RAYPLAN 9B

DICOM Conformance Statement

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1 OVERVIEW

RayPlan is a treatment planning system (TPS) for external beam dose delivery. The following DICOM services for receiving and sending imaging and radiotherapy data are supported.

SOP Class Name	SOP Class UID	Provider of Service (SCP)	User of Service (SCU)
Transfer and Query/Retrieve			
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Yes	Yes
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Yes	Yes
PET Image Storage	1.2.840.10008.5.1.4.1.1.128	Yes	Yes
Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.1	Yes	Yes
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	Yes	Yes
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	Yes	Yes
RT Ion Plan Storage	1.2.840.10008.5.1.4.1.1.481.8	Yes	Yes
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	Yes	Yes
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	No	Yes
Query/Retrieve			
Patient Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	No	Yes
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	No	Yes
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	No	Yes

2 INTRODUCTION

2.1 REVISION HISTORY

Date	Version	Comment
2019-12-04	1.0	First version.

2.2 REMARKS

The scope of this DICOM Conformance Statement is to facilitate integration between RayPlan and other applications. The document should be read and understood in conjunction with the DICOM Standard. DICOM adherence by itself does not guarantee interoperability. However, this document facilitate a first hand comparison for interoperability between different applications supporting compatible DICOM functionality.

This document is written for users that need to understand how RayPlan will integrate into their healthcare facility. This includes both those responsible for overall imaging network policy and architecture, as well as integrators who need to have a detailed understanding of the DICOM features of the product. This document contains some basic DICOM definitions so that any reader may understand how this product implements DICOM features. However, integrators are expected to fully understand all the DICOM terminology, how the tables in this document relate to the product's functionality, and how that functionality integrates with other devices that support compatible DICOM features.

This document is not supposed to replace validation with other systems to ensure proper exchange of intended information. The user should be aware of the following important issues:

- The comparison of different Conformance Statements is just the first step towards assessing interconnectivity and interoperability between the product and other DICOM conformant equipment.
- Test procedures should be defined and executed to validate the required level of interoperability with specific compatible DICOM equipment, as established by the healthcare facility.

When using RayPlan together with other software, the DICOM conformance statements must be compared and relevant validation tests run. The DICOM standard by itself does not guarantee interoperability. The Conformance Statement does, however, facilitate a first-level comparison for interoperability between different applications supporting compatible DICOM functionality. RaySearch is also active within the IHE-RO. Contact RaySearch for more info regarding adherence to IHE-RO profiles.

3 NETWORKING AND MEDIA INTERCHANGE

3.1 IMPLEMENTATION MODEL

3.1.1 Application Data Flow Diagram

RayPlan is a treatment planning system, i.e. a software program for planning and analysis of radiation therapy plans. Typically, a treatment plan is created by importing patient images obtained from a CT scanner, importing and/or defining regions of interest (possibly with the help of MR and PET-images), deciding on a treatment setup and objectives, optimizing the treatment parameters, comparing rival plans to find the best compromise, computing the clinical dose distribution, approving the plan and finally exporting the data.

The diagram below describes how RayPlan interacts with the DICOM world. RayPlan consists of two DICOM Application Entities, the client and the standalone Storage SCP service.
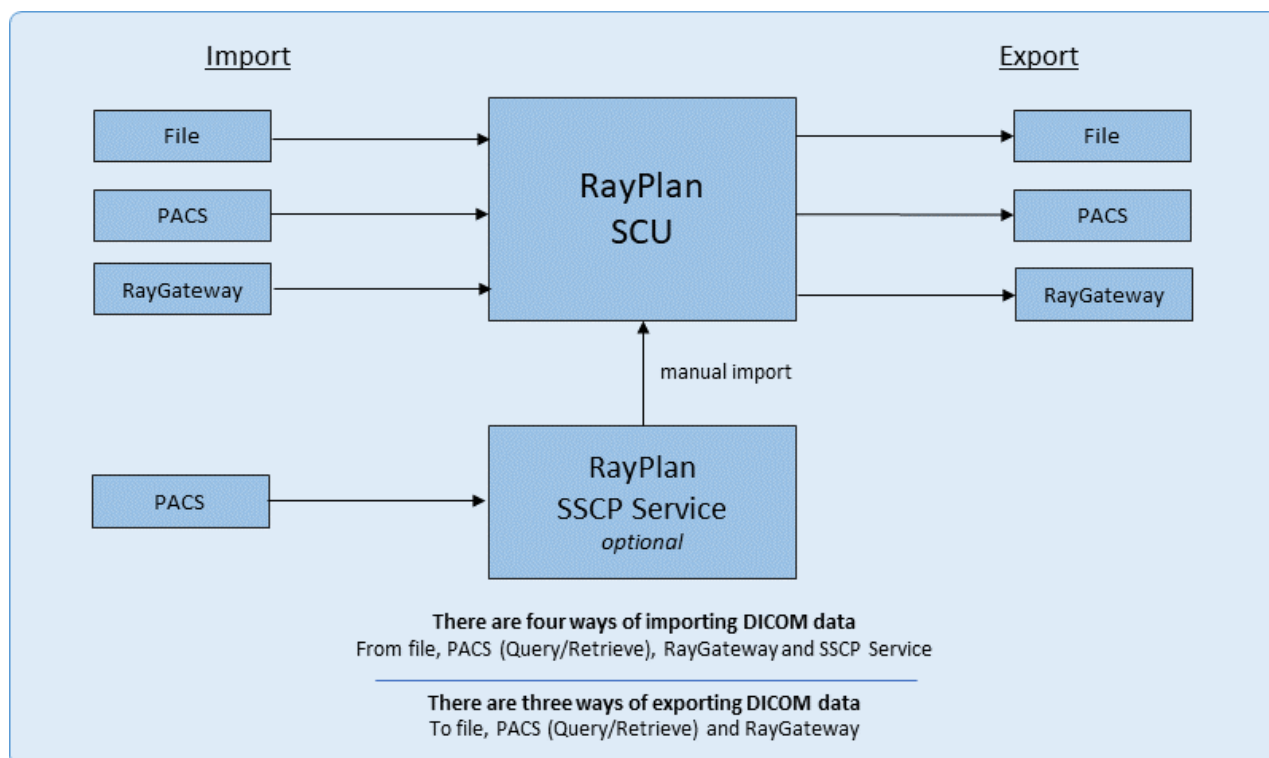
3.1.2 Functional Definition of AEs

3.1.2.1 Functional Definition of "RayPlan Application Entity"

RayPlan can act both as an SCU and SCP. When RayPlan performs import using Query/Retrieve an internal Storage SCP temporarily is invoked automatically when quering the PACS. AE settings for RayPlan are done in the separate ClinicSettings application.

3.1.2.2 Functional Definition of "RayPlan Storage SCP Service"

For transfers when the RayPlan client is not running the RayPlan Storage SCP Service is provided. This is a standalone Storage SCP service accepting incoming DICOM transfers and saving the files to a network share. The user then manually imports the data to the RayPlan database using a version of the file-based import in the RayPlan client.

3.2 TRANSFER SYNTAX

RayPlan import supports Implicit VR Little Endian Transfer Syntax (1.2.840.10008.1.2) and Explicit VR Little Endian Transfer Syntax (1.2.840.10008.1.2.1). The Transfer Syntax used for export can be configured in the Clinic Settings application. Additional Transfer Syntaxes might be supported for import, such as compressed images. Please contact RaySearch if more information is required.

3.3 IMPORTING DATA

3.3.1 Supported Sources

There are four ways to import DICOM data into RayPlan: File, PACS, RayGateway and Storage SCP. Imported CT, MR and PET datasets are stored without modification. All RT modalities are converted into internal representations and the original data will NOT be avaible for export.

Applying filters permanently modifies the imported data but usually does not regenerate the UID values.

3.3.1.1 File

Using File source will scan directories and filter files according to the selected file mask. DICOM datasets will be presented according the a Patient/Study/Series model similar to Query/Retrieve.

Sub-directories is scanned when expanded. The complete directory structure can be scanned by checking the top directory. This will recursively scan all directories and can take a long time. Cancellation of this process is not supported in this version of RayPlan.

3.3.1.2 PACS

Using PACS source will use the Query/Retrieve services using DIMSE-C C-FIND and C-MOVE. PACS endpoints must be configured in the Clinic Settings applications. Universal matching for patients is not allowed (when the search term is empty or contains wildcards only, e.g. "*", "**", or "?").

Only a single patient can be selected. Patient, Study and Series nodes can be expanded to list more details, which initiates C-FIND requests. Complete patient data can be retrieved by checking the patient node. It is not possible to cancel ongoing queries.

Once the Import button is clicked, RayPlan will C-MOVE requests for all selected series. Cancellation of this process is not supported in this version of RayPlan.

3.3.1.3 RayGateway

Using RayGateway source will behave differently depending on the endpoint system. Please contact RaySearch if more information is required.

3.3.1.4 Storage SCP

If "Storage SCP Directory" has been configured in the Clinic Settings application the Storage SCP source will be available. The directory is scanned for session folders are listed in the same way as a directory structure. The user also has the option of automatically deleting the files from the DICOM Inbox after succesful import.

The RayPlan Storage SCP service is designed to listen to incoming DICOM datasets and writes them to the "DICOM Inbox". All incoming DICOM datasets are stored in session folders grouped by Remote AE Title, Date and Patient ID.

If the service is unable to save the incoming files (e.g. not enough storage space), the network assocation is aborted. As the DICOM Inbox is only regarded as a temporary storage location, the service is setup to delete the folders in the DICOM Inbox after a defined number of days.

3.4 EXPORTING DATA

3.4.1 Supported Targets

RayPlan supports DICOM export to file, PACS or RayGateway. Exported image sets will be identical to the imported data with the exception that patient information is replaced to match the RayPlan patient (as shown in Patient Data Management).

3.4.2 Generated RayPlan UID

RayPlan generates UID with the prefix 1.2.752.243.1.1. No assumptions shall be made on the format and RaySearch reserves the right to change this at any time.

3.4.3 Checksums

Checksums can be enabled in the Clinic Settings application. If this feature is enabled exported RT Plans will contain the following private attributes carrying the checksum details:

- RaySearch Checksum Algorithm Version (4001,1060)
- RaySearch Checksum Data (4001,1060)

Contact RaySearch for a specification of the algorithm to verify this checksum.

3.4.4 Anonymization

RayPlan supports the Basic Profile de-identifier. In addition the following options are supported:

- Retain Longitudinal Temporal Information with Full Dates Option
- Retain Device Identity Option
- Retain Institution Identity Option
- Retain UIDs Option
- Retain Safe Private Option

See Table E.1-1. Application Level Confidentiality Profile Attributes in DICOM PS3.15 2018e.

Anonymization can be used when exporting DICOM and when creating patient backups. Both these features use the same underlying mechanism for cleaning DICOM datasets. Note the following limitations or deviations from the Basic Profile and supported options:

- Patient's Name (0010,0010) is replaced replaced by a user supplied value.
- Patient ID (0010,0020) is replaced by a user supplied value.
- Patient's Birth Date (0010,0030) is replaced with the current date.
- Patient's Sex (0010,0040) is replaced with "O".
- Private attributes (gggg,eeee) where gggg is odd, are completely removed if the Basic Profile is used. *This is according to the standard definition of the Basic Profile but explicitly noted since this can significantly strip a DICOM dataset from information.*
- All Sequences in DICOM PS3.15 2018e Table E.1-1 attributes with the action "D" (replace with a non-zero length value that may be a dummy value and consistent with the VR) will be removed.
- If the Retain Device Identity Option is selected, private attributes containing device information is also retained.
- If the Retain Safe Private Option is selected, private attributes containing no patient information is retained.

4 SECURITY

No Security Profiles are supported.

5 SUPPORT OF CHARACTER SETS

RayPlan supports the Default Character Repertoire, ISO_IR 100 (Latin-1) and ISO_IR 192 (Unicode). The exported character set is ISO_IR 100 by default can be changed in the Clinic Settings application.

Importing datasets with other character sets might lead to undefined behavior. Validation of the character set is done when importing or exporting data and warnings will be presented to the user. Usage of non-latin characters must be validated carefully by end users.

6 KNOWN ISSUES

6.1 IMPORT OF RESPIRATORY PHASE GATING DUTY CYCLE

There is a known issue when importing plan with the IMPAC private attribute Respiratory Phase Gating Duty Cycle (300B,1020). The attribute tag conflicts with another attribute definition and will therefore not be imported properly. Two possible work arounds:

1. Exporting a plan with Respiratory Phase Gating Duty Cycle first, the attribute definition will be registered in the DICOM dictionary and import will be possible.
2. Import the plan twice. The attribute definition will be registered in the DICOM dictionary and import will be successful in the second attempt.

Both work arounds must be done within the same RayPlan session.

7 ANNEXES

7.1 IMPORT IOD DEFINITIONS

7.1.1 CT Image IOD

Imported images are stored internally. Filters modifies data permanently.

IE	Module	Used
Patient	Patient Module	Yes
Study	General Study Module	Yes
Series	General Series Module	Yes
Frame of Reference	Frame of Reference Module	Yes
Equipment	General Equipment Module	Yes
Image	General Image Module	No
	Image Plane Module	Yes
	Image Pixel Module	Yes
	CT Image Module	Yes
	SOP Common Module	Yes

7.1.2 Patient Module

Patient attributes are read and stored when importing a new patient.
Patient ID and the first component (Last Name) of Patient's Name is the unique identifier. Differences in Patient's Sex and Patient's Birth Date are checked.

Attribute name	Tag	Vr	Type	Comment
Patient's Name	(0010,0010)	PN	2	
Patient ID	(0010,0020)	LO	2	
Patient's Birth Date	(0010,0030)	DA	2	
Patient's Sex	(0010,0040)	CS	2	Empty value defaults to Unknown gender. Supported values: • M - Male • F - Female • O - Other

7.1.3 General Study Module

Attribute name	Tag	Vr	Type	Comment
Study Instance UID	(0020,000D)	UI	1	Stored when importing a new case but not used.
Study Date	(0008,0020)	DA	2	
Study Time	(0008,0030)	TM	2	
Referring Physician's Name	(0008,0090)	PN	2	Stored as Case Physician when importing a new case.

Study ID	(0020,0010)	SH	2	
Accession Number	(0008,0050)	SH	2	
Study Description	(0008,1030)	LO	3	

7.1.4 General Series Module

Attribute name	Tag	Vr	Type	Comment
Modality	(0008,0060)	CS	1	Supported value: CT.
Series Instance UID	(0020,000E)	UI	1	Stored to verify references from RT Structure Sets.
Series Number	(0020,0011)	IS	2	
Series Date	(0008,0021)	DA	3	
Series Time	(0008,0031)	TM	3	
Protocol Name	(0018,1030)	LO	3	Used to identify Imaging System during import.
Series Description	(0008,103E)	LO	3	
Patient Position	(0018,5100)	CS	2C	Supported values: HFS, HFP, FFS, FFP, HFDR, HFDL, FFDR, FFDL.

7.1.5 Frame of Reference Module

Attribute name	Tag	Vr	Type	Comment
Frame of Reference UID	(0020,0052)	UI	1	Stored internally to be used if referenced from other dataset.

7.1.6 General Equipment Module

Attribute name	Tag	Vr	Type	Comment
Station Name	(0008,1010)	SH	3	Used to identify the correct CT-to-Density table.
Pixel Padding Value	(0028,0120)	US_SS	1C	If pixel padding is present within the region used for dose computation, the resulting dose may be wrong.

7.1.7 Image Plane Module

Attribute name	Tag	Vr	Type	Comment
Pixel Spacing	(0028,0030)	DS	1	Cannot be greater than 5 mm.
Image Orientation (Patient)	(0020,0037)	DS	1	Image orientation must be transversal.
Image Position (Patient)	(0020,0032)	DS	1	Converted to internal image corner. Used to find slice direction, which must be constant througout the series and along the Z-axis.

7.1.8 Image Pixel Module

Attribute name	Tag	Vr	Type	Comment
Samples per Pixel	(0028,0002)	US	1	Supported value: 1.
Photometric Interpretation	(0028,0004)	CS	1	Supported value: MONOCHROME2.
Rows	(0028,0010)	US	1	

Columns	(0028,0011)	US	1	
Bits Allocated	(0028,0100)	US	1	Supported value: 16.
Bits Stored	(0028,0101)	US	1	
High Bit	(0028,0102)	US	1	
Pixel Representation	(0028,0103)	US	1	Supported values: 0, 1.
Pixel Data	(7FE0,0010)	OB_OW	1C	
Pixel Padding Range Limit	(0028,0121)	US_SS	1C	

7.1.9 CT Image Module

Attribute name	Tag	Vr	Type	Comment
Image Type	(0008,0008)	CS	1	
Samples per Pixel	(0028,0002)	US	1	Supported value: 1.
Photometric Interpretation	(0028,0004)	CS	1	Supported value: MONOCHROME2.
Bits Allocated	(0028,0100)	US	1	Supported value: 16.
Bits Stored	(0028,0101)	US	1	Must be greater than 0 and less than or equal to Bits Allocated. Supported values: 12, 13, 14, 15, 16.
High Bit	(0028,0102)	US	1	Must be equal to "Bits Stored - 1".
Rescale Intercept	(0028,1052)	DS	1	
Rescale Slope	(0028,1053)	DS	1	
Rescale Type	(0028,1054)	LO	1C	Supported value: HU.

7.1.10 SOP Common Module

Attribute name	Tag	Vr	Type	Comment
SOP Class UID	(0008,0016)	UI	1	Supported value: 1.2.840.10008.5.1.4.1.1.2.
SOP Instance UID	(0008,0018)	UI	1	Stored internally to be used if referenced from other dataset.
Specific Character Set	(0008,0005)	CS	1C	Supported values: ISO_IR 100, ISO_IR 192.
Instance Creation Date	(0008,0012)	DA	3	
Instance Creation Time	(0008,0013)	TM	3	

7.1.11 MR Image IOD

Imported images are stored internally. Filters modifies data permanently.

IE	Module	Used
Patient	Patient Module	Yes
Study	General Study Module	Yes
Series	General Series Module	Yes
Frame of Reference	Frame of Reference Module	Yes

Equipment	General Equipment Module	Yes
Image	General Image Module	No
	Image Plane Module	Yes
	Image Pixel Module	Yes
	MR Image Module	Yes
	SOP Common Module	Yes

7.1.12 Patient Module

Patient attributes are read and stored when importing a new patient.
Patient ID and the first component (Last Name) of Patient's Name is the unique identifier. Differences in Patient's Sex and Patient's Birth Date are checked.

Attribute name	Tag	Vr	Type	Comment
Patient's Name	(0010,0010)	PN	2	
Patient ID	(0010,0020)	LO	2	
Patient's Birth Date	(0010,0030)	DA	2	
Patient's Sex	(0010,0040)	CS	2	Empty value defaults to Unknown gender. Supported values: • M - Male • F - Female • O - Other

7.1.13 General Study Module

Attribute name	Tag	Vr	Type	Comment
Study Instance UID	(0020,000D)	UI	1	Stored when importing a new case but not used.
Study Date	(0008,0020)	DA	2	
Study Time	(0008,0030)	TM	2	
Referring Physician's Name	(0008,0090)	PN	2	Stored as Case Physician when importing a new case.
Study ID	(0020,0010)	SH	2	
Accession Number	(0008,0050)	SH	2	

7.1.14 General Series Module

Attribute name	Tag	Vr	Type	Comment
Modality	(0008,0060)	CS	1	Supported value: MR.
Series Instance UID	(0020,000E)	UI	1	Stored to verify references from RT Structure Sets.
Series Number	(0020,0011)	IS	2	
Series Date	(0008,0021)	DA	3	
Series Time	(0008,0031)	TM	3	

Protocol Name	(0018,1030)	LO	3	Used to identify Imaging System during import.
Series Description	(0008,103E)	LO	3	
Patient Position	(0018,5100)	CS	2C	Supported values: HFS, HFP, FFS, FFP.

7.1.15 Frame of Reference Module

Attribute name	Tag	Vr	Type	Comment
Frame of Reference UID	(0020,0052)	UI	1	Stored internally to be used if referenced from other dataset.

7.1.16 General Equipment Module

Attribute name	Tag	Vr	Type	Comment
Pixel Padding Value	(0028,0120)	US_SS	1C	If pixel padding is present within the region used for dose computation, the resulting dose may be wrong.

7.1.17 Image Plane Module

Attribute name	Tag	Vr	Type	Comment
Pixel Spacing	(0028,0030)	DS	1	Cannot be greater than 5 mm.
Image Orientation (Patient)	(0020,0037)	DS	1	All image orientations are supported, as long as row and column directions are orthogonal.
Image Position (Patient)	(0020,0032)	DS	1	Converted to internal image corner. Used to find slice direction, which must be constant throughout the series.

7.1.18 Image Pixel Module

Attribute name	Tag	Vr	Type	Comment
Samples per Pixel	(0028,0002)	US	1	Supported value: 1.
Photometric Interpretation	(0028,0004)	CS	1	Supported value: MONOCHROME2.
Rows	(0028,0010)	US	1	
Columns	(0028,0011)	US	1	
Bits Allocated	(0028,0100)	US	1	Supported value: 16.
Bits Stored	(0028,0101)	US	1	Must be equal to or less than Bits Allocated.
High Bit	(0028,0102)	US	1	
Pixel Representation	(0028,0103)	US	1	Supported values: 0, 1.
Pixel Data	(7FE0,0010)	OB_OW	1C	
Pixel Padding Range Limit	(0028,0121)	US_SS	1C	

7.1.19 MR Image Module

Attribute name	Tag	Vr	Type	Comment
Image Type	(0008,0008)	CS	1	
Samples per Pixel	(0028,0002)	US	1	Supported value: 1.

Photometric Interpretation	(0028,0004)	CS	1	Supported value: MONOCHROME2.
Bits Allocated	(0028,0100)	US	1	Supported value: 16.
Scanning Sequence	(0018,0020)	CS	1	
Sequence Variant	(0018,0021)	CS	1	

7.1.20 SOP Common Module

Attribute name	Tag	Vr	Type	Comment
SOP Class UID	(0008,0016)	UI	1	Supported value: 1.2.840.10008.5.1.4.1.1.4.
SOP Instance UID	(0008,0018)	UI	1	Stored internally to be used if referenced from other dataset.
Specific Character Set	(0008,0005)	CS	1C	Supported values: ISO_IR 100, ISO_IR 192.
Instance Creation Date	(0008,0012)	DA	3	
Instance Creation Time	(0008,0013)	TM	3	

7.1.21 PET Image IOD

Imported images are stored internally. Filters modifies data permanently.

IE	Module	Used
Patient	Patient Module	Yes
Study	General Study Module	Yes
	Patient Study Module	Yes
Series	General Series Module	Yes
	PET Series Module	Yes
	PET Isotope Module	Yes
	NM/PET Patient Orientation Module	Yes
Frame of Reference	Frame of Reference Module	Yes
Equipment	General Equipment Module	Yes
Image	General Image Module	No
	Image Plane Module	Yes
	Image Pixel Module	Yes
	PET Image Module	Yes
	SOP Common Module	Yes

7.1.22 Patient Module

Patient attributes are read and stored when importing a new patient.
Patient ID and the first component (Last Name) of Patient's Name is the unique identifier. Differences in Patient's Sex and Patient's Birth Date are checked.

Attribute name	Tag	Vr	Type	Comment

Patient's Name	(0010,0010)	PN	2	
Patient ID	(0010,0020)	LO	2	
Patient's Birth Date	(0010,0030)	DA	2	
Patient's Sex	(0010,0040)	CS	2	Empty value defaults to Unknown gender. Supported values: • M - Male • F - Female • O - Other

7.1.23 General Study Module

Attribute name	Tag	Vr	Type	Comment
Study Instance UID	(0020,000D)	UI	1	Stored when importing a new case but not used.
Study Date	(0008,0020)	DA	2	
Study Time	(0008,0030)	TM	2	
Referring Physician's Name	(0008,0090)	PN	2	Stored as Case Physician when importing a new case.
Study ID	(0020,0010)	SH	2	
Accession Number	(0008,0050)	SH	2	

7.1.24 Patient Study Module

Attribute name	Tag	Vr	Type	Comment
Patient's Weight	(0010,1030)	DS	3	Used for SUV calculation.

7.1.25 General Series Module

Attribute name	Tag	Vr	Type	Comment
Modality	(0008,0060)	CS	1	Supported value: PT.
Series Instance UID	(0020,000E)	UI	1	Stored to verify references from RT Structure Sets.
Series Number	(0020,0011)	IS	2	
Series Date	(0008,0021)	DA	3	
Series Time	(0008,0031)	TM	3	
Protocol Name	(0018,1030)	LO	3	Used to identify the protocol during import.
Series Description	(0008,103E)	LO	3	Only used for display.
Patient Position	(0018,5100)	CS	2C	Supported values: HFS, HFP, FFS, FFP.

7.1.26 PET Series Module

Attribute name	Tag	Vr	Type	Comment
Series Date	(0008,0021)	DA	1	
Series Time	(0008,0031)	TM	1	

Units	(0054,1001)	CS	1	Supported values: CNTS, NONE, CM2, PCNT, CPS, BQML, MGMINML, UMOLMINML, MLMING, MLG, 1CM, UMOLML, PROPCNTS, PROPCPS, MLMINML, MLML, GML, STDDEV.
Counts Source	(0054,1002)	CS	1	
Series Type	(0054,1000)	CS	1	
Number of Slices	(0054,0081)	US	1	
Corrected Image	(0028,0051)	CS	2	Must contain DECY\ATTN in order to compute SUV.
Decay Correction	(0054,1102)	CS	1	Supported values: ● NONE ● START - Required to compute SUV ● ADMIN

7.1.27 PET Isotope Module

Attribute name	Tag	Vr	Type	Comment
Radiopharmaceutical Information Sequence	(0054,0016)	SQ	2	
>Radiopharmaceutical Start Time	(0018,1072)	TM	3	
>Radionuclide Total Dose	(0018,1074)	DS	3	
>Radionuclide Half Life	(0018,1075)	DS	3	

7.1.28 NM/PET Patient Orientation Module

Attribute name	Tag	Vr	Type	Comment
Patient Orientation Code Sequence	(0054,0410)	SQ	2	
>Code Value	(0008,0100)	SH	1C	Supported value: ● F-10450 - recumbent
>Coding Scheme Designator	(0008,0102)	SH	1C	Supported value: 99SDM.
>Code Meaning	(0008,0104)	LO	3	Supported value: recumbent.
>Patient Orientation Modifier Code Sequence	(0054,0412)	SQ	2C	
>Code Value	(0008,0100)	SH	1C	Supported values: ● F-10340 - supine ● F-10310 - prone
>Coding Scheme Designator	(0008,0102)	SH	1C	Supported value: 99SDM.
>Code Meaning	(0008,0104)	LO	3	Supported values: supine, prone.
Patient Gantry Relationship Code Sequence	(0054,0414)	SQ	2	

>Code Value	(0008,0100)	SH	1C	Supported values: • F-10470 - headfirst • F-10480 - feet-first • G-5190 - headfirst • G-5191 - feet-first
>Coding Scheme Designator	(0008,0102)	SH	1C	Supported value: 99SDM.
>Code Meaning	(0008,0104)	LO	3	Supported values: headfirst, feet-first.

7.1.29 Frame of Reference Module

Attribute name	Tag	Vr	Type	Comment
Frame of Reference UID	(0020,0052)	UI	1	Stored internally to be used if referenced from other dataset.

7.1.30 General Equipment Module

Attribute name	Tag	Vr	Type	Comment
Pixel Padding Value	(0028,0120)	US_SS	1C	If pixel padding is present within the region used for dose computation, the resulting dose may be wrong.

7.1.31 Image Plane Module

Attribute name	Tag	Vr	Type	Comment
Pixel Spacing	(0028,0030)	DS	1	Cannot be greater than 5 mm.
Image Orientation (Patient)	(0020,0037)	DS	1	Image orientation must be transversal.
Image Position (Patient)	(0020,0032)	DS	1	Converted to internal image corner. Used to find slice direction, which must be constant througout the series and along the Z-axis.

7.1.32 Image Pixel Module

Attribute name	Tag	Vr	Type	Comment
Samples per Pixel	(0028,0002)	US	1	Supported value: 1.
Photometric Interpretation	(0028,0004)	CS	1	Supported value: MONOCHROME2.
Rows	(0028,0010)	US	1	
Columns	(0028,0011)	US	1	
Bits Allocated	(0028,0100)	US	1	Supported value: 16.
Bits Stored	(0028,0101)	US	1	Must be equal to or less than Bits Allocated.
High Bit	(0028,0102)	US	1	
Pixel Representation	(0028,0103)	US	1	Supported values: 0, 1.
Pixel Data	(7FE0,0010)	OB_OW	1C	
Pixel Padding Range Limit	(0028,0121)	US_SS	1C	

7.1.33 PET Image Module

Attribute name	Tag	Vr	Type	Comment
Image Type	(0008,0008)	CS	1	
Samples per Pixel	(0028,0002)	US	1	Supported value: 1.
Photometric Interpretation	(0028,0004)	CS	1	Supported value: MONOCHROME2.
Bits Allocated	(0028,0100)	US	1	Supported value: 16.
Bits Stored	(0028,0101)	US	1	Must be greater than 0 and less than or equal to Bits Allocated.
High Bit	(0028,0102)	US	1	HighBit must be equal to Bits Stored - 1.
Rescale Intercept	(0028,1052)	DS	1	Supported value: 0.0.
Rescale Slope	(0028,1053)	DS	1	
Frame Reference Time	(0054,1300)	DS	1	
Image Index	(0054,1330)	US	1	
Acquisition Date	(0008,0022)	DA	2	
Acquisition Time	(0008,0032)	TM	2	
Actual Frame Duration	(0018,1242)	IS	2	
Decay Factor	(0054,1321)	DS	1C	
Philips Private Creator	(7053,0010)	LO	3	Philips PET Private Group
Philips SUV Scale Factor	(7053,1000)	DS	3	
Philips Activity Concentration Scale Factor	(7053,1009)	DS	3	
GE Private Creator	(0009,0010)	LO	3	GEMS_PETD_01
GE PET Scan Time	(0009,100D)	DT	3	

7.1.34 SOP Common Module

Attribute name	Tag	Vr	Type	Comment
SOP Class UID	(0008,0016)	UI	1	Supported value: 1.2.840.10008.5.1.4.1.1.128.
SOP Instance UID	(0008,0018)	UI	1	Stored internally to be used if referenced from other dataset.
Specific Character Set	(0008,0005)	CS	1C	Supported values: ISO_IR 100, ISO_IR 192.
Instance Creation Date	(0008,0012)	DA	3	
Instance Creation Time	(0008,0013)	TM	3	

7.1.35 RT Structure Set IOD

Imported RT Structure Sets are converted into internal representation. Exported structure sets will therefore not be identical to the imported object.
RT Structure Sets must referenced a single image series.

IE	Module	Used
Patient	Patient Module	Yes
Study	General Study Module	No

Series	RT Series Module	Yes
Frame of Reference	Frame of Reference Module	Yes
Equipment	General Equipment Module	Yes
Structure Set	Structure Set Module	Yes
	ROI Contour Module	Yes
	RT ROI Observations Module	Yes
	Approval Module	Yes
	SOP Common Module	Yes

7.1.36 Patient Module

Patient attributes only used to match patient.

Attribute name	Tag	Vr	Type	Comment
Patient's Name	(0010,0010)	PN	2	
Patient ID	(0010,0020)	LO	2	
Patient's Birth Date	(0010,0030)	DA	2	
Patient's Sex	(0010,0040)	CS	2	Supported values: • M - Male • F - Female • O - Other

7.1.37 RT Series Module

Attribute name	Tag	Vr	Type	Comment
Modality	(0008,0060)	CS	1	Supported value: RTSTRUCT.
Series Instance UID	(0020,000E)	UI	1	Only read for display during import. Not stored.

7.1.38 Frame of Reference Module

Attribute name	Tag	Vr	Type	Comment
Frame of Reference UID	(0020,0052)	UI	1	

7.1.39 General Equipment Module

Attribute name	Tag	Vr	Type	Comment
Manufacturer	(0008,0070)	LO	2	Used to handle ROI Physical Properties from TomoTherapy Hi-Art and Nucletron during import. Not stored.

7.1.40 Structure Set Module

Attribute name	Tag	Vr	Type	Comment
Structure Set Label	(3006,0002)	SH	1	Not stored.

Structure Set Date	(3006,0008)	DA	2	Stored as last save date.
Structure Set Time	(3006,0009)	TM	2	Stored as last save time.
Referenced Frame of Reference Sequence	(3006,0010)	SQ	3	May contain one or more items. A single referenced examinations must exist. Contours on unknown examinations are ignored.
>Frame of Reference UID	(0020,0052)	UI	1	Used to match referenced image set.
>RT Referenced Study Sequence	(3006,0012)	SQ	3	Must contain exactly one referenced study.
>Referenced SOP Class UID	(0008,1150)	UI	1	
>Referenced SOP Instance UID	(0008,1155)	UI	1	
>RT Referenced Series Sequence	(3006,0014)	SQ	1	Must contain exactly one referenced series.
>Series Instance UID	(0020,000E)	UI	1	
>Contour Image Sequence	(3006,0016)	SQ	1	
>Referenced SOP Class UID	(0008,1150)	UI	1	
>Referenced SOP Instance UID	(0008,1155)	UI	1	Referenced image has to be imported to patient (prior or at the same time as the RTSTRUCT dataset is imported).
Structure Set ROI Sequence	(3006,0020)	SQ	3	Number of elements must match number of elements in ROI Contour Sequence (3006,0039). At least one sequence must be defined.
>ROI Number	(3006,0022)	IS	1	Stored but only used internally.
>Referenced Frame of Reference UID	(3006,0024)	UI	1	
>ROI Name	(3006,0026)	LO	2	ROI:s are shared internally between multiple structure sets. If a ROI with the same name is already contoured on the referenced examination these contours will be skipped.

7.1.41 ROI Contour Module

Attribute name	Tag	Vr	Type	Comment
ROI Contour Sequence	(3006,0039)	SQ	1	
>Referenced ROI Number	(3006,0084)	IS	1	
>ROI Display Color	(3006,002A)	IS	3	Used for visualization.
>Contour Sequence	(3006,0040)	SQ	3	
>Attached Contours	(3006,0049)	IS	3	Information about attached contours are not imported. Must not have a value.
>Contour Image Sequence	(3006,0016)	SQ	3	
>Referenced SOP Class UID	(0008,1150)	UI	1	
>Referenced SOP Instance UID	(0008,1155)	UI	1	Must be found in the referenced Examination.
>Contour Geometric Type	(3006,0042)	CS	1	
>Number of Contour Points	(3006,0046)	IS	1	
>Contour Data	(3006,0050)	DS	1	Converted to internal contour representation. All contour vertices must be located on the same slice.

7.1.42 RT ROI Observations Module

Attribute name	Tag	Vr	Type	Comment
RT ROI Observations Sequence	(3006,0080)	SQ	1	
>Observation Number	(3006,0082)	IS	1	Not stored.
>Referenced ROI Number	(3006,0084)	IS	1	
>ROI Observation Label	(3006,0085)	SH	3	ROI Observation Label is "Localization Poi" and ROI Interpreted Type is "MARKER" the ROI is automatically converted to a localization point.
>RT ROI Interpreted Type	(3006,00A4)	CS	2	All types in the DICOM standard are supported and converted to internal equivalent. Furthermore if ROI Observation Label has value "Localization Poi" and ROI Interpreted Type is "MARKER", then the ROI is automatically converted to a localization point. Supported values: ACQ_ISOCENTER, AVOIDANCE, BOLUS, BRACHY_ACCESSORY, BRACHY_CHANNEL, BRACHY_CHNL_SHLD, BRACHY_SRC_APP, CAVITY, CONTRAST_AGENT, CONTROL, CTV, DOSE_REGION, EXTERNAL, FIXATION, GTV, INIT_LASER_ISO, INIT_MATCH_ISO, IRRAD_VOLUME, ISOCENTER, MARKER, ORGAN, PTV, REGISTRATION, SUPPORT, TREATED_VOLUME, NONE.
>Material ID	(300A,00E1)	SH	3	Imported as material name. Note that material names must be unique.
>ROI Physical Properties Sequence	(3006,00B0)	SQ	3	The values REL_MASS_DENSITY, REL_ELEC_DENSITY, EFFECTIVE_Z, EFF_Z_PER_A and ELEM_FRACTION are supported. The physical properties expressed in REL_MASS_DENSITY, REL_ELEC_DENSITY and EFF_Z_PER_A are connected as REL_ELEC_DENSITY = REL_MASS_DENSITY * EFF_Z_PER_A / EFF_Z_PER_A water. Any combination of two of these three properties are regarded as giving information also about the third. If all four are available REL_ELEC_DENSITY is disregarded in the import. If ELEM_FRACTION and REL_MASS_DENSITY are available, other given properties are not imported but are computed from these two. If ELEM_FRACTION and REL_ELEC_DENSITY and EFF_Z_PER_A are available but not REL_MASS_DENSITY, then REL_MASS_DENSITY is computed using the relation above and properties other than the resulting REL_MASS_DENSITY and ELEM_FRACTION are not imported but are computed from these two. If neither ELEM_FRACTION nor EFFECTIVE_Z are available RayStation must make assumptions about the material properties. RayStation then assumes the material to be water with REL_MASS_DENSITY set to the REL_ELEC_DENSITY from the RT Struct file if it is available or can be computed. This assumption leads to photon attenuations which are appropriate for materials with EFF_Z_PER_A similar to water. For high-Z materials, this can lead to significant dose deviations. If REL_ELEC_DENSITY cannot be established, REL_MASS_DENSITY is used.

>ROI Physical Property	(3006,00B2)	CS	1	Relative mass and electron densities must be between 0.0 - 22.7. MEAN_EXCI_ENERGY depicts the Mean Excitation Energy for a given material. Supported values: • REL_MASS_DENSITY • REL_ELEC_DENSITY • EFFECTIVE_Z • EFF_Z_PER_A • ELEM_FRACTION • MEAN_EXCI_ENERGY • CBE_BORON - Used for BNCT dose computation • RBE_HYDROGEN - Used for BNCT dose computation • RBE_NITROGEN - Used for BNCT dose computation • RBE_GAMMA - Used for BNCT dose computation • BORON_CONC_RATIO - Boron Concentration Ratio. Used for BNCT dose computation • BNCT_DOSE_LIMIT - Used for BNCT dose computation
>ROI Elemental Composition Sequence	(3006,00B6)	SQ	1C	
>ROI Elemental Composition Atomic Number	(3006,00B7)	US	1	
>ROI Elemental Composition Atomic Mass Fraction	(3006,00B8)	FL	1	
>ROI Physical Property Value	(3006,00B4)	DS	1	
>RaySearch Private Creator	(4001,0010)	LO	3	RAYSEARCHLABS 2.0
>Tissue Name	(4001,1010)	ST	3	RaySearch Private Tag. Contains the tissue name given to this Region of Interest.
>RBE Cell Type Name	(4001,1014)	ST	3	RaySearch Private Tag. Contains the RBE Cell Type Name given to this Region of Interest.

7.1.43 Approval Module

Attribute name	Tag	Vr	Type	Comment
Approval Status	(300E,0002)	CS	1	Used to set the approval status of the imported structure set. Supported values: • APPROVED - Structure set is approved. • UNAPPROVED - Structure set is not approved. • REJECTED - Same rules as for UNAPPROVED.
Review Date	(300E,0004)	DA	2C	Stored if Approval Status is APPROVED.
Review Time	(300E,0005)	TM	2C	Stored if Approval Status is APPROVED.
Reviewer Name	(300E,0008)	PN	2C	Stored if Approval Status is APPROVED.

7.1.44 SOP Common Module

Attribute name	Tag	Vr	Type	Comment

SOP Class UID	(0008,0016)	UI	1	Supported value: 1.2.840.10008.5.1.4.1.1.481.3.
SOP Instance UID	(0008,0018)	UI	1	Stored internally to find references from other objects.
Specific Character Set	(0008,0005)	CS	1C	Supported values: ISO_IR 100, ISO_IR 192.
Instance Creation Date	(0008,0012)	DA	3	Stored as last save date if Structure Set Date (3006,0008) is missing.
Instance Creation Time	(0008,0013)	TM	3	Stored as last save time if Structure Set Time (3006,00109) is missing.

7.1.45 RT Plan IOD

Imported RT Plans are converted into internal representation. Exported plans will therefore not be identical to the imported object.

IE	Module	Used
Patient	Patient Module	Yes
Study	General Study Module	No
Series	RT Series Module	Yes
Frame of Reference	Frame of Reference Module	Yes
Equipment	General Equipment Module	Yes
Plan	RT General Plan Module	Yes
	RT Prescription Module	Yes
	RT Patient Setup Module	Yes
	RT Fraction Scheme Module	Yes
	RT Beams Module	Yes
	Approval Module	Yes
	SOP Common Module	Yes

7.1.46 Patient Module

Patient attributes only used to match patient.

Attribute name	Tag	Vr	Type	Comment
Patient's Name	(0010,0010)	PN	2	
Patient ID	(0010,0020)	LO	2	
Patient's Birth Date	(0010,0030)	DA	2	
Patient's Sex	(0010,0040)	CS	2	Supported values: • M - Male • F - Female • O - Other

7.1.47 RT Series Module

Attribute name	Tag	Vr	Type	Comment

Modality	(0008,0060)	CS	1	Supported value: RTPLAN.
Series Instance UID	(0020,000E)	UI	1	Only read for display during import. Not stored.

7.1.48 Frame of Reference Module

Attribute name	Tag	Vr	Type	Comment
Frame of Reference UID	(0020,0052)	UI	1	Used to match referenced image set. Not stored.

7.1.49 General Equipment Module

Attribute name	Tag	Vr	Type	Comment
Manufacturer	(0008,0070)	LO	2	Used to handle special RT Plan cases. Not stored.
Manufacturer's Model Name	(0008,1090)	LO	3	Used to handle special RT Plan cases. Not stored.

7.1.50 RT General Plan Module

Attribute name	Tag	Vr	Type	Comment
RT Plan Label	(300A,0002)	SH	1	Stored as Beam Set Name.
RT Plan Name	(300A,0003)	LO	3	Stored as Treatment Plan Name.
RT Plan Description	(300A,0004)	ST	3	Stored as Beam Set Description.
RT Plan Date	(300A,0006)	DA	2	Stored as last save date.
RT Plan Time	(300A,0007)	TM	2	Stored as last save time.
RT Plan Geometry	(300A,000C)	CS	1	The plan is only required to reference structure set if value is PATIENT. Supported values: PATIENT, TREATMENT_DEVICE.
Referenced Structure Set Sequence	(300C,0060)	SQ	1C	If populated, the referenced Structure Set must be found. Not required.
>Referenced SOP Class UID	(0008,1150)	UI	1	Supported value: 1.2.840.10008.5.1.4.1.1.481.3.
>Referenced SOP Instance UID	(0008,1155)	UI	1	

7.1.51 RT Prescription Module

Attribute name	Tag	Vr	Type	Comment
Dose Reference Sequence	(300A,0010)	SQ	3	Primary Prescription supported only. Evaluation functions are read from Brainlab iPlan RT Plan.
>Dose Reference Number	(300A,0012)	IS	1	Not stored.
>Dose Reference Structure Type	(300A,0014)	CS	1	Supported values: POINT, VOLUME, SITE.
>Dose Reference Description	(300A,0016)	LO	3	Stored as Site Description if Dose Reference Structure Type (300A,0014) is SITE.
>Referenced ROI Number	(3006,0084)	IS	1C	Used to find ROI when Dose Reference Structure Type (300A,0014) is VOLUME.
>Nominal Prior Dose	(300A,001A)	DS	3	Not supported. Supported value: 0.

>Dose Reference Type	(300A,0020)	CS	1	Only TARGET is supported for Primary Prescription. ORGAN_AT_RISK is supported when importing evaluation functions from Brainlab plans only. Supported values: TARGET, ORGAN_AT_RISK.
>Constraint Weight	(300A,0021)	DS	3	Used when importing evaluation functions from Brainlab plans only. Not stored.
>Target Minimum Dose	(300A,0025)	DS	3	
>Target Prescription Dose	(300A,0026)	DS	3	Used when importing Primary Prescription.
>Target Maximum Dose	(300A,0027)	DS	3	
>Target Underdose Volume Fraction	(300A,0028)	DS	3	Used when importing Primary Prescription.
>Organ at Risk Full-volume Dose	(300A,002A)	DS	3	Stored as evaluation functions from Brainlab plans only.
>Organ at Risk Limit Dose	(300A,002B)	DS	3	Stored as evaluation functions from Brainlab plans only.
>Organ at Risk Maximum Dose	(300A,002C)	DS	3	Stored as evaluation functions from Brainlab plans only.
>Organ at Risk Overdose Volume Fraction	(300A,002D)	DS	3	Stored as evaluation functions from Brainlab plans only.

7.1.52 RT Patient Setup Module

Attribute name	Tag	Vr	Type	Comment
Patient Setup Sequence	(300A,0180)	SQ	1	Must contain at least one item.
>Patient Setup Number	(300A,0182)	IS	1	Not stored.
>Patient Position	(0018,5100)	CS	1C	Must be compatible with the planning image set patient position. Supported values: HFS, HFP, FFS, FFP, HFDR, HFDL, FFDR, FFDL.
>Motion Synchronization Sequence	(300A,0410)	SQ	3	
>Respiratory Motion Compensation Technique	(0018,9170)	CS	1	Supported values: • NONE • GATING • TRACKING - Static target tracking • REALTIME - Realtime tracking
>Respiratory Signal Source	(0018,9171)	CS	1	Supported values: • NONE • EXTERNAL_MARKER • SPIROMETER • BELT • INTERNAL_MARKER • FIDUCIAL - Tracking of fiducial markers • TRACKING_ROI - Tracking of volume
>Respiratory Motion Compensation Technique Description	(0018,9185)	ST	3	
>RaySearch Private Creator	(4001,0010)	LO	3	RAYSEARCHLABS 2.0
>Tracking ROI Sequence	(4001,1062)	SQ	3	Contains referenced ROI used for tracking

>RaySearch Private Creator	(4001,0010)	LO	3	RAYSEARCHLABS 2.0
>Referenced ROI Number	(4001,1051)	IS	1C	
>Imaging Angles	(4001,1063)	DS	3	Selected imaging angles for Tomo Synchrony
medPhoton Private Creator	(30BB,0010)	LO	3	medPhoton 1.0
Patient Setup ID	(30BB,1000)	SH	3	Stored in Patient Setup as IDCAS parameters.
Imaging Protocol ID	(30BB,1001)	SH	3	Stored in Patient Setup as IDCAS parameters.

7.1.53 RT Fraction Scheme Module

Attribute name	Tag	Vr	Type	Comment
Fraction Group Sequence	(300A,0070)	SQ	1	Each Fraction Group is imported as a separate Beam Set. Empty sequence is handled as special zero-fraction case. Dose cannot be imported to a plan with multiple Beam Sets.
>Fraction Group Number	(300A,0071)	IS	1	Used to identify fraction groups. Stored but only used internally.
>Number of Fractions Planned	(300A,0078)	IS	2	Used to create fraction schedule. If this value is 0 it is interpreted as a one-fraction plan.
>Number of Fraction Pattern Digits Per Day	(300A,0079)	IS	3	Not stored.
>Repeat Fraction Cycle Length	(300A,007A)	IS	3	Not stored.
>Fraction Pattern	(300A,007B)	LT	3	Not stored.
>Number of Beams	(300A,0080)	IS	1	
>Referenced Beam Sequence	(300C,0004)	SQ	1C	There must be at least one beam in the fraction group.
>Referenced Beam Number	(300C,0006)	IS	1C	
>Beam Dose Specification Point	(300A,0082)	DS	3	Stored as Dose Specification Point.
>Beam Dose	(300A,0084)	DS	3	Stored as Beam Dose.
>Beam Dose Point Depth	(300A,0088)	FL	3	Stored as Physical Depth.
>Beam Dose Point Equivalent Depth	(300A,0089)	FL	3	Stored as Radiological Depth.
>Beam Meterset	(300A,0086)	DS	3	Stored as Beam MU. Must be defined in MU.
>Number of Brachy Application Setups	(300A,00A0)	IS	1	Not supported. Supported value: 0.

7.1.54 RT Beams Module

Attribute name	Tag	Vr	Type	Comment
Beam Sequence	(300A,00B0)	SQ	1	
>Beam Number	(300A,00C0)	IS	1	Stored as Beam Number.
>Beam Name	(300A,00C2)	LO	3	Stored as Beam Name.
>Beam Description	(300A,00C3)	ST	3	Stored as Beam Description.

>Beam Type	(300A,00C4)	CS	1	Used to identify plan technique. Beam Type STATIC is converted to SMLC plan. Beam Type DYNAMIC which have Gantry Rotation Direction != NONE are converted to Arc plans Otherwise plans is considered to be DMLC plan. Supported values: STATIC, DYNAMIC.
>Radiation Type	(300A,00C6)	CS	2	Supported values: PHOTON, ELECTRON, NEUTRON.
>Primary Fluence Mode Sequence	(3002,0050)	SQ	3	
>Fluence Mode	(3002,0051)	CS	1	
>Fluence Mode ID	(3002,0052)	SH	1C	
>Treatment Machine Name	(300A,00B2)	SH	2	Stored as Machine Reference. Used to find treatment machine.
>Primary Dosimeter Unit	(300A,00B3)	CS	3	Used for precondition check only. Supported values: MU, MINUTE.
>Source-Axis Distance	(300A,00B4)	DS	3	Used to calculate Block isocenter to tray distance.
>Beam Limiting Device Sequence	(300A,00B6)	SQ	1	
>RT Beam Limiting Device Type	(300A,00B8)	CS	1	Supported values: X, Y, ASYMX, ASYMY, MLCX, MLCY.
>Number of Leaf/Jaw Pairs	(300A,00BC)	IS	1	
>Leaf Position Boundaries	(300A,00BE)	DS	2C	
>Referenced Patient Setup Number	(300C,006A)	IS	3	If this attribute is not set, the patient setup sequence must contain one patient setup. If multiple patient setups are defined in the patient setup sequence, this attribute must be set. All referenced patient setups must use the same patient position.
>Treatment Delivery Type	(300A,00CE)	CS	3	If the Treatment Delivery type is null, beam is assumed to be of type TREATMENT. Supported values: TREATMENT, SETUP.
>Number of Wedges	(300A,00D0)	IS	1	
>Wedge Sequence	(300A,00D1)	SQ	1C	
>Wedge Number	(300A,00D2)	IS	1	Not stored.
>Wedge Type	(300A,00D3)	CS	2	Converted to internal Wedge Type. Supported values: STANDARD, DYNAMIC, MOTORIZED.
>Wedge ID	(300A,00D4)	SH	3	Stored as Wedge ID.
>Wedge Angle	(300A,00D5)	IS	2	Stored as Wedge Angle.
>Wedge Orientation	(300A,00D8)	DS	2	Stored as Wedge Orientation. Supported values: 0.0, 90.0, 180.0, 270.0.
>Number of Compensators	(300A,00E0)	IS	1	
>Compensator Sequence	(300A,00E3)	SQ	1C	Compensator is not supported. Varian fluences stored as compensators are ignored.
>Compensator Number	(300A,00E4)	IS	1C	
>Compensator Type	(300A,00EE)	CS	3	
>Compensator Rows	(300A,00E7)	IS	1	
>Compensator Columns	(300A,00E8)	IS	1	

>Compensator Pixel Spacing	(300A,00E9)	DS	1	
>Compensator Position	(300A,00EA)	DS	1	
>Number of Boli	(300A,00ED)	IS	1	
>Referenced Bolus Sequence	(300C,00B0)	SQ	1C	Referenced boli must exist.
>Referenced ROI Number	(3006,0084)	IS	1	
>Bolus ID	(300A,00DC)	SH	3	
>Number of Blocks	(300A,00F0)	IS	1	Electron plans support 0 to 1 blocks. Photon plans support 0 to 2 blocks.
>Total Block Tray Factor	(300A,00F2)	DS	3	Must be set to between 0.5 and 1.0 for photon plans if block exist in the plan. Not used for electron plans
>Block Sequence	(300A,00F4)	SQ	1C	
>Block Tray ID	(300A,00F5)	SH	3	Storeda as Block Tray ID.
>Source to Block Tray Distance	(300A,00F6)	DS	2	Used to calculate Block isocenter to tray distance.
>Block Type	(300A,00F8)	CS	1	Stored as Block Type. Supported values: SHIELDING, APERTURE.
>Block Divergence	(300A,00FA)	CS	2	Stored as Block Divergence. Electron blocks will convert PRESENT to ABSENT because of model restrictions. Supported values: PRESENT, ABSENT.
>Block Mounting Position	(300A,00FB)	CS	3	Stored as Block Mounting Position. Electron blocks will convert PATIENT_SIDE to SOURCE_SIDE because of model restrictions. Supported values: PATIENT_SIDE, SOURCE_SIDE.
>Block Number	(300A,00FC)	IS	1	Stored as Block Number.
>Block Name	(300A,00FE)	LO	3	Stored as Block Name.
>Material ID	(300A,00E1)	SH	2	Stored as Block Material Name.
>Block Thickness	(300A,0100)	DS	2C	Not supported for Photon blocks. Stored as Block Thickness for Electron blocks.
>Block Transmission	(300A,0102)	DS	2C	Stored for Photon blocks only. Must be between 0.0 - 0.2.
>Block Number of Points	(300A,0104)	IS	2	
>Block Data	(300A,0106)	DS	2	Stored as Block Data.
>Applicator Sequence	(300A,0107)	SQ	3	Stored as Electron applicator or Photon cone depending on Radiation Type.
>Applicator ID	(300A,0108)	SH	1	Stored as Applicator ID for Electron applicator. Must be "Apex 2.5" for Photon cone.
>Applicator Type	(300A,0109)	CS	1	Stored as Applicator Type. Supported values: ELECTRON_SQUARE, ELECTRON_RECT, ELECTRON_CIRC, ELECTRON_SHORT, ELECTRON_OPEN, PHOTON_CIRC, STEREOTACTIC.
>Applicator Geometry Sequence	(300A,0431)	SQ	3	Only used for photon cones.
>Applicator Aperture Shape	(300A,0432)	CS	1	Not stored. Supported value: SYM_CIRCULAR.

>Applicator Opening	(300A,0433)	FL	1C	Stored as Applicator Opening (converted from MM to CM).
>Applicator Description	(300A,010A)	LO	3	
>RaySearch Private Creator	(4001,0010)	LO	3	RAYSEARCHLABS 2.0
>Applicator Thickness	(4001,1054)	DS	3	Physical thickness of applicator (in mm) parallel to radiation beam axis.
>Final Cumulative Meterset Weight	(300A,010E)	DS	1C	
>Number of Control Points	(300A,0110)	IS	1	Must be greater than or equal to 2. Must be exactly 2 if Radiation Type (300A, 00C6) is ELECTRON.
>Control Point Sequence	(300A,0111)	SQ	1	
>Control Point Index	(300A,0112)	IS	1	
>Cumulative Meterset Weight	(300A,0134)	DS	2	
>Nominal Beam Energy	(300A,0114)	DS	3	Required for the first control point and is assumed to be constant throughout beam. Nominal Beam Energy will be mapped against nominal energy of a machine beam quality when assigning imported beams to a machine. The nominal energy can differ from the energy used internally for dose calculation.
>Dose Rate Set	(300A,0115)	DS	3	
>Wedge Positions Sequence	(300A,0116)	SQ	3	
>Referenced Wedge Number	(300C,00C0)	IS	1	
>Wedge Position	(300A,0118)	CS	1	Supported values: IN, OUT.
>Beam Limiting Device Position Sequence	(300A,011A)	SQ	1C	Leaf/jaw positions are required to be constant within a control point pair for an SMLC plan.
>RT Beam Limiting Device Type	(300A,00B8)	CS	1	Supported values: X, Y, ASYMX, ASYMY, MLCX, MLCY.
>Leaf/Jaw Positions	(300A,011C)	DS	1	
>Gantry Angle	(300A,011E)	DS	1C	Required for the first control point and required to not change for SMLC and DMLC. See Beam Type (300A,00C4) for more information.
>Gantry Rotation Direction	(300A,011F)	CS	1C	Required for the first control point and required to not be "NONE" for SMLC and DMLC. See Beam Type (300A,00C4) for more information. Supported values: NONE, CW, CC.
>Gantry Pitch Angle	(300A,014A)	FL	3	Must be null or 0.
>Gantry Pitch Rotation Direction	(300A,014C)	CS	3	Supported values: NONE, CW, CC.
>Beam Limiting Device Angle	(300A,0120)	DS	1C	Required for the first control point, must be empty for subsequent control points or have the same value as in the first control point.
>Beam Limiting Device Rotation Direction	(300A,0121)	CS	1C	Required for the first control point. Supported values: NONE, CW, CC.
>Patient Support Angle	(300A,0122)	DS	1C	Required for the first control point, must be empty for subsequent control points or have the same value as in the first control point.
>Patient Support Rotation Direction	(300A,0123)	CS	1C	Required for the first control point. Supported values: NONE, CW, CC.

Attribute name	Tag	VR	Type	Comment
>Table Top Eccentric Axis Distance	(300A,0124)	DS	3	
>Table Top Eccentric Angle	(300A,0125)	DS	1C	Required for the first control point. Supported value: 0.0.
>Table Top Eccentric Rotation Direction	(300A,0126)	CS	1C	Required for the first control point. Supported values: NONE, CW, CC.
>Table Top Pitch Angle	(300A,0140)	FL	1C	
>Table Top Pitch Rotation Direction	(300A,0142)	CS	1C	Supported values: NONE, CW, CC.
>Table Top Roll Angle	(300A,0144)	FL	1C	
>Table Top Roll Rotation Direction	(300A,0146)	CS	1C	Supported values: NONE, CW, CC.
>Table Top Vertical Position	(300A,0128)	DS	2C	
>Table Top Longitudinal Position	(300A,0129)	DS	2C	
>Table Top Lateral Position	(300A,012A)	DS	2C	
>Isocenter Position	(300A,012C)	DS	2C	Required for the first control point. Must be constant throughout beam.
>TomoTherapy HA Private Creator	(300D,0010)	LO	3	TOMO_HA_01
>Tomo Projection Sinogram Data	(300D,10A7)	DS	3	Projection sinogram values for all 64 leaves of projection starting at the current control point. Empty if all 64 leaves have a sinogram value of zero. Empty for last control point.
>RaySearch Private Creator	(4001,0010)	LO	3	RAYSEARCHLABS 2.0
>Treatment Machine Commission Time	(4001,1001)	DT	3	The commission time of the treatment machine. Used together with Treatment Machine Name to determine the correct machine.
>Tomo IDMS Beam ID	(4001,1021)	LO	3	
>Tomo IDMS Machine ID	(4001,1020)	LO	3	
>Tomo Beam Isocenter	(4001,1023)	DS	3	
>Tomo machine revision	(4001,1025)	IS	3	
>Tomo beam revision	(4001,1026)	IS	3	
>Tomo intended back jaw position	(4001,1027)	DS	3	
>Tomo intended front jaw position	(4001,1028)	DS	3	
>Tomo Projection Time	(4001,1053)	DS	3	Projection time for Tomo Helical and Tomo Direct plans.
>Planned Blood Boron Concentration	(4001,1015)	DS	3	
>TomoTherapy HA Private Creator	(300D,0010)	LO	3	TOMO_HA_01
>Tomo Gantry Period	(300D,1040)	DS	3	Used for import of TomoHelical plans exported from RayStation 6 and 7.

7.1.55 Approval Module

Attribute name	Tag	Vr	Type	Comment

Approval Status	(300E,0002)	CS	1	Used to set the approval status of the imported structure set. Supported values: - APPROVED - Plan is approved. - UNAPPROVED - Plan is not approved. - REJECTED - Same rules as for UNAPPROVED.
Review Date	(300E,0004)	DA	2C	Stored if Approval Status is APPROVED.
Review Time	(300E,0005)	TM	2C	Stored if Approval Status is APPROVED.
Reviewer Name	(300E,0008)	PN	2C	Stored if Approval Status is APPROVED.

7.1.56 SOP Common Module

Attribute name	Tag	Vr	Type	Comment
SOP Class UID	(0008,0016)	UI	1	Supported value: 1.2.840.10008.5.1.4.1.1.481.5.
SOP Instance UID	(0008,0018)	UI	1	Stored internally to find references from other objects.
Specific Character Set	(0008,0005)	CS	1C	Supported values: ISO_IR 100, ISO_IR 192.
Instance Creation Date	(0008,0012)	DA	3	Stored if last save date if RT Plan Date (300A, 0006) is missing.
Instance Creation Time	(0008,0013)	TM	3	Stored if last save time if RT Plan Time (300A, 0007) is missing.
RaySearch Private Creator	(4001,0010)	LO	3	RAYSEARCHLABS 2.0
Tomo Plan SOP Instance UID	(4001,102A)	UI	3	The SOP Instance UID that shall be used by RayGateway for creating plan instances in IDMS based on this RT Plan.

7.1.57 RT Dose IOD

Imported RT Dose objects are converted into internal representation. Exported doses will therefore not be identical to the imported object.

IE	Module	Used
Patient	Patient Module	Yes
Study	General Study Module	No
Series	RT Series Module	Yes
Frame of Reference	Frame of Reference Module	Yes
Equipment	General Equipment Module	Yes
Dose	General Image Module	No
	Image Plane Module	Yes
	Multi-Frame Module	Yes
	Image Pixel Module	Yes
	RT Dose Module	Yes
	Structure Set Module	No
	ROI Contour Module	No

SOP Common Module		Yes

7.1.58 Patient Module

Patient attributes only used to match patient.

Attribute name	Tag	Vr	Type	Comment
Patient's Name	(0010,0010)	PN	2	
Patient ID	(0010,0020)	LO	2	
Patient's Birth Date	(0010,0030)	DA	2	
Patient's Sex	(0010,0040)	CS	2	Supported values: • M - Male • F - Female • O - Other

7.1.59 RT Series Module

Attribute name	Tag	Vr	Type	Comment
Modality	(0008,0060)	CS	1	Supported value: RTDOSE.
Series Instance UID	(0020,000E)	UI	1	Only read for display during import. Not stored.

7.1.60 Frame of Reference Module

Attribute name	Tag	Vr	Type	Comment
Frame of Reference UID	(0020,0052)	UI	1	Used to match referenced image set. Not stored.

7.1.61 General Equipment Module

Attribute name	Tag	Vr	Type	Comment
Pixel Padding Value	(0028,0120)	US_SS	1C	If pixel padding is present within the region used for dose computation, the resulting dose may be wrong.

7.1.62 Image Plane Module

Attribute name	Tag	Vr	Type	Comment
Pixel Spacing	(0028,0030)	DS	1	
Image Orientation (Patient)	(0020,0037)	DS	1	All non-oblique image orientations are supported (i.e. row and column directions must be along an axis).
Image Position (Patient)	(0020,0032)	DS	1	Note that this is the center of the first pixel, i.e. the corner of the image offset by half a pixel.

7.1.63 Multi-Frame Module

Optional. Only required for 3D doses.

Attribute name	Tag	Vr	Type	Comment
Number of Frames	(0028,0008)	IS	1	

Frame Increment Pointer	(0028,0009)	AT	1	

7.1.64 Image Pixel Module

Attribute name	Tag	Vr	Type	Comment
Samples per Pixel	(0028,0002)	US	1	Supported value: 1.
Photometric Interpretation	(0028,0004)	CS	1	Supported value: MONOCHROME2.
Rows	(0028,0010)	US	1	
Columns	(0028,0011)	US	1	
Bits Allocated	(0028,0100)	US	1	Supported values: 16, 32.
Bits Stored	(0028,0101)	US	1	Must be equal to Bits Allocated.
High Bit	(0028,0102)	US	1	HighBit must be BitsStored-1.
Pixel Representation	(0028,0103)	US	1	Supported value: 0.
Pixel Data	(7FE0,0010)	OB_OW	1C	
Pixel Padding Range Limit	(0028,0121)	US_SS	1C	

7.1.65 RT Dose Module

Attribute name	Tag	Vr	Type	Comment
Samples per Pixel	(0028,0002)	US	1C	Supported value: 1.
Photometric Interpretation	(0028,0004)	CS	1C	Supported value: MONOCHROME2.
Bits Allocated	(0028,0100)	US	1C	Supported values: 16, 32.
Bits Stored	(0028,0101)	US	1C	Bits Stored must be equal to Bits Allocated.
High Bit	(0028,0102)	US	1C	High Bit must be Bits Stored - 1.
Pixel Representation	(0028,0103)	US	1C	Supported value: 0.
Dose Units	(3004,0002)	CS	1	Supported value: GY.
Dose Type	(3004,0004)	CS	1	Supported values: PHYSICAL, EFFECTIVE.

Dose Summation Type	(3004,000A)	CS	1	Note: Summation type BEAM is interpreted as the dose contribution from this beam over the entire treatment course, not per fraction. Supported values: • PLAN • BEAM • FRACTION • TOTALHOMO - Interpreted as PLAN • TOTALHETERO - Interpreted as PLAN • EVALUATION - Interpreted as PLAN • BNCT_GAMMA - BNCT Gamma Plan Dose Component • BNCT_BORON - BNCT Boron Plan Dose Component • BNCT_NITROGEN - BNCT Nitrogen Plan Dose Component • BNCT_HYDROGEN - BNCT Hydrogen Plan Dose Component • BNCT_NORMAL_RBE - BNCT Normal RBE Plan Dose Component • BNCT_TUMOR_RBE - BNCT Tumor RBE Plan Dose Component • MULTI_PLAN
Referenced RT Plan Sequence	(300C,0002)	SQ	1C	Is required to contain only one item. For doses with summation type BEAM the referenced plan must be found and all beam doses must be imported together. For doses with summation type PLAN a dummy plan will be created if the referenced plan couldn't be found but an examination with a matching Frame of Reference UID is found.
>Referenced SOP Class UID	(0008,1150)	UI	1	
>Referenced SOP Instance UID	(0008,1155)	UI	1	Plan UID, used to establish references.
>Referenced Fraction Group Sequence	(300C,0020)	SQ	1C	
>Referenced Fraction Group Number	(300C,0022)	IS	1	Identifies fraction group within plan
>Referenced Beam Sequence	(300C,0004)	SQ	1C	
>Referenced Beam Number	(300C,0006)	IS	1	Identify a beam within a plan
Grid Frame Offset Vector	(3004,000C)	DS	1C	If the first element of the Grid Frame Offset Vector is zero, the vector should be interpreted as relative positive offsets in the direction of the cross product of the row and column directions. This means that if Image Orientation (Patient) (0020,0037) is for example (1,0,0,0,-1,0), the cross product will be negative and hence the elements in the Grid Frame Offset Vector should be read/written with opposite sign. It should be noted that some manufacturers are non-compliant regarding this and do not change the sign of the elements in the Grid Frame Offset Vector and could cause the dose grid to not be positioned correctly around the patient.
Dose Grid Scaling	(3004,000E)	DS	1C	
Tissue Heterogeneity Correction	(3004,0014)	CS	3	Supported values: WATER, IMAGE, ROI_OVERRIDE.
RaySearch Private Creator	(4001,0010)	LO	3	RAYSEARCHLABS 2.0

ROI Index Pixel Data	(4001,1016)	OB	3	

7.1.66 SOP Common Module

Attribute name	Tag	Vr	Type	Comment
SOP Class UID	(0008,0016)	UI	1	Supported value: 1.2.840.10008.5.1.4.1.1.481.2.
SOP Instance UID	(0008,0018)	UI	1	Stored internally to references from other objects.
Specific Character Set	(0008,0005)	CS	1C	Supported values: ISO_IR 100, ISO_IR 192.
Instance Creation Date	(0008,0012)	DA	3	Stored as last save date.
Instance Creation Time	(0008,0013)	TM	3	Stored as last save time.

7.1.67 Spatial Registration IOD

Imported Spatial Registrations are always converted into internal representation. Exported registrations will therefore not be identical to the imported object.

IE	Module	Used
Patient	Patient Module	Yes
Study	General Study Module	Yes
Series	General Series Module	Yes
	Spatial Registration Series Module	Yes
Frame of Reference	Frame of Reference Module	Yes
Equipment	General Equipment Module	Yes
Spatial Registration	Spatial Registration Module	Yes
	SOP Common Module	Yes
	Common Instance Reference Module	Yes

7.1.68 Patient Module

Patient attributes only used to match patient.

Attribute name	Tag	Vr	Type	Comment
Patient's Name	(0010,0010)	PN	2	Only used for matching patient.
Patient ID	(0010,0020)	LO	2	Only used for matching patient.
Patient's Birth Date	(0010,0030)	DA	2	Only used for matching patient.
Patient's Sex	(0010,0040)	CS	2	Only used for matching patient. Supported values: • M - Male • F - Female • O - Other

7.1.69 General Study Module

Attribute name	Tag	Vr	Type	Comment

Study Instance UID	(0020,000D)	UI	1	

7.1.70 General Series Module

Attribute name	Tag	Vr	Type	Comment
Modality	(0008,0060)	CS	1	Supported value: REG.
Series Instance UID	(0020,000E)	UI	1	Only read for display during import. Not stored.
Series Number	(0020,0011)	IS	2	
Series Date	(0008,0021)	DA	3	
Series Time	(0008,0031)	TM	3	
Protocol Name	(0018,1030)	LO	3	
Series Description	(0008,103E)	LO	3	
Patient Position	(0018,5100)	CS	2C	

7.1.71 Spatial Registration Series Module

Attribute name	Tag	Vr	Type	Comment
Modality	(0008,0060)	CS	1	Supported value: REG.

7.1.72 Frame of Reference Module

Attribute name	Tag	Vr	Type	Comment
Frame of Reference UID	(0020,0052)	UI	1	Used to match referenced image set.

7.1.73 General Equipment Module

Attribute name	Tag	Vr	Type	Comment

7.1.74 Spatial Registration Module

Attribute name	Tag	Vr	Type	Comment
Content Date	(0008,0023)	DA	1	
Content Time	(0008,0033)	TM	1	
Instance Number	(0020,0013)	IS	1	
Content Label	(0070,0080)	CS	1	
Content Description	(0070,0081)	LO	2	
Content Creator's Name	(0070,0084)	PN	2	
Registration Sequence	(0070,0308)	SQ	1	
>Frame of Reference UID	(0020,0052)	UI	1C	Used to match referenced image sets.
>Referenced Image Sequence	(0008,1140)	SQ	1C	
>Referenced SOP Class UID	(0008,1150)	UI	1	
>Referenced SOP Instance UID	(0008,1155)	UI	1	
>Matrix Registration Sequence	(0070,0309)	SQ	1	

>Matrix Sequence	(0070,030A)	SQ	1	
>Frame of Reference Transformation Matrix	(3006,00C6)	DS	1	
>Frame of Reference Transformation Matrix Type	(0070,030C)	CS	1	Supported value: RIGID.

7.1.75 SOP Common Module

Attribute name	Tag	Vr	Type	Comment
SOP Class UID	(0008,0016)	UI	1	Supported value: 1.2.840.10008.5.1.4.1.1.66.1.
SOP Instance UID	(0008,0018)	UI	1	Stored internally to references from other objects.
Specific Character Set	(0008,0005)	CS	1C	Supported values: ISO_IR 100, ISO_IR 192.
Instance Creation Date	(0008,0012)	DA	3	Stored as last save date.
Instance Creation Time	(0008,0013)	TM	3	Stored as last save time.

7.1.76 Common Instance Reference Module

Attribute name	Tag	Vr	Type	Comment
Referenced Series Sequence	(0008,1115)	SQ	1	
>Series Instance UID	(0020,000E)	UI	1	
>Referenced Instance Sequence	(0008,114A)	SQ	1	
>Referenced SOP Class UID	(0008,1150)	UI	1	
>Referenced SOP Instance UID	(0008,1155)	UI	1	
Studies Containing Other Referenced Instances Sequence	(0008,1200)	SQ	1C	If referenced images are located in a Study different from the REG object.
>Study Instance UID	(0020,000D)	UI	1	
>Referenced Series Sequence	(0008,1115)	SQ	1	
>Series Instance UID	(0020,000E)	UI	1	
>Referenced Instance Sequence	(0008,114A)	SQ	1	
>Referenced SOP Class UID	(0008,1150)	UI	1	
>Referenced SOP Instance UID	(0008,1155)	UI	1	

7.2 EXPORT IOD DEFINITIONS

7.2.1 CT Image IOD

Patient demographics is replaced in exported images to match patient.
The following applies to exported 4DCT projections.

IE	Module	Used
Patient	Patient Module	Yes
Study	General Study Module	Yes
Series	General Series Module	Yes

Frame of Reference	Frame of Reference Module	Yes
Equipment	General Equipment Module	Yes
Image	General Image Module	No
	Image Plane Module	Yes
	Image Pixel Module	Yes
	CT Image Module	Yes
	SOP Common Module	Yes

7.2.2 Patient Module

Attribute name	Tag	Vr	Type	Comment
Patient's Name	(0010,0010)	PN	2	
Patient ID	(0010,0020)	LO	2	
Patient's Birth Date	(0010,0030)	DA	2	
Patient's Sex	(0010,0040)	CS	2	Possible values: • M - Male • F - Female • O - Other
Other Patient IDs	(0010,1000)	LO	3	Populated with the original Patient ID if different from patient.
Other Patient Names	(0010,1001)	PN	3	Populated with the original Patient's Name if different from patient.

7.2.3 General Study Module

Attribute name	Tag	Vr	Type	Comment
Study Instance UID	(0020,000D)	UI	1	Based on the referenced image set.
Study Date	(0008,0020)	DA	2	Date when 4DCT projection was created.
Study Time	(0008,0030)	TM	2	Time when 4DCT projection was created.
Accession Number	(0008,0050)	SH	2	
Study Description	(0008,1030)	LO	3	Always: "4DCT Projection".

7.2.4 General Series Module

Attribute name	Tag	Vr	Type	Comment
Modality	(0008,0060)	CS	1	Always CT.
Series Instance UID	(0020,000E)	UI	1	Generated RaySearch UID.
Series Number	(0020,0011)	IS	2	
Series Date	(0008,0021)	DA	3	
Series Time	(0008,0031)	TM	3	
Series Description	(0008,103E)	LO	3	Always: "Projection method: [projection method used]".

Patient Position	(0018,5100)	CS	2C	

7.2.5 Frame of Reference Module

Attribute name	Tag	Vr	Type	Comment
Frame of Reference UID	(0020,0052)	UI	1	Based on the image sets used for projection.

7.2.6 General Equipment Module

Attribute name	Tag	Vr	Type	Comment
Manufacturer	(0008,0070)	LO	2	Always RaySearch Laboratories.
Manufacturer's Model Name	(0008,1090)	LO	3	Always RayPlan.
Software Versions	(0018,1020)	LO	3	Always the current application version and the application version when object was last saved. May also contain the filter version applied when exporting the object.

7.2.7 Image Plane Module

Attribute name	Tag	Vr	Type	Comment
Pixel Spacing	(0028,0030)	DS	1	
Image Orientation (Patient)	(0020,0037)	DS	1	
Image Position (Patient)	(0020,0032)	DS	1	Note that this is the center of the first pixel, i.e. the corner of the image offset by half a pixel.

7.2.8 Image Pixel Module

Attribute name	Tag	Vr	Type	Comment
Samples per Pixel	(0028,0002)	US	1	Always 1.
Photometric Interpretation	(0028,0004)	CS	1	Always MONOCHROME2.
Rows	(0028,0010)	US	1	
Columns	(0028,0011)	US	1	
Bits Allocated	(0028,0100)	US	1	Always 16.
Bits Stored	(0028,0101)	US	1	Always 16.
High Bit	(0028,0102)	US	1	Always 15.
Pixel Representation	(0028,0103)	US	1	Always 1.
Pixel Data	(7FE0,0010)	OB_OW	1C	
Pixel Padding Range Limit	(0028,0121)	US_SS	1C	

7.2.9 CT Image Module

Attribute name	Tag	Vr	Type	Comment
Image Type	(0008,0008)	CS	1	
Samples per Pixel	(0028,0002)	US	1	Always 1.

Photometric Interpretation	(0028,0004)	CS	1	Always MONOCHROME2.
Bits Allocated	(0028,0100)	US	1	Always 16.
Bits Stored	(0028,0101)	US	1	Always 16.
High Bit	(0028,0102)	US	1	Always 16.
Rescale Intercept	(0028,1052)	DS	1	Always 0.0.
Rescale Slope	(0028,1053)	DS	1	Always 1.0.
Rescale Type	(0028,1054)	LO	1C	Always HU.

7.2.10 SOP Common Module

Attribute name	Tag	Vr	Type	Comment
SOP Class UID	(0008,0016)	UI	1	Always 1.2.840.10008.5.1.4.1.1.2.
SOP Instance UID	(0008,0018)	UI	1	Generated RaySearch UID.
Specific Character Set	(0008,0005)	CS	1C	Possible values: ISO_IR 100, ISO_IR 192.
Instance Creation Date	(0008,0012)	DA	3	
Instance Creation Time	(0008,0013)	TM	3	

7.2.11 MR Image IOD

Patient demographics is replaced in exported images to match patient.

7.2.12 PET Image IOD

Patient demographics is replaced in exported images to match patient.

7.2.13 RT Structure Set IOD

All geometries are converted into contours when exporting RT Structure Sets. An imported structure set will always be converted from internal representation and a new instance will be created.

IE	Module	Used
Patient	Patient Module	Yes
Study	General Study Module	Yes
Series	RT Series Module	Yes
Frame of Reference	Frame of Reference Module	Yes
Equipment	General Equipment Module	Yes
Structure Set	Structure Set Module	Yes
	ROI Contour Module	Yes
	RT ROI Observations Module	Yes
	Approval Module	Yes
	SOP Common Module	Yes

7.2.14 Patient Module

Attribute values based on the patient demographics.

Attribute name	Tag	Vr	Type	Comment
Patient's Name	(0010,0010)	PN	2	
Patient ID	(0010,0020)	LO	2	
Patient's Birth Date	(0010,0030)	DA	2	
Patient's Sex	(0010,0040)	CS	2	Possible values: • M - Male • F - Female • O - Other

7.2.15 General Study Module

Attribute values based on the referenced image set.

Attribute name	Tag	Vr	Type	Comment
Study Instance UID	(0020,000D)	UI	1	
Study Date	(0008,0020)	DA	2	
Study Time	(0008,0030)	TM	2	
Referring Physician's Name	(0008,0090)	PN	2	
Study ID	(0020,0010)	SH	2	
Study Description	(0008,1030)	LO	3	

7.2.16 RT Series Module

Attribute name	Tag	Vr	Type	Comment
Modality	(0008,0060)	CS	1	Always RTSTRUCT.
Series Instance UID	(0020,000E)	UI	1	Generated RaySearch UID.
Series Number	(0020,0011)	IS	2	Always 1.
Series Date	(0008,0021)	DA	3	Last saved date.
Series Time	(0008,0031)	TM	3	Last saved time.
Series Description	(0008,103E)	LO	3	Always "RS: Approved Structure Set" or "RS: Unapproved Structure Set"

7.2.17 Frame of Reference Module

Attribute name	Tag	Vr	Type	Comment
Frame of Reference UID	(0020,0052)	UI	1	

7.2.18 General Equipment Module

Attribute name	Tag	Vr	Type	Comment
Manufacturer	(0008,0070)	LO	2	Always RaySearch Laboratories.
Institution Name	(0008,0080)	LO	3	As defined in Clinic Settings.
Manufacturer's Model Name	(0008,1090)	LO	3	Always RayPlan.

Attribute name	Tag	Vr	Type	Comment
Software Versions	(0018,1020)	LO	3	Always the current application version and the application version when object was last saved. May also contain the filter version applied when exporting the object.

7.2.19 Structure Set Module

Attribute name	Tag	Vr	Type	Comment
Structure Set Label	(3006,0002)	SH	1	Always 'RS: Approved Structure Set' or 'RS: Unapproved Structure Set'.
Instance Number	(0020,0013)	IS	3	Always 1.
Structure Set Date	(3006,0008)	DA	2	Last save date.
Structure Set Time	(3006,0009)	TM	2	Last save time.
Referenced Frame of Reference Sequence	(3006,0010)	SQ	3	
>Frame of Reference UID	(0020,0052)	UI	1	Based on the referenced image set.
>RT Referenced Study Sequence	(3006,0012)	SQ	3	Always contains one referenced study.
>Referenced SOP Class UID	(0008,1150)	UI	1	RT Detached Study Storage UID. Always 1.2.840.10008.3.1.2.3.1.
>Referenced SOP Instance UID	(0008,1155)	UI	1	Study UID from the image series for which the structure set is created.
>RT Referenced Series Sequence	(3006,0014)	SQ	1	Always contains one referenced series.
>Series Instance UID	(0020,000E)	UI	1	Series UID from the image series for which the structure set is created.
>Contour Image Sequence	(3006,0016)	SQ	1	All images from the image series for which the structure set is created is added to the sequence. Images for which there is no contour defined are also added.
>Referenced SOP Class UID	(0008,1150)	UI	1	
>Referenced SOP Instance UID	(0008,1155)	UI	1	
Structure Set ROI Sequence	(3006,0020)	SQ	3	All ROI:s and POI:s for which there exists a contour/point on the referenced image series are added to the sequence.
>ROI Number	(3006,0022)	IS	1	
>Referenced Frame of Reference UID	(3006,0024)	UI	1	Always same as the image series frame of reference for which the structure set is created.
>ROI Name	(3006,0026)	LO	2	Exported from ROI Name.
>ROI Generation Algorithm	(3006,0036)	CS	2	Always SEMIAUTOMATIC.

7.2.20 ROI Contour Module

Attribute name	Tag	Vr	Type	Comment
ROI Contour Sequence	(3006,0039)	SQ	1	
>Referenced ROI Number	(3006,0084)	IS	1	Exported from ROI Number.
>ROI Display Color	(3006,002A)	IS	3	Exported from ROI/POI Display Color.

>Contour Sequence	(3006,0040)	SQ	3	
>Contour Number	(3006,0048)	IS	3	
>Contour Image Sequence	(3006,0016)	SQ	3	May contain one or no contour image. If there is an image in the referenced image series that that is positioned on the same z-coordinate as the contour, that image will be referenced in this sequence. If no image is found, the sequence will be empty.
>Referenced SOP Class UID	(0008,1150)	UI	1	
>Referenced SOP Instance UID	(0008,1155)	UI	1	
>Contour Geometric Type	(3006,0042)	CS	1	Possible values: POINT, CLOSED_PLANAR.
>Number of Contour Points	(3006,0046)	IS	1	
>Contour Data	(3006,0050)	DS	1	

7.2.21 RT ROI Observations Module

Attribute name	Tag	Vr	Type	Comment
RT ROI Observations Sequence	(3006,0080)	SQ	1	
>Observation Number	(3006,0082)	IS	1	
>Referenced ROI Number	(3006,0084)	IS	1	
>ROI Observation Label	(3006,0085)	SH	3	Same as the name of the referenced ROI, except if the ROI is of type Localization Poi, in which case the label is set to "Localization Poi".
>RT ROI Interpreted Type	(3006,00A4)	CS	2	All DICOM standard terms are supported. Localization Poi exported as "MARKER".
>ROI Interpreter	(3006,00A6)	PN	2	
>Material ID	(300A,00E1)	SH	3	Exported from material name.
>ROI Physical Properties Sequence	(3006,00B0)	SQ	3	The values REL_MASS_DENSITY, REL_ELEC_DENSITY, EFFECTIVE_Z, EFF_Z_PER_A and ELEM_FRACTION are supported. However at least one of REL_MASS_DENSITY or REL_ELEC_DENSITY is needed to create a density override. If only one of these values exist, the physical properties of water is used and mass density is set primarily from REL_MASS_DENSITY and secondarily from REL_ELEC_DENSITY.

Attribute name	Tag	Vr	Type	Comment
>ROI Physical Property	(3006,00B2)	CS	1	MEAN_EXCI_ENERGY depicts the Mean Excitation Energy for a given material. Possible values: • REL_MASS_DENSITY • REL_ELEC_DENSITY • EFFECTIVE_Z • EFF_Z_PER_A • ELEM_FRACTION • MEAN_EXCI_ENERGY • CBE_BORON - Used for BNCT dose computation • RBE_HYDROGEN - Used for BNCT dose computation • RBE_NITROGEN - Used for BNCT dose computation • RBE_GAMMA - Used for BNCT dose computation • BORON_CONC_RATIO - Boron Concentration Ratio. Used for BNCT dose computation • BNCT_DOSE_LIMIT - Used for BNCT dose computation
>ROI Elemental Composition Sequence	(3006,00B6)	SQ	1C	
>ROI Elemental Composition Atomic Number	(3006,00B7)	US	1	
>ROI Elemental Composition Atomic Mass Fraction	(3006,00B8)	FL	1	
>ROI Physical Property Value	(3006,00B4)	DS	1	
>RaySearch Private Creator	(4001,0010)	LO	3	RAYSEARCHLABS 2.0
>Tissue Name	(4001,1010)	ST	3	RaySearch Private Tag. Contains the tissue name given to this Region of Interest.
>RBE Cell Type Name	(4001,1014)	ST	3	RaySearch Private Tag. Contains the RBE Cell Type Name given to this Region of Interest.

7.2.22 Approval Module

Attribute name	Tag	Vr	Type	Comment
Approval Status	(300E,0002)	CS	1	Possible values: • APPROVED - Structure set is approved. • UNAPPROVED - Structure set is not approved.
Review Date	(300E,0004)	DA	2C	Approval date.
Review Time	(300E,0005)	TM	2C	Approval time.
Reviewer Name	(300E,0008)	PN	2C	User that approved data.

7.2.23 SOP Common Module

Attribute name	Tag	Vr	Type	Comment
SOP Class UID	(0008,0016)	UI	1	Always 1.2.840.10008.5.1.4.1.1.481.3.
SOP Instance UID	(0008,0018)	UI	1	Generated RaySearch UID.
Specific Character Set	(0008,0005)	CS	1C	Possible values: ISO_IR 100, ISO_IR 192.

Instance Creation Date	(0008,0012)	DA	3	Last save time.
Instance Creation Time	(0008,0013)	TM	3	Last save time.

7.2.24 RT Plan IOD

IE	Module	Used
Patient	Patient Module	Yes
Study	General Study Module	Yes
Series	RT Series Module	Yes
Frame of Reference	Frame of Reference Module	Yes
Equipment	General Equipment Module	Yes
Plan	RT General Plan Module	Yes
	RT Prescription Module	Yes
	RT Patient Setup Module	Yes
	RT Fraction Scheme Module	Yes
	RT Beams Module	Yes
	Approval Module	Yes
	SOP Common Module	Yes

7.2.25 Patient Module

Attribute values based on the patient demographics.

Attribute name	Tag	Vr	Type	Comment
Patient's Name	(0010,0010)	PN	2	
Patient ID	(0010,0020)	LO	2	
Patient's Birth Date	(0010,0030)	DA	2	
Patient's Sex	(0010,0040)	CS	2	Possible values: • M - Male • F - Female • O - Other

7.2.26 General Study Module

Attribute values based on the referenced image set.

Attribute name	Tag	Vr	Type	Comment
Study Instance UID	(0020,000D)	UI	1	
Study Date	(0008,0020)	DA	2	
Study Time	(0008,0030)	TM	2	
Referring Physician's Name	(0008,0090)	PN	2	
Study ID	(0020,0010)	SH	2	

Accession Number	(0008,0050)	SH	2	
Study Description	(0008,1030)	LO	3	

7.2.27 RT Series Module

Attribute name	Tag	Vr	Type	Comment
Modality	(0008,0060)	CS	1	Always RTPLAN.
Series Instance UID	(0020,000E)	UI	1	Generated RaySearch UID.
Series Number	(0020,0011)	IS	2	
Series Date	(0008,0021)	DA	3	
Series Time	(0008,0031)	TM	3	
Series Description	(0008,103E)	LO	3	Exported from Beam Set Name.
Operators' Name	(0008,1070)	PN	2	

7.2.28 Frame of Reference Module

Attribute name	Tag	Vr	Type	Comment
Frame of Reference UID	(0020,0052)	UI	1	Always same as the referenced image series.
Position Reference Indicator	(0020,1040)	LO	2	

7.2.29 General Equipment Module

Attribute name	Tag	Vr	Type	Comment
Manufacturer	(0008,0070)	LO	2	Always RaySearch Laboratories.
Institution Name	(0008,0080)	LO	3	As defined in Clinic Settings.
Manufacturer's Model Name	(0008,1090)	LO	3	Always RayPlan.
Software Versions	(0018,1020)	LO	3	Always the current application version and the application version when object was last saved. May also contain the filter version applied when exporting the object.

7.2.30 RT General Plan Module

Attribute name	Tag	Vr	Type	Comment
RT Plan Label	(300A,0002)	SH	1	Exported from Beam Set Name.
RT Plan Name	(300A,0003)	LO	3	Exported from Treatment Plan Name.
RT Plan Description	(300A,0004)	ST	3	Exported from Beam Set Description.
RT Plan Date	(300A,0006)	DA	2	Last save date.
RT Plan Time	(300A,0007)	TM	2	Last save time.
Treatment Protocols	(300A,0009)	LO	3	Exported as plan delivery technique. Possible values: SMLC, DMLC, TomoHelical, TomoStatic, DynamicArc, StaticArc, TomoDirect, BNCT, NCT.

Plan Intent	(300A,000A)	CS	3	Treatment plans is always CURATIVE, QA plans always VERIFICATION, Beam Commission plans always RESEARCH, and plans with recalculated dose might have RECALCULATION. Possible values: CURATIVE, VERIFICATION, MACHINE_QA, RESEARCH, RECALCULATION, BNCT_DOSE_CALC.
Treatment Sites	(300A,000B)	LO	3	
RT Plan Geometry	(300A,000C)	CS	1	Always PATIENT.
Referenced Structure Set Sequence	(300C,0060)	SQ	1C	Based on the referenced Examination Structure Set.
>Referenced SOP Class UID	(0008,1150)	UI	1	Always 1.2.840.10008.5.1.4.1.1.481.3.
>Referenced SOP Instance UID	(0008,1155)	UI	1	
Referenced RT Plan Sequence	(300C,0002)	SQ	3	
>Referenced SOP Class UID	(0008,1150)	UI	1	Always 1.2.840.10008.5.1.4.1.1.481.5.
>Referenced SOP Instance UID	(0008,1155)	UI	1	
>RT Plan Relationship	(300A,0055)	CS	1	Possible values: VERIFIED_PLAN, EQUIVALENT, CONCURRENT.
>Brainlab Private Creator	(300B,0012)	LO	3	Brainlab - ONC - Beam Parameters
>Referenced Beam List	(300B,1210)	IS	3	Only used for Brainlab plans.

7.2.31 RT Prescription Module

Attribute name	Tag	Vr	Type	Comment
Prescription Description	(300A,000E)	ST	3	Exported from RT Plan Label.
Dose Reference Sequence	(300A,0010)	SQ	3	Primary Prescription supported only.
>Dose Reference Number	(300A,0012)	IS	1	Always 1.
>Dose Reference UID	(300A,0013)	UI	3	
>Dose Reference Structure Type	(300A,0014)	CS	1	Possible values: POINT, VOLUME, SITE.
>Dose Reference Description	(300A,0016)	LO	3	Exported from Site Description or textualized prescription.
>Referenced ROI Number	(3006,0084)	IS	1C	
>Dose Reference Type	(300A,0020)	CS	1	Always TARGET.
>Constraint Weight	(300A,0021)	DS	3	
>Target Minimum Dose	(300A,0025)	DS	3	
>Target Prescription Dose	(300A,0026)	DS	3	
>Target Underdose Volume Fraction	(300A,0028)	DS	3	Written for prescriptions of type Dose At Volume, Median Dose (always 50) and Near Minimum Dose (always 2).
>Organ at Risk Maximum Dose	(300A,002C)	DS	3	
>Organ at Risk Overdose Volume Fraction	(300A,002D)	DS	3	

7.2.32 RT Patient Setup Module

Attribute name	Tag	Vr	Type	Comment
Patient Setup Sequence	(300A,0180)	SQ	1	
>Patient Setup Number	(300A,0182)	IS	1	
>Patient Position	(0018,5100)	CS	1C	Possible values: HFS, HFP, FFS, FFP, HFDR, HFDL, FFDR, FFDL.
>Referenced Setup Image Sequence	(300A,0401)	SQ	3	
>Referenced SOP Class UID	(0008,1150)	UI	1	
>Referenced SOP Instance UID	(0008,1155)	UI	1	
>Setup Technique	(300A,01B0)	CS	3	Possible values: ISOCENTRIC, FIXED_SSD.
>Setup Technique Description	(300A,01B2)	ST	3	
>Table Top Vertical Setup Displacement	(300A,01D2)	DS	3	Vertical displacement in IEC TABLE TOP coordinate system (in mm) relative to Localization Poi. Value is only written if the Localization Poi is defined on the planning CT. The displacement is defined as (Localization Poi - isocenter). Export of table top displacement can be disabled in the RayPhysics per machine.
>Table Top Longitudinal Setup Displacement	(300A,01D4)	DS	3	Longitudinal displacement in IEC TABLE TOP coordinate system (in mm) relative to Localization Poi. Value is only written if the Localization Poi is defined on the planning CT. The displacement is defined as (Localization Poi - isocenter). Export of table top displacement can be disabled in the RayPhysics per machine.
>Table Top Lateral Setup Displacement	(300A,01D6)	DS	3	Lateral displacement in IEC TABLE TOP coordinate system (in mm) relative to Localization Poi. Value is only written if the Localization Poi is defined on the planning CT. The displacement is defined as (Localization Poi - isocenter). Export of table top displacement can be disabled in the RayPhysics per machine.
>Motion Synchronization Sequence	(300A,0410)	SQ	3	
>Respiratory Motion Compensation Technique	(0018,9170)	CS	1	Possible values: • NONE • GATING • TRACKING - Static target tracking • REALTIME - Realtime tracking
>Respiratory Signal Source	(0018,9171)	CS	1	Possible values: • NONE • EXTERNAL_MARKER • SPIROMETER • BELT • INTERNAL_MARKER • FIDUCIAL - Tracking of fiducial markers • TRACKING_ROI - Tracking of volume
>Respiratory Motion Compensation Technique Description	(0018,9185)	ST	3	

>RaySearch Private Creator	(4001,0010)	LO	3	RAYSEARCHLABS 2.0
>Tomo Localization point	(4001,1022)	DS	3	
>Tracking ROI Sequence	(4001,1062)	SQ	3	Contains referenced ROI used for tracking
>RaySearch Private Creator	(4001,0010)	LO	3	RAYSEARCHLABS 2.0
>Referenced ROI Number	(4001,1051)	IS	1C	
>Imaging Angles	(4001,1063)	DS	3	Selected imaging angles for Tomo Synchrony
>medPhoton Private Creator	(30BB,0010)	LO	3	medPhoton 1.0
>Patient Support Angle Offset Interval	(30BB,1022)	DS	3	The offset interval for the yaw angle in degrees to use when performing collision checks. Relates to Patient Support Angle (300A, 0122). The first value should be zero or negative and the second value should be zero or positive. Example: [0.0, 0.0], [-2.0, 2.0] or [-2.0, 3.0].
>Table Top Pitch Angle Offset Interval	(30BB,1040)	DS	3	The offset interval for the pitch angle in degrees to use when performing collision checks. Relates to Table Top Pitch Angle (300A, 0140). The first value should be zero or negative and the second value should be zero or positive. Example: [0.0, 0.0], [-2.0, 2.0] or [-2.0, 3.0].
>Table Top Roll Angle Offset Interval	(30BB,1044)	DS	3	The offset interval for the roll angle in degrees to use when performing collision checks. Relates to Table Top Roll Angle (300A, 0144). The first value defines the negative offset and should be zero or negative. The second value defines the positive offset and should be zero or positive. Example: [0.0, 0.0], [-2.0, 2.0] or [-2.0, 3.0].
>Isocenter Position Offset Interval	(30BB,102C)	DS	3	The offset interval for the isocenter in millimeter to use when performing collision checks. Relates to Isocenter Position (300A, 012C). The first three values define the negative offsets and should be zero or negative. The last three values define the positive offsets and should be zero or positive. Example: [0.0, 0.0, 0.0, 0.0, 0.0, 0.0], [-2.0, -3.0, 0.0, 2.0, 1.0, 0.0].
medPhoton Private Creator	(30BB,0010)	LO	3	medPhoton 1.0
Patient Setup ID	(30BB,1000)	SH	3	Exported from Patient Setup IDCAS parameters.
Imaging Protocol ID	(30BB,1001)	SH	3	Exported from Patient Setup IDCAS parameters.

7.2.33 RT Fraction Scheme Module

Attribute name	Tag	Vr	Type	Comment
Fraction Group Sequence	(300A,0070)	SQ	1	This sequence will always contain one item. Multiple fraction groups are not supported.
>Fraction Group Number	(300A,0071)	IS	1	Always 1.
>Referenced Dose Reference Sequence	(300C,0050)	SQ	3	
>Referenced Dose Reference Number	(300C,0051)	IS	1	Always 1.
>Number of Fractions Planned	(300A,0078)	IS	2	

>Number of Fraction Pattern Digits Per Day	(300A,0079)	IS	3	
>Repeat Fraction Cycle Length	(300A,007A)	IS	3	
>Fraction Pattern	(300A,007B)	LT	3	
>Number of Beams	(300A,0080)	IS	1	
>Referenced Beam Sequence	(300C,0004)	SQ	1C	
>Referenced Beam Number	(300C,0006)	IS	1C	
>Beam Dose Specification Point	(300A,0082)	DS	3	Exported from Dose Specification Point.
>Referenced Dose Reference UID	(300A,0083)	UI	3	
>Beam Dose	(300A,0084)	DS	3	Exported from Beam Dose at specified point, unless the user has chosen to "Export beam dose specification point dose as fraction of prescription dose" for the treatment machine.
>Beam Dose Point Depth	(300A,0088)	FL	3	Should be interpreted as the distance from the surface of the patient to the beam dose specification point, i.e. including support, fixture and boli.
>Beam Dose Point Equivalent Depth	(300A,0089)	FL	3	For photons: The water equivalent depth of the beam dose specification point, including support, fixation and boli. For electrons: The integrated depth from the surface to the beam dose specification point, including support, fixation and boli, weighted with electron density relative to water.
>Beam Dose Point SSD	(300A,008A)	FL	3	Should be interpreted as the distance to the surface of the patient, including support, fixation and boli.
>Beam Meterset	(300A,0086)	DS	3	Total MU for beam.
>RaySearch Private Creator	(4001,0010)	LO	3	RAYSEARCHLABS 2.0
>Beam Dose Specification Point Name	(4001,1029)	ST	3	The name of the Beam Dose Specification Point.
>Number of Brachy Application Setups	(300A,00A0)	IS	1	Not supported. Always 0.

7.2.34 RT Beams Module

Attribute name	Tag	Vr	Type	Comment
Beam Sequence	(300A,00B0)	SQ	1	
>Beam Number	(300A,00C0)	IS	1	Exported from Beam Name.
>Beam Name	(300A,00C2)	LO	3	Exported from Beam Name.
>Beam Description	(300A,00C3)	ST	3	Exported from Beam Description.
>Beam Type	(300A,00C4)	CS	1	Always STATIC for SMLC plans. Always DYNAMIC for Arc and DMLC plans. Possible values: STATIC, DYNAMIC.
>Radiation Type	(300A,00C6)	CS	2	Possible values: PHOTON, ELECTRON, NEUTRON.
>Primary Fluence Mode Sequence	(3002,0050)	SQ	3	

>Fluence Mode	(3002,0051)	CS	1	If a non standard fluence mode is used for the beam quality this attribute will be set to NON_STANDARD. Otherwise this attribute is STANDARD. Possible values: STANDARD, NON_STANDARD.
>Fluence Mode ID	(3002,0052)	SH	1C	Identifier for the specific fluence-shaping mode. If "Fluence Mode" is set to NON_STANDARD this attribute must be set to either FFF or SRS. If "Fluence Mode" is set to STANDARD this attribute is null. Possible values: FFF, SRS.
>Treatment Machine Name	(300A,00B2)	SH	2	
>Primary Dosimeter Unit	(300A,00B3)	CS	3	Possible values: MU, MINUTE.
>Source-Axis Distance	(300A,00B4)	DS	3	
>Beam Limiting Device Sequence	(300A,00B6)	SQ	1	
>RT Beam Limiting Device Type	(300A,00B8)	CS	1	Possible values: X, Y, ASYMX, ASYMY, MLCX, MLCY.
>Number of Leaf/Jaw Pairs	(300A,00BC)	IS	1	
>Leaf Position Boundaries	(300A,00BE)	DS	2C	
>Referenced Patient Setup Number	(300C,006A)	IS	3	
>Treatment Delivery Type	(300A,00CE)	CS	3	Possible values: TREATMENT, SETUP.
>Number of Wedges	(300A,00D0)	IS	1	Possible values: 0, 1.
>Wedge Sequence	(300A,00D1)	SQ	1C	
>Wedge Number	(300A,00D2)	IS	1	Always 1.
>Wedge Type	(300A,00D3)	CS	2	Possible values: STANDARD, DYNAMIC, MOTORIZED.
>Wedge ID	(300A,00D4)	SH	3	
>Wedge Angle	(300A,00D5)	IS	2	Always 60 for motorized wedge.
>Wedge Factor	(300A,00D6)	DS	2	
>Wedge Orientation	(300A,00D8)	DS	2	Possible values: 0.0, 90.0, 180.0, 270.0.
>Effective Wedge Angle	(300A,00DE)	DS	3	
>Number of Compensators	(300A,00E0)	IS	1	Always 0.
>Number of Boli	(300A,00ED)	IS	1	
>Referenced Bolus Sequence	(300C,00B0)	SQ	1C	
>Referenced ROI Number	(3006,0084)	IS	1	
>Bolus ID	(300A,00DC)	SH	3	
>Number of Blocks	(300A,00F0)	IS	1	Electron plans support 0 to 1 blocks. Photon plans support 0 to 2 blocks. Possible values: 0, 1, 2.
>Total Block Tray Factor	(300A,00F2)	DS	3	
>Block Sequence	(300A,00F4)	SQ	1C	
>Block Tray ID	(300A,00F5)	SH	3	
>Source to Block Tray Distance	(300A,00F6)	DS	2	
>Block Type	(300A,00F8)	CS	1	Possible values: SHIELDING, APERTURE.

>Block Divergence	(300A,00FA)	CS	2	Possible values: PRESENT, ABSENT.
>Block Mounting Position	(300A,00FB)	CS	3	Possible values: PATIENT_SIDE, SOURCE_SIDE.
>Block Number	(300A,00FC)	IS	1	
>Block Name	(300A,00FE)	LO	3	
>Block Transmission	(300A,0102)	DS	2C	
>Block Number of Points	(300A,0104)	IS	2	
>Block Data	(300A,0106)	DS	2	
>Applicator Sequence	(300A,0107)	SQ	3	Used for Electron applicators or Photon cones.
>Applicator ID	(300A,0108)	SH	1	
>Applicator Type	(300A,0109)	CS	1	Possible values: ELECTRON_SQUARE, ELECTRON_RECT, ELECTRON_CIRC, ELECTRON_SHORT, ELECTRON_OPEN, PHOTON_CIRC, STEREOTACTIC, NEUTRON_CIRC.
>Applicator Geometry Sequence	(300A,0431)	SQ	3	Only exported for photon cones.
>Applicator Aperture Shape	(300A,0432)	CS	1	Always SYM_CIRCULAR.
>Applicator Opening	(300A,0433)	FL	1C	
>Applicator Description	(300A,010A)	LO	3	
>RaySearch Private Creator	(4001,0010)	LO	3	RAYSEARCHLABS 2.0
>Applicator Thickness	(4001,1054)	DS	3	Physical thickness of applicator (in mm) parallel to radiation beam axis.
>Final Cumulative Meterset Weight	(300A,010E)	DS	1C	Always 1.0.
>Number of Control Points	(300A,0110)	IS	1	
>Control Point Sequence	(300A,0111)	SQ	1	
>Control Point Index	(300A,0112)	IS	1	
>Cumulative Meterset Weight	(300A,0134)	DS	2	Meterset weight at beginning of control point. Final control point will always have value 1.
>Referenced Dose Reference Sequence	(300C,0050)	SQ	3	
>Referenced Dose Reference Number	(300C,0051)	IS	1	Always 1.
>Cumulative Dose Reference Coefficient	(300A,010C)	DS	2	Be aware these values are linearly interpolated from 0 to the final value and are not accurate.
>Nominal Beam Energy	(300A,0114)	DS	3	Written as the nominal energy of the machine beam quality assigned to the beam. The energy used internally for dose calculation may differ from the nominal energy and will not be exported.
>Dose Rate Set	(300A,0115)	DS	3	
>Wedge Positions Sequence	(300A,0116)	SQ	3	If plan contains wedges.
>Referenced Wedge Number	(300C,00C0)	IS	1	Always 1.
>Wedge Position	(300A,0118)	CS	1	Possible values: IN, OUT.
>Beam Limiting Device Position Sequence	(300A,011A)	SQ	1C	

>RT Beam Limiting Device Type	(300A,00B8)	CS	1	Possible values: X, Y, ASYMX, ASYMY, MLCX, MLCY.
>Leaf/Jaw Positions	(300A,011C)	DS	1	
>Gantry Angle	(300A,011E)	DS	1C	
>Gantry Rotation Direction	(300A,011F)	CS	1C	Possible values: NONE, CW, CC.
>Gantry Pitch Rotation Direction	(300A,014C)	CS	3	Possible values: NONE, CW, CC.
>Beam Limiting Device Angle	(300A,0120)	DS	1C	Same throughout entire beam.
>Beam Limiting Device Rotation Direction	(300A,0121)	CS	1C	Possible values: NONE, CW, CC.
>Patient Support Angle	(300A,0122)	DS	1C	Same throughout entire beam except for Wave Arc plans.
>Patient Support Rotation Direction	(300A,0123)	CS	1C	Possible values: NONE, CW, CC.
>Table Top Eccentric Axis Distance	(300A,0124)	DS	3	
>Table Top Eccentric Angle	(300A,0125)	DS	1C	Always 0.0.
>Table Top Eccentric Rotation Direction	(300A,0126)	CS	1C	Possible values: NONE, CW, CC.
>Table Top Pitch Angle	(300A,0140)	FL	1C	
>Table Top Pitch Rotation Direction	(300A,0142)	CS	1C	Only written in first control point for SMLC, DMLC and Static Arc. Possible values: NONE, CW, CC.
>Table Top Roll Angle	(300A,0144)	FL	1C	
>Table Top Roll Rotation Direction	(300A,0146)	CS	1C	Only written in first control point for SMLC and DMLC. Possible values: NONE, CW, CC.
>Table Top Vertical Position	(300A,0128)	DS	2C	Always 0.0.
>Table Top Longitudinal Position	(300A,0129)	DS	2C	Always 0.0.
>Table Top Lateral Position	(300A,012A)	DS	2C	
>Isocenter Position	(300A,012C)	DS	2C	Always written in first control point.
>Source to Surface Distance	(300A,0130)	DS	3	Should be interpreted as the distance to the surface of the patient, i.e. including support, fixation and boli.
>TomoTherapy HA Private Creator	(300D,0010)	LO	3	TOMO_HA_01
>Tomo Projection Sinogram Data	(300D,10A7)	DS	3	TomoHelical plans only. Projection sinogram values for all 64 leaves of projection starting at the current control point. Empty if all 64 leaves have a sinogram value of zero. Empty for last control point.
>Brainlab Private Creator	(320B,0010)	LO	3	Brainlab - ONC - Multi-axial treatment machine
>Dynamic Tracking	(320B,1001)	CS	3	Dynamic Tracking for Vero. Possible values: ENABLED, DISABLED.
>RaySearch Private Creator	(4001,0010)	LO	3	RAYSEARCHLABS 2.0
>Treatment Machine Commission Time	(4001,1001)	DT	3	The commission time of the treatment machine. Used together with Treatment Machine Name to determine the correct machine.
>Tomo IDMS Beam ID	(4001,1021)	LO	3	
>Tomo IDMS Machine ID	(4001,1020)	LO	3	

>Tomo Beam Isocenter	[4001,1023]	DS	3	
>Tomo machine revision	[4001,1025]	IS	3	
>Tomo beam revision	[4001,1026]	IS	3	
>Tomo intended back jaw position	[4001,1027]	DS	3	
>Tomo intended front jaw position	[4001,1028]	DS	3	
>Tomo Projection Time	[4001,1053]	DS	3	Projection time for Tomo Helical and Tomo Direct plans.
>Planned Blood Boron Concentration	[4001,1015]	DS	3	Populated for BNCT plans only.
>Varian Medical Systems	[3243,0010]	LO	3	Varian Medical Systems VISION 3243
>Beam Secondary Name	[3243,1009]	LO	3	Value copied from Beam Description.

7.2.35 Approval Module

Attribute name	Tag	Vr	Type	Comment
Approval Status	[300E,0002]	CS	1	Possible values: • APPROVED - Plan is approved. • UNAPPROVED - Plan is not approved.
Review Date	[300E,0004]	DA	2C	Approval date.
Review Time	[300E,0005]	TM	2C	Approval time.
Reviewer Name	[300E,0008]	PN	2C	User that approved data.

7.2.36 SOP Common Module

Attribute name	Tag	Vr	Type	Comment
SOP Class UID	[0008,0016]	UI	1	Always 1.2.840.10008.5.1.4.1.1.481.5.
SOP Instance UID	[0008,0018]	UI	1	Generated RaySearch UID.
Specific Character Set	[0008,0005]	CS	1C	Possible values: ISO_IR 100, ISO_IR 192.
Instance Creation Date	[0008,0012]	DA	3	Last save date.
Instance Creation Time	[0008,0013]	TM	3	Last save time.
RaySearch Private Creator	[4001,0010]	LO	3	RAYSEARCHLABS 2.0
Tomo Plan SOP Instance UID	[4001,102A]	UI	3	The SOP Instance UID that shall be used by RayGateway for creating plan instances in IDMS based on this RT Plan.

7.2.37 RT Dose IOD

IE	Module	Used
Patient	Patient Module	Yes
Study	General Study Module	Yes
Series	RT Series Module	Yes
Frame of Reference	Frame of Reference Module	Yes

Equipment	General Equipment Module	Yes
Dose	General Image Module	No
	Image Plane Module	Yes
	Multi-Frame Module	Yes
	Image Pixel Module	Yes
	RT Dose Module	Yes
	Structure Set Module	No
	ROI Contour Module	No
	SOP Common Module	Yes

7.2.38 Patient Module

Attribute values based on the patient demographics.

Attribute name	Tag	Vr	Type	Comment
Patient's Name	(0010,0010)	PN	2	
Patient ID	(0010,0020)	LO	2	
Patient's Birth Date	(0010,0030)	DA	2	
Patient's Sex	(0010,0040)	CS	2	Possible values: • M - Male • F - Female • O - Other

7.2.39 General Study Module

Attribute values based on the referenced image set.

Attribute name	Tag	Vr	Type	Comment
Study Instance UID	(0020,000D)	UI	1	
Study Date	(0008,0020)	DA	2	
Study Time	(0008,0030)	TM	2	
Referring Physician's Name	(0008,0090)	PN	2	
Study ID	(0020,0010)	SH	2	
Accession Number	(0008,0050)	SH	2	
Study Description	(0008,1030)	LO	3	

7.2.40 RT Series Module

Attribute name	Tag	Vr	Type	Comment
Modality	(0008,0060)	CS	1	Always RTDOSE.
Series Instance UID	(0020,000E)	UI	1	Generated RaySearch UID.
Series Number	(0020,0011)	IS	2	Always 1.

Series Date	(0008,0021)	DA	3	Last save date.
Series Time	(0008,0031)	TM	3	Last save time.
Series Description	(0008,103E)	LO	3	Exported from Beam Set Name.

7.2.41 Frame of Reference Module

Attribute name	Tag	Vr	Type	Comment
Frame of Reference UID	(0020,0052)	UI	1	Always same as the referenced image series.

7.2.42 General Equipment Module

Attribute name	Tag	Vr	Type	Comment
Manufacturer	(0008,0070)	LO	2	Always RaySearch Laboratories.
Institution Name	(0008,0080)	LO	3	As defined in Clinic Settings.
Manufacturer's Model Name	(0008,1090)	LO	3	Always RayPlan.
Software Versions	(0018,1020)	LO	3	Always the current application version and the application version when object was last saved. May also contain the filter version applied when exporting the object.

7.2.43 Image Plane Module

Attribute name	Tag	Vr	Type	Comment
Pixel Spacing	(0028,0030)	DS	1	Exported from voxel size.
Image Orientation (Patient)	(0020,0037)	DS	1	Always '1\0\0\0\1\0' for 3D doses. Plane dependant for 2D doses.
Image Position (Patient)	(0020,0032)	DS	1	Note that this is the center of the first pixel, i.e. the corner of the image offset by half a pixel.
Slice Thickness	(0018,0050)	DS	2	Only exported for 3D doses. Exported from voxel size.

7.2.44 Multi-Frame Module

Not written for planar (2D) doses.

Attribute name	Tag	Vr	Type	Comment
Number of Frames	(0028,0008)	IS	1	Only used for 3D doses. Always equal the number of dose slices in z-direction.
Frame Increment Pointer	(0028,0009)	AT	1	Only used for 3D doses. Always '(3004,000c)'.

7.2.45 Image Pixel Module

Attribute name	Tag	Vr	Type	Comment
Samples per Pixel	(0028,0002)	US	1	Always 1.
Photometric Interpretation	(0028,0004)	CS	1	Always MONOCHROME2.
Rows	(0028,0010)	US	1	
Columns	(0028,0011)	US	1	

Bits Allocated	[0028,0100]	US	1	Always 16.
Bits Stored	[0028,0101]	US	1	Always 16.
High Bit	[0028,0102]	US	1	Always 15.
Pixel Representation	[0028,0103]	US	1	Always 0.
Pixel Data	[7FE0,0010]	OB_OW	1C	

7.2.46 RT Dose Module

Attribute name	Tag	Vr	Type	Comment
Samples per Pixel	[0028,0002]	US	1C	Always 1.
Photometric Interpretation	[0028,0004]	CS	1C	Always MONOCHROME2.
Bits Allocated	[0028,0100]	US	1C	Always 16.
Bits Stored	[0028,0101]	US	1C	Always 16.
High Bit	[0028,0102]	US	1C	Always 15.
Pixel Representation	[0028,0103]	US	1C	Always 0.
Content Date	[0008,0023]	DA	3	Last save date.
Content Time	[0008,0033]	TM	3	Last save time.
Dose Units	[3004,0002]	CS	1	Always GY.
Dose Type	[3004,0004]	CS	1	Possible values: PHYSICAL, EFFECTIVE.
Instance Number	[0020,0013]	IS	3	In-series counter starting from 1.
Dose Comment	[3004,0006]	LO	3	Exported from Beam Set Description.
Dose Summation Type	[3004,000A]	CS	1	Always PLAN or BEAM. Dose Summation Type FRACTION is not exported. Summation type BEAM referes to the dose contribution from this beam over the entire treatment course, not per fraction. Possible values: • PLAN • BEAM • EVALUATION • BNCT_GAMMA - BNCT Gamma Plan Dose Component • BNCT_BORON - BNCT Boron Plan Dose Component • BNCT_NITROGEN - BNCT Nitrogen Plan Dose Component • BNCT_HYDROGEN - BNCT Hydrogen Plan Dose Component • BNCT_NORMAL_RBE - BNCT Normal RBE Plan Dose Component • BNCT_TUMOR_RBE - BNCT Tumor RBE Plan Dose Component
Referenced RT Plan Sequence	[300C,0002]	SQ	1C	
>Referenced SOP Class UID	[0008,1150]	UI	1	Possible values: 1.2.840.10008.5.1.4.1.1.481.5, 1.2.840.10008.5.1.4.1.1.481.8.

>Referenced SOP Instance UID	(0008,1155)	UI	1	SOP Instance UID for the referenced plan. For evaluation doses a new UID is generated that does not reference an existing plan.
>Referenced Fraction Group Sequence	(300C,0020)	SQ	1C	Only written if Dose Summation Type is BEAM.
>Referenced Fraction Group Number	(300C,0022)	IS	1	Only written if Dose Summation Type is BEAM. Always 1.
>Referenced Beam Sequence	(300C,0004)	SQ	1C	Only written if Dose Summation Type is BEAM.
>Referenced Beam Number	(300C,0006)	IS	1	Only written if Dose Summation Type is BEAM. Exported from Beam Number.
Grid Frame Offset Vector	(3004,000C)	DS	1C	Only written for 3D doses.
Dose Grid Scaling	(3004,000E)	DS	1C	Dose Grid Scaling is always maximized for highest possible resolution.
Tissue Heterogeneity Correction	(3004,0014)	CS	3	Possible values: WATER, IMAGE, ROI_OVERRIDE.
RaySearch Private Creator	(4001,0010)	LO	3	RAYSEARCHLABS 2.0
ROI Index Pixel Data	(4001,1016)	OB	3	Contains ROI material index mapping used for BNCT dose computation.
ROI Index Bits Allocated	(4001,1017)	US	3	Number of bits allocated for each pixel sample

7.2.47 SOP Common Module

Attribute name	Tag	Vr	Type	Comment
SOP Class UID	(0008,0016)	UI	1	Always 1.2.840.10008.5.1.4.1.1.481.2.
SOP Instance UID	(0008,0018)	UI	1	Generated RaySearch UID.
Specific Character Set	(0008,0005)	CS	1C	Possible values: ISO_IR 100, ISO_IR 192.
Instance Creation Date	(0008,0012)	DA	3	Last save date.
Instance Creation Time	(0008,0013)	TM	3	Last save time.

7.2.48 Spatial Registration IOD

IE	Module	Used
Patient	Patient Module	Yes
Study	General Study Module	Yes
Series	General Series Module	Yes
	Spatial Registration Series Module	Yes
Frame of Reference	Frame of Reference Module	Yes
Equipment	General Equipment Module	Yes
Spatial Registration	Spatial Registration Module	Yes
	SOP Common Module	Yes
	Common Instance Reference Module	Yes

7.2.49 Patient Module

Attribute values based on the patient demographics.

Attribute name	Tag	Vr	Type	Comment
Patient's Name	(0010,0010)	PN	2	
Patient ID	(0010,0020)	LO	2	
Patient's Birth Date	(0010,0030)	DA	2	
Patient's Sex	(0010,0040)	CS	2	Possible values: ● M - Male ● F - Female ● O - Other

7.2.50 General Study Module

Attribute values based on the referenced image set.

Attribute name	Tag	Vr	Type	Comment
Study Instance UID	(0020,000D)	UI	1	
Study Date	(0008,0020)	DA	2	
Study Time	(0008,0030)	TM	2	
Referring Physician's Name	(0008,0090)	PN	2	
Study ID	(0020,0010)	SH	2	
Accession Number	(0008,0050)	SH	2	
Study Description	(0008,1030)	LO	3	

7.2.51 General Series Module

Attribute name	Tag	Vr	Type	Comment
Modality	(0008,0060)	CS	1	Always REG.
Series Instance UID	(0020,000E)	UI	1	
Series Number	(0020,0011)	IS	2	
Series Date	(0008,0021)	DA	3	
Series Time	(0008,0031)	TM	3	
Protocol Name	(0018,1030)	LO	3	
Series Description	(0008,103E)	LO	3	
Patient Position	(0018,5100)	CS	2C	

7.2.52 Spatial Registration Series Module

Attribute name	Tag	Vr	Type	Comment
Modality	(0008,0060)	CS	1	Always REG.

7.2.53 Frame of Reference Module

Attribute name	Tag	Vr	Type	Comment
Frame of Reference UID	(0020,0052)	UI	1	Always same as the referenced image series frame of reference.

7.2.54 General Equipment Module

Attribute name	Tag	Vr	Type	Comment
Manufacturer	(0008,0070)	LO	2	Always RaySearch Laboratories.
Institution Name	(0008,0080)	LO	3	As defined in Clinic Settings.
Manufacturer's Model Name	(0008,1090)	LO	3	Always RayPlan.
Software Versions	(0018,1020)	LO	3	Always the current application version and the application version when object was last saved. May also contain the filter version applied when exporting the object.

7.2.55 Spatial Registration Module

Attribute name	Tag	Vr	Type	Comment
Content Date	(0008,0023)	DA	1	
Content Time	(0008,0033)	TM	1	
Instance Number	(0020,0013)	IS	1	
Content Label	(0070,0080)	CS	1	
Content Description	(0070,0081)	LO	2	
Content Creator's Name	(0070,0084)	PN	2	
Registration Sequence	(0070,0308)	SQ	1	
>Frame of Reference UID	(0020,0052)	UI	1C	
>Referenced Image Sequence	(0008,1140)	SQ	1C	
>Referenced SOP Class UID	(0008,1150)	UI	1	
>Referenced SOP Instance UID	(0008,1155)	UI	1	
>Matrix Registration Sequence	(0070,0309)	SQ	1	
>Registration Type Code Sequence	(0070,030D)	SQ	2	
>Code Value	(0008,0100)	SH	1C	Possible values: 125021, 125023, 125024.
>Coding Scheme Designator	(0008,0102)	SH	1C	Always DCM.
>Code Meaning	(0008,0104)	LO	3	Possible values: Frame of Reference Identity, Acquisition Equipment Alignment, Image Content-based Alignment.
>Matrix Sequence	(0070,030A)	SQ	1	
>Frame of Reference Transformation Matrix	(3006,00C6)	DS	1	
>Frame of Reference Transformation Matrix Type	(0070,030C)	CS	1	Always RIGID.

7.2.56 SOP Common Module

Attribute name	Tag	Vr	Type	Comment
SOP Class UID	(0008,0016)	UI	1	Always 1.2.840.10008.5.1.4.1.1.66.1.
SOP Instance UID	(0008,0018)	UI	1	Generated RaySearch UID.
Specific Character Set	(0008,0005)	CS	1C	Possible values: ISO_IR 100, ISO_IR 192.
Instance Creation Date	(0008,0012)	DA	3	Last save date.
Instance Creation Time	(0008,0013)	TM	3	Last save time.

7.2.57 Common Instance Reference Module

Attribute name	Tag	Vr	Type	Comment
Referenced Series Sequence	(0008,1115)	SQ	1	
>Series Instance UID	(0020,000E)	UI	1	
>Referenced Instance Sequence	(0008,114A)	SQ	1	
>Referenced SOP Class UID	(0008,1150)	UI	1	
>Referenced SOP Instance UID	(0008,1155)	UI	1	
Studies Containing Other Referenced Instances Sequence	(0008,1200)	SQ	1C	If referenced images are located in a Study different from the REG object.
>Study Instance UID	(0020,000D)	UI	1	
>Referenced Series Sequence	(0008,1115)	SQ	1	
>Series Instance UID	(0020,000E)	UI	1	
>Referenced Instance Sequence	(0008,114A)	SQ	1	
>Referenced SOP Class UID	(0008,1150)	UI	1	
>Referenced SOP Instance UID	(0008,1155)	UI	1	

7.2.58 RT Image IOD

RT Images (DRR) are created during export. Content and annotations may not be identical to the DRR window.

IE	Module	Used
Patient	Patient Module	Yes
Study	General Study Module	Yes
Series	RT Series Module	Yes
Frame of Reference	Frame of Reference Module	Yes
Equipment	General Equipment Module	Yes
Image	General Image Module	Yes
	Image Pixel Module	Yes
	Multi-Frame Module	No
	RT Image Module	Yes
	VOI LUT Module	Yes
	SOP Common Module	Yes

7.2.59 Patient Module

Attribute values based on the patient demographics.

Attribute name	Tag	Vr	Type	Comment
Patient's Name	(0010,0010)	PN	2	
Patient ID	(0010,0020)	LO	2	
Patient's Birth Date	(0010,0030)	DA	2	
Patient's Sex	(0010,0040)	CS	2	Possible values: • M - Male • F - Female • O - Other

7.2.60 General Study Module

Attribute name	Tag	Vr	Type	Comment
Study Instance UID	(0020,000D)	UI	1	
Study Date	(0008,0020)	DA	2	
Study Time	(0008,0030)	TM	2	
Referring Physician's Name	(0008,0090)	PN	2	
Study ID	(0020,0010)	SH	2	
Accession Number	(0008,0050)	SH	2	
Study Description	(0008,1030)	LO	3	

7.2.61 RT Series Module

Attribute name	Tag	Vr	Type	Comment
Modality	(0008,0060)	CS	1	Always RTIMAGE.
Series Instance UID	(0020,000E)	UI	1	Generated RaySearch UID.
Series Number	(0020,0011)	IS	2	Always 1.
Series Date	(0008,0021)	DA	3	
Series Time	(0008,0031)	TM	3	

7.2.62 Frame of Reference Module

Attribute name	Tag	Vr	Type	Comment
Frame of Reference UID	(0020,0052)	UI	1	Always same as the referenced image set frame of reference.

7.2.63 General Equipment Module

Attribute name	Tag	Vr	Type	Comment
Manufacturer	(0008,0070)	LO	2	Always RaySearch Laboratories.
Institution Name	(0008,0080)	LO	3	As defined in Clinic Settings.

Manufacturer's Model Name	(0008,1090)	LO	3	Always RayPlan.
Software Versions	(0018,1020)	LO	3	Always the current application version and the application version when object was last saved. May also contain the filter version applied when exporting the object.

7.2.64 General Image Module

Attribute name	Tag	Vr	Type	Comment
Instance Number	(0020,0013)	IS	2	Exported from originating Beam Number.
Patient Orientation	(0020,0020)	CS	2C	
Content Date	(0008,0023)	DA	2C	Last save date of Beam Set.
Content Time	(0008,0033)	TM	2C	Last save time of Beam Set.
Acquisition Number	(0020,0012)	IS	3	
Burned In Annotation	(0028,0301)	CS	3	Possible values: YES, NO.

7.2.65 Image Pixel Module

Attribute name	Tag	Vr	Type	Comment
Samples per Pixel	(0028,0002)	US	1	Always 1.
Photometric Interpretation	(0028,0004)	CS	1	Always MONOCHROME2.
Rows	(0028,0010)	US	1	
Columns	(0028,0011)	US	1	
Bits Allocated	(0028,0100)	US	1	Always 16.
Bits Stored	(0028,0101)	US	1	Always 16.
High Bit	(0028,0102)	US	1	Always 15.
Pixel Representation	(0028,0103)	US	1	
Pixel Data	(7FE0,0010)	OB_OW	1C	
Pixel Padding Range Limit	(0028,0121)	US_SS	1C	

7.2.66 RT Image Module

Attribute name	Tag	Vr	Type	Comment
Samples per Pixel	(0028,0002)	US	1	Always 1.
Photometric Interpretation	(0028,0004)	CS	1	Always MONOCHROME2.
Bits Allocated	(0028,0100)	US	1	Always 16.
Bits Stored	(0028,0101)	US	1	Always 16.
High Bit	(0028,0102)	US	1	Always 15.
Pixel Representation	(0028,0103)	US	1	Always 0.
RT Image Label	(3002,0002)	SH	1	Beam Number or Beam Name (see Clinic Settings).
RT Image Name	(3002,0003)	LO	3	Beam Number or Beam Name (see Clinic Settings).

RT Image Description	(3002,0004)	ST	3	Combines Beam Name or Beam Number and Beam Description (see Clinic Settings).
Image Type	(0008,0008)	CS	1	Possible values: DERIVED, SECONDARY, DRR.
Conversion Type	(0008,0064)	CS	2	Always WSD.
RT Image Plane	(3002,000C)	CS	1	Always NORMAL.
X-Ray Image Receptor Angle	(3002,000E)	DS	2	Always 0.0.
RT Image Orientation	(3002,0010)	DS	2C	
Image Plane Pixel Spacing	(3002,0011)	DS	2	
RT Image Position	(3002,0012)	DS	2	
Radiation Machine Name	(3002,0020)	SH	2	Name of treatment machine or setup image device.
Primary Dosimeter Unit	(300A,00B3)	CS	2	
Radiation Machine SAD	(3002,0022)	DS	2	
RT Image SID	(3002,0026)	DS	2	
Referenced RT Plan Sequence	(300C,0002)	SQ	3	
>Referenced SOP Class UID	(0008,1150)	UI	1	
>Referenced SOP Instance UID	(0008,1155)	UI	1	
Referenced Beam Number	(300C,0006)	IS	3	
Referenced Fraction Group Number	(300C,0022)	IS	3	
Gantry Angle	(300A,011E)	DS	3	
Gantry Pitch Angle	(300A,014A)	FL	3	Only used for fixed setup beams
Beam Limiting Device Angle	(300A,0120)	DS	3	
Patient Support Angle	(300A,0122)	DS	3	
Table Top Pitch Angle	(300A,0140)	FL	3	
Table Top Roll Angle	(300A,0144)	FL	3	
Isocenter Position	(300A,012C)	DS	3	
Patient Position	(0018,5100)	CS	1C	
RaySearch Private Creator	(4001,0010)	LO	3	RAYSEARCHLABS 2.0
ROI Contour Sequence	(4001,1040)	SQ	3	Contours projected unto the isocenter plane.
>RaySearch Private Creator	(4001,0010)	LO	3	RAYSEARCHLABS 2.0
>Contour Name	(4001,1041)	LO	1	
>Contour Description	(4001,1042)	ST	2	
>Contour Generation Algorithm	(4001,1043)	CS	1	Possible values: • AUTOMATIC - Calculated ROI • SEMIAUTOMATIC - Contour calculated with user assistance • MANUAL - User-entered ROI

>Contour Interpreted Type	(4001,1044)	CS	1	Possible values: AVOIDANCE, BOLUS, CAVITY, CTV, EXTERNAL, FIXATION, GTV, IRRAD_VOLUME, ORGAN, PTV, SUPPORT, TREATED_VOLUME, NONE.
>Contour Display Color	(4001,1045)	IS	2	RGB triplet color representation for ROI, specified using the range 0-255.
>Referenced Structure Set SOP Instance UID	(4001,1050)	UI	1C	
>Referenced ROI Number	(4001,1051)	IS	1C	
>Contour Data Sequence	(4001,1052)	SQ	3	
>RaySearch Private Creator	(4001,0010)	LO	3	RAYSEARCHLABS 2.0
>Pixel Contour Data	(4001,1049)	OF	2	A data stream of (x,y) pairs that comprise the contours. The number of pairs shall be equal to Number of Pixel Contour Points (4001,1048). May contain multiple contours that does not connect. Coordinates are projected onto the IEC GANTRY coordinate system and translated to image pixel indices.
>Number of Pixel Contour Points	(4001,1048)	IS	2	
Varian Medical Systems	(3243,0010)	LO	3	Varian Medical Systems VISION 3243
Related Referenced Beam Number	(3243,1028)	IS	3	Value copied from Referenced Beam Number.

7.2.67 VOI LUT Module

Attribute name	Tag	Vr	Type	Comment
Window Center	(0028,1050)	DS	1C	
Window Width	(0028,1051)	DS	1C	

7.2.68 SOP Common Module

Attribute name	Tag	Vr	Type	Comment
SOP Class UID	(0008,0016)	UI	1	Always 1.2.840.10008.5.1.4.1.1.481.1.
SOP Instance UID	(0008,0018)	UI	1	Generated RaySearch UID.
Specific Character Set	(0008,0005)	CS	1C	Possible values: ISO_IR 100, ISO_IR 192.
Instance Creation Date	(0008,0012)	DA	3	Last save time.
Instance Creation Time	(0008,0013)	TM	3	

7.3 DATA DICTIONARY OF PRIVATE ATTRIBUTES

All used Private Creators and Private Attributes are listed in the table below. Usage of Private Attributes are listed in each module specification.

Attribute name	Tag	VR	VM	Value
GE Private Creator	(0009,0010)	LO	1	GEMS_PETD_01
GE PET Scan Time	(0009,100D)	DT	1	
RaySearch Private Creator	(3001,0011)	LO	1	RAYSEARCHLABS 1.0
IMPAC Private Creator	(300B,0010)	LO	1	IMPAC

Line Spot Tune ID	(300B,1090)	SH	1	
Number of Line Scan Spot Positions	(300B,1092)	IS	1	
Line Scan Position Map	(300B,1094)	FL	1-n	
Line Scan Meterset Weights	(300B,1096)	FL	1-n	
Line Scanning Spot Size	(300B,1098)	FL	2	
Number of Line Scan Spot Paintings	(300B,109A)	IS	1	
Maximum Collimated Field Diameter	(300B,1002)	FL	1	
Nominal SOBP Width	(300B,100E)	FL	1	
Planned Distal Target Distance	(300B,1004)	FL	1	
Respiratory Phase Gating Duty Cycle	(300B,1020)	DS	2	
Siemens IONTRIS Private Creator	(300B,0010)	LO	1	SIEMENS MED SYNGO RT
Plan Type	(300B,1010)	CS	1	
Checksum Encryption Code	(300B,10A1)	OB	1	
Configuration Baseline	(300B,10E5)	OB	1	
Fraction Group Code	(300B,1076)	CS	1	
Fraction Dose to Dose Reference	(300B,1078)	DS	1	
Imager Organ Program	(300B,1012)	LO	1	
Imaging Technique	(300B,102E)	CS	1	
Imager Angular Angle	(300B,1024)	DS	1	
Imager Iso-centric Angle	(300B,1025)	DS	1	
Imager Orbital Angle	(300B,102C)	DS	1	
Imager Vertical Position	(300B,1026)	DS	1	
Imager Longitudinal Position	(300B,1027)	DS	1	
Imager Lateral Position	(300B,1028)	DS	1	
Imager Angular Rotation Direction	(300B,1029)	DS	1	
Imager Isocentric Rotation Direction	(300B,102A)	DS	1	
Imager Orbital Rotation Direction	(300B,102F)	DS	1	
Referenced Treatment Beam Number	(300B,1077)	IS	1	
Alternative Treatment Machine Name Sequence	(300B,1020)	SQ	1	
Brainlab Private Creator	(300B,0012)	LO	1	Brainlab - ONC - Beam Parameters
Referenced Beam List	(300B,1210)	IS	1-n	
IBA Private Creator	(300D,0010)	LO	1	IBA
IBA Scattered Mode	(300D,1002)	SH	1	
TomoTherapy HA Private Creator	(300D,0010)	LO	1	TOMO_HA_01
Tomo Structure Blocking	(300D,1010)	CS	1	

Tomo Overlap Precedence	(300D,1012)	IS	1	
Tomo Modulation Factor	(300D,1014)	DS	1	
Tomo Target Minimum Dose Penalty	(300D,1016)	IS	1	
Tomo Target Maximum Dose Penalty	(300D,1017)	IS	1	
Tomo Organ At Risk Maximum Dose Penalty	(300D,1018)	IS	1	
Tomo Organ At Risk Full Volume Dose Penalty	(300D,1019)	IS	1	
Tomo Primary Prescription Type	(300D,101B)	CS	1	
Tomo Gantry Period	(300D,1040)	DS	1	
Tomo Machine UID	(300D,1050)	UI	1	
Tomo Treatment Pitch	(300D,1060)	DS	1	
Tomo Couch Speed	(300D,1080)	DS	1	
Tomo Performed Work Items	(300D,1090)	CS	3	
Tomo Plan Geometry	(300D,10A4)	CS	1	
Tomo Projection Sinogram Data	(300D,10A7)	DS	64	
Tomo Reference Isocenter	(300D,10A9)	DS	3	
Tomo Registration Translations	(300D,10B0)	DS	3	
Tomo Registration Rotations	(300D,10B1)	DS	3	
Tomo Delivered Secondary Meterset	(300D,10B5)	DS	1	
Tomo Plan IVDT Sequence	(300D,10C0)	SQ	1	
Tomo IVDT HU Entry	(300D,10C1)	DS	1	
Tomo IVDT Density Entry	(300D,10C2)	DS	1	
TomoTherapy DD Private Creator	(300D,0020)	LO	1	TOMO_DD_01
Procedure Number	(300D,2010)	SH	1	
Procedure Type	(300D,2011)	CS	1	
Procedure Purpose	(300D,2012)	CS	1	
Detector channel count	(300D,2020)	IS	1	
Dataset length	(300D,2021)	IS	1	
Detector data scaling factor	(300D,2022)	DS	1	
Compression Type	(300D,2024)	CS	1	
Compression Factor	(300D,2025)	IS	1	
Active Projection Beam Sequence	(300D,2026)	SQ	1	
Detector unit of measure	(300D,2030)	CS	1	
Element width	(300D,2031)	DS	1	
Curvature radius	(300D,2032)	DS	1	
Surface to Axis Distance	(300D,2033)	DS	1	

Surface to Center Distance	(300D,2034)	DS	1	
Channel range	(300D,2035)	IS	2	
medPhoton Private Creator	(30BB,0010)	LO	1	medPhoton 1.0
Patient Setup ID	(30BB,1000)	SH	1	
Imaging Protocol ID	(30BB,1001)	SH	1	
Patient Support Angle Offset Interval	(30BB,1022)	DS	2	
Table Top Pitch Angle Offset Interval	(30BB,1040)	DS	2	
Table Top Roll Angle Offset Interval	(30BB,1044)	DS	2	
Isocenter Position Offset Interval	(30BB,102C)	DS	6	
Brainlab Private Creator	(320B,0010)	LO	1	Brainlab - ONC - Multi-axial treatment machine
Dynamic Tracking	(320B,1001)	CS	1	
Varian Medical Systems	(3243,0010)	LO	1	Varian Medical Systems VISION 3243
Beam Secondary Name	(3243,1009)	LO	1	
Related Referenced Beam Number	(3243,1028)	IS	1	
RaySearch Private Creator	(4001,0010)	LO	1	RAYSEARCHLABS 2.0
Tissue Name	(4001,1010)	ST	1	
Target Prescription Effective Dose	(4001,1011)	DS	1	
Treatment Machine Commission Time	(4001,1001)	DT	1	
Spill Length	(4001,1005)	FL	1	
Degrader	(4001,1006)	FL	1	
Particles Per Spill	(4001,1007)	FL	1	
CNAO Nominal Beam Energy	(4001,1008)	DS	1	
CNAO Nominal Beam Energy Scale Factor	(4001,1009)	DS	1	
RBE Model Name	(4001,1002)	ST	1	
RBE Model Commission Time	(4001,1003)	DT	1	
Block Milling Tool Diameter	(4001,1004)	FL	1	
Internal Treatment Machine Name	(4001,1012)	SH	1	
Tomo IDMS Beam ID	(4001,1021)	LO	1	
RBE Cell Type Name	(4001,1014)	ST	1	
Tomo IDMS Machine ID	(4001,1020)	LO	1	
Tomo Localization point	(4001,1022)	DS	3	
Tomo Beam Isocenter	(4001,1023)	DS	3	
Tomo intended back jaw position	(4001,1027)	DS	1	
Tomo beam revision	(4001,1026)	IS	1	
Tomo machine revision	(4001,1025)	IS	1	

Tomo intended front jaw position	(4001,1028)	DS	1	
Beam Dose Specification Point Name	(4001,1029)	ST	1	
ROI Contour Sequence	(4001,1040)	SQ	1	
Contour Name	(4001,1041)	LO	1	
Contour Description	(4001,1042)	ST	1	
Contour Generation Algorithm	(4001,1043)	CS	1	
Contour Interpreted Type	(4001,1044)	CS	1	
Contour Display Color	(4001,1045)	IS	3	
Number of Contour Points	(4001,1046)	IS	1	
Contour Data	(4001,1047)	OF	2-2n	
Number of Pixel Contour Points	(4001,1048)	IS	1	
Pixel Contour Data	(4001,1049)	OF	2-2n	
Referenced Structure Set SOP Instance UID	(4001,1050)	UI	1	
Referenced ROI Number	(4001,1051)	IS	1	
Reference Beam Data ID	(4001,1030)	SH	1	
Reference Depth in Water	(4001,1031)	DS	1	
Mitsubishi Reference Value	(4001,1032)	DS	1	
Contour Data Sequence	(4001,1052)	SQ	1	
Tomo Plan SOP Instance UID	(4001,102A)	UI	1	
Tomo Projection Time	(4001,1053)	DS	1	
Planned Blood Boron Concentration	(4001,1015)	DS	1	
ROI Index Pixel Data	(4001,1016)	OB	1	
Applicator Thickness	(4001,1054)	DS	1	
ROI Index Bits Allocated	(4001,1017)	US	1	
Number Of Aperture Contour Points	(4001,1055)	IS	1	
Aperture Contour Point Map	(4001,1056)	FL	2-2n	
Collimation Mode	(4001,1057)	CS	1	
Treatment Machine RBE Mode	(4001,1033)	CS	1	
RaySearch Checksum Algorithm Version	(4001,1060)	LO	1	
RaySearch Checksum Data	(4001,1061)	OB	1	
Tracking ROI Sequence	(4001,1062)	SQ	1	
Imaging Angles	(4001,1063)	DS	1-6	
Mevion SMC Output	(4001,1064)	OB	1	
Mevion SMC Version	(4001,1065)	LO	1	

Philips Private Creator	(7053,0010)	LO	1	Philips PET Private Group
Philips SUV Scale Factor	(7053,1000)	DS	1	
Philips Activity Concentration Scale Factor	(7053,1009)	DS	1	

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