

Regarding Leksell GammaPlan® & Leksell SurgiPlan®	Document Pd117_CONFSTAT	Date 2012-10-15	Edition 11	Page 1 (57)
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## **DICOM Conformance Statement**

### **Leksell GammaPlan® & Leksell SurgiPlan®**

#### **10.2**

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# 1 Introduction

## 1.1 Scope and field of application

The scope of this DICOM conformance statement is to facilitate data exchange with equipment of Elekta Neuro Sciences. This document specifies the conformance to the DICOM standard (formally called the NEMA PS3.X-1993 standards). It contains a short description of the applications involved and provides technical information about the data exchange capabilities of the equipment. The main elements describing these capabilities are the supported DICOM service object pairs (SOP) classes, Roles and Transfer Syntaxes.

## 1.2 Reference documents

*Digital Imaging and Communications in Medicine (DICOM)*. Version 3.0. National Electrical Manufacturer's Association. Rosslyn, VA, United States of America. 2011.

## 1.3 Revision history

Issue	Date	Author	Status	Description
1	1999-10	JrC	Approved	Version for SIF 4.6
2	2002-02-25	EH	Approved	Approved for SIF 4.7 (description of PET support added)
3	2003-08-11	EH	Approved	Approved for SIF 4.7.2 (support for PET added).
4	2005-06-30	ErSa	Approved	Approved for SIF 4.7.2.
5	2006-03-22	HBo	Approved	Approved for Leksell GammaPlan® 7.
6	2006-10-24	ErSa	Approved	Approved for Leksell GammaPlan® 7 (support for reading CD-R).
7	2008-09-12	ErSa	Approved	Approved for Leksell GammaPlan® and Leksell SurgiPlan® 8.2
8	2008-09-12	ErSa	Approved	Approved for Leksell GammaPlan® and Leksell SurgiPlan® 8.3
9	2008-09-21	ErSa	Approved	Approved for Leksell GammaPlan® and Leksell SurgiPlan® 9.
10	2010-10-29	ErSa	Approved	Approved for Leksell GammaPlan® and Leksell SurgiPlan® 10.0
10.1	2012-09-20	ErSa	Draft	Updated for Leksell GammaPlan® and Leksell SurgiPlan® 10.2
11	2012-10-15	ErSa	Approved	Approved for Leksell GammaPlan® and Leksell SurgiPlan® 10.2

## 1.4 Terminology

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Term	Explanation
AE	Application Entity
AET	Application Entity Title
AP	Application Profile
FSR	File Set Reader
FSC	File Set Creator
PDU	Protocol data unit
SCP	Service Class Provider
SCU	Service Class User
SOP	Service Object Pair
UID	Unique Identifier
NTPS	The abbreviation for Leksell GammaPlan and Leksell SurgiPlan is Neuro Treatment planning system NTPS.

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## 1.5 Important notes

This Conformance Statement by itself does not guarantee successful interoperability of Elekta equipment with non-Elekta equipment. The user (or user's agent) should be aware of the following issues:

### Scope

The goal of DICOM is to facilitate inter-connectivity rather than interoperability. Interoperability refers to the ability of application functions, distributed over two or more systems, to work successfully together. The integration of medical devices into a networked environment may require application functions that are not specified within the scope of DICOM. Consequently, using only the information provided by this Conformance Statement does not guarantee interoperability of Elekta equipment with non-Elekta equipment. It is the user's responsibility to analyze thoroughly the application requirements and to specify a solution that integrates Elekta equipment with non-Elekta equipment.

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## Validation

Elekta equipment has been carefully tested to assure that the actual implementation of the DICOM interface corresponds with this Conformance Statement. Where Elekta equipment is linked to non-Elekta equipment, the first step is to compare the relevant Conformance Statements. If the Conformance Statements indicate that successful information exchange should be possible, additional validation tests will be necessary to ensure the functionality, performance, accuracy and stability of image and image related data. It is the responsibility of the user (or user's agent) to specify the appropriate test suite and to carry out the additional validation tests.

## New versions of the DICOM Standard

The DICOM standard will evolve in future to meet the user's growing requirements and to incorporate new features and technologies. Elekta plans to adapt its equipment to future versions of the DICOM standard. In order to do so, Elekta reserves the right to make changes to its products or to discontinue its delivery. The user should ensure that any non-Elekta provider linking to Elekta equipment also adapts to future versions of the DICOM Standard. If not, the incorporation of DICOM enhancements into Elekta equipment may lead to loss of connectivity (in case of networking) and incompatibility (in case of media).

## 2 Implementation Model

The Elekta Neuro Treatment Planning system consist of one Elekta Storage Server Application Entity connected to one or more Leksell GammaPlan® or Leksell SurgiPlan® Treatment Planning Workstations.

### 2.1 Applications data flow diagrams

The application data flows for the different services supported by the Elekta Storage Server, Leksell GammaPlan® and Leksell SurgiPlan® are described below.

#### Verification SCU

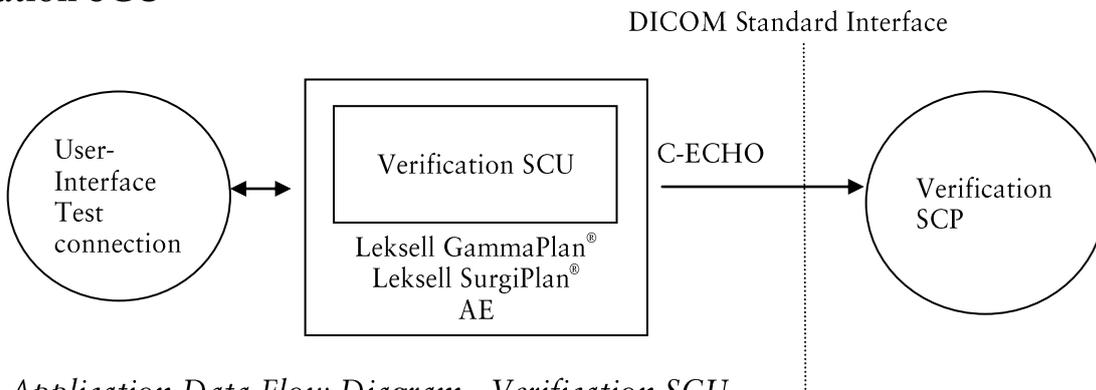


Figure 1 Application Data Flow Diagram - Verification SCU.

#### Verification SCP

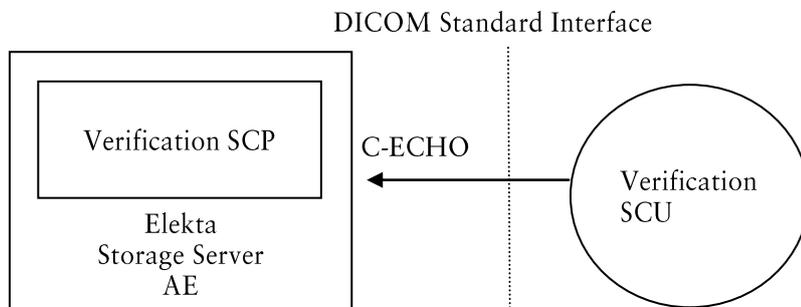


Figure 2 Application Data Flow Diagram - Verification SCP.

### Storage SCP

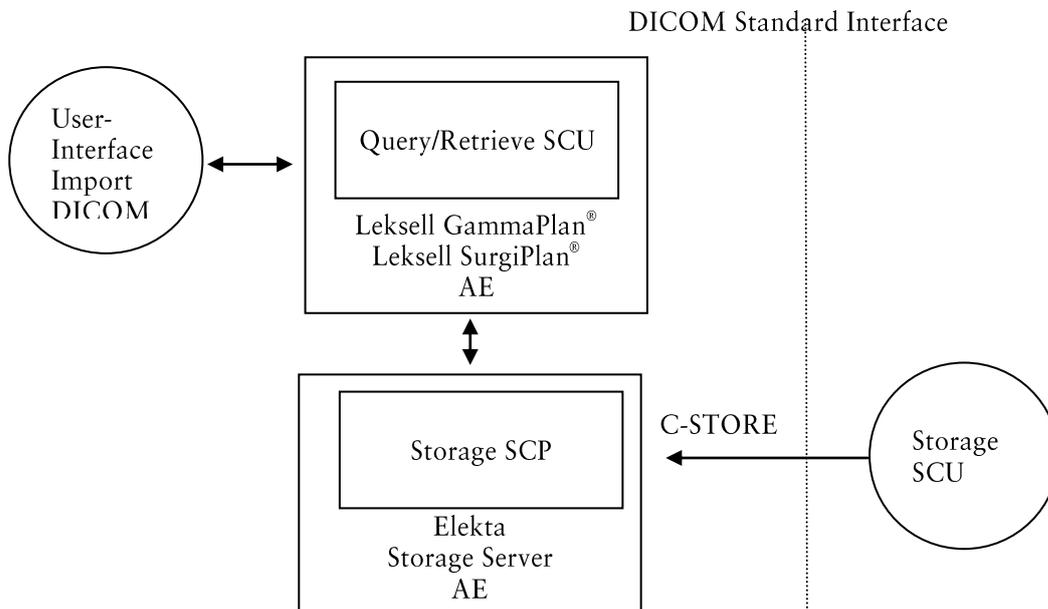


Figure 3 Application Data Flow Diagram - Storage SCP.

### Storage SCU

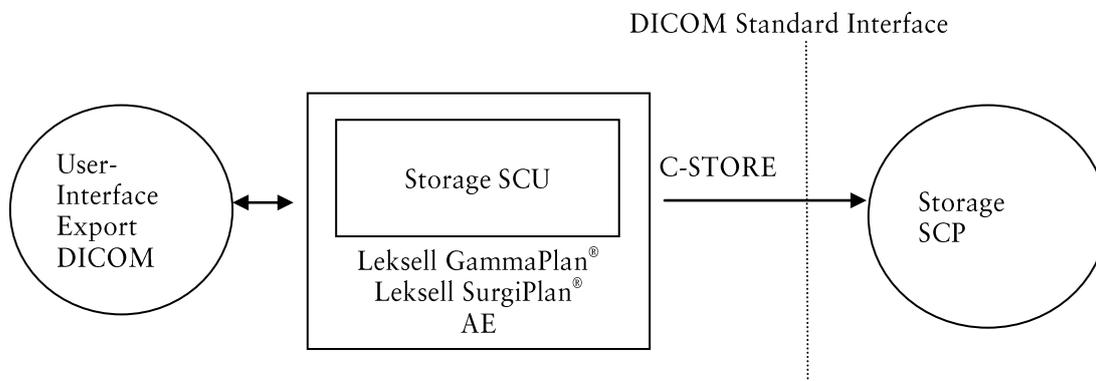


Figure 4 Application Data Flow Diagram - Storage SCU.

**Query/Retrieve SCP**

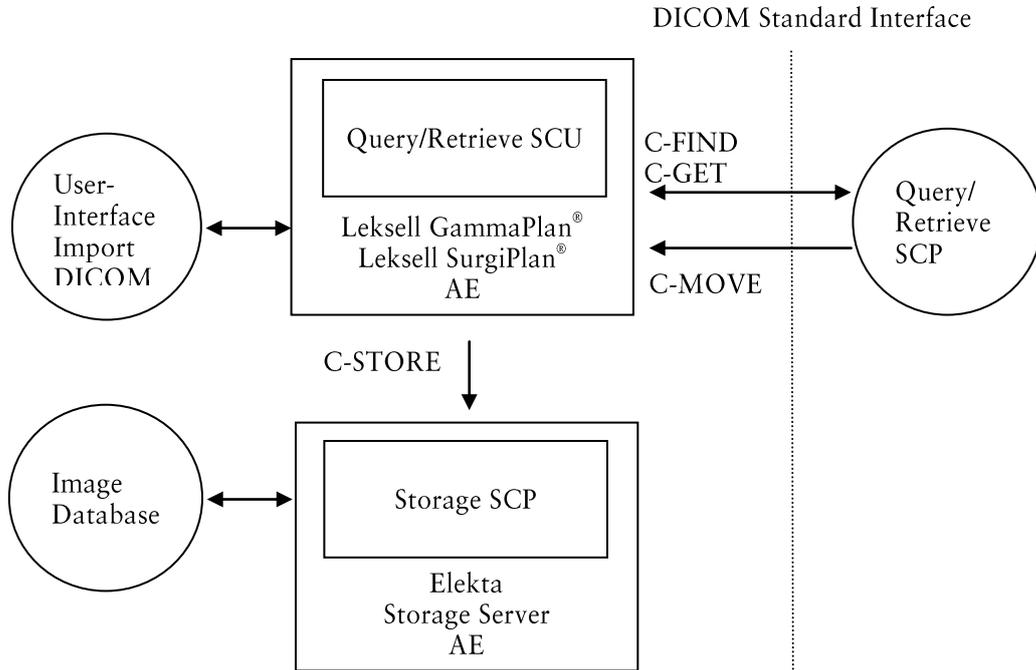


Figure 5 Application Data Flow Diagram – Query/Retrieve SCP.

**File Set Reader**

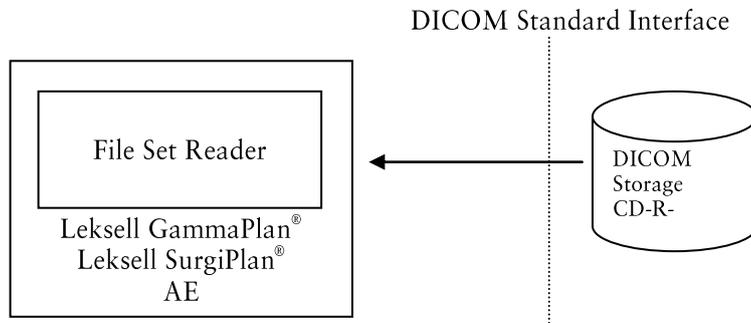


Figure 6 Application Data Flow Diagram – File Set Reader from DICOM CD-R.

Note: This is a partially conformant File Set Reader as it is able to perform M-READ but not MINQUIRE FILE Media Storage Operation.

## File Set Writer

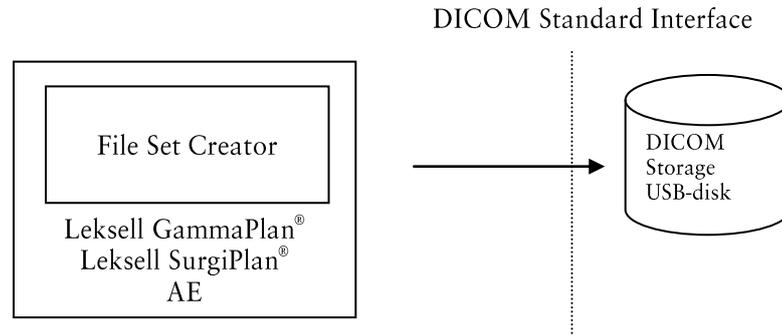


Figure 7 Application Data Flow Diagram – File Set Writer to USB medium.

Note: This is a partially conformant File Set Creator as it is able to perform M-WRITE but not M-INQUIRE FILE or MINQUIRE FILESET Media Storage Operation.

## 2.2 Functional definitions of Application Entity

### Elekta Storage Server

The Elekta Storage Server waits for another application to connect at the TCP/IP port number 104. When another application makes a DICOM association request, the Storage Server acts as a SCP for the storage service class: It stores the DICOM objects in the inbox of the Leksell GammaPlan® and Leksell SurgiPlan® Treatment Planning. The Storage Server also acts as a SCP for the verification service class: It responds to C-ECHO requests from other applications.

### Leksell GammaPlan® and Leksell SurgiPlan®

Leksell GammaPlan® and Leksell SurgiPlan® are DICOM Clients (SCU) for the purpose of

- Importing DICOM Images and DICOM RT Structure Sets, drawn in the image planes of an already imported image series.
- Requests a remote query/retrieve SCP to perform a search and match to the keys specified in the request in order to display the results in the Leksell GammaPlan® and Leksell SurgiPlan® user interface. Depending on user action (Import) Leksell GammaPlan® and Leksell SurgiPlan® sends a C-GET or a C-MOVE request to initiate a C-STORE operation on the SCP to start an image transfer from the remote query/retrieve SCP to Leksell GammaPlan® and Leksell SurgiPlan®. A C-MOVE request is only sent if the query/retrieve SCP does not support the C-GET service.
- Exporting DICOM Images and DICOM Structure sets object to a remote Service Class Provider (DICOM Server). Leksell GammaPlan® also exports DICOM RT Dose and DICOM RT Plan objects. The RT objects can be exported together with an image series. Only 3D volumes can be exported. The DICOM RT Dose object contains the global dose distribution within the skull for the currently active treatment plan. A DICOM RT Plan object is created and used to connect the dose object with the structure sets and images. The DICOM RT Object can be exported together with CT, MR and PET images.
- Writing DICOM Images and DICOM Structure sets objects to a USB flash drive. Leksell GammaPlan® also writes DICOM RT Dose and DICOM RT Plan objects. This is a partially conformant File Set Creator (FSC) as it is able to perform M-WRITE but not M-INQUIRE FILE SET or M-INQUIRE FILE Media Storage Operation.

- Reading DICOM object stored on a CD-ROM. This is a partially conformant File Set Reader (FSR) as it is able to perform M-READ but not M-INQUIRE FILE Media Storage Operation.
- Echo Utility for test and validation purposes. It sends a verify request to a specified DICOM node. It acts as a SCU for the verification service class.

### **2.3 Sequencing of Real World Activities**

The user “verification” of a remote application can be made during a configuration session of the remote applications. Retrieve of images is only possible if results from a previous “Search...” operation exists and those entities can be selected for “Import”.

### 3 AE specifications

#### 3.1 Elekta Storage Server AE Specification - Storage

The Elekta Storage Server Application Entity provides Standard Conformance to the following DICOM V3.0 SOP classes for storage as a SCP:

SOP Class Name	UID
CT Image Storage	1.2.840.10008.5.1.4.1.1.2
MR Image Storage	1.2.840.10008.5.1.4.1.1.4
XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1
PET Image Storage	1.2.840.10008.5.1.4.1.1.128
RT Structure Set	1.2.840.10008.5.1.4.1.1.481.3
SC Image Storage	1.2.840.10008.5.1.4.1.1.7

Table 1: SOP Classes for storage supported by the Elekta Storage Server.

### Association Establishment Policies

#### General

The Elekta Storage Server accepts association in response to C-STORE requests from other Applications Entities. It will accept C-STORE requests for CT, MR, XA, PET, RT Structure Set and SC SOP classes and in this case will act as storage service class provider. The Storage Server is a LINUX daemon, waits for C-STORE requests, and performs the necessary operations upon it receiving such requests.

#### Number of Associations

The number of simultaneous associations that will be accepted by the Elekta Storage Server is limited to 5.

#### Asynchronous Nature

The Elekta Storage Server does not perform asynchronous operations window negotiation.

#### Implementation Identifying Information

The Elekta Storage Server does not export any DICOM object. The only occasion where an Implementation Identifier may be used is during the establishment of the association with a DICOM peer. For this reason the implementation identifying information of the OFFIS DCMTK DICOM toolkit has been kept unchanged:

IMPLEMENTATION\_CLASS\_UID = 1.22276.0.7230010.3.0.3.5.4

IMPLEMENTATION\_VERSION= OFFIS\_DCMTK\_354

#### Association Initiation by Real World Activity

The Elekta Storage Server never initiates an association.

## Association Acceptance Policy

### Remote System Requests Image Storage on the Elekta Storage Server

#### Associated Real World Activity – Storage Provider

A DICOM AE sends a storage request to the Elekta Storage Server. If the request is accepted the images and objects are stored on the Elekta Storage Server.

#### Presentation context table - storage

Presentation Context Table					
Abstract Syntax		Transfer Syntax List		Role	Extended Negotiation
Name	UID	Name	UID		
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
PET Image Storage	1.2.840.10008.5.1.4.1.1.12.8	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.48.1.3	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

		Explicit VR Big Endian	1.2.840.10008.1.2.2		
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Table 2: Presentation context table: C-STORE service

**C-STORE SCP conformance**

The Elekta Storage Server is Conformance Level 0 Storage SCP. The stored attributes may be accessed only through Leksell GammaPlan® and Leksell SurgiPlan® and only for display. The duration of storage of these attributes is at the user discretion.

**Presentation context acceptance criterion**

The Elekta Storage Server will accept any context listed in Table 2. There is no check for duplicate contexts.

**Transfer syntax selection policies**

The preference in acceptance of Transfer Syntaxes is:

Implicit Little Endian above Explicit Little Endian above Explicit Big Endian

**3.2 Elekta Storage Server AE Specification - Verification**

The Elekta Storage Server Application Entity provides Standard Conformance to the Verification DICOM V3.0 SOP class as a SCP:

SOP Class Name	UID
Verification	1.2.840.10008.1.1

Table 3: SOP Classes for verification supported by the Elekta Storage Server.

**General**

The Elekta Storage Server accepts association in response to C-ECHO requests and act as verification service class provider. The Storage Server is a LINUX daemon, waits for C-ECHO requests, and performs the necessary operations upon it receiving such requests.

**Number of Associations**

The number of simultaneous associations that will be accepted by the Elekta Storage Server is limited to 5.

**Asynchronous Nature**

The Elekta Storage Server does not perform asynchronous operations window negotiation.

**Implementation Identifying Information**

The Elekta Storage Server does not export any DICOM object. The only occasion where an Implementation Identifier may be used is during the establishment of the association with a DICOM peer. For this reason the implementation identifying information of the OFFIS DCMTK DICOM toolkit has been kept unchanged:

IMPLEMENTATION\_CLASS\_UID = 1.22276.0.7230010.3.0.3.5.4

IMPLEMENTATION\_VERSION= OFFIS\_DCMTK\_354

**Association Initiation by Real World Activity**

The Elekta Storage Server never initiates an association.

**Association Acceptance Policy**

**Remote system requests verification**

**Associated real world activity – Verification Provider**

A remote DICOM AE wish to verify the application level communication using the C-ECHO command.

**Presentation context table - verification**

Presentation Context Table					
Abstract Syntax		Transfer Syntax List		Role	Extended Negotiation
Name	UID	Name	UID		
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	SCP	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None

Table 4: Presentation context table: C-ECHO service

**C-ECHO SCP conformance**

The Elekta Storage Server provides standard conformance to the C-ECHO service as a Service Class Provider.

**Presentation context acceptance criterion**

The only accepted presentation context is defined in Table 4.

**Transfer syntax selection policies**

The preference in acceptance of Transfer Syntaxes is:

Implicit Little Endian above Explicit Little Endian above Explicit Big Endian

**3.3 Leksell GammaPlan® and Leksell SurgiPlan® AE - Storage**

Leksell GammaPlan® and Leksell SurgiPlan® Application Entity provides Standard Conformance the following DICOM V3.0 SOP classes for storage as a SCU:

SOP Class Name	UID
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CT Image Storage	1.2.840.10008.5.1.4.1.1.2
MR Image Storage	1.2.840.10008.5.1.4.1.1.4
PET Image Storage	1.2.840.10008.5.1.4.1.1.128
<sup>1</sup> S Image Storage	1.2.840.10008.5.1.4.1.1.7
RT Structure Set	1.2.840.10008.5.1.4.1.1.481.3

Table 5: SOP Classes for storage supported by Leksell GammaPlan® and Leksell SurgiPlan®.

Leksell GammaPlan® Application Entity also provides Standard Conformance the following DICOM V3.0 SOP classes as a SCU:

SOP Class Name	UID
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5

Table 6: SOP Classes supported only by Leksell GammaPlan® only.

## Association Establishment Policies

### General

The maximum PDU size for Leksell GammaPlan® and Leksell SurgiPlan® can be configurable from a minimum of 4 Kbytes. There is no upper limit. It is limited by the available system resources. The default value is 64 Kbytes.

### Number of Associations

Leksell GammaPlan® and Leksell SurgiPlan® support one active association at a time as a Service Class User.

### Asynchronous Nature

Leksell GammaPlan® and Leksell SurgiPlan® do not support asynchronous operations and will not perform asynchronous window negotiation.

### Implementation Identifying Information

IMPLEMENTATION\_CLASS\_UID = 1.2.840.113854.88

IMPLEMENTATION\_VERSION= ELEKTA\_NTPS\_10.2

### Association Initiation by Real World Activity

Leksell GammaPlan® or Leksell SurgiPlan® sends a C-STORE request to a remote Applications Entities.

### Association Initiation Policy

- Leksell GammaPlan® and Leksell SurgiPlan® initiates associations for the purpose of
- Export DICOM objects to PACS, Linac or other similar systems

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<sup>1</sup> Only Secondary Capture of tomographic images can be sent to a remote Application Entity.

## Association Acceptance Policy

Leksell GammaPlan® or Leksell SurgiPlan® does not accept associations.

## Requests for DICOM Object Storage on Remote Systems

### Associated Real World Activity – Storage User

Leksell GammaPlan® and Leksell SurgiPlan® requests associations with remote systems that it wishes to send DICOM objects to.

### Presentation context table - storage

Presentation Context Table					
Abstract Syntax		Transfer Syntax List		Role	Extended Negotiation
Name	UID	Name	UID		
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	BOTH	None
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Implicit VR Little Endian	1.2.840.10008.1.2	BOTH	None
PET Image Storage	1.2.840.10008.5.1.4.1.1.128	Implicit VR Little Endian	1.2.840.10008.1.2	BOTH	None
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	BOTH	None
Secondary Capture Storage	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian	1.2.840.10008.1.2	BOTH	None

Table 7: Presentation context table: C-STORE service for Leksell GammaPlan® and Leksell SurgiPlan®.

Presentation Context Table					
Abstract Syntax		Transfer Syntax List		Role	Extended Negotiation
Name	UID	Name	UID		
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	Implicit VR Little Endian	1.2.840.10008.1.2	BOTH	None
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	Implicit VR Little Endian	1.2.840.10008.1.2	BOTH	None

Table 8: Presentation context table: C-STORE service for Leksell GammaPlan® only

### C-STORE SCU conformance

Leksell GammaPlan® and Leksell SurgiPlan® provides standard conformance for Storage as a SCU. The systems performs a Conformance Level 0 for Storage, i.e., not all DICOM Type 1 and 2 attributes received earlier by another module may have been stored for re-export.

### Presentation context acceptance criterion

Not applicable.

#### Transfer syntax selection policies

Not applicable.

### 3.4 Leksell GammaPlan® and Leksell SurgiPlan® AE – Verification

Leksell GammaPlan® and Leksell SurgiPlan® Application Entity provides Standard Conformance the following DICOM V3.0 SOP classes for verification as a SCU for :

SOP Class Name	UID
Verification	1.2.840.10008.1.1

Table 9: SOP Classes for verification supported by Leksell GammaPlan® and Leksell SurgiPlan®.

## Association Establishment Policies

### General

The maximum PDU size for Leksell GammaPlan® and Leksell SurgiPlan® can be configurable from a minimum of 4 Kbytes. There is no upper limit. It is limited by the available system resources. The default value is 64 Kbytes.

### Number of Associations

Leksell GammaPlan® and Leksell SurgiPlan® support one active association at a time as a Service Class User.

### Asynchronous Nature

Leksell GammaPlan® and Leksell SurgiPlan® do not support asynchronous operations and will not perform asynchronous window negotiation.

### Implementation Identifying Information

IMPLEMENTATION\_CLASS\_UID = 1.2.840.113854.88

IMPLEMENTATION\_VERSION= ELEKTA\_NTPS\_10.2

### Association Initiation by Real World Activity

Leksell GammaPlan® or Leksell SurgiPlan® sends a C-ECHO request to a remote Applications Entities.

### Association Initiation Policy

Leksell GammaPlan® and Leksell SurgiPlan® initiates associations for the purpose of

- Verify the application level communication to another system

### Association Acceptance Policy

Leksell GammaPlan® or Leksell SurgiPlan® does not accept associations.

**Remote system requests verification**

**Associated real world activity – Verification User**

Leksell GammaPlan® or Leksell SurgiPlan® requests associations from remote systems to verify the application level communication using the C-ECHO command.

**Presentation context table - Verification**

Presentation Context Table					
Abstract Syntax		Transfer Syntax List		Role	Extended Negotiation
Name	UID	Name	UID		
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

Table 10: Presentation context table: C-ECHO service

**C-ECHO SCU conformance**

Leksell GammaPlan® and Leksell SurgiPlan® provides standard conformance for Verification as SCU.

**Presentation context acceptance criterion**

Not applicable.

**Transfer syntax selection policies**

Not applicable.

**3.5 Leksell GammaPlan® and Leksell SurgiPlan® AE Specification – Query/Retrieve**

Leksell GammaPlan® and Leksell SurgiPlan® Application Entity provides Standard Conformance the following DICOM V3.0 SOP classes for Query/Retrieve as a SCU<sup>2</sup>:

SOP Class Name	UID
Patient Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1
Study Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1
Patient Root Query/Retrieve Information Model - GET	1.2.840.10008.5.1.4.1.2.1.3
Patient Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2

Table 11: SOP Classes for Query/Retrieve supported by Leksell GammaPlan® and Leksell SurgiPlan®.

<sup>2</sup> A license is required for the Query/Retrieve functionality.

## Association Establishment Policies

### General

The maximum PDU size for Leksell GammaPlan® and Leksell SurgiPlan® can be configurable from a minimum of 4 Kbytes. There is no upper limit. It is limited by the available system resources. The default value is 64 Kbytes.

### Number of Associations

Leksell GammaPlan® and Leksell SurgiPlan® support one active association at a time as a Service Class User.

### Asynchronous Nature

Leksell GammaPlan® and Leksell SurgiPlan® do not support asynchronous operations and will not perform asynchronous window negotiation.

### Implementation Identifying Information

IMPLEMENTATION\_CLASS\_UID = 1.2.840.113854.88  
IMPLEMENTATION\_VERSION= ELEKTA\_NTPS\_10.2

### Association Initiation by Real World Activity

Leksell GammaPlan® or Leksell SurgiPlan® sends a C-FIND request to a remote Applications Entity followed by a C-GET request if the Entity supports a C-MOVE request is sent otherwise.

### Association Initiation Policy

- Leksell GammaPlan® and Leksell SurgiPlan® initiates associations for the purpose of
- Finding DICOM objects on remote Application Entities
  - Retrieve DICOM objects from remote Application Entities

### Requests for finding DICOM Object on Remote Systems

#### Associated Real World Activity - Find

Leksell GammaPlan® and Leksell SurgiPlan® send a C-FIND request when the user queries a remote Query/Retrieve SCP for patients, studies, series or objects. The search on the STUDY level is performed using the Study Root Query Retrieve Information Model with the following tags:

Description	Tag	Value
Patient's Name	(0010,0010)	The value is entered in the GUI. Non ascii letters included in the entered value will be replaced by a question mark (?).
Patient ID	(0010,0020)	The value is entered in the GUI
Study Date	(0008,0020)	A date range is entered in the GUI.
Query/Retrieve level	(0008,0052)	STUDY
Study Time	(0008,0030)	Empty
Study ID	(0020,0010)	Empty

Study Instance UID	(0020,000d)	Empty
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The search on the SERIES level is performed using the Patient Root Query Retrieve Information Model with the following tags:

Description	Tag	Value
Patient ID	(0010,0020)	From the STUDY level query.
Study Instance UID	(0020,000d)	From the STUDY level query
Query/Retrieve level	(0008,0052)	SERIES
Modality	(0008,0060)	Empty
Series Instance UID	(0020,000e)	Empty
Series Number	(0020,0011)	Empty

The search on the IMAGE level is performed using the Patient Root Query Retrieve Information Model with the following tags:

Description	Tag	Value
Patient ID	(0010,0020)	From the STUDY level query.
Study Instance UID	(0020,000d)	From the STUDY level query
Series Instance UID	(0020,000e)	From the SERIES level query
Query/Retrieve level	(0008,0052)	IMAGE
SOP Instance UID	(0008,0018)	Empty
Instance Number	(0020,0013)	Empty

The attributes with empty values or with wild cards “\*” or “?” above are retrieved from the Query/Retrieve SCP. Leksell GammaPlan® and Leksell SurgiPlan®.does not support code extension techniques multiple values of Specific Character Sets are not supported.

**Presentation context table - Find**

Presentation Context Table					
Abstract Syntax		Transfer Syntax List		Role	Extended Negotiation
Name	UID	Name	UID		
Patient Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	BOTH	None
Study Root Query/Retrieve Information	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian	1.2.840.10008.1.2	BOTH	None

Model – FIND					
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Table 12: Presentation context table: C-FIND service for Leksell GammaPlan® and Leksell SurgiPlan®.

**C-FIND SCU conformance**

Leksell GammaPlan® and Leksell SurgiPlan® provides standard conformance for the C-FIND service as SCU.

**Presentation context acceptance criterion**

Not applicable.

**Transfer syntax selection policies**

Not applicable.

**Requests for retrieving DICOM Object on Remote Systems**

**Associated Real World Activity – Move/Get**

Leksell GammaPlan® and Leksell SurgiPlan® requests associations for retrieving DICOM objects on remote DICOM AE. On user selection of a specific DICOM series or a DICOM object, a C-GET request is sent to systems supporting the C-GET service if this service is not supported a C\_MOVE request is sent. When retrieving a selected DICOM series a C-FIND request on the IMAGE level is sent before the C-GET/C-MOVE request. The C-GET/C-MOVE request will include the following tags:

Description	Tag	Value
Patient ID	0010,0020	From the previous C-FIND query
Study Instance UID	0020,000d	From the previous C-FIND query
Series Instance UID	0020,000e	From the previous C-FIND query
SOP Instance UID	0008,0018	A vector of values from the preceding C-FIND query when retrieving DICOM series. One value when retrieving a DICOM object.

**Presentation context table – Move/Get**

Presentation Context Table					
Abstract Syntax		Transfer Syntax List		Role	Extended Negotiation
Name	UID	Name	UID		
Patient Root Query/Retrieve Information Model - GET	1.2.840.10008.5.1.4.1.2.1.3	Implicit VR Little Endian	1.2.840.10008.1.2	BOTH	None
Patient Root Query/Retrieve Information	1.2.840.10008.5.1.4.1.2.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	BOTH	None

Model - MOVE					
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Table 13: Presentation context table: C-GET and C-MOVE service for Leksell GammaPlan® and Leksell SurgiPlan®.

**C-GET conformance**

Leksell GammaPlan® and Leksell SurgiPlan® provides standard conformance for the C-GET service as SCU.

**C-MOVE SCU conformance**

Leksell GammaPlan® and Leksell SurgiPlan® provides standard conformance for the C-MOVE service as SCU.

## 4 Communication profiles

### 4.1 Supported Communication Stacks

The Elekta Storage Server, Leksell GammaPlan® and Leksell SurgiPlan® provide DICOM V3.0 TCP/IP Network Communication Support as defined in part 8 of the DICOM standard.

### 4.2 TCP/IP Stack

Elekta Storage Server inherits the TCP/IP stack from the LINUX operating system upon which they execute.

### 4.3 OSI Stack

Not supported.

### 4.4 Physical Media Support

## Reading DICOM Object stored on CD-ROM

### Specification

Leksell GammaPlan® and Leksell SurgiPlan® can read DICOM part 10 formatted Objects stored on CD-R with the ISO/IEC 9660 Media Format. All DICOM objects on the CD-R will be sent to the Elekta Storage Server. I.e. the DICOM Directory File (DICOMDIR) is not used and it is not possible to select separate files to be stored. The Leksell GammaPlan® and Leksell SurgiPlan® are then not conformant to any application profiles defined in the DICOM standard. DICOM objects without Meta information will also be sent to the Elekta Storage Server.

Leksell GammaPlan® and Leksell SurgiPlan® is partially conformant as FSR because it supports the M-READ service but does not the M-INQUIRE FILE service. The following table defines which objects are read by the application and which transfer syntaxes are supported:

Information Object Definition	Service Object Pair Class UID	Transfer Syntax	UID
CT Image	1.2.840.10008.5.1.4.1.1.2	Implicit VR Little Endian	1.2.840.10008.1.2
		Explicit VR Little Endian	1.2.840.10008.1.2.1
		Explicit VR Big Endian	1.2.840.10008.1.2.2
		JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14 [Selection Value 1])	1.2.840.10008.1.2.4.70
		JPEG Lossless, Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57
MR Image	1.2.840.10008.5.1.4.1.1.4	Implicit VR Little Endian	1.2.840.10008.1.2
		Explicit VR Little Endian	1.2.840.10008.1.2.1
		Explicit VR Big Endian	1.2.840.10008.1.2.2

		JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14 [Selection Value 1])	1.2.840.10008.1.2.4.70
		JPEG Lossless, Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57
X-Ray Angiographic Image	1.2.840.10008.5.1.4.1.1.12.1	Implicit VR Little Endian	1.2.840.10008.1.2
		Explicit VR Little Endian	1.2.840.10008.1.2.1
		Explicit VR Big Endian	1.2.840.10008.1.2.2
		JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14 [Selection Value 1])	1.2.840.10008.1.2.4.70
		JPEG Lossless, Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57
PET Image	1.2.840.10008.5.1.4.1.1.128	Implicit VR Little Endian	1.2.840.10008.1.2
		Explicit VR Little Endian	1.2.840.10008.1.2.1
		Explicit VR Big Endian	1.2.840.10008.1.2.2
		JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14 [Selection Value 1])	1.2.840.10008.1.2.4.70
		JPEG Lossless, Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57
Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian	1.2.840.10008.1.2
		Explicit VR Little Endian	1.2.840.10008.1.2.1
		Explicit VR Big Endian	1.2.840.10008.1.2.2
		JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14 [Selection Value 1])	1.2.840.10008.1.2.4.70
		JPEG Lossless, Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57
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
		Explicit VR Little Endian	1.2.840.10008.1.2.1
		Explicit VR Big Endian	1.2.840.10008.1.2.2

Table 14: Media Storage: Objects and Transfer

## Writing DICOM Object to USB flash drives

**Specification**

Leksell GammaPlan® and Leksell SurgiPlan® can write DICOM part 10 formatted objects to USB flash drives. They are partially conformant as FSC as it is able to perform M-WRITE but not M-INQUIRE FILE SET or M-INQUIRE FILE Media Storage Operation. They are not conformant to any application profiles defined in the DICOM standard. The following table defines which objects are written by the applications and which transfer syntaxes are supported:

Information Object Definition	Service Object Pair Class UID	Transfer Syntax	UID
CT Image	1.2.840.10008.5.1.4.1.1.2	Implicit VR Little Endian	1.2.840.10008.1.2
MR Image	1.2.840.10008.5.1.4.1.1.4	Implicit VR Little Endian	1.2.840.10008.1.2
X-Ray Angiographic Image	1.2.840.10008.5.1.4.1.1.12.1	Implicit VR Little Endian	1.2.840.10008.1.2
PET Image	1.2.840.10008.5.1.4.1.1.128	Implicit VR Little Endian	1.2.840.10008.1.2
Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian	1.2.840.10008.1.2
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	Implicit VR Little Endian	1.2.840.10008.1.2

Table 15: Media Storage: Objects and Transfer supported by Leksell GammaPlan® and Leksell SurgiPlan®.

Leksell GammaPlan® also supports writing the following objects:

Information Object Definition	Service Object Pair Class UID	Transfer Syntax	UID
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	Implicit VR Little Endian	1.2.840.10008.1.2
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	Implicit VR Little Endian	1.2.840.10008.1.2

Table 16: Media Storage: Objects and Transfer supported only by Leksell GammaPlan®

## 5 Extensions, Specialization, Privatization

### 5.1 Private Data Elements

Private Attributes are added to the RT Plan exported by Leksell GammaPlan® if the Dose Reference Type (300A,0020) is TARGET. The used group is 0009 and the private identification code is added to element 0010. Thereby we have reserve the block 0009,1000 – 0009,10FF.

Attribute Name	Tag	Type	Value Type	Value Multiplicity	Attribute Description	Pd051
> Implementor Identification Code	(0009,0010)	1	LO	1	Identifier for the implementor reserving the private elements.	ELEKTA GAMMAPLAN
> Target Bounding Box Size	(0009,1020)	3	DS	3	A vector defining the size in the X, Y and Z directions of the Patient Coordinate System, the values given in mm of a bounding box containing the target.	
> Target Volume Size	(0009,1021)	3	DS	1	The size in cubic centimeters of the target volume (TV). <sup>3</sup>	
> Prescription Isodose Volume Size	(0009,1022)	3	DS	1	The size in cubic centimeters of the the prescription isodose volume (PIV) <sup>3</sup> .	
> Prescription Isodose Volume in Target	(0009,1023)	3	DS	1	The size in cubic centimeters of the part of the prescription isodose volume (PIV) that is inside the target volume (TV), i.e. $\text{Volume}(\text{PIV} \cap \text{TV})$ . <sup>3</sup>	
> Paddick Conformity Index	(0009,1024)	3	DS	1	The conformity index defined by Paddick: $\text{Volume}(\text{PIV} \cap \text{TV})^2 / (\text{Volume}(\text{TV}) * \text{Volume}(\text{PIV}))$ <sup>4</sup>	
> Dose Gradient Index	(0009,1025)	3	DS	1	The quotient between the half-prescription isodose volume size and the prescription isodose volume size. <sup>4</sup>	
> 12 Gy Volume	(0009,1026)	3	DS	1	The size in cubic centimeters of the the volume receiving more than 12 Gy. <sup>3</sup>	
> Target Prescription Isodose	(0009,1027)	3	DS	1	The isodose in percent to which the dose (300A,0026) is prescribed. <sup>5</sup>	

Table 17: Private Data Elements included in the RT Plan exported by Leksell GammaPlan®.

<sup>3</sup> Will be set to zero if no target is defined.

<sup>4</sup> Will be set to NULL if no target is defined.

<sup>5</sup> Will not be included if no target is defined.

## 6 Configuration

### 6.1 Elekta Storage Server

The Application Entity Title for the Storage Server and the port is defined in a configuration file. The default AET (as generated when the application is installed) is ELEKTA\_STORAGE and the port is 104. This configuration is intended to be performed by Elekta service engineers only.

### 6.2 Leksell GammaPlan® and Leksell SurgiPlan®

The AET of Leksell GammaPlan® and Leksell SurgiPlan® can be configured in the user interface. Leksell GammaPlan® and Leksell SurgiPlan® listen to port 50 001. The IP-address is configured when installing the Leksell GammaPlan® and Leksell SurgiPlan® workstation. The AET, IP-address and port of the remote Storage and Query/Retrieve SCP can be configured in the user interface. The maximum PDU size for Leksell GammaPlan® Leksell SurgiPlan® is configurable from a minimum of 4 Kbytes. There is no upper limit. It is limited by the available system resources. The default value is 64 Kbytes.

## **7 Support of Extended Character Sets**

Leksell GammaPlan® and Leksell SurgiPlan® support the following character sets in addition to the default when handling DICOM objects:

- ISO\_IR 100
- ISO\_IR 101
- ISO\_IR 109
- ISO\_IR 110
- ISO\_IR 144
- ISO\_IR 127
- ISO\_IR 126
- ISO\_IR 138
- ISO\_IR 148
- ISO\_IR 192

Code extension techniques are currently not supported.

## DICOM Image Attributes handled by Leksell GammaPlan® and Leksell SurgiPlan®

The tables below list the DICOM attributes handled by Leksell GammaPlan® and Leksell SurgiPlan® when handling DICOM image objects.

Name	TAG	Usage/Comment
Patient Name	(0010, 0010)	Identification
Patient ID	(0010, 0020)	Identification
Study Date	(0008,0020)	Identification
Study Time	(0008,0030)	Identification
Instance Number	(0020,0013)	User information
Patient Orientation	(0020, 0020)	3D reconstruction
Modality	(0008, 0060)	Identification/Validation See Note 1
Image Orientation Patient	(0020, 0037)	3D reconstruction
Bits Allocated	(0028, 0100)	Pixel data interpretation and display
Bits stored	(0028, 0101)	Pixel data interpretation and display
Samples per pixel	(0028, 0002)	Pixel data interpretation and display
Photometric Interpretation	(0028, 0004)	Pixel data interpretation
High Bit	(0028, 0102)	Pixel data interpretation and display
Pixel Representation	(0028, 0103)	Pixel data interpretation and display
Columns	(0028, 0011)	Pixel data interpretation and display
Rows	(0028, 0010)	Pixel data interpretation and display
Pixel Data	(7FE0, 0010)	Pixel data interpretation and display
Pixel Data Group Length	(7FE0,0000)	Must match length of Pixel Data attribute
Transfer Syntax UID	(0002, 0010)	Criteria to perform byte swapping
Pixel spacing	(0028, 0030)	3D reconstruction
Pixel Aspect Ratio	(0028,0034)	Pixel data interpretation and display
Series Number	(0020, 0011)	Separation of a stack in several series
Instance Number	(0020, 0013)	User information
Slice Location	(0020, 1041)	Separation of a stack in several series

Study Instance UID	(0020, 000D)	Separation of a stack in several series
Image Position Patient	(0020, 0032)	3D reconstruction
Slice Thickness	(0018, 0050)	3D reconstruction/validation. See Note 2
Spacing between Slices	(0018, 0088)	3D reconstruction/validation See Note 2
CT rescale slope	(0028, 1053)	Pixel data interpretation and display
CT rescale intercept	(0028, 1052)	Pixel data interpretation and display
KVP	(0020,0012)	Used during electron density calculations.
Pixel Padding Value	(0028, 0120)	Pixel data interpretation and display
Window Center	(0028, 1050)	Pixel data interpretation and display
Window Width	(0028, 1051)	Pixel data interpretation and display
Manufacturer	(0008, 0070)	Used during electron density calculations.
Manufacturer's Model Name	(0008,1090)	Used during electron density calculations.
Station Name	(0008,1010)	Used during electron density calculations.
Frame of Reference	(0020,0052)	Reference to other DICOM objects
Series Instance UID	(0020, 000E)	Separation of a stack in several series
SOP Instance UID	(0008, 0018)	Image object identification
Specific Character Set	(0008,0005)	The exported DICOM RT objects will have the same Specific Character Set as the referring DICOM images.
SOP Class UID	(0008,0016)	Used to determine if the application support this DICOM object.
Series Type	(0054,1000)	For rejection of dynamic PET studies.
Number Of Frames	(0028,0008)	For rejection of multi frame angio studies.

Table 18: Image DICOM Attributes handled by Leksell GammaPlan® and Leksell SurgiPlan®.

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## Note 1

The accepted values for "modality" are: CT, MR, XA, PT, RTSTRUCT, OT and DS. Note DS is a retired enumerated value for modality since the introduction of XA, but it can still be found in some image headers.

## Note 2

For a valid 3D reconstruction, it is required that "slice thickness" and "spacing between slices" do not differ more than an application-configured tolerance.

**DICOM RT Attributes exported by Leksell GammaPlan®**

The Structure Set Module, ROI Contour Module and the RT ROI Observation Module Attributes are applicable for both Leksell GammaPlan® and Leksell SurgiPlan the other attributes listed below are only applicable for Leksell GammaPlan®.

<b>GENERAL IMAGE MODULE ATTRIBUTES</b>				
<b>Attribute Name</b>	<b>Tag</b>	<b>Type</b>	<b>Attribute Description</b>	<b>Value</b>
Instance Number	(0020,0013)	2	A number that identifies this image. Note: This Attribute was named Image Number in earlier versions of this Standard.	<null>
Image Type	(0008,0008)	3	Image identification characteristics. See C.7.6.1.1.2 for Defined Terms and further explanation.	DERIVED\SECONDARY\DOSE
<b>IMAGE PLANE MODULE ATTRIBUTES</b>				
<b>Attribute Name</b>	<b>Tag</b>	<b>Type</b>	<b>Attribute Description</b>	<b>Value</b>
Pixel Spacing	(0028,0030)	1	Physical distance in the patient between the center of each pixel, specified by a numeric pair - adjacent row spacing (delimiter) adjacent column spacing in mm. See 10.7.1.3 for further explanation.	<value depending on data – grid size>
Image Orientation (Patient)	(0020,0037)	1	The direction cosines of the first row and the first column with respect to the patient. See C.7.6.2.1.1 for further explanation.	<value depending on data>
Image Position (Patient)	(0020,0032)	1	The x, y, and z coordinates of the upper left hand corner (center of the first voxel transmitted) of the image, in mm. See C.7.6.2.1.1 for further explanation.	<value depending on data >
Slice Thickness	(0018,0050)	2	Nominal slice thickness, in mm.	<null>
<b>IMAGE PIXEL MODULE ATTRIBUTES</b>				
<b>Attribute Name</b>	<b>Tag</b>	<b>Type</b>	<b>Attribute Description</b>	<b>Value</b>
Include 'Image Pixel Macro' Table C.7-11b				See IMAGE PIXEL MACRO ATTRIBUTES
<b>IMAGE PIXEL MACRO ATTRIBUTES</b>				
<b>Attribute Name</b>	<b>Tag</b>	<b>Type</b>	<b>Attribute Description</b>	<b>Value</b>

Samples per Pixel	(0028,0002)	1	Number of samples (planes) in this image. See C.7.6.3.1.1 for further explanation.	1
Photometric Interpretation	(0028,0004)	1	Specifies the intended interpretation of the pixel data. See C.7.6.3.1.2 for further explanation.	MONOCHROME2
Rows	(0028,0010)	1	Number of rows in the image.	<value depending on data – pixels covering the selected object>
Columns	(0028,0011)	1	Number of columns in the image	<value depending on data – pixels covering the selected object >
Bits Allocated	(0028,0100)	1	Number of bits allocated for each pixel sample. Each sample shall have the same number of bits allocated. See PS 3.5 for further explanation.	16
Bits Stored	(0028,0101)	1	Number of bits stored for each pixel sample. Each sample shall have the same number of bits stored. See PS 3.5 for further explanation.	16
High Bit	(0028,0102)	1	Most significant bit for pixel sample data. Each sample shall have the same high bit. See PS 3.5 for further explanation.	15
Pixel Representation	(0028,0103)	1	Data representation of the pixel samples. Each sample shall have the same pixel representation. Enumerated Values: 0000H = unsigned integer. 0001H = 2's complement	0
Pixel Data	(7FE0,0010)	1C	A data stream of the pixel samples that comprise the Image. See C.7.6.3.1.4 for further explanation. Required if Pixel Data Provider URL (0028,7FE0) is not present.	<value depending on data – dose values>
<b>MULTI-FRAME MODULE ATTRIBUTES</b>				
Attribute Name	Tag	Type	Attribute Description	Value
Number of Frames	(0028,0008)	1	Number of frames in a Multi-frame Image. See C.7.6.6.1.1 for further explanation.	<value depending on data – frames covering the selected object>
Frame Increment Pointer	(0028,0009)	1	Contains the Data Element Tag of the attribute that is used as the frame increment in Multi-frame pixel data. See C.7.6.6.1.1	(3004,000C)

			for further explanation.	
<b>RT DOSE MODULE ATTRIBUTES</b>				
<b>Attribute Name</b>	<b>Tag</b>	<b>Type</b>	<b>Attribute Description</b>	<b>Value</b>
Samples per Pixel	(0028,0002)	1C	Number of samples (planes) in this image. See C.8.8.3.4.1 for specialization. Required if Pixel Data (7FE0,0010) is present.	1
Photometric Interpretation	(0028,0004)	1C	Specifies the intended interpretation of the pixel data. See C.8.8.3.4.2 for specialization. Required if Pixel Data (7FE0,0010) is present.	MONOCHROME2
Bits Allocated	(0028,0100)	1C	Number of bits allocated for each pixel sample. Each sample shall have the same number of bits allocated. See C.8.8.3.4.3 for specialization. Required if Pixel Data (7FE0,0010) is present.	16
Bits Stored	(0028,0101)	1C	Number of bits stored for each pixel sample. Each sample shall have the same number of bits stored. See C.8.8.3.4.4 for specialization. Required if Pixel Data (7FE0,0010) is present.	16
High Bit	(0028,0102)	1C	Most significant bit for each pixel sample. Each sample shall have the same high bit. See C.8.8.3.4.5 for specialization. Required if Pixel Data (7FE0,0010) is present.	15
Pixel Representation	(0028,0103)	1C	Data representation of the pixel samples. Each sample shall have the same pixel representation. See C.8.8.3.4.6 for specialization. Required if Pixel Data (7FE0,0010) is present.	0
Dose Units	(3004,0002)	1	Units used to describe dose. Enumerated Values: GY = Gray RELATIVE = dose relative to implicit reference value	GY

Dose Type	(3004,0004)	1	Type of dose. Defined Terms: PHYSICAL = physical dose EFFECTIVE = physical dose after correction for biological effect using user-defined modeling technique ERROR = difference between desired and planned dose	PHYSICAL
Instance Number	(0020,0013)	3	A number that identifies this object instance.	<null>
Dose Summation Type	(3004,000A)	1	Type of dose summation. Defined Terms: PLAN = dose calculated for entire RT Plan MULTI_PLAN = dose calculated for 2 or more RT Plans FRACTION = dose calculated for a single Fraction Group within RT Plan BEAM = dose calculated for one or more Beams within RT Plan BRACHY = dose calculated for one or more Brachy Application Setups within RT Plan CONTROL_POINT = dose calculated for one or more Control Points within a Beam	PLAN
Referenced RT Plan Sequence	(300C,0002)	1C	Sequence describing RT Plan associated with dose. Required if Dose Summation Type (3004,000A) is PLAN, MULTI_PLAN, FRACTION, BEAM, BRACHY or CONTROL_POINT. Only a single item shall be permitted in this sequence, unless Dose Summation Type (3004,000A) is MULTI_PLAN, in which case two or more items shall be included in this sequence.	<One item>
>Include 'SOP Instance Reference Macro' Table 10-11				<Reference to RT Plan object>
Grid Frame Offset Vector	(3004,000C)	1C	An array which contains the dose image plane offsets (in mm) of the dose image frames in a multi-frame dose. Required if multi-frame pixel data are present and Frame Increment Pointer (0028,0009) points to Grid Frame Offset Vector (3004,000C). See C.8.8.3.2.	<value depending on data>

Dose Grid Scaling	(3004,000E)	1C	Scaling factor that when multiplied by the dose grid data found in the Pixel Data (7FE0,0010) attribute of the Image Pixel Module, yields grid doses in the dose units as specified by Dose Units (3004,0002). Required if Pixel Data (7FE0,0010) is present.	<value depending on data>
<b>STRUCTURE SET MODULE ATTRIBUTES</b>				
<b>Attribute Name</b>	<b>Tag</b>	<b>Type</b>	<b>Attribute Description</b>	<b>Value</b>
Structure Set Label	(3006,0002)	1	User-defined label for Structure Set.	ROIs in <Image study name>
Structure Set Date	(3006,0008)	2	Date at which Structure Set was last modified.	<null>
Structure Set Time	(3006,0009)	2	Time at which Structure Set was last modified.	<null>
Referenced Frame of Reference Sequence	(3006,0010)	3	Introduces sequence of items describing Frames of Reference in which the ROIs are defined. One or more items may be included in this sequence. See C.8.8.5.1.	<one item>
>Frame of Reference UID	(0020,0052)	1	Uniquely identifies Frame of Reference within Structure Set.	<frame of reference in image study>
>RT Referenced Study Sequence	(3006,0012)	3	Introduces sequence of Studies containing series to be referenced. One or more items may be included in this sequence.	<one item>
>>Include 'SOP Instance Reference Macro' Table 10-11				<study instance UID of image study>
>>RT Referenced Series Sequence	(3006,0014)	1	Introduces sequence of items describing series of images within the referenced study which are used in defining the Structure Set. One or more items may be included in this sequence.	<one item>
>>>Series Instance UID	(0020,000E)	1	Unique identifier for the series containing the images.	<series instance UID of image study>
>>>>Contour Image Sequence	(3006,0016)	1	Introduces sequence of items describing images in a given series used in defining the Structure Set (typically CT or MR images). One or more items may be included in this sequence.	<one item per image in the study >

>>>>Include 'Image SOP Instance Reference Macro' Table 10-3				<SOP instance UID of image>
Structure Set ROI Sequence	(3006,0020)	3	Introduces sequence of ROIs for current Structure Set. One or more items may be included in this sequence.	<one item per Volume>
>ROI Number	(3006,0022)	1	Identification number of the ROI. The value of ROI Number (3006,0022) shall be unique within the Structure Set in which it is created.	<sequence number starting at 1>
>Referenced Frame of Reference UID	(3006,0024)	1	Uniquely identifies Frame of Reference in which ROI is defined, specified by Frame of Reference UID (0020,0052) in Referenced Frame of Reference Sequence (3006,0010).	<frame of reference UID>
>ROI Name	(3006,0026)	2	User-defined name for ROI.	<User defined Volume name>
>ROI Generation Algorithm	(3006,0036)	2	Type of algorithm used to generate ROI. Defined Terms: AUTOMATIC = calculated ROI SEMIAUTOMATIC = ROI calculated with user assistance MANUAL = user-entered ROI	MANUAL
<b>ROI CONTOUR MODULE ATTRIBUTES</b>				
<b>Attribute Name</b>	<b>Tag</b>	<b>Type</b>	<b>Attribute Description</b>	<b>Value</b>
ROI Contour Sequence	(3006,0039)	1	Introduces sequence of Contour Sequences defining ROIs. One or more items may be included in this sequence.	<one item per Volume>
>Referenced ROI Number	(3006,0084)	1	Uniquely identifies the referenced ROI described in the Structure Set ROI Sequence (3006,0020).	<reference to ROI number>
>ROI Display Color	(3006,002A)	3	RGB triplet color representation for ROI, specified using the range 0-255.	<user defined Volume color>
>Contour Sequence	(3006,0040)	3	Introduces sequence of Contours defining ROI. One or more items may be included in this sequence.	<one item per Region in Volume>
>>Contour Image Sequence	(3006,0016)	3	Introduces sequence of images containing the contour. One or more items may be included in this sequence.	<one item>

>>>Include 'Image SOP Instance Reference Macro' Table 10-3				<reference to image containing the contour>
>>Contour Geometric Type	(3006,0042)	1	Geometric type of contour. See C.8.8.6.1. Enumerated Values: POINT = single point OPEN_PLANAR = open contour containing coplanar points OPEN_NONPLANAR = open contour containing non-coplanar points CLOSED_PLANAR = closed contour (polygon) containing coplanar points	CLOSED_PLANAR
>>Number of Contour Points	(3006,0046)	1	Number of points (triplets) in Contour Data (3006,0050).	<number of Vertices in Region>
>>Contour Data	(3006,0050)	1	Sequence of (x,y,z) triplets defining a contour in the patient based coordinate system described in C.7.6.2.1.1 (mm). See C.8.8.6.1 and C.8.8.6.3. Note: Contour Data may not be properly encoded if Explicit-VR transfer syntax is used and the VL of this attribute exceeds 65534 bytes.	<vertex coordinates in DICOM patient coordinates>
<b>RT ROI OBSERVATIONS MODULE ATTRIBUTES</b>				
Attribute Name	Tag	Type	Attribute Description	Value
RT ROI Observations Sequence	(3006,0080)	1	Introduces sequence of observations related to ROIs defined in the ROI Module. One or more items may be included in this sequence.	<One item per Volume>
>Observation Number	(3006,0082)	1	Identification number of the Observation. The value of Observation Number (3006,0082) shall be unique within the RT ROI Observations Sequence (3006,0080).	<Index starting at 0>
>Referenced ROI Number	(3006,0084)	1	Uniquely identifies the referenced ROI described in the Structure Set ROI Sequence (3006,0020).	<Reference to ROI Item>
>ROI Observation Label	(3006,0085)	3	User-defined label for ROI Observation.	<User defined Volume name>
>RT ROI Interpreted Type	(3006,00A4)	2	Type of ROI. See C.8.8.8.1. Defined Terms: EXTERNAL = external patient contour	<null>

			PTV = Planning Target Volume (as defined in ICRU50) CTV = Clinical Target Volume (as defined in ICRU50) GTV = Gross Tumor Volume (as defined in ICRU50) TREATED_VOLUME = Treated Volume (as defined in ICRU50) IRRAD_VOLUME = Irradiated Volume (as defined in ICRU50) BOLUS = patient bolus to be used for external beam therapy AVOIDANCE = region in which dose is to be minimized ORGAN = patient organ MARKER = patient marker or marker on a localizer REGISTRATION = registration ROI ISOCENTER = treatment isocenter to be used for external beam therapy CONTRAST_AGENT = volume into which a contrast agent has been injected CAVITY = patient anatomical cavity BRACHY_CHANNEL = brachytherapy channel BRACHY_ACCESSORY = brachytherapy accessory device BRACHY_SRC_APP = brachytherapy source applicator BRACHY_CHNL_SHLD = brachytherapy channel shield SUPPORT = external patient support device FIXATION = external patient fixation or immobilisation device DOSE_REGION = ROI to be used as a dose reference CONTROL = ROI to be used in control of dose optimization and calculation	
>ROI Interpreter	(3006,00A6)	2	Name of person performing the interpretation.	<null>
<b>RT GENERAL PLAN MODULE ATTRIBUTES</b>				
<b>Attribute Name</b>	<b>Tag</b>	<b>Type</b>	<b>Attribute Description</b>	<b>Value</b>
RT Plan Label	(300A,0002)	1	User-defined label for treatment plan.	<User defined plan name>1
RT Plan Name	(300A,0003)	3	User-defined name for treatment plan.	<user defined plan name>

RT Plan Description	(300A,0004)	3	User-defined description of treatment plan.	<user defined plan comment>
RT Plan Date	(300A,0006)	2	Date treatment plan was last modified.	<Treatment plan date, date of approval>
RT Plan Time	(300A,0007)	2	Time treatment plan was last modified.	<empty>
RT Plan Geometry	(300A,000C)	1	Describes whether RT Plan is based on patient or treatment device geometry. See C.8.8.9.1. Defined Terms: PATIENT = RT Structure Set exists TREATMENT_DEVICE = RT Structure Set does not exist	PATIENT
<b>RT PRESCRIPTION MODULE ATTRIBUTES</b>				
<b>Attribute Name</b>	<b>Tag</b>	<b>Type</b>	<b>Attribute Description</b>	<b>Value</b>
Dose Reference Sequence	(300A,0010)	3	Introduces sequence of Dose References. One or more items may be included in this sequence.	<One item per target>
>Dose Reference Number	(300A,0012)	1	Identification number of the Dose Reference. The value of Dose Reference Number (300A,0012) shall be unique within the RT Plan in which it is created.	<Number matching the target ID: 1 for target A, 2 for target B etc.>
>Dose Reference Structure Type	(300A,0014)	1	Structure type of Dose Reference. Defined Terms: POINT = dose reference point specified as ROI VOLUME = dose reference volume specified as ROI COORDINATES = point specified by Dose Reference Point Coordinates (300A,0018) SITE = dose reference clinical site	SITE
>Dose Reference Description	(300A,0016)	3	User-defined description of Dose Reference.	<User defined treatment prefix><User defined target name>
>Dose Reference Type	(300A,0020)	1	Type of Dose Reference. Defined Terms: TARGET = treatment target (corresponding to GTV, PTV, or CTV in ICRU50) ORGAN_AT_RISK = Organ at Risk (as defined in ICRU50)	TARGET
>Target Prescription Dose	(300A,0026)	3	Prescribed dose (in Gy) to Dose Reference if Dose Reference Type (300A,0020) is TARGET.	<Target prescription dose [Gy]>

RT PATIENT SETUP MODULE ATTRIBUTES				
Attribute Name	Tag	Type	Attribute Description	Value
Patient Setup Sequence	(300A,0180)	1	Introduces sequence of patient setup data for current plan. One or more items may be included in this sequence.	<One item per shot run>
>Patient Setup Number	(300A,0182)	1	Identification number of the Patient Setup. The value of Patient Setup Number (300A,0182) shall be unique within the RT Plan in which it is created.	<Sequence number starting at 1>
>Patient Position	(0018,5100)	1C	Patient position descriptor relative to the equipment. Required if Patient Additional Position (300A,0184) is not present. See Section C.8.8.12.1.2 for Defined Terms and further explanation.	HFS/HFP
>Fixation Device Sequence	(300A,0190)	3	Introduces sequence of Fixation Devices used in Patient Setup. One or more items may be included in this sequence.	<Zero or one item>
>>Fixation Device Type	(300A,0192)	1	Type of Fixation Device used during in Patient Setup. Defined Terms: BITEBLOCK HEADFRAME MASK MOLD CAST HEADREST BREAST_BOARD BODY_FRAME VACUUM_MOLD WHOLE_BODY_POD RECTAL_BALLOON	HEADFRAME/BITEBLOCK
>>Fixation Device Label	(300A,0194)	2	User-defined label identifier for Fixation Device.	<null>
>>Fixation Device Pitch Angle	(300A,0199)	3	The Fixation Device Pitch Angle, i.e. orientation of PITCHED FIXATION DEVICE coordinate system with respect to IEC PATIENT SUPPORT coordinate system (degrees). Pitching is the rotation around IEC PATIENT SUPPORT X-axis.	<Shot run gamma angle>

>Setup Technique	(300A,01B0)	3	Setup Technique used in Patient Setup. Defined Terms: ISOCENTRIC FIXED_SSD TBI BREAST_BRIDGE SKIN_APPPOSITION	ISOCENTRIC
<b>RT FRACTION SCHEME MODULE ATTRIBUTES</b>				
Attribute Name	Tag	Type	Attribute Description	Value
Fraction Group Sequence	(300A,0070)	1	Introduces sequence of Fraction Groups in current Fraction Scheme. One or more items may be included in this sequence.	<One item per target>
>Fraction Group Number	(300A,0071)	1	Identification number of the Fraction Group. The value of Fraction Group Number (300A,0071) shall be unique within the RT Plan in which it is created.	<Sequence number starting at 1>
>Referenced Dose Reference Sequence	(300C,0050)	3	Introduces sequence of Dose References for the current Fraction Group. One or more items may be included in this sequence.	<One item for each dose reference/target with the primary target first in the sequence>
>>Referenced Dose Reference Number	(300C,0051)	1	Uniquely identifies Dose Reference specified by Dose Reference Number (300A,0012) within Dose Reference Sequence (300A,0010) in RT Prescription Module.	<Reference to dose reference number>
>>Target Prescription Dose	(300A,0026)	3	Prescribed dose (in Gy) to Dose Reference if Dose Reference Type (300A,0020) of referenced Dose Reference is TARGET.	<Target prescription dose [Gy]>
>Number of Fractions Planned	(300A,0078)	2	Total number of treatments (Fractions) prescribed for current Fraction Group.	<Number of fractions>
>Number of Beams	(300A,0080)	1	Number of Beams in current Fraction Group. If Number of Beams is greater then zero, Number of Brachy Application Setups (300A,00A0) shall equal zero.	<Number of shots>
>Referenced Beam Sequence	(300C,0004)	1C	Introduces sequence of treatment beams in current Fraction Group. Required if Number of Beams (300A,0080) is greater than zero. One or more items may be included in this sequence.	<One item per shot>

>>Referenced Beam Number	(300C,0006)	1	Uniquely identifies Beam specified by Beam Number (300A,00C0) within Beam Sequence (300A,00B0) in RT Beams Module.	<Reference to beam number>
>>Beam Dose Specification Point	(300A,0082)	3	Coordinates (x,y,z) of point at which Beam Dose is specified in the patient based coordinate system described in C.7.6.2.1.1 (mm). See Note 3.	<Dose reference point of the target in DICOM patient coordinates >
>>Beam Dose	(300A,0084)	3	Dose (in Gy) at Beam Dose Specification Point (300A,0082) due to current Beam.	<Dose [Gy] delivered by the shot in the Beam Dose Specification Point>
>>Beam Meterset	(300A,0086)	3	Machine setting to be delivered for current Beam, specified in Monitor Units (MU) or minutes as defined by Primary Dosimeter Unit (300A,00B3) (in RT Beams Module) for referenced Beam. See Note 4.	<Shot time>
>Number of Brachy Application Setups	(300A,00A0)	1	Number of Brachy Application Setups in current Fraction Group. If Number of Brachy Application Setups is greater than zero, Number of Beams (300A,0080) shall equal zero.	0
<b>RT BEAMS MODULE ATTRIBUTES</b>				
<b>Attribute Name</b>	<b>Tag</b>	<b>Type</b>	<b>Attribute Description</b>	<b>Value</b>
Beam Sequence	(300A,00B0)	1	Introduces sequence of treatment beams for current RT Plan. One or more items may be included in this sequence.	<One item per shot>
>Beam Number	(300A,00C0)	1	Identification number of the Beam. The value of Beam Number (300A,00C0) shall be unique within the RT Plan in which it is created. See Note 1.	<Sequence number starting at 1>
>Beam Name	(300A,00C2)	3	User-defined name for Beam. See Note 1.	<User defined treatment prefix><Shot name/ID>
>Beam Type	(300A,00C4)	1	Motion characteristic of Beam. See Note 5. Enumerated Values: STATIC = All Control Point Sequence (300A,0111) attributes remain unchanged between consecutive pairs of control points with changing Cumulative Meterset Weight (300A,0134). DYNAMIC = One or more	STATIC

			Control Point Sequence (300A,0111) attributes change between one or more consecutive pairs of control points with changing Cumulative Meterset Weight (300A,0134).	
>Radiation Type	(300A,00C6)	2	Particle type of Beam. Defined Terms: PHOTON ELECTRON NEUTRON PROTON	PHOTON
>Treatment Machine Name	(300A,00B2)	2	User-defined name identifying treatment machine to be used for beam delivery. See Note 2.	<User defined radiation unit name>
>Institutional Department Name	(0008,1040)	3	Department in the institution where the equipment is located that is to be used for beam delivery.	<User defined clinic name>
>Primary Dosimeter Unit	(300A,00B3)	3	Measurement unit of machine dosimeter. See C.8.8.14.1. Enumerated Values: MU = Monitor Unit MINUTE = minute	MINUTE
>Beam Limiting Device Sequence	(300A,00B6)	1	Introduces sequence of beam limiting device (collimator) jaw or leaf (element) sets. One or more items may be included in this sequence.	<One item>
>>RT Beam Limiting Device Type	(300A,00B8)	1	Type of beam limiting device (collimator). Enumerated Values: X = symmetric jaw pair in IEC X direction Y = symmetric jaw pair in IEC Y direction ASYMX = asymmetric jaw pair in IEC X direction ASYMY = asymmetric pair in IEC Y direction MLCX = multileaf (multi-element) jaw pair in IEC X direction MLCY = multileaf (multi-element) jaw pair in IEC Y direction	X
>>Number of Leaf/Jaw Pairs	(300A,00BC)	1	Number of leaf (element) or jaw pairs (equal to 1 for standard beam limiting device jaws).	0
>>Leaf Position Boundaries	(300A,00BE)	2C	Boundaries of beam limiting device (collimator) leaves (in mm) in IEC BEAM LIMITING DEVICE coordinate axis	NULL

			appropriate to RT Beam Limiting Device Type (300A,00B8), i.e. X-axis for MLCY, Y-axis for MLCX. Contains N+1 values, where N is the Number of Leaf/Jaw Pairs (300A,00BC), starting from Leaf (Element) Pair 1. Required if Beam Limiting Device Sequence (300A,00B6) is sent and RT Beam Limiting Device Type (300A,00B8) is MLCX or MLCY.	
>Referenced Patient Setup Number	(300C,006A)	3	Uniquely identifies Patient Setup to be used for current beam, specified by Patient Setup Number (300A,0182) within Patient Setup Sequence of RT Patient Setup Module.	<Reference to Patient Setup item>
>Treatment Delivery Type	(300A,00CE)	3	Delivery Type of treatment. Defined Terms: TREATMENT = normal patient treatment OPEN_PORTFILM = portal image acquisition with open field TRMT_PORTFILM = portal image acquisition with treatment port CONTINUATION = continuation of interrupted treatment SETUP = no treatment beam is applied for this RT Beam. To be used for specifying the gantry, couch, and other machine positions where X-Ray set-up images or measurements are to be taken	TREATMENT
>Number of Wedges	(300A,00D0)	1	Number of wedges associated with current Beam.	0
>Number of Compensators	(300A,00E0)	1	Number of compensators associated with current Beam.	0
>Number of Boli	(300A,00ED)	1	Number of boli associated with current Beam.	0
>Number of Blocks	(300A,00F0)	1	Number of shielding blocks associated with Beam.	0
>Final Cumulative Meterset Weight	(300A,010E)	1C	Value of Cumulative Meterset Weight (300A,0134) for final Control Point in Control Point Sequence (300A,0111). Required if Cumulative Meterset Weight is non-null in Control Points specified within Control Point Sequence (300A,0111). See C.8.8.14.1.	<Same as meterset for last (2nd) control point.>
>Number of Control Points	(300A,0110)	1	Number of control points in Beam.	2

>Control Point Sequence	(300A,0111)	1	Introduces sequence of machine configurations describing treatment beam. Two or more items may be included in this sequence. See C.8.8.14.5 and C.8.8.14.6.	<2 items>
>>Control Point Index	(300A,0112)	1	Index of current Control Point, starting at 0 for first Control Point.	0/1
>>>Cumulative Meterset Weight	(300A,0134)	2	Cumulative weight to current control point. Cumulative Meterset Weight for the first item in Control Point Sequence shall always be zero. Cumulative Meterset Weight for the final item in Control Point Sequence shall always be equal to Final Cumulative Meterset Weight. See C.8.8.14.1.	0/<Shot time>
>>>Referenced Dose Reference Sequence	(300C,0050)	3	Introduces a sequence of Dose References for current Beam. One or more items may be included in this sequence.	<One item for each dose reference/target with the primary target first in the sequence>
>>>>Referenced Dose Reference Number	(300C,0051)	1	Uniquely identifies Dose Reference specified by Dose Reference Number (300A,0012) in Dose Reference Sequence (300A,0010) in RT Prescription Module.	<Reference to dose reference number>
>>>>Cumulative Dose Reference Coefficient	(300A,010C)	2	Coefficient used to calculate cumulative dose contribution from this Beam to the referenced Dose Reference at the current Control Point. See C.8.8.14.7.	For control point 0: 0 For control point 1 if the dose reference represents the target to which the shot belongs: 1 For control point 1 if the dose reference represents another target: beam dose to the dose reference point of the referenced target divided by the beam dose to the reference point of the target to which the shot belongs.0/1
>>>>Nominal Beam Energy	(300A,0114)	3	Nominal Beam Energy at control point (MV/MeV).	<1.25>
>>>>Dose Rate Set	(300A,0115)	3	Dose Rate to be set on treatment machine for segment beginning at current control point (e.g. MU/min).	<Shot dose rate [Gy/minutes] corresponding to the calculated meterset>
>>>>Beam Limiting Device Position Sequence	(300A,011A)	1C	Introduces sequence of beam limiting device (collimator) jaw or leaf (element) positions. Required for first item of Control Point Sequence, or if Beam Limiting Device changes during Beam. One or more	<Two items. One in the X- and one in the Y-direction>

			items may be included in this sequence.	
>>>RT Beam Limiting Device Type	(300A,00B8)	1	Type of beam limiting device (collimator). The value of this attribute shall correspond to RT Beam Limiting Device Type (300A,00B8) defined in an item of Beam Limiting Device Sequence (300A,00B6). Enumerated Values: X = symmetric jaw pair in IEC X direction Y = symmetric jaw pair in IEC Y direction ASYMX = asymmetric jaw pair in IEC X direction ASYMY = asymmetric pair in IEC Y direction MLCX = multileaf (multi-element) jaw pair in IEC X direction MLCY = multileaf (multi-element) jaw pair in IEC Y direction	X and Y
>>>Leaf/Jaw Positions	(300A,011C)	1	Positions of beam limiting device (collimator) leaf (element) or jaw pairs (in mm) in IEC BEAM LIMITING DEVICE coordinate axis appropriate to RT Beam Limiting Device Type (300A,00B8), e.g. X-axis for MLCX, Y-axis for MLCY. Contains 2N values, where N is the Number of Leaf/Jaw Pairs (300A,00BC) in Beam Limiting Device Sequence (300A,00B6). Values shall be listed in IEC leaf (element) subscript order 101, 102, ... 1N, 201, 202, ... 2N. See Note 2.	Hard coded to -10 and 10 for the X- and Y-direction.
>>Gantry Angle	(300A,011E)	1C	Gantry angle of radiation source, i.e. orientation of IEC GANTRY coordinate system with respect to IEC FIXED REFERENCE coordinate system (degrees). Required for first item of Control Point Sequence, or if Gantry Angle changes during Beam.	0

>>Gantry Rotation Direction	(300A,011F)	1C	<p>Direction of Gantry Rotation when viewing gantry from isocenter, for segment following Control Point. Required for first item of Control Point Sequence, or if Gantry Rotation Direction changes during Beam. See C.8.8.14.8.</p> <p>Enumerated Values:                      CW = clockwise                      CC = counter-clockwise                      NONE = no rotation</p>	NONE
>>Beam Limiting Device Angle	(300A,0120)	1C	<p>Beam Limiting Device angle, i.e. orientation of IEC BEAM LIMITING DEVICE coordinate system with respect to IEC GANTRY coordinate system (degrees). Required for first item of Control Point Sequence, or if Beam Limiting Device Angle changes during Beam.</p>	0
>>Beam Limiting Device Rotation Direction	(300A,0121)	1C	<p>Direction of Beam Limiting Device Rotation when viewing beam limiting device (collimator) from radiation source, for segment following Control Point. Required for first item of Control Point Sequence, or if Beam Limiting Device Rotation Direction changes during Beam. See C.8.8.14.8.</p> <p>Enumerated Values:                      CW = clockwise                      CC = counter-clockwise                      NONE = no rotation</p>	NONE
>>Patient Support Rotation Direction	(300A,0123)	1C	<p>Direction of Patient Support Rotation when viewing table from above, for segment following Control Point. Required for first item of Control Point Sequence, or if Patient Support Rotation Direction changes during Beam. See C.8.8.14.8.</p> <p>Enumerated Values:                      CW = clockwise                      CC = counter-clockwise                      NONE = no rotation</p>	NONE
>>Patient Support Angle	(300A,0122)	1C	<p>Patient Support angle, i.e. orientation of IEC PATIENT SUPPORT (turntable) coordinate system with respect to IEC FIXED REFERENCE coordinate system (degrees). Required for first item of Control Point Sequence, or if Patient Support</p>	0

			Angle changes during Beam.	
>>Table Top Eccentric Angle	(300A,0125)	1C	Table Top (non-isocentric) angle, i.e. orientation of IEC TABLE TOP ECCENTRIC coordinate system with respect to IEC PATIENT SUPPORT coordinate system (degrees). Required for first item of Control Point Sequence, or if Table Top Eccentric Angle changes during Beam.	0
>>Table Top Eccentric Rotation Direction	(300A,0126)	1C	Direction of Table Top Eccentric Rotation when viewing table from above, for segment following Control Point. Required for first item of Control Point Sequence, or if Table Top Eccentric Rotation Direction changes during Beam. See C.8.8.14.8. Enumerated Values: CW = clockwise CC = counter-clockwise NONE = no rotation	NONE
>>Table Top Pitch Angle	(300A,0140)	1C	Table Top Pitch Angle, i.e. the rotation of the IEC TABLE TOP coordinate system about the X-axis of the IEC TABLE TOP coordinate system (degrees). If required by treatment delivery device, shall be present for first item of Control Point Sequence. If required by treatment delivery device and if Table Top Pitch Angle changes during Beam, shall be present in all subsequent items of Control Point Sequence. See C.8.8.25.6.2.	0
>>Table Top Pitch Rotation Direction	(300A,0142)	1c	Direction of Table Top Pitch Rotation when viewing the table along the positive X-axis of the IEC TABLE TOP coordinate system, for segment following Control Point. If required by treatment delivery device, shall be present for first item of Control Point Sequence. If required by treatment delivery device and if Table Top Pitch Rotation Direction changes during Beam, shall be present in all subsequent items of Control Point Sequence. See C.8.8.14.8 and C.8.8.25.6.2.	NONE

			Enumerated Values: CW = clockwise CC = counter-clockwise NONE = no rotation	
>>Table Top Roll Angle	(300A,0144)	1C	Table Top Roll Angle, i.e. the rotation of the IEC TABLE TOP coordinate system about the IEC Y-axis of the IEC TABLE TOP coordinate system (degrees). If required by treatment delivery device, shall be present for first item of Control Point Sequence. If required by treatment delivery device and if Table Top Roll Angle changes during Beam, shall be present in all subsequent items of Control Point Sequence. See C.8.8.25.6.2.	0
>>Table Top Roll Rotation Direction	(300A,0146)	1C	Direction of Table Top Roll Rotation when viewing the table along the positive Y-axis of the IEC TABLE TOP coordinate system, for segment following Control Point. If required by treatment delivery device, shall be present for first item of Control Point Sequence. If required by treatment delivery device and if Table Top Roll Rotation Direction changes during Beam, shall be present in all subsequent items of Control Point Sequence. See C.8.8.14.8 and C.8.8.25.6.2. Enumerated Values: CW = clockwise CC = counter-clockwise NONE = no rotation	NONE
>>Table Top Vertical Position	(300A,0128)	2C	Table Top Vertical position in IEC TABLE TOP coordinate system (mm). Required for first item of Control Point Sequence, or if Table Top Vertical Position changes during Beam. See C.8.8.14.6.	0
>>Table Top Longitudinal Position	(300A,0129)	2C	Table Top Longitudinal position in IEC TABLE TOP coordinate system (mm). Required for first item of Control Point Sequence, or if Table Top Longitudinal Position changes during Beam. See C.8.8.14.6.	0

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>>Table Top Lateral Position	(300A,012A)	2C	Table Top Lateral position in IEC TABLE TOP coordinate system (mm). Required for first item of Control Point Sequence, or if Table Top Lateral Position changes during Beam. See C.8.8.14.6.	0
>>Isocenter Position	(300A,012C)	2C	Isocenter coordinates (x,y,z) in the patient based coordinate system described in C.7.6.2.1.1 (mm). Required for first item of Segment Control Point Sequence, or if Segment Isocenter Position changes during Beam.	<Shot position in DICOM patient coordinates >
<b>PATIENT MODULE ATTRIBUTES</b>				
<b>Attribute Name</b>	<b>Tag</b>	<b>Type</b>	<b>Attribute Description</b>	<b>Value</b>
Patient's Name	(0010,0010)	2	Patient's full name.	<copied from the images>
Patient ID	(0010,0020)	2	Primary hospital identification number or code for the patient.	<copied from the images>
Patient's Birth Date	(0010,0030)	2	Birth date of the patient.	<copied from the images>
Patient's Sex	(0010,0040)	2	Sex of the named patient. Enumerated Values: M = male F = female O = other	<copied from the images>
<b>GENERAL STUDY MODULE ATTRIBUTES</b>				
<b>Attribute Name</b>	<b>Tag</b>	<b>Type</b>	<b>Attribute Description</b>	<b>Value</b>
Study Instance UID	(0020,000D)	1	Unique identifier for the Study.	<copied from the images>
Study Date	(0008,0020)	2	Date the Study started.	<copied from the images>
Study Time	(0008,0030)	2	Time the Study started.	<copied from the images>
Referring Physician's Name	(0008,0090)	2	Name of the patient's referring physician	<copied from the images>
Study ID	(0020,0010)	2	User or equipment generated Study identifier.	<copied from the images>
Accession Number	(0008,0050)	2	A RIS generated number that identifies the order for the Study.	<copied from the images>
Study Description	(0008,1030)	3	Institution-generated description or classification of the Study (component) performed.	<copied from the images>
<b>PATIENT STUDY MODULE ATTRIBUTES</b>				
<b>Attribute Name</b>	<b>Tag</b>	<b>Type</b>	<b>Attribute Description</b>	<b>Value</b>

Admitting Diagnoses Description	(0008,1080)	3	Description of the admitting diagnosis (diagnoses)	<Diagnosis string for the examination>6
Admitting Diagnoses Code Sequence	(0008,1084)	3	A sequence that conveys the admitting diagnosis (diagnoses). One or more Items may be included in this Sequence.	<One item per diagnosis>
>Code Value	(0008,0100)	1	See Section 8.1.	
>Coding Scheme Designator	(0008,0102)	1	See Section 8.2.	ELEKTA GAMMAPLAN
>Coding Scheme Version	(0008,0103)	1C	See Section 8.2. Required if the value of Coding Scheme Designator (0008,0102) is not sufficient to identify the Code Value (0008,0100) unambiguously. May be present otherwise.	1.0
>Code Meaning	(0008,0104)	1	See Section 8.3.	
<b>RT SERIES MODULE ATTRIBUTES</b>				
<b>Attribute Name</b>	<b>Tag</b>	<b>Type</b>	<b>Attribute Description</b>	<b>Value</b>
Modality	(0008,0060)	1	Type of equipment that originally acquired the data. Enumerated Values: RTIMAGE = RT Image RTDOSE = RT Dose RTSTRUCT = RT Structure Set RTPLAN = RT Plan RTRECORD = RT Treatment Record See C.8.8.1.1.	RTDOSE/RTSTRUCT/RTPLAN
Series Instance UID	(0020,000E)	1	Unique identifier of the series.	<generated UID>
Series Number	(0020,0011)	2	A number that identifies this series.	<null>
<b>FRAME OF REFERENCE MODULE ATTRIBUTES</b>				
<b>Attribute Name</b>	<b>Tag</b>	<b>Type</b>	<b>Attribute Description</b>	<b>Value</b>
Frame of Reference UID	(0020,0052)	1	Uniquely identifies the frame of reference for a Series. See C.7.4.1.1.1 for further explanation.	<copied from the images>
Position Reference Indicator	(0020,1040)	2	Part of the patient's anatomy used as a reference, such as the iliac crest, orbital-medial, sternal notch, symphysis pubis, xiphoid, lower coastal margin, external auditory meatus. See C.7.4.1.1.2 for further explanation.	<copied from the images>

<b>GENERAL EQUIPMENT MODULE ATTRIBUTES</b>				
<b>Attribute Name</b>	<b>Tag</b>	<b>Type</b>	<b>Attribute Description</b>	<b>Value</b>
Manufacturer	(0008,0070)	2	Manufacturer of the equipment that produced the composite instances.	Elekta
Manufacturer's Model Name	(0008,1090)	3	Manufacturer's model name of the equipment that produced the composite instances.	GammaPlan
Software Versions	(0018,1020)	3	Manufacturer's designation of software version of the equipment that produced the composite instances. See Section C.7.5.1.1.3.	<NTPS version number>
<b>APPROVAL MODULE ATTRIBUTES</b>				
<b>Attribute Name</b>	<b>Tag</b>	<b>Type</b>	<b>Attribute Description</b>	<b>Value</b>
Approval Status	(300E,0002)	1	Approval status at the time the SOP Instance was created. Enumerated Values: APPROVED = Reviewer recorded that object met an implied criterion UNAPPROVED = No review of object has been recorded REJECTED = Reviewer recorded that object failed to meet an implied criterion	UNAPPROVED/APPROVED/REJECTED
Review Date	(300E,0004)	2C	Date on which object was reviewed. Required if Approval Status (300E,0002) is APPROVED or REJECTED.	<null>
Review Time	(300E,0005)	2C	Time at which object was reviewed. Required if Approval Status (300E,0002) is APPROVED or REJECTED.	<null>
Reviewer Name	(300E,0008)	2C	Name of person who reviewed object. Required if Approval Status (300E,0002) is APPROVED or REJECTED.	<User entered approver name>
<b>SOP COMMON MODULE ATTRIBUTES</b>				
<b>Attribute Name</b>	<b>Tag</b>	<b>Type</b>	<b>Attribute Description</b>	<b>Value</b>
SOP Class UID	(0008,0016)	1	Uniquely identifies the SOP Class. See C.12.1.1.1 for further explanation. See also PS 3.4.	<SOP Class UID>
SOP Instance UID	(0008,0018)	1	Uniquely identifies the SOP Instance. See C.12.1.1.1 for further explanation. See also PS 3.4.	<generated UID>

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Specific Character Set	(0008,0005)	1C	Character Set that expands or replaces the Basic Graphic Set. Required if an expanded or replacement character set is used. See C.12.1.1.2 for Defined Terms.	<copied from the images>
Instance Creation Date	(0008,0012)	3	Date the SOP Instance was created.	<date of creation>
Instance Creation Time	(0008,0013)	3	Time the SOP Instance was created.	<time of creation>