DICOM Conformance Statement

for decimal ElectronRT version 0.0.4

1 Introduction

This section provides the information about the purpose, scope, and contents of this DICOM Conformance Statement.

1.1 Purpose

This document contains the DICOM Conformance Statement for decimal ElectronRT Application. The decimal ElectronRT Application is intended to create and send DICOM formatted files with defined standard data types to a remote DICOM receiver. The compliance has been specified through the Service Classes, Information Object Definitions (IODs), Transfer Syntaxes, and Communication Protocols supported by the implementation.

1.2 Target Audience

This document is intended for existing and potential users of the decimal ElectronRT Application. This document assumes familiarity with the DICOM standard as defined by NEMA.

1.3 General

The decimal ElectronRT Application is a product of .decimal, LLC. The decimal ElectronRT Application will be revised as needed to meet future DICOM standards, and as such this may result in changes being made to the IODs listed in this Conformance Statement. It is the user's responsibility to ensure that the DICOM standard being used to receive files from the decimal ElectronRT Application meets the requirements as defined in this Conformance Statement.

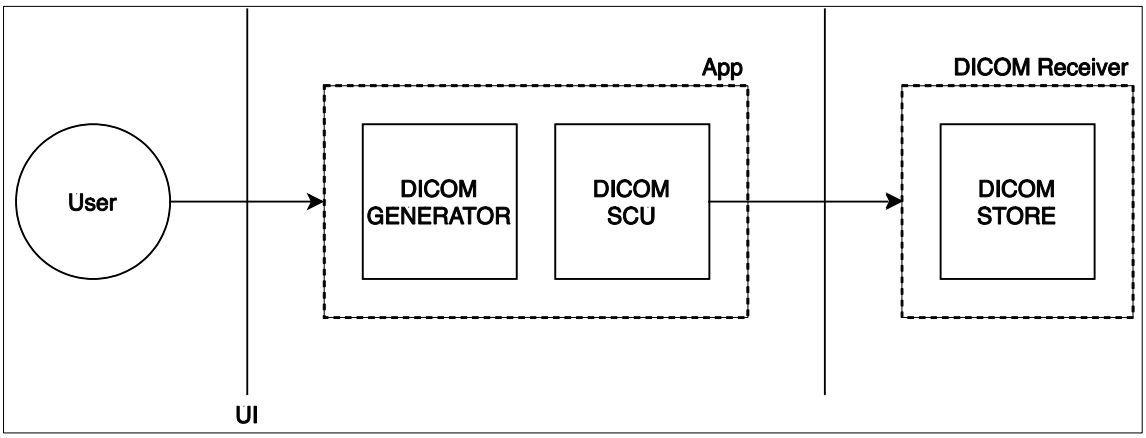
.decimal may make changes and updates to the decimal ElectronRT Application and the Conformance Statement or to retire it from usage at any time. .decimal is not liable for errors in this document or for damages resulting in the usage of this material. This Conformance Statement does not guarantee successful interconnection between the decimal ElectronRT Application and user supplied remote DICOM receiver. It is also the end user's responsibility to independently verify correct functionality and accuracy of patient and treatment planning data.

1.4 Trademarks

2 Implementation Model

The decimal ElectronRT Application is a stand-alone application available through the Apple iOS App Store. The application provides all of the necessary interface options and functionality for an end user to create and send a DICOM formatted file.

2.1 Application Data Flow



The decimal ElectronRT Application allows trained radiation therapy professionals to perform physical scans of a patient's intended treatment area. The application then allows users to manually contour treatment fields and design patient-specific treatment devices using the scan data. These devices can then be ordered for fabrication by our company so that they can be used for patient treatment. Once ordered, the user may choose to export the treatment device information via a DICOM RT Plan file. When the user selects a scan for which they would like to export the information, a DICOM file generator in the decimal ElectronRT Application will take that information, validate it and then process it into a DICOM file format. At this point, the file is handed off to the DICOM SCU which will attempt to establish a connection with, and send the DICOM file to, the user's entered remote DICOM Receiver.

2.2 Functional Definition of Application Entities

The decimal ElectronRT Application acts as a Storage Service Class User.

2.3 Sequencing of Real World Activities

The only real world sequence that must take place is the requirement of purchase of a device (based on a scan) in the decimal ElectronRT Application before export can be completed.

3 Application Entity Specifications

The decimal ElectronRT Entity provides standard conformance to the following DICOM Service Object Pairs (SOP) Class as a Service Class User (SCU).

SOP Class Name	UID
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5

3.1 Number of Associations

The decimal ElectronRT Application will only handle one association at a time. The application will only have a single remote DICOM receiver in memory.

3.2 Asynchronous Nature

The decimal ElectronRT Application does not support asynchronous communication.

4 Supported IODs

Only the DICOM modules and tags defined in this section are created and written to by the decimal ElectronRT Application based on end user inputs. If a tag is omitted from this list, it is not written by the application.

4.1 Patient Module – C.7.1.1

Used for DICOM RT Plan writing.

Attribute Name	Tag	Type	Description
Patient's Name	(0010,0010)	2	Patient's full name.
Patient ID	(0010,0020)	2	Primary identifier for the patient.
Patient's Birth Date	(0010,0030)	2	Birth date of the patient.
Patient's Sex	(0010,0040)	2	Sex of the named patient. Enumerated Values: **M** male **F** female **O** other
Patient Identity Removed	(0012,0062)	3	**NO** (decimal ElectronRT does not support identity removal)

4.2 General Study Module – C.7.2.1

Used for DICOM RT Plan writing.

Attribute Name	Tag	Type	Description
Study Instance UID	(0020,000D)	1	Unique identifier for the Study.
Study Date	(0008,0020)	2	Date of Export.
Study Time	(0008,0030)	2	Time of Export.

Attribute Name	Tag	Type	Description
Referring Physician's Name	(0008,0090)	2	Name of the patient's physician.
Study ID	(0020,0010)	2	Empty field.
Accession Number	(0008,0050)	2	Empty field.

4.3 RT Series Module – C.8.8.1

Used for DICOM RT Plan writing.

Attribute Name	Tag	Type	Description
Modality	(0008,0060)	1	**RTPLAN**
Series Instance UID	(0020,000E)	1	Unique identifier of the series.
Series Number	(0020,0011)	2	Empty field.
Operator's Name	(0008,1070)	2	Empty field.

4.4 Frame of Reference Module – C.7.4.1

Used for DICOM RT Plan and RT Dose writing.

Attribute Name	Tag	Type	Description
Frame of Reference UID	(0020,0052)	1	Uniquely identifies the frame of reference for a Series. See Section C.7.4.1.1.1 for further explanation.
Position Reference Indicator	(0020,1040)	2	Empty field.

4.5 General Equipment Module – C.7.5.1

Used for DICOM RT Plan writing.

Attribute Name	Tag	Type	Description
Manufacturer	(0008,0070)	2	".decimal LLC"
Manufacturer's Model Name	(0008,1090)	3	The Beam model name
Institution Name	(0008,0080)	3[LO]	Institution where the equipment is located that is to be used for beam delivery. Written only.

Attribute Name	Tag	Type	Description
Software Versions	(0018,1020)	3	Version and build of the decimal ElectronRT software at the time of Export.

4.6 RT Structure Set Module - C.8.8.5

Used for DICOM RT Structure Set file parsing and writing.

Attribute Name	Tag	Type	Attribute Description
Structure Set Label	(3006,0002)	1	User-defined label for Structure Set.
Structure Set Name	(3006,0004)	3	User-defined name for Structure Set.
Structure Set Description	(3006,0006)	3	User-defined description of Structure Set.
Structure Set Date	(3006,0008)	2	Date at which Structure Set was last modified
Structure Set Time	(3006,0009)	2	Time as which Structure Set was last modified
Referenced Frame of Reference Sequence	(3006,0010)	3	Sequence describing Frames of Reference in which the ROIs are defined. One or more Items are permitted in this Sequence. See Section C.8.8.5.1.
>Frame of Reference UID	(0020,0052)	1	Uniquely identifies Frame of Reference within Structure Set.
>RT Referenced Study Sequence	(3006,0012)	3	Sequence of Studies containing series to be referenced. One or more Items are permitted in this Sequence. See Section C.8.8.5.4.
>>RT Referenced Series Sequence	(3006,0014)	1	Sequence describing series of images within the referenced study that are used in defining the Structure Set. One or more Items shall be included in this Sequence.
>>>Series Instance UID	(0020,000E)	1	Unique identifier for the series containing the images.
>>>Contour Image Sequence	(3006,0016)	1	Sequence of items describing images in a given series used in defining the Structure Set (typically CT or MR images). One or more Items shall be included in this Sequence.
Structure Set ROI Sequence	(3006,0020)	1	ROIs for current Structure Set. One or more Items shall be included in this Sequence.
>ROI Number	(3006,0022)	1	Identification number of the ROI. The value of ROI Number (3006,0022) shall be unique within the Structure Set in which it is created.

Attribute Name	Tag	Type	Attribute Description
>ROI Name	(3006,0026)	2	User-defined name for ROI.

4.7 ROI Contour Module - C.8.8.6

Used for DICOM RT Structure Set file parsing and writing.

Attribute Name	Tag	Type	Attribute Description
ROI Contour Sequence	(3006,0039)	1	Sequence of Contour Sequences defining ROIs. One or more Items shall be included in this Sequence.
>Referenced ROI Number	(3006,0084)	1	Uniquely identifies the referenced ROI described in the Structure Set ROI Sequence (3006,0020).
>ROI Display Color	(3006,002A)	3	RGB triplet color representation for ROI, specified using the range 0-255.
>Contour Sequence	(3006,0040)	3	Sequence of Contours defining ROI. One or more Items are permitted in this Sequence.
>>Contour Image Sequence	(3006,0016)	3	Sequence of images containing the contour. One or more items are permitted in this Sequence. Written only.
>>>Referenced SOP Class UID	(0008,1150)	1	Uniquely identifies the referenced SOP Class.
>>>Referenced SOP Instance UID	(0008,1155)	1	Uniquely identifies the referenced SOP Instance. Written only.
>>Contour Geometric Type	(3006,0042)	1	Geometric type of contour. See Section C.8.8.6.1. Enumerated Values: **POINT** single point **OPEN_PLANAR** open contour containing coplanar points **OPEN_NONPLANAR** open contour containing non-coplanar points **CLOSED_PLANAR** closed contour (polygon) containing coplanar points
>>Number of Contour Points	(3006,0046)	1	Number of points (triplets) in Contour Data (3006,0050).
>>Contour Data	(3006,0050)	1	Sequence of (x,y,z) triplets defining a contour in the patient based coordinate system described in Section C.7.6.2.1.1 (mm). See Section C.8.8.6.1 and Section C.8.8.6.3.

Attribute Name	Tag	Type	Attribute Description
			Note Contour Data may not be properly encoded if Explicit VR transfer syntax is used and the VL of this attribute exceeds 65534 bytes.

4.8 RT ROI Observations Module - C.8.8.8

Used for DICOM RT Structure Set file parsing and writing.

Attribute Name	Tag	Type	Attribute Description
RT ROI Observations Sequence	(3006,0080)	1	Sequence of observations related to ROIs defined in the ROI Module. One or more Items shall be included in this Sequence.
>Observation Number	(3006,0082)	1	Identification number of the Observation. The value of Observation Number (3006,0082) shall be unique within the RT ROI Observations Sequence (3006,0080).
>Referenced ROI Number	(3006,0084)	1	Uniquely identifies the referenced ROI described in the Structure Set ROI Sequence (3006,0020).
>RT ROI Interpreted Type	(3006,00A4)	2	Type of ROI. See Section C.8.8.8.1. Defined Terms: **EXTERNAL** external patient contour **PTV** Planning Target Volume (as defined in ICRU50) **CTV** Clinical Target Volume (as defined in ICRU50) **GTV** Gross Tumor Volume (as defined in ICRU50) **TREATED_VOLUME** Treated Volume (as defined in ICRU50) **IRRAD_VOLUME** Irradiated Volume (as defined in ICRU50) **BOLUS** patient bolus to be used for external beam therapy **AVOIDANCE** region in which dose is to be minimized **ORGAN** patient organ **MARKER** patient marker or marker on a localizer **REGISTRATION** registration ROI **ISOCENTER** treatment isocenter to be used for external beam therapy **CONTRAST_AGENT** volume into which a contrast agent has been injected **CAVITY** patient anatomical cavity **BRACHY_CHANNEL** brachytherapy channel **BRACHY_ACCESSORY** brachytherapy accessory device **BRACHY_SRC_APP** brachytherapy source applicator **BRACHY_CHNL_SHLD** brachytherapy channel shield **SUPPORT** external patient support device **FIXATION** external patient fixation or immobilization device

Attribute Name	Tag	Type	Attribute Description
			DOSE_REGION ROI to be used as a dose reference **CONTROL** ROI to be used in control of dose optimization and calculation
>Material ID	(300A,00E1)	3	User-supplied identifier for ROI material.
>ROI Interpreter	(3006,00A6)	2	Name of person performing the interpretation.
>ROI Physical Properties Sequence	(3006,00B0)	3	Sequence describing physical properties associated with current ROI interpretation. One or more items are permitted in this Sequence.
>>ROI Physical Property	(3006,00B2)	1	Physical property specified by ROI Physical Property Value (3006,00B4). Defined Terms: **REL_MASS_DENSITY** mass density relative to water **REL_STOP_RATIO** ratio of linear stopping power of material relative to linear stopping power of water
>>ROI Physical Property Value	(3006,00B4)	1	User-assigned value for physical property. Note The value has no meaning when ROI Physical Property (3006,00B2) has the value ELEM_FRACTION. Therefore this attribute may contain any value and receivers may ignore that value.

4.9 RT General Plan Module – C.8.8.9

Used for DICOM RT Plan writing.

Attribute Name	Tag	Type	Description
RT Plan Label	(300A,0002)	1	User-defined label for treatment plan (Scan Name).
RT Plan Name	(300A,0003)	3	User-defined name for treatment plan (Scan Name).
RT Plan Date	(300A,0006)	2	Date treatment plan was last modified.
RT Plan Time	(300A,000A)	2	Time treatment plan was last modified.
RT Plan Geometry	(300A,000C)	1	**TREATMENT_DEVICE** (RT Structure Set does not exist)
Referenced Structure Set Sequence	(300C,0060)	1C	The RT Structure Set on which the RT Plan is based. Only a single Item shall be included in this Sequence.

Attribute Name	Tag	Type	Description
			Required if RT Plan Geometry (300A,000C) is PATIENT.
>Referenced SOP Class UID	(0008,1150)	1	Uniquely identifies the references SOP Class.
>Referenced SOP Instance UID	(0008,1152)	1	Uniquely identifies the referenced SOP Instance.
Referenced Dose Sequence	(300C,0080)	3	Related Instances of RT Dose (for grids and named/unnamed point doses). One or more Items are permitted in this Sequence.
>Referenced SOP Class UID	(0008,1150)	1	Uniquely identifies the referenced SOP Class.
>Referenced SOP Instance UID	(0008,1155)	1	Uniquely identifies the referenced SOP Instance.

4.10 RT Prescription Module - C.8.8.10

Used for DICOM RT Plan file parsing and writing.

Attribute Name	Tag	Type	Attribute Description
Dose Reference Sequence	(300A,0010)	3	Sequence of Dose References. One or more Items are permitted in this Sequence.
>Dose Reference Number	(300A,0012)	1	Identification number of the Dose Reference. The value of Dose Reference Number (300A,0012) shall be unique within the RT Plan in which it is created.
>Dose Reference UID	(300A,0013)	3	A unique identifier for a Dose Reference that can be used to link the same entity across multiple RT Plan objects.
>Referenced ROI Number	(3006,0084)	1C	Uniquely identifies ROI representing the dose reference specified by ROI Number (3006,0022) in Structure Set ROI Sequence (3006,0020) in Structure Set Module within RT Structure Set in Referenced Structure Set Sequence (300C,0060) in RT General Plan Module.

Attribute Name	Tag	Type	Attribute Description
			Required if Dose Reference Structure Type (300A,0014) is POINT or VOLUME.
>Dose Reference Structure Type	(300A,0014)	1	Structure type of Dose Reference. Defined Terms: **POINT** dose reference point specified as ROI **VOLUME** dose reference volume specified as ROI **COORDINATES** point specified by Dose Reference Point Coordinates (300A,0018) **SITE** dose reference clinical site
>Dose Reference Description	(300A,0016)	3[LO]	User-defined description of Dose Reference.
>Dose Reference Point Coordinates	(300A,0018)	1C	Coordinates (x,y,z) of Reference Point in the patient based coordinate system described in Section C.7.6.2.1.1 (mm). Required if Dose Reference Structure Type (300A,0014) is COORDINATES.
>Dose Reference Type	(300A,0020)	1	Type of Dose Reference. Defined Terms: **TARGET** treatment target (corresponding to GTV, PTV, or CTV in ICRU50) **ORGAN_AT_RISK** Organ at Risk (as defined in ICRU50)
>Target Prescription Dose	(300A,0026)	3	Prescribed dose (in Gy) to Dose Reference if Dose Reference Type (300A,0020) is TARGET.
>Target Underdose Volume Fraction	(300A,0028)	3	Maximum permitted fraction (in percent) of Target to receive less than the Target Prescription Dose if Dose Reference Type (300A,0020) is TARGET and Dose Reference Structure Type (300A,0014) is VOLUME. See Section C.8.8.10.1.

Attribute Name	Tag	Type	Attribute Description
>Referenced ROI Number	(3006,0084)	1C	Uniquely identifies ROI representing the dose reference specified by ROI Number (3006,0022) in Structure Set ROI Sequence (3006,0020) in Structure Set Module within RT Structure Set in Referenced Structure Set Sequence (300C,0060) in RT General Plan Module. Required if Dose Reference Structure Type (300A,0014) is POINT or VOLUME.

4.11 RT Patient Setup Module – C.8.8.12

Used for DICOM RT Plan writing.

Attribute Name	Tag	Type	Description
Patient Setup Sequence	(300A,0180)	1	Sequence of patient setup data for current plan. One Item is included in this Sequence.
>Patient Setup Number	(300A,0182)	1	"1"
>Patient Position	(0018,5100)	1C	The Patient setup position (e.g.: HFS)
>Setup Technique	(300A,01B0)	3	**FIXED_SSD**

4.12 RT Fraction Scheme Module – C.8.8.13

Used for DICOM RT Plan writing.

Attribute Name	Tag	Type	Description
Fraction Group Sequence	(300A,0070)	1	All beams in the scan are added to a single Fraction Group in this Sequence.
>Fraction Group Number	(300A,0071)	1	"1"
>Number of Fractions Planned	(300A,0078)	2	Empty field.
>Number of Beams	(300A,0080)	1	Number of Beams in the plan.
>Referenced Beam Sequence	(300C,0004)	1C	Sequence of treatment beams in current Fraction Group (all ordered beams will be listed).
>>Referenced Beam Number	(300C,0006)	1	Unique number to identify each beam.

Attribute Name	Tag	Type	Description
>Number of Brachy Application Setups	(300A,00A0)	1	“0”

4.13 RT Beams Module – C.8.8.14

Used for DICOM RT Plan writing.

Attribute Name	Tag	Type	Description
Beam Sequence	(300A,00B0)	1	Sequence of treatment beams for current RT Plan. All ordered beams will be included in this Sequence.
>Beam Number	(300A,00C0)	1	Identification number of the Beam.
>Beam Name	(300A,00C2)	3	User-defined name for Beam. See Note 1.
>Beam Description	(300A,00C3)	3	User-defined description for Beam. See Note 1.
>Beam Type	(300A,00C4)	1	**STATIC**
>Radiation Type	(300A,00C6)	2	**ELECTRON**
>Treatment Machine Name	(300A,00B2)	2	User-defined name identifying treatment machine to be used for beam delivery. See Note 2.
>Manufacturer	(0008,0070)	3	Manufacturer of the equipment to be used for beam delivery.
>Primary Dosimeter Unit	(300A,00B3)	3	**MU**
>Source-Axis Distance	(300A,00B4)	3	Radiation source to Gantry rotation axis distance of the equipment that is to be used for beam delivery (mm).
>Beam Limiting Device Sequence	(300A,00B6)	1	Sequence of beam limiting device (collimator) jaw or leaf (element) sets. X and Y jaws are included in this Sequence.
>>RT Beam Limiting Device Type	(300A,00B8)	1	Type of beam limiting device (collimator). Enumerated Values: **X** symmetric jaw pair in IEC X direction **Y** symmetric jaw pair in IEC Y direction
>>Number of Leaf/Jaw Pairs	(300A,00BC)	1	“1”
>Treatment Delivery Type	(300A,00CE)	3	“TREATMENT”
>Number of Wedges	(300A,00D0)	1	“0”

Attribute Name	Tag	Type	Description
>Number of Compensators	(300A,00E0)	1	“0”
>Number of Boli	(300A,00ED)	1	Number of boli associated with current Beam.
>Number of Blocks	(300A,00F0)	1	Number of shielding blocks associated with Beam. Each Block opening is written as a unique Block, although all openings are present in one physical block device.
>Block Sequence	(300A,00F4)	1C	Sequence of blocks associated with Beam. One or more Items will be included in this Sequence. Required if Number of Blocks (300A,00F0) is non-zero.
>>Source to Block Tray Distance	(300A,00F6)	2	Radiation Source to attachment edge of block tray assembly (mm).
>>Block Type	(300A,00F8)	1	**APERTURE** (blocking material is outside contour)
>>Block Divergence	(300A,00FA)	2	**ABSENT** (block edges are not shaped for beam divergence)
>>Block Mounting Position	(300A,00FB)	3	**SOURCE_SIDE** (block is mounted on the side of the Block Tray that is towards the radiation source)
>>Block Number	(300A,00FC)	1	Identification number of the Block. This value will be unique within the Beam in which it is created.
>>Block Name	(300A,00FE)	3	User-defined name for Block.
>>Material ID	(300A,00E1)	2	“Copper”
>>Block Thickness	(300A,0100)	2C	“14.86”
>>Block Transmission	(300A,0102)	2C	Empty field.
>>Block Number of Points	(300A,0104)	2	Number of (x,y) pairs defining the Block edge.
>>Block Data	(300A,0106)	2	A data stream of (x,y) pairs that comprise the block edge. The vertices form a closed polygon. Coordinates are projected onto the machine isocentric plane in the IEC BEAM LIMITING DEVICE coordinate system (mm) See Note 3.
>Applicator Sequence	(300A,0107)	3	Sequence for Applicator associated with Beam. A single Item is included in this Sequence.
>>Accessory Code	(300A,00F9)	3	An identifier for the accessory intended to be read by a device such as a bar-code reader.

Attribute Name	Tag	Type	Description
			Currently empty and not written.
>>Applicator ID	(300A,0108)	1	Name of the Applicator selected for Beam.
>>Applicator Type	(300A,0109)	1	Type of Applicator shape. Enumerated values: ELECTRON_SQUARE ELECTRON_RECT ELECTRON_CIRC
>>Applicator Description	(300A,010A)	3	Description for Applicator. Currently empty and not written.
>>Applicator Geometry Sequence	(300A,0431)	3	Describes the applicator aperture geometry. A single Item is included in this Sequence.
>>>Applicator Aperture Shape	(300A,0432)	1	Aperture shape of the Applicator. Enumerated values: SYM_SQUARE SYM_RECTANGLE SYM_CIRCULAR
>>>Applicator Opening	(300A,0433)	1C	Opening (in mm) of the Applicator's aperture in IEC BEAM LIMITING DEVICE coordinate system. In case of square-shaped applicator contains the length of the sides of the square. In case of circular-shaped applicators, contains the diameter of the circular aperture. Required if Applicator Aperture Shape (300A,0432) is SYM_SQUARE or SYM_CIRCULAR.
>>>Applicator Opening X	(300A,0434)	1C	Opening (in mm) of the Applicator's aperture in IEC BEAM LIMITING DEVICE coordinate system in X-Direction. Required if Applicator Aperture Shape (300A,0432) is SYM_RECTANGLE.
>>>Applicator Opening Y	(300A,0435)	1C	Opening (in mm) of the Applicator's aperture in IEC BEAM LIMITING DEVICE coordinate system in Y-Direction. Required if Applicator Aperture Shape (300A,0432) is SYM_RECTANGLE.
>Referenced Bolus Sequence	(300C,00B0)	1C	Sequence of boli associated with Beam. Required if Number of Boli (300A,00ED) is non-zero.
>>Referenced ROI Number	(3006,0084)	1	Uniquely identifies ROI representing the Bolus specified by ROI Number (3006,0022) in Structure Set ROI Sequence (3006,0020) in Structure Set Module within RT Structure Set in Referenced Structure Set Sequence (300C,0060) in RT General Plan Module.

Attribute Name	Tag	Type	Description
>>Bolus ID	(300A,00DC)	3	User-supplied identifier for the Bolus.
>>Bolus Description	(300A,00DD)	3	User-defined description for the Bolus.
>>Accessory Code	(300A,00F9)	3	An identifier for the accessory intended to be read by a device such as a bar-code reader.
>Final Cumulative Meterset Weight	(300A,010E)	1C	“1.0”
>Number of Control Points	(300A,0110)	1	“2”
>Control Point Sequence	(300A,0111)	1	Sequence of machine configurations describing treatment beam. The minimum required two Items are included in this Sequence.
>>Control Point Index	(300A,0112)	1	Index of current Control Point, starting at 0 for first Control Point.
>>Nominal Beam Energy	(300A,0114)	3	Nominal Beam Energy at Control Point (MeV).
>>Cumulative Meterset Weight	(300A,0134)	2	Cumulative weight to current control point. Cumulative Meterset Weight for the first item in Control Point Sequence shall always be zero. Cumulative Meterset Weight for the final item in Control Point Sequence shall always be equal to Final Cumulative Meterset Weight.
>>Beam Limiting Device Position Sequence	(300A,011A)	1C	Sequence of beam limiting device (collimator) jaw or leaf (element) positions. X and Y jaws are included in this Sequence for the first Control Point.
>>>Beam Limiting Device Type	(300A,00B8)	1	Type of beam limiting device (collimator). The value of this attribute shall correspond to RT Beam Limiting Device Type (300A,00B8) defined in an item of Beam Limiting Device Sequence (300A,00B6). Enumerated Values: **X** symmetric jaw pair in IEC X direction **Y** symmetric jaw pair in IEC Y direction
>>>Leaf/Jaw Positions	(300A,011C)	1	Positions of beam limiting device (collimator) leaf (element) or jaw pairs (in mm) in IEC BEAM LIMITING DEVICE coordinate axis appropriate to RT Beam Limiting Device Type (300A,00B8). These value match the edge positions of the user selected electron applicator.
>>Gantry Angle	(300A,011E)	1C	Gantry angle of radiation source, i.e., orientation of IEC GANTRY coordinate system with respect to IEC FIXED REFERENCE coordinate system (degrees). Included only in first Control Point.

Attribute Name	Tag	Type	Description
>>Gantry Rotation Direction	(300A,011F)	1C	**NONE**
>>Beam Limiting Device Angle	(300A,0120)	1C	Beam Limiting Device (collimator) angle, i.e., orientation of IEC BEAM LIMITING DEVICE coordinate system in respect to IED GANTRY coordinate system (degrees). Included only in first Control Point.
>>Beam Limiting Device Rotation Direction	(300A,0121)	1C	**NONE**
>>Patient Support Angle	(300A,0122)	1C	Patient Support (couch) angle, i.e., orientation of IEC PATIENT SUPPORT (turntable) coordinate system with respect to IEC FIXED REFERENCE coordinate system (Degrees). Included only in first Control Point.
>>Patient Support Rotation Direction	(300A,0123)	1C	**NONE**
>>Table Top Eccentric Angle	(300A,0125)	1C	“0”
>>Table Top Eccentric Rotation Direction	(300A,0126)	1C	**NONE**
>>Table Top Pitch Angle	(300A,0140)	1C	“0”
>>Table Top Pitch Rotation Direction	(300A,0142)	1C	**NONE**
>>Table Top Roll Angle	(300A,0144)	1C	“0”
>>Table Top Roll Rotation Direction	(300A,0146)	1C	**NONE**
>>Table Top Vertical Position	(300A,0128)	2C	Empty field.
>>Table Top Longitudinal Position	(300A,0129)	2C	Empty field.
>>Table Top Lateral Position	(300A,012A)	2C	Empty field.
>>Isocenter Position	(300A,012C)	2C	Empty field.
>>Source to Surface Distance	(300A,0130)	3	User specified Source to Patient Surface (skin) distance (mm).

Notes:

1. Beam Number (300A,00C0) is provided to link related information across modules, and its value should not be required to have any real-world interpretation. Beam Name (300A,00C2), a Type 3 attribute, is intended to store the primary beam identifier (often referred to as "field identifier"). Beam Description (300A,00C3), a Type 3 attribute, is intended to store additional beam identifying information (often referred to as "field name"). Equipment supporting both these attributes should state this clearly in the Conformance Statement.
2. The DICOM standard does not support the transmission of treatment unit modeling information such as depth doses and beam profiles.

3. Block coordinates may not be transmitted when the receiving system does not have internal mechanisms to use or store such data. For example, a plan sent from this software to a Record and Verify (R&V) system will contain the block data for blocked beams. Subsequent transfer of beam data from the R&V system may omit this data since the R&V system may not be configured to store it.

4.14 Approval Module – C.8.8.16

Used for DICOM RT Plan writing.

Approval Status	(300E,0002)	1	Approval status at the time the SOP Instance was created. Enumerated Values: **APPROVED** Reviewer recorded that object met an implied criterion **UNAPPROVED** No review of object has been recorded **REJECTED** Reviewer recorded that object failed to meet an implied criterion
Review Date	(300E,0004)	2C	Date on which object was reviewed. Required if Approval Status (300E,0002) is APPROVED or REJECTED.
Review Time	(300E,0005)	2C	Time at which object was reviewed. Required if Approval Status (300E,0002) is APPROVED or REJECTED.
Reviewer Name	(300E,0008)	2C	Name of person who reviewed object. Required if Approval Status (300E,0002) is APPROVED or REJECTED.

4.15 SOP Common Module – C.12.1

Used for DICOM RT Plan writing.

Attribute Name	Tag	Type	Description
SOP Class UID	(0008,0016)	1	Unique identifier for the SOP Class.
SOP Instance UID	(0008,0018)	1	Unique identifier for the SOP Instance (generated new with each export).
Specific Character Set	(0008,0005)	1C	"ISO_IR 100"
Instance Creation Date	(0008,0012)	3	Date the SOP Instance was created.
Instance Creation Time	(0008,0013)	3	Time the SOP Instance was created.

4.16 RT Dose Module – C.8.8.13

Used for DICOM RT Dose writing.

Attribute Name	Tag	Type	Description
Operator's Name	(0008,1070)	2	Empty field.
Slice Thickness	(0018,0050)	2	Nominal slice thickness, in mm.
Instance Number	(0020,0013)	3	A number that identifies this object Instance.
Grid Frame Offset Vector	(3004,000C)	1C	An array that contains the dose image plane offsets (in mm) of the dose image frames in a multi-frame dose.

Attribute Name	Tag	Type	Description
Image Position (Patient)	(0020,0032)	1	The x, y, and z coordinates of the upper left hand corner (center of the first voxel transmitted) of the image, in mm.
Image Orientation (Patient)	(0020,0037)	1	The direction cosines of the first row and the first column with respect to the patient.
Samples per Pixel	(0028,0002)	1C	Number of samples (planes) in this image.
Photometric Interpretation	(0028,0004)	1C	Specifies the intended interpretation of the pixel data. Required if Pixel Data (7FE0,0010) is present.
Number of Frames	(0028,0008)	1	Number of frames in a Multi-frame Image.
Frame Increment Pointer	(0028,0009)	1	Contains the Data Element Tag of the Attribute that is used as the frame increment in Multi-frame pixel data.
Rows	(0028,0010)	1	Number of rows in the image.
Columns	(0028,0011)	1	Number of columns in the image.
Pixel Spacing	(0028,0030)	1	Physical distance in the patient between the center of each pixel, specified by a numeric pair - adjacent row spacing (delimiter) adjacent column spacing in mm.
Bits Allocated	(0028,0100)	1	Number of bits allocated for each pixel sample. Each sample shall have the same number of bits allocated.
Bits Stored	(0028,0101)	1	Number of bits stored for each pixel sample. Each sample shall have the same number of bits stored.
High Bit	(0028,0102)	1	Most significant bit for pixel sample data. Each sample shall have the same high bit.
Pixel Representation	(0028,0103)	1	Data representation of the pixel samples. Each sample shall have the same pixel representation.
Dose Units	(3004,0002)	1	Units used to describe dose. Enumerated Values: **GY** Gray **RELATIVE** dose relative to implicit reference value

Dose Type	(3004,0004)	1	Type of dose. Enumerated Values: **PHYSICAL** physical dose **EFFECTIVE** physical dose after correction for biological effect using user-defined modeling technique **ERROR** difference between desired and planned dose

Attribute Name	Tag	Type	Description
Dose Summation Type	(3004,000A)	1	Type of dose summation. Enumerated Values: **PLAN** dose calculated for entire delivery of all fraction groups of RT Plan **MULTI_PLAN** dose calculated for entire delivery of 2 or more RT Plans **FRACTION** dose calculated for entire delivery of a single Fraction Group within RT Plan **BEAM** dose calculated for entire delivery of one or more Beams within RT Plan **BRACHY** dose calculated for entire delivery of one or more Brachy Application Setups within RT Plan **FRACTION_SESSION** dose calculated for a single session ("fraction") of a single Fraction Group within RT Plan **BEAM_SESSION** dose calculated for a single session ("fraction") of one or more Beams within RT Plan **BRACHY_SESSION** dose calculated for a single session ("fraction") of one or more Brachy Application Setups within RT Plan **CONTROL_POINT** dose calculated for one or more Control Points within a Beam for a single fraction **RECORD** dose calculated for RT Beams Treatment Record
Dose Grid Scaling	(3004,000E)	1C	Scaling factor that when multiplied by the dose grid data found in Pixel Data (7FE0,0010) Attribute of the Image Pixel Module, yields grid doses in the dose units as specified by Dose Units (3004,0002). Required if Pixel Data (7FE0,0010) is present.
Referenced RT Plan Sequence	(300C,0002)	1C	Sequence describing RT Plan associated with dose. One or more Items shall be included in this Sequence.
>Referenced SOP Class UID	(0008,1150)	1	Uniquely identifies the referenced SOP Class.
>Referenced SOP Instance UID	(0008,1155)	1	Uniquely identifies the referenced SOP Instance.
>Referenced Fraction Group Sequence	(300C,0020)	1C	Sequence of one Fraction Group containing beams or brachy application setups contributing to dose. One or more Items shall be included in this Sequence.
>>Referenced Fraction Group Number	(300C,0022)	1	Uniquely identifies the referenced Fraction Group.
>>Referenced Beam Sequence	(300C,0004)	1C	Sequence of Beams in current Fraction Group contributing to dose. One or more Items shall be included in this Sequence.
>>>Referenced Beam Number	(300C,0006)	1	Uniquely identifies the referenced Beam.
Pixel Data	(7FE0,0010)	1C	A data stream of pixel samples that comprise the image.

			Required if Pixel Data Provider URL (0028,7FE0) is not present.