

Technical Publication

DICOM Conformance Statement

iPlan RT Dose 4.1

Document Revision 1

December 4, 2008

2008 © Copyright BrainLAB AG



1 Conformance Statement Overview

This document details the DICOM Conformance Statement for the iPlan RT Dose software by BrainLAB. Full details are provided for the DICOM export and conversion from the BrainLAB advanced file format.

The DICOM export component of the iPlan RT Dose application is

- Send DICOM data to another DICOM application or archive.
- Write DICOM data to the file system (no media interchange application profile supported so far).

SOP Classes	User Of Service (SCU)	Provider Of Service (SCP)
Transfer		
CT Image Storage	Yes	No
RT Structure Set Storage	Yes	No
RT Plan Storage	Yes	No
RT Dose Storage	Yes	No
RT Image Storage	Yes	No

Table 1-1: Network services supported by iPlan RT Dose

2 Table Of Contents

1	Conformance Statement Overview	3
2	Table Of Contents	5
3	Introduction	7
3.1	Revision History	7
3.2	Audience	7
3.3	Remarks	7
3.4	Abbreviations	8
3.5	References	8
3.6	Contact	8
4	Networking	9
4.1	Implementation Model	9
4.1.1	Application Data Flow Diagram	9
4.1.2	Functional Definition of Application Entity (AE)	9
4.2	Application Entity Specifications	10
4.2.1	iPlan RT Dose Specification	10
4.2.1.1	SOP Classes and Transfer Syntaxes	10
4.2.1.2	Association Policies	10
4.2.1.2.1	General	10
4.2.1.2.2	Number of Associations	10
4.2.1.2.3	Asynchronous Nature	11
4.2.1.2.4	Implementation Identifying Information	11
4.2.1.3	Association Initiation Policy	11
4.2.1.3.1	Activity – Store	11
4.3	Network Interfaces	12
4.3.1	Physical Network Interface	12
4.3.2	Additional Protocols	12
4.4	Configuration	12
4.4.1	AE Title / Presentation Address Mapping	12
4.4.1.1	Remote AE Title/Presentation Address Mapping	12
4.4.2	Parameters	12
5	Media Interchange	13
6	Support Of Extended Character Sets	15
7	Security Profiles	17
8	Annexes	19
8.1	IOD Contents	19
8.1.1	Created SOP Instances	19
8.1.1.1	Created IODs	19
8.1.1.1.1	Computed Tomography Image Storage	19
8.1.1.1.2	RT Structure Set Storage	20
8.1.1.1.3	RT Plan Storage	20
8.1.1.1.4	RT Dose Storage	21
8.1.1.1.5	RT Image Storage	21
8.1.1.2	Created Modules	22
8.1.1.2.1	Patient	22
8.1.1.2.2	Clinical Trial Subject	22
8.1.1.2.3	General Study	23
8.1.1.2.4	Patient Study	23
8.1.1.2.5	Clinical Trial Study	23

8.1.1.2.6	General Series	23
8.1.1.2.7	RT Series	23
8.1.1.2.8	Clinical Trial Series	24
8.1.1.2.9	Frame Of Reference	24
8.1.1.2.10	General Equipment	24
8.1.1.2.11	General Image	24
8.1.1.2.12	Image Plane	24
8.1.1.2.13	Image Pixel	25
8.1.1.2.14	CT Image	25
8.1.1.2.15	Multi-frame	25
8.1.1.2.16	VOI LUT	25
8.1.1.2.17	SOP Common	26
8.1.1.2.18	Structure Set	26
8.1.1.2.19	ROI Contour	27
8.1.1.2.20	RT ROI Observations	27
8.1.1.2.21	Approval	27
8.1.1.2.22	RT General Plan	28
8.1.1.2.23	RT Prescription	29
8.1.1.2.24	RT Tolerance Tables	29
8.1.1.2.25	RT Patient Setup	29
8.1.1.2.26	RT Fraction Scheme	30
8.1.1.2.27	RT Beams	30
8.1.1.2.28	RT Dose	33
8.1.1.2.29	RT DVH	34
8.1.1.2.30	RT Image	34
8.2	Data Dictionary Of Private Attributes	36
8.2.1	Group 0009	36
8.2.2	Group 3273	36
8.3	Coded Terminology And Templates	36
8.4	Grayscale Image Consistency	36
8.5	Standard Extended/Specialized/Private Sop Classes	36
8.6	Private Transfer Syntaxes	36
9	Indexes	38
9.1	Index Of Tables	38
9.2	Index Of Figures	38

3 Introduction

3.1 Revision History

Document Version	Date of Issue	Author	Description
1	December 4, 2008		Initial release for iPlan RT Dose 4.1

3.2 Audience

This document is intended for hospital staff, health system integrators, software designers or implementers. It is assumed that the reader has a working understanding of DICOM.

3.3 Remarks

DICOM, by itself, does not guarantee interoperability. The Conformance Statement facilitates a first-level validation for interoperability between different applications supporting the same DICOM functionality. It should be read and understood in conjunction with the DICOM Standard [1]. However, by itself it is not guaranteed to ensure a successful interconnectivity.

The user should be aware of the following important issues:

- The comparison of different conformance statements is the first step towards assessing interconnectivity between BrainLAB and non–BrainLAB equipment.
- This Conformance Statement is not intended to replace validation with other DICOM equipment to ensure that proper exchange of information is achieved.
- The DICOM standard will evolve to meet the users' future requirements. BrainLAB reserves the right to make changes to its products or to discontinue its delivery.

3.4 Abbreviations

There are a variety of terms and abbreviations used in this document that are defined in the DICOM Standard. Abbreviations and terms are as follows:

AE	DICOM Application Entity
AET	Application Entity Title
ATC	Advanced Technology Consortium
CD	Compact Disk
CD-R	Compact Disk Recordable
DVD	Digital Versatile Disc
DVH	Dose Volume Histogram
FSC	File-Set Creator
FSU	File-Set Updater
FSR	File-Set Reader
HD	Hard Disk
IOD	(DICOM) Information Object Definition
ISO	International Standard Organization
MOD	Magneto Optical Disk
PDU	DICOM Protocol Data Unit
PTV	Planning Target Volume
Q/R	Query and Retrieve
SCU	DICOM Service Class User (DICOM client)
SCP	DICOM Service Class Provider (DICOM server)
SOP	DICOM Service-Object Pair
xBrain	BrainLAB advanced file format

3.5 References

- [1] Digital Imaging and Communications in Medicine (DICOM) 3.0, NEMA PS 3.1-3.18 – 2008
- [2] DICOM Conformance Statement Converting DICOM Service 1.0, BrainLAB, April 19, 2005
- [3] DICOM File Set Reader Conformance Statement (v2.3), Advanced Technology Consortium at Washington University in St. Louis,
http://itc.wustl.edu/dicom/Conf_Stmts/ATC_FSR_ConfStmt_V2.3f.pdf

3.6 Contact

In case of any questions or any inconsistencies concerning this Conformance Statement please contact dicomrt@brainlab.com.

4 Networking

4.1 Implementation Model

The BrainLAB iPlan RT Dose application is an implementation of:

- A Storage SCU that sends DICOM data to a DICOM archive or workstation.
- An application that converts data from the BrainLAB advanced file format into DICOM image data (CT).

4.1.1 Application Data Flow Diagram

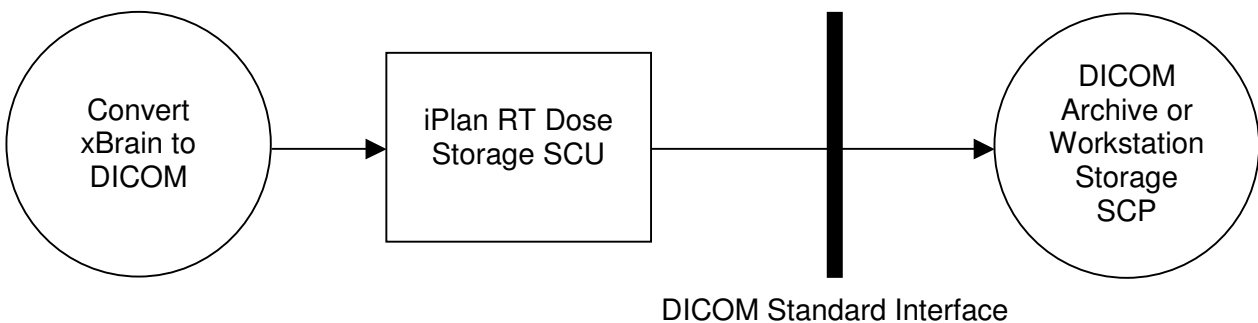


Figure 4-1: The Storage SCU application flow diagram

4.1.2 Functional Definition of Application Entity (AE)

Some communications and data transfer with remote AEs are accomplished utilizing the DICOM protocol over a network using the TCP/IP protocol stack.

- Storage SCU:
iPlan RT Dose loads data from the BrainLAB advanced file format, converts it to DICOM – with user interaction – and initiates an association with a Storage SCP negotiating all SOPs listed in Table 4-2. The converted DICOM data then is sent to the remote DICOM Storage SCP.

4.2 Application Entity Specifications

4.2.1 iPlan RT Dose Specification

4.2.1.1 SOP Classes and Transfer Syntaxes

iPlan RT Dose sends or receives a C-ECHO request in order to test the connection to a remote AE. It provides standard conformance to the following DICOM V3.0 SOP Classes:

SOP Class Name	SOP Class UID	SCU	SCP
Verification SOP Class	1.2.840.10008.1.1	Yes	No

Table 4-1: Supported Verification SOP Classes

iPlan RT Dose exports DICOM image data. It provides Standard Conformance to the following DICOM V3.0 SOP Classes:

SOP Class Name	SOP Class UID	SCU	SCP
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Yes	No
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	Yes	No
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	Yes	No
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	Yes	No
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	Yes	No

Table 4-2: Supported Storage SOP Classes

iPlan RT Dose supports the following transfer syntaxes. In an association negotiation the syntaxes are proposed in the order of appearance in the list.

Transfer Syntax Name	Transfer Syntax UID	SCU	SCP
DICOM Implicit VR Little Endian	1.2.840.10008.1.2	Yes	No
DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	Yes	No
DICOM Explicit VR Big Endian	1.2.840.10008.1.2.2	Yes	No

Table 4-3: Supported Transfer Syntaxes

4.2.1.2 Association Policies

4.2.1.2.1 General

The DICOM standard application context name for DICOM 3.0 is always proposed:

Application Context Name	1.2.840.10008.3.1.1.1
--------------------------	-----------------------

4.2.1.2.2 Number of Associations

For both association initiation and acceptance:

Maximum number of simultaneous Associations	1
---	---

4.2.1.2.3 Asynchronous Nature

The iPlan RT Dose does not support asynchronous communication (multiple outstanding transactions over a single association).

Maximum number of outstanding asynchronous transactions	1
---	---

4.2.1.2.4 Implementation Identifying Information

The implementation information for this Application Entity is:

Implementation Class UID	1.2.276.0.20.1.1.5.4.1.0
Implementation Version Name	IPLANRTDOSE

4.2.1.3 Association Initiation Policy

iPlan RT Dose initiates an association in the case the user loaded a dataset in the BrainLAB advanced file format and wants to convert it to the DICOM format for export to a remote DICOM node.

4.2.1.3.1 Activity – Store

4.2.1.3.1.1 Associated Real-World Activity

After successful conversion of the selected BrainLAB data to DICOM, a storage request is triggered to send the DICOM data to a remote Storage SCP. The remote Storage SCP must be one of the AETs known by iPlan RT Dose.

4.2.1.3.1.2 Proposed Presentation Contexts

Presentation Context Table			
Abstract Syntax	Transfer Syntax	Role	Ext. Neg
All SCU SOP Classes as listed in Table 4-1 and Table 4-2	All SCU Transfer Syntaxes as listed in Table 4-3	SCU	None
		SCU	None
		SCU	None

Table 4-4: Proposed Presentation Contexts for Activity Store.

4.2.1.3.1.3 SOP Specific Conformance

iPlan RT Dose provides standard conformance to the DICOM Verification Service Class and to the DICOM Storage SOP Classes. No extended negotiation is implemented.

4.3 Network Interfaces

4.3.1 Physical Network Interface

iPlan RT Dose supports the DICOM upper layer using TCP/IP. iPlan RT Dose is indifferent to the physical medium over which TCP/IP executes. It inherits this from the operating system upon which it executes.

4.3.2 Additional Protocols

The usage of DNS and DHCP is possible and is based on the network configuration of the operating system upon which iPlan RT Dose executes.

4.4 Configuration

4.4.1 AE Title / Presentation Address Mapping

Configuration of remote and local DICOM nodes can be performed with the graphical user interface of iPlan RT Dose.

4.4.1.1 Remote AE Title/Presentation Address Mapping

In iPlan RT Dose you can specify several nodes for export. The IP address/hostname, AET and listening port may be configured for each DICOM network node separately within the graphical user interface.

4.4.2 Parameters

Additional a timeout may be specified for each DICOM network archive separately.

Parameter	Configurable	Default Value
Timeout	Yes	30
Maximum PDU Size	No	28672

5 Media Interchange

There is no media interchange application profile supported for export. The files are simply stored to the file system grouped by patient without using any DICOMDIR. For export it supports the same SOP Classes like the Storage SCU (see Table 4-2 or Table 4-4).

6 Support Of Extended Character Sets

iPlan RT Dose supports the

- ISO_IR 100 (ISO 8859-1:1987 Latin Alphabet No. 1 supplementary set)

7 Security Profiles

No security profiles are supported.

8 Annexes

8.1 IOD Contents

8.1.1 Created SOP Instances

The following tables use a number of abbreviations. The abbreviations used in the “Presence of Module” column are:

MNAP	Module not always present
ALWAYS	Module always present

8.1.1.1 Created IODs

8.1.1.1.1 Computed Tomography Image Storage

IE	Module	Reference	Presence of Module
Patient	Patient	Table 8-6	ALWAYS
	Clinical Trial Subject	Table 8-7	MNAP
Study	General Study	Table 8-8	ALWAYS
	Patient Study	Table 8-9	ALWAYS
	Clinical Trial Study	Table 8-10	MNAP
Series	General Series	Table 8-11	ALWAYS
	Clinical Trial Series	Table 8-13	MNAP
Frame of Reference	Frame of Reference	Table 8-14	ALWAYS
Equipment	General Equipment	Table 8-15	ALWAYS
Image	General Image	Table 8-16	ALWAYS
	Image Plane	Table 8-17	ALWAYS
	Image Pixel	Table 8-18	ALWAYS
	CT Image	Table 8-19	ALWAYS
	VOI LUT	Table 8-21	MNAP
	SOP Common	Table 8-22	ALWAYS

Table 8-1: CT Image Storage IOD

8.1.1.1.2 RT Structure Set Storage

IE	Module	Reference	Presence of Module
Patient	Patient	Table 8-6	ALWAYS
	Clinical Trial Subject	Table 8-7	MNAP
Study	General Study	Table 8-8	ALWAYS
	Patient Study	Table 8-9	ALWAYS
	Clinical Trial Study	Table 8-10	MNAP
Series	RT Series	Table 8-12	ALWAYS
	Clinical Trial Series	Table 8-13	MNAP
Equipment	General Equipment	Table 8-15	ALWAYS
Structure Set	Structure Set	Table 8-23	ALWAYS
	ROI Contour	Table 8-24	ALWAYS
	RT ROI Observations	Table 8-25	ALWAYS
	Approval	Table 8-26	ALWAYS
	SOP Common	Table 8-22	ALWAYS

Table 8-2: RT Structure Set Storage IOD
8.1.1.1.3 RT Plan Storage

IE	Module	Reference	Presence of Module
Patient	Patient	Table 8-6	ALWAYS
	Clinical Trial Subject	Table 8-7	MNAP
Study	General Study	Table 8-8	ALWAYS
	Patient Study	Table 8-9	ALWAYS
	Clinical Trial Study	Table 8-10	MNAP
Series	RT Series	Table 8-12	ALWAYS
	Clinical Trial Series	Table 8-13	MNAP
Equipment	General Equipment	Table 8-15	ALWAYS
Plan	RT General Plan Module	Table 8-27	ALWAYS
	RT Prescription Module	Table 8-28	MNAP
	RT Tolerance Tables	Table 8-29	MNAP
	RT Patient Setup	Table 8-30	ALWAYS
	RT Fraction Scheme	Table 8-31	ALWAYS
	RT Beams Module	Table 8-32	ALWAYS
	Approval	Table 8-26	ALWAYS
	SOP Common	Table 8-22	ALWAYS

Table 8-3: RT Plan Storage IOD

8.1.1.1.4 RT Dose Storage

IE	Module	Reference	Presence of Module
Patient	Patient	Table 8-6	ALWAYS
	Clinical Trial Subject	Table 8-7	MNAP
Study	General Study	Table 8-8	ALWAYS
	Patient Study	Table 8-9	ALWAYS
	Clinical Trial Study	Table 8-10	MNAP
Series	RT Series	Table 8-12	ALWAYS
	Clinical Trial Series	Table 8-13	MNAP
Frame of Reference	Frame of Reference	Table 8-14	ALWAYS
Equipment	General Equipment	Table 8-15	ALWAYS
Image	General Image	Table 8-16	MNAP
	Image Plane	Table 8-17	MNAP
	Image Pixel	Table 8-18	MNAP
	Multi-Frame	Table 8-20	MNAP
	RT Dose	Table 8-33	ALWAYS
	RT DVH	Table 8-34	MNAP
	SOP Common	Table 8-22	ALWAYS

Table 8-4: RT Dose Storage IOD

Note: The RT Dose IOD contains either a dose volume or a DVH, never both. Whereas the dose volume can be separated per fractionation or per beam, the DVH always comprises the entire treatment plan.

8.1.1.1.5 RT Image Storage

IE	Module	Reference	Presence of Module
Patient	Patient	Table 8-6	ALWAYS
	Clinical Trial Subject	Table 8-7	MNAP
Study	General Study	Table 8-8	ALWAYS
	Patient Study	Table 8-9	ALWAYS
	Clinical Trial Study	Table 8-10	MNAP
Series	RT Series	Table 8-12	ALWAYS
	Clinical Trial Series	Table 8-13	MNAP
Frame of Reference	Frame of Reference	Table 8-14	ALWAYS
Equipment	General Equipment	Table 8-15	ALWAYS
Image	General Image	Table 8-16	ALWAYS
	Image Pixel	Table 8-18	ALWAYS
	RT Image	Table 8-35	ALWAYS
	VOI LUT	Table 8-21	ALWAYS
	SOP Common	Table 8-22	ALWAYS

Table 8-5: RT Image Storage IOD

8.1.1.2 Created Modules

The following tables use a number of abbreviations. The abbreviations used in the “Presence” column are:

VNAP	Value not always present (attribute set to zero length if no value is present)
ANAP	Attribute not always present
ALWAYS	Attribute is always present
EMPTY	Attribute is set to zero length

The abbreviations used in the “Source” column are:

USER	The attribute value source is from user input
AUTO	The attribute value is generated automatically
CONFIG	The attribute value source is a configurable parameter

8.1.1.2.1 Patient

Attribute Name	Tag	VR	Value	Presence	Source
Patient's Name	(0010,0010)	PN	From loaded data or user input (see also Note 8-1)	VNAP	AUTO/USER
Patient ID	(0010,0020)	LO	From loaded data or user input (see also Note 8-1)	VNAP	AUTO/USER
Patient's Birth Date	(0010,0030)	DA	From loaded data	VNAP	AUTO
Patient's Sex	(0010,0040)	CS	From loaded data	VNAP	AUTO

Table 8-6: Patient Module

8.1.1.2.2 Clinical Trial Subject

Attribute Name	Tag	VR	Value	Presence	Source
Clinical Trial Sponsor Name	(0012,0010)	LO	From user input	ANAP	USER
Clinical Trial Protocol ID	(0012,0020)	LO	From user input	ANAP	USER
Clinical Trial Protocol Name	(0012,0021)	LO	From user input	ANAP	USER
Clinical Trial Site ID	(0012,0030)	LO	From user input	ANAP	USER
Clinical Trial Site Name	(0012,0031)	LO	From user input	ANAP	USER
Clinical Trial Subject ID	(0012,0042)	LO	From user input	ANAP	USER

Table 8-7: Clinical Trial Subject Module

Note 8-1: Data for Clinical Trial modules is entered by user and is mandatory for clinical trial export. A patient de-identification of the exported data (including all UIDs) is automatically performed according to the ATC Conformance Statement [3].

8.1.1.2.3 General Study

Attribute Name	Tag	VR	Value	Presence	Source
Study Instance UID	(0020,000D)	UI	From imported data or generated	ALWAYS	AUTO
Study Date	(0008,0020)	DA	From loaded data	ANAP	AUTO
Referring Physician's Name	(0008,0090)	PN		EMPTY	AUTO
Study ID	(0020,0010)	SH	From loaded data	VNAP	AUTO
Accession Number	(0008,0050)	SH		EMPTY	AUTO
Study Description	(0008,1030)	LO	From loaded data	ANAP	AUTO

Table 8-8: General Study Module

8.1.1.2.4 Patient Study

Attribute Name	Tag	VR	Value	Presence	Source
Patient's Height	(0010,1020)	DS	From loaded data	ANAP	AUTO
Patient's Weight	(0010,1030)	DS	From loaded data	ANAP	AUTO

Table 8-9: Patient Study Module

8.1.1.2.5 Clinical Trial Study

Attribute Name	Tag	VR	Value	Presence	Source
Clinical Trial Time Point ID	(0012,0050)	LO	From user input	ANAP	USER
Clinical Trial Time Point Description	(0012,0051)	ST	From user input	ANAP	USER

Table 8-10: Clinical Trial Study Module

8.1.1.2.6 General Series

Attribute Name	Tag	VR	Value	Presence	Source
Modality	(0008,0060)	CS	From loaded data	ALWAYS	AUTO
Series Instance UID	(0020,000E)	UI	Generated	ALWAYS	AUTO
Series Number	(0020,0011)	IS	From loaded data	ALWAYS	AUTO
Series Date	(0008,0021)	DA	From loaded data	ANAP	AUTO
Series Time	(0008,0031)	TM	From loaded data	ANAP	AUTO
Series Description	(0008,103E)	LO	From loaded data	ANAP	AUTO
Patient Position	(0018,5100)	DA	If applicable: From loaded data or user	ANAP	AUTO/ USER

Table 8-11: General Series Module

8.1.1.2.7 RT Series

Attribute Name	Tag	VR	Value	Presence	Source
Modality	(0008,0060)	CS		ALWAYS	AUTO
Series Instance UID	(0020,000E)	UI		ALWAYS	AUTO
Series Number	(0020,0011)	IS		ALWAYS	AUTO

Table 8-12: RT Series Module

8.1.1.2.8 Clinical Trial Series

Attribute Name	Tag	VR	Value	Presence	Source
Clinical Trial Coordinating Center Name	(0012,0060)	LO	From user input	ANAP	USER

Table 8-13: Clinical Trial Series Module

8.1.1.2.9 Frame Of Reference

Attribute Name	Tag	VR	Value	Presence	Source
Frame of Reference UID	(0020,0052)	UI	Generated	ALWAYS	AUTO
Position Reference Indicator	(0020,1040)	LO		EMPTY	AUTO

Table 8-14: Frame of Reference Module

8.1.1.2.10 General Equipment

Attribute Name	Tag	VR	Value	Presence	Source
Manufacturer	(0008,0070)	LO	"BrainLAB"	ALWAYS	AUTO
Station Name	(0008,1010)	SH	<Host Name>	ALWAYS	AUTO
Manufacturer's Model Name	(0008,1090)	LO	"iPlan RT Dose"	ALWAYS	AUTO
Software Version(s)	(0018,1020)	LO	4.1.0	ALWAYS	AUTO
Private Creator Code	(0009,00xx)	LO	"BrainLAB_Conversion"	ALWAYS	AUTO
Export Platform Name	(0009,xx01)	LO	Configured Platform Name	ALWAYS	CONFIG

Table 8-15: General Equipment Module

8.1.1.2.11 General Image

Attribute Name	Tag	VR	Value	Presence	Source
Instance Number	(0020,0013)	IS	From loaded data	ALWAYS	AUTO
Content Date	(0008,0023)	DA	<Current Date>	ALWAYS	AUTO
Content Time	(0008,0033)	TM	<Current Time>	ALWAYS	AUTO

Table 8-16: General Image Module

8.1.1.2.12 Image Plane

Attribute Name	Tag	VR	Value	Presence	Source
Pixel Spacing	(0028,0030)	DS	From loaded data	ALWAYS	AUTO
Image Orientation (Patient)	(0020,0037)	DS	From loaded data (see Note 8-2)	ALWAYS	AUTO
Image Position (Patient)	(0020,0032)	DS	From loaded data (see Note 8-2)	ALWAYS	AUTO
Slice Thickness	(0018,0050)	DS	From loaded data	ALWAYS	AUTO

Table 8-17: Image Plane Module

Note 8-2: For localized data sets, the image data will be re-sampled during export in order to re-align the slices to create an orthogonal alignment ("Image Orientation (Patient)": 1/0/0,0/1/0). This will result in a different "Image Position (Patient)" and different image pixel data.

8.1.1.2.13 Image Pixel

Attribute Name	Tag	VR	Value	Presence	Source
Rows	(0028,0010)	IS	From loaded data	ALWAYS	AUTO
Columns	(0028,0011)	DA	From loaded data	ALWAYS	AUTO
Pixel Data	(7FE0,0010)	OB OW	From loaded data (see Note 8-2)	ALWAYS	AUTO

Table 8-18: Image Pixel Module

8.1.1.2.14 CT Image

Attribute Name	Tag	VR	Value	Presence	Source
Image Type	(0008,0008)	CS	"DERIVED\SECONDARY\AXIAL"	ALWAYS	AUTO
Samples per Pixel	(0028,0002)	US	1	ALWAYS	AUTO
Photometric Interpretation	(0028,0004)	CS	"MONOCHROME2"	ALWAYS	AUTO
Bits Allocated	(0028,0100)	US	16	ALWAYS	AUTO
Bits Stored	(0028,0101)	US	16	ALWAYS	AUTO
High Bit	(0028,0102)	US	15	ALWAYS	AUTO
Pixel Representation	(0028,0103)	US	0000H (<i>unsigned integer</i>)	ALWAYS	AUTO
Rescale Intercept	(0028,1052)	DS	-1024	ALWAYS	AUTO
Rescale Slope	(0028,1053)	DS	1	ALWAYS	AUTO
KVP	(0018,0060)	DS		EMPTY	AUTO
Acquisition Number	(0020,0012)	IS		EMPTY	AUTO

Table 8-19: CT Image Module

8.1.1.2.15 Multi-frame

Attribute Name	Tag	VR	Value	Presence	Source
Number Of Frames	(0028,0008)	IS	From loaded data	ALWAYS	AUTO
Frame Increment Pointer	(0028,0009)	AT	"(3004,0002)" <i>Grid Frame Offset Vector</i>	ALWAYS	AUTO

Table 8-20: Multi-frame Module

8.1.1.2.16 VOI LUT

Attribute Name	Tag	VR	Value	Presence	Source
Window Center	(0028,1050)	DS	From loaded data	ANAP	AUTO
Window Width	(0028,1051)	DS	From loaded data	ANAP	AUTO

Table 8-21: VOI LUT Module

8.1.1.2.17 SOP Common

Attribute Name	Tag	VR	Value	Presence	Source
SOP Class UID	(0008,0016)	DS	IOD specific	ALWAYS	AUTO
SOP Instance UID	(0008,0018)	DS	Generated	ALWAYS	AUTO
Specific Character Set	(0008,0005)	CS	"ISO_IR 100"	ALWAYS	AUTO
Instance Creation Date	(0008,0012)	DA	<Current Date>	ALWAYS	AUTO
Instance Creation Time	(0008,0013)	TM	<Current Time>	ALWAYS	AUTO
Private Creator Code	(0009,00XX)	LO	"BrainLAB_Conversion"	ANAP	AUTO
Export Platform Name	(0009,XX01)	LO	Platform Name	ANAP	CONFIG

Table 8-22: SOP Common Module
8.1.1.2.18 Structure Set

Attribute Name	Tag	VR	Value	Presence	Source
Structure Set Label	(3006,0002)	SH		ALWAYS	CONFIG
Structure Set Name	(3006,0004)	LO		ALWAYS	CONFIG
Structure Set Description	(3006,0006)	ST		ALWAYS	CONFIG
Instance Number	(0020,0013)	IS		ALWAYS	AUTO
Structure Set Date	(3006,0008)	DA		ALWAYS	AUTO
Structure Set Time	(3006,0009)	TM		ALWAYS	AUTO
Referenced Frame of Reference Sequence	(3006,0010)	SQ		ALWAYS	AUTO
>Frame of Reference UID	(0020,0052)	UI		ALWAYS	AUTO
>RT Referenced Study Sequence	(3006,0012)	SQ		ALWAYS	AUTO
>>Referenced SOP Class UID	(0008,1150)	UI		ALWAYS	AUTO
>>Referenced SOP Instance UID	(0008,1155)	UI		ALWAYS	AUTO
>>RT Referenced Series Sequence	(3006,0014)	SQ		ALWAYS	AUTO
>>Series Instance UID	(0020,000E)	UI		ALWAYS	AUTO
>>>Contour Image Sequence	(3006,0016)	SQ		ALWAYS	AUTO
>>>>Referenced SOP Class UID	(0008,1150)	UI		ALWAYS	AUTO
>>>>Referenced SOP Instance UID	(0008,1155)	UI		ALWAYS	AUTO
Structure Set ROI Sequence	(3006,0020)	SQ		ALWAYS	AUTO
>ROI Number	(3006,0022)	IS		ALWAYS	AUTO
>Referenced Frame of Reference UID	(3006,0024)	UI		ALWAYS	AUTO
>ROI Name	(3006,0026)	LO		ALWAYS	AUTO
>ROI Volume	(3006,002C)	DS		ALWAYS	AUTO
>ROI Generation Algorithm	(3006,0038)	CS		ALWAYS	AUTO

Table 8-23: Structure Set Module

8.1.1.2.19 ROI Contour

Attribute Name	Tag	VR	Value	Presence	Source
ROI Contour Sequence	(3006,0039)	SQ		ALWAYS	AUTO
>Referenced ROI Number	(3006,0084)	IS		ALWAYS	AUTO
>ROI Display Color	(3006,002A)	IS		ALWAYS	AUTO
>Contour Sequence	(3006,0040)	SQ		ALWAYS	AUTO
>>Contour Number	(3006,0048)	IS		ALWAYS	AUTO
>>Contour Image Sequence	(3006,0016)	SQ		ALWAYS	AUTO
>>>Referenced SOP Class UID	(0008,1150)	UI		ALWAYS	AUTO
>>>Referenced SOP Instance UID	(0008,1155)	UI		ALWAYS	AUTO
>>Contour Geometric Type	(3006,0042)	CS	"CLOSED_PLANAR"	ALWAYS	AUTO
>>Contour Offset Vector	(3006,0045)	DS		ALWAYS	AUTO
>>Number of Contour Points	(3006,0046)	IS		ALWAYS	AUTO
>>Contour Data	(3006,0050)	DS	Note 8-3	ALWAYS	AUTO

Table 8-24: ROI Contour Module

Note 8-3: According to the definition of the transfer syntax or a third-party system there is a maximum number of contour points. As iPlan RT Dose stores the contours with a very high resolution it might be possible that this maximum number of contour points may be reached and a reduction of contour points will take place. For such cases, the software indicates this during export and the user has to verify the reduced versus the original contour.

8.1.1.2.20 RT ROI Observations

Attribute Name	Tag	VR	Value	Presence	Source
RT ROI Observations Sequence	(3006,0080)	SQ		ALWAYS	AUTO
>Observation Number	(3006,0082)	IS		ALWAYS	AUTO
>Referenced ROI Number	(3006,0084)	IS		ALWAYS	AUTO
>RT ROI Interpreted Type	(3006,00A4)	CS	"EXTERNAL", "PTV", "AVOIDANCE", "ORGAN"	ALWAYS	AUTO
>ROI Interpreter	(3006,00A6)	PN		ALWAYS	AUTO

Table 8-25: RT ROI Observations Module

8.1.1.2.21 Approval

Attribute Name	Tag	VR	Value	Presence	Source
Approval Status	(300E,0002)	CS	"UNAPPROVED" or "APPROVED"	ALWAYS	AUTO
Review Date	(300E,0004)	DA		ANAP	AUTO
Review Time	(300E,0005)	TM		ANAP	AUTO
Reviewer Name	(300R,0008)	PN		ANAP	AUTO

Table 8-26: Approval Module

8.1.1.2.22 RT General Plan

Attribute Name	Tag	VR	Value	Presence	Source
RT Plan Label	(300A,0002)	LO	(see Note 8-4)	ALWAYS	AUTO/ USER
RT Plan Name	(300A,0003)	SH	(see Note 8-4)	ANAP	AUTO/ USER
RT Plan Description	(300A,0004)	ST	(see Note 8-4)	ANAP	AUTO/ USER
Instance Number	(0020,0013)	IS		ALWAYS	AUTO
Operators' Name	(0008,1070)	PN		VNAP	AUTO
RT Plan Date	(300A,0006)	DA		ALWAYS	AUTO
RT Plan Time	(300A,0007)	TM		ALWAYS	AUTO
RT Plan Geometry	(300A,000C)	CS	"TREATMENT_DEVICE" or "PATIENT"	ALWAYS	AUTO
Referenced Structure Set Sequence	(300C,0060)	SQ		ANAP	AUTO
>Referenced SOP Class UID	(0008,1150)	UI		ANAP	AUTO
>Referenced SOP Instance UID	(0008,1155)	UI		ANAP	AUTO
Referenced RT Plan Sequence	(300C,0002)	SQ	(see Note 8-5)	ANAP	CONFIG/ AUTO
>Referenced SOP Class UID	(0008,1150)	UI		ANAP	AUTO
>Referenced SOP Instance UID	(0008,1155)	UI		ANAP	AUTO
>RT Plan Relationship	(300A,0055)	CS	"PARTIAL" (see Note 8-5)	ANAP	AUTO

Table 8-27: RT General Plan Module

Note 8-4: iPlan RT Dose offers the possibility to configure which string element will be assigned to which DICOM attribute for RT Plan Label (300A,0002), RT Plan Name (300A,0003) and RT Plan Description (300A,0004) in order to guarantee the correct assignment in different target systems.

Note 8-5: Due to some limitations of third-party systems, iPlan RT Dose offers the export of a DICOM RT Plan per fractionation. Thus, the Referenced RT Plan Sequence (300C,0002) is only present in cases where several plans are exported. To define the relationship between multiple plans, the list of defined terms "PRIOR", "ALTERNATIVE", "PREDECESSOR", and "VERIFIED_PLAN" is extended by the term "PARTIAL". This is the only term currently supported by iPlan RT Dose.

8.1.1.2.23 RT Prescription

Attribute Name	Tag	VR	Value	Presence	Source
Dose Reference Sequence	(300A,0010)	SQ		ALWAYS	AUTO
>Dose Reference Number	(300A,0022)	IS		ALWAYS	AUTO
>Dose Reference Structure Type	(300A,0014)	CS	“COORDINATES” or “VOLUME” if RT Plan Geometry (300A,000C) is “PATIENT”, otherwise “SITE”.	ALWAYS	AUTO
>Dose Reference Description	(300A,0016)	ST	(see Note 8-6)	ALWAYS	CONFIG
>Referenced ROI Number	(3006,0084)	IS		ANAP	AUTO
>Dose Reference Point Coordinates	(300A,0018)	DS		ANAP	AUTO
>Dose Reference Type	(300A,0020)	CS	“TARGET”	ALWAYS	AUTO
>Target Prescription Dose	(300A,0026)	DS		ALWAYS	AUTO

Table 8-28: RT Prescription Module

Note 8-6: iPlan RT Dose offers the possibility to configure the Dose Reference Description (300A,0016). The Description can either be the PTV Name, Isocenter Name and/or a Course ID.

Note 8-7: As one or more DICOM RT Plans can be created out of one treatment plan (see Note 8-5 and Note 8-8) and it is configurable how to separate the treatment plan, there will be no RT Prescription Module in case plan separation is performed for each Treatment Group. If plan separation is performed for each prescription, the RT Prescription Module is included.

8.1.1.2.24 RT Tolerance Tables

Attribute Name	Tag	VR	Value	Presence	Source
Tolerance Table Sequence	(300A,0040)	SQ		ALWAYS	AUTO
>Tolerance Table Number	(300A,0042)	IS		ALWAYS	AUTO
>Tolerance Table Label	(300A,0043)	SH	From Machine Profile	ALWAYS	CONFIG

Table 8-29: RT Tolerance Tables Module

8.1.1.2.25 RT Patient Setup

Attribute Name	Tag	VR	Value	Presence	Source
Patient Setup Sequence	(300A,0180)	SQ		ALWAYS	AUTO
>Patient Setup Number	(300A,0182)	IS		ALWAYS	AUTO
>Patient Setup Label	(300A,0183)	LO	Names of Treatment Group and Isocenter Coordinate.	ALWAYS	AUTO
>Patient Position	(0018,5100)	CS		ALWAYS	AUTO
>Referenced Setup Image Sequence	(300A,0401)	SQ		ANAP	AUTO
>>Referenced SOP Class UID	(0008,1150)	UI		ANAP	AUTO
>>Referenced SOP Instance UID	(0005,1155)	UI		ANAP	AUTO

Table 8-30: RT Patient Setup Module

8.1.1.2.26 RT Fraction Scheme

Attribute Name	Tag	VR	Value	Presence	Source
Fraction Group Sequence	(300A,0070)	SQ		ALWAYS	AUTO
>Fraction Group Number	(300A,0071)	IS		ALWAYS	AUTO
>Referenced Dose Reference Sequence	(300C,0050)	SQ		ALWAYS	AUTO
>>Referenced Dose Reference Number	(300C,0051)	IS		ALWAYS	AUTO
>Number of Fractions Planned	(300A,0078)	IS		ALWAYS	AUTO
>Number of Beams	(300A,0080)	IS		ALWAYS	AUTO
>Referenced Beam Sequence	(300C,0004)	SQ		ALWAYS	AUTO
>>Beam Dose Specification Point	(300A,0082)	DS		ANAP	AUTO
>>Beam Dose	(300A,0084)	DS		ALWAYS	AUTO
>>Beam Dose Point Depth	(300A,0088)	DS		ANAP	AUTO
>>Beam Dose Equivalent Depth	(300A,0089)	DS		ANAP	AUTO
>>Beam Dose SSD	(300A,008A)	DS		ANAP	AUTO
>>Beam Meterset	(300A,0086)	DS		ALWAYS	AUTO
>>Referenced Beam Number	(300C,0006)	IS		ALWAYS	AUTO
>Number of Brachy Application Setups	(300A,00A0)	IS	"0"	ALWAYS	AUTO

Table 8-31: RT Fraction Scheme Module

Note 8-8: It is configurable how many items are within a Fraction Group Sequence. This can either be one fractionation or all. If only one item is included, the application will create as many RT Plans as there are fractionations. See also Note 8-5.

8.1.1.2.27 RT Beams

Attribute Name	Tag	VR	Value	Presence	Source
Beam Sequence	(300A,00B0)	SQ		ALWAYS	AUTO
>Beam Number	(300A,00C0)	IS	(see Note 8-9)	ALWAYS	AUTO
>Beam Name	(300A,00C2)	LO	(see Note 8-9)	ALWAYS	AUTO
>Beam Description	(300A,00C3)	LO	(see Note 8-9)	ALWAYS	AUTO
>Beam Type	(300A,00C4)	CS	"STATIC" or "DYNAMIC"	ALWAYS	AUTO
>Radiation Type	(300A,00C6)	CS	"PHOTON"	ALWAYS	AUTO
>Treatment Machine Name	(300A,00B2)	SH		ALWAYS	AUTO
>Manufacturer	(0008,0070)	LO	(see Note 8-10)	ALWAYS	AUTO
>Institution Name	(0008,0080)	LO		ALWAYS	CONFIG
>Institutional Department Name	(0008,1040)	LO		ALWAYS	CONFIG
>Manufacturer's Model Name	(0008,1090)	LO		ALWAYS	AUTO
>Primary Dosimeter Unit	(300A,00B3)	CS	"MU"	ALWAYS	AUTO
>Source-Axis Distance	(300A,00B4)	DS		ALWAYS	AUTO
>Beam Limiting Device Sequence	(300A,00B6)	SQ		ALWAYS	AUTO
>>RT Beam Limiting Device Type	(300A,00B8)	CS		ALWAYS	AUTO
>>Number of Leaf/Jaw Pairs	(300A,00BC)	IS		ALWAYS	AUTO

Attribute Name	Tag	VR	Value	Presence	Source
>>Leaf Position Boundaries	(300A,00BE)	DS		ANAP	AUTO
>Referenced Patient Setup Number	(300C,006A)	IS		ALWAYS	AUTO
>Treatment Delivery Type	(300A,00CE)	CS	"TREATMENT"	ALWAYS	AUTO
>Number of Wedges	(300A,00D0)	IS	"0" or "1"	ALWAYS	AUTO
>Wedge Sequence	(300A,00D1)	SQ	Only for Cones	ANAP	AUTO
>>Wedge Number	(300A,00D2)	IS		ANAP	AUTO
>> Wedge Type	(300A,00D3)	CS	"STANDARD"	ANAP	AUTO
>>Wedge ID	(300A,00D4)	SH	(see Note 8-12)	ANAP	CONFIG
>>Wedge Angle	(300A,00D5)	IS		EMPTY	AUTO
>>Wedge Factor	(300A,00D6)	DS		EMPTY	AUTO
>>Wedge Orientation	(300A,00D8)	DS		EMPTY	AUTO
>Number of Blocks	(300A,00F0)	IS	"0" or "1"	ALWAYS	AUTO
>Block Sequence	(300A,00F4)	SQ	Only for m3 MLC Full Integration or Cones	ANAP	AUTO
>>Block Tray ID	(300A,00F5)	SH	(see Note 8-12)	ANAP	CONFIG
>> Source to Block Tray Distance	(300A,00F6)	DS		EMPTY	AUTO
>>Block Type	(300A,00F8)	CS	"APERTURE"	ANAP	AUTO
>>Block Divergence	(300A,00FA)	CS		EMPTY	AUTO
>>Block Number	(300A,00FC)	IS		ANAP	AUTO
>>Material ID	(300A,00E1)	SH		EMPTY	AUTO
>>Block Thickness	(300A,0100)	DS		EMPTY	AUTO
>>Block Transmission	(300A,0102)	DS		EMPTY	AUTO
>>Block Number of Points	(300A,0104)	IS		EMPTY	AUTO
>>Block Data	(300A,0106)	DS		EMPTY	AUTO
>Applicator Sequence	(300A,0107)		Only for Cones	ANAP	AUTO
>>Applicator ID	(300A,0108)	SH	(see Note 8-12)	ANAP	CONFIG
>>Applicator Type	(300A,0109)	CS	"STEREOTACTIC"	ANAP	AUTO
>Number of Compensators	(300A,00E0)	IS	"0"	ALWAYS	AUTO
>Number of Boli	(300A,00ED)	IS	"0"	ALWAYS	AUTO
>Final Cumulative Meterset Weight	(300A,010E)	DS	"1.0"	ALWAYS	AUTO
>Number of Control Points	(300A,0110)	IS		ALWAYS	AUTO
>Control Point Sequence	(300A,0111)	SQ		ALWAYS	AUTO
>>Control Point Index	(300A,0112)	IS		ALWAYS	AUTO
>>Cumulative Meterset Weight	(300A,0134)	DS		ALWAYS	AUTO
>>Referenced Dose Reference Sequence	(300C,0050)	SQ		ALWAYS	AUTO
>>>Referenced Dose Reference Number	(300C,0051)	IS		ALWAYS	AUTO
>>>Cumulative Dose Reference Coefficient	(300A,010C)	DS		ALWAYS	AUTO
>>Nominal Beam Energy	(300A,0114)	DS		ALWAYS	AUTO
>>Dose Rate Set	(300A,0115)	DS	(see Note 8-11)	ANAP	CONFIG
>>Beam Limiting Device Position Sequence	(300A,011A)	SQ		ANAP	AUTO
>>>RT Beam Limiting Device Type	(300A,00B8)	CS		ANAP	AUTO

Attribute Name	Tag	VR	Value	Presence	Source
>>>Leaf/Jaw Positions	(300A,011C)	DS		ANAP	AUTO
>>Gantry Angle	(300A,011E)	DS		ANAP	AUTO
>>Gantry Rotation Direction	(300A,011F)	CS		ANAP	AUTO
>>Beam Limiting Device Angle	(300A,0120)	DS		ANAP	AUTO
>>Beam Limiting Device Rotation Direction	(300A,0121)	CS		ANAP	AUTO
>>Patient Support Angle	(300A,0122)	DS		ANAP	AUTO
>>Patient Support Rotation Direction	(300A,0123)	CS		ANAP	AUTO
>>Table Top Eccentric Angle	(300A,0125)	DS		ANAP	AUTO
>>Table Top Eccentric Rotation Direction	(300A,0126)	CS		ANAP	AUTO
>>Table Top Pitch Angle	(300A,0140)	DS		ANAP	AUTO
>>Table Top Pitch Rotation Direction	(300A,0142)	CS		ANAP	AUTO
>>Table Top Roll Angle	(300A,0144)	DS		ANAP	AUTO
>>Table Top Roll Rotation Direction	(300A,0146)	CS		ANAP	AUTO
>>Table Top Vertical Position	(300A,0128)	DS		VNAP	CONFIG
>>Table Top Longitudinal Position	(300A,0129)	DS		VNAP	CONFIG
>>Table Top Lateral Position	(300A,012A)	DS		VNAP	CONFIG
>>Isocenter Position	(300A,012C)	DS		VNAP	AUTO
>>Source to Surface Distance	(300A,0130)	DS		ANAP	CONFIG

Table 8-32: RT Beams Module

Note 8-9: iPlan RT Dose offers the possibility to configure which string element will be assigned to which DICOM attribute for Beam Number (300A,00C0), Beam Name (300A,00C2), and Beam Description (300A,00C3) in order to guarantee the correct assignment in different record-and-verify systems.

Note 8-10: Some target systems do not interpret this value as the manufacturer of the treatment delivery device, but as the manufacturer of the beam-limiting device. Therefore, the value of this attribute can be configured accordingly.

Note 8-11: iPlan RT Dose offers the possibility to configure how the Dose Rate Set (300A,0115) shall be written. There are four possibilities:

- None: No Dose Rate at all is written (Attribute not present);
- Null: 0 is written as Dose Rate;
- Defined: Dose Rate from Machine Profile is written;
- Actual: the actual Dose *Rate is written*.

Note 8-12: For the export of an identifier of a conical collimator iPlan RT Dose offers the possibility to configure the usage of either the Wedge ID (300A,00D4), the Block Tray ID (300A,00F5), or the Applicator ID (300A,0108).

8.1.1.2.28 RT Dose

Attribute Name	Tag	VR	Value	Presence	Source
Samples per Pixel	(0028,0002)	US		ANAP	AUTO
Photometric Interpretation	(0028,0004)	CS		ANAP	AUTO
Bits Allocated	(0028,0100)	US		ANAP	AUTO
Bits Stored	(0028,0101)	US		ANAP	AUTO
High Bit	(0028,0102)	US		ANAP	AUTO
Pixel Representation	(0028,0103)	US		ANAP	AUTO
Dose Units	(3004,0002)	CS	“GY”	ALWAYS	AUTO
Dose Type	(3004,0004)	CS	“PHYSICAL” (see Note 8-13)	ALWAYS	AUTO
Dose Comment	(3004,0006)	LO		ANAP	AUTO
Dose Summation Type	(3004,000A)	CS	(see Note 8-14)	ALWAYS	AUTO
Referenced RT Plan Sequence	(300C,0002)	SQ		ANAP	AUTO
>Referenced SOP Class UID	(0008,1150)	UI		ANAP	AUTO
>Referenced SOP Instance UID	(0008,1155)	UI		ANAP	AUTO
>Referenced Fraction Group Sequence	(300C,0020)	SQ		ANAP	AUTO
>>Referenced Fraction Group Number	(300C,0022)	IS		ANAP	AUTO
>>Referenced Beam Sequence	(300C,0004)	SQ		ANAP	AUTO
>>>Referenced Beam Number	(300C,0006)	IS		ANAP	AUTO
Grid Frame Offset Vector	(3004,000C)	DS		ANAP	AUTO
Dose Grid Scaling	(3004,000E)	DS		ALWAYS	AUTO

Table 8-33: RT Dose Module

Note 8-13: The default value is “PHYSICAL”. For ATC compliant exports, this value may also be “PHYSICAL_HOMO” or “PHYSICAL_HETERO”. See the ATC Conformance Statement for details [3].

Note 8-14: Out of the list of defined terms only “PLAN”, “FRACTION” and “BEAM” are supported. The list is extended with the term “COMPOSITE”, if more than one plan is created out of the treatment plan. Additionally, the ATC terms “TOTAL_HOMO” and “TOTAL_HETERO” are supported. See the ATC Conformance Statement for details [3]. For “COMPOSITE”, “TOTAL_HOMO”, and “TOTAL_HETERO” no Referenced RT Plan Sequence (300C,0002) is created.

8.1.1.2.29 RT DVH

Attribute Name	Tag	VR	Value	Presence	Source
Referenced Structure Set Sequence	(300C,0060)	SQ		ALWAYS	AUTO
>Referenced SOP Class UID	(0008,1150)	UI		ALWAYS	AUTO
>Referenced SOP Instance UID	(0008,1155)	UI		ALWAYS	AUTO
DVH Sequence	(3004,0050)	SQ		ALWAYS	AUTO
>DVH Referenced ROI Sequence	(3004,0060)	SQ		ALWAYS	AUTO
>>Referenced ROI Number	(3006,0084)	IS		ALWAYS	AUTO
>>DVH ROI Contribution Type	(3004,0062)	CS	"INCLUDED"	ALWAYS	AUTO
>DVH Type	(3004,0001)	CS	"DIFFERENTIAL"	ALWAYS	AUTO
>Dose Units	(3004,0002)	CS	"GY"	ALWAYS	AUTO
>Dose Type	(3004,0004)	CS	"PHYSICAL" (see Note 8-13)	ALWAYS	AUTO
>DVH Dose Scaling	(3004,0052)	DS		ALWAYS	AUTO
>DVH Volume Units	(3004,0054)	CS	"CM3"	ALWAYS	AUTO
>DVH Number of Bins	(3004,0056)	IS		ALWAYS	AUTO
>DVH Data	(3004,0058)	DS		ALWAYS	AUTO
>DVH Minimum Dose	(3004,0070)	DS		ALWAYS	AUTO
>DVH Maximum Dose	(3004,0072)	DS		ALWAYS	AUTO
>DVH Mean Dose	(3004,0074)	DS		ALWAYS	AUTO

Table 8-34: RT DVH Module

8.1.1.2.30 RT Image

Attribute Name	Tag	VR	Value	Presence	Source
Samples per Pixel	(0028,0002)	US	"1"	ALWAYS	AUTO
Photometric Interpretation	(0028,0004)	CS	"MONOCHROME2"	ALWAYS	AUTO
Bits Allocated	(0028,0100)	US	"16"	ALWAYS	AUTO
Bits Stored	(0028,0101)	US	"16"	ALWAYS	AUTO
High Bit	(0028,0102)	US	"15"	ALWAYS	AUTO
Pixel Representation	(0028,0103)	US	"0"	ALWAYS	AUTO
RT Image Label	(3002,0002)	SH	Reference to beam or isocenter (see Note 8-9)	ALWAYS	CONFIG
RT Image Name	(3002,0003)	LO	Reference to beam or isocenter (see Note 8-9)	ALWAYS	CONFIG
RT Image Description	(3002,0004)	ST	Reference to beam or isocenter (see Note 8-9)	ALWAYS	CONFIG
Operators' Name	(0008,1070)	PN		ALWAYS	AUTO
Image Type	(0008,0008)	CS	"DERIVED\SECONDARY\DRR"	ALWAYS	AUTO
Conversion Type	(0008,0064)	CS	"WSD"	ALWAYS	AUTO
Reported Values Origin	(3002,000A)	CS	"PLAN"	ALWAYS	AUTO
RT Image Plane	(3002,000C)	CS	"NORMAL"	ALWAYS	AUTO
X-Ray Image Receptor Translation	(3002,000D)	DS		ALWAYS	CONFIG
X-Ray Image Receptor	(3002,000E)	DS	"0"	ALWAYS	AUTO

Angle					
RT Image Orientation	(3002,0010)	DS		ANAP	AUTO
Image Plane Pixel Spacing	(3002,0011)	DS		ALWAYS	CONFIG
RT Image Position	(3002,0012)	DS		ALWAYS	AUTO
Radiation Machine Name	(3002,0020)	SH		ALWAYS	CONFIG/USER
Exposure Sequence	(3002,0030)	SQ		ANAP	CONFIG
> Beam Limiting Device Sequence	(300A,00B6)	SQ		ANAP	AUTO
>> RT Beam Limiting Device Type	(300A, 00B8)	CS		ANAP	AUTO
>> Number of Leaf/Jaw Pairs	(300A,00BC)	IS		ANAP	AUTO
>> Leaf Position Boundaries	(300A,00BE)	DS		ANAP	AUTO
>> Leaf/Jaw Position	(300A,011C)	DS		ANAP	AUTO
Primary Dosimeter Unit	(300A,00B3)	CS	"MU"	ALWAYS	AUTO
Radiation Machine SAD	(3002,0022)	DS		ALWAYS	CONFIG
Radiation Machine SSD	(3002,0024)	DS		ALWAYS	AUTO
RT Image SID	(3002,0026)	DS		ALWAYS	CONFIG
Referenced RT Plan Sequence	(300C,0002)	SQ		ALWAYS	AUTO
>Referenced SOP Class UID	(0008,1150)	UI		ALWAYS	AUTO
>Referenced SOP Instance UID	(0008,1155)	UI		ALWAYS	AUTO
Referenced Beam Number	(300C,0006)	IS		ANAP	AUTO
Referenced Fraction Group Number	(300C,0022)	IS		ALWAYS	AUTO
Gantry Angle	(300A,011E)	DS		ALWAYS	USER/CONFIG
Beam Limiting Device Angle	(300A,0120)	DS		ALWAYS	AUTO
Patient Support Angle	(300A,0122)	DS		ALWAYS	AUTO
Table Top Vertical Position	(300A,0128)	DS		ALWAYS	CONFIG
Table Top Longitudinal Position	(300A,0129)	DS		ALWAYS	CONFIG
Table Top Lateral Position	(300A,012A)	DS		ALWAYS	CONFIG
Private Creator Code	(3273,0010)	LO	(see Note 8-15)	ANAP	USER/CONFIG
Isocenter Position	(3273,1000)	DS	(see Note 8-15)	ANAP	USER/CONFIG
Patient Position	(3273,1001)	CS	(see Note 8-15)	ANAP	USER/CONFIG
Isocenter Position	(300A,012C)	DS		ALWAYS	AUTO
Patient Position	(0018,5100)	CS		ALWAYS	AUTO

Table 8-35: RT Image Module

8.2 Data Dictionary Of Private Attributes

The Private Attributes added to created SOP Instances are listed in the Table below. BrainLAB reserves blocks of private attributes in group 0009 and 0099. Further details on usage of these private attributes are outlined in Section 8.1.

8.2.1 Group 0009

Tag	Attribute Name	VR	VM
(0009,xx01)	Export Platform Name	LO	1

Table 8-36: Data Dictionary Of Private Attributes For Group 0009

8.2.2 Group 3273

Tag	Attribute Name	VR	VM
(3273,0010)	Private Creator Code (see Note 8-15)	LO	1
(3273,1000)	Isocenter Position (see Note 8-15)	DS	3
(3273,1001)	Patient Position (see Note 8-15)	CS	1

Table 8-37: Data Dictionary of Private Attributes for Group 3273

Note 8-15: The private tags Isocenter Position and Patient Position are written because of backward compatibility. Some third party systems expect the isocenter position and the patient position within DICOM RT Image objects. For this reason iPlan RT Dose offers the possibility to enable a private group. This private group will not be written per default.

8.3 Coded Terminology And Templates

None supported.

8.4 Grayscale Image Consistency

Not supported.

8.5 Standard Extended/Specialized/Private Sop Classes

None supported.

8.6 Private Transfer Syntaxes

None supported.

9 Indexes

9.1 Index Of Tables

Table 1-1: Network services supported by iPlan RT Dose.....	3
Table 4-1: Supported Verification SOP Classes	10
Table 4-2: Supported Storage SOP Classes	10
Table 4-3: Supported Transfer Syntaxes.....	10
Table 4-4: Proposed Presentation Contexts for Activity Store.	11
Table 8-1: CT Image Storage IOD.....	19
Table 8-2: RT Structure Set Storage IOD.....	20
Table 8-3: RT Plan Storage IOD	20
Table 8-4: RT Dose Storage IOD	21
Table 8-5: RT Image Storage IOD.....	21
Table 8-6: Patient Module	22
Table 8-7: Clinical Trial Subject Module	22
Table 8-8: General Study Module.....	23
Table 8-9: Patient Study Module	23
Table 8-10: Clinical Trial Study Module	23
Table 8-11: General Series Module.....	23
Table 8-12: RT Series Module	23
Table 8-13: Clinical Trial Series Module	24
Table 8-14: Frame of Reference Module.....	24
Table 8-15: General Equipment Module.....	24
Table 8-16: General Image Module	24
Table 8-17: Image Plane Module	24
Table 8-18: Image Pixel Module.....	25
Table 8-19: CT Image Module.....	25
Table 8-20: Multi-frame Module.....	25
Table 8-21: VOI LUT Module	25
Table 8-22: SOP Common Module	26
Table 8-23: Structure Set Module.....	26
Table 8-24: ROI Contour Module	27
Table 8-25: RT ROI Observations Module	27
Table 8-26: Approval Module	27
Table 8-27: RT General Plan Module.....	28
Table 8-28: RT Prescription Module.....	29
Table 8-29: RT Tolerance Tables Module	29
Table 8-30: RT Patient Setup Module	29
Table 8-31: RT Fraction Scheme Module.....	30
Table 8-32: RT Beams Module	32
Table 8-33: RT Dose Module	33
Table 8-34: RT DVH Module	34
Table 8-35: RT Image Module.....	35
Table 8-36: Data Dictionary Of Private Attributes For Group 0009	36
Table 8-37: Data Dictionary of Private Attributes for Group 3273	36

9.2 Index Of Figures

Figure 4-1: The Storage SCU application flow diagram.....	9
---	---

(This page is intentionally left blank)