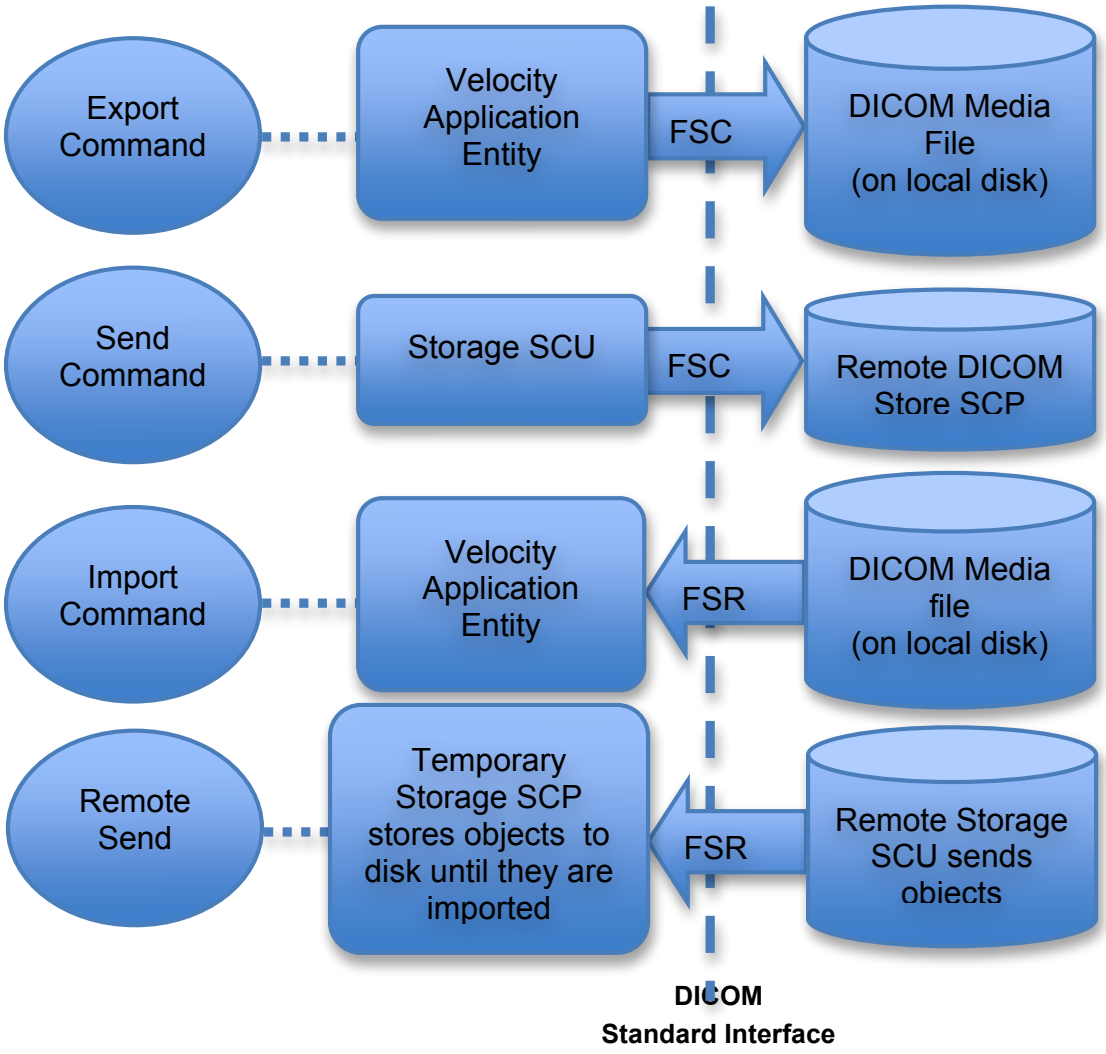
[1] Digital Imaging and Communications in Medicine (DICOM), Parts 1-14 (2006), National Electrical Manufacturers Association (NEMA) Rosslyn, VA United States of America.

2. Implementation Model

This implementation provides for reading information object definitions from media storage in the DICOM Part 10 file format. DICOM communications support is limited to a C-STORE SCP and SCU.

2.1 Application Data Flow Diagram

DICOM objects can only be read from a storage disk when Velocity software performs an import command. An operator can however export to a DICOM file on disk, or send objects to a remove DICOM Store SCP over a TCP/IP network. Clients can also send DICOM objects to VelocityAIS, which will store the files in the local file system, until the operator chooses to import the DICOM inbox.



2.2 Functional definitions of AE's

The Velocity Application Entity is responsible for the DICOM file import and export of DICOM objects from and to other systems. Those functions are operated by the user invoking the Import/Export functions in a Velocity Application

3. AE Specifications

The VelocityAIS is compliant as a Service Class User.

3.1 VelocityAIS Specification

The Velocity Application Entity provides standard conformance to the following DICOM V3.0 SOP classes:

SOP Class Name	FSC/FSR Role	SOP Class UID
Computed Radiography Image Storage	FSR	1.2.840.10008.5.1.4.1.1.1
CT Image Storage	FSC/FSR	1.2.840.10008.5.1.4.1.1.2
Encapsulated PDF Storage	FSC/FSR	1.2.840.10008.5.1.4.1.1.104.1
Deformable Spatial Registration Storage	FSC/FSR	1.2.840.10008.5.1.4.1.1.66.3
MR Image Storage	FSC/FSR	1.2.840.10008.5.1.4.1.1.4
Nuclear Medicine Image Storage	FSC/FSR	1.2.840.10008.5.1.4.1.1.20
Positron Emission Image Storage	FSC/FSR	1.2.840.10008.5.1.4.1.1.128
Spatial Registration Storage	FSC/FSR	1.2.840.10008.5.1.4.1.1.66.1
Ultrasound Image Storage	FSR	1.2.840.10008.5.1.4.1.1.6.1
Ultrasound Multiframe Image Storage	FSR	1.2.840.10008.5.1.4.1.1.3.1
X-Ray Angiographic Image Storage	FSR	1.2.840.10008.5.1.4.1.1.12.1
RT Beams Treatment Record Storage	FSR	1.2.840.10008.5.1.4.1.1.481.4
RT Dose Storage	FSR	1.2.840.10008.5.1.4.1.1.481.2
RT Image Storage	FSR	1.2.840.10008.5.1.4.1.1.481.1
RT Plan Storage	FSR	1.2.840.10008.5.1.4.1.1.481.5
RT Structure Set Storage	FSC/FSR	1.2.840.10008.5.1.4.1.1.481.3
RT Treatment Summary Record Storage	FSR	1.2.840.10008.5.1.4.1.1.481.7

3.1.1 Association Establishment Policies

3.1.1.1 General

The VelocityAIS software is started by an operator launching the application and selecting a DICOM Object file on disk to import. After executing the Import command, the VelocityAIS will read the DICOM file from disk only if it is a valid DICOM file. If the file is not a DICOM formatted file, VelocityAIS will not read the file.

3.1.1.2 Number of Associations

VelocityAIS will read only one DICOM image object at a time.

3.1.1.3 Asynchronous Nature

Asynchronous mode is not supported. All operations will be performed synchronously.

3.1.1.4 Implementation Identifying Information

No implementation information.

3.1.2 Association Initiation Policy

The VelocityAIS software initiates associations by reading the File Meta Information header and verifying that the file format is a valid DICOM file.

3.1.3 Association Acceptance Policy

There is only one Real World Activity which causes association establishment. This is when VelocityAIS determines the file is a valid DICOM image object.

3.1.3.1 Remote connection to VelocityAIS

3.1.3.1.1 Associated Real World Activity

The Associated Real World Activity is the attempt to import/export a DICOM object.

3.1.3.1.2 Acceptable presentation contexts.

The table below indicates which presentation contexts will be accepted by the VelocityAIS software.

Presentation Context Table

Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	**UID**	**Name List**	**UID list**		
See Note	See Note	DICOM Implicit VR Big and Little Endian	1.2.840.10008.1.2	SCU	None

NOTE: The Abstract Syntax corresponds to the SOP Class UID specified in the header of the plan file to be read.

3.1.3.1.2.1 SOP Specific Conformance

VelocityAIS provides standard conformance to the DICOM RT Plan Information Object Definition and DICOM Part 10 File Format.

3.1.3.1.3 Presentation Context Acceptance Criteria

No criterion.

3.1.3.1.4 Transfer Syntax Acceptance Criteria

VelocityAIS accepts the following Transfer Syntaxes.

Supported Transfer Syntax	UID
Implicit VR Little Endian	1.2.840.10008.1.2
Explicit VR Little Endian	1.2.840.10008.1.2.1
Explicit VR Big Endian	1.2.840.10008.1.2.2
JPEG Baseline (Process 1): Default Transfer Syntax for Lossy JPEG 8 Bit Image Compression	1.2.840.10008.1.2.4.50
JPEG Extended (Process 2 & 4): Default Transfer Syntax for Lossy JPEG 12 Bit Image Compression (Process 4 only)	1.2.840.10008.1.2.4.51
JPEG Extended (Process 3 & 5)	1.2.840.10008.1.2.4.52
JPEG Spectral Selection - Non-Hierarchical (Process 6 & 8)	1.2.840.10008.1.2.4.53
JPEG Spectral Selection - Non-Hierarchical (Process 7 & 9)	1.2.840.10008.1.2.4.54
JPEG Full Progression - Non-Hierarchical (Process 10 & 12)	1.2.840.10008.1.2.4.55
JPEG Full Progression - Non-Hierarchical (Process 11 & 13)	1.2.840.10008.1.2.4.56
JPEG Lossless - Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57
JPEG Lossless - Non-Hierarchical (Process 15)	1.2.840.10008.1.2.4.58
JPEG Extended - Hierarchical (Process 16 & 18)	1.2.840.10008.1.2.4.59
JPEG Extended - Hierarchical (Process 17 & 19)	1.2.840.10008.1.2.4.60
JPEG Spectral Selection - Hierarchical (Process 20 & 22)	1.2.840.10008.1.2.4.61
JPEG Spectral Selection - Hierarchical (Process 21 & 23)	1.2.840.10008.1.2.4.62
JPEG Full Progression - Hierarchical (Process 24 & 26)	1.2.840.10008.1.2.4.63
JPEG Full Progression - Hierarchical (Process 25 & 27)	1.2.840.10008.1.2.4.64
JPEG Lossless - Hierarchical (Process 28)	1.2.840.10008.1.2.4.65
JPEG Lossless - Hierarchical (Process 29)	1.2.840.10008.1.2.4.66
JPEG Lossless - Non-Hierarchical First-Order Prediction (Process 14 [Selection Value 1]): Default Transfer Syntax for Lossless JPEG Image Compression	1.2.840.10008.1.2.4.70
JPEG-LS Lossless Image Compression	1.2.840.10008.1.2.4.80
JPEG-LS Lossy (Near-Lossless) Image Compression	1.2.840.10008.1.2.4.81
RLE Lossless	1.2.840.10008.1.2.5
Deflated Explicit VR Little Endian	1.2.840.10008.1.2.1.99

4. Communications Profiles

4.1 Supported Communications Stacks (Parts 8)

DICOM network communication support is limited to C-STORE SCU and SCP in VelocityAIS.

4.2 TCP/IP Stack

The TCP/IP stack is inherited from the host Operating System.

4.2.1 Physical Media Support

Any host Operating System supported physical media.

5. Extensions/Specializations/Privatization

No extensions, specializations, or privatization are used in this implementation.

6. Configuration

AE Title, client IP address, client port, and server port are configurable in VelocityAIS.

6.1 Support for Character Sets

When an unsupported character set is received, the implementation assumes ISO-IR 6 encoding. All supported character sets are converted to Unicode internally. DICOM files generated by VelocityAIS are all encoded as per ISO-IR 6. Note that Single-Byte and Multi-Byte Character Sets that with Code Extension are not supported.

The following encodings are supported on import:

- ISO_IR 6 - Default Repertoire
- ISO_IR 192 - Unicode in UTF-8
- ISO_IR 100 - Latin alphabet Number 1
- ISO_IR 101 - Latin alphabet Number 2
- ISO_IR 109 - Latin alphabet Number 3
- ISO_IR 110 - Latin alphabet Number 4
- ISO_IR 148 - Latin alphabet Number 5
- ISO_IR 144 - Cyrillic
- ISO_IR 127 - Arabic
- ISO_IR 126 - Greek
- ISO_IR 138 - Hebrew

7. Information Object Implementation Details

This section specifies the use of the DICOM Information Object Definition (IOD) to represent the information included in images and RT structure sets produced by this implementation. Corresponding attributes are conveyed using the module construct.

DICOM specified usage: M = mandatory, U = User option

7.1 CT IOD Implementation

IE	Module	Reference	Usage	Remarks
Patient	Patient	C.7.1.1	M	
Study	General Study	C.7.2.1	M	
	Patient Study	C.7.2.2	U	Not supported
Series	General Series	C.7.3.1	M	
Frame of Reference	Frame of Reference	C.7.4.1	M	
Equipment	General Equipment	C.7.5.1	M	
Image	General Image	C.7.6.1	M	
	Image Plane	C.7.6.2	M	
	Image Pixel	C.7.6.3	M	
	Contrast/Bolus	C.7.6.4	U	Not supported
	CT Image	C.8.2.1	M	
	Overlay Plane	C.9.2	U	Not supported
	VOI LUT	C.11.2	U	Not supported
	SOP Common	C.12.1	M	

7.2 MR IOD Implementation

IE	Module	Reference	Usage	Remarks
Patient	Patient	C.7.1.1	M	
Study	General Study	C.7.2.1	M	
	Patient Study	C.7.2.2	U	Not supported
Series	General Series	C.7.3.1	M	
Frame of Reference	Frame of Reference	C.7.4.1	M	
Equipment	General Equipment	C.7.5.1	M	
Image	General Image	C.7.6.1	M	
	Image Plane	C.7.6.2	M	
	Image Pixel	C.7.6.3	M	
	Contrast/Bolus	C.7.6.4	U	Not supported
	MR Image	C.8.3.1	M	
	Overlay Plane	C.9.2	U	Not supported

	VOI LUT	C.11.2	U	Not supported
	SOP Common	C.12.1	M	

7.3 NM IOD Implementation

IE	Module	Reference	Usage	Remarks
Patient	Patient	C.7.1.1	M	
Study	General Study	C.7.2.1	M	
	Patient Study	C.7.2.2	U	Not supported
Series	General Series	C.7.3.1	M	
	NM/PET Patient Orientation	C.8.4.6	M	Not supported
Frame of Reference	Frame of Reference	C.7.4.1	M	
Equipment	General Equipment	C.7.5.1	M	
Image	General Image	C.7.6.1	M	
	Image Plane	C.7.6.2	M	
	Image Pixel	C.7.6.3	M	
	NM Multi-frame		M	
	NM Image Pixel		M	
	Overlay Plane	C.9.2	U	Not supported
	VOI LUT	C.11.2	U	Not supported
	SOP Common	C.12.1	M	

7.4 PT IOD Implementation

IE	Module	Reference	Usage	Remarks
Patient	Patient	C.7.1.1	M	
Study	General Study	C.7.2.1	M	
	Patient Study	C.7.2.2	U	Not supported
Series	General Series	C.7.3.1	M	
	PET Series	C.8.9.1	M	Partially supported
	PET Isotope	C.8.9.2	M	
	PET Multi-gated Acquisition	C.9.9.3	U	Not supported
	NM/PET Patient Orientation	C.8.4.6	M	
Frame of Reference	Frame of Reference	C.7.4.1	M	
Equipment	General Equipment	C.7.5.1	M	
Image	General Image	C.7.6.1	M	
	Image Plane	C.7.6.2	M	

	Image Pixel	C.7.6.3	M	
	PET Image	C.8.9.4	M	
	Overlay Plane	C.9.2	U	Not supported
	VOI LUT	C.11.2	U	Not supported
	SOP Common	C.12.1	M	

7.5 RT Structure Set Implementation

IE	Module	Reference	Usage	Remarks
Patient	Patient	C.7.1.1	M	
Study	General Study	C.7.2.1	M	
	Patient Study	C.7.2.2	U	Not supported
Series	RT Series	C.8.8.1	M	
Equipment	General Equipment	C.7.5.1	M	
Structure Set	Structure Set	C.8.8.5	M	
	ROI Contour	C.8.8.6	M	
	RT ROI Observations	C.8.8.8	M	
	Approval	C.8.8.16	U	Not supported
	Audio	C.10.3	U	Not supported
	SOP Common	C.12.1	M	

7.6 RT Dose Implementation

IE	Module	Reference	Usage	Remarks
Patient	Patient	C.7.1.1	M	
	Clinical Trial Subject	C.7.1.3	U	Not supported
Study	General Study	C.7.2.1	M	
	Patient Study	C.7.2.2	U	Not supported
	Clinical Trial Study	C.7.2.3	U	Not supported
Series	RT Series	C.8.8.1	M	
	Clinical Trial Series	C.7.3.2	U	Not supported
Frame of Reference	Frame of Reference	C.7.4.1	M	
Equipment	General Equipment	C.7.5.1	M	
Dose	General Image	C.7.6.1	C - Required if dose data contains grid-based doses.	
	Image Plane	C.7.6.2	C - Required if dose data contains grid-based doses.	
	Image Pixel	C.7.6.3	C - Required if dose data contains grid-based doses.	
	Multi-Frame	C.7.6.6	C - Required if dose data contains grid-based doses and pixel data is multi-frame data.	
	Overlay Plane	C.9.2	U	Not supported
	Multi-Frame Overlay	C.9.3	U	Not supported
	Modality LUT	C.11.1	U	Not supported
	RT Dose	C.8.8.3	M	
	RT DVH	C.8.8.4	U	Not supported
	Structure Set	C.8.8.5	C - Required if dose data contains dose points or isodose curves	
	ROI Contour	C.8.8.6	C - Required if dose data contains dose points or isodose curves	
	RT Dose ROI	C.8.8.7	C - Required if dose data contains dose points or isodose curves	
	SOP Common	C.12.1	M	

7.7 Spatial Registration Implementation

IE	Module	Reference	Usage	Remarks
Patient	Patient	C.7.1.1	M	
	Specimen Identification	C.7.1.2	U	Not supported
	Clinical Trial Subject	C.7.1.3	U	Not supported
Study	General Study	C.7.2.1	M	
	Patient Study	C.7.2.2	U	Not supported
	Clinical Trial Study	C.7.2.3	U	Not supported
Series	General Series	C.7.3.1	M	
	Clinical Trial Series	C.7.3.2	U	Not supported
	Spatial Registration Series	C.20.1	M	
Frame of Reference	Frame of Reference	C.7.4.1	M	
Equipment	General Equipment	C.7.5.1	M	
Spatial Registration	Spatial Registration	C.20.2	M	
	Common Instance Reference	C.12.2	M	
	SOP Common	C.12.1	M	

7.8 Deformable Spatial Registration Implementation

IE	Module	Reference	Usage	Remarks
Patient	Patient	C.7.1.1	M	
	Clinical Trial Subject	C.7.1.3	U	Not supported
Study	General Study	C.7.2.1	M	
	Patient Study	C.7.2.2	U	Not supported
	Clinical Trial Study	C.7.2.3	U	Not supported
Series	Clinical Trial Series	C.7.3.2	U	Not supported
	Spatial Registration Series	C.20.1	M	
Frame of Reference	Frame of Reference	C.7.4.1	M	
Equipment	General Equipment	C.7.5.1	M	
	Enhanced General Equipment	C.7.5.2	M	
Deformable Registration	Deformable Spatial Registration	C.20.3	M	
	Common Instance Reference	C.12.2	M	
	SOP Common	C.12.1	M	

7.9 RT Beams Treatment Record Implementations

IE	Module	Reference	Usage	Remarks
Patient	Patient	C.7.1.1	M	
	Clinical Trial Subject	C.7.1.3	U	Not supported
Study	General Study	C.7.2.1	M	
	Patient Study	C.7.2.2	U	Not supported
	Clinical Trial Study	C.7.2.3	U	Not supported
Series	RT Series	C.8.8.1	M	
	Clinical Trial Series	C.7.3.2	U	Not supported
Equipment	General Equipment	C.7.5.1	M	
Treatment Record	RT General Treatment Record	C.8.8.17	M	
	RT Patient Setup	C.8.8.12	U	Not supported
	RT Treatment Machine Record	C.8.8.18	M	
	Measured Dose Reference Record	C.8.8.19	U	Not supported
	Calculated Dose Reference Record	C.8.8.20	U	Not supported
	RT Beams Session Record	C.8.8.21	M	
	RT Treatment Summary Record	C.8.8.23	U	Not supported
	SOP Common	C.12.1	M	

7.10 RT Treatment Summary Record Implementation

IE	Module	Reference	Usage	Remarks
Patient	Patient	C.7.1.1	M	
	Clinical Trial Subject	C.7.1.3	U	Not supported
Study	General Study	C.7.2.1	M	
	Patient Study	C.7.2.2	U	Not supported
	Clinical Trial Study	C.7.2.3	U	Not supported
Series	RT Series	C.8.8.1	M	
	Clinical Trial Series	C.7.3.2	U	Not supported
Equipment	General Equipment	C.7.5.1	M	
Treatment Record	RT General Treatment Record	C.8.8.17	M	
	RT Treatment Summary Record	C.8.8.23	M	
	SOP Common	C.12.1	M	

7.11 RT Plans Implementation

IE	Module	Reference	Usage	Remarks
Patient	Patient	C.7.1.1	M	
	Clinical Trial Subject	C.7.1.3	U	Not supported
Study	General Study	C.7.2.1	M	
	Patient Study	C.7.2.2	U	Not supported
	Clinical Trial Study	C.7.2.3	U	Not supported
Series	RT Series	C.8.8.1	M	
	Clinical Trial Series	C.7.3.2	U	Not supported
Frame of Reference	Frame of Reference	C.7.4.1	U – See Note.	Not supported
Equipment	General Equipment	C.7.5.1	M	
Plan	RT General Plan	C.8.8.9	M	
	RT Prescription	C.8.8.10	U	Not supported
	RT Tolerance Tables	C.8.8.11	U	Not supported
	RT Patient Setup	C.8.8.12	U	Not supported
	RT Fraction Scheme	C.8.8.13	U	Not supported
	RT Beams	C.8.8.14	C - Required if RT Fraction Scheme Module exists and Number of Beams (300A,0080) is greater than zero for one or more fraction groups	
	RT Brachy Application Setups	C.8.8.15	C - Required if RT Fraction Scheme Module exists and Number of Brachy Application Setups (300A,00A0) is greater than zero for one or more fraction groups	
	Approval	C.8.8.16	U	Not supported
	SOP Common	C.12.1	M	

7.12 RT Image Implementation

IE	Module	Reference	Usage	Remarks
Patient	Patient	C.7.1.1	M	
	Clinical Trial Subject	C.7.1.3	U	Not supported
Study	General Study	C.7.2.1	M	
	Patient Study	C.7.2.2	U	Not supported
	Clinical Trial Study	C.7.2.3	U	Not supported
Series	RT Series	C.8.8.1	M	
	Clinical Trial Series	C.7.3.2	U	Not supported
Frame of Reference	Frame of Reference	C.7.4.1	U	Not supported
Equipment	General Equipment	C.7.5.1	M	
Image	General Image	C.7.6.1	M	
	Image Pixel	C.7.6.3	M	
	Contrast/bolus	C.7.6.4	C-Required if contrast media was used in this image.	
	Cine	C.7.6.5	C - Required if multi-frame image is a cine image.	
	Multi-Frame	C.7.6.6	C - Required if pixel data is multi-frame data.	
	Device	C.7.6.12	U	Not supported
	RT Image	C.8.8.2	M	
	Modality LUT	C.11.1	U	Not supported
	VOI LUT	C.11.2	U	Not supported
	Approval	C.8.8.16	U	Not supported
	SOP Common	C.12.1	M	

7.13 CR Image Implementation

IE	Module	Reference	Usage	Remarks
Patient	Patient	C.7.1.1	M	
	Clinical Trial Subject	C.7.1.3	U	Not supported
Study	General Study	C.7.2.1	M	
	Patient Study	C.7.2.2	U	Not supported
	Clinical Trial Study	C.7.2.3	U	Not supported
Series	General Series	C.7.3.1	M	
	CR Series	C.8.1.1	M	
	Clinical Trial Series	C.7.3.2	U	Not supported
Equipment	General Equipment	C.7.5.1	M	
Image	General Image	C.7.6.1	M	
	Image Pixel	C.7.6.3	M	
	Contrast/bolus	C.7.6.4	C - Required if contrast media was used in this image	
	Display Shutter	C.7.6.11	U	Not supported
	Device	C.7.6.12	U	Not supported
	CR Image	C.8.1.2	M	
	Overlay Plane	C.9.2	U	Not supported
	Modality LUT	C.11.1	U	Not supported
	VOILUT	C.11.2	U	Not supported
	SOP Common	C.12.1	M	

7.14 UltraSound Image Implementation

IE	Module	Reference	Usage	Remarks
Patient	Patient	C.7.1.1	M	
	Clinical Trial Subject	C.7.1.3	U	Not supported
Study	General Study	C.7.2.1	M	
	Patient Study	C.7.2.2	U	Not supported
	Clinical Trial Study	C.7.2.3	U	Not supported
Series	General Series	C.7.3.1	M	
	Clinical Trial Series	C.7.3.2	U	Not supported
Frame of Reference	Frame of Reference	C.7.4.1	U	Not supported
	Synchronization	C.7.4.2	U	Not supported
Equipment	General Equipment	C.7.5.1	M	
Image	General Image	C.7.6.1	M	
	Image Pixel	C.7.6.3	M	
	Contrast/bolus	C.7.6.4	C - Required if contrast media was used in this image	
	Palette Color Lookup Table	C.7.9	C - Required if Photometic Interpretation (0028,0004) has a value of PALETTE COLOR	
	Device	C.7.6.12	U	Not supported
	US Region Calibration	C.8.5.5	U	Not supported
	US Image	C.8.5.6	M	
	Overlay Plane	C.9.2	U	Not supported
	VOI LUT	C.11.2	U	Not supported
	SOP Common	C.12.1	M	

7.15 Multiframe Ultrasound Image Implementation

IE	Module	Reference	Usage	Remarks
Patient	Patient	C.7.1.1	M	
	Clinical Trial Subject	C.7.1.3	U	Not supported
Study	General Study	C.7.2.1	M	
	Patient Study	C.7.2.2	U	Not supported
	Clinical Trial Study	C.7.2.3	U	Not supported
Series	General Series	C.7.3.1	M	
	Clinical Trial Series	C.7.3.2	U	Not supported
Frame of Reference	Frame of Reference	C.7.4.1	U	Not supported
	Synchronization	C.7.4.2	C – Required if Modality (0008,0060) = IVUS. May be present otherwise.	
Equipment	General Equipment	C.7.5.1	M	
Image	General Image	C.7.6.1	M	
	Image Pixel	C.7.6.3	M	
	Contrast/bolus	C.7.6.4	C - Required if contrast media was used in this image.	
	Cine	C.7.6.5	M	
	Multi-frame	C.7.6.6	M	
	Frame Pointers	C.7.6.9	U	Not supported
	Palette Color Lookup Table	C.7.9	C - Required if Photometric Interpretation (0028,0004) has a value of PALETTE COLOR	
	Device	C.7.6.12	U	Not supported
	US Region Calibration	C.8.5.5	U	Not supported
	US Image	C.8.5.6	M	
	VOI LUT	C.11.2	U	Not supported
	SOP Common	C.12.1	M	

7.16 X-Ray Angiographic Image Implementation

IE	Module	Reference	Usage	Remarks
Patient	Patient	C.7.1.1	M	
	Clinical Trial Subject	C.7.1.3	U	Not supported
Study	General Study	C.7.2.1	M	
	Patient Study	C.7.2.2	U	Not supported
	Clinical Trial Study	C.7.2.3	U	Not supported
Series	General Series	C.7.3.1	M	
	Clinical Trial Series	C.7.3.2	U	Not supported
Frame of Reference	Synchronization	C.7.4.2	U	Not supported
Equipment	General Equipment	C.7.5.1	M	
Image	General Image	C.7.6.1	M	
	Image Pixel	C.7.6.3	M	
	Contrast/Bolus	C.7.6.4	C - Required if contrast media was used in this Image	
	Cine	C.7.6.5	C - Required if pixel data is Multi-Frame Cine data	
	Multi-Frame	C.7.6.6	C - Required if pixel data is Multi-Frame Cine data	
	Frame Pointers	C.7.6.9	U	Not supported
	Mask	C.7.6.10	C - Required if the Image may be subtracted	
	Display Shutter	C.7.6.11	U	Not supported
	Device	C.7.6.12	U	Not supported
	Intervention	C.7.6.13	U	Not supported
	X-Ray Image	C.8.7.1	M	
	X-Ray Acquisition	C.8.7.2	M	
	X-Ray Collimator	C.8.7.3	U	Not supported
	X-Ray Table	C.8.7.4	C - Required if Image is created with table motion, may be present otherwise	
	XA Positioner	C.8.7.5	M	
	DX Detector	C.8.11.4	U	Not supported
	Overlay Plane	C.9.2	U	Not supported
	Multi-Frame Overlay	C.9.3	C - Required if	

			Overlay data contains multiple frames.	
	Modality LUT	C.11.1	C - Required if Pixel Intensity Relationship (0028,1040) is LOG U - Optional if Pixel Intensity Relationship (0028,1040) is DISP	
	VOI LUT	C.11.2	U	Not supported
	SOP Common	C.12.1	M	

7.1 Encapsulated PDF Implementation

IE	Module	Reference	Usage	Remarks
Patient	Patient	C.7.1.1	M	
	Specimen Identification	C.7.1.2	U	Not supported
	Clinical Trial Subject	C.7.1.3	U	Not supported
Study	General Study	C.7.2.1	M	
	Patient Study	C.7.2.2	U	Not supported
	Clinical Trial Study	C.7.2.3	U	Not supported
Series	Encapsulated Document Series	C.24.1	M	
	Clinical Trial Series	C.7.3.2	U	Not supported
Equipment	General Equipment	C.7.5.1	M	
	SC Equipment	C.8.6.1	M	
Encapsulated Document	Encapsulated Document	C.24.2	M	
	SOP Common	C.12.1	M	