RAYCARE v2025 SP1

DICOM Conformance Statement Varian TrueBeam

Declaration of conformity

CE 2862

Complies with Medical Device Regulation (MDR) 2017/745. A copy of the corresponding Declaration of Conformity is available on request.

Safety notices

Warning and caution notices in the user documentation inform about the safe use of the product and must be followed.

WARNING!

A warning notice informs about a risk for bodily harm or death. In most cases, the risk is related to mistreatment of the patient.

CAUTION!

A caution notice informs about a risk for damage to equipment, software or data.

Note: *A note provides additional helpful information, tips or reminders.*

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1 OVERVIEW

This document specifies the DICOM interface for the RaySearch Laboratories RayCare treatment management system driver for use with external treatment delivery devices. The driver can export DICOM data associated with a treatment delivery session to the treatment delivery device, as well accept, validate, and store DICOM data related to patient positioning and treatment delivery results received from the treatment delivery device.

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 Beams Treatment 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
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	Yes	No
Query/Retrieve			
Study Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1	Yes	No
Verification			
Verification SOP Class	1.2.840.10008.1.1	Yes	No

TABLE OF CONTENTS

3 INTRODUCTION

3.1 REVISION HISTORY

Date	Version	Comment
2025-12-08	1.0	Varian TrueBeam Driver DCS for RayCare Release v2025 SP1

3.2 AUDIENCE

This document is written for users that need to understand how the RayCare Varian TrueBeam driver (hereafter referred to simply as "the driver") 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

The scope of this DICOM Conformance Statement is to facilitate integration between the driver and other DICOM products. The Conformance Statement should be read and understood in conjunction with the DICOM Standard. DICOM 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.
- This Conformance Statement shall not replace validation with other DICOM equipment to ensure proper exchange of intended information. In fact, it is the user's responsibility to perform the following validation activities:
    - The comparison of Conformance Statements from the driver and other DICOM conformant equipment is the first step towards assessing interconnectivity and interoperability between those systems.
    - Test procedures shall be defined and executed to validate the required level of interoperability with specific DICOM conformant equipment, as established by the healthcare facility.

RaySearch is also active within the IHE-RO. Contact RaySearch for more information regarding adherence to IHE-RO profiles.

3.3.1 DICOM revision

The module tables listed in the last two chapters are based on part 3 of the DICOM-standard edition 2024c. For extra clarity all attributes in the referenced modules have been listed, even the ones that are not used by the driver.

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 definitions 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.

3.4.1 RayCare specific terminology

Some terminology used in this Conformance Statement refers to internal concepts used within the application. This section contains a description of these terms.

Beam set – Another name for an RT Plan.

TPS plan – refers to an RT Plan or RT Ion Plan as created by a Treatment Planning System, e.g. RayStation.

Delivery plan – refers to an RT Plan or RT Ion Plan generated by the driver. The plan is generated by taking a TPS plan as input and do some modifications/updates to reflect the current state of the plan in RayCare. Examples of modification are updates to dose reference information for nominal dose tracking and setting of absolute table top positions.

Session – A session is one visit of the patient for treatment, typically from when the patient enters the treatment room to when they leave the treatment room. In practice, an Appointment is scheduled for each Treatment Session.

Fraction delivery – One or more Fraction Deliveries are treated during a Session. A fraction delivery entails either a nominal or continuation treatment for a specific RT Plan.

Fraction number – This is referring to the fraction number in the treatment series. A Treatment series can contain different RT Plans.

Fraction number in beam set – The fraction number within a RT Plan.

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 perform a 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 specifies a number of network services and types of information objects, each of which is called an Abstract Syntax for the Negotiation. DICOM also specifies 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
AET	Application Entity Title
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
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 illustrates the application data flow between the driver and the specific TDD.

4.1 IMPLEMENTATION MODEL

4.1.1 Application data flow

Not applicable. The application flow between the driver and the treatment delivery device includes FHIR requests.

4.1.2 Functional Definition of AEs

4.1.2.1 Functional Definition of the driver Application Entity

The driver Application Entity resides on a workstation that is connected to RayCare. It is a Windows Service which starts up when the workstation on which it resides is started and runs continuously until the workstation is shut down or the service is stopped via services management console. The driver waits for a remote Application Entity to request an association. The driver Application Entity (RAYSEARCH_TX) accepts the association if the proposed context is valid and supported. The driver waits for C-ECHO, C-FIND, N-ACTION, C-STORE and N-SET commands from the remote Application Entity. The associations are maintained by the driver until the remote Application Entity initiates the release process or an abort. The following operations are supported:

CT Image

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

RT Structure Set

- C-MOVE for planning RT Structure Set.

Spartial Registration (SRO)

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

RT Image

- C-STORE for setup RT Images.

RT Plan

- C-STORE of RT Plan with changes made during treatment.
- C-MOVE for RT Plan referenced in the Procedure Request.

RT Beams Treatment Record

- C-STORE of delivery result.
- C-FIND for previously delivered Treatment Records for a specific plan and fraction number.

RT Treatment Summary Record

- C-MOVE for the treatment summary record for the current plan to be delivered.

Verification

- C-ECHO for connection verification.

4.1.3 Sequence of Real World Activities

4.1.3.1 Prepare session

FHIR communication is used to list available appointments and to open a session on the VTI.

4.1.3.2 Session delivery

The driver Application Entity does not control the sequence, but it expects the requests to be sent in a certain order. The different activities and their sequencing are described below.

1. C-MOVE to get delivery plan (RT Plan)
    - Options: can be done before or after the encounter is set to *IN PROGRESS*.
    - Request: *Study Root Query/Retrieve Information Model – MOVE*. The following attributes must be included in the request:
        - Query/Retrieve Level (0008,0052) - Needs to be PLAN
        - SOP Instance UID (0008,0018)
    - Response: The requested delivery plan instance
2. C-MOVE to get RT Treatment Summary Record
    - Options: can be done before or after the encounterr is set to *IN PROGRESS*.
    - Request: *Study Root Query/Retrieve Information Model – MOVE*. The following attributes must be included in the request:
        - Query/Retrieve Level (0008,0052) - Needs to be TREATMENTSUMREC
        - SOP Instance UID (0008,0018)
    - Response: The requested RT Treatment Summary Record instance
3. C-FIND to get RT Beams Treatment Record for previous deliveries
    - Options: can be done before or after the encounter is set to *IN PROGRESS*.
    - Request: *Study Root Query/Retrieve Information Model – FIND*. The following attributes must be included in the request:
        - Query/Retrieve Level (0008,0052) - Needs to be TREATMENTRECORD
        - SOP Instance UID (0008,0018)
    - Response: The requested Treatment Record instance
4. C-MOVE to Structure Set
    - Options: can be done before or after the encounter is set to *IN PROGRESS*.
    - Request: *Study Root Query/Retrieve Information Model – MOVE*. The following attributes must be included in the request:
        - Query/Retrieve Level (0008,0052) - Needs to be IMAGE
        - Sop Instance UID (0008,0018)
    - Response: All instances in the requested image series
5. C-MOVE to images
    - Options: can be done before or after the encounter is set to *IN PROGRESS*.
    - Request: *Study Root Query/Retrieve Information Model – MOVE*. The following attributes must be included in the request:
        - Query/Retrieve Level (0008,0052) - Needs to be IMAGE
        - Series Instance UID (0008,0018)
    - Response: All instances in the requested image series
6. C-MOVE to get other items.
    - Options: can be done before or after the encounter is set to *IN PROGRESS*.
    - Request: *Study Root Query/Retrieve Information Model – MOVE*.
        - Query/Retrieve Level (0008,0052) - Needs to be IMAGE
        - SOP Instance UID (0008,0018)
    - Response: The requested instance
7. C-STORE of delivery artifacts can be sent at any time. Other delivery artifacts than the ones listed below can be sent to the driver. They will be forwarded to the RayCare PACS but they will not be linked to the session. The following artifacts can be stored and linked to session delivery:
    - CT Image Storage
    - RT Image Storage
    - Spatial Registration Storage
    - RT Beams Treatment Record Storage

4.1.3.3 Manual cancellation

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

4.1.3.4 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 FUNCTIONAL DEFINITION OF AE:

4.2.1 Driver 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 Beams Treatment 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
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	Yes	No
Query/Retrieve			
Study Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1	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

4.2.1.4 Number of Associations

Any number of incoming concurrent associations are accepted.

4.2.1.5 Asynchronous Nature

The driver 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	1.2.752.243.2
Implementation Version Name	fo-dicom 5.1.3

4.2.1.8 Accepted Transfer Syntaxes

The Transfer Syntaxes accepted for each activity is described in the respective section below. Other Transfer Syntaxes might be supported. For questions about other supported values, please contact RaySearch Laboratories.

Activity C-ECHO

4.2.1.8.1 Description and Sequencing of Activities

See C-ECHO in the DICOM standard, PS3.7 Chapter 9 http://dicom.nema.org/medical/dicom/current/output/chtml/part07/chapter_9.html

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		

4.2.1.9 Activity C-FIND

4.2.1.9.1 Description and Sequencing of Activities

See C-FIND in the DICOM standard, PS3.7 Chapter 9 http://dicom.nema.org/medical/dicom/current/output/chtml/part07/chapter_9.html

4.2.1.9.2 Accepted Presentation Context

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax name	Transfer Syntax UID	Role	Extended Negotiation
Study Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

4.2.1.10 Activity C-MOVE

4.2.1.10.1 Description and Sequencing of Activities

See C-MOVE in the DICOM standard, PS3.7 Chapter 9 http://dicom.nema.org/medical/dicom/current/output/chtml/part07/chapter_9.html

4.2.1.10.2 Accepted Presentation Context

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax name	Transfer Syntax UID	Role	Extended Negotiation
Study Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

4.2.1.11 Activity C-STORE

4.2.1.11.1 Description and Sequencing of Activities

The driver accepts storage requests for any artifacts created during a treatment. All received datasets will be archived in the RayCare PACS by the driver. For the SOP Classes listed in the table below, the datasets will also be linked to the current session delivery.

See C-STORE in the DICOM standard, PS3.7 Chapter 9
http://dicom.nema.org/medical/dicom/current/output/chtml/part07/chapter_9.html

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		
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
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		

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		
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		

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	

4.3 NETWORK INTERFACES

4.3.1 Physical Network Interface

The application is indifferent to the physical medium over which TCP/IP executes, which is dependent on the underlying operating system and hardware.

4.3.2 Additional protocols

None.

4.3.3 IPv4 and IPv6 Support

The driver supports both IPv4 and IPv6. It does not utilize any of the optional configuration identification or security features of IPv6.

4.3.4 Configuration

All configuration is performed with configuration files stored at the installation location. More information about the configuration can be found in the driver installation instructions.

5 MEDIA INTERCHANGE

Not applicable

6 TRANSFORMATION OF DICOM TO CDA

Not applicable

7 SUPPORT OF CHARACTER SETS

The driver supports the following character sets in addition to the default.

- ISO_IR 192

For instances created by the driver, the possible Specific Character Set values are defined in the Created SOP Instance(s) section.

For use cases where the driver only acts as a proxy for the RayCare PACS, character set handling is done according to the RayCare PACS DICOM Conformance Statement.

8 SECURITY

It is the responsibility of the clinic to ensure that the environment where the driver is running is secure. It is assumed that a secured environment includes at a minimum:

- Firewall or router protections to ensure that only approved external hosts have network access to the driver.
- Firewall and router protections to ensure that the driver only has access to approved external hosts and services.
- Any communication with external hosts and services outside the locally secured environment use appropriate secure network channels (e.g. such as a Virtual Private Network (VPN)).

8.1 SECURITY PROFILES

No Security Profiles are supported.

8.2 ASSOCIATION LEVEL SECURITY

The driver 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

Delivery plan is created based on TPS plan. The attributes below are modified when the delivery plan is 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
Plan	RT General Plan Module	Yes
	RT Prescription Module	Yes
	RT Tolerance Tables 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

9.1.1.1.1 Patient Module

Attribute name	Tag	Vr	Type	Comment
Patient's Name	(0010,0010)	PN	2	Only read. Not updated.
Patient ID	(0010,0020)	LO	2	Only read. Not updated.
Patient's Birth Date	(0010,0030)	DA	2	Only read. Not updated.
Patient's Sex	(0010,0040)	CS	2	Only read. Not updated. Supported values: • M - Male • F - Female • O - Other

9.1.1.1.2 General Study Module

Attribute name	Tag	Vr	Type	Comment
Study Instance UID	(0020,000D)	UI	1	Only read. Not updated.

9.1.1.1.3 RT Series Module

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

Series Instance UID	(0020,000E)	UI	1	A new UID is generated where ".200" is appended to the Series Instance UID of the TPS plan.
Series Number	(0020,0011)	IS	2	
Series Date	(0008,0021)	DA	3	
Series Time	(0008,0031)	TM	3	
Series Description	(0008,103E)	LO	3	"Delivery plan" is prepended to the series description of the TPS plan.
Operators' Name	(0008,1070)	PN	2	

9.1.1.1.4 Frame of Reference Module

Attribute name	Tag	Vr	Type	Comment
Frame of Reference UID	(0020,0052)	UI	1	Only read. Not updated.

9.1.1.1.5 General Equipment Module

Attribute name	Tag	Vr	Type	Comment
Software Versions	(0018,1020)	LO	3	

9.1.1.1.6 RT General Plan Module

Attribute name	Tag	Vr	Type	Comment
Plan Intent	(300A,000A)	CS	3	For QA sessions the value is set to VERIFICATION. For treatment sessions the value is not modified. Supported values: VERIFICATION, CURATIVE, PALLIATIVE, PROPHYLACTIC, MACHINE_QA, RESEARCH, SERVICE.
Referenced Structure Set Sequence	(300C,0060)	SQ	1C	
>Referenced SOP Instance UID	(0008,1155)	UI	1	Only read. Not updated.
Referenced RT Plan Sequence	(300C,0002)	SQ	3	Contains reference to TPS plan.
>Referenced SOP Class UID	(0008,1150)	UI	1	
>Referenced SOP Instance UID	(0008,1155)	UI	1	
>RT Plan Relationship	(300A,0055)	CS	1	Supported values: PREDECESSOR, VERIFIED_PLAN.
Varian Medical Systems	(3253,0010)	LO	3	Varian Medical Systems VISION 3253
Extended Interface Data	(3253,1000)	LT	3	XML data
Extended Interface Length	(3253,1001)	IS	3	Data length of the XML in Extended Interface Data
Extended Interface Format	(3253,1002)	CS	3	Extended Interface Format tag Supported value: ExtendedIF.

9.1.1.1.7 RT Prescription Module

Attribute name	Tag	Vr	Type	Comment
Dose Reference Sequence	(300A,0010)	SQ	3	
>Dose Reference Number	(300A,0012)	IS	1	
>Dose Reference UID	(300A,0013)	UI	3	
>Dose Reference Description	(300A,0016)	LO	3	Only read. Not updated.
>Dose Reference Type	(300A,0020)	CS	1	Supported values: TARGET, ORGAN_AT_RISK.
>Delivery Maximum Dose	(300A,0023)	DS	3	

>Target Prescription Dose	(300A,0026)	DS	3	Updated with the nominal beam set dose specified in RayCare.
>Target Maximum Dose	(300A,0027)	DS	3	
>Organ at Risk Maximum Dose	(300A,002C)	DS	3	

9.1.1.1.8 RT Tolerance Tables Module

Attribute name	Tag	Vr	Type	Comment
Tolerance Table Sequence	(300A,0040)	SQ	3	At least one tolerance table must exist. Can either be as defined in TPS plan or as defined in RayCare.
>Tolerance Table Number	(300A,0042)	IS	1	Always set to '1'.
>Tolerance Table Label	(300A,0043)	SH	3	
>Gantry Angle Tolerance	(300A,0044)	DS	3	
>Beam Limiting Device Angle Tolerance	(300A,0046)	DS	3	
>Beam Limiting Device Tolerance Sequence	(300A,0048)	SQ	3	
>>RT Beam Limiting Device Type	(300A,00B8)	CS	1	Supported values: X, Y, ASYMX, ASYMY, MLCX, MLCY.
>>Beam Limiting Device Position Tolerance	(300A,004A)	DS	1	
>Patient Support Angle Tolerance	(300A,004C)	DS	3	
>Table Top Eccentric Angle Tolerance	(300A,004E)	DS	3	
>Table Top Pitch Angle Tolerance	(300A,004F)	FL	3	
>Table Top Roll Angle Tolerance	(300A,0050)	FL	3	
>Table Top Vertical Position Tolerance	(300A,0051)	DS	3	
>Table Top Longitudinal Position Tolerance	(300A,0052)	DS	3	
>Table Top Lateral Position Tolerance	(300A,0053)	DS	3	

9.1.1.1.9 RT Patient Setup Module

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

9.1.1.1.10 RT Fraction Scheme Module

Attribute name	Tag	Vr	Type	Comment
Fraction Group Sequence	(300A,0070)	SQ	1	
>Number of Fractions Planned	(300A,0078)	IS	2	
>Referenced Beam Sequence	(300C,0004)	SQ	1C	
>>Referenced Beam Number	(300C,0006)	IS	1	Only read. Not updated.
>>Beam Meterset	(300A,0086)	DS	3	Only read. Not updated.

9.1.1.1.11 RT Beams Module

Attribute name	Tag	Vr	Type	Comment
Beam Sequence	(300A,00B0)	SQ	1	
>Beam Number	(300A,00C0)	IS	1	Only read. Not updated.
>Beam Name	(300A,00C2)	LO	3	Only read. Not updated.
>Primary Dosimeter Unit	(300A,00B3)	CS	3	Only read. Not updated. Supported values: MU, MINUTE.
>Referenced Tolerance Table Number	(300C,00A0)	IS	3	Always set to '1'.
>Source-Axis Distance	(300A,00B4)	DS	3	
>Referenced Patient Setup Number	(300C,006A)	IS	3	Only read. Not updated.
>Referenced Reference Image Sequence	(300C,0042)	SQ	3	
>>Referenced SOP Instance UID	(0008,1155)	UI	1	
>Planned Verification Image Sequence	(300A,00CA)	SQ	3	
>>RT Image Plane	(3002,000C)	CS	3	Supported value: NORMAL.
>>RT Image Position	(3002,0012)	DS	3	
>>RT Image SID	(3002,0026)	DS	3	
>>Imaging Device-Specific Acquisition Parameters	(300A,00CC)	LO	3	
>Treatment Delivery Type	(300A,00CE)	CS	3	Only read. Not updated. Supported values: TREATMENT, OPEN_PORTFILM, SETUP, CONTINUATION, TRMT_PORTFILM.
>Number of Wedges	(300A,00D0)	IS	1	Only read. Not updated.
>Number of Boli	(300A,00ED)	IS	1	Only read. Not updated.
>Referenced Bolus Sequence	(300C,00B0)	SQ	1C	Only read and displayed in Treat UI. Not updated.
>>Referenced ROI Number	(3006,0084)	IS	1	
>>Bolus ID	(300A,00DC)	SH	3	
>Applicator Sequence	(300A,0107)	SQ	3	
>>Applicator ID	(300A,0108)	SH	1	Only read. Not updated.
>>Applicator Description	(300A,010A)	LO	3	Only read. Not updated.
>General Accessory Sequence	(300A,0420)	SQ	3	
>>General Accessory ID	(300A,0421)	SH	1	Only read. Not updated.
>>General Accessory Description	(300A,0422)	ST	3	Only read. Not updated.
>>General Accessory Type	(300A,0423)	CS	3	Only read. Not updated. Supported values: GRATICULE, IMAGE_DETECTOR, RETICLE.
>Control Point Sequence	(300A,0111)	SQ	1	
>>Control Point Index	(300A,0112)	IS	1	Only read. Not updated.
>>Dose Rate Set	(300A,0115)	DS	3	Only read. Not updated.
>>Gantry Angle	(300A,011E)	DS	1C	Only read. Not updated.

>>Beam Limiting Device Angle	(300A,0120)	DS	1C	Only read. Not updated.
>>Patient Support Angle	(300A,0122)	DS	1C	Only read. Not updated.
>>Table Top Pitch Angle	(300A,0140)	FL	1C	Only read. Not updated.
>>Table Top Roll Angle	(300A,0144)	FL	1C	Only read. Not updated.
>>Table Top Vertical Position	(300A,0128)	DS	2C	Set to delivery table top position defined in RayCare for the beam. Only set in first control point.
>>Table Top Longitudinal Position	(300A,0129)	DS	2C	Set to delivery table top position defined in RayCare for the beam. Only set in first control point.
>>Table Top Lateral Position	(300A,012A)	DS	2C	Set to delivery table top position defined in RayCare for the beam. Only set in first control point.
>>Isocenter Position	(300A,012C)	DS	2C	Only read. Not updated.

9.1.1.1.12 SOP Common Module

Attribute name	Tag	Vr	Type	Comment
SOP Class UID	(0008,0016)	UI	1	Copied from TPS plan
SOP Instance UID	(0008,0018)	UI	1	A new UID is generated where ".100" is appended to the SOP Instance UID of the TPS plan.
Instance Creation Date	(0008,0012)	DA	3	
Instance Creation Time	(0008,0013)	TM	3	

9.1.1.2 RT Beams Treatment Record IOD

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

9.1.1.2.1 RT Beams Session Record Module

Attribute name	Tag	Vr	Type	Comment
Treatment Session Beam Sequence	(3008,0020)	SQ	1	
>Varian Medical Systems	(3261,0010)	LO	3	Varian Medical Systems VISION 3261
>Treatment Session Beam Extended Interface	(3261,102A)	OB	3	Extended interface in XML format.

9.1.1.3 RT Treatment Summary 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 Treatment Summary Record Module	Yes
	SOP Common Module	Yes

9.1.1.3.1 Patient Module

Values copied from delivery plan

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

9.1.1.3.2 General Study Module

Values copied from delivery plan

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 RT Series Module

Attribute name	Tag	Vr	Type	Comment
Modality	(0008,0060)	CS	1	Supported value: RTRECORD.
Series Instance UID	(0020,000E)	UI	1	
Series Number	(0020,0011)	IS	2	
Series Date	(0008,0021)	DA	3	Set to local date
Series Time	(0008,0031)	TM	3	Set to local time
Series Description	(0008,103E)	LO	3	
Operators' Name	(0008,1070)	PN	2	

9.1.1.3.4 General Equipment Module

Attribute name	Tag	Vr	Type	Comment
Manufacturer	(0008,0070)	LO	2	Supported value: RaySearch Laboratories.
Station Name	(0008,1010)	SH	3	Set to driver machine name
Manufacturer's Model Name	(0008,1090)	LO	3	Supported value: RayCare.
Device Serial Number	(0018,1000)	LO	3	Always set to '0'
Software Versions	(0018,1020)	LO	3	Will contain current RayCare version

9.1.1.3.5 RT General Treatment Record Module

Attribute name	Tag	Vr	Type	Comment
Instance Number	(0020,0013)	IS	1	Always set to '1'
Treatment Date	(3008,0250)	DA	2	
Treatment Time	(3008,0251)	TM	2	
Referenced RT Plan Sequence	(300C,0002)	SQ	2	Will contain reference to delivery plan
>Referenced SOP Class UID	(0008,1150)	UI	1	
>Referenced SOP Instance UID	(0008,1155)	UI	1	

9.1.1.3.6 RT Treatment Summary Record Module

Attribute name	Tag	Vr	Type	Comment
Current Treatment Status	(3008,0200)	CS	1	Supported value: ON_TREATMENT.
First Treatment Date	(3008,0054)	DA	2	Not set if no previous treatment of the RT Plan
Most Recent Treatment Date	(3008,0056)	DA	2	Not set if no previous treatment of the RT Plan
Fraction Group Summary Sequence	(3008,0220)	SQ	3	Always contains a single item
>Referenced Fraction Group Number	(300C,0022)	IS	3	Always references single Fraction Group of delivery plan.
>Fraction Group Type	(3008,0224)	CS	2	Supported value: EXTERNAL_BEAM.
>Number of Fractions Planned	(300A,0078)	IS	2	Set to number of assigned fractions in RayCare
>Number of Fractions Delivered	(3008,005A)	IS	2	Set to number of delivered fractions (fully delivered or partial) of the referenced RT Plan
>Fraction Status Summary Sequence	(3008,0240)	SQ	3	One item for every delivered fraction (completely delivered or partially delivered) included in sequence
>>Referenced Fraction Number	(3008,0223)	IS	1	
>>Treatment Date	(3008,0250)	DA	2	
>>Treatment Time	(3008,0251)	TM	2	
>>Treatment Termination Status	(3008,002A)	CS	2	Supported values: NORMAL, MACHINE, OPERATOR, UNKNOWN.
Treatment Summary Calculated Dose Reference Sequence	(3008,0050)	SQ	3	One item included for every Dose Reference in the delivery plan
>Referenced Dose Reference Number	(300C,0051)	IS	3	
>Dose Reference Description	(300A,0016)	LO	3	Set to same value as in corresponding RT Plan
>Cumulative Dose to Dose Reference	(3008,0052)	DS	1	Set to contain delivered nominal case dose

Varian Medical Systems	(3265,0010)	LO	3	Varian Medical Systems VISION 3265
Total Number of Fractions	(3265,1000)	SL	3	Total number of Fractions planned for the current plan and all its former plans.
Last Treated Fraction	(3265,1001)	SL	3	The index of the last fraction treated across the current plan and all its former plans. In other words, this tag will always contain the fraction, which was last treated (completely or partially). So it will be the same as in the Fraction Status Summary Sequence (3008,0240) on the last item of the sequence in the tag Referenced Fraction Number (3008,0223), as soon as the sequence is not empty any more (so after the 1st treatment has got at least 1 MU). In case of completing a partial treatment, the plan's current fraction number is equal to Last Treated Fraction (3265, 1001).
Varian Medical Systems	(3259,0010)	LO	3	Varian Medical Systems VISION 3259
Additional Dose Value Sequence	(3259,1000)	SQ	3	Introduces sequence of Actual Session Dose Sequence. The sequence may contain one or more items. Sequence for additional Dose Information to a Reference Point. The ReferencePoint must be connected to Referenced Plan of this TreatmentSummary Record, but also the Dose of other Plans which have the same Reference Point have influence on this values.
>Varian Medical Systems	(3259,0010)	LO	3	Varian Medical Systems VISION 3259
>Actual Session Dose	(3259,1002)	DS	3	Session Dose Delivered of Actual Session Required if Actual Session Dose Sequence is sent.
>Daily Dose	(3259,1004)	DS	3	Daily Dose of current day. Required if Actual Session Dose Sequence is sent.
>Life Time Total Dose	(3259,1006)	DS	3	Total Dose of Reference Point over all Plans. Required if Actual Session Dose Sequence is sent.

9.1.1.3.7 SOP Common Module

Attribute name	Tag	Vr	Type	Comment
SOP Class UID	(0008,0016)	UI	1	Supported value: • 1.2.840.10008.5.1.4.1.1.481.7 - RT Treatment Summary Record Storage
SOP Instance UID	(0008,0018)	UI	1	
Specific Character Set	(0008,0005)	CS	1C	Supported value: ISO_IR 192.
Instance Creation Date	(0008,0012)	DA	3	
Instance Creation Time	(0008,0013)	TM	3	
Timezone Offset From UTC	(0008,0201)	SH	3	

9.1.1.4 RT Beams Delivery Instruction IOD

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

Equipment	General Equipment Module	Yes
Plan	RT Beams Delivery Instruction Module	Yes
	Common Instance Reference Module	No
	SOP Common Module	Yes

9.1.1.4.1 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	Supported values: • M - Male • F - Female • O - Other

9.1.1.4.2 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	

9.1.1.4.3 General Series Module

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

9.1.1.4.4 General Equipment Module

Attribute name	Tag	Vr	Type	Comment
Manufacturer	(0008,0070)	LO	2	Supported value: RaySearch Laboratories.
Station Name	(0008,1010)	SH	3	Set to driver machine name
Manufacturer's Model Name	(0008,1090)	LO	3	Supported value: RayCare.
Device Serial Number	(0018,1000)	LO	3	Always set to '0'

Software Versions	(0018,1020)	LO	3	Contains current RayCare version number

9.1.1.4.5 RT Beams Delivery Instruction Module

Attribute name	Tag	Vr	Type	Comment
Referenced RT Plan Sequence	(300C,0002)	SQ	1	
>Referenced SOP Class UID	(0008,1150)	UI	1	Supported values: • 1.2.840.10008.5.1.4.1.1.481.5 - RT Plan Storage • 1.2.840.10008.5.1.4.1.1.481.8 - RT Ion Plan Storage
>Referenced SOP Instance UID	(0008,1155)	UI	1	
Beam Task Sequence	(0074,1020)	SQ	1	Will contain references to all beams not already treated in the current fraction.
>Beam Task Type	(0074,1022)	CS	1	Set to TREAT for beams with TreatmentDeliveryType TREATMENT. Otherwise set to VERIFY. Supported values: TREAT, VERIFY.
>Treatment Delivery Type	(300A,00CE)	CS	1	Set based on result (record) from last treatment of beam. Supported values: TREATMENT, CONTINUATION.
>Primary Dosimeter Unit	(300A,00B3)	CS	1C	Supported values: MU, MINUTE, NP.
>Continuation Start Meterset	(0074,0120)	FD	1C	
>Continuation End Meterset	(0074,0121)	FD	1C	
>Current Fraction Number	(3008,0022)	IS	1	Populated with "fraction number in beam set".
>Referenced Beam Number	(300C,0006)	IS	1	
Omitted Beam Task Sequence	(300C,0111)	SQ	3	Will contain references to all beams that has already been treated in the current fraction.
>Referenced Beam Number	(300C,0006)	IS	1	
>Reason for Omission	(300C,0112)	CS	1	Supported value: ALREADY_TREATED.

9.1.1.4.6 SOP Common Module

Attribute name	Tag	Vr	Type	Comment
SOP Class UID	(0008,0016)	UI	1	Supported value: • 1.2.840.10008.5.1.4.34.7 - RT Beams Delivery Instruction Storage
SOP Instance UID	(0008,0018)	UI	1	
Specific Character Set	(0008,0005)	CS	1C	Supported value: ISO_IR 192.
Instance Creation Date	(0008,0012)	DA	3	
Instance Creation Time	(0008,0013)	TM	3	

9.1.2 Usage of Attributes From Received IODs

9.1.2.1 CT Image IOD

Storage of CT images created during a session.

IE	Module	Used
Patient	Patient Module	Yes
Study	General Study Module	Yes
Series	General Series Module	Yes
Frame of Reference	Frame of Reference Module	No
	Synchronization Module	No
Equipment	General Equipment Module	No
Acquisition	General Acquisition Module	Yes
Image	General Image Module	No
	General Reference Module	Yes
	Image Plane Module	No
	Image Pixel Module	No
	Contrast/Bolus Module	No
	CT Image Module	Yes
	Multi-energy CT Image Module	No
	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	Supported values: • M - Male • F - Female • O - Other

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	Supported value: CT.
Series Instance UID	(0020,000E)	UI	1	

9.1.2.1.4 General Acquisition Module

Attribute name	Tag	Vr	Type	Comment
Acquisition Date	(0008,0022)	DA	3	
Acquisition Time	(0008,0032)	TM	3	

9.1.2.1.5 General Reference Module

Attribute name	Tag	Vr	Type	Comment
Referenced Instance Sequence	(0008,114A)	SQ	3	
>Referenced SOP Class UID	(0008,1150)	UI	1	Value not read
>Referenced SOP Instance UID	(0008,1155)	UI	1	If reference matches delivery plan, the image will be linked to the session in RayCare.
>Purpose of Reference Code Sequence	(0040,A170)	SQ	1	Value not read

9.1.2.1.6 CT Image Module

Attribute name	Tag	Vr	Type	Comment
Image Type	(0008,0008)	CS	1	Value not read
Samples per Pixel	(0028,0002)	US	1	Value not read
Photometric Interpretation	(0028,0004)	CS	1	Value not read
Bits Allocated	(0028,0100)	US	1	Value not read
Bits Stored	(0028,0101)	US	1	Value not read
High Bit	(0028,0102)	US	1	Value not read
Rescale Intercept	(0028,1052)	DS	1	Value not read
Rescale Slope	(0028,1053)	DS	1	Value not read
Table Height	(0018,1130)	DS	3	
Patient Support Angle	(300A,0122)	DS	3	
Table Top Lateral Position	(300A,012A)	DS	3	
Table Top Longitudinal Position	(300A,0129)	DS	3	
Table Top Pitch Angle	(300A,0140)	FL	3	
Table Top Roll Angle	(300A,0144)	FL	3	

9.1.2.1.7 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	

9.1.2.2 RT Image IOD

IE	Module	Used
Patient	Patient Module	Yes
Study	General Study Module	Yes
Series	RT Series Module	Yes
Equipment	General Equipment Module	No
Acquisition	General Acquisition Module	No
Image	General Image Module	No
	Image Pixel Module	No

Contrast/Bolus Module	No
Cine Module	No
Multi-frame Module	No
RT Image Module	Yes
SOP Common Module	Yes
Frame Extraction Module	No

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	Supported values: • M - Male • F - Female • O - Other

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	Supported value: RTIMAGE.
Series Instance UID	(0020,000E)	UI	1	

9.1.2.2.4 RT Image Module

Attribute name	Tag	Vr	Type	Comment
Samples per Pixel	(0028,0002)	US	1	Value not read
Photometric Interpretation	(0028,0004)	CS	1	Value not read
Bits Allocated	(0028,0100)	US	1	Value not read
Bits Stored	(0028,0101)	US	1	Value not read
High Bit	(0028,0102)	US	1	Value not read
Pixel Representation	(0028,0103)	US	1	Value not read
RT Image Label	(3002,0002)	SH	1	Value not read
Image Type	(0008,0008)	CS	1	Supported values: ORIGINAL, DERIVED, PRIMARY, SECONDARY, DRR, PORTAL, SIMULATOR, RADIOGRAPH, BLANK, FLUENCE, UNKNOWN.
RT Image Plane	(3002,000C)	CS	1	Value not read
Referenced RT Plan Sequence	(300C,0002)	SQ	3	
>Referenced SOP Class UID	(0008,1150)	UI	1	

>Referenced SOP Instance UID	(0008,1155)	UI	1	If value matches delivery plan, the RT Image will be linked to the current session.
Referenced Beam Number	(300C,0006)	IS	3	Read when reporting acquired image position, to RayCare.
Fraction Number	(3002,0029)	IS	3	
Patient Support Angle	(300A,0122)	DS	3	Read when reporting acquired image position, to RayCare.
Table Top Pitch Angle	(300A,0140)	FL	3	Read when reporting acquired image position, to RayCare.
Table Top Roll Angle	(300A,0144)	FL	3	Read when reporting acquired image position, to RayCare.
Table Top Vertical Position	(300A,0128)	DS	3	Read when reporting acquired image position, to RayCare.
Table Top Longitudinal Position	(300A,0129)	DS	3	Read when reporting acquired image position, to RayCare.
Table Top Lateral Position	(300A,012A)	DS	3	Read when reporting acquired image position, to RayCare.

9.1.2.2.5 SOP Common Module

Attribute name	Tag	Vr	Type	Comment
SOP Class UID	(0008,0016)	UI	1	Supported value: 1.2.840.10008.5.1.4.1.1.481.1.
SOP Instance UID	(0008,0018)	UI	1	

9.1.2.3 RT Structure Set IOD

IE	Module	Used
Patient	Patient Module	No
Study	General Study Module	No
Series	RT Series Module	No
Equipment	General Equipment Module	No
Structure Set	Structure Set Module	Yes
	ROI Contour Module	Yes
	RT ROI Observations Module	Yes
	SOP Common Module	Yes

9.1.2.3.1 Structure Set Module

Attribute name	Tag	Vr	Type	Comment
Structure Set Label	(3006,0002)	SH	1	Value not read
Structure Set Date	(3006,0008)	DA	2	
Structure Set Time	(3006,0009)	TM	2	
Referenced Frame of Reference Sequence	(3006,0010)	SQ	3	
>Frame of Reference UID	(0020,0052)	UI	1	Only read if Referenced Frame of Reference Sequence contains a single item.

>RT Referenced Study Sequence	(3006,0012)	SQ	3	
>>Referenced SOP Class UID	(0008,1150)	UI	1	Value not read
>>Referenced SOP Instance UID	(0008,1155)	UI	1	Value not read
>>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	Value not read
>>>>Referenced SOP Instance UID	(0008,1155)	UI	1	
Structure Set ROI Sequence	(3006,0020)	SQ	1	Value not read

9.1.2.3.2 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	Only POINT contours are parsed.
>>Contour Geometric Type	(3006,0042)	CS	1	Supported value: POINT.
>>Number of Contour Points	(3006,0046)	IS	1	Value not read
>>Contour Data	(3006,0050)	DS	1	

9.1.2.3.3 RT ROI Observations Module

Attribute name	Tag	Vr	Type	Comment
RT ROI Observations Sequence	(3006,0080)	SQ	1	
>Observation Number	(3006,0082)	IS	1	Value not read
>Referenced ROI Number	(3006,0084)	IS	1	
>RT ROI Interpreted Type	(3006,00A4)	CS	2	Supported values: ACQ_ISOCENTER, INITLASERISO, INITMATCHISO.
>Material ID	(300A,00E1)	SH	3	Used for bolus material

9.1.2.3.4 SOP Common Module

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

9.1.2.4 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 Patient Setup Module	Yes
	RT Fraction Scheme Module	Yes
	RT Beams Module	Yes
	RT Brachy Application Setups Module	No
	SOP Common Module	No

9.1.2.4.1 RT Patient Setup Module

Attribute name	Tag	Vr	Type	Comment
Patient Setup Sequence	(300A,0180)	SQ	1	
>Patient Setup Number	(300A,0182)	IS	1	Value not read
>Setup Technique Description	(300A,01B2)	ST	3	
>Table Top Vertical Setup Displacement	(300A,01D2)	DS	3	
>Table Top Longitudinal Setup Displacement	(300A,01D4)	DS	3	
>Table Top Lateral Setup Displacement	(300A,01D6)	DS	3	

9.1.2.4.2 RT Fraction Scheme Module

Attribute name	Tag	Vr	Type	Comment
Fraction Group Sequence	(300A,0070)	SQ	1	
>Fraction Group Number	(300A,0071)	IS	1	Value not read
>Definition Source Sequence	(0008,1156)	SQ	3	
>>Referenced SOP Class UID	(0008,1150)	UI	1	Supported value: • 1.2.840.10008.5.1.4.1.1.481.12 - RT Radiation Set SOP Class UID
>>Referenced SOP Instance UID	(0008,1155)	UI	1	
>Number of Fractions Planned	(300A,0078)	IS	2	
>Number of Beams	(300A,0080)	IS	1	Value not read
>Number of Brachy Application Setups	(300A,00A0)	IS	1	Value not read

9.1.2.4.3 RT Beams Module

Attribute name	Tag	Vr	Type	Comment
Beam Sequence	(300A,00B0)	SQ	1	
>Beam Number	(300A,00C0)	IS	1	Value not read
>Definition Source Sequence	(0008,1156)	SQ	3	

>>Referenced SOP Class UID	(0008,1150)	UI	1	Supported value: • 1.2.840.10008.5.1.4.1.1.481.15 - Robotic-Arm Radiation SOP Class UID
>>Referenced SOP Instance UID	(0008,1155)	UI	1	
>Beam Type	(300A,00C4)	CS	1	Value not read
>Referenced Reference Image Sequence	(300C,0042)	SQ	3	
>>Referenced SOP Class UID	(0008,1150)	UI	1	Value not read
>>Referenced SOP Instance UID	(0008,1155)	UI	1	
>>Reference Image Number	(300A,00C8)	IS	1	Value not read
>Number of Wedges	(300A,00D0)	IS	1	Value not read
>Number of Compensators	(300A,00E0)	IS	1	Value not read
>Number of Boli	(300A,00ED)	IS	1	Value not read
>Number of Blocks	(300A,00F0)	IS	1	Value not read
>Number of Control Points	(300A,0110)	IS	1	Value not read
>Control Point Sequence	(300A,0111)	SQ	1	Value not read

9.1.2.5 RT Beams Treatment Record IOD

Storage of Treatment Record created during a session.

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 Treatment Machine Record Module	Yes
	RT Beams Session Record Module	Yes
	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	Supported values: • M - Male • F - Female • O - Other

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 RT Series Module

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

9.1.2.5.4 RT General Treatment Record Module

Attribute name	Tag	Vr	Type	Comment
Instance Number	(0020,0013)	IS	1	Value not read
Treatment Date	(3008,0250)	DA	2	Value stored in RayCare.
Treatment Time	(3008,0251)	TM	2	Value stored in RayCare.
Referenced RT Plan Sequence	(300C,0002)	SQ	2	
>Referenced SOP Class UID	(0008,1150)	UI	1	
>Referenced SOP Instance UID	(0008,1155)	UI	1	

9.1.2.5.5 RT Treatment Machine Record Module

Attribute name	Tag	Vr	Type	Comment
Treatment Machine Sequence	(300A,0206)	SQ	1	
>Treatment Machine Name	(300A,00B2)	SH	2	

9.1.2.5.6 RT Beams Session Record Module

Attribute name	Tag	Vr	Type	Comment
Primary Dosimeter Unit	(300A,00B3)	CS	1	Supported values: MU, MINUTE.
Treatment Session Beam Sequence	(3008,0020)	SQ	1	
>Referenced Beam Number	(300C,0006)	IS	3	
>Beam Name	(300A,00C2)	LO	3	
>Beam Description	(300A,00C3)	ST	3	
>Beam Type	(300A,00C4)	CS	1	Value not read
>Radiation Type	(300A,00C6)	CS	1	Value not read
>Number of Wedges	(300A,00D0)	IS	1	Value not read
>Applicator Sequence	(300A,0107)	SQ	3	
>>Applicator ID	(300A,0108)	SH	1	
>>Applicator Type	(300A,0109)	CS	1	Value not read
>>Applicator Description	(300A,010A)	LO	3	
>General Accessory Sequence	(300A,0420)	SQ	3	
>>General Accessory Number	(300A,0424)	IS	1	Value not read
>>General Accessory ID	(300A,0421)	SH	1	

>>General Accessory Description	(300A,0422)	ST	3	
>>General Accessory Type	(300A,0423)	CS	3	Supported values: GRATICULE, IMAGE_DETECTOR, RETICLE.
>Current Fraction Number	(3008,0022)	IS	2	
>Treatment Delivery Type	(300A,00CE)	CS	2	Supported values: TREATMENT, OPEN_PORTFILM, TRMT_PORTFILM, CONTINUATION, SETUP, VERIFICATION.
>Treatment Termination Status	(3008,002A)	CS	1	Supported values: NORMAL, OPERATOR, MACHINE, UNKNOWN.
>Specified Primary Meterset	(3008,0032)	DS	3	
>Delivered Primary Meterset	(3008,0036)	DS	3	
>Specified Treatment Time	(3008,003A)	DS	3	
>Delivered Treatment Time	(3008,003B)	DS	3	
>Number of Control Points	(300A,0110)	IS	1	Value not read
>Control Point Delivery Sequence	(3008,0040)	SQ	1	
>>Referenced Control Point Index	(300C,00F0)	IS	3	
>>Treatment Control Point Date	(3008,0024)	DA	1	Value stored in RayCare.
>>Treatment Control Point Time	(3008,0025)	TM	1	Value stored in RayCare.
>>Specified Meterset	(3008,0042)	DS	2	
>>Delivered Meterset	(3008,0044)	DS	1	
>>Dose Rate Set	(300A,0115)	DS	2	
>>Dose Rate Delivered	(3008,0048)	DS	2	
>>Nominal Beam Energy	(300A,0114)	DS	3	
>>Nominal Beam Energy Unit	(300A,0015)	CS	1C	Supported values: MV, MEV.
>>Gantry Angle	(300A,011E)	DS	1C	
>>Gantry Rotation Direction	(300A,011F)	CS	1C	Supported values: NONE, CW, CC.
>>Beam Limiting Device Angle	(300A,0120)	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	
>>Override Sequence	(3008,0060)	SQ	3	
>>>Override Parameter Pointer	(3008,0062)	AT	2	
>>>Operators' Name	(0008,1070)	PN	2	

9.1.2.5.7 SOP Common Module

Attribute name	Tag	Vr	Type	Comment
SOP Class UID	(0008,0016)	UI	1	Supported value: 1.2.840.10008.5.1.4.1.1.481.4.

SOP Instance UID	(0008,0018)	UI	1	

9.1.2.6 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	Yes
	General Reference Module	Yes
	SOP Common Module	Yes

9.1.2.6.1 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	Supported values: • M - Male • F - Female • O - Other

9.1.2.6.2 General Study Module

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

9.1.2.6.3 General Series Module

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

9.1.2.6.4 Frame of Reference Module

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

9.1.2.6.5 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	Value not read
Content Label	(0070,0080)	CS	1	Value not read
Content Description	(0070,0081)	LO	2	If content description matches delivery plan SOP Instance UID, the spatial registration will be linked to the session in RayCare.
Registration Sequence	(0070,0308)	SQ	1	Value not read

9.1.2.6.6 Common Instance Reference Module

The information in this module is used to locate the two image IODs used to create the registration.

Attribute name	Tag	Vr	Type	Comment
Referenced Series Sequence	(0008,1115)	SQ	1C	
>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	
>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	

9.1.2.6.7 General Reference Module

Attribute name	Tag	Vr	Type	Comment
Referenced Instance Sequence	(0008,114A)	SQ	3	Contains referenced delivery plan for ProBeat
>Referenced SOP Class UID	(0008,1150)	UI	1	Supported value: • 1.2.840.10008.5.1.4.1.1.481.8 - RT Ion Plan Storage
>Referenced SOP Instance UID	(0008,1155)	UI	1	
>Purpose of Reference Code Sequence	(0040,A170)	SQ	1	Value not read

9.1.2.6.8 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	

9.1.2.7 RT Radiation Set IOD

IE	Module	Used
Patient	Patient Module	No
Study	General Study Module	Yes
Series	General Series Module	Yes
	Enhanced RT Series Module	No
Equipment	General Equipment Module	No
	Enhanced General Equipment Module	No
Frame of Reference	Frame of Reference Module	No
RT Radiation Set	General Reference Module	No
	RT Radiation Set Module	No
	RT Dose Contribution Module	No
	SOP Common Module	Yes
	Common Instance Reference Module	No
	Radiotherapy Common Instance Module	No

9.1.2.7.1 General Study Module

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

9.1.2.7.2 General Series Module

Attribute name	Tag	Vr	Type	Comment
Modality	(0008,0060)	CS	1	Value not read
Series Instance UID	(0020,000E)	UI	1	

9.1.2.7.3 SOP Common Module

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

9.1.3 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
HITACHI	(300F,0010)	LO	1	HITACHI
Table Top CT Vertical Position	(300F,1050)	FL	1	

RaySearch Private Creator	(4001,0010)	LO	1	RAYSEARCHLABS 2.0
Tomo Plan SOP Instance UID	(4001,102A)	UI	1	
Varian Medical Systems	(3253,0010)	LO	1	Varian Medical Systems VISION 3253
Extended Interface Data	(3253,1000)	LT	1	
Extended Interface Length	(3253,1001)	IS	1	
Extended Interface Format	(3253,1002)	CS	1	
Varian Medical Systems	(3259,0010)	LO	1	Varian Medical Systems VISION 3259
Additional Dose Value Sequence	(3259,1000)	SQ	1	
Actual Session Dose	(3259,1002)	DS	1	
Daily Dose	(3259,1004)	DS	1	
Life Time Total Dose	(3259,1006)	DS	1	
Varian Medical Systems	(3261,0010)	LO	1	Varian Medical Systems VISION 3261
Treatment Session Beam Extended Interface	(3261,102A)	OB	1	
Varian Medical Systems	(3265,0010)	LO	1	Varian Medical Systems VISION 3265
Total Number of Fractions	(3265,1000)	SL	1	
Last Treated Fraction	(3265,1001)	SL	1	

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

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