



**Nucletron**

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*Customer Information Bulletin*

*Title*

**DICOM Conformance Statement**

*Scope*

**IBU-Digital 1.1**

*Target Group*

**Customers and Service Engineers**

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## 1 Document History

Revision	Who	Reason for Change	Changes
00	Berthold Hutten	First issue	

## 2 Subject

### 2.1 Purpose

This conformance statement specifies how the IBU-Digital 1.1 application conforms to the DICOM V3.0 standard and the IEC Technical Report 61852. This document follows the guidelines for DICOM conformance statements of the IEC technical Report 62266.

The IBU-Digital 1.1 uses the DICOM protocol to receive and transmit objects that are used in the radiation therapy process for cancer treatment.

### 2.2 Scope

The IBU-Digital 1.1 application is a digital image acquisition, processing and review system for image-based X-ray procedures using projective fluoroscopy or digital radiograph. Typically, the images that are acquired are forwarded to a treatment planning system where a treatment plan is created as preparation for the treatment.

The IBU-Digital 1.1 uses a large flat panel X-ray detector, producing high quality images with reasonably low X-ray dose exposure to the patient.

Smoothbase is the generic database from Nucletron and is used for data storage by multiple applications like IBU-Digital 1.1. The main features of Smoothbase are:

- Store and retrieve Projective Images, Studies, etc.
- Export Projective Images, etc. to another DICOM destination or,
- Export images, etc. to a DICOM Media file.
- Print images to a DICOM printer.
- Query and Retrieve User (SCU) functionality, which may be used to query and retrieve DICOM objects from a remote Query and Retrieve Provider (SCP).
- Query worklist functionality (SCU) and handling of query responses.

The format of chapter 5 is based on Part 2 of the DICOM standard. Some sections defined in the standard are not applicable and left out for clarity.

### 2.3 Intended Audience

The intended audience is:

- Customers, who want to use DICOM with the IBU-Digital 1.1 Application.
- Marketing and Sales.
- System Integrators of medical equipment.
- Other vendors offering interfacing via DICOM.

It is assumed that the reader is familiar with the DICOM standard.

### 3 Abbreviations

This section provides the definitions of terms, acronyms, and abbreviations, which are used throughout the document.

Abbreviation	Description
IBU-Digital	Integrated Brachytherapy Unit-Digital (with flat panel imager)
Smoothbase	Nucletron wide database to store and retrieve patient data. Main feature of Smoothbase is to import and export patient data via DICOM protocol. Includes option for Cone Beam CT acquisition and reconstruction.
AE	Application Entity
DICOM	Digital Imaging and Communications in Medicine, a standard on image communications in medical applications
DIMSE	DICOM Message Service element
IE	Information Entity
IOD	Information Object Definition
NEMA	National Electrical Manufacturers Association
PDU	Protocol Data Unit
SCU	Service Class User
SCP	Service Class Provider
SOP	Service-Object-Pair, a definition of an information object (like an image) and of a service (like storage) that can be performed for the object
TCP/IP	Transmission Control Protocol / Internet Protocol, a widely used computer networking protocol
VR	Value Representation, a data encoding method in DICOM
UID	Unique Identifier used to identify an object by a worldwide unique Identifier.
C-MOVE	DIMSE for transfer of object instance(s) from a remote AE, whose attributes match a specified set of attributes, to another remote AE, which could be the AE of the requestor.
C-FIND	DIMSE for matching of a set of attributes to the attributes of a set of DICOM object instances on a remote AE.
C-STORE	DIMSE for transfer of a DICOM object instance to a remote AE.

### 4 Implementation Model

In its current version, Smoothbase is, very basically, an implementation of a

- Export Command, which can send DICOM objects to a Remote Storage SCP.
- DICOM Basic Print, which can send DICOM objects to a DICOM Basic Print SCP.
- Query and Retrieve User (SCU) functionality, which may be used to query and retrieve DICOM objects from a remote Query and Retrieve Provider (SCP).
- Query worklist (SCU) functionality, which can be used to query a worklist from a remote worklist provider.

### 4.1 Application Data Flow Diagram

A diagram illustrating the application model is shown below in Figure 1: Application Data Flow Diagram.

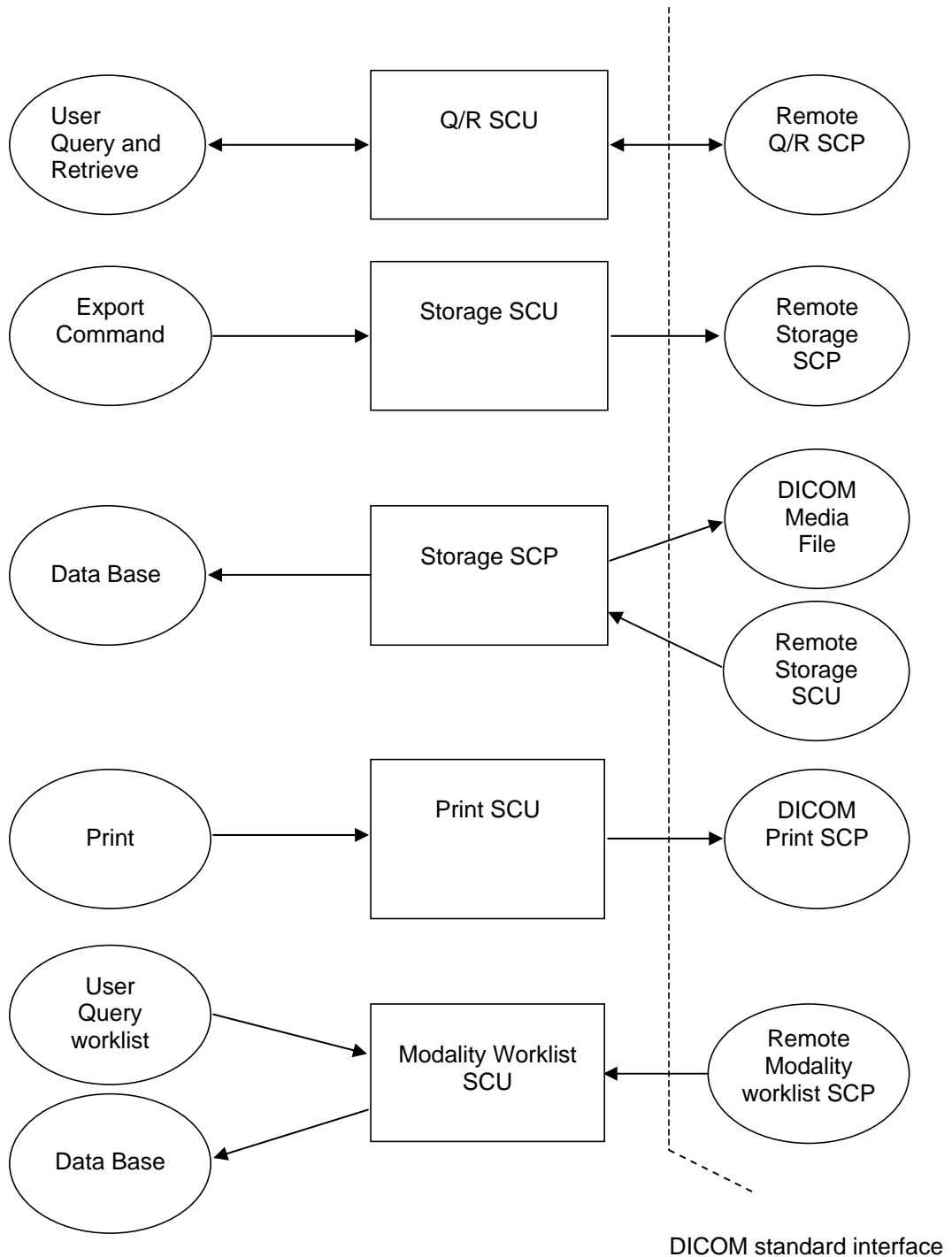


Figure 1 Application Data Flow Diagram

The IBU-Digital 1.1 Export Command is invoked when a user requests to transfer objects (RT Images) to a Remote Storage SCP. The objects are retrieved from the database and sent to the remote system.

The Storage SCP has a background process, which is started when the system boots. When an association is received the incoming objects will be validated and stored in the database.

The IBU-Digital 1.1 DICOM Print is invoked when a user requests to print an image to a remote DICOM printer. The image is composed to the Basic Grayscale Print protocol and sent to the remote system.

On request of the user, the Modality Worklist is queried at the remote modality worklist SCP. The worklist items returned are made available to the user. The user can select a worklist item from the worklist. The attributes settings that belong to the selected worklist item will be applied to the objects created, at the moment that the requested task in the selected worklist item is carried out.

## 4.2 Functional Definitions of AE's

All communications and transfer with the remote application is accomplished utilizing the DICOM protocol over a network using the TCP/IP protocol stack or the DICOM Media File.

### 4.2.1 Query/Retrieve SCU AE

The Query/Retrieve SCU AE supports negotiation and establishment of association with a Query/Retrieve SCP AE. It supports querying for patients, studies, series and series items (images), as well as issuing of C-MOVE requests for selected information objects. If a Find or Move request is issued, the SCU AE will synchronously wait for a response from the remote SCP AE.

### 4.2.2 Storage SCU AE

The Storage SCU AE establishes an association with a user selected remote AE just prior to sending a Store request to that AE.

### 4.2.3 Storage SCP AE

The Storage SCP AE waits for an association to accept at the TCP/IP port number 104. When an association request is received with valid connections criteria, the Storage SCP AE responds with a list of SOP class UIDs that it will accept. It then waits for a Store request. If a Store is received, then from all incoming plans and images that are conformant to the association Smoothbase domain objects are created. These domain objects are validated against their validation rules and stored in the database when valid.

### 4.2.4 Print SCU AE

The Print SCU AE establishes an association with a user selected remote AE just prior to sending a Print request to that AE.

### 4.2.5 Modality worklist SCU AE

The modality worklist SCU AE supports negotiation and establishment of association with modality worklist SCP AE. It supports querying for the basic worklist.

## 4.3 Sequencing of Real-World Activities

Not applicable.

# 5 AE Specifications

## 5.1 Query Retrieve SCU AE – Specification

The Query Retrieve SCU AE provides Standard Conformance to the following DICOM V3.0 SOP Classes as a Query Retrieve SCU.

SOP Class Name	SOP Class UID
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1

## 5.1.1 Association Establishment Policies

### 5.1.1.1 General

The Query Retrieve SCU AE will initiate an association as a Query Retrieve Service Class User requesting data about object instances and object instances themselves.

The PDU size is configurable and should be defined between 4096 bytes and 28672K bytes.

### 5.1.1.2 Number of Associations

The maximum number of simultaneous associations is one.

### 5.1.1.3 Asynchronous Nature

The Query Retrieve SCU AE does not support asynchronous communication (multiple outstanding transactions over a single association).

### 5.1.1.4 Implementation Identifying Information

The Implementation Identifying information is defined as followed:

- The implementation class UID is 2.16.840.1.
- The implementation version name is MergeCOM3\_321

## 5.1.2 Association Initiation by Real-World Activity

The Query Retrieve SCU AE initiates an association for the appropriate Query Retrieve Service Class that corresponds to the set of information objects that is requested for lookup or for transfer. The association is closed when all queries have been performed or all requested information objects have been transferred or when an error occurs.

The IBU-Digital 1.1 operator selects a function for querying and retrieving messages from a known source that supports Query and Retrieve as a Provider.

### 5.1.2.1 Real-World Activity for Find and Move execution operations

The IBU-Digital 1.1 application opens associations to do C-FINDs and C-MOVEs. The associations are closed after an error or when the initiator requests them to be closed.

#### 5.1.2.1.1 Associated Real-World Activity for the Find and Move operations

The IBU-Digital 1.1 application can load patient data by means of a DICOM Query Retrieve dialog. Based on operator supplied search parameters the application selects an appropriate query model to be used in a C-FIND request to a selected Query Retrieve Provider.

The result returned from the Query Retrieve Provider, if any, is displayed in a dialog, from which the operator may select candidates for retrieval to the Smoothbase Storage Provider.

The selected retrieval candidate data, if any selected, is used in a new association with a C-MOVE request to the Q/R Provider. The result, if successful, is displayed in the application and may be used for further processing.

#### 5.1.2.1.2 Proposed Presentation Contexts

The presentation contexts that are proposed by the Query Retrieve SCU AE for the Query Retrieve operations are specified in the following table.

Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Study Root Query Retrieve Information Model - Find	1.2.840.10008.5.1.4.1.2.2.1	Explicit VR Little Endian Implicit VR Little Endian	1.2.840.10008.1.2.1 1.2.840.10008.1.2	SCU	None
Study Root Query Retrieve	1.2.840.10008.5.1.4.1.2.2.2	Explicit VR Little Endian Implicit VR Little Endian	1.2.840.10008.1.2.1 1.2.840.10008.1.2	SCU	None

Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Information Model - Move					

**Note:**

*Big Endian is not yet supported in the current version of Smoothbase.*

### 5.1.3 Association Acceptance Policy

The Query Retrieve SCU AE never accepts an association.

## 5.2 Storage SCU AE – Specification

The Storage SCU AE provides Standard Conformance to the following DICOM V3.0 SOP Classes as a Storage SCU.

SOP Class Name	SOP Class UID
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1

### 5.2.1 Association Establishment Policies

#### 5.2.1.1 General

The Storage SCU AE will initiate an association as an SCU of Storage Services when a local operator requests to send objects over the network to a remote Storage SCP. The association is closed when the object has been sent to the remote Storage SCP. The Storage SCU AE is able to abort the association when an error occurs.

The PDU size is configurable and should be defined between 4096 bytes and 28672K bytes.

#### 5.2.1.2 Number of Associations

The maximum number of simultaneous associations is one.

#### 5.2.1.3 Asynchronous Nature

The Storage SCU AE does not support asynchronous communication (multiple outstanding transactions over a single association).

#### 5.2.1.4 Implementation Identifying Information

The Implementation Identifying information is defined as followed:

- The implementation class UID is 2.16.840.1.
- The implementation version name is MergeCOM3\_321

### 5.2.2 Association Initiation by Real-World Activity

The Storage SCU AE initiates an association for the appropriate Storage Services Class that corresponds to the set of objects requested for transfer. The association is closed when all objects have been sent to the remote DICOM system or when an error occurs.

#### 5.2.2.1 Real-World Activity for the Transfer Objects operation

The Storage SCU AE initiates associations for the transfer of objects to a remote DICOM system.

##### 5.2.2.1.1 Associated Real-World Activity

The user selects the Export Command and the DICOM destination. The DICOM destination can be configured with one or more DICOM Export adapters.

Once the association has been established, the Storage SCU AE sends a Store message.

##### 5.2.2.1.2 Proposed Presentation Contexts

The presentation contexts that are proposed by the Storage SCU AE for the Transfer Objects operation are specified in the following table.

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Applies to all supported storage SOP classes		Explicit VR Little Endian Implicit VR Little Endian	1.2.840.10008.1.2.1 1.2.840.10008.1.2	SCU	None

### 5.2.3 Association Acceptance Policy

The Storage SCU AE never accepts an association.

## 5.3 Storage SCP AE – Specification

The Storage SCP AE provides Standard Conformance to the following DICOM V3.0 SOP Classes as a Verification SCP.

SOP Class Name	SOP Class UID
Verification SOP Class	1.2.840.10008.1.1

The Storage SCP AE provides Standard Conformance to the following DICOM V3.0 SOP Classes as a Storage SCP.

SOP Class Name	SOP Class UID
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1

### 5.3.1 Association Establishment Policies

#### 5.3.1.1 General

The Storage SCP AE will wait for an association as an SCP of Storage Services. When a Store request is received, the corresponding objects are validated and when valid stored in the database.

The PDU size is configurable and should be defined between 4096 bytes and 28672K bytes.

#### 5.3.1.2 Number of Associations

The maximum number of simultaneous associations is one.

#### 5.3.1.3 Asynchronous Nature

The Storage SCP AE does not support asynchronous communication (multiple outstanding transactions over a single association).

#### 5.3.1.4 Implementation Identifying Information

The Implementation Identifying information is defined as followed:

- The implementation class UID is 2.16.840.1.
- The implementation version name is MergeCOM3\_321

### 5.3.2 Association Initiation by Real-World Activity

The Storage SCP AE never initiates an association.

### 5.3.3 Association Acceptance Policy

The Storage SCP AE accepts an association for the Verification and Storage Service Class. The Storage SCP is able to abort the association when an error occurs.

#### **Note:**

*Only those associations are accepted that are registered with the Storage SCP AE.*

#### 5.3.3.1 Real-World Activity for the Echo Response operation

The Storage SCP AE waits for an association request and accepts associations to do, among other things, the Verification Service. The association is closed after an error or when the initiator requests that it be closed.

### 5.3.3.1.1 Presentation Context table

Storage SCP AE for the Verification Service Class will only accept the presentation context listed in the following table.

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Verification Service Class	1.2.840.10008.1.1	Explicit VR Little Endian Implicit VR Little Endian	1.2.840.10008.1.2.1 1.2.840.10008.1.2	SCP	None

### 5.3.3.2 Real-World Activity for the Receive Objects operation

The Storage SCP AE waits for an association and offers to do the Storage service. The association is closed after an error or when the initiator requests that it be closed.

#### 5.3.3.2.1 Associated Real-World Activity

Once the association has been established, the Storage SCP AE waits for the transmission of conformant Storage Service messages.

#### 5.3.3.2.2 Presentation Context table

Storage SCP AE for the Storage Service Class will only accept the presentation contexts listed in the following table.

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Applies to all supported storage SOP classes		Explicit VR Little Endian Implicit VR Little Endian	1.2.840.10008.1.2.1 1.2.840.10008.1.2	SCP	None

#### 5.3.3.2.3 SOP Specific Conformance for all storage SOP Classes

The Storage SCP AE responds to a C-STORE request with one of the following response codes.

Service Status	Status Description	Status Code (0000,0900)	Related Fields
Success		0000	None
Error	Incoming object was not valid or could not be written to the database.	0110	None
Error	The new SOP Instance Value supplied by the invoking DIMSE-service-user was already registered for a SOP Instance of the specified SOP Class (Duplicate SOP Instance UID).	0111	
Error	Data Set does not match SOP Class.	A900	
Error	Send Study Instance UID (0020,000D) is already known under a different Patient ID (0010,0020).	A9A8	
Error	Send Series Instance UID (0020,000E) is already known under a different Study Instance UID (0020,000D).	A9A9	
Warning	Certain attributes have been changed in order to coerce the SOP Instance into the Query Model of the SCP.	B000	

**Note:**

*Attributes with a value type of 'Coded String (CS)' will only be accepted if they have a value as defined in the DICOM standard, unless stated otherwise in Appendix A. When the CS value is not recognized as a defined term, then status code 0110 is returned.*

#### 5.3.3.2.4 Presentation Context Acceptance Criterion

Not applicable since only a single presentation context for each Storage Service Class is supported.

#### 5.3.3.2.5 Transfer Syntax Selection Policies

Transfer syntaxes are accepted in the following order.

Transfer Syntax Name
Explicit VR Little Endian
Implicit VR Little Endian

## 5.4 Print SCU AE – Specifications

The Print SCU AE provides Standard Conformance to the following DICOM V3.0 SOP Classes as a DICOM Basic Print SCU.

SOP Class Name	SOP Class UID
Basic Grayscale Print Management (META)	1.2.840.10008.5.1.1.9
Basic Film Session	1.2.840.10008.5.1.1.1
Basic Film Box	1.2.840.10008.5.1.1.2
Basic Grayscale Image Box	1.2.840.10008.5.1.1.4
Printer	1.2.840.10008.5.1.1.16

### 5.4.1 Association Establishment Policies

#### 5.4.1.1 General

The Print SCU AE will initiate an association as an SCU of Print Services when a local operator requests to print images over the network to a remote Basic Print SCP.

The maximum PDU size is 28672 bytes.

#### 5.4.1.2 Number of Associations

The maximum number of simultaneous associations is one.

#### 5.4.1.3 Asynchronous Nature

The Print SCU AE does not support asynchronous communication (multiple outstanding transactions over a single association).

#### 5.4.1.4 Implementation Identifying Information

The Implementation Identifying information is defined as followed:

- The implementation class UID is 2.16.840.1.
- The implementation version name is MergeCOM3\_321

### 5.4.2 Association Initiation by Real-World Activity

The Print SCU AE initiates an association for the appropriate Print Services Class that corresponds to the set of images requested to be printed. The association is closed when all images have been printed or when an error occurs.

#### 5.4.2.1 Real-World Activity for the Print Image operation

The Print SCU AE initiates associations for the printing of images to a Basic Print SCP.

##### 5.4.2.1.1 Associated Real-World Activity

Once the association has been established, the Print SCU sends a Basic Film Session, N\_CREATE message to the Basic Print SCP. This is followed by a Basic Film Box, N\_CREATE message. The Print SCU then sends a Basic Grayscale Image Box, N\_SET message. Finally, an N\_ACTION message is sent to instruct the Basic Print SCP to print either at the Basic Film Session or at the Basic Film Box level.

##### 5.4.2.1.2 Proposed Presentation Contexts

The presentation contexts that are proposed by the Print SCU AE for the Print Image operation are specified in the following table.

Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Basic Grayscale Print Management	1.2.840.10008.5.1.1.9	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2		

(META)					
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**Note:**

*Big Endian is not yet supported in the current version of Smoothbase.*

### 5.4.2.1.3 SOP Specific Conformance

Attribute values for SOP classes proposed by the Print SCU AE are specified in the following table.

SOP Class Name	Command	Attribute Name	Range
Basic Film Session	N_CREATE	Number of Copies	
		Medium Type	
		Film Destination	
		Film Session Label	"IBU - Digital"
Basic Film Box	N_CREATE	Film Orientation	
		Magnification Type	
		Max Density	
		Border Density	
		Empty Image Density	
		Min Density	
Basic Grayscale Image Box	N_SET	Trim	
		Image Position	
		Samples Per Pixel	1
		Photometric Interpretation	Monochrome 1 or 2
		Rows	Depending on Image
		Columns	Depending on Image
		Pixel Aspect Ratio	Depending on Image
		Bits Allocated	16
		Bits Stored	12
		High Bit	11
Printer	N_GET / N_EVENT_REPORT	Pixel Representation	
		Pixel Data	
		Magnification Type	

### 5.4.3 Association Acceptance Policy

The Print SCU AE never accepts an association.

## 5.5 Modality worklist SCU AE – Specification

The Modality Worklist SCU AE provides Standard Conformance to the following DICOM V3.0 SOP Classes as a Modality Worklist SCU.

SOP Class Name	SOP Class UID
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31

### 5.5.1 Association Establishment Policies

#### 5.5.1.1 General

The Modality Worklist SCU AE will initiate an association as a Service Class User, requesting data about object instances and object instances themselves.

The PDU size is configurable and should be defined between 4096 bytes and 28672K bytes.

#### 5.5.1.2 Number of Associations

The maximum number of simultaneous associations is one.

### 5.5.1.3 Asynchronous Nature

The Modality Worklist SCU AE does not support asynchronous communication (multiple outstanding transactions over a single association).

### 5.5.1.4 Implementation Identifying Information

The Implementation Identifying information is defined as followed:

- The implementation class UID is 2.16.840.1.
- The implementation version name is MergeCOM3\_321

### 5.5.2 Association Initiation by Real-World Activity

The Modality Worklist SCU AE initiates an association for the appropriate Modality Worklist Service Class that corresponds to the set of worklist objects that is requested for lookup or for transfer. The association is closed when all queries have been performed or all requested information objects have been transferred or when an error occurs.

The IBU-Digital 1.1 operator selects a function for querying and retrieving messages from a known source that supports Modality Worklist as a Provider.

#### 5.5.2.1 Real-World Activity for Find execution operations

The IBU-Digital 1.1 application opens associations to do C-FINDs. The associations are closed after an error or when the initiator requests them to be closed.

##### 5.5.2.1.1 Associated Real-World Activity for the Find and Move operations

The IBU-Digital 1.1 application can load worklist data by means of a DICOM Modality Worklist dialog. Based on operator supplied search parameters, the application uses a C-FIND request to a selected Modality Worklist Provider.

The result returned from the Modality Worklist Provider, if any, is displayed in a list, from which the operator may select a worklist item. The attribute values that belong to the selected worklist item will be used by the application while performing the tasks requested in the selected worklist item or any other task for which these attribute values can be used.

##### 5.5.2.1.2 Proposed Presentation Contexts

The presentation contexts that are proposed by the Modality Worklist SCU AE for the Modality Worklist operation(s) are specified in the following table.

Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Modality Worklist Information Model - Find	1.2.840.10008.5.1.4.3.1	Explicit VR Little Endian Implicit VR Little Endian	1.2.840.10008.1.2.1 1.2.840.10008.1.2	SCU	None

**Note:**

*Big Endian is not yet supported in the current version of Smoothbase.*

### 5.5.3 Association Acceptance Policy

The Modality Worklist SCU AE never accepts an association.

### 5.5.4 SOP Specific Conformance - Modality Worklist Management

#### 5.5.4.1 Matching keys and return keys

The user can configure/select the matching keys that will be used in the query. The following keys are provided to the user:

Module / Attribute Name	Tag	Match Key Type	Match
<b>Scheduled Procedure Step</b>			
Scheduled Station AE Title	(0040,0001)	R	SV
Scheduled Procedure Step Start Date	(0040,0002)	R	SV or RM
Scheduled Procedure Step Start Time	(0040,0003)	R	SV or RM

Start Date: The user can select the start date from a list, containing the following values: Today, (= everything from today and later), Yesterday, (=everything from yesterday and later), Last 3 days, Last 7 days, all values are mapped in Scheduled Procedure Start Date (0040,0002).

SV - single value  
 RM - range matching  
 WC - wildcard matching  
 SM - Sequence matching

IBU-Digital 1.1 will provide support for requests on the following information:

Module / Attribute Name	Tag	Return Key Type
<b>Scheduled Procedure Step</b>		
Scheduled Station AE Title	(0040,0001)	1
Scheduled Procedure Step Start Date	(0040,0002)	1
Scheduled Procedure Step Start Time	(0040,0003)	1
Scheduled Performing Physician's Name	(0040,0006)	2
Scheduled Procedure Step Description	(0040,0005)	1C
<b>Patient Identification</b>		
Patient ID	(0010,0020)	1
Patients Name	(0010,0010)	1
<b>Patient Demographic</b>		
Patients Birth Date	(0010,0030)	2
Patients Sex	(0010,0040)	2
Patients Weight	(0010,1030)	2
Patient's Age	(0010,1010)	3
Patient's Size	(0010,1020)	3
Patient Comments	(0010,4000)	3
<b>Imaging Service Request</b>		
Accession Number	(0008,0050)	2
Referring Physician's Name	(0008,0090)	2
<b>Requested Procedure</b>		
Study Instance UID	(0020,000D)	1
Study ID	(0020,0010)	3
Study Description	(0008,1030)	3
Study Date	(0008,0020)	3
Study Time	(0008,0030)	3
<b>Visit Status</b>		
Current Patient Location	(0038,0300)	2

#### 5.5.4.2 Status codes processed when receiving messages from a modality worklist SCP

Service Status	Further Meaning	Status Codes	Simulator Behavior
Refused	Out of resources	A700	No worklist
Failed	Identifier does not match SOP class	A900	No worklist
	Unable to process	Cxxx	No worklist
Cancel	Matching terminated due to cancel request	FE00	No worklist
Success	Matching is complete - No final identifies	0000	Worklist displayed

Service Status	Further Meaning	Status Codes	Simulator Behavior
	will be supplied		
Pending	Matches are continued - Current match is supplied and any Optional Keys were supported in the same manner as required keys	FF00	Indication that the Worklist is retrieved
	Matches are continuing - Warning that one or more Optional Keys were not supported for this identifier	FF01	Indication that the Worklist is retrieved

## 6 Communication Profiles

### 6.1 Supported Communication Stacks

Smoothbase, in conjunction with MergeCOM-3, provides DICOM V3.0 TCP/IP Network Communication Support as defined in PS 3.8.

### 6.2 TCP/IP Stack

Smoothbase uses the MergeCOM-3 Advanced DICOM Tool Kit to communicate over the TCP/IP protocol stack on any physical interconnection media supporting the TCP/IP stack. The tool kit inherits the TCP/IP stack from the Microsoft Windows operating system upon which it executes.

#### 6.2.1 Physical Media Support

The Smoothbase AE is indifferent to the physical medium over which TCP/IP executes; it inherits this from the Microsoft Windows operating system upon which it executes.

## 7 Extensions/Specializations/Privatizations

### 7.1 Standard Extended/Specialized/Private SOPs

None supported.

### 7.2 Private Transfer Syntaxes

None supported.

## 8 Configuration

The lower-level configuration parameters are default set during the installation of the software. These settings work for the most systems, but it is possible that some modifications are needed to improve the communication with a remote system.

**Most parameters should NEVER be changed. Doing so could break DICOM conformance.**

Never change lower-level communication parameters, but contact Nucletron service department for advice.

### 8.1 AE Title/Presentation Address Mapping

Presentation address mapping is configured through the Configure DICOM dialog of Smoothbase application.

The Presentation Address of the application is specified according to the following table:



<b>AE Title/Presentation Address Mapping</b>	<b>Defaults</b>
AE Title	Smoothbase
TCP/IP port	104

These parameters are configurable by a Nucletron Service engineer.

In case there are multiple workstations with Smoothbase applications, each workstation must have a unique AE title for the storage provider to ensure that external systems can address them uniquely.

## **8.2 Configurable Parameters**

The logging of error messages, warning messages, informational messages and trace messages can be enabled or disabled in the configuration file.

The maximum PDU size can be configured in the configuration file.

- The default size is 28672 bytes.

## **9 Support of Extended Character Sets**

Not supported.

## **10 Codes and Controlled Terminology**

Not supported.

## **11 Security Profiles**

Not supported.

## Appendix A DICOM – IBU-Digital Specific Implementations Details

### A.1 Definitions

	SCP (Importer)	Description
<b>Modules</b>		
	SCP - Not supported	The module is not supported by the application. That means that the received module is ignored during import.
	SCP - Not Used	The module is not used by the application, but the received module is made persistent. On an export the module is used for export.
<b>Attribute</b>		
	SCP - Not Supported	
	SCP - Used	Means that the application uses this attribute.
	SCP - Not Used.	The attribute is not used by the application. The content of the attribute is remained and re-used on an export.
	SCP - Ignored	The attribute is ignored by the application. The content of the attribute is lost on export.
	SCP - Supported by application if supplied ...	The attribute is supported by the application when specified parameters are supplied.
	SCP - Supported if supplied ...	The attribute is supported by the 'Storage SCP' when specified parameters are supplied.
	<b>SCU (Exporter)</b>	<b>Description</b>
<b>Modules</b>		
	SCU - Provided	The Module as it initially is provided by the application. When the module has been imported, the original content is provided on export.
	SCU - Not provided	The module is not provided by the application when a new IOD is made.
<b>Attribute</b>		
	SCU - Provided	The attribute as it initially is provided by the application. When the attribute is imported, this value is provided on an export.
	SCU - Not Provided	The attribute is not provided by the application on an export. When the attribute is imported, this value is provided on an export.  Note that: DICOM type 1 is always sent. In case type 2 a 'null' value is sent.
	SCU – Not Provided Conditionally	The attribute is not provided by the application on an export. When the attribute is imported, this value is provided or not provided on an export depending on application activities.  Note that: DICOM type 1 is always sent. In case type 2 a 'null' value is sent.
	SCU - Supported values	If not all options are supported, an list with supported options follows e.g. Beam Type: SCU: Supported Values 'Photons and Electrons'

This appendix lists the supported Information Object Definitions (IODs). In each section header, a reference is given between brackets to the corresponding section in the official DICOM Standard document, part 3.

## A.2 RT Image IOD (A.17)

IE	Module	Section	Usage	Comments
Patient	Patient	C.7.1.1	M	
	Clinical Trial Subject	C.7.1.3	U	SCP - Not used SCU - Not provided
Study	General Study	C.7.2.1	M	
	Patient Study	C.7.2.2	U	SCP - Used SCU - Provided
	Clinical Trial Study	C.7.2.3	U	SCP - Not used SCU - Not provided
Series	RT Series	C.8.8.1	M	
	Clinical Trial Series	C.7.3.2	U	SCP - Not used SCU - Not provided
Frame of Reference	Frame Of Reference	C.7.4.1	U	SCP - Not used SCU - Not provided
Equipment	General Equipment	C.7.5.1	M	
Image	General Image	C.7.6.1	M	
	Image Pixel	C.7.6.3	M	
	Contrast/Bolus	C.7.6.4	C - Required if contrast media was used in this image	SCP - Not supported SCU - Not provided
	Cine	C.7.6.5	C - Required if multi-frame image is a cine image	SCP - Not supported SCU - Not provided
	Multi-Frame	C.7.6.6	C - Required if pixel data is multi-frame data	SCP - Not supported SCU - Not provided
	RT Image	C.8.8.2	M	
	Modality LUT	C.11.1	U	SCP - Not supported SCU - Not provided
	VOI LUT	C.11.2	U	SCP - Used SCU - Provided
	Approval	C.8.8.16	U	SCP - Not supported SCU - Not provided
	Curve	C.10.2	U	SCP - Used SCU - Provided
	Audio	C.10.3	U	SCP - Not supported SCU - Not provided
	SOP Common	C.12.1	M	

### A.2.1. Patient (C.7.1.1)

Attribute Name	Tag	Type	Notes
Patient's Name	(0010,0010)	2	SCP - Used, but the family name and give name are required. SCU - Provided
Patient ID	(0010,0020)	2	SCP - Used SCU - Provided
Patient's Birth Date	(0010,0030)	2	SCP - Date should be between January 1, 1753 and December 31, 9999 SCU - Provided
Patient's Sex	(0010,0040)	2	SCP - Used SCU - Provided

Attribute Name	Tag	Type	Notes
Referenced Patient Sequence	(0008,1120)	3	SCP - Ignored SCU - Not Provided
>Referenced SOP Class UID	(0008,1150)	1C	SCP - Ignored SCU - Not provided
>Referenced SOP Instance UID	(0008,1155)	1C	SCP - Ignored SCU - Not provided
Patient's Birth Time	(0010,0032)	3	SCP - Ignored SCU - Not provided
Other Patient IDs	(0010,1000)	3	SCP - Not used SCU - Not provided
Other Patient Names	(0010,1001)	3	SCP - Ignored SCU - Not provided
Ethnic Group	(0010,2160)	3	SCP - Not used SCU - Not provided
Patient Comments	(0010,4000)	3	SCP - Used SCU - Provided

### A.2.2. Clinical Trial Subject (C.7.1.3)

Attribute Name	Tag	Type	Notes
Clinical Trial Sponsor Name	(0012,0010)	1	SCP - Not used SCU - Not provided
Clinical Trial Protocol ID	(0012,0020)	1	SCP - Not used SCU - Not provided
Clinical Trial Protocol Name	(0012,0021)	2	SCP - Not used SCU - Not provided
Clinical Trial Site ID	(0012,0030)	2	SCP - Not used SCU - Not provided
Clinical Trial Site Name	(0012,0031)	2	SCP - Not used SCU - Not provided
Clinical Trial Subject ID	(0012,0040)	1C	SCP - Not used SCU - Not provided
Clinical Trial Subject Reading ID	(0012,0042)	1C	SCP - Not used SCU - Not provided

### A.2.3. General Study (C.7.2.1)

Attribute Name	Tag	Type	Notes
Study Instance UID	(0020,000D)	1	
Study Date	(0008,0020)	2	SCP - Used SCU - Provided
Study Time	(0008,0030)	2	SCP - Used SCU - Provided
Referring Physician's Name	(0008,0090)	2	SCP - Used SCU - Provided
Study ID	(0020,0010)	2	SCP - Used SCU - Provided
Accession Number	(0008,0050)	2	SCP - Used SCU - Provided
Study Description	(0008,1030)	3	SCP - Used SCU - Provided
Physician(s) of Record	(0008,1048)	3	SCP - Not used SCU - Not supported
Physician(s) of Record Identification Sequence	(0008,1049)	3	SCP - Ignored SCU - Not Provided
Name of Physician(s) Reading Study	(0008,1060)	3	SCP - Ignored SCU - Not Provided
Referenced Study Sequence	(0008,1110)	3	SCP - Ignored SCU - Not Provided

>Referenced SOP Class UID	(0008,1150)	1C	SCP - Ignored SCU - Not Provided
>Referenced SOP Instance UID	(0008,1155)	1C	SCP - Ignored SCU - Not Provided
Procedure Code Sequence	(0008,1032)	3	SCP - Ignored SCU - Not Provided
>Code Sequence Macro	(8.8-,1)		SCP - Ignored SCU - Not Provided

#### A.2.4. Patient Study (C.7.2.2)

Attribute Name	Tag	Type	Notes
Admitting Diagnoses Description	(0008,1080)	3	SCP - Ignored SCU - Not Provided
Admitting Diagnoses Code Sequence	(0008,1084)	3	SCP - Ignored SCU - Not Provided
Patient's Age	(0010,1010)	3	SCP - Age is recalculated on an import. SCU - Provided
Patient's Size	(0010,1020)	3	SCP - Used SCU - Provided
Patient's Weight	(0010,1030)	3	SCP - Used SCU - Provided
Occupation	(0010,2180)	3	SCP - Ignored SCU - Not Provided
Additional Patient History	(0010,21B0)	3	SCP - Ignored SCU - Not Provided

#### A.2.5. Clinical Trial Study (C.7.2.3)

Attribute Name	Tag	Type	Notes
Clinical Trial Time Point ID	(0012,0050)	2	SCP - Not used SCU - Not provided
Clinical Trial Time Point Description	(0012,0051)	3	SCP - Not used SCU - Not provided

#### A.2.6. RT Series (C.8.8.1)

Attribute Name	Tag	Type	Notes
Modality	(0008,0060)	1	SCP - Used SCU - RTIMAGE
Series Instance UID	(0020,000E)	1	SCP - Used SCU - Provided
Series Number	(0020,0011)	2	SCP - Used SCU - Provided
Series Description	(0008,103E)	3	SCP - Not used SCU - Not provided
Referenced Study Component Sequence	(0008,1111)	3	SCP - Ignored SCU - Not provided
>Referenced SOP Class UID	(0008,1150)	1C	SCP - Ignored SCU - Not provided
>Referenced SOP Instance UID	(0008,1155)	1C	SCP - Ignored SCU - Not provided
Request Attributes Sequence	(0040,0275)	3	SCP - Ignored SCU - Not provided
>Requested Procedure ID	(0040,1001)	1C	SCP - Ignored SCU - Not provided
>Scheduled Procedure Step ID	(0040,0009)	1C	SCP - Ignored SCU - Not provided
>Scheduled Procedure Step Description	(0040,0007)	3	SCP - Ignored SCU - Not provided

>Scheduled Protocol Code Sequence	(0040,0008)	3	SCP - Ignored SCU - Not provided
Performed Procedure Step ID	(0040,0253)	3	SCP - Ignored SCU - Not provided
Performed Procedure Step Start Date	(0040,0244)	3	SCP - Ignored SCU - Not provided
Performed Procedure Step Start Time	(0040,0245)	3	SCP - Ignored SCU - Not provided
Performed Procedure Step Description	(0040,0254)	3	SCP - Ignored SCU - Not provided
Performed Protocol Sequence	(0040,0260)	3	SCP - Ignored SCU - Not provided

### A.2.7. Clinical Trial Series (C.7.3.2)

Attribute Name	Tag	Type	Notes
Clinical Trial Coordinating Center Name	(0012,0060)	2	SCP - Not used SCU - Not provided

### A.2.8. Frame of Reference (C.7.6)

Attribute Name	Tag	Type	Notes
Frame of Reference UID	(0020,0052)	See C.12.1.1.1	SCP - Used SCU - Provided
Position Reference Indicator	(0020,1040)	See C.12.1.1.1	SCP - Not Used SCU - Not Provided

### A.2.9. General Equipment (C.7.5.1)

Attribute Name	Tag	Type	Notes
Manufacturer	(0008,0070)	2	SCP - Used SCU - Fixed value: "Nucletron B.V."
Institution Name	(0008,0080)	3	SCP - Used SCU - Provided
Institution Address	(0008,0081)	3	SCP - Ignored SCU - Not Provided
Station Name	(0008,1010)	3	SCP - Not used SCU - Not provided
Institutional Department Name	(0008,1040)	3	SCP - Used SCU - Provided
Manufacturer's Model Name	(0008,1090)	3	SCP - Used SCU - Fixed value: "IBU-Digital".
Device Serial Number	(0018,1000)	3	SCP - Not used SCU - Not provided
Software Version(s)	(0018,1020)	3	SCP - Used SCU - Provided
Spatial Resolution	(0018,1050)	3	SCP - Ignored SCU - Not Provided
Date of Last Calibration	(0018,1200)	3	SCP - Ignored SCU - Not Provided
Time of Last Calibration	(0018,1201)	3	SCP - Ignored SCU - Not Provided
Pixel Padding Value	(0028,0120)	3	SCP - Ignored SCU - Not Provided

### A.2.10. General Image (C.7.6.1)

Attribute Name	Tag	Type	Notes
Instance Number	(0020,0013)	2	SCP - Used SCU - Provided
Patient Orientation	(0020,0020)	2C	SCP - Not Used SCU - Not provided.
Content Date	(0008,0023)	2C	SCP - Date should be between January 1, 1753 and December 31, 9999 SCU - Not provided.
Content Time	(0008,0033)	2C	SCP - Not Used SCU - Not provided.
Image Type	(0008,0008)	3	SCP - Used SCU - Provided
Acquisition Number	(0020,0012)	3	SCP - Used SCU - Provided
Acquisition Date	(0008,0022)	3	SCP - Date should be between January 1, 1753 and December 31, 9999 SCU - Provided
Acquisition Time	(0008,0032)	3	SCP - Used SCU - Provided
Acquisition Datetime	(0008,002A)	3	SCP - Ignored SCU - Not provided.
Referenced Image Sequence	(0008,1140)	3	SCP - Ignored SCU - Not provided.
>Referenced SOP Class UID	(0008,1150)	1C	SCP - Ignored SCU - Not provided.
>Referenced SOP Instance UID	(0008,1155)	1C	SCP - Ignored SCU - Not provided.
>Referenced Frame Number	(0008,1160)	3	SCP - Ignored SCU - Not provided.
Derivation Description	(0008,2111)	3	SCP - Not Used SCU - Not provided.
Source Image Sequence	(0008,2112)	3	SCP - Ignored SCU - Not provided.
>Referenced SOP Class UID	(0008,1150)	1C	SCP - Ignored SCU - Not provided.
>Referenced SOP Instance UID	(0008,1155)	1C	SCP - Ignored SCU - Not provided.
>Referenced Frame Number	(0008,1160)	3	SCP - Ignored SCU - Not provided.
>Purpose of Reference Code Sequence	(0040,A170)	3	SCP - Ignored SCU - Not provided.
Referenced Waveform Sequence	(0008,113A)	3	SCP - Ignored SCU - Not provided.
>Purpose of Reference Code Sequence	(0040,A170)	3	SCP - Ignored SCU - Not provided.
Images in Acquisition	(0020,1002)	3	SCP - Ignored SCU - Not provided.
Image Comments	(0020,4000)	3	SCP - Not Used SCU - Not provided.
Quality Control Image	(0028,0300)	3	SCP - Not Used SCU - Fixed value: "NO"
Burned In Annotation	(0028,0301)	3	SCP - Not Used SCU - Fixed value: "NO"
Lossy Image Compression	(0028,2110)	3	SCP - Not Used SCU - Fixed value: "00"
Lossy Image Compression Ratio	(0028,2112)	3	SCP - Not Used SCU - Not provided.

Attribute Name	Tag	Type	Notes
Icon Image Sequence	(0088,0200)	3	SCP - Ignored SCU - Not provided.
Presentation LUT Shape	(2050,0020)	3	SCP - Not Used SCU - Not provided.
Private Creator	(0071,1001)	3	Introduces Annotation Sequence.
>Text Value	(0071,1006)	1C	The Annotation text value placed on the image. Required if the Annotation Sequence is sent. Value representation is LO.
>Text Position	(0071,1010)	1C	The (X, Y) pair representing the pixel coordinates of the location of the Annotation text on the Image. Value representation is LO, multiplicity 2. Required if the Annotation Sequence is sent.
>Arrow Position	(0071,1014)	1C	The (X, Y) pair representing the pixel coordinates of the location of the Arrow position to a point on the Image. Value representation is LO, multiplicity 2. Required if the Annotation Sequence is sent.

### A.2.11. Image Pixel (C.7.6.3)

Attribute Name	Tag	Type	Notes
Samples per Pixel	(0028,0002)	1	SCP - Supported if supplied 1 SCU - Fixed value: "1"
Photometric Interpretation	(0028,0004)	1	SCP - Supported by application if supplied: "MONOCHROME1 or MONOCHROME2" SCU - Fixed value: "MONOCHROME2", (RT Image to CR Adapter)
Rows	(0028,0010)	1	SCP - Used SCU - Provided
Columns	(0028,0011)	1	SCP - Used SCU - Provided
Bits Allocated	(0028,0100)	1	SCP - Used SCU - Provided
Bits Stored	(0028,0101)	1	SCP - Supported by application if supplied between 8 and 16 SCU - Value between 8 and 16
High Bit	(0028,0102)	1	SCP - Used SCU - Provided
Pixel Representation	(0028,0103)	1	SCP - Used SCU - Provided
Pixel Data	(7FE0,0010)	1	SCP - Used SCU - Provided
Planar Configuration	(0028,0006)	1C	SCP - Ignored SCU - Not provided
Pixel Aspect Ratio	(0028,0034)	1C	SCP - Not Used SCU - Not provided
Smallest Image Pixel Value	(0028,0106)	3	SCP - Not Used SCU - Not provided
Largest Image Pixel Value	(0028,0107)	3	SCP - Not Used SCU - Not provided
Red Palette Color Lookup Table Descriptor	(0028,1101)	1C	SCP - Ignored SCU - Not provided
Green Palette Color Lookup Table Descriptor	(0028,1102)	1C	SCP - Ignored SCU - Not provided
Blue Palette Color Lookup Table Descriptor	(0028,1103)	1C	SCP - Ignored SCU - Not provided
Red Palette Color Lookup Table Data	(0028,1201)	1C	SCP - Ignored SCU - Not provided



Attribute Name	Tag	Type	Notes
Green Palette Color Lookup Table Data	(0028,1202)	1C	SCP - Ignored SCU - Not provided
Blue Palette Color Lookup Table Data	(0028,1203)	1C	SCP - Ignored SCU - Not provided

**A.2.12. RT Image (C.8.8.2)**

Attribute Name	Tag	Type	Notes
Samples per Pixel	(0028,0002)	1	See Module Image Pixel (C.7.6.3)
Photometric Interpretation	(0028,0004)	1	SCP - Used SCU - Provided
Bits Allocated	(0028,0100)	1	See Module Image Pixel (C.7.6.3)
Bits Stored	(0028,0101)	1	See Module Image Pixel (C.7.6.3)
High Bit	(0028,0102)	1	See Module Image Pixel (C.7.6.3)
Pixel Representation	(0028,0103)	1	See Module Image Pixel (C.7.6.3)
RT Image Label	(3002,0002)	1	SCP - Used SCU - Provided
RT Image Name	(3002,0003)	3	SCP - Used SCU - Provided
RT Image Description	(3002,0004)	3	SCP - Not Used SCU - Not Provided
Operators' Name	(0008,1070)	2	SCP - Not Used SCU - Not Provided
Image Type	(0008,0008)	1	SCP - Used SCU - Fixed value: "RADIOGRAPH"
Conversion Type	(0008,0064)	2	SCP - Not Used SCU - Fixed value: "DI"
Reported Values Origin	(3002,000A)	2C	SCP - Not Used SCU - Fixed value: "ACTUAL"
RT Image Plane	(3002,000C)	1	SCP - Not Used SCU - Fixed value: "NORMAL"
X-Ray Image Receptor Translation	(3002,000D)	3	SCP - Not Used SCU - Provided
X-Ray Image Receptor Angle	(3002,000E)	2	SCP - Not Used SCU - 0.0
RT Image Orientation	(3002,0010)	2C	SCP - Ignored SCU - Not provided
Image Plane Pixel Spacing	(3002,0011)	2	SCP - Used SCU - Provided
RT Image Position	(3002,0012)	1	SCP - Used SCU - Provided
Radiation Machine Name	(3002,0020)	2	SCP - Not Used SCU - Fixed value: "IBU-Digital"
Primary Dosimeter Unit	(300A,00B3)	2	SCP - Not Used SCU - Fixed value: "MINUTE"
Radiation Machine SAD	(3002,0022)	2	SCP - Used SCU - Provided
Radiation Machine SSD	(3002,0024)	3	SCP - Used SCU - Provided
RT Image SID	(3002,0026)	2	SCP - Used SCU - Provided
Source to Reference Object Distance	(3002,0028)	3	SCP - Ignored SCU - Not provided
Referenced RT Plan Sequence	(300C,0002)	3	SCP - Used SCU - Provided
>Referenced SOP Class UID	(0008,1150)	1C	SCP - Used SCU - Provided
>Referenced SOP Instance UID	(0008,1155)	1C	SCP - Used SCU - Provided

Attribute Name	Tag	Type	Notes
Referenced Beam Number	(300C,0006)	3	SCP - Used SCU - Provided
Referenced Fraction Group Number	(300C,0022)	3	SCP - Not used SCU - Not provided
Fraction Number	(3002,0029)	3	SCP - Not used SCU - Not provided
Start Cumulative Meterset Weight	(300C,0008)	3	SCP - Not used SCU - Not provided
End Cumulative Meterset Weight	(300C,0009)	3	SCP - Not used SCU - Not provided
Exposure Sequence	(3002,0030)	3	SCP - Used SCU - Provided
>Referenced Frame Number	(0008,1160)	1C	SCP - Not used SCU - Not provided
>KVP	(0018,0060)	2C	SCP - Not used SCU - Provided
>X-ray Tube Current	(0018,1151)	2C	SCP - Not used SCU - Provided
>Exposure Time	(0018,1150)	2C	SCP - Not used SCU - Provided
>Meterset Exposure	(3002,0032)	2C	SCP - Not used SCU - Not provided
>Diaphragm Position	(3002,0034)	3	SCP - Not Used SCU - Provided
>Beam Limiting Device Sequence	(300A,00B6)	3	SCP - Used SCU - Provided
>>RT Beam Limiting Device Type	(300A,00B8)	1C	SCP - Used SCU - Supported values: "X or ASYMX and Y or ASYMY"
>>Source to Beam Limiting Device Distance	(300A,00BA)	3	SCP - Not used SCU - Not provided
>>Number of Leaf/Jaw Pairs	(300A,00BC)	1C	SCP - Not used SCU - Provided
>>Leaf Position Boundaries	(300A,00BE)	2C	SCP - Not used SCU - Not provided
>>Leaf/Jaw Positions	(300A,011C)	1C	SCP - Used SCU - Provided
>Applicator Sequence	(300A,0107)	3	SCP - Not used SCU - Not provided
>>Applicator ID	(300A,0108)	1C	SCP - Not used SCU - Not provided
>>Applicator Type	(300A,0109)	1C	SCP - Not used SCU - Not provided
>>Applicator Description	(300A,010A)	3	SCP - Not used SCU - Not provided
>Number of Blocks	(300A,00F0)	1C	SCP - Not used SCU - Provided
>Block Sequence	(300A,00F4)	2C	SCP - Not used SCU - Not provided
>>Block Tray ID	(300A,00F5)	3	SCP - Not used SCU - Not provided
>>Source to Block Tray Distance	(300A,00F6)	2C	SCP - Not used SCU - Not provided
>>Block Type	(300A,00F8)	1C	SCP - Not used SCU - Not provided
>>Block Divergence	(300A,00FA)	2C	SCP - Not used SCU - Not provided
>>Block Number	(300A,00FC)	1C	SCP - Not used SCU - Not provided
>>Block Name	(300A,00FE)	3	SCP - Not used SCU - Not provided

Attribute Name	Tag	Type	Notes
>>Material ID	(300A,00E1)	2C	SCP - Not used SCU - Not provided
>>Block Thickness	(300A,0100)	3	SCP - Not used SCU - Not provided
>>Block Number of Points	(300A,0104)	2C	SCP - Not used SCU - Not provided
>>Block Data	(300A,0106)	2C	SCP - Not used SCU - Not provided
Gantry Angle	(300A,011E)	3	SCP - Used SCU - Provided
Beam Limiting Device Angle	(300A,0120)	3	SCP - Not used SCU - Provided
Patient Support Angle	(300A,0122)	3	SCP - Not used SCU - Provided
Table Top Eccentric Axis Distance	(300A,0124)	3	SCP - Not used SCU - Not provided
Table Top Eccentric Angle	(300A,0125)	3	SCP - Not used SCU - Not provided
Table Top Vertical Position	(300A,0128)	3	SCP - Not used SCU - Provided
Table Top Longitudinal Position	(300A,0129)	3	SCP - Not used SCU - Provided
Table Top Lateral Position	(300A,012A)	3	SCP - Not used SCU - Provided
C-Arm angle	(3003,xx10)	1	SCP - Not used SCU - Provided
L-Arm angle	(3003,xx20)	1	SCP - Not used SCU - Provided
Flip horizontal	(3003,xx30)	1	SCP - Not used SCU - Provided
Flip vertical	(3003,xx31)	1	SCP - Not used SCU - Provided

### A.2.13. Curve (C.10.2)

**Note:**

Multiple Curves are supported, but in the sequence only one Curve from the "Type of Data" is equal to ROI may exist.

Attribute Name	Tag	Type	Notes
Curve Dimensions	(50xx,0005)	1	SCP - Supported if supplied: "2" SCU - Fixed value: "2"
Number of Points	(50xx,0010)	1	SCP - Used SCU - Provided
Type of Data	(50xx,0020)	1	SCP - Supported by application if supplied: "ROI" or "POLY" SCU - Supported values: "ROI" or "POLY"
Data Value Representation	(50xx,0103)	1	SCP - Supported if supplied: - 0002H = floating point single (FL) or - 0003H = floating point double (FD) SCU - Fixed value: 0003H = floating point double (FD)
Curve Data	(50xx,3000)	1	SCP - Used SCU - Provided
Curve Description	(50xx,0022)	3	SCP - Used SCU - Provided
Axis Units	(50xx,0030)	3	SCP - Supported by application if supplied PIXL, PIXL, otherwise ignored curve. SCU - Fixed value: "PIXL, PIXL"
Axis Labels	(50xx,0040)	3	SCP - Ignored SCU - Not provided

Attribute Name	Tag	Type	Notes
Minimum Coordinate Value	(50xx,0104)	3	SCP - Ignored SCU - Not provided
Maximum Coordinate Value	(50xx,0105)	3	SCP - Ignored SCU - Not provided
Curve Range	(50xx,0106)	3	SCP - Ignored SCU - Not provided
Curve Data Descriptor	(50xx,0110)	1C	SCP - Ignored SCU - Not provided
Coordinate Start Value	(50xx,0112)	1C	SCP - Ignored SCU - Not provided
Coordinate Step Value	(50xx,0114)	1C	SCP - Ignored SCU - Not provided
Curve Label	(50xx,2500)	3	SCP - Used; SCU - Provided
Referenced Overlay Sequence	(50xx,2600)	3	SCP - Ignored SCU - Not provided
>Referenced SOP Class UID	(0008,1150)	1C	SCP - Ignored SCU - Not provided
>Referenced SOP Instance UID	(0008,1155)	1C	SCP - Ignored SCU - Not provided
>Referenced Overlay Group	(50xx,2610)	1C	SCP - Ignored SCU - Not provided
Margin Sequence	(5001,1005)	3	Note that the Margin Sequence is defined in the new sequence format. The Curve Module still used the old sequences format.
Margin Value	(5001,1001)	3	Private tag: Value specified in mm. Used to calculate the Margined Curve data
Number Of Original Points	(5001,1010)	3	Private tag: Number of data points of the Original Data contour.
Original Data	(5001,1000)	3	Private tag: The original curve data, which contains no margin.

#### A.2.14. VOI LUT (C.11.2)

Attribute Name	Tag	Type	Notes
VOI LUT Sequence	(0028,3010)	3	SCP - Used SCU - Provided
>LUT Descriptor	(0028,3002)	1C	SCP - Used SCU - Provided
>LUT Explanation	(0028,3003)	3	SCP - Not used SCU - Not provided
>LUT Data	(0028,3006)	1C	SCP - Used SCU - Provided
Window Center	(0028,1050)	3	SCP - Used SCU - Provided
Window Width	(0028,1051)	1C	SCP - Used SCU - Provided
Window Center & Width Explanation	(0028,1055)	3	SCP - Used SCU - Gamma Curve Index, supported values: "1, 2, or 3"



**A.2.15. SOP Common (C.12.1)**

<b>Attribute Name</b>	<b>Tag</b>	<b>Type</b>	<b>Notes</b>
SOP Class UID	(0008,0016)	1	SCP - Used SCU - Provided
SOP Instance UID	(0008,0018)	1	SCP - Used SCU - Provided
Specific Character Set	(0008,0005)	1C	SCP - Not used SCU - Not provided
Instance Creation Date	(0008,0012)	3	SCP - Used SCU - Provided
Instance Creation Time	(0008,0013)	3	SCP - Used SCU - Provided
Instance Creator UID	(0008,0014)	3	SCP - Not used SCU - Not provided