RAYSTATION 8B

DICOM Conformance Statement Accuray Driver

1 OVERVIEW

This documentspecifiesthe DICOMinterface for the treatmentmanagementsystem (TMS) RayTreatment Tomo driver with Accuray TomoTherapy and Radixact Treatment Delivery Devices(TDD).

1.1 NETWORK SERVICES

SOP Class Name	SOP Class UID	Provider of Service (SCP)	User of Service (SCU)
Transfer			
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Yes	No
RT BeamsTreatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4	Yes	No
Spatial Registration (REG) Storage	1.2.840.10008.5.1.4.1.1.66.1	Yes	No
Query/Retrieve			
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Yes	No
Workflow Management			
Unified Procedure Step - Push SOP Class-Trial (Retired)	1.2.840.10008.5.1.4.34.4.1	Yes	No
Unified Procedure Step - Pull SOP Class-Trial (Retired)	1.2.840.10008.5.1.4.34.4.3	Yes	No
Verification			
Verification SOP Class	1.2.840.10008.1.1	Yes	No

3 INTRODUCTION

3.1 REVISION HISTORY

Date	Version	Comment
2018-12-13	1.0	Tomo Driver DCS for RayStation Release 8B
2019-02-14	2.0	Tomo Driver DCS for RayStation Release 8B SP1

3.2 AUDIENCE

This document is written for users that need to understand how Tomo 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.

3.3 REMARKS

This document is written for users that need to understand how RayTreatment Driver Tomo 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 DICOMfeatures 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 Conformance Statement is not supposed to replace validation with other DICOM equipment to ensure proper exchange of intended information. In fact, 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.

3.3.1 Interoperability validation needed

When using RayTreatment Driver Tomo 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.

3.3.2 DICOM revision

The module tables listed in the last two chapters are based on part 3 of the DICOM-standard revision 2009. For extra clarity all attributes in the referenced modules have been listed, even the ones that are not used by Tomo.

3.4 TERMS AND DEFINITIONS

Informal definitions are provided for the following terms used in this Conformance Statement. The DICOM Standard is the authoritative source for formal definitons of these terms.

Abstract Syntax – the information agreed to be exchanged between applications, generally equivalent to a Service/Object Pair (SOP) Class. Examples : Verification SOP Class, Modality Worklist Information Model Find SOP Class, Computed Radiography Image Storage SOP Class.

Application Entity (AE) – an end point of a DICOM information exchange, including the DICOM network or media interface software; i.e., the software that sends or receives DICOM information objects or messages. A single device may have multiple Application Entities.

Application Entity Title – the externally known name of an Application Entity, used to identify a DICOM application to other DICOM applications on the network.

Application Context – the specification of the type of communication used between Application Entities. Example: DICOM network protocol.

Association – a network communication channel set up between Application Entities.

Attribute – a unit of information in an object definition; a data element identified by a tag. The information may be a complex data structure (Sequence), itself composed of lower level data elements. Examples: Patient ID (0010,0020), Accession Number (0008,0050), Photometric Interpretation (0028,0004), Procedure Code Sequence (0008,1032).

Information Object Definition (IOD) – the specified set of Attributes that comprise a type of data object; does not represent a specific instance of the data object, but rather a class of similar data objects that have the same properties. The Attributes may be specified as Mandatory (Type 1), Required but possibly unknown (Type 2),

or Optional (Type 3), and there may be conditions associated with the use of an Attribute (Types 1C and 2C). Examples: MR Image IOD, CT Image IOD, Print Job IOD.

Joint Photographic Experts Group (JPEG) – a set of standardized image compression techniques, available for use by DICOM applications.

Module – a set of Attributes within an Information Object Definition that are logically related to each other. Example: Patient Module includes Patient Name, Patient ID, Patient Birth Date, and Patient Sex.

Negotiation – first phase of Association establishment that allows Application Entities to agree on the types of data to be exchanged and how that data will be encoded.

Protocol Data Unit (PDU) – a packet (piece) of a DICOM message sent across the network. Devices must specify the maximum size packet they can receive for DICOM messages.

Service Class Provider (SCP) – role of an Application Entity that provides a DICOM network service; typically, a server that performs operations requested by another Application Entity (Service Class User). Examples: Picture Archiving and Communication System (image storage SCP, and image query/retrieve SCP), Radiology Information System (modality worklist SCP).

Service Class User (SCU) – role of an Application Entity that uses a DICOM network service; typically, a client. Examples: imaging modality (image storage SCU, and modality worklist SCU), imaging workstation (image query/retrieve SCU)

Service/Object Pair (SOP) Class – the specification of the network or media transfer (service) of a particular type of data (object); the fundamental unit of DICOM interoperability specification. Examples: Ultrasound Image Storage Service, Basic Grayscale Print Management.

Service/Object Pair (SOP) Instance – an information object; a specific occurrence of information exchanged in a SOP Class. Examples: a specific x-ray image.

Tag – a 32-bit identifier for a data element, represented as a pair of four digit hexadecimal numbers, the "group" and the "element". If the "group" number is odd, the tag is for a private (manufacturer-specific) data element. Examples: (0010,0020) [Patient ID], (07FE,0010) [Pixel Data], (0019,0210) [private data element]

Transfer Syntax – the encoding used for exchange of DICOM information objects and messages. Examples: JPEG compressed (images), little endian explicit value representation.

Unique Identifier (UID) – a globally unique "dotted decimal" string that identifies a specific object or a class of objects; an ISO-8824 Object Identifier. Examples: Study Instance UID, SOP Class UID, SOP Instance UID.

Value Representation (VR) – the format type of an individual DICOM data element, such as text, an integer, a person's name, or a code. DICOM information objects can be transmitted with either explicit identification of the type of each data element (Explicit VR), or without explicit identification (Implicit VR); with Implicit VR, the receiving application must use a DICOM data dictionary to look up the format of each data element.

3.5 BASICS OF DICOM COMMUNICATION

This section describes terminology used in this Conformance Statement for the non-specialist. This section is not a substitute for training about DICOM, and it makes many simplifications about the meanings of DICOM terms.

Two Application Entities (devices) that want to communicate with each other over a network using DICOM protocol must first agree on several things during an intial network "handshake". One of the two devices must initiate an Association (a connection to the other device), and ask if specific services, information, and encoding can be supported by the other device (Negotiation).

DICOM specifes a number of network services and types of information objects, each of which is called an Abstract Syntax for the Negotiation. DICOM also specifes a variety of methods for encoding data, denoted Transfer Syntaxes. The Negotiation allows the initiating Application Entity to propose combinations of Abstract Syntax and Transfer Syntax to be used on the Association; these combinations are called Presentation Contexts. The receiving Application Entity accepts the Presentation Contexts it supports.

For each Presentation Context, the Association Negotiation also allows the devices to agree on Roles – which one is the Service Class User (SCU - client) and which is the Service Class Provider (SCP - server). Normally the device initiating the connection is the SCU, i.e., the client system calls the server, but not always.

The Association Negotiation finally enables exchange of maximum network packet (PDU) size, security information, and network service options (called Extended Negotiation information). The Application Entities, having negotiated the Association parameters, may now commence exchanging data. Common data exchanges include queries for worklists and lists of stored images, transfer of image objects and analyses (structured reports), and sending images to film printers. Each exchangeable unit of data is formatted by the sender in accordance with the appropriate Information Object Definition, and sent using the negotiated Transfer Syntax. There is a Default Transfer Syntax that all systems must accept, but it may not be the most efficient for some use cases. Each transfer is explicitly acknowledged by the receiver with a Response Status indicating success, failure, or that query or retrieve operations are still in process.

Two Application Entities may also communicate with each other by exchanging media (such as a CD-R). Since there is no Association Negotiation possible, they both use a Media Application Profile that specifies "pre-negotiated" exchange media format, Abstract Syntax, and Transfer Syntax.

3.6 ABBREVIATIONS

Name	Meaning
AE	Application Entity
CT	Computed Tomography
DICOM	Digital Imaging and Communications in Medicine
IHE / IHE-RO	Integrating the Healthcare Enterprise. IHE-RO deals with integrating Radiation Oncology.
IOD	Information Object Definition
JPEG	Joint Photographic Experts Group
MR	Magnetic Resonance Imaging
PACS	Picture Archiving and Communication System
PET	Positron Emission Tomography
PTS	Proton Planning System (used by IBA)
RT	Radiotherapy
SCP	Service Class Provider
SCU	Service Class User
SOP	Service-Object Pair
TDD	Treatment Delivery Device
TMS	Treatment Management System
TPS	Treatment Planning System

3.7 REFERENCES

- NEMA PS3 Digital Imaging and Communications in Medicine (DICOM) Standard, available free at http://medical.nema.org/

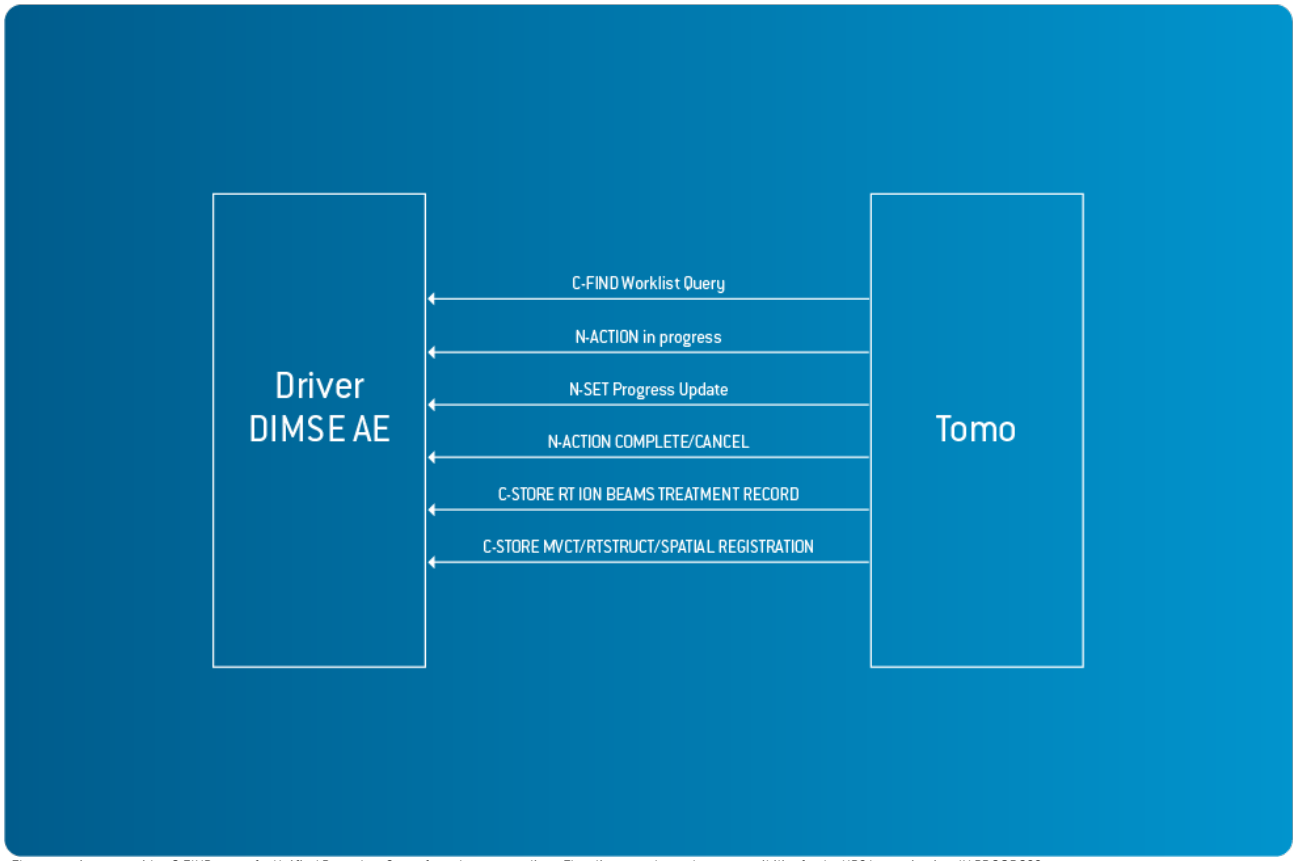
4 NETWORKING

The following diagram illustratesthe application dataflow between RayTreatment Driver Tomo and the specific TDD.

4.1 IMPLEMENTATION MODEL

4.1.1 Application data flow

The following diagram illustrates the application data flow between RayTreatment Driver Tomo and the specific TDD



The scenario starts with a C-FIND query for Unified Procedure Steps from the remote client. The client can then take responsibility for the UPS by setting it to IN PROGRESS. Once the UPS is IN PROGRESS the RayTreatment Driver Tomo only allows requests corresponding to the current session until the session has been completed in the application.

4.1.2 Functional Definition of AEs

4.1.2.1 Functional Definition of "Tomo Application Entity"

The following operations are supported:

CT Image

- C-STORE for setup CT images
- C-MOVE for planning CT images

Spartial Registration (SRO)

- C-STORE for registration between setup and planning images.

RT Image

- C-STORE for setup RT Images.

RT Structure Set

- C-MOVE for planning RT Structure Set.

RT Beams Treatment Record

- C-STORE for delivery result.
- C-MOVE for previous delivered results.

Beams Delivery Instructions

- C-MOVE for BDIs related to the Unified Procedure Step.

Modality Performed Procedrue Step - PULL

- C-FIND for worklist query.
- N-ACTION for UPS status changes.
- N-SET for progress update.

Verification

- C-ECHO for connection verfication

4.1.3 Sequence of Real World Activities

4.1.3.1 Prepare session

Once the patient is checked in to the session, Unified Procedure Steps will be created and available for Worklist queries.

4.1.3.2 Manual cancellation

The procedure step can be canceled by the user in the application. Further requests relation to the session will be rejected.

4.1.3.3 Complete session

All sessions, including canceled sessions, needs to be completed by the user in the application before another session can be started.

4.2 AE SPECIFICATIONS:

4.2.1 Raytratment Driver Tomo Application Entity

4.2.1.1 SOP Classes

SOP Class Name	SOP Class UID	Provider of Service (SCP)	User of Service (SCU)
Transfer			
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Yes	No
RT BeamsTreatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4	Yes	No
Spatial Registration (REG) Storage	1.2.840.10008.5.1.4.1.1.66.1	Yes	No
Query/Retrieve			
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Yes	No
Workflow Management			
Unified Procedure Step - Push SOP Class-Trial (Retired)	1.2.840.10008.5.1.4.34.4.1	Yes	No
Unified Procedure Step - Pull SOP Class-Trial (Retired)	1.2.840.10008.5.1.4.34.4.3	Yes	No
Verification			
Verification SOP Class	1.2.840.10008.1.1	Yes	No

4.2.1.2 Association Policies

Not applicable

4.2.1.3 General

The DICOM standard Application context shall be specified.

Application Context Name	1.2.840.10008.3.1.1.1

The maximum PDU size in not configurable and is set to 16384 for SCU and unlimited for SCP.

4.2.1.4 Number of Associations

Any number of incoming concurrentassociationsare accepted.

4.2.1.5 Asynchronous Nature

RayTreatment Driver Tomo does not support asynchronous communication (multiple outstanding transactions over a single Association).

4.2.1.6 Implementation Identity Information

Not applicable

4.2.1.7 Association Initiation Policy

The implementation for this Application Entity is:

Implementation Class UID	1.3.6.1.4.1.30071.8
Implementation Version Name	fo-dicom 3.0.5

4.2.1.8 Activity C-ECHO

4.2.1.8.1 Description and Sequencing of Activities

A C-ECHO request can always be sent to the Tomo driver.

4.2.1.8.2 Accepted Presentation Context

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax name	Transfer Syntax UID	Role	Extended Negotiation
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		

4.2.1.9 Activity C-FIND

4.2.1.9.1 Description and Sequencing of Activities

Not applicable

4.2.1.9.2 Accepted Presentation Context

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax name	Transfer Syntax UID	Role	Extended Negotiation
Unified Procedure Step - Pull SOP Class - Trial (Retired)	1.2.840.10008.5.1.4.34.4.3	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		

4.2.1.10 Activity C-MOVE

4.2.1.10.1 Description and Sequencing of Activities

Not applicable

4.2.1.10.2 Accepted Presentation Context

RayTreatment Driver Tomo does not support C-MOVE requests.

4.2.1.11 Activity C-STORE

4.2.1.11.1 Description and Sequencing of Activities

Not applicable

4.2.1.11.2 Accepted Presentation Context

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax name	Transfer Syntax UID	Role	Extended Negotiation
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		

4.2.1.11.3 Status Response

Service Status	Further meaning	Error Code	Reason
Failure	Storage Cannot Understand	Cxxx	Cannot find session or validation failed.
	SOP class not supported	0122	SOP class not supported.
Success	Success	0000	

4.2.1.12 Activity N-ACTION

4.2.1.12.1 Description and Sequencing of Activities

Not applicable

4.2.1.12.2 Accepted Presentation Context

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax name	Transfer Syntax UID	Role	Extended Negotiation
Unified Procedure Step - Pull SOP Class - Trial (Retired)	1.2.840.10008.5.1.4.34.4.3	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		

4.2.1.12.3 Status Response

Service Status	Further meaning	Error Code	Reason
Refused	QueryRetrieveUnableToProcess	C000	Unknown SOP Instance UID.
	NoLongerUpdateUps	C300	The UPS may no longer be updated.
	IncorrectTransactionUid	C301	The correct Transaction UID was not provided.
	AlreadyInProgress	C302	The UPS is already IN PROGRESS
	IncorrectTransactionUid	C301	The correct Transaction UID was not provided.
	SopInstanceUidDoesNotExists	C307	Specified SOP Instance UID does not exist or is nota UPS Instancemanaged by this SCP
Failure	AlreadyCanceled	B304	The UPS isalready in the requested state of CANCELED.
	AlreadyCompleted	B306	The UPS isalready in the requested state of COMPLETED.
Success	Success	0000	

4.2.1.13 Activity N-SET

4.2.1.13.1 Description and Sequencing of Activities

Not applicable

4.2.1.13.2 Accepted Presentation Context

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax name	Transfer Syntax UID	Role	Extended Negotiation
Unified Procedure Step - Pull SOP Class - Trial (Retired)	1.2.840.10008.5.1.4.34.4.3	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		

4.2.1.13.3 Status Response

Service Status	Further meaning	Error Code	Reason
Refused	QueryRetrieveUnableToProcess	C000	Unknown SOP Instance UID.
	NoLongerUpdateUps	C300	The UPS may no longer be updated.
	IncorrectTransactionUid	C301	The correct Transaction UID was not provided.
	SopInstanceUidDoesNotExists	C307	Specified SOP Instance UID does not exist or is nota UPS Instancemanaged by this SCP
Success	Success	0000	

5 MEDIA INTERCHANGE

Not applicable

6 TRANSFORMATION OF DICOM TO CDA

Not applicable

7 SUPPORT OF CHARACTER SETS

RayTreatment Driver Tomo support the following charactersets in addition to the default

- ISO_IR 192

8 SECURITY

8.1 SECURITY PROFILES

No Security Profiles are supported.

8.2 ASSOCIATION LEVEL SECURITY

RayTreatment Driver Tomo checks the following values for validation of received Association Open Requests:

- Called AE Title.

8.3 APPLICATION LEVEL SECURITY

None supported.

9 ANNEXES

9.1 IOD CONTENTS

9.1.1 Created SOP Instance(s)

9.1.1.1 RT Plan IOD

IE	Module	Used
Patient	Patient Module	No
Study	General Study Module	No
Series	RT Series Module	No
Equipment	General Equipment Module	No
Plan	RT General Plan Module	No
	RT Beams Module	No
	RT Brachy Application Setups Module	No
	SOP Common Module	No

9.1.1.2 RT Beams Treatment Record IOD

IE	Module	Used
Patient	Patient Module	Yes
Study	General Study Module	Yes
Series	RT Series Module	Yes
Equipment	General Equipment Module	Yes
Treatment Record	RT General Treatment Record Module	Yes
	RT Patient Setup Module	Yes
	RT Treatment Machine Record Module	Yes
	RT Beams Session Record Module	Yes
	SOP Common Module	Yes

9.1.1.2.1 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	

9.1.1.2.2 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	
Study Description	(0008,1030)	LO	3	

9.1.1.2.3 RT Series Module

Attribute name	Tag	Vr	Type	Comment
Modality	(0008,0060)	CS	1	Always RTRECORD.
Series Instance UID	(0020,000E)	UI	1	
Series Number	(0020,0011)	IS	2	
Operators' Name	(0008,1070)	PN	2	

9.1.1.2.4 General Equipment Module

Attribute name	Tag	Vr	Type	Comment
Manufacturer	(0008,0070)	LO	2	
Manufacturer's Model Name	(0008,1090)	LO	3	
Software Version(s)	(0018,1020)	LO	3	

9.1.1.2.5 RT General Treatment Record Module

Attribute name	Tag	Vr	Type	Comment
Instance Number	(0020,0013)	IS	1	
Treatment Date	(3008,0250)	DA	2	
Treatment Time	(3008,0251)	TM	2	
Referenced RT Plan Sequence	(300C,0002)	SQ	2	
>Referenced SOP Class UID	(0008,1150)	UI	1	
>Referenced SOP Instance UID	(0008,1155)	UI	1	
Referenced Treatment Record Sequence	(3008,0030)	SQ	3	
>Referenced SOP Class UID	(0008,1150)	UI	1	
>Referenced SOP Instance UID	(0008,1155)	UI	1	

9.1.1.2.6 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	
>Setup Technique	(300A,01B0)	CS	3	

9.1.1.2.7 RT Treatment Machine Record Module

Attribute name	Tag	Vr	Type	Comment
Treatment Machine Sequence	(300A,0206)	SQ	1	
>Manufacturer	(0008,0070)	LO	2	
>Institution Name	(0008,0080)	LO	2	
>Manufacturer's Model Name	(0008,1090)	LO	2	
>Device Serial Number	(0018,1000)	LO	2	

9.1.1.2.8 RT Beams Session Record Module

Attribute name	Tag	Vr	Type	Comment
Number of Fractions Planned	(300A,0078)	IS	2	
Primary Dosimeter Unit	(300A,00B3)	CS	1	
Treatment Session Beam Sequence	(3008,0020)	SQ	1	
>Referenced Beam Number	(300C,0006)	IS	3	
>Beam Name	(300A,00C2)	LO	3	

>Beam Type	(300A,00C4)	CS	1	
>Radiation Type	(300A,00C6)	CS	1	
>Beam Limiting Device Leaf Pairs Sequence	(3008,00A0)	SQ	1	
>RT Beam Limiting Device Type	(300A,00B8)	CS	1	
>Number of Leaf/Jaw Pairs	(300A,00BC)	IS	1	
>Referenced Patient Setup Number	(300C,006A)	IS	3	
>Number of Wedges	(300A,00D0)	IS	1	
>Number of Compensators	(300A,00E0)	IS	2	
>Number of Boli	(300A,00ED)	IS	2	
>Number of Blocks	(300A,00F0)	IS	2	
>Current Fraction Number	(3008,0022)	IS	2	
>Treatment Delivery Type	(300A,00CE)	CS	2	
>Treatment Termination Status	(3008,002A)	CS	1	
>Treatment Verification Status	(3008,002C)	CS	2	
>Specified Primary Meterset	(3008,0032)	DS	3	
>Delivered Primary Meterset	(3008,0036)	DS	3	
>Number of Control Points	(300A,0110)	IS	1	
>Control Point Delivery Sequence	(3008,0040)	SQ	1	
>Referenced Control Point Index	(300C,00F0)	IS	3	
>Treatment Control Point Date	(3008,0024)	DA	1	
>Treatment Control Point Time	(3008,0025)	TM	1	
>Specified Meterset	(3008,0042)	DS	2	
>Delivered Meterset	(3008,0044)	DS	1	
>Nominal Beam Energy	(300A,0114)	DS	3	
>Wedge Position Sequence	(300A,0116)	SQ	3	
>Referenced Wedge Number	(300C,00C0)	IS	1	
>Wedge Position	(300A,0118)	CS	1	
>Gantry Angle	(300A,011E)	DS	1C	
>Gantry Rotation Direction	(300A,011F)	CS	1C	
>Beam Limiting Device Angle	(300A,0120)	DS	1C	
>Beam Limiting Device Rotation Direction	(300A,0121)	CS	1C	
>Patient Support Angle	(300A,0122)	DS	1C	
>Patient Support Rotation Direction	(300A,0123)	CS	1C	
>Table Top Pitch Angle	(300A,0140)	FL	1C	
>Table Top Pitch Rotation Direction	(300A,0142)	CS	1C	
>Table Top Roll Angle	(300A,0144)	FL	1C	
>Table Top Roll Rotation Direction	(300A,0146)	CS	1C	
>Table Top Vertical Position	(300A,0128)	DS	2C	
>Table Top Longitudinal Position	(300A,0129)	DS	2C	
>Table Top Lateral Position	(300A,012A)	DS	2C	

9.1.1.2.9 SOP Common Module

Attribute name	Tag	Vr	Type	Comment
SOP Class UID	(0008,0016)	UI	1	

SOP Instance UID	(0008,0018)	UI	1	

9.1.1.3 RT Beams Delivery InstructionRETIRED IOD

IE	Module	Used
Patient	Patient Module	Yes
	Clinical Trial Subject Module	No
Study	General Study Module	Yes
	Patient Study Module	No
	Clinical Trial Study Module	No
Series	General Series Module	Yes
	Clinical Trial Series Module	No
Equipment	General Equipment Module	Yes
Plan	RT Beams Delivery Instruction Module	Yes
	Common Instance Reference Module	No
	General Reference Module	No
	SOP Common Module	Yes

9.1.1.3.1 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, F, O.

9.1.1.3.2 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	

9.1.1.3.3 General Series Module

Attribute name	Tag	Vr	Type	Comment
Modality	(0008,0060)	CS	1	Always PLAN.
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	
Series Description	(0008,103E)	LO	3	

9.1.1.3.4 General Equipment Module

Attribute name	Tag	Vr	Type	Comment
Manufacturer	(0008,0070)	LO	2	
Station Name	(0008,1010)	SH	3	

9.1.1.3.5 RT Beams Delivery Instruction Module

Attribute name	Tag	Vr	Type	Comment
Beam Task Sequence	(0074,1020)	SQ	1	
>Beam Task Type	(0074,1022)	CS	1	Always • TREAT - Treat
>Treatment Delivery Type	(300A,00CE)	CS	1	Possible values: TREATMENT, CONTINUATION.
>Continuation Start Meterset	(0074,0120)	FD	1C	
>Continuation End Meterset	(0074,0121)	FD	1C	
>Current Fraction Number	(3008,0022)	IS	1	
>Referenced Beam Number	(300C,0006)	IS	1	
>Table Top Vertical Setup Displacement	(300A,01D2)	DS	2	
>Table Top Longitudinal Setup Displacement	(300A,01D4)	DS	2	
>Table Top Lateral Setup Displacement	(300A,01D6)	DS	2	
>Referenced RT Plan Sequence	(300C,0002)	SQ	3	
>Referenced Series Sequence	(0008,1115)	SQ	1C	
>Series Instance UID	(0020,000E)	UI	1	
>Retrieve AE Title	(0008,0054)	AE		
>Referenced SOP Sequence	(0008,1199)	SQ		
>Referenced SOP Class UID	(0008,1150)	UI	1	
>Referenced SOP Instance UID	(0008,1155)	UI	1	
>Study Instance UID	(0020,000D)	UI	1	
Omitted Beam Task Sequence	(300C,0111)	SQ	3	
>Referenced Beam Number	(300C,0006)	IS	1	
>Reason for Omission	(300C,0112)	CS	1	Always ALREADY_TREATED.

9.1.1.3.6 SOP Common Module

Attribute name	Tag	Vr	Type	Comment
SOP Class UID	(0008,0016)	UI	1	
SOP Instance UID	(0008,0018)	UI	1	
Specific Character Set	(0008,0005)	CS	1C	
Instance Creation Date	(0008,0012)	DA	3	
Instance Creation Time	(0008,0013)	TM	3	

9.1.1.4 Unified Procedure StepRETIRED IOD

IE	Module	Used
Unified Procedure Step	SOP Common Module	Yes
	Unified Procedure Step Relationship Module	Yes
	Unified Procedure Step Scheduled Procedure Information Module	Yes
	Unified Procedure Step Progress Information Module	Yes
	Unified Procedure Step Performed Procedure Information Module	No
	Patient Medical Module	No
	Transaction Module	Yes

9.1.1.4.1 SOP Common Module

Attribute name	Tag	Vr	Type	Comment

SOP Class UID	(0008,0016)	UI	1	
SOP Instance UID	(0008,0018)	UI	1	
Timezone Offset From UTC	(0008,0201)	SH	3	

9.1.1.4.2 Unified Procedure Step Relationship Module

Attribute name	Tag	Vr	Type	Comment
Patient's Name	(0010,0010)	PN		
Patient ID	(0010,0020)	LO		
Patient's Birth Date	(0010,0030)	DA		
Patient's Sex	(0010,0040)	CS		Possible values: • M - Male • F - Female • O - Other
Referenced Request Sequence	(0040,A370)	SQ		
>Requested Procedure Code Sequence	(0032,1064)	SQ		
>Code Value	(0008,0100)	SH	1C	
>Coding Scheme Designator	(0008,0102)	SH	1C	
>Coding Scheme Version	(0008,0103)	SH	1C	
>Code Meaning	(0008,0104)	LO	1	
>Requested Procedure ID	(0040,1001)	SH		

9.1.1.4.3 Unified Procedure Step Scheduled Procedure Information Module

Attribute name	Tag	Vr	Type	Comment
Scheduled Procedure Step Priority	(0074,1200)	CS		Possible values: • HIGH - High • MEDIUM - Medium • LOW - Low
Procedure Step Label	(0074,1204)	LO		
Scheduled Station Name Code Sequence	(0040,4025)	SQ		
>Code Value	(0008,0100)	SH	1C	
>Coding Scheme Designator	(0008,0102)	SH	1C	
>Code Meaning	(0008,0104)	LO	1	
Scheduled Procedure Step Start DateTime	(0040,4005)	DT		
Expected Completion DateTime	(0040,4011)	DT		
Scheduled Workitem Code Sequence	(0040,4018)	SQ		
>Code Value	(0008,0100)	SH	1C	
>Coding Scheme Designator	(0008,0102)	SH	1C	
>Code Meaning	(0008,0104)	LO	1	
Scheduled Processing Parameters Sequence	(0074,1210)	SQ		
>Value Type	(0040,A040)	CS	1	Always • TEXT - Text
>Concept Name Code Sequence	(0040,A043)	SQ	1	
>Code Value	(0008,0100)	SH	1C	
>Coding Scheme Designator	(0008,0102)	SH	1C	
>Code Meaning	(0008,0104)	LO	1	

>Text Value	(0040,A160)	UT	1C	
Input Information Sequence	(0040,4021)	SQ		
>Study Instance UID	(0020,000D)	UI	1	
>Referenced Series Sequence	(0008,1115)	SQ	1C	
>Series Instance UID	(0020,000E)	UI	1	
>Retrieve AE Title	(0008,0054)	AE		
>Referenced SOP Sequence	(0008,1199)	SQ		
>Referenced SOP Class UID	(0008,1150)	UI	1	
>Referenced SOP Instance UID	(0008,1155)	UI	1	
Study Instance UID	(0020,000D)	UI		
Input Availability Flag	(0040,4020)	CS	1	Possible values: • COMPLETE - Complete • INCOMPLETE - Incomplete

9.1.1.4.4 Unified Procedure Step Progress Information Module

Attribute name	Tag	Vr	Type	Comment
Procedure Step State	(0074,1000)	CS		Possible values: • SCHEDULED - Scheduled • IN PROGRESS - In Progress • CANCELED - Canceled • COMPLETED - Completed

9.1.1.4.5 Transaction Module

Attribute name	Tag	Vr	Type	Comment
Transaction UID	(0008,1195)	UI	3	

9.1.2 Usage of Attributes From Received IODs

9.1.2.1 CT Image IOD

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	No
Image	General Image Module	No
	Image Plane Module	No
	Image Pixel Module	No
	Contrast/Bolus Module	No
	CT Image Module	Yes
	SOP Common Module	Yes

9.1.2.1.1 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	

9.1.2.1.2 General Study Module

Attribute name	Tag	Vr	Type	Comment
Study Instance UID	(0020,000D)	UI	1	

9.1.2.1.3 General Series Module

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

9.1.2.1.4 Frame of Reference Module

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

9.1.2.1.5 CT Image Module

Attribute name	Tag	Vr	Type	Comment
Image Type	(0008,0008)	CS	1	
Samples per Pixel	(0028,0002)	US	1	
Photometric Interpretation	(0028,0004)	CS	1	
Bits Allocated	(0028,0100)	US	1	
Bits Stored	(0028,0101)	US	1	
High Bit	(0028,0102)	US	1	
Rescale Intercept	(0028,1052)	DS	1	
Rescale Slope	(0028,1053)	DS	1	
Table Height	(0018,1130)	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	
Table Top Longitudinal Position	(300A,0129)	DS	3	
Table Top Lateral Position	(300A,012A)	DS	3	

9.1.2.1.6 SOP Common Module

Attribute name	Tag	Vr	Type	Comment
SOP Class UID	(0008,0016)	UI	1	
SOP Instance UID	(0008,0018)	UI	1	

9.1.2.2 RT Structure Set IOD

IE	Module	Used
Patient	Patient Module	Yes
Study	General Study Module	Yes
Series	RT Series Module	Yes
Equipment	General Equipment Module	No

Structure Set	Structure Set Module	Yes
	ROI Contour Module	Yes
	RT ROI Observations Module	Yes
	SOP Common Module	Yes

9.1.2.2.1 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	

9.1.2.2.2 General Study Module

Attribute name	Tag	Vr	Type	Comment
Study Instance UID	(0020,000D)	UI	1	

9.1.2.2.3 RT Series Module

Attribute name	Tag	Vr	Type	Comment
Modality	(0008,0060)	CS	1	
Series Instance UID	(0020,000E)	UI	1	

9.1.2.2.4 Structure Set Module

Attribute name	Tag	Vr	Type	Comment
Structure Set Label	(3006,0002)	SH	1	
Referenced Frame of Reference Sequence	(3006,0010)	SQ	3	
>Frame of Reference UID	(0020,0052)	UI	1	
>RT Referenced Study Sequence	(3006,0012)	SQ	3	
>Referenced SOP Class UID	(0008,1150)	UI	1	
>Referenced SOP Instance UID	(0008,1155)	UI	1	
>RT Referenced Series Sequence	(3006,0014)	SQ	1	
>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	
Structure Set ROI Sequence	(3006,0020)	SQ	1	

9.1.2.2.5 ROI Contour Module

Attribute name	Tag	Vr	Type	Comment
ROI Contour Sequence	(3006,0039)	SQ	1	
>Referenced ROI Number	(3006,0084)	IS	1	
>Contour Sequence	(3006,0040)	SQ	3	
>Contour Geometric Type	(3006,0042)	CS	1	
>Number of Contour Points	(3006,0046)	IS	1	
>Contour Data	(3006,0050)	DS	1	

9.1.2.2.6 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	
>RT ROI Interpreted Type	(3006,00A4)	CS	2	
>ROI Physical Properties Sequence	(3006,00B0)	SQ	3	
>ROI Physical Property	(3006,00B2)	CS	1	
>ROI Physical Property Value	(3006,00B4)	DS	1	

9.1.2.2.7 SOP Common Module

Attribute name	Tag	Vr	Type	Comment
SOP Class UID	(0008,0016)	UI	1	
SOP Instance UID	(0008,0018)	UI	1	

9.1.2.3 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	No
Plan	RT General Plan Module	Yes
	RT Patient Setup Module	Yes
	RT Fraction Scheme Module	Yes
	RT Beams Module	Yes
	RT Brachy Application Setups Module	No
	SOP Common Module	Yes

9.1.2.3.1 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	

9.1.2.3.2 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	

9.1.2.3.3 RT Series Module

Attribute name	Tag	Vr	Type	Comment
Modality	(0008,0060)	CS	1	
Series Instance UID	(0020,000E)	UI	1	

9.1.2.3.4 Frame of Reference Module

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

9.1.2.3.5 RT General Plan Module

Attribute name	Tag	Vr	Type	Comment
RT Plan Label	(300A,0002)	SH	1	
RT Plan Geometry	(300A,000C)	CS	1	

9.1.2.3.6 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	
>Setup Technique	(300A,01B0)	CS	3	

9.1.2.3.7 RT Fraction Scheme Module

Attribute name	Tag	Vr	Type	Comment
Fraction Group Sequence	(300A,0070)	SQ	1	
>Fraction Group Number	(300A,0071)	IS	1	
>Number of Fractions Planned	(300A,0078)	IS	2	
>Number of Beams	(300A,0080)	IS	1	
>Number of Brachy Application Setups	(300A,00A0)	IS	1	

9.1.2.3.8 RT Beams Module

Attribute name	Tag	Vr	Type	Comment
Beam Sequence	(300A,00B0)	SQ	1	
>Beam Number	(300A,00C0)	IS	1	
>Beam Name	(300A,00C2)	LO	3	
>Beam Type	(300A,00C4)	CS	1	
>Radiation Type	(300A,00C6)	CS	2	
>Beam Limiting Device Sequence	(300A,00B6)	SQ	1	
>Treatment Delivery Type	(300A,00CE)	CS	3	
>Number of Wedges	(300A,00D0)	IS	1	
>Number of Compensators	(300A,00E0)	IS	1	
>Number of Boli	(300A,00ED)	IS	1	
>Number of Blocks	(300A,00F0)	IS	1	
>Number of Control Points	(300A,0110)	IS	1	
>Control Point Sequence	(300A,0111)	SQ	1	
>Control Point Index	(300A,0112)	IS	1	
>Nominal Beam Energy	(300A,0114)	DS	3	
>Gantry Angle	(300A,011E)	DS	1C	
>Gantry Rotation Direction	(300A,011F)	CS	1C	
>Beam Limiting Device Angle	(300A,0120)	DS	1C	
>Beam Limiting Device Rotation Direction	(300A,0121)	CS	1C	
>Patient Support Angle	(300A,0122)	DS	1C	
>Patient Support Rotation Direction	(300A,0123)	CS	1C	

>Table Top Pitch Angle	(300A,0140)	FL	1C	
>Table Top Pitch Rotation Direction	(300A,0142)	CS	1C	
>Table Top Roll Angle	(300A,0144)	FL	1C	
>Table Top Roll Rotation Direction	(300A,0146)	CS	1C	
>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	

9.1.2.3.9 SOP Common Module

Attribute name	Tag	Vr	Type	Comment
SOP Class UID	(0008,0016)	UI	1	
SOP Instance UID	(0008,0018)	UI	1	

9.1.2.4 RT Beams Treatment Record IOD

IE	Module	Used
Patient	Patient Module	Yes
Study	General Study Module	Yes
Series	RT Series Module	Yes
Equipment	General Equipment Module	No
Treatment Record	RT General Treatment Record Module	Yes
	RT Patient Setup Module	Yes
	RT Treatment Machine Record Module	Yes
	RT Beams Session Record Module	Yes
	SOP Common Module	Yes

9.1.2.4.1 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	

9.1.2.4.2 General Study Module

Attribute name	Tag	Vr	Type	Comment
Study Instance UID	(0020,000D)	UI	1	

9.1.2.4.3 RT Series Module

Attribute name	Tag	Vr	Type	Comment
Modality	(0008,0060)	CS	1	
Series Instance UID	(0020,000E)	UI	1	

9.1.2.4.4 RT General Treatment Record Module

Attribute name	Tag	Vr	Type	Comment
Instance Number	(0020,0013)	IS	1	
Treatment Date	(3008,0250)	DA	2	
Treatment Time	(3008,0251)	TM	2	

Referenced RT Plan Sequence	(300C,0002)	SQ	2	
>Referenced SOP Class UID	(0008,1150)	UI	1	
>Referenced SOP Instance UID	(0008,1155)	UI	1	

9.1.2.4.5 RT Patient Setup Module

Attribute name	Tag	Vr	Type	Comment
Patient Setup Sequence	(300A,0180)	SQ	1	
>Patient Setup Number	(300A,0182)	IS	1	

9.1.2.4.6 RT Treatment Machine Record Module

Attribute name	Tag	Vr	Type	Comment
Treatment Machine Sequence	(300A,0206)	SQ	1	

9.1.2.4.7 RT Beams Session Record Module

Attribute name	Tag	Vr	Type	Comment
Primary Dosimeter Unit	(300A,00B3)	CS	1	
Treatment Session Beam Sequence	(3008,0020)	SQ	1	
>Referenced Beam Number	(300C,0006)	IS	3	
>Beam Name	(300A,00C2)	LO	3	
>Beam Type	(300A,00C4)	CS	1	
>Radiation Type	(300A,00C6)	CS	1	
>Beam Limiting Device Leaf Pairs Sequence	(3008,00A0)	SQ	1	
>Number of Wedges	(300A,00D0)	IS	1	
>Current Fraction Number	(3008,0022)	IS	2	
>Treatment Delivery Type	(300A,00CE)	CS	2	
>Treatment Termination Status	(3008,002A)	CS	1	
>Specified Primary Meterset	(3008,0032)	DS	3	
>Specified Secondary Meterset	(3008,0033)	DS	3	
>Delivered Primary Meterset	(3008,0036)	DS	3	
>Delivered Secondary Meterset	(3008,0037)	DS	3	
>Specified Treatment Time	(3008,003A)	DS	3	
>Delivered Treatment Time	(3008,003B)	DS	3	
>Number of Control Points	(300A,0110)	IS	1	
>Control Point Delivery Sequence	(3008,0040)	SQ	1	
>Treatment Control Point Date	(3008,0024)	DA	1	
>Treatment Control Point Time	(3008,0025)	TM	1	
>Delivered Meterset	(3008,0044)	DS	1	
>Gantry Angle	(300A,011E)	DS	1C	
>Patient Support Angle	(300A,0122)	DS	1C	
>Table Top Pitch Angle	(300A,0140)	FL	1C	
>Table Top Roll Angle	(300A,0144)	FL	1C	
>Table Top Vertical Position	(300A,0128)	DS	2C	
>Table Top Longitudinal Position	(300A,0129)	DS	2C	
>Table Top Lateral Position	(300A,012A)	DS	2C	
>Tomo Registration	(300D,0010)	LO	3	TOMO_HA_01
>Tomo Registration Translation	(300D,10B0)	DS	3	

>Tomo Registration Rotation	(300D,10B1)	DS	3	
>Tomo bug Hi art 3.6.1	(300D,0010)	LO	3	LO
>Tomo Registration Translation Bug	(300D,10B0)	DS	3	
>Tomo Registration Rotation Bug	(300D,10B1)	SH	3	

9.1.2.4.8 SOP Common Module

Attribute name	Tag	Vr	Type	Comment
SOP Class UID	(0008,0016)	UI	1	
SOP Instance UID	(0008,0018)	UI	1	

9.1.2.5 Spatial Registration IOD

IE	Module	Used
Patient	Patient Module	Yes
Study	General Study Module	Yes
Series	General Series Module	Yes
	Spatial Registration Series Module	No
Frame of Reference	Frame of Reference Module	Yes
Equipment	General Equipment Module	No
Spatial Registration	Spatial Registration Module	Yes
	Common Instance Reference Module	No
	SOP Common Module	Yes

9.1.2.5.1 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	

9.1.2.5.2 General Study Module

Attribute name	Tag	Vr	Type	Comment
Study Instance UID	(0020,000D)	UI	1	

9.1.2.5.3 General Series Module

Attribute name	Tag	Vr	Type	Comment
Modality	(0008,0060)	CS	1	
Series Instance UID	(0020,000E)	UI	1	
Patient Position	(0018,5100)	CS	2C	

9.1.2.5.4 Frame of Reference Module

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

9.1.2.5.5 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	
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	
>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	

9.1.2.5.6 SOP Common Module

Attribute name	Tag	Vr	Type	Comment
SOP Class UID	(0008,0016)	UI	1	
SOP Instance UID	(0008,0018)	UI	1	

9.1.2.6 RT Beams Delivery InstructionRETIRED IOD

IE	Module	Used
Patient	Patient Module	No
	Clinical Trial Subject Module	No
Study	General Study Module	Yes
	Patient Study Module	No
	Clinical Trial Study Module	No
Series	General Series Module	Yes
	Clinical Trial Series Module	No
Equipment	General Equipment Module	No
Plan	RT Beams Delivery Instruction Module	Yes
	Common Instance Reference Module	No
	General Reference Module	No
	SOP Common Module	Yes

9.1.2.6.1 General Study Module

Attribute name	Tag	Vr	Type	Comment
Study Instance UID	(0020,000D)	UI	1	

9.1.2.6.2 General Series Module

Attribute name	Tag	Vr	Type	Comment
Modality	(0008,0060)	CS	1	
Series Instance UID	(0020,000E)	UI	1	

9.1.2.6.3 RT Beams Delivery Instruction Module

Attribute name	Tag	Vr	Type	Comment
Beam Task Sequence	(0074,1020)	SQ	1	
>Beam Task Type	(0074,1022)	CS	1	
>Treatment Delivery Type	(300A,00CE)	CS	1	Supported values: TREATMENT, CONTINUATION.
>Continuation Start Meterset	(0074,0120)	FD	1C	

>Continuation End Meterset	(0074,0121)	FD	1C	
>Current Fraction Number	(3008,0022)	IS	1	
>Referenced Beam Number	(300C,0006)	IS	1	
Omitted Beam Task Sequence	(300C,0111)	SQ	3	
>Referenced Beam Number	(300C,0006)	IS	1	
>Reason for Omission	(300C,0112)	CS	1	

9.1.2.6.4 SOP Common Module

Attribute name	Tag	Vr	Type	Comment
SOP Class UID	(0008,0016)	UI	1	
SOP Instance UID	(0008,0018)	UI	1	

9.1.2.7 Unified Procedure StepRETIRED IOD

IE	Module	Used
Unified Procedure Step	SOP Common Module	Yes
	Unified Procedure Step Relationship Module	Yes
	Unified Procedure Step Scheduled Procedure Information Module	Yes
	Unified Procedure Step Progress Information Module	Yes
	Unified Procedure Step Performed Procedure Information Module	No
	Patient Medical Module	No
	Transaction Module	Yes

9.1.2.7.1 SOP Common Module

Attribute name	Tag	Vr	Type	Comment
SOP Class UID	(0008,0016)	UI	1	
SOP Instance UID	(0008,0018)	UI	1	
Timezone Offset From UTC	(0008,0201)	SH	3	

9.1.2.7.2 Unified Procedure Step Relationship Module

Attribute name	Tag	Vr	Type	Comment
Patient's Name	(0010,0010)	PN		
Patient ID	(0010,0020)	LO		

9.1.2.7.3 Unified Procedure Step Scheduled Procedure Information Module

Attribute name	Tag	Vr	Type	Comment
Scheduled Station Name Code Sequence	(0040,4025)	SQ		
>Code Value	(0008,0100)	SH	1C	
>Coding Scheme Designator	(0008,0102)	SH	1C	
>Code Meaning	(0008,0104)	LO	1	
Scheduled Procedure Step Start DateTime	(0040,4005)	DT		
Scheduled Workitem Code Sequence	(0040,4018)	SQ		
>Code Value	(0008,0100)	SH	1C	
>Coding Scheme Designator	(0008,0102)	SH	1C	
>Code Meaning	(0008,0104)	LO	1	
Study Instance UID	(0020,000D)	UI		
Input Availability Flag	(0040,4020)	CS	1	

9.1.2.7.4 Unified Procedure Step Progress Information Module

Attribute name	Tag	Vr	Type	Comment
Procedure Step State	(0074,1000)	CS		
Procedure Step Progress Information Sequence	(0074,1002)	SQ		
>Procedure Step Progress	(0074,1004)	DS		
>Procedure Step Progress Description	(0074,1006)	ST		

9.1.2.7.5 Transaction Module

Attribute name	Tag	Vr	Type	Comment
Transaction UID	(0008,1195)	UI	3	

9.1.3 Attribute Mapping

Not applicable

9.1.4 Coerced/Modified Fields

Not applicable

9.2 DATA DICTIONARY OF PRIVATE ATTRIBUTES

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

Attribute name	Tag	VR	VM	Value
Tomo Registration	(300D,0010)	LO	1	TOMO_HA_01
Tomo bug Hi art 3.6.1	(300D,0010)	LO	1	LO

9.3 CODE TERMINOLOGY AND TEMPLATES

Not applicable

9.4 GRAYSCALE IMAGE CONSISTENCY

Not applicable

9.5 STANDARD EXTENDED/SPECIALIZED/PRIVATE SOP CLASSES

9.5.1 Standard extended SOP Class

9.5.2 Specialized SOP Class

Not applicable

9.5.3 Private SOP Class

Not applicable

9.6 PRIVATE TRANSFER SYNTAXES

Not applicable

CONTACT INFORMATION

RaySearch Laboratories AB (publ) - Head office
P.O. Box 3297
SE-103 65 Stockholm, Sweden
Phone: +46 8 510 530 00
Fax: +46 8 510 530 30

Visiting address:
Sveavägen 44
SE-111 34 Stockholm, Sweden
info@raysearchlabs.com
www.raysearchlabs.com

RaySearch Americas
Phone: +1 877 778 3849

RaySearch Belgium
Phone: +32 2 213 83 65

RaySearch China
Phone: +86 137 0111 5932

RaySearch France
Phone: +33 975 433 632

RaySearch Germany
Phone: +49 30 89 36 06 90

RaySearch Japan
Phone: +81 3 4405 6902

RaySearch Korea
Phone: +82 10 2230 2046

RaySearch Singapore
Phone: +65 81 28 59 80

RaySearch UK
Phone: +44 7508 426 563

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