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Digital Imaging and Communications in Medicine (DICOM)

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Supplement 213: Second Generation Radiotherapy

- Enhanced RT Image and RT Patient Position Acquisition Instruction

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Foreword

181 This Supplement specifies additional IODs representing projection images constructed for or acquired at
182 Radiotherapy treatment sessions and instructions to acquire images and other artifacts for positioning the patient
183 for Radiotherapy treatments.

184 This document is an extension to the following parts of the published DICOM Standard:

185   PS 3.2   Conformance

186   PS 3.3   Information Object Definitions

187   PS 3.4   Service Class Specifications

188   PS 3.6   Data Dictionary

189   PS 3.15   Security and System Management Profiles

190   PS 3.16   Content Mapping Resource

191

Scope and Field of Application

193 The Supplement addresses Imaging and acquiring patient positioning information performed in the context of
194 Radiotherapy treatment sessions.

195 The supplement adds two IODs supporting projection images and one IOD supporting acquisition instructions for
196 images and other artifacts to be used for patient positioning.

197 **Enhanced RT Image and Enhanced Continuous RT Image**

198 The Supplement adds two new IODs to support projection images reconstructed for use during or acquired during
199 Radiotherapy treatment sessions to support patient position verification for Radiotherapy treatment delivery
200 sessions ("RT Images").

201   • Enhanced RT Image IOD

202   • Enhanced Continous RT Image IOD

203 The first IOD covers the images with a smaller number of frames, where the per-frame functional group macros are
204 populated for all frames.

205 The second IOD covers images which are continuously acquired, resulting in high number of frames due to a high
206 frame rate. In this case it is sufficient to populate only a subset of frames to avoid a huge amount of superfluous
207 data.

208 E.g. an imaging device may continuously acquire image frames and store them using an MPEG Transfer syntax. A
209 typical frame rate of 25 fps would result in 1500 frames per minute. A typical treatment may last several minutes,
210 resulting in several thousand frames. To populate each frame with the set of required functional group macros is
211 not necessary for most use cases of positioning and review, but will slow down processing and presentation of
212 images. Further, it may not always be possible to populate functional groups with such frame rates when devices
213 providing the macro content do not have the same sampling rate as the image receptor. This IOD supports
214 populating macros for a selected subset of frames only (instead of all frames) for such cases.

215 Both IODs represent projection images of the patient geometry in relation to the treatment device equipment. They
216 may be used to guide the positioning of the patient in respect to the treatment delivery device to ensure delivery of

217 the therapeutic dose to the intended region. They may also be used to verify the position of the patient when
218 acquired prior, during or after the delivery of the therapeutic radiation.

219 The existing RT Image IOD is insufficient to support features needed for positioning in modern Radiotherapy, such
220 as a generic approach to reference control points of therapeutic beams, capturing of use-case-specific data related
221 to monitoring and tracking and providing well-structured technical data related to the acquisition.

222 **RT Patient Position Acquisition Instruction**

223 The Supplement specifies a new IOD to convey parameters to instruct devices on how to acquire images or other
224 patient position-related information used for patient position verification in Radiotherapy treatment delivery
225 sessions.

226 • RT Patient Position Acquisition Instruction IOD

227 This IOD contains the definition of the procedures, devices and related parameters to be used for the assessment
228 and/or verification of the patient position. The technical parameters can be defined on any level of detail as needed
229 by a specific device. Procedures can be paired to represent related operations like a paired orthogonal MV/kV
230 image acquisition. The scope of therapeutic radiation whose position is verified is specified by referencing SOP
231 Instances identifying objects like RT Radiation Set IOD of RT Radiation IODs. The instruction defined in this
232 supplement supports projection imaging and volumetric imaging for MV and kV image acquisitions. It is constructed
233 in a way that it is possible to cover other acquisition techniques like MR, US or Surface Scanning at a later time.

234 The 1st Generation DICOM RT Plan IOD provided various different ways to include imaging instructions. These
235 instructions were heavily underspecified and came in various forms, like co-called "setup beams", port film beams
236 or verification image sequences in therapeutic beams. These specifications suffer from lack of generality and
237 comprehensiveness. Further, such instructions often vary from fraction to fraction, while the treatment beams stay
238 unaltered. Therefore, such instructions must be provided by separate IODs with their independent lifetime.
239 Therefore, concept of using therapeutic beam definitions to represent workflow steps for positioning procedures is
240 no longer part of the 2nd Generation RT approach. Dedicated instruction objects such as this one are used instead.

241 **IODs as part of 2nd Generation**

242 The IODs of this Supplement are part of the 2nd Generation RT Objects family and use the concepts developed
243 there.

244 Within this family it covers the positioning imaging in close coordination with other 2nd Generation Radiotherapy
245 Objects and makes use of the strong concepts developed there. E.g. the generalizing to diverse types of devices,
246 the systematic description of geometries and the annotation of devices used in the beam line will significantly
247 streamline and tighten the semantic in the new IOD.

248

249

250

Part 2 Addendum

251 **Add new SOP Classes to PS3.2, Annex A, Table A.1-2 UID Values:**

252

UID Value	UID Name	Category
1.2.840.10008.5.1.4.1.1.481.23	Enhanced RT Image	Transfer
1.2.840.10008.5.1.4.1.1.481.24	Enhanced Continuous RT Image	Transfer
1.2.840.10008.5.1.4.1.1.481.25	RT Patient Position Acquisition Instruction	Transfer

253

254

Part 3 Addendum

255 **Add the following reference to PS 3.3, Section 2.6**

256

257 **2.6   Other References**

258 …

259 **[MEDPHYS 23464308] Medical Physics March 2013, PMID: 23464308. Chytyk-Praznik K, VanUytven E,**
260 **vanBeek TA, Greer PB, McCurdy BM.** *Model-based prediction of portal dose images during patient*
261 *treatment.* *https://pubmed.ncbi.nlm.nih.gov/23464308/*

262 …

263

264

265 **Add the following rows and columns in PS3.3, Annex A, Section A.1.4, Table A.1-1 Composite Information**
266 **Object Modules Overview - Images**

267 **A.1   Elements of An Information Object Definition**

268 …

269 **A.1.4   Overview of the Composite IOD Module Content**

270 …

IODs Modules	Enhanced RT Image	Enhanced Continuous RT Image	RT Patient Position Acquisition Instruction
Patient	M	M	M
Clinical Trial Subject	U	U	U
General Study	M	M	M
Patient Study	U	U	U
Clinical Trial Study	U	U	U
General Series	M	M	M

IODs Modules	Enhanced RT Image	Enhanced Continuous RT Image	RT Patient Position Acquisition Instruction
Clinical Trial Series	**U**	**U**	**U**
Enhanced RT Series	**M**	**M**	**M**
…			
Frame Of Reference	**M**	**M**	
…			
Synchronization	**C**	**C**	
Cardiac Synchronization	**C**	**C**	
Respiratory Synchronization	**C**	**C**	
…			
General Equipment	**M**	**M**	**M**
Enhanced General Equipment	**M**	**M**	**M**
…			
Image Pixel	**M**	**M**	
…			
Enhanced RT Image Device	**M**	**M**	
Enhanced RT Image	**M**	**M**	
RT Patient Position Acquisition Device			**M**
RT Patient Position Acquisition Instruction			**M**
…			
Multi-frame Functional Groups	**M**		
Sparse Multi-frame Functional Groups		**M**	
Multi-frame Dimension	**M**		
…			
Enhanced Contrast/Bolus	**C**	**C**	
Device	**U**	**U**	
…			
General Reference	**M**	**M**	**M**
Common Instance Reference	**M**	**M**	**M**
…			
SOP Common	**M**	**M**	**M**
Radiotherapy Common Instance	**M**	**M**	**M**
Frame Extraction	**C**		

271

272

> **Modify Figure A.86.1.1.1-1. RT Second Generation IOD Information Model in PS3.3, Annex A, Section**
> **A.86.1.1.1:**
>
> **Add:**
>
> **"Enhanced RT Image"**
> **"Enhanced Continuous RT Image"**
> **"RT Patient Position Acquisition Instruction"**
>
> **Annotating a cardinality of the relation by 1 – 0-n to Series**
>
> **Re-arrange SOP Classes to make them fit to the page**

281

A.86.1.1.1   RT Second Generation Entity-Relationship Model

The E-R Model in Figure A.86.1.1.1-1 depicts those components of the DICOM Information Model that are relevant to RT Second Generation IODs.

285
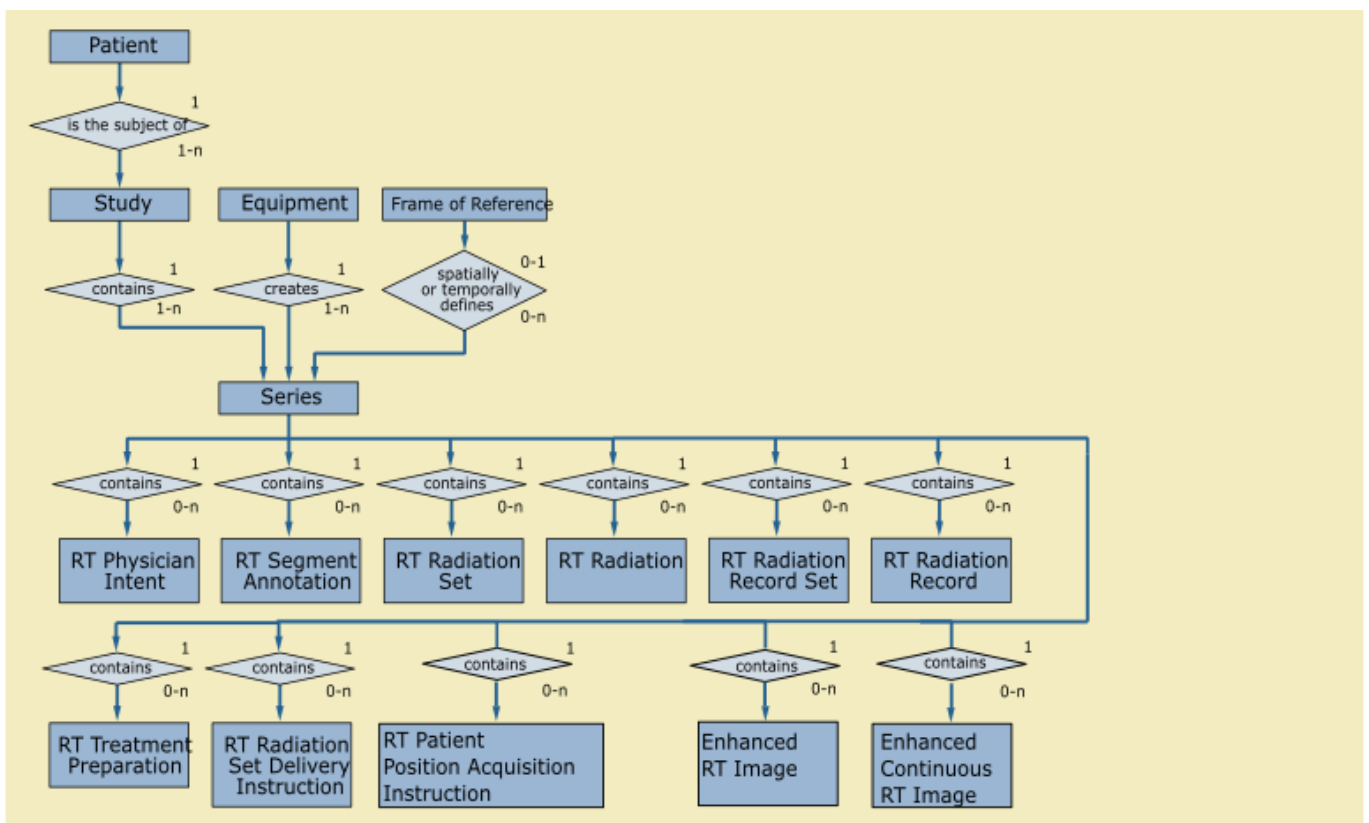
286

287

288   **Figure A.86.1.1.1-1. RT Second Generation IOD Information Model**

289 | **Add the following to PS3.3 Annex A, Section A.86:**

290   **A.86   RT Second Generation**

291   …

292   **A.86.1.15   Enhanced RT Image Information Object Definition**

293   **A.86.1.15.1   Enhanced RT Image IOD Description**

294   The Enhanced RT Image IOD represents projection images generated before, during or after Radiotherapy
295   treatment sessions. The projection images may be acquired directly or may be derived (”reconstructed”) from
296   volumetric data such as CT. Such images capture the patient geometry to guide, or record, the positioning of the
297   patient on a patient support device to deliver therapeutic dose to an intended location.

298   **A.86.1.15.2   Enhanced RT Image IOD Entity-Relationship Model**

299   See Figure A.86.1.1.1-1.

300   **A.86.1.15.3   Enhanced RT Image IOD Module Table**

301   Table A.86.1.15-1 specifies the Modules of the Enhanced RT Image IOD.

302   **Table A.86.1.15-1**
303   **Enhanced RT Image IOD Modules**

304

IE	Module	Reference	Usage
Patient	Patient	C.7.1.1	M
	Clinical Trial Subject	C.7.1.3	U
Study	General Study	C.7.2.1	M
	Patient Study	C.7.2.2	U
	Clinical Trial Study	C.7.2.3	U
Series	General Series	C.7.3.1	M
	Clinical Trial Series	C.7.3.2	U
	Enhanced RT Series	C.36.3	M
Frame of Reference	Frame of Reference	C.7.4.1	M
	Synchronization	C.7.4.2	C – Required if time synchronization was applied.
Equipment	General Equipment	C.7.5.1	M
	Enhanced General Equipment	C.7.5.2	M
Image	General Reference	C.12.4	M
	Image Pixel	C.7.6.3	M
	Multi-frame Functional Groups	C.7.6.16	M
	Multi-frame Dimension	C.7.6.17	M
	Cardiac Synchronization	C.7.6.18.1	C – Required if cardiac synchronization was applied for image acquisition
	Respiratory Synchronization	C.7.6.18.2	C – Required if respiratory synchronization was applied for image acquisition.

Enhanced Contrast/Bolus	C.7.6.4b	C - Required if contrast media was used	
Device	C.7.6.12	U	
Enhanced RT Image Device	C.36.26	M	
Enhanced RT Image	C.36.27	M	
SOP Common	C.12.1	M	
Common Instance Reference	C.12.2	M	
Radiotherapy Common Instance	C.36.4	M	
Frame Extraction	C.12.3	C - Required if the SOP Instance was created in response to a Frame-Level retrieve request	

305

A.86.1.15.4   Enhanced RT Image IOD Content Constraints

A.86.1.15.4.1   Modality Attribute

The value of Modality (0008,0060) shall be RTIMAGE.

A.86.1.15.4.2   Inclusion of Modules in Standard Extended SOP Classes

The General Image Module, Overlay Plane Module, Curve Module, Modality LUT Module and VOI LUT Module shall not be used in a Standard Extended SOP Class of the Enhanced RT Image IOD.

A.86.1.15.4.3   Image Pixel Module

In the Image Pixel Module C.7.6.3, the following constraints apply:

- Samples per Pixel (0028,0002) shall be 1

- Photometric Interpretation (0028,0004) shall be MONOCHROME2

- Bits Allocated (0028,0100) shall be 8 or 16

- Bits Stored (0028,0101) shall be equal to Bits Allocated (0028,0100)

- High Bit (0028,0102) shall be one less than the value of Bits Stored (0028,0101).

- Pixel Representation (0028,0103) shall be 0

A.86.1.15.5   Enhanced RT Image Functional Group Macros

Table A.86.1.15-2 specifies the use of the Functional Group Macros used in the Multi-frame Functional Groups Module for the Enhanced RT Image IOD.

Table A.86.1.15-2
ENHANCED RT IMAGE FUNCTIONAL GROUP MACROS

Function Group Macro	Section	Usage
Pixel Measures	C.7.6.16.2.1	M - Shall be used as a Shared Functional Group.
Frame Content	C.7.6.16.2.2	M - May not be used as a Shared Functional Group.
Plane Position (Patient)	C.7.6.16.2.3	M
Plane Orientation (Patient)	C.7.6.16.2.4	M
Referenced Image	C.7.6.16.2.5	U

Derivation Image	C.7.6.16.2.6	C - Required if the image or frame has been derived from another SOP Instance.
Cardiac Synchronization	C.7.6.16.2.7	C - Required if Cardiac Synchronization Technique (0018,9037) equals other than NONE and if Image Type (0008,0008) Value 1 is ORIGINAL or MIXED. May be present otherwise.
Respiratory Synchronization	C.7.6.16.2.17	C - Required if Respiratory Motion Compensation Technique (0018,9170) equals other than NONE, REALTIME or BREATH_HOLD and if Image Type (0008,0008) Value 1 is ORIGINAL or MIXED. May be present otherwise.
Contrast/Bolus Usage	C.7.6.16.2.12	C - Required if Contrast/Bolus Agent Sequence (0018,0012) is used.
RT Image Frame General Content	C.36.2.4.8	M The units for Start Cumulative Meterset (3002,0106) are specified by Radiation Dosimeter Unit Sequence (300A,0658) in the Enhanced RT Image Module C.36.27.
RT Image Frame Imaging Device Position	C.36.2.4.9	M
RT Image Frame Radiation Acquisition Parameters	C.36.2.4.10	C – Required if Image Type (0008,0008) Value 1 is ORIGINAL. May be present otherwise.
RT Image Frame Context	C.36.2.4.11	C - Required if the SOP Instance was created for the purpose of controlling the treatment position of the patient.
RT Beam Limiting Device Opening Sequence	C.36.2.2.21	C - Required if all Frames or the current Frame were acquired using a Beam Limiting Device.
Frame VOI LUT	C.7.6.16.2.10	U
Real World Value Mapping	C.7.6.16.2.11	U

325

A.86.1.15.5.1   Pixel Spacing

326

327 The Pixel Spacing (0028,0030) is measured on the x/y plane of the Image Receptor Coordinate System at z = 0.
328 Imager Pixel Spacing (0018,1164) shall not be used.

329 See Section C.7.6.16.2.1 for a description of Pixel Spacing (0028,0030).

330 See Section C.36.1.1.12 for a description of the Image Receptor Coordinate System.

A.86.1.16   Enhanced Continuous RT Image Information Object Definition

331

A.86.1.16.1   Enhanced Continuous RT Image IOD Description

332

333 The Enhanced Continuous RT Image IOD represents projection images generated before, during or after
334 Radiotherapy treatment sessions. The projection images may be acquired directly or may be derived
335 ("reconstructed") from volumetric data such as CT. Such images capture the patient geometry to guide, or record,
336 the positioning of the patient on a patient support device to deliver therapeutic dose to an intended location.

337 This IOD limits the content to a selected set of frames in the per-frame functional group when a high number of
338 frames are present due to a high frame rate (e.g. 25 frames / second).

339   **A.86.1.16.2   Enhanced Continuous RT Image IOD Entity-Relationship Model**

340   See Figure A.86.1.1.1-1.

341   **A.86.1.16.3   Enhanced Continuous RT Image IOD Module Table**

342   Table A.86.1.16-1 specifies the Modules of the Enhanced Continuous RT Image IOD.

343   **Table A.86.1.16-1**
344   **Enhanced Continuous RT Image IOD Modules**

345

IE	Module	Reference	Usage
Patient	Patient	C.7.1.1	M
	Clinical Trial Subject	C.7.1.3	U
Study	General Study	C.7.2.1	M
	Patient Study	C.7.2.2	U
	Clinical Trial Study	C.7.2.3	U
Series	General Series	C.7.3.1	M
	Clinical Trial Series	C.7.3.2	U
	Enhanced RT Series	C.36.3	M
Frame of Reference	Frame of Reference	C.7.4.1	M
	Synchronization	C.7.4.2	C – Required if time synchronization was applied.
Equipment	General Equipment	C.7.5.1	M
	Enhanced General Equipment	C.7.5.2	M
Image	General Reference	C.12.4	M
	Image Pixel	C.7.6.3	M
	Sparse Multi-frame Functional Groups	C.7.6.29	M
	Cardiac Synchronization	C.7.6.18.1	C – Required if cardiac synchronization was applied for image acquisition.
	Respiratory Synchronization	C.7.6.18.2	C – Required if respiratory synchronization was applied for image acquisition.
	Enhanced Contrast/Bolus	C.7.6.4b	C - Required if contrast media was used
	Device	C.7.6.12	U
	Enhanced RT Image Device	C.36.26	M
	Enhanced RT Image	C.36.27	M
	SOP Common	C.12.1	M
	Common Instance Reference	C.12.2	M
	Radiotherapy Common Instance	C.36.4	M

346

347

348

349   **A.86.1.16.4   Enhanced Continuous RT Image IOD Content Constraints**

350   **A.86.1.16.4.1   Modality Attribute**

351   The value of Modality (0008,0060) shall be RTIMAGE.

352   **A.86.1.16.4.2   Inclusion of Modules in Standard Extended SOP Classes**

353   The General Image Module, Overlay Plane Module, Curve Module, Modality LUT Module, VOI LUT Module and
354   Multi-frame Dimension Module shall not be used in a Standard Extended SOP Class of the Enhanced Continuous
355   RT Image IOD.

356   **A.86.1.16.4.3   Image Pixel Module**

357   In Section Image Pixel Module C.7.6.3, the constraints apply as specified in A.86.1.15.4.3 Image Pixel Module.

358   **A.86.1.16.5   Enhanced Continuous RT Image Functional Group Macros**

359   Table A.86.1.16-2 specifies the use of the Functional Group Macros used in the Sparse Multi-frame Functional
360   Groups Module for the Enhanced Continuous RT Image IOD.

361   **Table A.86.1.16-2**
362   **ENHANCED CONTINOUS RT IMAGE FUNCTIONAL GROUP MACROS**

Function Group Macro	Section	Usage
Pixel Measures	C.7.6.16.2.1	M - Shall be used as a Shared Functional Group.
Frame Content	C.7.6.16.2.2	M - May not be used as a Shared Functional Group.
Plane Position (Patient)	C.7.6.16.2.3	M
Plane Orientation (Patient)	C.7.6.16.2.4	M
Referenced Image	C.7.6.16.2.5	U
Derivation Image	C.7.6.16.2.6	C - Required if the image has been derived from another SOP Instance.
Cardiac Synchronization	C.7.6.16.2.7	C - Required if Cardiac Synchronization Technique (0018,9037) equals other than NONE and if Image Type (0008,0008) Value 1 is ORIGINAL or MIXED. May be present otherwise
Respiratory Synchronization	C.7.6.16.2.17	C - Required if Respiratory Motion Compensation Technique (0018,9170) equals other than NONE, REALTIME or BREATH_HOLD and if Image Type (0008,0008) Value 1 is ORIGINAL or MIXED. May be present otherwise.
Contrast/Bolus Usage	C.7.6.16.2.12	C - Required if Contrast/Bolus Agent Sequence (0018,0012) is used.
RT Image Frame General Content	C.36.2.4.8	M The units for Start Cumulative Meterset (3002,0106) are specified by Radiation Dosimeter Unit Sequence (300A,0658) in the Enhanced RT Image Module C.36.27.
RT Image Frame Imaging Device Position	C.36.2.4.9	M
RT Image Frame Radiation Acquisition Parameters	C.36.2.4.10	C – Required if Image Type (0008,0008) Value 1 is ORIGINAL. May be present otherwise.

RT Image Frame Context	C.36.2.4.11	C - Required if the SOP Instance was created for the purpose of controlling the treatment position of the patient.
RT Beam Limiting Device Opening Sequence	C.36.2.2.21	C - Required if all Frames or the current Frame was acquired using a Beam Limiting Device.
Frame VOI LUT	C.7.6.16.2.10	U
Real World Value Mapping	C.7.6.16.2.11	U

363

A.86.1.16.5.1   Pixel Spacing

The Pixel Spacing (0028,0030) is measured on the x/y plane of the Image Receptor Coordinate System at z = 0. Imager Pixel Spacing (0018,1164) shall not be used.

See Section C.7.6.16.2.1 for a description of Pixel Spacing (0028,0030).

See Section C.36.1.1.12 for a description of the Image Receptor Coordinate System.

A.86.1.17   RT Patient Position Acquisition Instruction Information Object Definition

A.86.1.17.1   RT Patient Position Acquisition Instruction IOD Description

The RT Patient Position Acquisition Instruction IOD contains parameters needed to acquire the actual patient position.

A.86.1.17.2   RT Patient Position Acquisition Instruction IOD Entity-Relationship Model

See Figure A.86.1.1.1-1.

A.86.1.17.3   RT Patient Position Acquisition Instruction IOD Module Table

Table A.86.1.17-1
RT Patient Position Acquisition Instruction IOD Modules

IE	Module	Reference	Usage
Patient	Patient	C.7.1.1	M
	Clinical Trial Subject	C.7.1.3	U
Study	General Study	C.7.2.1	M
	Patient Study	C.7.2.2	U
	Clinical Trial Study	C.7.2.3	U
Series	General Series	C.7.3.1	M
	Clinical Trial Series	C.7.3.2	U
	Enhanced RT Series	C.36.3	M
Equipment	General Equipment	C.7.5.1	M
	Enhanced General Equipment	C.7.5.2	M
Plan	General Reference	C.12.4	M
	RT Patient Position Acquisition Device	C.36.28	M
	RT Patient Position Acquisition Instruction	C.36.29	M
	SOP Common	C.12.1	M
	Common Instance Reference	C.12.2	M
	Radiotherapy Common Instance	C.36.4	M

379

380   **A.86.1.17.4   RT Patient Position Acquisition Instruction IOD Constraints**

381   **A.86.1.17.4.1   Modality Attribute**

382   The value of Modality (0008,0060) shall be PLAN.

383

384 | **Extend PS3.3, Annex C, Section C.7.6.16.2.1 Pixel Measures Macro and C.7.6.16.2.4 Plane Orientation** |
385 | **(Patient) Macro by the following:** |

386   **C.7.6 Common Image IE Modules**

387   …

388   **C.7.6.16 Multi-frame Functional Groups Module**

389   …

390   **C.7.6.16.2 Common Functional Group Macros**

391   …

392   **C.7.6.16.2.1 Pixel Measures Macro**

393   Table C.7.6.16-2 specifies the attributes of the Pixel Measures Functional Group Macro.

394   **Table C.7.6.16-2. Pixel Measures Macro Attributes**

Attribute Name	Tag	Type	Attribute Description
Pixel Measures Sequence	(0028,9110)	1	Identifies the physical characteristics of the pixels of this frame. Only a single Item shall be included in this Sequence.
>Pixel Spacing	(0028,0030)	1C	Physical distance in the imaging target (patient, specimen, or phantom) between the centers of each pixel, specified by a numeric pair - adjacent row spacing (delimiter) adjacent column spacing in mm. See Section 10.7.1.3 for further explanation of the value order.
			Note
			1. In the case of CT images with an Acquisition Type (0018,9302) of CONSTANT_ANGLE, the pixel spacing is that in a plane normal to the central ray of the diverging X-Ray beam as it passes through the data collection center.
			2. In the case of Enhanced RT Image ("1.2.840.10008.5.1.4. 1.1.481.23") or Enhanced Continuous RT Image ("1.2.840.10008.5.1.4.1.1.481.24") the pixel spacing is defined on the x/y plane at z = 0 of the Image Receptor Coordinate System.
			Required if:
			Volumetric Properties (0008,9206) is other than DISTORTED or SAMPLED, or
			SOP Class UID is Segmentation Storage ("1.2.840.10008.5.1.4.1.1.66.4") and Frame of Reference UID (0020,0052) is present, or
			SOP Class UID is Ophthalmic Tomography Image Storage ("1.2.840.10008.5.1.4.1.1.77.1.5.4") and Ophthalmic Volumetric Properties Flag (0022,1622) is YES, or

Attribute Name	Tag	Type	Attribute Description
			SOP Class UID is Ophthalmic Optical Coherence Tomography B-scan Volume Analysis Storage ("1.2.840.10008.5.1.4.1.1.77.1.5.8")**, or** **SOP Class UID is Enhanced RT Image ("1.2.840.10008.5.1.4.1.1.481.23"), or** **SOP Class UID is Enhanced Continuous RT Image ("1.2.840.10008.5.1.4.1.1.481.24").** May be present otherwise.

>Slice Thickness	(0018,0050)	1C	Nominal reconstructed slice thickness (for tomographic imaging) or depth of field (for optical non-tomographic imaging), in mm.
			
			 See Section C.7.6.16.2.3.1 for further explanation.
			
			 Note
			
			 Depth of field may be an extended depth of field created by focus stacking (see Section C.8.12.4).
			
			 Required if:
			
			     Volumetric Properties (0008,9206) is VOLUME or SAMPLED, or
			
			     SOP Class UID is Segmentation Storage ("1.2.840.10008.5.1.4.1.1.66.4") and Frame of Reference UID (0020,0052) is present, or
			
			     SOP Class UID is Ophthalmic Tomography Image Storage ("1.2.840.10008.5.1.4.1.1.77.1.5.4") and Ophthalmic Volumetric Properties Flag (0022,1622) is YES, or
			
			     SOP Class UID is Ophthalmic Optical Coherence Tomography B-scan Volume Analysis Storage ("1.2.840.10008.5.1.4.1.1.77.1.5.8").
			
			 May be present otherwise~~.~~**, if**
			
			     SOP Class UID is not Enhanced RT Image ("1.2.840.10008.5.1.4.1.1.481.23"), and
			
			     SOP Class UID is not Enhanced Continuous RT Image ("1.2.840.10008.5.1.4.1.1.481.24").

>Spacing Between Slices	(0018,0088)	3	Spacing between adjacent slices, in mm. The spacing is measured from the center-to-center of each slice, and if present shall not be negative.
			
			 Required if Dimension Organization Type (0020,9311) is TILED_FULL and Total Pixel Matrix Focal Planes (0048,0303) is greater than 1. May be present otherwise.
			
			     Note
			
			     In the case of Whole Slide Images, Spacing Between Slices (0018,0088) describes the spacing of focal planes separately encoded, and is distinct from Distance Between Focal Planes (0048,0014), which describes in what manner different focal planes were combined into a single encoded plane (focus stacking).

395

396   **C.7.6.16.2.4 Plane Orientation (Patient) Macro**

397   Table C.7.6.16-5 specifies the attributes of the Plane Orientation (Patient) Functional Group Macro.

398   **Table C.7.6.16-5. Plane Orientation (Patient) Macro Attributes**

399

Attribute Name	Tag	Type	Attribute Description
Plane Orientation Sequence	(0020,9116)	1	Identifies orientation of the plane of this frame. Only a single Item shall be included in this Sequence.
>Image Orientation (Patient)	(0020,0037)	1C	The direction cosines of the first row and the first column with respect to the patient. See Section C.7.6.2.1.1 and Section C.7.6.16.2.3.1 for further explanation. Required if: Frame Type (0008,9007) Value 1 of this frame is ORIGINAL and Volumetric Properties (0008,9206) of this frame is other than DISTORTED, or SOP Class UID is Segmentation Storage ("1.2.840.10008.5.1.4.1.1.66.4") and Frame of Reference UID (0020,0052) is present, or SOP Class UID is Ophthalmic Tomography Image Storage ("1.2.840.10008.5.1.4.1.1.77.1.5.4") and Ophthalmic Volumetric Properties Flag (0022,1622) is YES, or SOP Class UID is Ophthalmic Optical Coherence Tomography B-scan Volume Analysis Storage ("1.2.840.10008.5.1.4.1.1.77.1.5.8")**, or** **SOP Class UID is Enhanced RT Image ("1.2.840.10008.5.1.4.1.1.481.23"), or** **SOP Class UID is Enhanced Continuous RT Image ("1.2.840.10008.5.1.4.1.1.481.24")**. May be present otherwise.

400

401   **Modify PS3.3, Annex C, Section C.8.16.1 "Image Type and Frame Type" as follows:**

402   **C.8.16.1 Image Type and Frame Type**

403   Image Type (0008,0008) and associated ~~Image Type related~~ Attributes provide a high level description of a multi-
404   frame SOP Instance. ~~These Attributes describe properties that provide key summary information to users of~~
405   ~~the SOP Instance.~~ Image Type (0008,0008) contains the highest level summary of what is in the SOP Instance.

406   Frame Type (0008,9007) mirrors the corresponding Image Type Attribute and applies to the frame level ~~rather~~
407   ~~than to the image level~~.

408   If more than one value is used by the set of frames for a given Frame Type (0008,9007) Attribute value or
409   associated Attribute value then the corresponding value of Image Type (0008,0008) or associated Attribute shall
410   contain a value of MIXED. This indicates that a mixed set of values exists within the multi-frame SOP Instance.

411   …

412 | **Add the following Sections to PS3.3, Annex C, Section C.36.1.1:**

413 **C.36.1   RT Second Generation Concepts**

414 …

415 **C.36.1.1   RT Second Generation Radiation Concepts**

416 …

417 **C.36.1.1.11   Imaging Source Coordinate System**

418 The Imaging Source Coordinate System describes the location of the imaging source with respect to the Equipment
419 Frame of Reference coordinate system identified by the Equipment Frame of Reference UID (300A,0675), i.e. the
420 Equipment Frame of Reference coordinate system is the parent system of the Imaging Source Coordinate System.

421 The Device Position to Equipment Mapping Matrix (3002,010F) relates the two coordinate systems, and when it is
422 identity:

423 • The origin of Imaging Source Coordinate System is located at the origin of the Equipment Frame of
424   Reference coordinate system

425 • The axes of Imaging Source Coordinate System are aligned with the axes of the Equipment Frame of
426   Reference coordinate system

427 The Imaging Source Coordinate System is aligned with the imaging source as follows:

428 • The origin of the Imaging Source Coordinate System is the nominal location of the imaging source.

429 • The z-axis is aligned with the central ray of the diverging rays of the imaging source

430 • The positive z-axis is in the direction from the image receptor to the imaging source

431 Beam modifying devices attached to the imaging source, such as Beam Limiting Devices, use a Base Beam
432 Modifier Coordinate System, if they use coordinates in their specification.

433 The Base Beam Modifier Coordinate System, defined in C.36.1.1.9 Beam Modifier Coordinate System, is related to
434 the Image Source Coordinate System as follows:

435 • The parent system of the Base Beam Modifier Coordinate System is the Imaging Source Coordinate System.

436 • The Base Beam Modifier Plane is located at a distance specified by RT Beam Modifier Definition Distance
437   (300A,0688) along the z-axis from the reference location specified by RT Device Distance Reference
438   Location Code Sequence (300A,0659).

439 • If the radiation used for imaging is generated by an imaging-specific source, the RT Device Distance
440   Reference Location Code Sequence (300A,0659) shall have the value (130789, DCM, "Nominal Imaging
441   Source Location")

442 • If the radiation used for imaging is generated by the therapeutic source ("MV Imaging"), the RT Device
443   Distance Reference Location Code Sequence (300A,0659) shall have the value (130358, DCM, "Nominal
444   Radiation Source Location")

445 **C.36.1.1.12   Image Receptor Coordinate System**

446 The Image Receptor Coordinate System describes the location of the image acquisition receptor device with
447 respect to the Equipment Frame of Reference coordinate system identified by the Equipment Frame of Reference
448 UID (300A,0675), i.e. the Equipment Frame of Reference coordinate system is the parent system of the Image
449 Receptor Coordinate System.

450 The Image Receptor Coordinate System is also used when describing the location of an acquisition plane of a
451 virtual imaging device without presence of physical image receptor, e.g. in case of a digital reconstructed
452 radiograph (DRR).

453 The Pixel Spacing (0028,0030) is measured on the x/y plane of the Image Receptor Coordinate System at z = 0.

454 The Device Position to Equipment Mapping Matrix (3002,010F) relates the two coordinate systems, and when it is
455 identity:

456   • The origin of Image Receptor Coordinate System is located at the origin of the Equipment Frame of
457   Reference coordinate system

458   • The axes of Image Receptor Coordinate System are aligned with the axes of the Equipment Frame of
459   Reference coordinate system

460 The Image Receptor Coordinate System is aligned with the image receptor as follows.

461   • The z-axis passes through the center of the image receptor

462   • For rectangular receptors, the x-axis and y-axis are aligned with the edges of the image receptor.

463 The alignment shall be documented in the Conformance Statement for the device.

464

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465 **Modify the following Macro in PS3.3, Annex C, Section C.36.2.2:**

466 **C.36.2   RT Second Generation Macros**

467 …

468 **C.36.2.2   RT Second Generation Device Macros**

469 …

470 **C.36.2.2.4   RT Treatment Position Macro**

471 The RT Treatment Position Macro establishes a connection between the patient's geometry and the treatment
472 delivery equipment to define the treatment position. When used in an RT Radiation object, this treatment position is
473 the prescribed position. When used in an RT Radiation Record object, this treatment position is the record of the
474 actual position **during treatment delivery. When used in an Enhanced RT Image or Enhanced Continuous RT**
475 **Image object, this position is the record of the actual position during acquisition.**

476   **Table C.36.2.2.4-1. RT Treatment Position Macro Attributes**

Attribute Name	Tag	Type	Attribute Description
Include Table 10-15a "Patient Orientation And Equipment Relationship Macro Attributes".			
Treatment Position Sequence	(300A,063F)	1C	Patient positions during treatment, being prescribed or recorded.
			Required if ~~the SOP Class of the SOP Instance including this Module is not~~
			SOP Class UID is not RT Radiation Salvage Record Storage ("1.2.840.10008.5.1.4.1.1.481.17") **and**
			SOP Class UID is not Enhanced RT Image ("1.2.840.10008.5.1.4.1.1.481.23") and
			SOP Class UID is not Enhanced Continuous RT Image ("1.2.840.10008.5.1.4.1.1.481.24").
			May be present otherwise.
			One or more Items shall be included in this Sequence.
>Treatment Position Index	(300A,0606)	1	Index of this Item in this Sequence.
			The value shall start at 1 and increase monotonically by 1.

Attribute Name	Tag	Type	Attribute Description
>*Include Table 10.39-1 "Patient to Equipment Relationship Macro Attributes".*			*DCID 9553 "Treatment Points".*

477

478   …

479

Add the following Macros to PS3.3, Annex C, Section C.36.2.2:

481

482   **C.36.2   RT Second Generation Macros**

483   …

484   **C.36.2.2   RT Second Generation Device Macros**

485   …

486   **C.36.2.2.21   RT Beam Limiting Device Opening Sequence Macro**

487   This Macro defines the opening created by RT Beam Limiting Devices for a specific frame.

488   **Table C.36.2.2.21-1. RT Beam Limiting Device Opening Sequence Macro Attributes**

Attribute Name	Tag	Type	Attribute Description
RT Beam Limiting Device Opening Sequence	(300A,0656)	1C	Beam limiting device (collimator) settings defining the opening for the current Control Point. Required if Number of RT Beam Limiting Devices (300A,0641) is present and has a non-zero value. One or more Items shall be included in this Sequence.
>*Include Table C.36.2.2.20-1. "RT Beam Limiting Device Opening Definition Macro Attributes"*			

489

490   **C.36.2.2.22   Patient Position Acquisition Device Macro**

491   The Patient Position Acquisition Device Macro contains all parameters that describe a device to acquire artifacts to
492   detect the patient position.

493   **Table C.36.2.2.22-1**
494   **Patient Position Acquisition Device Macro Attributes**

Attribute Name	Tag	Type	Attribute Description
Number of Acquisition Devices	(3002,0116)	1	Number of Acquisition Devices defined in the Acquisition Device Sequence (3002,0117).
Acquisition Device Sequence	(3002,0117)	1C	Devices used to generate images. The devices may be physical imaging devices that performed acquisition or virtual imaging devices for which acquisition was simulated. Required if the Number of Acquisition Devices (3002,0116) has a non-zero value. The number of Items included in this Sequence shall equal the value of Number of Acquisition Devices (3002,0116).

Attribute Name	Tag	Type	Attribute Description
>*Include Table C.36.2.2.3-1 "RT Accessory Device Identification Macro Attributes"*			*CID is specified at invocation.*
>Device Index	(3010,0039)	1	Index of the Device in this Sequence.
			The value shall start at 1 and increase monotonically by 1.
>Referenced Defined Device Index	(300A,0602)	1C	Device Index value that links the device defined by this Sequence Item to the corresponding device in another SOP Radiation Instance. The description of the two devices may or may not be the same.
			The value is the index of a device in the Acquisition Device Sequence (3002,0117) within the single SOP Instance referenced by a SOP Instance Sequence defined in the Macro invocation.
			Required if the Instance referenced in the SOP Instance Sequence contains the device that corresponds to the device defined by this Sequence Item.
			See Section C.36.2.2.19.1.5.

495

496

Add the following Macros to PS3.3, Annex C, Section C.36.2.3:

498 **C.36.2   RT Second Generation Macros**

499 …

500 **C.36.2.3   RT Second Generation Positioning Macros**

501 …

502 **C.36.2.3.3   RT Patient Position Scope With Legacy Support Macro**

503 The RT Patient Position Scope With Legacy Support Macro defines the RT Radiation Set, RT Radiation Instances,
504 Treatment Position Groups or RT Plan Instances to which a set of positioning parameters apply.

505 **Table C.36.2.3.3-1**
506 **RT Patient Position Scope With Legacy Support Macro Attributes**

Attribute Name	Tag	Type	Description
Referenced RT Radiation Sequence	(300A,0630)	1C	A set of RT Radiation Instances for which the positioning parameters apply.
			Required if Referenced RT Radiation Set Sequence (300A,0702) and Referenced RT Plan Sequence (300C,0002) are absent.
			One or more Items shall be included in this Sequence.
>*Include Table 10-11 "SOP Instance Reference Macro Attributes"*			
Referenced RT Radiation Set Sequence	(300A,0702)	1C	A collection of RT Radiation Sets for which the positioning parameters apply.
			Required if Referenced RT Radiation Sequence (300A,0630) and Referenced RT Plan Sequence (300C,0002) are absent.
			One or more Items shall be included in this Sequence.

Attribute Name	Tag	Type	Description
>Include Table 10-11 "SOP Instance Reference Macro Attributes"			
>Referenced RT Radiation Sequence	(300A,0630)	1C	A subset of the SOP Instances referenced in the RT Radiation Set SOP Instance for which the parameters apply.
			Required if Treatment Position Group Sequence (300A,060A) is absent and the scope is limited to a subset of RT Radiation SOP Instances of the referenced RT Radiation Set.
			One or more Items shall be included in this Sequence. The maximum number of Items is one less than the number of RT Radiation SOP Instances in the referenced RT Radiation Set SOP Instance.
>>Include Table 10-11 "SOP Instance Reference Macro Attributes"			
>Treatment Position Group Sequence	(300A,060A)	1C	Treatment Position Groups defining patient positions for which the parameters apply.
			Required if Referenced RT Radiation Sequence (300A,0630) is absent and Treatment Position Groups to which the positioning parameters apply are defined in the referenced RT Radiation Set.
			One or more Items shall be included in this Sequence.
			See C.36.10.1.3.
>>Referenced Treatment Position Group UID	(300A,0785)	1	Referenced unique identifier of the Treatment Position Group.
Referenced RT Plan Sequence	(300C,0002)	1C	A collection of RT Plans and/or RT Ion Plans for which the positioning parameters apply.
			Required if Referenced RT Radiation Sequence (300A,0630) and Referenced RT Radiation Set Sequence (300A,0702) are absent.
			One or more Items shall be included in this Sequence.
>Include Table 10-11 "SOP Instance Reference Macro Attributes"			
>Beam Sequence	(300A,00B0)	1C	A subset of RT Beams included in the RT Plan SOP Instance for which the parameters apply.
			Required if the scope is limited to a subset of RT Beams of the referenced RT Plan and the Number Of Beams (300A,0080) is not zero.
			One or more Items shall be included in this Sequence. The maximum number of Items is one less than the number of RT Beams in the referenced RT Plan SOP Instance.
>>Referenced Beam Number	(300C,0006)	1	Beam Number identifying the referenced RT Beam or RT Ion Beam.

507

508 **Create Section C.36.2.4 and add the following Macros to PS3.3, Annex C, Section C.36.2:**

509

510 **C.36.2   RT Second Generation Macros**

511 …

512   **C.36.2.4   RT Second Generation Imaging Macros**

513   …

514   **C.36.2.4.1   RT Projection Imaging Request Geometry Macro**

515   The RT Projection Imaging Request Geometry Macro describes the location of the imaging source and image
516   receptor to be used for acquisition.

517   **Table C.36.2.4.1-1**
518   **RT Projection Imaging Request Geometry Macro Attributes**

Attribute Name	Tag	Type	Description
Imaging Source Location Specification Type	(3002,0111)	1	The method of specifying the location and orientation of the imaging source.
			Enumerated Values:
			ABSOLUTE_MATRIX: Specified using absolute values represented by matrices describing the Imaging Source Coordinate System with respect to the Equipment Frame of Reference.
			ABSOLUTE_PARAMS: Specified using absolute values for native parameters of a specific device.
			RELATIVE_PARAMS: Specified using values for native parameters relative to the values referenced in Referenced Baseline Parameters RT Radiation Instance Sequence (3002,011E).
Imaging Device Location Matrix Sequence	(3002,0112)	1C	Parameters describing the location of the Imaging Source and the Image Receptor by the means of matrices.
			Required if Imaging Source Location Specification Type (3002,0111) is present and has a value of ABSOLUTE_MATRIX.
			Only a single Item shall be included in this Sequence.
>Include Table C.36.2.4.2-1 "Matrix-based RT Imaging Geometry Macro Attributes"			
Imaging Device Location Parameter Sequence	(3002,0113)	1C	Parameters describing the location and orientation of the image receptor by the means of parameters.
			Required if Imaging Source Location Specification Type (3002,0111) is present and has a value of ABSOLUTE_PARAMS or RELATIVE_PARAMS.
			Only a single Item shall be included in this Sequence.
			See C.36.2.4.1.1.1.
>Referenced Radiation RT Control Point Index	(300A,073B)	1C	Index of the RT Control Point of the RT Radiation SOP Instance referenced in the Referenced Baseline Parameters RT Radiation Instance Sequence (3002,011E) which defines the values against which the relative values have to be applied.
			Required if Imaging Source Location Specification Type (3002,0111) has a value of RELATIVE_PARAMS.
>Include Table C.36.2.4.3-1 "Parameterized RT Imaging Geometry Macro Attributes"			

519

520   **C.36.2.4.1.1   RT Projection Imaging Request Geometry Macro Attribute Descriptions**

521   **C.36.2.4.1.1.1   Imaging Device Location Parameter Sequence**

522   If Imaging Source Location Specification Type (3002,0111) has a value of ABSOLUTE_PARAMS the parameters
523   have to be applied as is.

524 If Imaging Source Location Specification Type (3002,0111) has a value of RELATIVE_PARAMS the parameters
525 represent delta values between the parameters of the referenced RT Control Point in Radiation SOP Instance
526 referenced in the Referenced Baseline Parameters RT Radiation Instance Sequence (3002,011E). Only those
527 parameters whose value is not zero shall be included in the Imaging Device Location Parameter Sequence
528 (3002,0113).

529 **C.36.2.4.2   Matrix-based RT Imaging Geometry Macro**

530 The Matrix-based RT Imaging Geometry Macro describes the location of the imaging source and image receptor by
531 the means of matrices with respect to the Equipment Frame of Reference.

532   **Table C.36.2.4.2-1**
533   **Matrix-based RT Imaging Geometry Macro Attributes**

Attribute Name	Tag	Type	Attribute Description
Imaging Source Position Sequence	(3002,010D)	1	The position of the imaging source. Only a single Item shall be included in this Sequence.
>Referenced Defined Device Index	(300A,0602)	1C	The value of Device Index (3010,0039) from the Acquisition Device Sequence (3002,0117) corresponding to the Acquisition Device used in this Item. Required if Value 1 of Image Type (0008,0008) has the value ORIGINAL or the current Instance was derived from an Instance where Referenced Defined Device Index (300A,0602) was present in the Imaging Source Position Sequence (3002,010D). May be present otherwise.
>Device Position to Equipment Mapping Matrix	(3002,010F)	1	A rigid, homogeneous 4x4 transformation matrix that maps the Imaging Source Coordinate System to the Equipment Coordinate System. Matrix elements shall be listed in row-major order. See C.36.1.1.11.
>Device Position Parameter Sequence	(3002,0110)	2	Device-specific parameters, derived from the Device Position to Equipment Mapping Matrix (3002,010F). See C.36.2.4.2.1.1. Zero or more Items shall be included in this sequence.
>>*Include Table 10-2 "Content Item Macro Attributes"*			*Defined TID is TID 15308 "Imaging Source Geometry Parameters".*
Image Receptor Position Sequence	(3002,010E)	1	The position of the image receptor. Only a single Item shall be included in this Sequence.
>Referenced Defined Device Index	(300A,0602)	1C	The value of Device Index (3010,0039) from the Acquisition Device Sequence (3002,0117) corresponding to the Acquisition Device used in this Item. Required if Value 1 of Image Type (0008,0008) has the value ORIGINAL or the current Instance was derived from an Instance where Referenced Defined Device Index (300A,0602) was present in the Image Receptor Position Sequence (3002,010E). May be present otherwise.
>Device Position to Equipment Mapping Matrix	(3002,010F)	1	A rigid, homogeneous 4x4 transformation matrix that maps the Image Receptor Coordinate System to the Equipment Coordinate System. Matrix elements shall be listed in row-major order. See C.36.1.1.12.
>Device Position Parameter Sequence	(3002,0110)	2	Device-specific parameters, derived from the Device Position to Equipment Mapping Matrix (3002,010F).

Attribute Name	Tag	Type	Attribute Description
			See C.36.2.4.2.1.1.
			Zero or more Items shall be included in this sequence.
>>*Include Table 10-2 "Content Item Macro Attributes"*			*Defined TID is TID 15309 "Image Receptor Geometry Parameters".*

534

C.36.2.4.2.1   Matrix-based RT Imaging Geometry Macro Attribute Descriptions

C.36.2.4.2.1.1   Imaging Source Position Parameter Sequence and Image Receptor Position Parameter Sequence

The Device Position to Equipment Mapping Matrix (3002,010F) is the exclusive source of information to define the location of the imaging source and the image receptor. Imaging devices will solely derive the displacement by this matrix.

Some applications, which do not act as imaging devices and cannot de-compose these matrices into device-specific parameters, may want to informatively display device-specific parameters to the user. The purpose of the Device Position Parameter Sequence (3002,0110) is to facilitate such display. These Sequences are not a substitute for the Device Position to Equipment Mapping Matrix (3002,010F).

C.36.2.4.3   Parameterized RT Imaging Geometry Macro

This macro defines positioning of the image radiation source and the image receptor by the means of device parameters.

Table C.36.2.4.3-1
Parameterized RT Imaging Geometry Macro Attributes

Attribute Name	Tag	Type	Description
Imaging Source Position Sequence	(3002,010D)	1	The position of the imaging source.
			Only a single Item shall be included in this Sequence.
>Referenced Defined Device Index	(300A,0602)	1C	The value of Device Index (3010,0039) from the Acquisition Device Sequence (3002,0117) corresponding to the Acquisition Device used in this Item.
			Required if Value 1 of Image Type (0008,0008) has the value ORIGINAL or the current Instance was derived from an Instance where Referenced Defined Device Index (300A,0602) was present in the Imaging Source Position Sequence (3002,010D). May be present otherwise.
>Device Position Parameter Sequence	(3002,0110)	1	Parameters describing the position of the imaging source.
			One or more Items shall be included in this sequence.
>>*Include Table 10-2 "Content Item Macro Attributes"*			*Defined TID is TID 15308 "Imaging Source Geometry Parameters".*
Image Receptor Position Sequence	(3002,010E)	1	The position of the image receptor.
			Only a single Item shall be included in this Sequence.
>Referenced Defined Device Index	(300A,0602)	1C	The value of Device Index (3010,0039) from the Acquisition Device Sequence (3002,0117) corresponding to the Acquisition Device used in this Item.
			Required if Value 1 of Image Type (0008,0008) has the value ORIGINAL or the current Instance was derived from an Instance where Referenced Defined Device Index (300A,0602) was present in the Image Receptor Position Sequence (3002,010E). May be present otherwise.

Attribute Name	Tag	Type	Description
>Device Position Parameter Sequence	(3002,0110)	1	Parameters describing the position of the image receptor. One or more Items shall be included in this sequence.
>>Include Table 10-2 "Content Item Macro Attributes"			Defined TID is TID 15309 "Image Receptor Geometry Parameters".

550

551 **C.36.2.4.4   RT Imaging Aperture Macro**

552 The RT Imaging Aperture Macro defines the aperture of the imaging device to be applied during image acquisition.

553 **Table C.36.2.4.4-1**
554 **RT Imaging Aperture Macro Attributes**

Attribute Name	Tag	Type	Attribute Description
Imaging Aperture Specification Type	(3002,0115)	3	Type of specification of field aperture for imaging. Enumerated Values: OPEN: The aperture is specified to be fully opened. BEAM: The aperture is specified to be the aperture in an RT Control point of the RT Radiation SOP Instance referenced in the Referenced Baseline Parameters RT Radiation Instance Sequence (3002,011E). RELATIVE_TO_BEAM: The aperture is specified relative to the aperture in an RT Control point of the RT Radiation SOP Instance referenced in the Referenced Baseline Parameters RT Radiation Instance Sequence (3002,011E). CUSTOM: The aperture is fully specified by the provided parameter values.
Imaging Source to Beam Modifier Definition Plane Distance	(3002,012D)	1C	Distance in mm from the Radiation Source to the origin of the Base Beam Modifier System. Required if Imaging Aperture Specification Type (3002,0115) does not have a value of OPEN.
Referenced Radiation RT Control Point Index	(300A,073B)	1C	Index of the RT Control Point of the RT Radiation SOP Instance referenced in the Referenced Baseline Parameters RT Radiation Instance Sequence (3002,011E) which provides the basis for the aperture definition of the imaging source. Required if Imaging Aperture Specification Type (3002,0115) has a value of BEAM or RELATIVE_TO_BEAM.

Imaging Aperture Sequence	(3002,0114)	1C	Parameters describing the aperture of the imaging source.
			If Imaging Aperture Specification Type (3002,0115) has a value of CUSTOM, the provided parameter values fully specify the aperture.
			If Imaging Aperture Specification Type (3002,0115) has a value of RELATIVE_TO_BEAM, the provided parameter values represent delta values with respect to the values in the referenced RT Control Point in the RT Radiation SOP Instance referenced in the Referenced Baseline Parameters RT Radiation Instance Sequence (3002,011E).
			Required if Imaging Aperture Specification Type (3002,0115) has a value of CUSTOM or RELATIVE_TO_BEAM.
			Only a single Item shall be included in this Sequence.
>Include Table C.36.2.2.21-1 "RT Beam Limiting Device Opening Sequence Macro Attributes"			

555

C.36.2.4.5   3D RT Cone-Beam Imaging Geometry Macro

The 3D RT Cone-Beam Imaging Geometry Macro describes the parameters to be applied for a Cone-Beam acquisition in a Radiotherapy context.

Table C.36.2.4.5-1
3D RT Cone-Beam Imaging Geometry Macro Attributes

Attribute Name	Tag	Type	Attribute Description
Scan Arc Type	(3002,012E)	3	Categorization of the amount of rotation of the scan.
			Enumerated Values:
			FULL_ARC = 360 deg
			HALF_ARC = 180 deg
			CUSTOM_ARC = user defined scan range
Scan Start Position Sequence	(3002,012B)	1	Start Position of the 3D RT Cone Beam Radiation Imaging Acquisition. The angle is a Continuous Rotation Angle, see Section C.36.1.1.5.
			Only a single Item shall be included in this Sequence.
>Include Table C.36.2.4.3-1 "Parameterized RT Imaging Geometry Macro Attributes"			
Scan Stop Position Sequence	(3002,012C)	1	Stop Position of the 3D RT Cone Beam Radiation Imaging Acquisition. The angle is a Continuous Rotation Angle, see Section C.36.1.1.5.
			Only a single Item shall be included in this Sequence.
>Include Table C.36.2.4.3-1 "Parameterized RT Imaging Geometry Macro Attributes"			
Detector Positioning Type	(3002,012F)	3	Fan type of acquisition.
			Enumerated Values:
			CENTERED = full fan, detector is centered, resulting in a normal field of view

Attribute Name	Tag	Type	Attribute Description
			SHIFTED = half fan, detector is laterally shifted by half of the detector size to increase the field of view.
Parameters Specification Sequence	(0018,9913)	3	Acquisition parameters. One or more Items are permitted in this Sequence.
>Include Table 10.25-1 "Attribute Value Constraint Macro Attributes"			*Only Attributes defined in Table C.34.10-1 (i.e., in the Acquisition Protocol Element Sequence (0018,9920) in the Performed CT Acquisition Module) and Private Data Elements associated with this acquisition protocol element may be specified as Selector Attributes.* *The semantics of values of Constraint Violation Significance (0082,0036) in the Macro are assigned in Section C.34.9.3.* *The same Attribute shall not appear in more than one Item in the Sequence with the same values for Selector Sequence Pointer (0072,0052) and Selector Sequence Pointer Items (0074,1057).*

561

562

C.36.2.4.6   kV Radiation Image Acquisition Parameters Macro

The kV Radiation Image Acquisition Parameters Macro contains parameters specifying details of X-Ray generation for image acquisition using kV-level radiation.

Table C.36.2.4.6-1
kV Radiation Image Acquisition Parameters Macro Attributes

Attribute Name	Tag	Type	Attribute Description
Energy Derivation Code Sequence	(3002,0133)	1C	How the value of imaging energy is derived from the device configuration. Required if KVP (0018,0060) is not present. Only a single Item shall be included in this Sequence. See C.36.2.4.6.1.1.
>Include Table 8.8-1 "Code Sequence Macro Attributes"			*Baseline CID 9262 "Energy Derivation Types"*
KVP	(0018,0060)	2C	Peak kilo voltage of the X-Ray generator used to acquire the image. Required if Imaging Energy Derivation Code Sequence (3002,0133) is not present. See C.36.2.4.6.1.1.
X-Ray Tube Current in μA	(0018,8151)	3	X-Ray Tube Current in μA.
Exposure Time in μS	(0018,8150)	3	Duration of X-Ray exposure in μsec.
Average Pulse Width	(0018,1154)	3	Average width of X-Ray pulse in msec.
Radiation Mode	(0018,115A)	3	Specifies X-Ray radiation mode. Enumerated Values: CONTINUOUS PULSED

Attribute Name	Tag	Type	Attribute Description
X-Ray Filter Sequence	(0018,9556)	3	Image filter inserted into the X-Ray beam. One or more Items are permitted in this Sequence.
>Include Table 10.36-1 "Device Identification Macro Attributes"			*Baseline CID 10007 "X-Ray Filter Types".*

568

569 **C.36.2.4.6.1   kV Radiation Image Acquisition Parameters Macro Attribute Descriptions**

570 **C.36.2.4.6.1.1   Imaging Energy Category Code Sequence**

571 The Imaging Energy can be described in either Energy Derivation Code Sequence (3002,0133) or KVP
572 (0018,0060).

573 When KVP (0018,0060) is present and has no value, no Imaging Energy is described.

574 **C.36.2.4.7   MV Radiation Image Acquisition Parameters Macro**

575 The MV Radiation Image Acquisition Parameters Macro contains parameters specifying details of X-Ray
576 generation for image acquisition using MV-level radiation.

577   **Table C.36.2.4.7-1**
578   **MV Radiation Image Acquisition Parameters Macro Attributes**

Attribute Name	Tag	Type	Attribute Description
Energy Derivation Code Sequence	(3002,0133)	1C	How the value of imaging energy is derived from the device configuration. Required if Radiation Generation Mode Sequence (300A,067B) is not present. Only a single Item shall be included in this Sequence. See C.36.2.4.7.1.1.
>Include Table 8.8-1 "Code Sequence Macro Attributes"			*Baseline CID 9262 "Energy Derivation Types"*
Radiation Generation Mode Sequence	(300A,067B)	2C	The beam parameters of the imaging energy. Required if Energy Derivation Code Sequence (3002,0133) is not present. Zero or one Items shall be included in this Sequence. See C.36.2.4.7.1.1.
>Include Table C.36.2.2.7-1 "Radiation Generation Mode Macro Attributes"			*Defined CID for Radiation Type Code Sequence (300A,067F) is CID 9525 "Radiation Therapy Particle".* *Defined CID for Energy Unit Code Sequence (300A,0684) is CID 9521 "Radiotherapy Treatment Energy Unit".* *Defined CID for Radiation Fluence Modifier Code Sequence (300A,0683) is CID 9549 "Radiation Generation Mode Types".* *The Number of Radiation Generation Modes (300A,0685) shall have the value one.*
Maximum Cumulative Meterset Exposure	(3002,0134)	3	The maximum allowed exposure described in Meterset values between start and stop of acquisition. The radiation shall be stopped at latest when the difference between the start value and the current value exceeds this value.

Attribute Name	Tag	Type	Attribute Description
			The unit is defined in the Radiation Dosimeter Unit Sequence (300A,0658).
Radiation Dosimeter Unit Sequence	(300A,0658)	1C	Measurement unit of the machine dosimeter. Required if Maximum Cumulative Meterset Exposure (3002,0134) is present. Only a single Item shall be included in this Sequence.
>Include Table 8.8-1 "Code Sequence Macro Attributes"			Defined CID 9269 "RT Radiation Meterset Units"
Delivery Rate	(300A,063D)	2C	The nominal rate of delivery of the Meterset during acquisition. Required if the acquisition is not taken simultaneously during the delivery of the therapeutic radiation. The unit is defined in the Delivery Rate Unit Sequence (300A,063E).
Delivery Rate Unit Sequence	(300A,063E)	1C	The unit of a delivery rate value. Required if Delivery Rate (300A,063D) is present and has a value. Only a single Item shall be included in this Sequence.
>Include Table 8.8-1 "Code Sequence Macro Attributes"			No Baseline CID defined.

579

580 **C.36.2.4.7.1   MV Radiation Image Acquisition Parameters Macro Attribute Description**

581 **C.36.2.4.7.1.1   Energy-related Attributes**

582 The Imaging Energy can be described in either Energy Derivation Code Sequence (3002,0133) or Radiation
583 Generation Mode Sequence (300A,067B).

584 When the Radiation Generation Mode Sequence (300A,067B) is present with zero Items, the imaging energy may
585 be defined as follows:

586 • When the acquisition occurs before or after the therapeutic radiation delivery, the energy may be defined by the
587   imaging protocol or set by the user.

588 • When the acquisition occurs during the therapeutic radiation delivery, the energy is defined by parameters set
589   for the therapeutic beam.

590 **C.36.2.4.8   RT Image Frame General Content Macro**

591 The RT Image Frame General Content Macro contains information about the geometric and dosimetric context of a
592 frame reconstructed for use in or acquired during Radiotherapy treatment sessions.

593   **Table C.36.2.4.8-1**
594   **RT Image Frame General Content Macro Attributes**

Attribute Name	Tag	Type	Attribute Description
RT Image Frame General Content Sequence	(3002,0102)	1	Identifies RT-specific characteristics of the frame. Only a single Item shall be included in this Sequence.
>Frame Type	(0008,9007)	1	Type of Frame. A multi-valued Attribute analogous to Image Type (0008,0008). See C.36.2.4.8.1.1 and C.36.27.1.1.
>Referenced Treatment Position Index	(300A,060B)	1C	The value of Treatment Position Index (300A,0606) from the Treatment Position Sequence (300A,063F)

Attribute Name	Tag	Type	Attribute Description
			within this IOD describing the position when the frame was taken.
			Required if the Treatment Position Sequence (300A,063F) is present and the current Frame was acquired at a position specified in an Item of this Sequence.
>Start Cumulative Meterset	(3002,0106)	2C	The value of the Cumulative Meterset when the acquisition of the current frame started.
			Required if the image was acquired while therapeutic radiation was applied. May be present otherwise.
			The units are specified at invocation of the Macro.

595

C.36.2.4.8.1   RT Image Frame General Content Macro Attribute Descriptions

C.36.2.4.8.1.1   Frame Type

Frame Type (0008,9007) Value 1 and Value 2 shall identify the Pixel Data Characteristics in accordance with Section C.7.6.1.1.2.

Values 3 and 4 are required to be present.

Defined Terms for Value 3:

    PLANNED: Image representing planned treatment position

    TREATMENT: Image acquired at the actual treatment position or reconstructed based on the information about the actual treatment position

    SIMULATION: Image acquired at a treatment device to simulate a potential treatment by a conventional simulator image

Defined Terms for Value 4:

    IMAGE: Image

    PORTFILM: Digitized Portal Image

    DOSE: Integrated dose map at the imaging device plane [MEDPHYS 23464308]

    FLUENCE: Fluence map

Defined Terms for Value 5:

    PREDICTED: Expected values of integrated dose or fluence

    ACQUIRED: Image, dose or fluence as acquired by image receptor

    REF_MATCHING: Image reconstructed to compare against an image acquired at treatment position

C.36.2.4.9   RT Image Frame Imaging Device Position Macro

The RT Image Frame Imaging Device Position Macro contains the specification of the position of the imaging source and the imaging device.

Table C.36.2.4.9-1
RT Image Frame Imaging Device Position Macro Attributes

Attribute Name	Tag	Type	Attribute Description
RT Image Frame Imaging Device Position Sequence	(3002,0109)	1	The position of the imaging source and the imaging device for this frame. Only a single Item shall be included in this Sequence.
>Include Table C.36.2.4.2-1 "Matrix-based RT Imaging Geometry Macro Attributes"			

622

C.36.2.4.10   RT Image Frame Radiation Acquisition Parameters Macro

The Radiation Image Acquisition Parameters Macro contains parameters specifying details of generation of the radiation used for image acquisition.

Table C.36.2.4.10-1
RT Image Frame Radiation Acquisition Parameters Macro Attributes

Attribute Name	Tag	Type	Attribute Description
RT Image Frame Radiation Acquisition Sequence	(3002,010C)	1	The acquisition parameters describing the generation of radiation of the frame. Only a single Item shall be included in this Sequence.
>RT Image Frame kV Radiation Acquisition Sequence	(3002,010A)	1C	The kV photon acquisition parameters of the frame. Required if RT Image Frame MV Radiation Acquisition Sequence (3002,010B) is not present. Only a single Item shall be included in this Sequence.
>>Include Table C.36.2.4.6-1 "kV Radiation Image Acquisition Parameters Macro Attributes"			
>RT Image Frame MV Radiation Acquisition Sequence	(3002,010B)	1C	The MV photon or particle acquisition parameters of the frame. Required if RT Image Frame kV Radiation Acquisition Sequence (3002,010A) is not present. Only a single Item shall be included in this Sequence.
>>Include Table C.36.2.4.7-1 "MV Radiation Image Acquisition Parameters Macro Attributes"			

628

C.36.2.4.11   RT Image Frame Context Macro

The RT Image Frame Context Macro contains information about the context of a frame constructed for use in, or acquired during, Radiotherapy treatment sessions.

Table C.36.2.4.11-1
RT Image Frame Context Macro Attributes

Attribute Name	Tag	Type	Attribute Description
RT Image Frame Context Sequence	(3002,0103)	1	Contextual information of the frame. Only a single Item shall be included in this Sequence.
>RT Image Scope Sequence	(3002,0104)	1	The RT Radiation Instances or the Treatment Position Groups for which the Frame is reconstructed or acquired. Only a single Item shall be included in this Sequence.
>>Include Table C.36.2.3.3-1 "RT Patient Position Scope With Legacy Support Macro Attributes"			

Attribute Name	Tag	Type	Attribute Description
>RT Radiation Set Delivery Number	(300A,0704)	1C	Identification of the RT Radiation Set Delivery of the referenced RT Radiation Set Instance that this frame refers to. Required if the Frame is related to a specific Fraction. See C.36.20.1.2.
>Clinical Fraction Number	(300A,0705)	1C	Identification of the RT Treatment Fraction of the referenced RT Radiation Set Instance that this frame refers to. Required if the Frame is related to a specific Fraction. See C.36.20.1.2.

634

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635   **Add the following Module to PS3.3, Annex C, Section C.7.6**

636   **C.7.6   Common Image IE Modules**

637   …

638   **C.7.6.29   Sparse Multi-frame Functional Groups Module**

639   Table C.7.6.29-1 specifies the Attributes of the Sparse Multi-frame Functional Groups Module. This Module is
640   included in SOP Instances which contain frames acquired continuously with a high frame rate, resulting in a high
641   number of frames.

642   Unlike the Per-frame Functional Groups Sequence (5200,9230) where functional groups that are not shared must
643   be populated on every frame, the Selected Frame Functional Groups Sequence (3002,0101) allows a selected
644   subset of frames to be populated. For Frames that are not selected, the functional groups that are not shared are
645   not present. The Selected Frame Functional Groups Sequence (3002,0101) allows frames to be omitted, but does
646   not allow required Attributes within the selected frames to be omitted.

647   The Per-frame Functional Group Macros of a frame shall be populated if any value of the required Attributes of the
648   per-frame Functional Group Macro changes; the definition of the change is up to the discretion of the implementer
649   and shall be documented in the Conformance Statement.

650   Per-frame Functional Group Macros for Frames may also be populated even if all required Attribute values do not
651   change, e.g. when frames are populated with a constant sampling rate.

652   The frames in this SOP Instance are identified by a number. The first frame is identified as frame number 1 and
653   subsequent frames are identified by a number incremented by 1. The values in Selected Frame Number
654   (3002,0100) correspond to these numbered frames.

655   The rest of the semantics of C.7.6.16 Multi-frame Functional Groups Module applies to this Module.

656

657   **Table C.7.6.29-1. Sparse Multi-frame Functional Groups Module Attributes**

658

Attribute Name	Tag	Type	Attribute Description
Shared Functional Groups Sequence	(5200,9229)	1	Sequence that contains the Functional Group Macros that are shared for all frames in this SOP Instance and Concatenation. Note The contents of this Sequence are the same in all SOP Instances that comprise a Concatenation.

Attribute Name	Tag	Type	Attribute Description
			Only a single Item shall be included in this Sequence. See Section C.7.6.16.1.1 for further explanation.
>Include one or more Functional Group Macros that are shared by all frames. The selected Functional Group Macros shall not be present in the Selected Frame Functional Groups Sequence (3002,0101).			*For each IOD that includes this Module, a table is defined in which the permitted Functional Group Macros and their usage is specified.* *The Item may be empty if the requirements for inclusion of the Functional Groups are not satisfied.*
Selected Frame Functional Groups Sequence	(3002,0101)	1C	Sequence that contains the Functional Group Sequence Attributes corresponding to selected frames of the Multi-frame Image. One or more Items shall be included in this Sequence. The number of Items shall be greater than zero and the less as the number of frames in the Multi-frame image. See Section C.7.6.29.1.1 for further explanation.
>Selected Frame Number	(3002,0100)	1	Identifies the corresponding frame in the SOP Instance.
>Include one or more Functional Group Macros.			*For each IOD that includes this Module, a table is defined in which the permitted Functional Group Macros and their usage is specified.*
Instance Number	(0020,0013)	1	A number that identifies this Instance. The value shall be the same for all SOP Instances of a Concatenation, and different for each separate Concatenation and for each SOP Instance not within a Concatenation in a Series.
Content Date	(0008,0023)	1	The date the data creation was started. Note For Instance, this is the date the pixel data is created, not the date the data is acquired.
Content Time	(0008,0033)	1	The time the data creation was started. Note For Instance, this is the time the pixel data is created, not the time the data is acquired.
Number of Frames	(0028,0008)	1	Number of frames in a multi-frame image. See Section C.7.6.6.1.1 for further explanation.
Stereo Pairs Present	(0022,0028)	3	The multi-frame pixel data consists of left and right stereoscopic pairs. See Section C.7.6.6.1.3 for further explanation. Enumerated Values: YES NO
Concatenation Frame Offset Number	(0020,9228)	1C	Offset of the first frame in a multi-frame image of a concatenation. Logical frame numbers in a concatenation can be used across all its SOP Instances. This offset can be applied to the implicit

Attribute Name	Tag	Type	Attribute Description
			frame number to find the logical frame number in a concatenation. The offset is numbered from zero; i.e., the instance of a concatenation that begins with the first frame of the concatenation has a Concatenation Frame Offset Number (0020,9228) of zero. Required if Concatenation UID (0020,9161) is present.
Representative Frame Number	(0028,6010)	3	The frame number selected for use as a pictorial representation (e.g., icon) of the multi-frame Image.
Concatenation UID	(0020,9161)	1C	Identifier of all SOP Instances that belong to the same concatenation. Required if a group of multi-frame image SOP Instances within a Series are part of a Concatenation.
SOP Instance UID of Concatenation Source	(0020,0242)	1C	The SOP Instance UID of the single composite SOP Instance of which the Concatenation is a part. All SOP Instances of a concatenation shall use the same value for this Attribute, see Section C.7.6.16.1.3. Note May be used to reference the entire Instance rather than individual Instances of the concatenation, which may be transient (e.g., from a presentation state). Required if Concatenation UID (0020,9161) is present.
In-concatenation Number	(0020,9162)	1C	Identifier for one SOP Instance belonging to a concatenation. See Section C.7.6.16.2.2.4 for further specification. The first Instance in a concatenation (that with the lowest Concatenation Frame Offset Number (0020,9228) value) shall have an In-concatenation Number (0020,9162) value of 1, and subsequent Instances shall have values monotonically increasing by 1. Required if Concatenation UID (0020,9161) is present.
In-concatenation Total Number	(0020,9163)	3	The number of SOP Instances sharing the same Concatenation UID. If present, shall have a value greater than one, unless an IOD overrides this constraint to enumerate a value of 1 to prevent the use of Concatenations (e.g., see Section C.8.17.7 and Section C.8.17.16).

659

C.7.6.29.1 Sparse Multi-frame Functional Groups Module Attribute Descriptions

C.7.6.29.1.1 Selected Frame Functional Groups Sequence

The Selected Frame Functional Groups Sequence (3002,0101) Attribute consists of a Sequence of Items. Each Item describes a frame in the multi-frame pixel data, identified by Selected Frame Number (3002,0100). Frames are implicitly numbered starting from 1. See Figure C.7.6.29-1.

666

667
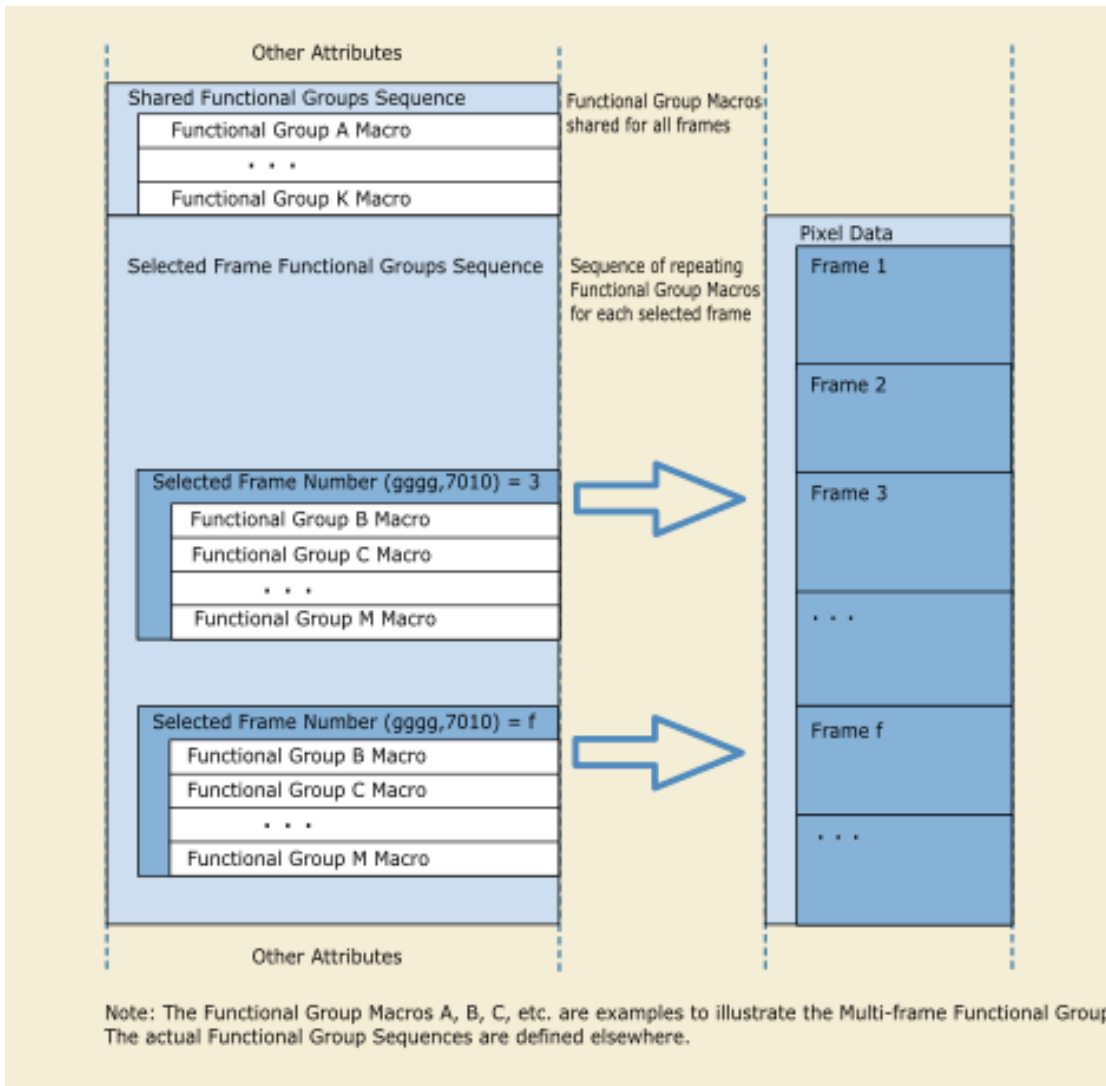
668   **Figure C.7.6.29-1. A Graphical Presentation of the Multi-frame Functional Groups Structure for Sparse**
669   **Multi-frame Functional Groups**

670

671

672

Add the following Modules to PS3.3 Annex C, Section C.36

674

C.36.26   Enhanced RT Image Device Module

The Enhanced RT Image Device Module contains information about the devices used in the image.

Table C.36.26-1
Enhanced RT Image Device Module Attributes

Attribute Name	Tag	Type	Description
Equipment Frame of Reference UID	(300A,0675)	1	Frame of Reference identifier identifying the Equipment Frame of Reference coordinate system which is the parent for Imaging Source Coordinate System and/or the Image Receptor Coordinate System. See 10.39.1.1 and C.36.1.1.11 and C.36.1.1.12
Beam Modifier Coordinates Presence Flag	(3002,0105)	1	Whether Beam Modifiers which contain coordinates referring to the Beam Modifier Coordinate System are present in the current SOP Instance. Enumerate Values: YES: Beam Modifiers containing such coordinates are present. NO: Beam Modifiers containing such coordinates are not present.
RT Device Distance Reference Location Code Sequence	(300A,0659)	1C	Point of reference used for measuring the distance to various devices. Required if Beam Modifier Coordinates Presence Flag (3002,0105) equals YES. Only a single item shall be included in this Sequence.
>Include Table 8.8-1 "Code Sequence Macro Attributes".			DCID 9261 "Patient Position Acquisition Radiation Source Locations".
RT Beam Modifier Definition Distance	(300A,0688)	1C	Absolute distance in mm along the z-axis of the Base Beam Modifier Coordinate System from the reference location as specified by RT Device Distance Reference Location Code Sequence (300A,0659) to the Beam Modifier Definition Plane. The value shall be greater than or equal to zero. Required if Beam Modifier Coordinates Presence Flag (3002,0105) equals YES. See Section C.36.1.1.9.
Include Table C.36.2.2.2-1 "RT Patient Support Devices Macro Attributes"			
Include Table C.36.2.2.15-1 "General Accessories Definition Macro Attributes"			

Attribute Name	Tag	Type	Description
Include Table C.36.2.2.8-1 "RT Beam Limiting Devices Definition Macro Attributes"			
Include Table C.36.2.2.22-1 "Patient Position Acquisition Device Macro Attributes"			*Defined CID 9271 "RT Image Patient Position Acquisition Devices".* *The Referenced Defined Device Index (300A,0602) is absent because the SOP Instance containing this Module does not define the SOP Instance Sequence the Referenced Defined Device Index (300A,0602) refers to.*

679

680   **C.36.27   Enhanced RT Image Module**

681   Table C.36.27-1 contains IOD Attributes that describe an Enhanced RT Image.

682   **Table C.36.27-1**
683   **Enhanced RT Image Module Attributes**

Attribute Name	Tag	Type	Description
Include Table 10.32-1 "Entity Long Labeling Macro Attributes"			
Image Type	(0008,0008)	1	Image characteristics. See Section C.8.16.1 and Section C.36.27.1.1.
Treatment Session UID	(300A,0700)	3	A unique identifier of the Treatment Session to which this Instance belongs.
Start Cumulative Meterset	(3002,0106)	2C	The value of the Cumulative Meterset when the acquisition of the first frame started. Required if the image was acquired while therapeutic radiation was applied. May be present otherwise. The units are specified by Radiation Dosimeter Unit Sequence (300A,0658).
Stop Cumulative Meterset	(3002,0107)	2C	The value of the Cumulative Meterset when the acquisition of the last frame was finished. Required if the image was acquired while therapeutic radiation was applied. May be present otherwise. The units are specified by Radiation Dosimeter Unit Sequence (300A,0658).
Radiation Dosimeter Unit Sequence	(300A,0658)	1C	Measurement units of the delivery device dosimeter. Required if Start Cumulative Meterset (3002,0106) or Stop Cumulative Meterset (3002,0107) is present in this Module or in a Functional Group Macro of the current SOP Instance and has a value.
>Include Table 8.8-1 "Code Sequence Macro Attributes".			DCID 9269 "RT Radiation Meterset Units"
Exposure Time in μS	(0018,8150)	2	Cumulative X-Ray exposure time in μsec summed across all frames in this SOP Instance.
Include Table C.36.2.2.4-1 "RT Treatment Position Macro Attributes"			

684

C.36.27.1   Enhanced RT Image Module Attribute Descriptions

C.36.27.1.1   Image Type and Frame Type

Image Type (0008,0008) and associated Attributes provide a high level description of a multi-frame SOP Instance. Image Type contains the highest level summary of what is in the SOP Instance.

Frame Type (0008,9007) mirrors the corresponding Image Type Attribute and applies to the frame level rather than to the image level.

If more than one value is used by the set of frames for a given Frame Type (0008,9007) Attribute value or associated Attribute value then the corresponding value of Image Type (0008,0008) or associated Attribute shall contain a value of MIXED. This indicates that a mixed set of values exists within the multi-frame SOP Instance.

The value MIXED shall only be used in Image Type (0008,0008) when the corresponding values for the individual frames are not equal. When a value of an Attribute is equal for all frames, the same value shall be used for the corresponding value of Image Type (0008,0008).

The 2nd value of Image Type and Frame Type shall be PRIMARY.

C.36.28   RT Patient Position Acquisition Device Module

The RT Patient Position Acquisition Device Module contains information about the devices specified to be used during acquisition to detect the patient position before, during or after delivering of a Radiation.

More devices than those contained in this macro may be used during acquisition. The use of devices that are not contained here may be implied by other information such as the identification of acquisition protocols as defined by Position Acquisition Template Name (3002,0121).

Table C.36.28-1
RT Patient Position Acquisition Device Module Attributes

Attribute Name	Tag	Type	Description
Equipment Frame of Reference UID	(300A,0675)	1C	Frame of Reference identifier for the Treatment Delivery Device defining the coordinate system in which the geometric parameters are defined. Required if Image to Equipment Mapping Matrix (0028,9520) or Device Position to Equipment Mapping Matrix (3002,010F) are present in the current SOP Instance. See C.36.12.1.1.
Include Table C.36.2.2.2-1 "RT Patient Support Devices Macro Attributes"			
Include Table C.36.2.2.14-1 "RT Accessory Holders Definition Macro Attributes"			
Include Table C.36.2.2.15-1 "General Accessories Definition Macro Attributes"			
Include Table C.36.2.2.8-1 "RT Beam Limiting Devices Definition Macro Attributes"			*Defined CID for Device Type Code Sequence (3010,002E) within "RT Accessory Device Identification Macro" is CID 9541 "Beam Limiting Device Types".*
Include Table C.36.2.2.22-1 "Patient Position Acquisition Device Macro Attributes"			*Defined CID 9268 "Patient Position Acquisition Devices". The SOP Instance Sequence referred to by the Referenced Defined Device Index (300A,0602) is not declared.*

706

707 **C.36.29   RT Patient Position Acquisition Instruction Module**

708 The RT Patient Position Acquisition Instruction Module contains information required by a Patient Position
709 Acquisition System (PPAS) when specifying acquisition of data to detect the patient position before, during or after
710 the delivery specified by an RT Radiation SOP Instance or Treatment Position Group in a RT Radiation Set IOD
711 Instance.

712 The RT Patient Position Acquisition Instruction Module consists of a sequence of one or more acquisition tasks.
713 Every acquisition task consists of one or more acquisition subtasks (e.g. two subtasks are required in case of a
714 dual plane acquisition task).

715   **Table C.36.29-1**
716   **RT Patient Position Acquisition Instruction Module Attributes**

Attribute Name	Tag	Type	Description
Include Table 10.32-1 "Entity Long Labeling Macro Attributes"			
Acquisition Task Sequence	(3002,0118)	1	The types and details of acquisitions which are requested by the current Instance. One or more Items shall be included in this Sequence.
>Acquisition Task Index	(3002,011C)	1	Index of this acquisition task in this Sequence. The value shall start at 1 and increase monotonically by 1.
>Acquisition Task Workitem Code Sequence	(3002,0119)	1	The Workitem code of the acquisition task. Only a single Item shall be included in this Sequence.
>>Include Table 8.8-1 "Code Sequence Macro Attributes"			Defined CID 9242 "Radiotherapy Acquisition Workitem Definition"
>Acquisition Task Applicability Sequence	(3002,0124)	1C	The RT Radiation Set, RT Radiation Instances or the Treatment Position Groups to which the acquisition task is applicable. Required if RT Radiation Set, RT Radiation Instances or Treatment Position Groups exist whose treatment position is guided by this acquisition task. Note: In some treatment scenarios, acquisitions may be performed prior to the completion of RT Radiation Instances or Treatment Position Groups.
>>Include Table C.36.2.3.3-1 "RT Patient Position Scope With Legacy Support Macro Attributes"			
>RT Acquisition Patient Position Sequence	(3002,0108)	2	The position of the patient when performing this acquisition task. Only a single Item shall be included in this Sequence.
>>Include Table C.36.2.3.2-1 "RT Patient Position Macro Attributes"			
>Acquisition Subtask Sequence	(3002,011A)	1	The types and details of acquisitions which are part of the acquisition task. One or more Items shall be included in this Sequence. The number of Items shall be as defined in C.36.29.1.
>>Acquisition Subtask Index	(3002,011D)	1	Index of this acquisition subtask in this Sequence. The value shall start at 1 and increase monotonically by 1.

Attribute Name	Tag	Type	Description
>>Subtask Workitem Code Sequence	(3002,011B)	1	The type of acquisition subtask. Only a single Item shall be included in this Sequence.
>>>*Include Table 8.8-1 "Code Sequence Macro Attributes"*			*Defined CIDs are 9263 "kV Imaging Acquisition Techniques" 9264 "MV Imaging Acquisition Techniques"*
>>Acquisition Signal Type	(3002,0129)	1	Type of signal used for acquisition. Defined Terms: KV kilovolt X-Ray MV Megavolt X-Ray
>>Acquisition Method	(3002,012A)	1	Method used for acquisition. Defined Terms: PROJECTION Projection radiography CT Computed Tomography
>>Position Acquisition Template Identification Sequence	(3002,011F)	3	Identifies an acquisition template containing a set of parameters to be used when acquiring data for patient position detection. Note: Values of parameters explicitly defined below in this acquisition subtask Item override values specified in the acquisition template identified in this Sequence. Only a single Item is permitted in this Sequence.
>>>Position Acquisition Template Name	(3002,0121)	1	User defined name of the position acquisition template.
>>>Position Acquisition Template Code Sequence	(3002,0122)	1C	Code identifying the position acquisition template. Required if Position Acquisition Template ID (3002,0120) not present. May be present otherwise. Only a single Item shall be included in this Sequence.
>>>>*Include Table 8.8-1 "Code Sequence Macro Attributes"*			*No Baseline CID defined. See C.36.29.2.1*
>>>Position Acquisition Template ID	(3002,0120)	1C	Identifier of the position acquisition template. Required if Position Acquisition Template Code Sequence (3002,0122) is not present. May be present otherwise.
>>>Position Acquisition Template Description	(3002,0123)	2	User-defined description of the position acquisition template.
>>Referenced Baseline Parameters RT Radiation Instance Sequence	(3002,011E)	1C	RT Radiation SOP or RT Plan Instance that defines baseline parameter values for acquisition, which are modified by parameter values increments in this Subtask. Required if Imaging Source Location Specification Type (3002,0111) has the value RELATIVE_PARAMS or Imaging Aperture Specification Type (3002,0115) has the value BEAM or RELATIVE_TO_BEAM. Only a single Item shall be included in this Sequence.
>>>*Include Table 10-11 "SOP Instance Reference Macro Attributes"*			

Attribute Name	Tag	Type	Description
>>>Referenced Beam Number	(300C,0006)	1C	Uniquely identifies the Beam specified by Beam Number (300A,00C0) in the referenced SOP Instance. Required, if the referenced SOP Instance has the SOP Class UID RT Plan ("1.2.840.10008.5.1.4.1.1.481.5") or RT Ion Plan ("1.2.840.10008.5.1.4.1.1.481.8").
>>Referenced Device Index	(300A,0607)	1C	The value of Device Index (3010,0039) from the Acquisition Device Sequence (3002,0117) corresponding to the device to be used for acquisition. Required if Number of Acquisition Devices (3002,0116) is greater than one.
>>RT Device Distance Reference Location Code Sequence	(300A,0659)	1C	Point of reference used for measuring the distance to various devices. Required if the current Item contains any Attributes which refer to the Base Beam Modifier Coordinate System. Only a single item shall be included in this Sequence.
>>>*Include Table 8.8-1 "Code Sequence Macro Attributes".*			*DCID 9261 "Patient Position Acquisition Radiation Source Locations".*
>>RT Beam Modifier Definition Distance	(300A,0688)	1C	Absolute distance in mm along the z-axis of the Base Beam Modifier Coordinate System from the reference location specified by RT Device Distance Reference Location Code Sequence (300A,0659) to the Beam Modifier Definition Plane. The value shall be greater than or equal to zero. Required if RT Device Distance Reference Location Code Sequence(300A,0659) is present. See Section C.36.1.1.9.
>>Acquisition Initiation Sequence	(3002,0135)	3	Description of how to the acquisition is triggered. One or more Items are permitted in this Sequence.
>>>*Include Table 10-2 "Content Item Macro Attributes"*			*DTID 15307 "Acquisition Initiation Parameters"*
>>KV Imaging Generation Parameters Sequence	(3002,0127)	1C	Parameters for kV Imaging Acquisitions. Required if the value of Acquisition Signal Type (3002,0129) is KV. Only a single Item shall be included in this Sequence.
>>>*Include Table C.36.2.4.6-1 "kV Radiation Image Acquisition Parameters Macro Attributes"*			
>>MV Imaging Generation Parameters Sequence	(3002,0128)	1C	Parameters for MV Imaging Acquisitions. Required if the value of Acquisition Signal Type (3002,0129) is MV. Only a single Item shall be included in this Sequence.
>>>*Include Table C.36.2.4.7-1 "MV Radiation Image Acquisition Parameters Macro Attributes"*			

Attribute Name	Tag	Type	Description
>>Projection Imaging Acquisition Parameter Sequence	(3002,0125)	1C	Parameters for Projection Image Acquisitions. Required if the value of Acquisition Method (3002,012A) is PROJECTION. Only a single Item shall be included in this Sequence.
>>>*Include Table C.36.2.4.1-1 "RT Projection Imaging Request Geometry Macro"*			
>>>*Include Table C.36.2.4.4-1 "RT Imaging Aperture Macro Attributes"*			
>>CT Imaging Acquisition Parameter Sequence	(3002,0126)	1C	Parameters for CT Image Acquisitions. Required if the value of Acquisition Method (3002,012A) is CT. Only a single Item shall be included in this Sequence.
>>>*Include Table C.36.2.4.5-1 "3D RT Cone-Beam Imaging Geometry Macro Attributes"*			
>>Device-Specific Acquisition Parameter Sequence	(3002,0131)	3	User-specified device-specific acquisition parameters applicable to the device executing this Acquisition Subtask. One or more Items are permitted in this Sequence.
>>>*Include Table 10-2 "Content Item Macro Attributes"*			*No Baseline TID defined.*
>>Additional RT Accessory Device Sequence	(3002,0130)	1C	Additional devices used during the acquisition of the reference position artifacts. Required if additional RT Accessory Devices are to be used during patient position acquisition. One or more Items shall be included in this Sequence.
>>>Referenced Device Index	(300A,0607)	1	Reference to an Item identified by the Device Index (3010,0039) in the General Accessory Definition Sequence (300A,0671).
>>>Device-Specific Acquisition Parameter Sequence	(3002,0131)	3	User-specified device-specific acquisition parameters applicable to the device of the current Item. One or more Items are permitted in this Sequence.
>>>>*Include Table 10-2 "Content Item Macro Attributes"*			*No Baseline TID defined.*
>>Referenced Position Reference Instance Sequence	(3002,0132)	3	SOP Instances which may be used to provide a positional reference for verification of patient position in the current acquisition subtask. One or more Items are permitted in this Sequence.
>>>*Include Table 10.37-1 "Related Information Entities Macro Attributes"*			*Defined CID 9267 "Patient Positioning Related Object Purposes"*

C.36.29.1   Patient Position Reference Acquisition Subtask Sequence Multiplicity

For the codes defined in Table C.36.29.1-1 the number of Items in the Acquisition Subtask Sequence (3002,011A) is determined by the code in the Acquisition Task Workitem Code Sequence (3002,0119) as follows:

Table C.36.29.1-1
Workitem Codes and Subtask Multiplicity

Acquisition Task Workitem Code Sequence (3002,0119)	Number of Sequence Items
(121704, DCM, "RT Patient Position Acquisition, single plane kV")	1
(121702, DCM, "RT Patient Position Acquisition, single plane MV")	1
(121705, DCM, "RT Patient Position Acquisition, dual plane kV")	2
(121703, DCM, "RT Patient Position Acquisition, dual plane MV")	2
(121706, DCM, "RT Patient Position Acquisition, dual plane kV/MV")	2
(121707, DCM, "RT Patient Position Acquisition, CT kV")	1
(121708, DCM, "RT Patient Position Acquisition, CT MV")	1
(130785, DCM, "RT Patient Position Acquisition, Cone-Beam CT kV")	1
(130787, DCM, "RT Patient Position Acquisition, Cone-Beam CT MV")	1
(130786, DCM, "RT Patient Position Acquisition, Conventional CT kV")	1
(130788, DCM, "RT Patient Position Acquisition, Conventional CT MV")	1
(130782, DCM, "RT Patient Position Acquisition, Integrated Dose MV")	1
(130783, DCM, "RT Patient Position Acquisition, Film Cassette kV")	1

723

724   For codes not in this table, the number of Items is not constrained.

725   **C.36.29.2   RT Patient Position Acquisition Instruction Module Attribute Descriptions**

726   **C.36.29.2.1   Position Acquisition Template Code Sequence and Position Acquisition Template ID**

727   Standardized position acquisition templates may be identified by a code conveyed by Position Acquisition Template
728   Code Sequence (3002,0122). Locally defined position acquisition templates may be identified using a code in a
729   private coding scheme, or using a string conveyed by Position Acquisition Template ID (3002,0120).

730

731   **Part 4 Addendum**

732 | **Add the following to PS3.4, Annex B, Section B.5, Table B.5-1** |
       |---|

SOP Class Name	SOP Class UID	IOD Spec (defined in PS 3.3)
Enhanced RT Image Storage	**1.2.840.10008.5.1.4.1.1.481.23**	**Enhanced RT Image IOD**
Enhanced Continuous RT Image Storage	**1.2.840.10008.5.1.4.1.1.481.24**	**Enhanced Continuous RT Image IOD**
RT Patient Position Acquisition Instruction Storage	**1.2.840.10008.5.1.4.1.1.481.25**	**RT Patient Position Acquisition Instruction IOD**

733

734   **Part 6 Addendum**

735 | **Add the following data elements to PS3.6, Chapter 6:** |

736

737   **6   Registry of DICOM Data Elements**

738

(3002,0100)	Selected Frame Number	SelectedFrameNumber	IS	1
(3002,0101)	Selected Frame Functional Groups Sequence	SelectedFrameFunctionalGroups Sequence	SQ	1
(3002,0102)	RT Image Frame General Content Sequence	RTImageFrameGeneralContentS equence	SQ	1
(3002,0103)	RT Image Frame Context Sequence	RTImageFrameContextSequence	SQ	1
(3002,0104)	RT Image Scope Sequence	RTImageScopeSequence	SQ	1
(3002,0105)	Beam Modifier Coordinates Presence Flag	BeamModifierCoordinatesPresen ceFlag	CS	1
(3002,0106)	Start Cumulative Meterset	StartCumulativeMeterset	FD	1
(3002,0107)	Stop Cumulative Meterset	StopCumulativeMeterset	FD	1
(3002,0108)	RT Acquisition Patient Position Sequence	RTAcquisitionPatientPositionSeq uence	SQ	1
(3002,0109)	RT Image Frame Imaging Device Position Sequence	RTImageFrameImagingDevicePo sitionSequence	SQ	1
(3002,010A)	RT Image Frame kV Radiation Acquisition Sequence	RTImageFramekVRadiationAcqui sitionSequence	SQ	1
(3002,010B)	RT Image Frame MV Radiation Acquisition Sequence	RTImageFrameMVRadiationAcqu isitionSequence	SQ	1
(3002,010C)	RT Image Frame Radiation Acquisition Sequence	RTImageFrameRadiationAcquisiti onSequence	SQ	1
(3002,010D)	Imaging Source Position Sequence	ImagingSourcePositionSequence	SQ	1
(3002,010E)	Image Receptor Position Sequence	ImageReceptorPositionSequence	SQ	1
(3002,010F)	Device Position to Equipment Mapping Matrix	DevicePositionToEquipmentMapp ingMatrix	FD	16
(3002,0110)	Device Position Parameter Sequence	DevicePositionParameterSequen ce	SQ	1
(3002,0111)	Imaging Source Location Specification Type	ImagingSourceLocationSpecificati onType	CS	1
(3002,0112)	Imaging Device Location Matrix Sequence	ImagingDeviceLocationMatrixSeq uence	SQ	1
(3002,0113)	Imaging Device Location Parameter Sequence	ImagingDeviceLocationParameter Sequence	SQ	1
(3002,0114)	Imaging Aperture Sequence	ImagingApertureSequence	SQ	1

(3002,0115)	Imaging Aperture Specification Type	ImagingApertureSpecificationType	CS	1
(3002,0116)	Number of Acquisition Devices	NumberOfAcquisitionDevices	US	1
(3002,0117)	Acquisition Device Sequence	AcquisitionDeviceSequence	SQ	1
(3002,0118)	Acquisition Task Sequence	AcquisitionTaskSequence	SQ	1
(3002,0119)	Acquisition Task Workitem Code Sequence	AcquisitionTaskWorkitemCodeSequence	SQ	1
(3002,011A)	Acquisition Subtask Sequence	AcquisitionSubtaskSequence	SQ	1
(3002,011B)	Subtask Workitem Code Sequence	SubtaskWorkitemCodeSequence	SQ	1
(3002,011C)	Acquisition Task Index	AcquisitionTaskIndex	US	1
(3002,011D)	Acquisition Subtask Index	AcquisitionSubtaskIndex	US	1
(3002,011E)	Referenced Baseline Parameters RT Radiation Instance Sequence	ReferencedBaselineParametersRTRadiationInstanceSequence	SQ	1
(3002,011F)	Position Acquisition Template Identification Sequence	PositionAcquisitionTemplateIdentificationSequence	SQ	1
(3002,0120)	Position Acquisition Template ID	PositionAcquisitionTemplateID	ST	1
(3002,0121)	Position Acquisition Template Name	PositionAcquisitionTemplateName	LO	1
(3002,0122)	Position Acquisition Template Code Sequence	PositionAcquisitionTemplateCodeSequence	SQ	1
(3002,0123)	Position Acquisition Template Description	PositionAcquisitionTemplateDescription	LT	1
(3002,0124)	Acquisition Task Applicability Sequence	AcquisitionTaskApplicabilitySequence	SQ	1
(3002,0125)	Projection Imaging Acquisition Parameter Sequence	ProjectionImagingAcquisitionParameterSequence	SQ	1
(3002,0126)	CT Imaging Acquisition Parameter Sequence	CTImagingAcquisitionParameterSequence	SQ	1
(3002,0127)	KV Imaging Generation Parameters Sequence	KVImagingGenerationParametersSequence	SQ	1
(3002,0128)	MV Imaging Generation Parameters Sequence	MVImagingGenerationParametersSequence	SQ	1
(3002,0129)	Acquisition Signal Type	AcquisitionSignalType	CS	1
(3002,012A)	Acquisition Method	AcquisitionMethod	CS	1
(3002,012B)	Scan Start Position Sequence	ScanStartPositionSequence	SQ	1
(3002,012C)	Scan Stop Position Sequence	ScanStopPositionSequence	SQ	1
(3002,012D)	Imaging Source to Beam Modifier Definition Plane Distance	ImagingSourceToBeamModifierDefinitionPlaneDistance	FD	1
(3002,012E)	Scan Arc Type	ScanArcType	CS	1
(3002,012F)	Detector Positioning Type	DetectorPositioningType	CS	1
(3002,0130)	Additional RT Accessory Device Sequence	AdditionalRTAccessoryDeviceSequence	SQ	1
(3002,0131)	Device-Specific Acquisition Parameter Sequence	DeviceSpecificAcquisitionParameterSequence	SQ	1

(3002,0132)	Referenced Position Reference Instance Sequence	ReferencedPositionReferenceInstanceSequence	SQ	1
(3002,0133)	Energy Derivation Code Sequence	EnergyDerivationCodeSequence	SQ	1
(3002,0134)	Maximum Cumulative Meterset Exposure	MaximumCumulativeMetersetExposure	FD	1
(3002,0135)	Acquisition Initiation Sequence	AcquisitionInitiationSequence	SQ	1

739

740 **Add the following to PS3.6, Annex A:**

741

742 **Annex A   Registry of DICOM unique identifiers (UIDs) (Normative)**

743 **Table A-1 UID Values**

744

UID Value	UID Name	UID Type	Part
1.2.840.10008.5.1.4.1.1.481.23	**Enhanced RT Image Storage**	**SOP Class**	**PS3.4**
1.2.840.10008.5.1.4.1.1.481.24	**Enhanced Continuous RT Image Storage**	**SOP Class**	**PS3.4**
1.2.840.10008.5.1.4.1.1.481.25	**RT Patient Position Acquisition Instruction Storage**	**SOP Class**	**PS 3.4**

745

746 **Table A-3 Context Group UID Values**

747

Context UID	Context Identifier	Context Group Name
1.2.840.10008.6.1.1459	**9260**	**Radiotherapy Acquisition WorkItem Subtasks**
1.2.840.10008.6.1.1460	**9261**	**Patient Position Acquisition Radiation Source Locations**
1.2.840.10008.6.1.1461	**9262**	**Energy Derivation Types**
1.2.840.10008.6.1.1462	**9263**	**kV Imaging Acquisition Techniques**
1.2.840.10008.6.1.1463	**9264**	**MV Imaging Acquisition Techniques**
1.2.840.10008.6.1.1464	**9265**	**Patient Position Acquisition - Projection Techniques**
1.2.840.10008.6.1.1465	**9266**	**Patient Position Acquisition - CT Techniques**
1.2.840.10008.6.1.1466	**9267**	**Patient Positioning Related Object Purposes**
1.2.840.10008.6.1.1467	**9268**	**Patient Position Acquisition Devices**
1.2.840.10008.6.1.1468	**9269**	**RT Radiation Meterset Units**
1.2.840.10008.6.1.1469	**9270**	**Acquisition Initiation Types**
1.2.840.10008.6.1.1470	**9271**	**RT Image Patient Position Acquisition Devices**

748

749

750   **Part 15 Addendum**

751 | **Add the following rows to PS3.15, Annex E, Table E.1-1:** |
    |---|

752   **Table E.1-1. Application Level Confidentiality Profile Attributes**

Attribute Name	Tag	Retired (from PS3.6)	In Std. Comp. IOD (from PS3.3)	Basic Profile	Retain Safe Private Option	Retain UIDs Option	Retain Device Ident. Option	Retain Inst. Ident. Option	Retain Patient Chars. Option	Retain Long. Full Dates Option	Retain Long. Modif. Dates Option	Clean Desc. Option	Clean Struct. Cont. Option	Clean Graph. Option
Position Acquisition Template Name	(3002,0121)	N	Y	X								C		
Position Acquisition Template Description	(3002,0123)	N	Y	X								C		

753

754

755   **Part 16 Addendum**

756 | **Modify the following CIDs to PS3.16, Annex B:** |
    |---|

757 **Annex B   DCMR Context Groups (Normative)**

758 …

759 **CID 9242   Radiotherapy Acquisition Workitem Definition**

760   **Resources: HTML l FHIR JSON l FHIR XML l IHE SVS XML**
761   **Type: Extensible**
762   **Version: 20221225**
763   **UID: 1.2.840.10008.6.1.932**
764   **Table CID 9242. Radiotherapy Acquisition Workitem Definition**
765

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
Include CID 9265 "Patient Position Acquisition - Projection Techniques"		
Include CID 9266 "Patient Position Acquisition - CT Techniques"		
~~DCM~~	~~121702~~	~~RT Patient Position Acquisition, single plane MV~~
~~DCM~~	~~121703~~	~~RT Patient Position Acquisition, dual plane MV~~
~~DCM~~	~~121704~~	~~RT Patient Position Acquisition, single plane kV~~
~~DCM~~	~~121705~~	~~RT Patient Position Acquisition, dual plane kV~~
~~DCM~~	~~121706~~	~~RT Patient Position Acquisition, dual plane kV/MV~~
~~DCM~~	~~121707~~	~~RT Patient Position Acquisition, CT kV~~

~~DCM~~	~~121708~~	~~RT Patient Position Acquisition, CT MV~~
DCM	121709	RT Patient Position Acquisition, Optical
DCM	121710	RT Patient Position Acquisition, Ultrasound
DCM	121711	RT Patient Position Acquisition, Spatial Fiducials

766

767

768

Add the following new CIDs to PS3.16, Annex B:

770

CID 9260   Radiotherapy Acquisition WorkItem Subtasks

Resources: HTML l FHIR JSON l FHIR XML l IHE SVS XML

Type: Extensible

Version: 20221225

UID: 1.2.840.10008.6.1.1459

Table CID 9260. Radiotherapy Acquisition WorkItem Subtasks

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
DCM	130785	RT Patient Position Acquisition, Cone-Beam CT kV
DCM	130787	RT Patient Position Acquisition, Cone-Beam CT MV
DCM	130786	RT Patient Position Acquisition, Conventional CT kV
DCM	130788	RT Patient Position Acquisition, Conventional CT MV
DCM	121707	RT Patient Position Acquisition, CT kV
DCM	121708	RT Patient Position Acquisition, CT MV
DCM	121705	RT Patient Position Acquisition, dual plane kV
DCM	121706	RT Patient Position Acquisition, dual plane kV/MV
DCM	121703	RT Patient Position Acquisition, dual plane MV
DCM	130784	RT Patient Position Acquisition, Film Cassette kV
DCM	130783	RT Patient Position Acquisition, Film Cassette MV
DCM	130782	RT Patient Position Acquisition, Integrated Dose MV
DCM	121704	RT Patient Position Acquisition, single plane kV
DCM	121702	RT Patient Position Acquisition, single plane MV

777

CID 9261   Patient Position Acquisition Radiation Source Locations

Resources: HTML l FHIR JSON l FHIR XML l IHE SVS XML

Type: Extensible

Version: 20221225

UID: 1.2.840.10008.6.1.1460

Table CID 9261. Patient Position Acquisition Radiation Source Locations

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
DCM	130358	Nominal Radiation Source Location
DCM	130789	Nominal Imaging Source Location

784

CID 9262   Energy Derivation Types

Resources: HTML l FHIR JSON l FHIR XML l IHE SVS XML

Type: Extensible

Version: 20221225

UID: 1.2.840.10008.6.1.1461

Table CID 9262. Energy Derivation Types

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
DCM	130806	Configured Lowest Imaging Energy
DCM	130807	Configured Default Imaging Energy

791

CID 9263   KV Imaging Acquisition Techniques

Resources: HTML l FHIR JSON l FHIR XML l IHE SVS XML

Type: Extensible

Version: 20221225

UID: 1.2.840.10008.6.1.1462

Table CID 9263. KV Imaging Acquisition Techniques

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
DCM	121704	RT Patient Position Acquisition, single plane kV
DCM	121707	RT Patient Position Acquisition, CT kV
DCM	130785	RT Patient Position Acquisition, Cone-Beam CT kV
DCM	130786	RT Patient Position Acquisition, Conventional CT kV
DCM	130784	RT Patient Position Acquisition, Film Cassette kV

798

CID 9264   MV Imaging Acquisition Techniques

Resources: HTML l FHIR JSON l FHIR XML l IHE SVS XML

Type: Extensible

Version: 20221225

UID: 1.2.840.10008.6.1.1463

Table CID 9264. MV Imaging Acquisition Techniques

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
DCM	121702	RT Patient Position Acquisition, single plane MV

DCM	121708	RT Patient Position Acquisition, CT MV
DCM	130787	RT Patient Position Acquisition, Cone-Beam CT MV
DCM	130788	RT Patient Position Acquisition, Conventional CT MV
DCM	130782	RT Patient Position Acquisition, Integrated Dose MV
DCM	130783	RT Patient Position Acquisition, Film Cassette MV

805

806 **CID 9265   Patient Position Acquisition - Projection Techniques**

807 **Resources: HTML I FHIR JSON I FHIR XML I IHE SVS XML**

808 **Type: Extensible**

809 **Version: 20221225**

810 **UID: 1.2.840.10008.6.1.1464**

811 **Table CID 9265. Patient Position Acquisition - Projection Techniques**

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
DCM	121702	RT Patient Position Acquisition, single plane MV
DCM	121704	RT Patient Position Acquisition, single plane kV
DCM	130782	RT Patient Position Acquisition, Integrated Dose MV
DCM	130783	RT Patient Position Acquisition, Film Cassette MV
DCM	130784	RT Patient Position Acquisition, Film Cassette kV

812

813 **CID 9266   Patient Position Acquisition – CT Techniques**

814 **Resources: HTML I FHIR JSON I FHIR XML I IHE SVS XML**

815 **Type: Extensible**

816 **Version: 20221225**

817 **UID: 1.2.840.10008.6.1.1465**

818 **Table CID 9266. Patient Position Acquisition – CT Techniques**

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
DCM	121707	RT Patient Position Acquisition, CT kV
DCM	130785	RT Patient Position Acquisition, Cone-Beam CT kV
DCM	130786	RT Patient Position Acquisition, Conventional CT kV
DCM	121708	RT Patient Position Acquisition, CT MV
DCM	130787	RT Patient Position Acquisition, Cone-Beam CT MV
DCM	130788	RT Patient Position Acquisition, Conventional CT MV

819

820 **CID 9267   Patient Positioning Related Object Purposes**

821 **Resources: HTML I FHIR JSON I FHIR XML I IHE SVS XML**

822 **Type: Extensible**

823 **Version: 20221225**

824 **UID: 1.2.840.10008.6.1.1466**

825

Table CID 9267. Patient Positioning Related Object Purposes

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
DCM	130790	RT Patient Positioning Reference Image

826

827

CID 9268   Patient Position Acquisition Devices

Resources: HTML I FHIR JSON I FHIR XML I IHE SVS XML

Type: Extensible

Version: 20221225

UID: 1.2.840.10008.6.1.1467

Table CID 9268. Patient Position Acquisition Devices

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SCT	468886001	Digital imaging scanner, computed radiography
SCT	468440006	Digital imager, radiation therapy
SCT	466556008	X-ray film cassette, manual

834

CID 9269   RT Radiation Meterset Units

Resources: HTML I FHIR JSON I FHIR XML I IHE SVS XML

Type: Extensible

Version: 20221225

UID: 1.2.840.10008.6.1.1468

Table CID 9269. RT Radiation Meterset Units

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
Include CID 9552 "C-Arm Photon-Electron Dosimeter Units"		
Include CID 9557 "Tomotherapeutic Dosimeter Units"		
Include CID 9559 "Robotic Delivery Device Dosimeter Units"		

841

CID 9270   Acquisition Initiation Types

Resources: HTML I FHIR JSON I FHIR XML I IHE SVS XML

Type: Extensible

Version: 20221225

UID: 1.2.840.10008.6.1.1469

Table CID 9270. Acquisition Initiation Types

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
DCM	130792	Acquisition Initiation not defined

DCM	130793	Acquisition Initiation before start of Radiation
DCM	130794	Acquisition Initiation after end of Radiation
DCM	130795	Acquisition Initiation by triggering parameter

848

849 **CID 9271   RT Image Patient Position Acquisition Devices**

850 **Resources: HTML I FHIR JSON I FHIR XML I IHE SVS XML**

851 **Type: Extensible**

852 **Version: 20221225**

853 **UID: 1.2.840.10008.6.1.1470**

854 **Table CID 9271. RT Image Patient Position Acquisition Devices**

855 This Context Group includes physical imaging devices that performed acquisition or virtual imaging devices for
856 which acquisition was simulated.

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SCT	468440006	Digital imager, radiation therapy
SCT	466556008	X-ray film cassette, manual

857

858

859 **Add the following template to PS3.16, Annex C:**

860 **Annex C   Acquisition and Protocol Context Templates (Normative)**

861

862 **TID 15307   Acquisition Initiation Parameters**

863 This Template specifies how an acquisition of data by devices, which perform such operations to construct images
864 or similar objects (like surfaces, fiducials etc.), is to be initiated. Acquisitions may be initiated manually or triggered
865 when parameters have specified values. Parameterized acquisitions may be initiated once or repeatedly.

866 This TID does not contain patient-related parameters; however, the TID is extensible and implementations may
867 include such parameters (e.g. a measurement of a certain value of distance between a device and the patient
868 surface triggering the acquisition).

869 **Type: Extensible**

870 **Order: Non-Significant**

871 **Root: No**

872

	Value Type	Concept Name	VM	Req Type	Condition	Value Set Constraint
1	CODE	EV (130791, DCM, "Acquisition Initiation Type")	1	M		BCID 9270 "Acquisition Initiation Types"
2	CODE	EV (130796, DCM, "Incremental Acquisition Triggering")	1	MC	IFF value of Row 1 is (130795, DCM, "Acquisition Initiation by triggering parameter")	DCID 231 "Yes-No Only"

3	NUMERIC	EV (130797, DCM, "Meterset")	1-n	MC	IFF value of Row 1 is (130795, DCM, "Acquisition Initiation by triggering parameter ") XOR Rows 4, 5, 6	UNITS = DCID 9269 "RT Radiation Meterset Units".
4	NUMERIC	EV (130798, DCM, "Source Continuous Roll Angle")	1-n	MC	IFF value of Row 1 is (130795, DCM, "Acquisition Initiation by triggering parameter ") XOR Rows 3, 5, 6	UNITS = EV (deg, UCUM, "deg")
5	NUMERIC	EV (130799, DCM, "Time after start of Radiation")	1-n	MC	IFF value of Row 1 is (130795, DCM, "Acquisition Initiation by triggering parameter ") XOR Rows 3, 4, 6	UNITS = EV (s, UCUM, "s")
6	NUMERIC	EV (130800, DCM, "Percentage of expected beam-on time of Radiation")	1-n	MC	IFF value of Row 1 is (130795, DCM, "Acquisition Initiation by triggering parameter ") XOR Rows 3, 4, 5	UNITS = EV (%, UCUM, "%")

873

Content Item Descriptions

874

Row 3 - 6	These rows provide the value(s) of a triggering parameter associated with acquisition initiation.
	If Row 2 has the value of (373066001, SCT, "Yes") these rows contain 2 or 3 values. Value 1 represents the start value at which the repeated acquisition starts and value 2 contains the interval value by which the start value is repeatedly incremented to trigger subsequent acquisitions. Value 3 if present contains the stop value at which, when exceeded, no further acquisitions are started. If the stop value is not provided, the acquisition is triggered until the end of the therapeutic radiation.
	If Row 2 has the value of (373066001, SCT, "No") these rows shall contain a distinct value for the start of each acquisition. If more than one value is present, the values shall be specified in increasing order.

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TID 15308   Imaging Source Geometry Parameters

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878   **Type: Extensible**
879   **Order: Non-Significant**
880   **Root: No**

881 This Template specifies the location and orientation of an imaging source coordinate system.

882 For an IEC 61217 GANTRY coordinate system, the Z-axis passes through, and is directed towards, the radiation
883 source, which in this context is the imaging source.

	Value Type	Concept Name	VM	Req Type	Condition	Value Set Constraint
1	NUMERIC	EV (126809, DCM, "IEC61217 Gantry Continuous Roll Angle")	1	U		Units = EV (deg, UCUM, "deg")
2	NUMERIC	EV (126810, DCM, "IEC61217 Gantry Continuous Pitch Angle")	1	U		Units = EV (deg, UCUM, "deg")
3	NUMERIC	EV (126811, DCM, "IEC61217 Gantry Continuous Yaw Angle")	1	U		Units = EV (deg, UCUM, "deg")
4	NUMERIC	EV (130801, DCM, "IEC61217 Imaging Source to Axis Distance")	1	U		Units = EV (mm, UCUM, "mm")

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885   **TID 15309   Image Receptor Geometry Parameters**

886   **Type: Extensible**
887   **Order: Non-Significant**
888   **Root: No**

889   This Template specifies the location and orientation of an image receptor coordinate system.

890   For an IEC 61217 GANTRY coordinate system, the Z-axis passes through, and is directed towards, the radiation
891   source, which in this context is the imaging source.

	Value Type	Concept Name	VM	Req Type	Condition	Value Set Constraint
1	NUMERIC	EV (126809, DCM, "IEC61217 Gantry Continuous Roll Angle")	1	U		Units = EV (deg, UCUM, "deg")
2	NUMERIC	EV (126810, DCM, "IEC61217 Gantry Continuous Pitch Angle")	1	U		Units = EV (deg, UCUM, "deg")
3	NUMERIC	EV (126811, DCM, "IEC61217 Gantry Continuous Yaw Angle")	1	U		Units = EV (deg, UCUM, "deg")
4	NUMERIC	EV (130802, DCM, "IEC61217 X-Ray Image Receptor Radial Displacement from Isocenter")	1	U		Units = EV (mm, UCUM, "mm")
5	NUMERIC	EV (130803, DCM, "IEC61217 X-Ray Image Receptor Longitudinal Displacement")	1	U		Units = EV (mm, UCUM, "mm")
6	NUMERIC	EV (130804, DCM, "IEC61217 X-Ray Image Receptor Lateral Displacement")	1	U		Units = EV (mm, UCUM, "mm")
7	NUMERIC	EV (130805, DCM, "IEC61217 X-Ray Image Receptor Rotation")	1	U		Units = EV (deg, UCUM, "deg")

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894   **Change the following code definitions in PS3.16, Annex D:**

895   **Annex D   DICOM Controlled Terminology Definitions (Normative)**

Code Value	Code Meaning	Definition	Notes
121702	RT Patient Position Acquisition, single plane MV	Acquisition of patient positioning information ~~prior to treatment delivery~~, using single-plane megavoltage projection imaging.	
121703	RT Patient Position Acquisition, dual plane MV	Acquisition of patient positioning information ~~prior to treatment delivery~~, using dual-plane megavoltage projection imaging.	
121704	RT Patient Position Acquisition, single plane kV	Acquisition of patient positioning information ~~prior to treatment delivery~~, using single-plane kilovoltage projection imaging.	

Code Value	Code Meaning	Definition	Notes
121705	RT Patient Position Acquisition, dual plane kV	Acquisition of patient positioning information ~~prior to treatment delivery~~, using dual-plane kilovoltage projection imaging.	
121706	RT Patient Position Acquisition, dual plane kV/MV	Acquisition of patient positioning information ~~prior to treatment delivery~~, using dual-plane combined kilovoltage and megavoltage projection imaging.	
121707	RT Patient Position Acquisition, CT kV	Acquisition of patient positioning information ~~prior to treatment delivery~~, using kilovoltage CT imaging. **Note: This code encompasses both Cone-Beam CT and conventional CT.**	
121708	RT Patient Position Acquisition, CT MV	Acquisition of patient positioning information ~~prior to treatment delivery~~, using megavoltage CT imaging. **Note: This code encompasses both Cone-Beam CT and conventional CT**.	
121709	RT Patient Position Acquisition, Optical	Acquisition of patient positioning information ~~prior to treatment delivery~~, using optical imaging.	
121710	RT Patient Position Acquisition, Ultrasound	Acquisition of patient positioning information ~~prior to treatment delivery~~, using ultrasound imaging.	
121711	RT Patient Position Acquisition, Spatial Fiducials	Acquisition of patient positioning information ~~prior to treatment delivery~~, using spatial fiducials.	
126801	IEC61217 Patient Support Continuous Yaw Angle	~~Patient Support Continuous Yaw Angle in IEC PATIENT SUPPORT Coordinate System about the Z-axis of the IEC FIXED REFERENCE coordinate system.~~ **Patient Support isocentric rotation (in the IEC FIXED REFERENCE Coordinate System) as defined by [IEC 61217]. DICOM represents this value as a Continuous Rotation Angle in degrees.**	
126802	IEC61217 Table Top Continuous Pitch Angle	~~Table Top Continuous Pitch Angle in the direction of the IEC TABLE TOP Coordinate System [IEC 61217].~~ **Pitch of the Table Top (in the IEC TABLE TOP Coordinate System) as defined by [IEC 61217]. DICOM represents this value as a Continous Rotation Angle in degrees.**	
126803	IEC61217 Table Top Continuous Roll Angle	~~Table Top Continuous Roll Angle in the direction of the IEC TABLE TOP Coordinate System [IEC 61217].~~ **Roll of the Table Top (in the IEC TABLE TOP Coordinate System) as defined by [IEC 61217]. DICOM represents this value as a Continous Rotation Angle in degrees.**	
126804	IEC61217 Table Top Eccentric Axis Distance	~~Table Top Eccentric Axis Distance [IEC 61217].~~ **Eccentric axis offset, in mm (in the IEC PATIENT SUPPORT Coordinate System) as defined by [IEC 61217].**	
126805	IEC61217 Table Top Continuous Eccentric Angle	~~Table Top Continuous Eccentric Angle in the direction of the IEC TABLE TOP ECCENTRIC Coordinate System [IEC 61217].~~ **Table Top eccentric rotation (in the IEC TABLE TOP ECCENTRIC Coordinate System) as defined by [IEC 61217]. DICOM represents this value as a Continuous Rotation Angle in degrees.**	

Code Value	Code Meaning	Definition	Notes
126806	IEC61217 Table Top Lateral Position	~~Table Top Lateral Position IEC TABLE TOP Coordinate System [IEC 61217].~~ **Lateral displacement of the table top, in mm (in the IEC TABLE TOP Coordinate System) as defined by [IEC 61217].**	
126807	IEC61217 Table Top Longitudinal Position	~~Table Top Longitudinal Position IEC TABLE TOP Coordinate System [IEC 61217].~~ **Longitudinal displacement of the table top, in mm (in the IEC TABLE TOP Coordinate system) as defined by [IEC 61217].**	
126808	IEC61217 Table Top Vertical Position	~~Table Top Vertical Position in IEC TABLE TOP Coordinate System [IEC 61217].~~ **Vertical displacement of the table top, in mm (in the IEC TABLE TOP Coordinate System) as defined by [IEC 61217].**	
126809	IEC61217 Gantry Continuous Roll Angle	~~Gantry Continuous Roll Angle in degrees of the radiation source, i.e., the rotation about the Y-axis of the IEC GANTRY coordinate system [IEC 61217].~~ **Rotation of the gantry (around the Y-axis of the IEC FIXED REFERENCE Coordinate System) as defined by [IEC 61217]. DICOM represents this value as a Continuous Rotation Angle in degrees.**	
126810	IEC61217 Gantry Continuous Pitch Angle	~~Gantry Pitch Continuous Angle in degrees of the radiation source, i.e., the rotation about the X-axis of the IEC GANTRY coordinate system [IEC 61217].~~ **Pitch angle of rotation of the gantry around the X-axis of the IEC GANTRY Coordinate System. This parameter is not specifically defined by [IEC 61217], but is consistent with [IEC 61217]. DICOM represents this value as a Continuous Rotation Angle in degrees.**	
126811	IEC61217 Gantry Continuous Yaw Angle	~~Gantry Yaw Continuous Angle in degrees of the radiation source, i.e., about the Z-axis of the IEC GANTRY coordinate system [IEC 61217].~~ **Yaw angle of rotation of the gantry around the Z-axis of the IEC GANTRY Coordinate System This parameter is not specifically defined by [IEC 61217], but is consistent with [IEC 61217]. DICOM represents this value as a Continuous Rotation Angle in degrees.**	

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Add the following codes to PS3.16, Annex D:

Annex D   DICOM Controlled Terminology Definitions (Normative)

Code Value	Code Meaning	Definition	Notes
130782	RT Patient Position Acquisition, Integrated Dose MV	Acquisition of patient positioning information using continuous megavoltage acquisition during treatment delivery.	
130783	RT Patient Position Acquisition, Film Cassette MV	Acquisition of patient positioning information using a radiation-sensitive film suited for megavoltage radiation.	
130784	RT Patient Position Acquisition, Film Cassette kV	Acquisition of patient positioning information using a radiation-sensitive film suited for photon radiation.	

Code Value	Code Meaning	Definition	Notes
130785	RT Patient Position Acquisition, Cone-Beam CT kV	Acquisition of patient positioning information using kilovoltage Cone-Beam CT imaging.	
130786	RT Patient Position Acquisition, Conventional CT kV	Acquisition of patient positioning information using kilovoltage conventional CT imaging.	
130787	RT Patient Position Acquisition, Cone-Beam CT MV	Acquisition of patient positioning information using megavoltage Cone-Beam CT imaging.	
130788	RT Patient Position Acquisition, Conventional CT MV	Acquisition of patient positioning information using megavoltage conventional CT imaging.	
130789	Nominal Imaging Source Location	The point location defined as the nominal source of radiation used for imaging.	
130790	RT Patient Positioning Reference Image	Image(s) of the patient used to provide a reference for positioning of the patient for the planned treatment.	
130791	Acquisition Initiation Type	The type of method used to start the acquisition.	
130792	Acquisition Initiation not defined	The acquisition trigger is not specified. Acquisition may be initiated manually by the device operator.	
130793	Acquisition Initiation before start of Radiation	The acquisition is started before delivering the therapeutic radiation. It is expected that the therapeutic beam is not started before the acquisition is completed.	
130794	Acquisition Initiation after end of Radiation	The acquisition is started after delivering the therapeutic radiation.	
130795	Acquisition Initiation by triggering parameter	The acquisition is started when the triggering parameter reaches specific value(s).	
130796	Incremental Acquisition Triggering	Flag denoting whether the acquisition is to be repeated in regular intervals separated by a certain increment.	
130797	Meterset	A single parameter from which the absorbed dose delivered can be calculated through a calibration procedure with additional information.	
130798	Source Continuous Roll Angle	Angle in degrees about the Y-axis of the Equipment Coordinate System by which the source is rotated. A Continuous Rotation Angle is an angle in the range ($-\infty, +\infty$). Continuous Rotation Angle represent a rotation direction and magnitude. The magnitude is not limited to be between 0 and 360 degrees.	
130799	Time after start of Radiation	Time elapsed after the start of the delivery of an RT Radiation.	
130800	Percentage of expected beam-on time of Radiation	Delivered percentage of the duration of a Radiation at a given point in time. The denominator is the duration of time that the beam is expected to be on between the start and the end of the delivery of an RT Radiation. The numerator is the duration of time that the beam has been on since the start of the first beam-on. Both durations exclude "beam-hold" periods within the treatment delivery (e.g. during gated treatments).	
130801	IEC61217 Imaging Source to Axis Distance	Distance from the imaging source, in mm, to the gantry rotation axis of a IEC C-Arm Device. This parameter is not specifically defined by [IEC 61217], but is consistent with [IEC 61217]	

Code Value	Code Meaning	Definition	Notes
130802	IEC61217 X-Ray Image Receptor Radial Displacement from Isocenter	X-Ray Image Receptor Radial Displacement From Isocenter, in mm (in the IEC GANTRY Coordinate System) as defined by [IEC 61217].	
130803	IEC61217 X-Ray Image Receptor Longitudinal Displacement	X-Ray Image Receptor Longitudinal Displacement, in mm (in the IEC GANTRY Coordinate System) as defined by [IEC 61217].	
130804	IEC61217 X-Ray Image Receptor Lateral Displacement	X-Ray Image Receptor Lateral Displacement, in mm (in the IEC GANTRY Coordinate System) as defined by [IEC 61217].	
130805	IEC61217 X-Ray Image Receptor Rotation	X-Ray Image Receptor rotation (around the z-axis of the IEC X-RAY IMAGE RECEPTOR Coordinate System) as defined by [IEC61217]. DICOM represents this value as a Continous Rotation Angle in degrees.	
130806	Configured Lowest Imaging Energy	Lowest energy for acquiring an image as configured on the device.	
130807	Configured Default Imaging Energy	Default energy for acquiring an image as configured on the device.	

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