

DICOM CONFORMANCE STATEMENT

Intera R10.3 (SP3) & R10.4

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PHILIPS

DICOM Conformance Statement

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1. INTRODUCTION

This chapter provides general information about the purpose, scope and contents of this Conformance Statement.

1.1. Scope and Field of Application

The scope of this DICOM Conformance Statement is to facilitate data exchange with equipment of Philips Medical Systems. This document specifies the compliance to the DICOM standard (formally called the NEMA PS 3.X 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 Pair (SOP) Classes, Roles, Information Object Definitions (IOD) and Transfer Syntaxes.

The field of application is the integration of the Philips Medical Systems equipment into an environment of medical devices. This Conformance Statement should be read in conjunction with the DICOM standard and its addenda [DICOM].

1.2. Intended Audience

This Conformance Statement is intended for:

- (potential) customers
- system integrators of medical equipment
- marketing staff interested in system functionality
- software designers implementing DICOM interfaces

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

1.3. Contents and Structure

The DICOM Conformance Statement is contained in chapter 2 through 7 and follows the contents and structuring requirements of DICOM PS 3.2.

1.4. Used Definitions, Terms and Abbreviations

DICOM definitions, terms and abbreviations are used throughout this Conformance Statement. For a description of these, see NEMA PS 3.3 and PS 3.4.

The word Philips in this document refers to Philips Medical Systems.

1.5. References

[DICOM] The Digital Imaging and Communications in Medicine

(DICOM) standard (NEMA PS 3.X):
National Electrical Manufacturers Association (NEMA)
Publication Sales 1300 N. 17th Street, Suite 1847
Rosslyn, Va. 22209, United States of America

1.6. Important Note to the Reader

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

➤ 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 IT 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 Philips equipment with non-Philips equipment.

It is the user's responsibility to analyse thoroughly the application requirements and to specify a solution that integrates Philips equipment with non-Philips equipment.

➤ Validation

Philips equipment has been carefully tested to assure that the actual implementation of the DICOM interface corresponds with this Conformance Statement.

Where Philips equipment is linked to non-Philips 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. Philips is actively involved in this evolution and plans to adapt its equipment to future versions of the DICOM Standard. In order to do so, Philips reserves the right to make changes to its products or to discontinue its delivery.

The user should ensure that any non-Philips provider linking to Philips equipment also adapts to future versions of the DICOM Standard. If not, the incorporation of DICOM enhancements into Philips equipment may lead to loss of connectivity (in case of networking) and incompatibility (in case of media).

1.7. General Acronyms and Abbreviations

The following acronyms and abbreviations are used in the document.

➤ ACR	American College of Radiology
➤ AE	Application Entity
➤ AET	Application Entity Title
➤ ANSI	American National Standard Institute
➤ CT	Computed Tomography (Image Storage)
➤ DICOM	Digital Imaging and Communication in Medicine
➤ DIMSE	DICOM Message Service Element
➤ EBE	Explicit VR Big Endian
➤ ELE	Explicit VR Little Endian
➤ FSC	File-Set Creator
➤ FSR	File-Set Reader
➤ FSU	File-Set Updater
➤ HIS	Hospital Information System
➤ ILE	Implicit VR Little Endian
➤ IOD	Information Object Definition
➤ MIP	Maximum/Minimum Intensity Projection
➤ MOD	Magneto-Optical Disc
➤ MPR	Multi-Planar Reformat
➤ MR	Magnetic Resonance (Image Storage)
➤ NEMA	National Electrical Manufacturers Association
➤ PACS	Picture Archiving and Communication System
➤ PC	Personal Computer
➤ PDU	Protocol Data Unit
➤ PS	Grayscale Softcopy Presentation State (Storage)
➤ Q/R	Query/Retrieve
➤ RIS	Radiology Information System
➤ RWA	Real World Activity
➤ SC	Secondary Capture (Image Storage)
➤ SCP	Service Class Provider
➤ SCU	Service Class User
➤ SOP	Service Object Pair
➤ TCP/IP	Transmission Control Protocol/Internet protocol
➤ UI	User Interface
➤ UID	Unique Identifier

2. IMPLEMENTATION MODEL

The Intera (Gyrosan) system of Philips Medical Systems, later referred to as Intera, is an MR image generating system.

The Intera (Gyrosan) is primarily intended for:

A DICOM Radiology Information System (RIS) interface to retrieve the Worklist of patients to be examined and to send an MPPS request to the RIS.

A DICOM Image Import function to receive DICOM MR images and image related data (originating from the same or other Intera systems) from a remote DICOM node.

A DICOM Image Export function to transfer DICOM MR or DICOM SC images and image related data from the Intera to a remote system. After the store request a Storage Commit request can be sent to the remote system.

A DICOM Image Print function to print MR images on a DICOM network printer.

A DICOM Media export function write and read DICOM MOD's.

Supported DICOM functionality of the Intera:

Network SCU:

- Storage
- Query/Retrieve
- Study Management (Modality Performed Procedure Step)
- Storage Commitment
- Basic Worklist Management

Network SCP:

- Verification
- Storage

Print SCU:

- Print Management

DICOM Media:

- Media Storage (Read, Write, Update)

These DICOM functions are described in this document.

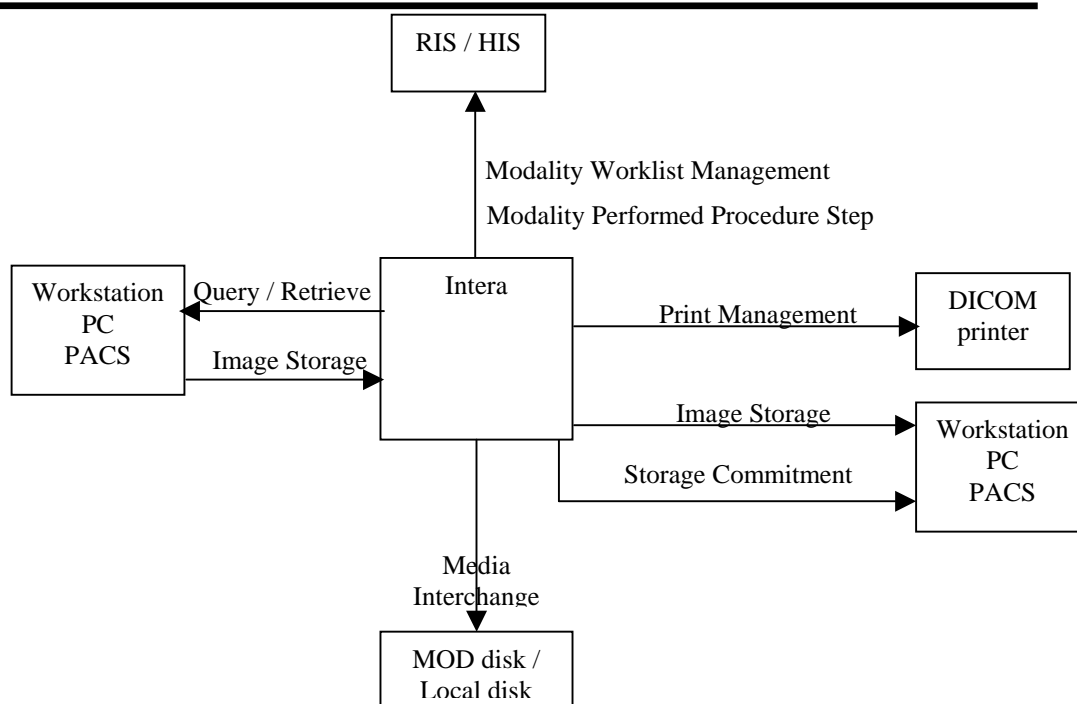


Figure 1. Interact system in a DICOM network

2.1. Application Data Flow Diagram

Interact has 2 Application Entities (AE). The related implementation model is shown in Figure 2.

Before or after an acquisition a remote system can send related images of one or more of the scheduled patients to the Interact. The Interact can send a query request for images to an archive. DICOM Instances (MR, SC Images, Private SOP Classes and grayscale softcopy presentation state) are imported for reference purposes only.

The Interact DICOM Modality Worklist function requests the Worklist from a DICOM Information System like a RIS. At the start and the end of the acquisition/processing MPPS messages are sent to the RIS to inform the RIS of the status of the Examination.

The created Images are converted into a DICOM message to be sent to the remote system or can be written onto a local disk or a MOD. After the storage to a remote archive the Interact can request a storage commitment.

The Interact DICOM Print function allows the Interact operator to send/print images on a DICOM network printer.

Secondary Capture Images can be created when the user uses the screen capture function.

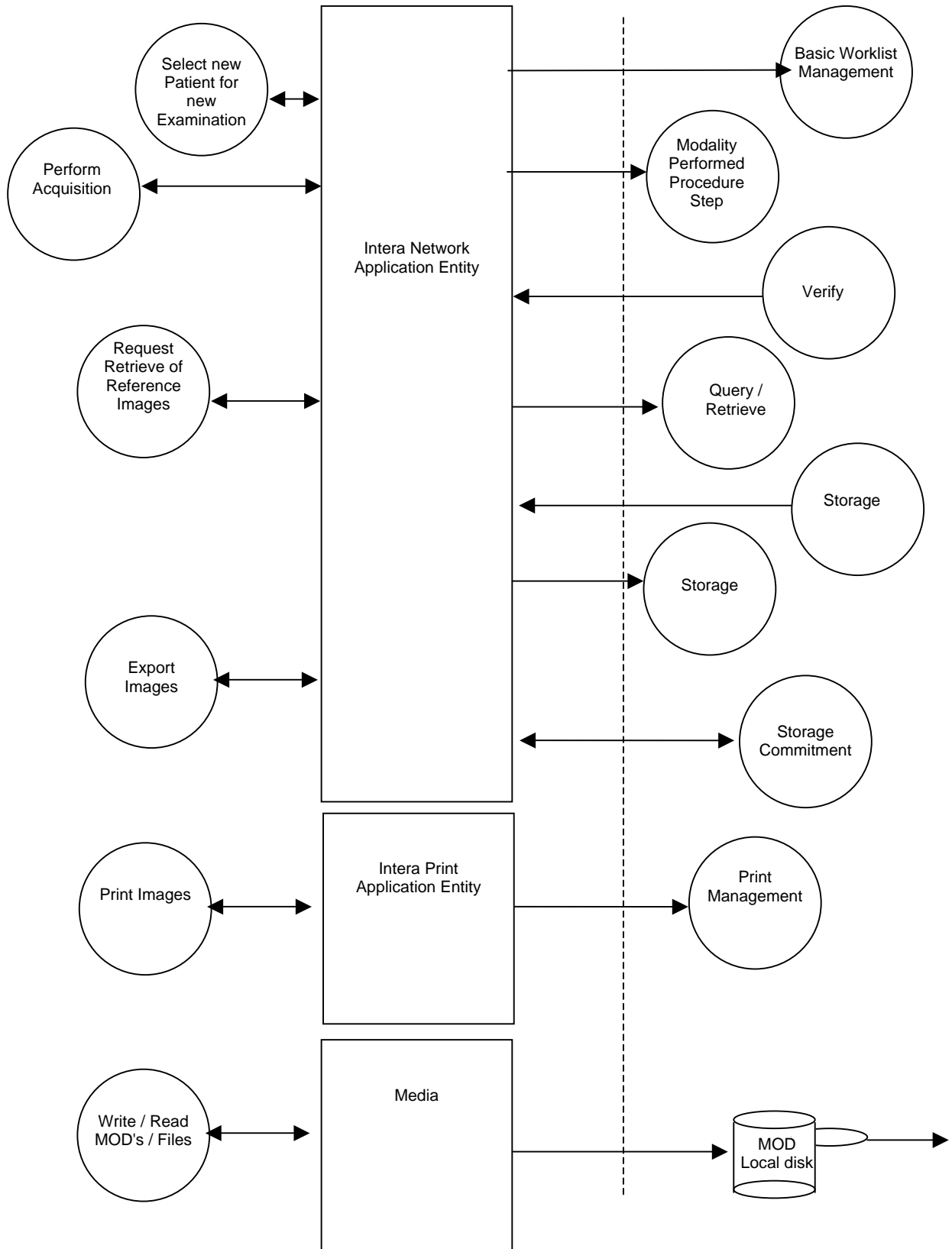


Figure 2. Implementation Model Intera

2.2. Functional definition of Application Entities

2.2.1. Intera Network AE

2.2.1.1. Worklist services

The Intera Worklist Management RWA requests the Worklist from a DICOM Information System like a RIS with the Worklist Management service. The function is initiated on the Intera by clicking the "RIS" button.

At the start and at the end of the acquisition/processing the configured MPPS node system is informed of the process of the selected procedure step by the Modality Performed Procedure Step (MPPS) service. The function is initiated at the start of a new examination (status is IN-PROGRESS). When the object has been archived and other administrative data has been updated the operator pushes the "ready" or "incomplete" button and Intera sends a new MPPS message with the status COMPLETED/DISCONTINUED.

2.2.1.2. Intera Import services

The Intera Network AE acts as SCP for the storage SOP classes and as SCU for the Q/R SOP classes: the Intera will respond to a remote request and store the images in the patient database. Imported images are to be used for reference only; when these are exported afterwards again no guarantee for consistency or completeness can be given.

2.2.1.3. Intera Export services

The Intera operator can activate the DICOM Image Export function. The Intera Network AE acts as SCU of the Storage Service Class. The selected images and related object data are converted into a DICOM message to be sent to the remote system.

The images to be sent are selected from one or more examinations. At export the images will be sent to a user selected remote destination. The images transferred are intended for viewing purposes; planscan information can be calculated from reference images. Post-processing like MPR, MIP, 3D reconstruction and rendering are possible, depending on the capabilities of the workstation receiving the MR images; for more detailed interpretation a large amount of information is stored in private elements. These have to be discarded by another DICOM system when modifying/processing the images. These DICOM nodes are then responsible for data consistency.

2.2.1.4. Verification services

The Intera verification function can handle verification requests.

2.2.2. Intera Print AE

The Intera DICOM Print function allows the Intera operator to send/print images on a DICOM network printer. The Intera DICOM Print AE acts as SCU of the Basic Grayscale Print Management Meta SOP Class. After selecting the images these can be sent to a DICOM network printer.

2.2.3. Media

The Intera has the function to Read, Write or Update MOD's and DICOM files written by the CT/MR application Profile. As an extension to this profile also grayscale softcopy presentation state objects can be written, updated and read from MOD's.

2.3. Sequencing of Real World Activities

Worklist Management

When a RIS interface is configured, the prepared worklist data can be requested by clicking the "RIS" button on the Patient Administration user interface. It may request the Worklist for "Today" and "Tomorrow" from the specific Intera AE title.

After receiving the worklist data from the RIS the Intera will display the worklist on the user interface.

The user can select a relevant patient record and add or modify missing or wrong data before the received patient data is stored in the Intera database. The Worklist contains the Requested Procedure Steps.

Prefetching Images

Before or after requesting a worklist a remote system can send related images of one or more of the scheduled patients to the Intera, for reference purposes. In this way prefetching of images can be performed.

If no RIS is configured or no connection is possible, data can be introduced manually via the user interface.

After preparation of the scanner and the patient, the operator will perform the requested, or on his own initiative modified, procedure steps.

Results may be MR images and screen-grabs stored as Secondary Capture images, as well as Private MR Spectrum and Private MR Series Data.

Export

The selected MR images and other objects can be sent (manually or by acquisition protocol) to a selected remote system.

The Intera can be configured to send grayscale softcopy presentation state for the selected series.

Print

After selecting the images these can be sent to a DICOM network printer.

Media

Storage on MOD can be initiated by selecting the requested images and pressing the MOD destination button on the user interface.

Storage Commitment

After sending the images to an archive, the Intera can be configured to request a storage commitment from the archive. After receiving the Storage Commitment, this is indicated on the Patient Administration Users Interface. After this the user may decide to delete the images locally.

Worklist, MPPS and Storage Commitment are part of the IHE Scheduled Workflow option package.

3. AE SPECIFICATIONS

The Network capabilities of the system consists of two DICOM Application Entities:

- Intera Network AE
- Intera Print AE

These are specified in section 3.1 to section 3.2.

The Media services are described in section 3.3.

3.1. Intera Network AE Specification

The Intera Network AE Application Entity provides standard conformance to the DICOM V3.0 SOP classes as an SCU specified in Table 1.

Table 1. Supported SOP Classes as SCU by the Intera Network AE Specification

SOP Class Name	UID
Storage Commitment Push Model	1.2.840.10008.1.20.1
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3
MR Image Storage	1.2.840.10008.5.1.4.1.1.4
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1
Patient Root Query/Retrieve Info Model - FIND	1.2.840.10008.5.1.4.1.2.1.1
Patient Root Query/Retrieve Info Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2
Study Root Query/Retrieve Info Model - FIND	1.2.840.10008.5.1.4.1.2.2.1
Study Root Query/Retrieve Info Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31
Private MR Spectrum Storage	1.3.46.670589.11.0.0.12.1
Private MR Series Data Storage	1.3.46.670589.11.0.0.12.2

The Intera DICOM Network AE Application Entity provides standard conformance to the DICOM V3.0 SOP classes as a SCP specified in Table 2.

Table 2. Supported SOP Classes as SCP by the Intera Network AE Specification

SOP Class Name	UID
Verification	1.2.840.10008.1.1
MR Image Storage	1.2.840.10008.5.1.4.1.1.4
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1
Private MR Spectrum Storage	1.3.46.670589.11.0.0.12.1
Private MR Series Data Storage	1.3.46.670589.11.0.0.12.2

3.1.1. Association Establishment Policies

3.1.1.1. General

The Intera Network AE always proposes the following DICOM Application Context Name (ACN): 1.2.840.10008.3.1.1.1.

The Maximum PDU size is configurable.

3.1.1.2. Number of Associations

The Intera Network AE will attempt one association for each service as SCU at the time. For the SCP service also one association is supported.

3.1.1.3. Asynchronous Nature

The Intera Network AE does not support asynchronous operations and will not perform asynchronous window negotiation.

3.1.1.4. Implementation Identifying Information

Implementation Class UID:	1.3.46.670589.11.0.0.51.4.2.2
Implementation Version Name:	MR DICOM 2.2

3.1.2. Association Initiation Policy

3.1.2.1. Worklist Management

3.1.2.1.1. Associated Real-World Activity

The Worklist Management function will be accessible through the Intera user interface. An association will be initiated to the configured remote system (usually a RIS). After receiving the Worklist the association is released.

3.1.2.1.2. Proposed Presentation Context

The Intera Network AE will propose the following presentation context.

Table 3. Proposed Presentation Context for Worklist Management SCU

Abstract Syntax	UID	Transfer Syntax	UID List	Role	Ext. Neg.
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	ELE	1.2.840.10008.1.2.1	SCU	None
		EBE	1.2.840.10008.1.2.2		
		ILE	1.2.840.10008.1.2		

3.1.2.1.3. SOP Specific Conformance Worklist SOP Classes

Following are the status codes that are processed by the Intera Network AE when received from a remote Modality Worklist SCP system:

Table 4. WLM Status

Service Status	Status Codes	Further Meaning	Behaviour upon receiving Status Codes
Refused	A700	Out of resources	Processing of the matches and the association is terminated. A message appears on the User Interface.
Failed	A900	Identifier does not match SOP Class	The association is terminated and the status is logged into the system error log. A message appears on the User Interface.
	Cxxx	Unable to process	Processing of the matches and the association is terminated. A message appears on the User Interface.
Cancel	FE00	Matching terminated due to cancel	Processing of the matches and the association is terminated. A message appears on the User Interface.
Success	0000	Matching is complete - No final identifier is supplied	The association is released and the matches received are stored.
All other status codes	xxxx	-	No specific behaviour.

Table 5 lists the received attributes that are shown on the user interface, providing the mapping of the DICOM attribute to the UI entry.

Table 5. Mapping between UI Fields and DICOM Attributes for Modality Worklist Query

Attribute Name	Tag	UI Entry
Scheduled Procedure Step Sequence	(0040,0100)	Sequence attribute not required in UI
>Scheduled Procedure Step Start Date	(0040,0002)	Not visible
>Scheduled Procedure Step Start Time	(0040,0003)	Not visible
>Modality	(0008,0060)	Not visible
>Scheduled Procedure Step Description	(0040,0007)	Exam Name
Requested Procedure ID	(0040,1001)	Not visible
Accession Number	(0008,0050)	Accession Number
Referring Physician's Name	(0008,0090)	Physician
Patient's Name	(0010,0010)	Patient's name
Patient ID	(0010,0020)	Registration ID
Patient's Birth Date	(0010,0030)	Date of birth
Patient's Sex	(0010,0040)	Sex
Patient's Weight	(0010,1030)	Weight

In the following tables an overview of the WLM request attributes is given. Additional information is included in the Note field.

Table 6. Modality Worklist Information Model - FIND SOP Class - C-FIND-RQ - SOP Common Module

Attribute Name	Tag	Note
Specific Character Set	0008,0005	Single value matching ISO_IR 100

Table 7. Modality Worklist Information Model - FIND SOP Class - C-FIND-RQ - Scheduled Procedure Step Module

Attribute Name	Tag	Note
Scheduled Procedure Step Sequence	0040,0100	-
>Modality	0008,0060	-
>Requested Contrast Agent	0032,1070	-
>Scheduled Station AE Title	0040,0001	Single value matching <local network AET>
>Scheduled Procedure Step Start Date	0040,0002	Range matching <Today> - <Tomorrow> or Single value matching <Today>, <Tomorrow>
>Scheduled Procedure Step Start Time	0040,0003	-
>Scheduled Procedure Step End Date	0040,0004	-
>Scheduled Procedure Step End Time	0040,0005	-
>Scheduled Performing Physician's Name	0040,0006	-
>Scheduled Procedure Step Description	0040,0007	-
>Scheduled Action Item Code Sequence	0040,0008	-
>>Code Value	0008,0100	-
>>Coding Scheme Designator	0008,0102	-
>>Coding Scheme Version	0008,0103	-
>>Code Meaning	0008,0104	-

Attribute Name	Tag	Note
>Scheduled Procedure Step ID	0040,0009	-
>Scheduled Station Name	0040,0010	-
>Scheduled Procedure Step Location	0040,0011	-
>Pre-Medication	0040,0012	-
>Scheduled Procedure Step Status	0040,0020	-
>Comments on the Scheduled Procedure Step	0040,0400	-

Table 8. Modality Worklist Information Model - FIND SOP Class - C-FIND-RQ - Requested Procedure Module

Attribute Name	Tag	Note
Referenced Study Sequence	0008,1110	-
>Referenced SOP Class UID	0008,1150	-
>Referenced SOP Instance UID	0008,1155	-
Study Instance UID	0020,000D	-
Requested Procedure Description	0032,1060	-
Requested Procedure Code Sequence	0032,1064	-
>Code Value	0008,0100	-
>Coding Scheme Designator	0008,0102	-
>Coding Scheme Version	0008,0103	-
>Code Meaning	0008,0104	-
Requested Procedure ID	0040,1001	-
Names of Intended Recipients of Results	0040,1010	-
Requested Procedure Comments	0040,1400	-

Table 9. Modality Worklist Information Model - FIND SOP Class - C-FIND-RQ - Imaging Service Request Module

Attribute Name	Tag	Note
Accession Number	0008,0050	-
Referring Physician's Name	0008,0090	-
Requesting Physician	0032,1032	-
Requesting Service	0032,1033	-
Imaging Service Request Comments	0040,2400	-

Table 10. Modality Worklist Information Model - FIND SOP Class - C-FIND-RQ - Visit Status Module

Attribute Name	Tag	Note
Current Patient Location	0038,0300	-

Table 11. Modality Worklist Information Model - FIND SOP Class - C-FIND-RQ - Patient Identification Module

Attribute Name	Tag	Note
Patient's Name	0010,0010	-
Patient ID	0010,0020	-

Attribute Name	Tag	Note
Other Patient IDs	0010,1000	-

Table 12. Modality Worklist Information Model - FIND SOP Class - C-FIND-RQ - Patient Demographic Module

Attribute Name	Tag	Note
Patient's Birth Date	0010,0030	-
Patient's Sex	0010,0040	-
Patient's Weight	0010,1030	-
Ethnic Group	0010,2160	-
Patient Comments	0010,4000	-

Table 13. Modality Worklist Information Model - FIND SOP Class - C-FIND-RQ - Patient Medical Module

Attribute Name	Tag	Note
Medical Alerts	0010,2000	-
Additional Patient History	0010,21B0	-
Pregnancy Status	0010,21C0	-

3.1.2.2. MPPS

3.1.2.2.1. Associated Real-World Activity

The Intera Network AE initiates an association to the MPPS server when the first scan of the examination is initiated and sends an N-CREATE message with all appropriate information for the study. By pressing the "ready" or "incomplete" button an N-SET message is then sent with end dates and time, with a status COMPLETED/DISCONTINUED.

3.1.2.2.2. Proposed Presentation Context

The Intera Network AE will propose the following presentation context.

Table 14. Proposed Presentation Context for MPPS SCU

Abstract Syntax	UID	Transfer Syntax	UID List	Role	Ext. Neg.
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3	ELE	1.2.840.10008.1.2.1	SCU	None
		EBE	1.2.840.10008.1.2.2		
		ILE	1.2.840.10008.1.2		

3.1.2.2.3. SOP Specific Conformance MPPS SOP Classes

The Intera Network AE provides standard conformance to the MPPS SOP Class.

This chapter specifies in detail the applied attributes in the N-CREATE and N-SET Service Element of this supported SOP Class.

Status information may be obtained via the Queue Manager.

**Table 15. Modality Performed Procedure Step SOP Class - N-CREATE-RQ
- SOP Common Module**

Attribute Name	Tag	Note
Specific Character Set	0008,0005	-
Instance Creation Date	0008,0012	Additional attribute.
Instance Creation Time	0008,0013	Additional attribute.
Instance Creator UID	0008,0014	Additional attribute.
SOP Class UID	0008,0016	Additional attribute.
SOP Instance UID	0008,0018	Additional attribute.

**Table 16. Modality Performed Procedure Step SOP Class - N-CREATE-RQ
- Performed Procedure Step Relationship Module**

Attribute Name	Tag	Note
Referenced Patient Sequence	0008,1120	Always empty.
Patient's Name	0010,0010	-
Patient ID	0010,0020	-
Patient's Birth Date	0010,0030	-
Patient's Sex	0010,0040	-
Scheduled Step Attribute Sequence	0040,0270	-
>Accession Number	0008,0050	-
>Referenced Study Sequence	0008,1110	Always empty.
>Study Instance UID	0020,000D	-
>Requested Procedure Description	0032,1060	-
>Scheduled Procedure Step Description	0040,0007	-
>Scheduled Action Item Code Sequence	0040,0008	Always empty.
>Scheduled Procedure Step ID	0040,0009	-
>Requested Procedure ID	0040,1001	-

**Table 17. Modality Performed Procedure Step SOP Class - N-CREATE-RQ
- Performed Procedure Step Information Module**

Attribute Name	Tag	Note
Procedure Code Sequence	0008,1032	Always empty.
Performed Station AE Title	0040,0241	Applied value: <local network AET>
Performed Station Name	0040,0242	Always empty.
Performed Location	0040,0243	Always empty.
Performed Procedure Step Start Date	0040,0244	-
Performed Procedure Step Start Time	0040,0245	-
Performed Procedure Step End Date	0040,0250	-
Performed Procedure Step End Time	0040,0251	-
Performed Procedure Step Status	0040,0252	Applied value: IN PROGRESS
Performed Procedure Step ID	0040,0253	-
Performed Procedure Step Description	0040,0254	-
Performed Procedure Type Description	0040,0255	-

**Table 18. Modality Performed Procedure Step SOP Class - N-CREATE-RQ
- Image Acquisition Results Module**

Attribute Name	Tag	Note
Modality	0008,0060	-
Study ID	0020,0010	-
Performed Action Item Code Sequence	0040,0260	Always empty.
Performed Series Sequence	0040,0340	Always empty.

**Table 19. Modality Performed Procedure Step SOP Class – N-CREATE-RQ
- Radiation Dose Module**

Attribute Name	Tag	Note
Anatomic Structure, Space or Region Sequence	0008,2229	Always empty.
Distance Source to Detector	0018,1110	Always empty.
Image Area Dose Product	0018,115E	Always empty.
Total Time of Fluoroscopy	0040,0300	Always empty.
Total Number of Exposures	0040,0301	Always empty.
Entrance Dose	0040,0302	Always empty.
Exposed Area	0040,0303	Always empty.
Distance Source to Entrance	0040,0306	Always empty.
Comments on Radiation Dose	0040,0310	Always empty.

**Table 20. Modality Performed Procedure Step SOP Class – N-CREATE-RQ
- Billing And Material Management Code Module**

Attribute Name	Tag	Note
Billing Procedure Step Sequence	0040,0320	Always empty.
Film Consumption Sequence	0040,0321	Always empty.
Billing Supplies and Devices Sequence	0040,0324	Always empty.

**Table 21. Modality Performed Procedure Step SOP Class – N-SET-RQ
- SOP Common Module**

Attribute Name	Tag	Note
Instance Creation Date	0008,0012	Additional attribute.
Instance Creation Time	0008,0013	Additional attribute.
Instance Creator UID	0008,0014	Additional attribute.
SOP Class UID	0008,0016	Additional attribute.
SOP Instance UID	0008,0018	Additional attribute.

**Table 22. Modality Performed Procedure Step SOP Class - N-SET-RQ
- Performed Procedure Step Information Module**

Attribute Name	Tag	Note
Procedure Code Sequence	0008,1032	Always empty.
Performed Procedure Step End Date	0040,0250	-
Performed Procedure Step End Time	0040,0251	-

Attribute Name	Tag	Note
Performed Procedure Step Status	0040,0252	Applied values: COMPLETED, DISCONTINUED
Performed Procedure Step Description	0040,0254	-
Performed Procedure Type Description	0040,0255	-

**Table 23. Modality Performed Procedure Step SOP Class - N-SET-RQ
- Image Acquisition Results Module**

Attribute Name	Tag	Note
Performed Series Sequence	0040,0340	-
>Retrieve AE Title	0008,0054	-
>Series Description	0008,103E	-
>Performing Physician's Name	0008,1050	-
>Operator's Name	0008,1070	-
>Referenced Image Sequence	0008,1140	-
>>Referenced SOP Class UID	0008,1150	-
>>Referenced SOP Instance UID	0008,1155	-
>Protocol Name	0018,1030	-
>Series Instance UID	0020,000E	-
>Referenced Standalone SOP Instance Sequence	0040,0220	Always empty.
>>Referenced SOP Class UID	0008,1150	-
>>Referenced SOP Instance UID	0008,1155	-

**Table 24. Modality Performed Procedure Step SOP Class – N-SET-RQ
- Radiation Dose Module**

Attribute Name	Tag	Note
Anatomic Structure, Space or Region Sequence	0008,2229	Always empty.
Distance Source to Detector	0018,1110	Always empty.
Image Area Dose Product	0018,115E	Always empty.
Total Time of Fluoroscopy	0040,0300	Always empty.
Total Number of Exposures	0040,0301	Always empty.
Entrance Dose	0040,0302	Always empty.
Exposed Area	0040,0303	Always empty.
Distance Source to Entrance	0040,0306	Always empty.
Comments on Radiation Dose	0040,0310	Always empty.

**Table 25. Modality Performed Procedure Step SOP Class – N-SET-RQ
- Billing And Material Management Code Module**

Attribute Name	Tag	Note
Billing Procedure Step Sequence	0040,0320	Always empty.
Film Consumption Sequence	0040,0321	Always empty.
Billing Supplies and Devices Sequence	0040,0324	Always empty.

3.1.2.3. Query Remote Database

3.1.2.3.1. Associated Real-World Activity

The operator queries a remote database by means of the filter tool in the Patient Administration facility. The Intera initiates an association to the selected peer entity and uses it to send C-FIND requests (and receive the associated C-FIND responses).

3.1.2.3.2. Proposed Presentation Contexts

The Intera will propose the presentation context as given in the next Table.

Table 26. Proposed Presentation Context for Query Remote Database SCU

Abstract Syntax	UID	Transfer Syntax	UID List	Role	Ext. Neg.
Supported Query/Retrieve Information Model - FIND	See table 1.	ELE	1.2.840.10008.1.2.1	SCU	None
		EBE	1.2.840.10008.1.2.2		
		ILE	1.2.840.10008.1.2		

3.1.2.3.3. C-FIND SCU Conformance

Depending on the configuration the Intera shows the following behaviour.

If the remote system is configured as archive (PACS) the Intera shall always require a non-universal matching query filter before performing a query to the remote system.

Otherwise Intera shall perform an initial universal matching query. After this initial query the subsequent queries shall be as specified in the Patient Administration Filter.

Intera provides the Patient Administration Filter dialog to enter matching criteria for the following matching keys.

Table 27. Patient Administration Filter

Filter Key	DICOM Matching Key	Tag	Note
Patient name	Patient's Name	0010,0010	-
Registration ID	Patient ID	0010,0020	-
Date of birth	Patient's Birth Date	0010,0030	-

Table 28. Patient Root Query/Retrieve Information Model - FIND SOP Class - C-FIND-RQ

Q/R Level	Attribute Name	Tag	Note
	Specific Character Set	0008,0005	-
	Query/Retrieve Level	0008,0052	-
PATIENT	Patient's Name	0010,0010	-
	Patient ID	0010,0020	-
	Patient's Birth Date	0010,0030	-
	Ethnic Group	0010,2160	-
	Patient's Sex	0010,0040	-
STUDY	Study Date	0008,0020	-
	Study Time	0008,0030	-
	Accession Number	0008,0050	-

Q/R Level	Attribute Name	Tag	Note
	Study Instance UID	0020,000D	-
SERIES	Series Date	0008,0021	-
	Series Time	0008,0031	-
	Modality	0008,0060	-
	Series Description	0008,103E	-
	Body Part Examined	0018,0015	-
	Protocol Name	0018,1030	-
	Series Instance UID	0020,000E	-
	Series Number	0020,0011	-
	Number of Series Related Instances	0020,1209	-
		Performed Procedure Step Start Date	0040,0244
	Performed Procedure Step Status	0040,0252	-
	Performed Procedure Step Description	0040,0254	-
	Examination Source	2001,1063	-

Table 29. Study Root Query/Retrieve Information Model - FIND SOP Class - C-FIND-RQ

Q/R Level	Attribute Name	Tag	Note
	Specific Character Set	0008,0005	-
	Query/Retrieve Level	0008,0052	-
STUDY	Study Date	0008,0020	-
	Study Time	0008,0030	-
	Accession Number	0008,0050	-
	Patient's Name	0010,0010	-
	Patient ID	0010,0020	-
	Patient's Birth Date	0010,0030	-
	Patient's Sex	0010,0040	-
	Ethnic Group	0010,2160	-
	Study Instance UID	0020,000D	-
	SERIES	Series Date	0008,0021
Series Time		0008,0031	-
Modality		0008,0060	-
Series Description		0008,103E	-
Body Part Examined		0018,0015	-
Protocol Name		0018,1030	-
Series Instance UID		0020,000E	-
Series Number		0020,0011	-
Number of Series Related Instances		0020,1209	-
		Performed Procedure Step Start Date	0040,0244
	Performed Procedure Step Status	0040,0252	-
	Performed Procedure Step Description	0040,0254	-
	Examination Source	2001,1063	-

In case of errors or warnings a message will appear on the UI.

3.1.2.4. Retrieve Images

3.1.2.4.1. Associated Real-World Activity

The operator is able to copy all series in a patient/study (examination) folder from a remote database to the local database by means of the "Local Database" button in the Intera patient administration facility. The Intera initiates an association to the selected peer entity and uses it to send C-MOVE requests (and receive the associated C-MOVE responses). The association is released when all selected images have been transmitted.

3.1.2.4.2. Proposed Presentation Contexts

The Intera will propose the presentation context as given in next table.

Table 30. Proposed Presentation Context for Retrieve Images SCU

Abstract Syntax	UID	Transfer Syntax	UID List	Role	Ext. Neg.
Supported Query/Retrieve Information Model - MOVE	See table 1.	ELE EBE ILE	1.2.840.10008.1.2.1 1.2.840.10008.1.2.2 1.2.840.10008.1.2	SCU	None

3.1.2.4.3. C-MOVE SCU Conformance

The Intera Network AE provides standard conformance for all levels except Image level, which is not supported.

Status information may be obtained via the Queue Manager.

3.1.2.5. Export Images

3.1.2.5.1. Associated Real-World Activity

After selection of a remote station and after selection of one or more images, these images will be sent when initiating the Export command. Intera initiates one association to the selected remote entity and uses it to send the selected images via C-STORE requests (and receives the associated C-STORE responses).

The Intera will release the association after successful transfer of the images or when an error occurs.

3.1.2.5.2. Proposed Presentation Contexts

The Intera will propose the presentation context as given in the next table.

Table 31. Proposed Presentation Context for Export Images SCU

Abstract Syntax	UID	Transfer Syntax	UID List	Role	Ext. Neg.
All storage SOP classes in table 1.	All storage SOP classes in table 1.	ELE EBE ILE	1.2.840.10008.1.2.1 1.2.840.10008.1.2.2 1.2.840.10008.1.2	SCU	None

3.1.2.5.3. Storage SCU Conformance

The Intera Network AE provides standard conformance.

Upon receiving a C-STORE response containing an Error or Refused status the implementation will release the association. All the images associated with the job will be considered by the Intera to have failed to transfer. The Intera Network AE has the ability to automatically recover from this situation and will attempt to send all the images at a later time.

The behaviour on successful and unsuccessful transfer of images is given in the table below.

Table 32. C-STORE Status

Service Status	Codes	Further Meaning Status
Refused	A7xx	Message in console.
Error	A9xx	Message in console.
	Cxxx	Message in console.
Warning	B00x	Message in console.
Success	0000	Message in console.

If the Intera user makes changes in the default image settings and/or annotations, these settings and annotations can be exported as DICOM Standard grayscale softcopy presentation state if the Storage SCP supports this function.

On the export of such an image the Intera system first sets up an association to determine if the SCP supports the grayscale softcopy presentation state SOP class. If the SCP supports this SOP class the Intera will request the storage of the MR Image objects and the related grayscale softcopy presentation state object. In annex 1 the supported attributes for the MR storage object service are listed. Annex 2 gives an overview of the supported Secondary Capture attributes. Annex 3 gives an overview of the supported grayscale softcopy presentation state attributes.

If an MR image is exported and the remote system does not support the MR Image SOP class the Intera automatically converts the MR image into a Secondary Capture image.

If the SCP does not support the grayscale softcopy presentation state service the graphical information is added to the MR image object and a new SOP Instance UID is generated for this MR image. The MR object will then include the supported attributes of the (conditional) modules; Overlay Plane module and VOI LUT module.

In the following tables an overview is presented with the supported modules for each exported instance.

Table 33. Supported module for the MR Image Storage SOP Class

Module	Usage
Patient Module	Always
Patient Medical Module	Always
General Study Module	Always
Patient Study Module	Always
Study Classification Module	Always
Requested Procedure Module	Always
Imaging Service Request Module	Always
Performed Procedure Step Information Module	Always

Module	Usage
Billing and Material Management Code Module	Always
General Series Module	Always
Frame of Reference Module	Always
General Equipment Module	Always
General Image Module	Always
Image Plane Module	Always
Image Pixel Module	Always
MR Image Module	Always
Overlay Plane Module	If overlay is applied and Presentation State SOP class is either not configured or not accepted by SCP.
Modality LUT Module	Depending on configuration.
VOI LUT Module	Always
SOP Common Module	Always
Private Group	Always

Table 34. Supported module for the Secondary Capture Image Storage SOP Class

Module	Usage
Patient Module	Always
General Study Module	Always
Patient Study Module	Always
General Series Module	Always
General Equipment Module	Always
SC Equipment Module	Always
General Image Module	Always
Image Pixel Module	Always
SC Image Module	Always
SOP Common Module	Always

Table 35. Supported modules for the Grayscale Softcopy Presentation State Storage SOP Class

Module	Usage
Patient Module	Always
General Study Module	Always
Patient Study Module	Always
General Series Module	Always
Presentation Series Module	Always
General Equipment Module	Always
Overlay Plane Module	If overlay is applied.
Displayed Area Module	Always
Graphic Annotation Module	If graphic annotations are applied.
Spatial Transformation Module	If rotation or flipping are applied.
Graphic Layer Module	If graphic annotations, overlays, or curves are applied.
Modality LUT Module	Always
Softcopy Presentation LUT Module	Always

Module	Usage
Softcopy VOI LUT Module	Always
Presentation State Module	Always
SOP Common Module	Always

3.1.2.6. Storage Commitment

3.1.2.6.1. Associated Real-World Activity

The Storage Commitment function comprises the storage commitment of images on a remote system.

Storage Commitment will be initiated in a new association after closing the association of the related image storage (C-STORE). This new association will be open until the remote archive sends a storage commitment report (synchronous) or when the configured maximum time is passed. When this maximum configured period is passed, it is the responsibility of the remote archive to setup a new association with Intera and send the storage commitment report (asynchronous).

For cases when the Storage Commitment SCP is not functioning (i.e. momentarily off-line), the Intera Storage Commitment implementation queues the N-ACTION request for future re-transmission.

Upon receiving an N-ACTION response containing a failure status, this status will be logged to the system log file and the implementation will terminate the association.

Upon receiving an N-EVENT-REPORT message containing failed storage commitments the "stored" field in the User Interface is set to "Failed".

3.1.2.6.2. Proposed Presentation Contexts

The Intera will propose the presentation contexts as given in the next table.

Table 36. Proposed Presentation Contexts for Storage Commitment SCU

Abstract Syntax	UID	Transfer Syntax	UID List	Role	Ext. Neg.
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	ELE EBE ILE	1.2.840.10008.1.2.1 1.2.840.10008.1.2.2 1.2.840.10008.1.2	SCU	None

3.1.2.6.3. Storage Commitment SCU Conformance

Storage Commitment is accomplished according to the real world activity described earlier. The Intera Network AE provides Standard conformance to the Storage Commitment SOP class.

There are no SOP class specific status codes defined by DICOM for the N-ACTION or the N-EVENT-REPORT, therefore, only general statuses from PS3.7 [DICOM] are used.

Table 37. Storage Commitment Push Model SOP Class - N-ACTION-RQ

Attribute Name	Tag	Note
Referenced Performed Procedure Step Sequence	0008,1111	-
>Referenced SOP Class UID	0008,1150	-

Attribute Name	Tag	Note
>Referenced SOP Instance UID	0008,1155	-
Transaction UID	0008,1195	-
Referenced SOP Sequence	0008,1199	-
>Referenced SOP Class UID	0008,1150	-
>Referenced SOP Instance UID	0008,1155	-

3.1.3. Association Acceptance Policy

3.1.3.1. Verification

The Intera Network AE shall act as Verification SCP for any remote SCU.

3.1.3.1.1. Associated Real-World Activity

An association can be accepted to verify application level communication using the C-ECHO command.

3.1.3.1.2. Presentation Context Table

The Intera DICOM Import AE may accept the following presentation contexts.

Table 38. Accepted Presentation Contexts for Verification SCP

Abstract Syntax	UID	Transfer Syntax	UID List	Role	Extended Negotiation
Verification	1.2.840.10008.1.1	ELE	1.2.840.10008.1.2.1	SCP	None
		EBE	1.2.840.10008.1.2.2	SCP	None
		ILE	1.2.840.10008.1.2	SCP	None

3.1.3.1.3. SOP Specific Conformance Verification SOP Classes

The Intera DICOM Import AE provides standard conformance to the Verification SOP class.

3.1.3.2. Import Images

The Intera Network AE shall act as Storage SCP for any remote Storage SCU that is configured in the Intera configuration using an accepted presentation context.

3.1.3.2.1. Associated Real-World Activity

After the Intera Network AE accepts an association from the Storage SCU it shall receive images, send store responses including the relevant status, and finally release the association on SCU request.

3.1.3.2.2. Presentation Context Table

The Intera Network AE may accept the following presentation contexts.

Table 39. Accepted Presentation Contexts for Import Images SCP

Abstract Syntax	UID	Transfer Syntax	UID List	Role	Ext. Neg.
All storage SOP classes in table 2	All storage SOP classes in table 2	ELE	1.2.840.10008.1.2.1	SCP	None
		EBE	1.2.840.10008.1.2.2	SCP	None
		ILE	1.2.840.10008.1.2	SCP	None

3.1.3.2.3. SOP Specific Conformance for Storage SOP Classes

Only MR images created on an Intera are allowed to be imported again. Then these imported images are used for reference only; it is not intended to export them again. SC images can be imported at all times from any source.

When Intera receives non-native MR images it will not import such images, respond with error status (C000) "Cannot understand", and abort the association.

3.1.3.3. Storage Commitment

The Intera Network AE shall act as Storage Commitment SCU to receive asynchronous Storage Commitment reports from requests sent to the Storage Commitment SCP.

3.1.3.3.1. Associated Real-World Activity

After the Intera Network AE accepts an association from the Storage Commitment SCP it shall receive Storage Commitment reports, send responses including the relevant status, and finally release the association on SCP request.

3.1.3.3.2. Presentation Context Table

The Intera Network AE may accept the following presentation contexts:

Table 40. Accepted Presentation Contexts for Storage Commitment SCU

Abstract Syntax	UID	Transfer Syntax	UID List	Role	Ext. Neg.
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	ELE	1.2.840.10008.1.2.1	SCU	None
		EBE	1.2.840.10008.1.2.2	SCU	None
		ILE	1.2.840.10008.1.2	SCU	None

3.1.3.3.3. SOP Specific Conformance for Storage Commitment Push Model SOP Class

The Intera Network AE implements the Storage Commitment Push Model SOP Class conform the standard DICOM Storage Commitment Service Class.

3.2. Intera Print AE Specification

The Intera Print AE provides conformance to the following DICOM 3.0 SOP class as an SCU:

Table 41. Supported SOP classes by the Intera Print AE as SCU

SOP Class Name	UID	DIMSE
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	-
> Basic Film Session SOP Class	1.2.840.10008.5.1.1.1	N-CREATE
> Basic Film Box SOP Class	1.2.840.10008.5.1.1.2	N-CREATE N-DELETE N-ACTION
> Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4	N-SET
> Printer SOP Class	1.2.840.10008.5.1.1.16	N-EVENT-REPORT N-GET

3.2.1. Association Establishment Policies

3.2.1.1. General

The Intera Print AE Specification always proposes the following DICOM Application Context Name (ACN): 1.2.840.10008.3.1.1.1.

The Print AE has a fixed Maximum PDU size of 64K.

3.2.1.2. Number of Associations

Always one at a time. It releases the association with DICOM SCP if no operation is done on the association within 120 s. or by user cancellation.

3.2.1.3. Asynchronous Nature

The Intera Print AE does not support asynchronous operations and will not perform asynchronous window negotiation.

3.2.1.4. Implementation Identifying Information

Implementation Class UID:	2.16.124.113531.1.1.1
Implementation Version Name:	MR PRINT 1.2

3.2.2. Association Initiation Policy

When the application submits a print job designated for a listed print server to the AE, the AE will request an association with the configured print server. For every supported printer the Association Initiation Policy can be configured, a list of attribute values can be configured.

3.2.2.1. Print Management

3.2.2.1.1. Associated Real-World Activity

The Print request causes the AE to initiate an association.

3.2.2.1.2. Proposed Presentation Context

The Intera Print AE will propose the following presentation contexts:

Table 42. Proposed Presentation Contexts for Print Management SCU

Abstract Syntax	UID	Transfer Syntax	UID List	Role	Ext. Neg.
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	ELE EBE ILE	1.2.840.10008.1.2.1 1.2.840.10008.1.2.2 1.2.840.10008.1.2	SCU	None

3.2.2.1.3. SOP Specific Conformance Printer SOP Classes

The Intera does not support the N-EVENT-REPORT DIMSE Service for the Printer SOP class. When the system receives an N-EVENT-REPORT FAILURE Intera will disable the printer, and the operator will have to re-enable the printer again.

The Intera does not detect the printer status FAILURE (N-GET). Instead of releasing the association the print job is continued.

Conform the DICOM standard, the Basic Film Box SOP Class – N-ACTION DIMSE does not contain any dataset.

Note:

Applied values other than mentioned below are NOT supported.

**Table 43. Basic Film Session SOP Class - N-CREATE-RQ
- Basic Film Session Presentation Module**

Attribute Name	Tag	Note
Number of Copies	2000,0010	Between 1 and 99
Print Priority	2000,0020	Applied Value: MED
Medium Type	2000,0030	Applied Value: BLUE FILM
Film Destination	2000,0040	Applied Values: MAGAZINE, PROCESSOR
Film Session Label	2000,0050	-

**Table 44. Basic Film Box SOP Class - N-CREATE-RQ
- Basic Film Box Presentation Module**

Attribute Name	Tag	Note
Image Display Format	2010,0010	Applied Values: COL, CUSTOM, ROW, SLIDE, STANDARD, SUPERSLIDE
Film Orientation	2010,0040	Applied Value: PORTRAIT
Film Size ID	2010,0050	Applied Values: 8INX10IN, 10INX12IN, 10INX14IN, 11INX14IN, 14INX14IN, 14INX17IN, 24CMX24CM, 24CMX30CM
Magnification Type	2010,0060	Applied Value: CUBIC
Smoothing Type	2010,0080	-
Border Density	2010,0100	Applied Value: BLACK
Empty Image Density	2010,0110	Applied Value: BLACK
Min Density	2010,0120	-
Max Density	2010,0130	-
Trim	2010,0140	Applied Value: NO
Configuration Information	2010,0150	-

**Table 45. Basic Film Box SOP Class - N-CREATE-RQ
- Basic Film Box Relationship Module**

Attribute Name	Tag	Note
Referenced Film Session Sequence	2010,0500	Parent Film Session
>Referenced SOP Class UID	0008,1150	-
>Referenced SOP Instance UID	0008,1155	-

**Table 46. Basic Grayscale Image Box SOP Class - N-SET-RQ
- Image Box Pixel Presentation Module**

Attribute Name	Tag	Note
Magnification Type	2010,0060	Applied Value: CUBIC
Smoothing Type	2010,0080	SCP specific.
Image Position	2020,0010	Applied Value: 1
Polarity	2020,0020	Applied Value: NORMAL
Basic Grayscale Image Sequence	2020,0110	-
>Samples per Pixel	0028,0002	Applied Value: 1
>Photometric Interpretation	0028,0004	Applied Value: MONOCHROME2
>Rows	0028,0010	-
>Columns	0028,0011	-
>Bits Allocated	0028,0100	Applied Value: 8
>Bits Stored	0028,0101	Applied Value: 8
>High Bit	0028,0102	Applied Value: 7
>Pixel Representation	0028,0103	Applied Value: 0x0000
>Pixel Data	7FE0,0010	-

**Table 47. Printer SOP Class - N-EVENT-REPORT-RSP
- Printer Module**

Attribute Name	Tag	Note
Printer Status Info	2110,0020	-

**Table 48. Printer SOP Class - N-GET-RQ
- Printer Module**

Attribute Name	Tag	Note
Manufacturer	0008,0070	-
Manufacturer's Model Name	0008,1090	-
Device Serial Number	0018,1000	-
Software Version(s)	0018,1020	-
Printer Status	2110,0010	Applied Values: FAILURE, NORMAL, WARNING
Printer Status Info	2110,0020	Applied Values: FILM JAM, RECEIVER FULL, SUPPLY EMPTY, SUPPLY LOW
Printer Name	2110,0030	-

3.2.3. Association Acceptance Policy

The Intera Print AE does not accept any associations.

3.3. Media Specification

The Intera provides standard conformance to the DICOM Media Storage Service and File Format (PS 3.10 [DICOM]) and the Media Storage Application Profiles (PS 3.11 [DICOM]) as far as the reading of uncompressed images on MOD medium is concerned.

The Intera supports **multi-patient** and **multi-session** (both for reading and writing) MOD disks.

The supported Application Profiles, their Roles and the Service Class (SC) options, all defined in DICOM terminology, are listed in Table 49.

Table 49. Application Profile, Activities and Roles of the DICOM Media part of the Intera

Application Profile	Identifier	Real World Activity	Role	SC Option
MR Studies on MOD	AUG-CTMR-MOD650	Display Directory of MOD disk	FSR	Interchange
	AUG-CTMR-MOD12	Write image(s) on MOD disk	FSC, FSU	Interchange
	AUG-CTMR-MOD23	Read image(s) from MOD disk	FSR	Interchange
	AUG-CTMR-MOD41			

The next table gives an overview of the supported SOP Classes that can be written via this Application Profile.

Table 50. Supported SOP Classes by the Media AE

SOP class Name	UID
MR Image Storage	1.2.840.10008.5.1.4.1.1.4
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Greyscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1
Private MR Spectrum Storage	1.3.46.670589.11.0.0.12.1
Private MR Series Data Storage	1.3.46.670589.11.0.0.12.2

Note that the Grayscale Softcopy Presentation State object is not in the application profile but is written as an additional SOP class (extended Application profile).

3.3.1. File Meta Information

The (Source) Application Entity Title is derived from the Network AE.

The Implementation Class UID and the Implementation Version Name in the File Meta Header are specified in section 3.1.

3.3.2. Media related Real-World Activities

3.3.2.1. Display Directory

The Media AE will act as a FSR when reading the directory of the medium. This will result in an overview of the patients, studies, series and images on the Intera user interface.

3.3.2.1.1. Application Profile(s) for this RWA

See Table 49.

3.3.2.1.2. Required and optional DICOMDIR Keys

Default all mandatory DICOM keys are written to the DICOMDIR file, if configured additional keys can be stored.

3.3.2.2. Write images on MOD disk

The Media AE will act as a FSC/FSU when writing all selected images in a patient folder onto the MOD medium.

3.3.2.2.1. Application Profile(s) for this RWA

See Table 49.

3.3.2.2.2. Support for Attributes in the images

The DICOMDIR file will be extended when new images are written. In case some attributes are not present in the images but are specified Mandatory in the DICOMDIR definition in DICOM Media, a generated dummy value will be filled in.

Implementation remarks and restriction:

- When writing the DICOMDIR records the following key values are generated if no value of the corresponding attribute is supplied:
 - Patient ID;
 - Study ID;
 - Study Instance UID;
 - Series Number;
 - Series Instance UID;
 - Image Number;
 - SOP Instance UID.
- The mechanism of generating a value for Patient ID creates each time a new value based on Patient's Name for each new study written to the MOD, even if this study belongs to a patient recorded earlier.
- The default value for the Pixel Intensity Relationship (0028,1040) is set to DISP.
- A number of attributes (e.g., Window Width and Window Centre) can be formatted as floating point numbers.

3.3.2.2.3. Supported DICOMDIR attributes

Table 51. DICOMDIR Attributes

DICOMDIR Key	Attribute TAG	Attribute Name	Note
PATIENT	(0010,0010)	Patient's Name	-
	(0010,0020)	Patient ID	-
	(0010,0030)	Patient's Birth Date	-
	(0010,0032)	Patient's Birth Time	-
	(0010,0040)	Patient's Sex	-
	(0010,1000)	Other Patient IDs	-
	(0010,1001)	Other Patient Names	-
	(0010,2160)	Ethnic Group	-
STUDY	(0008,0020)	Study Date	-
	(0008,0030)	Study Time	-
	(0008,0050)	Accession Number	-
	(0008,1030)	Study Description	-
	(0020,000D)	Study Instance UID	-
	(0020,0010)	Study ID	-

DICOMDIR Key	Attribute TAG	Attribute Name	Note
	(0040,0244)	Performed Procedure Step Start Date	-
	(0040,0252)	Performed Procedure Step Status	-
	(0040,0254)	Performed Procedure Step Description	-
	(2001,1063)	Examination Source	-
SERIES	(0008,0021)	Series Date	-
	(0008,0031)	Series Time	-
	(0008,0060)	Modality	-
	(0018,1030)	Protocol Name	-
	(0020,000E)	Series Instance UID	-
	(0020,0011)	Series Number	-
	(2001,1014)	MRSeriesNrOfEchoes	-
	(2001,1017)	MRSeriesNrOfPhases	-
	(2001,1018)	MRSeriesNrOfSlices	-
	(2001,101D)	MRSeriesReconstructionNumber	-
	(2001,105F)	StackSequence	-
	(2001,1060)	MRSeriesNrOfStacks	-
	(2001,1081)	MRSeriesNrOfDynamicScans	-
	(2005,1020)	MRSeriesNrOfChemicalShifts	-
	IMAGE	(0008,0008)	Image Type
(0008,1140)		Referenced Image Sequence	If available
(0020,0013)		Instance Number	-
(0020,0032)		Image Position (Patient)	-
(0020,0037)		Image Orientation (Patient)	-
(0020,0052)		Frame of Reference UID	-
(0028,0004)		Photometric Interpretation	-
(0028,0010)		Rows	-
(0028,0011)		Columns	-
(0028,0030)		Pixel Spacing	-
(0028,0101)		Bits Stored	-
(0028,0102)		High Bit	-
PRESENTATION		(0008,1115)	Referenced Series Sequence
	(0020,0013)	Instance Number	-
	(0070,0080)	Presentation Label	-
	(0070,0081)	Presentation Description	-
	(0070,0082)	Presentation Creation Date	-
	(0070,0083)	Presentation Creation Time	-
	(0070,0084)	Presentation Creator's Name	Applied value: Intera

3.3.2.3. Read images from MOD disk

The Intera Media AE will act as a FSR when reading all/selected images from the MOD medium. Only images made on an Intera are allowed to be imported again, these imported images are used for reference only, it is not intended to export them again.

3.3.2.3.1. Application Profile(s) for this RWA

See Table 49.

3.3.2.3.2. Support for Attributes in the images

The mandatory attributes of the DICOM images are required for the correct storage of the images in the Intera internal image database. For conformance see ANNEX 1.

3.3.3. Augmented Application Profile

As an augmentation to the STD-CTMR application profiles, also grayscale softcopy presentation state and private objects shall be interchanged per MOD.

4. COMMUNICATION PROFILES

Intera provides DICOM V3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard. No OSI stack communications are provided with this implementation.

4.1. TCP/IP Stack

Intera supports Ethernet v2.0 and IEEE 802.3, 10/100 BASE-T and 1000 BASE-T depending on system hardware.

5. EXTENSIONS/SPECIALIZATIONS/PRIVATIZATIONS

The following standard extensions are applied for the MR Image Storage SOP class. See also the overview of the applied MR Image IOD.

Table 52. Applied Standard Extensions

Module	Reference	Note
Patient Medical Module	Table 59	-
Study Classification Module	Table 62	-
Requested Procedure Module	Table 63	Additional attribute: Requested Contrast Agent
Imaging Service Request Module	Table 64	-
Performed Procedure Step Information Module	Table 65	-
Billing and Material Management Code Module	Table 66	-
General Series Module	Table 67	Additional attributes in Referenced Performed Procedure Step Sequence: >Specific Character Set >Instance Creation Date >Instance Creation Time >Instance Creator UID >Instance Number
Modality LUT	Table 75	Present if configured. Must be applied when viewing the image.
Private Group	Table 78	Private MR attributes.

The Intera system supports private SOP classes; for the C-STORE services these private SOP classes are listed in the following table.

Table 53. Supported Private SOP Classes as SCU and SCP by the Intera

SOP Class Name	UID
Private MR Spectrum Storage	1.3.46.670589.11.0.0.12.1
Private MR Series Data Storage	1.3.46.670589.11.0.0.12.2

6. CONFIGURATION

The Intera is configured by means of a configuration program. This program is accessible from the login prompt of the operating system. It is password protected and intended to be used by Philips Customer Support Engineers only. The program allows the Customer Support Engineer to enter configuration information needed by the Intera applications.

6.1. Local Network Configuration

An Intera can be configured in two ways for the local IP network:

- Automatically via DHCP (hospital provided).
- By assigning a dedicated IP address, (sub)net mask and gateway (if necessary) manually.

This is determined upon installation time of the Intera.

6.2. AE Title/Presentation Address Mapping

6.2.1. Local AE Title and Presentation Address

The Intera contains two configurable AE Titles, one for the DICOM print service and one for all other DICOM services.

The Intera host name is configurable.

The Intera listens default on port 3010. This port number is configurable.

6.2.2. Remote AE Titles and Presentation Addresses

All relevant remote applications that are able to initiate an association with the Intera, must be configured on the Intera with the following information:

- AE Title.
- The SOP classes and transfer syntaxes for which the Intera accepts associations.

All relevant remote applications that are able to accept an association from the Intera must be configured on the Intera with the following information:

- IP Address.
- Host name and listening port number.
- AE Title.
- The SOP classes and transfer syntaxes that are supported by the remote application.

6.3. Configurable Parameters

6.3.1. Configuration of the Local System

The following items are configurable per Intera installation:

Table 54. Installation Configuration Items of Intera

Parameter	Explanation	Default
Maximum data PDU size	For associations initiated by the Intera; value must be greater than 0	32768

Parameter	Explanation	Default
Allow incoming queries?	Not used – should not be changed	No
ARTIM timeout	Max. time Intera waits for an incoming association	60 seconds
Max nbr of associations	Simultaneous incoming connections to the Intera	1
Image number direction	Instance number given upon storage export	H-F / R-L / A-P
Institution name	Must be shorter than 40 characters	-

The following DICOM services are only supported when a software key has been purchased:

- RIS (Modality Worklist Management).
- Storage Commitment and Modality Performed Procedure Step (MPPS).

6.3.2. Configuration per Remote System

All relevant remote applications are defined through selection of one of the available preconfigured templates. Each defined remote application can be fine-tuned (if necessary) through several configurable parameters. What parameters are configurable depends on the selected template.

Table 55. Configurable Parameters for Remote Systems of Intera

Parameter	Explanation	Default
IsArchive	If set to Yes then the network node plays role of archive	-
Storage Commitment	Only when IsArchive is Yes;	-
Network Node Name		
Storage Commitment Max.	Only when IsArchive is Yes;	-
Reply Waiting Time	For asynchronous storage commitment use -1	
Supported SOP classes	Depends on used template; SOP classes can be unconfigured	-
Supported Transfer Syntaxes	Depends on used template; the preference can be configured by ordering the supported transfer syntaxes	-
ARTIM timeout	Max. time Intera waits for association acknowledge	60 seconds
Split multiple day range	Only with RIS template	Yes
Pure DICOM	Do not send private attributes: only standard attributes	No
Combine MR Rescaling	Exported Window Width and Center have been rescaled	Yes
Send logging	For trouble shooting purposes	No
Receive logging	For trouble shooting purposes	No
Add group length attributes	For trouble shooting purposes	No

- The Basic Worklist Management services may be configured for one node only.
- A worklist query can be configured in two ways:
 - Intera requests one worklist: for today till tomorrow
 - Intera requests two worklists: one for today and one for tomorrow (default)
 This is configurable through the parameter 'Split multiple day range'.
- The MPPS service may be configured for one node only.
- If IsArchive is set to Yes then the following statements apply:
 - Only complete series can be sent;
 - Storage commitment shall be enabled;
 - A committed image shall be marked in the Patient Administration UI with "archive" flag set;
 - Query filter must be specified and applied.
- The Intera can autopush MR images to the selected remote application. Whether or not to autopush a scan is defined in the scan protocol.

6.3.3. Print Configuration

Configurable per Intera installation:

- The DICOM printers to be selected by the operator.

Configurable for each defined DICOM printer:

All relevant DICOM printers are defined through selection of one of the available preconfigured templates. Each defined DICOM printer can be fine-tuned (if necessary) through several configurable parameters.

The following list shows all the configurable printer parameters. Depending on the type of printer not all parameters may be present.

- Medium type
- Film formats
- Destination
- Photometric Interpretation
- Film size ID
- Orientation
- Magnification
- Smoothing
- Border density
- Empty image density
- Min. density
- Max. density
- Trim
- Configuration Info
- Polarity

The Intera can print to only one DICOM printer at a time.

7. SUPPORT OF EXTENDED CHARACTER SETS

Intera supports extended character set "ISO_IR 100" that is the Latin alphabet No 1, supplementary set.

If the RIS Worklist contains a Specific Character Set attribute that is not empty and not equal to ISO_IR 100 then the Intera will send a C-CANCEL request to the RIS and a "RIS ERROR" message will be displayed; the Intera will reject the RIS import.

For Print the server provides no support for extended character sets in the communication with DICOM SCP's.

8. REMARKS

The following table shows the relation between MWL and MPPS attributes and image storage attributes.

Table 56. Correlation of DICOM Object

Nr.	Level	Attribute	MWL Tag	MPPS Create Tag	Related Store Tag	MPPS Set Tag
1	Patient	Patient's Name	0010,0010	0010,0010	0010,0010	-
2		Patient ID	0010,0020	0010,0020	0010,0020	-
3		Patient's Birth Date	0010,0030	0010,0030	0010,0030	-
4		Patient's Sex	0010,0040	0010,0040	0010,0040	-
5	Study	Accession Number	0008,0050	0008,0050	0008,0050	-
6		Study Instance UID	0020,000D	0020,000D	0020,000D	-
7		Request Procedure Description	0032,1060	-	-	-
8		Request Procedure ID	0040,1001	0040,1001	0040,1001	-
9	Exam	Code Value	0008,0100	-	-	-
10		Code Scheme Designator	0008,0102	-	-	-
11		Code Meaning	0008,0104	-	-	-
12		Scheduled Procedure Step Descr	0040,0007	0040,0007	0040,0007	-
13		Scheduled Procedure Step ID	0040,0009	0040,0009	0040,0009	-
14		Examination Comments	-	0040,0280	0040,0280	0040,0280
15	Series / Image / reyscale softcopy presentation state	Performed Series Sequence	-	-	-	0040,0340
16		>Referenced Image Sequence	-	-	-	0008,1140
17		>>Referenced SOP Class UID	-	-	0008,0016	0008,1150
18		>>Referenced SOP Instance UID	-	-	0008,0018	0008,1155
19		>Referenced Stand Alone SOP Inst. Seq for the reyscale softcopy presentation state Objects	-	-	-	0040,0220
20		>>Referenced SOP Class UID	-	-	0008,0016	0008,1150
21		>>Referenced SOP Instance UID	-	-	0008,0018	0008,1155
22		>Series Protocol Name	-	-	0018,1030	0018,1030
23		>Series Description	-	-	0008,103E	0008,103E
24		>Series Instance UID	-	-	0020,000E	0020,000E

Intera provides a dialog to modify examination attributes. The following table shows the correlation between the Modify Examination dialog fields and the related DICOM attributes.

Table 57. Mapping between Modify Examination Dialog Fields and DICOM Attributes

UI Entry	Attribute Name	Tag
Patient name	<i>Patient's Name</i>	0010,0010
Registration ID	<i>Patient ID</i>	0010,0020
Date of birth	<i>Patient's Birth Date</i>	0010,0030
Sex	<i>Patient's Sex</i>	0010,0040
Exam name	<i>Scheduled Procedure Step Description</i>	0040,0007
	Study Description	0008,1030
	Performed Procedure Step Description	0040,0254
Accession number	<i>Accession Number</i>	0008,0050
Exam date	<i>Performed Procedure Step Start Date</i>	0040,0244
	Study Date	0008,0020
Patient weight	<i>Patient's Weight</i>	0010,1030
Physician	<i>Referring Physician's Name</i>	0008,0090
Comments	<i>Comments on the Scheduled Procedure Step</i>	0040,0400
	Study Comments	0032,4000
	Comments on the Performed Procedure Step	0040,0280

Note that for each UI entry the first attribute (in italics) is used for initial value.

The conditional Contrast Module is not implemented

Protocol Name (0018,1030) can be filled by the operator to contain the information relevant for MR. Future developments in user-interface with scanner controlled injectors will provide more detailed contrast information.

Note for Image Plane module attribute (0020,1041) Slice Location

The value of this attribute is calculated from the image position values (0020,0032) of each image in the series. These are compared to those of the image with Instance Number 1. It is meant for sorting purposes in simple cases, when the receiving node cannot effectively calculate the image position in patient space from the attribute (0020,0032) Image Position (Patient).

Note for Displayed Area module

The conditional presentation state attributes (0070,0101) Presentation Pixel Spacing and (0070,0102) Presentation Pixel Aspect Ratio are not used.

Note for Softcopy Presentation State

The following attributes of the Displayed Area Module are not sent:

- Presentation Pixel Spacing (0070,0101) and
- Presentation Pixel Aspect Ratio (0070,0102)

For applications that need the attribute values, the following remark is valid:

- The Pixel Aspect Ratio (0028,0034) is always 1:1, this can be found in the Image Pixel Module of the images,
- The Pixel Spacing (0028,0030) can be found in the Image Plane Module of the images, the row spacing always equals the column spacing.

This omission for the Softcopy Presentation State will be solved in a future update that will become available to all R 10 systems.

DICOM Connectivity test

The Intera has the possibility to perform a connectivity session with a remote node. In this session the following issues are tested sequentially:

- Perform a TCP/IP ping to the remote node (Network Connectivity);
- Check what DICOM services are supported by both the Intera and the remote node (Associate DICOM Node);
- Make a DICOM association with the remote node via the DICOM Verification service class (Verify DICOM Node);
- Check if the remote node accepts a DICOM secondary capture image and if so, check the storage of that image via a query of the database of that remote node (Network Store Query).

Each of the tested issues can be configured separately.

Only a Philips service engineer can initiate this test.

ANNEX 1. Overview applied Magnetic Resonance Image IOD

The details of the applied modules are given in the tables below. The situation that an attribute is present conditionally/optionally or that an attribute may contain a zero length value is indicated too. Conditions and Defined/Enumerated Values of DICOM 3.0 are applicable but are not shown in the tables. The specified attributes are present and filled except for what is specified in the notes.

Table 58. MR Image Storage SOP Class – Patient Module

Attribute Name	Tag	Note
Patient's Name	0010,0010	The characters '=' and '\' are not used. Received from RIS or entered by the operator.
Patient ID	0010,0020	Received from RIS or entered by the operator (Registration Number on UI).
Patient's Birth Date	0010,0030	Received from RIS or entered by the operator.
Patient's Sex	0010,0040	Received from RIS or entered by the operator.
Patient Comments	0010,4000	-

Table 59. MR Image Storage SOP Class – Patient Medical Module

Attribute Name	Tag	Note
Medical Alerts	0010,2000	Always empty.
Contrast Allergies	0010,2110	Always empty.
Pregnancy Status	0010,21C0	Always empty.
Special Needs	0038,0050	Always empty.
Patient State	0038,0500	Always empty.

Table 60. MR Image Storage SOP Class – General Study Module

Attribute Name	Tag	Note
Study Date	0008,0020	Received from RIS or entered by the operator.
Study Time	0008,0030	Received from RIS or generated by the Intera system.
Accession Number	0008,0050	Received from RIS, entered by the operator or has zero length.
Referring Physician's Name	0008,0090	Received from RIS, entered by the operator or has zero length.
Study Description	0008,1030	Received from RIS as Scheduled Procedure Step Description) or entered by the operator (visible as Exam Name).
Study Instance UID	0020,000D	Received from RIS or generated by the Intera system.
Study ID	0020,0010	Value received from RIS or generated by the Intera system.

Table 61. MR Image Storage SOP Class – Patient Study Module

Attribute Name	Tag	Note
Patient's Weight	0010,1030	Weight of the patient, in kilograms.

Table 62. MR Image Storage SOP Class – Study Classification Module

Attribute Name	Tag	Note
Study Comments	0032,4000	Attribute from UI.

Table 63. MR Image Storage SOP Class – Requested Procedure Module

Attribute Name	Tag	Note
Requested Procedure Description	0032,1060	Attribute from RIS.
Requested Contrast Agent	0032,1070	-
Requested Procedure ID	0040,1001	Attribute from RIS.
Reason for the Requested Procedure	0040,1002	Always empty.
Requested Procedure Priority	0040,1003	Always empty.
Patient Transport Arrangements	0040,1004	Always empty.
Requested Procedure Location	0040,1005	Always empty.
Names of Intended Recipients of Results	0040,1010	Always empty.
Requested Procedure Comments	0040,1400	Always empty.

Table 64. MR Image Storage SOP Class – Imaging Service Request Module

Attribute Name	Tag	Note
Requesting Physician	0032,1032	Always empty.
Requesting Service	0032,1033	Always empty.
Reason for the Imaging Service Request	0040,2001	Always empty.
Issue Date of Imaging Service Request	0040,2004	Always empty.
Issue Time of Imaging Service Request	0040,2005	Always empty.
Placer Order Number	0040,2006	Always empty.
Filler Order Number	0040,2007	Always empty.
Order Entered By	0040,2008	Always empty.
Order Enterer's Location	0040,2009	Always empty.
Order Callback Phone Number	0040,2010	Always empty.
Imaging Service Request Comments	0040,2400	Always empty.

Table 65. MR Image Storage SOP Class – Performed Procedure Step Information Module

Attribute Name	Tag	Note
Performed Station AE Title	0040,0241	-
Performed Station Name	0040,0242	Always empty.
Performed Location	0040,0243	-
Performed Procedure Step End Date	0040,0250	-
Performed Procedure Step End Time	0040,0251	-
Performed Procedure Step Status	0040,0252	-
Performed Procedure Type Description	0040,0255	-

Table 66. MR Image Storage SOP Class – Billing and Material Management Code Module

Attribute Name	Tag	Note
Film Consumption Sequence	0040,0321	Always empty.

Table 67. MR Image Storage SOP Class – General Series Module

Attribute Name	Tag	Note
Series Date	0008,0021	-
Series Time	0008,0031	-
Modality	0008,0060	-
Series Description	0008,103E	Contains the values of Sub-anatomy and Scan name.
Referenced Performed Procedure Step Sequence	0008,1111	-
>Specific Character Set	0008,0005	Applied value: ISO_IR 100
>Instance Creation Date	0008,0012	-
>Instance Creation Time	0008,0013	-
>Instance Creator UID	0008,0014	-
>Referenced SOP Class UID	0008,1150	Applied value: 1.2.840.10008.3.1.2.3.3
>Referenced SOP Instance UID	0008,1155	-
>Instance Number	0020,0013	-
Protocol Name	0018,1030	Applied value: <Scan name>
Patient Position	0018,5100	Attribute is always present.
Series Instance UID	0020,000E	Generated by Intera system.
Series Number	0020,0011	Created dynamically at export. Contains the concatenation of the acquisition number and the private reconstruction number.
Performed Procedure Step Start Date	0040,0244	-
Performed Procedure Step Start Time	0040,0245	-
Performed Procedure Step ID	0040,0253	-
Performed Procedure Step Description	0040,0254	-
Request Attributes Sequence	0040,0275	Only send if received from RIS.
>Scheduled Procedure Step Description	0040,0007	Only send if received from RIS.
>Scheduled Procedure Step ID	0040,0009	-
>Requested Procedure ID	0040,1001	-
Comments on the Performed Procedure Step	0040,0280	-

Table 68. MR Image Storage SOP Class – Frame of Reference Module

Attribute Name	Tag	Note
Frame of Reference UID	0020,0052	-
Position Reference Indicator	0020,1040	Always empty.

Table 69. MR Image Storage SOP Class – General Equipment Module

Attribute Name	Tag	Note
Manufacturer	0008,0070	Applied Value: Philips Medical Systems
Institution Name	0008,0080	Configured on the system.
Station Name	0008,1010	Same as the Host Name.
Manufacturer's Model Name	0008,1090	Applied value: Intera
Device Serial Number	0018,1000	Applied value: SRN
Software Version(s)	0018,1020	The release text of the original Image.

Table 70. MR Image Storage SOP Class – General Image Module

Attribute Name	Tag	Note
Content Date	0008,0023	Present if image is part of a dynamic scan.
Content Time	0008,0033	Present if image is part of a dynamic scan.
Referenced Image Sequence	0008,1140	-
>Referenced SOP Class UID	0008,1150	-
>Referenced SOP Instance UID	0008,1155	-
Acquisition Number	0020,0012	Is visible on the UI as Scan number.
Instance Number	0020,0013	-
Image Comments	0020,4000	-
Lossy Image Compression	0028,2110	Applied value: 00

Table 71. MR Image Storage SOP Class – Image Plane Module

Attribute Name	Tag	Note
Slice Thickness	0018,0050	-
Image Position (Patient)	0020,0032	-
Image Orientation (Patient)	0020,0037	-
Slice Location	0020,1041	Not for diagnostic use, see Remarks chapter 8.
Pixel Spacing	0028,0030	-

Table 72. MR Image Storage SOP Class – Image Pixel Module

Attribute Name	Tag	Note
Rows	0028,0010	-
Columns	0028,0011	-
Pixel Aspect Ratio	0028,0034	Applied value: 1\1
Bits Stored	0028,0101	-
High Bit	0028,0102	-
Pixel Representation	0028,0103	-
Pixel Data	7FE0,0010	-

Table 73. MR Image Storage SOP Class – MR Image Module

Attribute Name	Tag	Note
Image Type	0008,0008	See Table 79.
Scanning Sequence	0018,0020	-
Sequence Variant	0018,0021	-
Scan Options	0018,0022	-
MR Acquisition Type	0018,0023	-
Repetition Time	0018,0080	-
Echo Time	0018,0081	-
Inversion Time	0018,0082	Attribute is always present.
Number of Averages	0018,0083	-
Imaging Frequency	0018,0084	-
Imaged Nucleus	0018,0085	-
Echo Number(s)	0018,0086	-
Magnetic Field Strength	0018,0087	-
Spacing Between Slices	0018,0088	-

Attribute Name	Tag	Note
Number of Phase Encoding Steps	0018,0089	-
Echo Train Length	0018,0091	-
Percent Sampling	0018,0093	-
Percent Phase Field of View	0018,0094	-
Trigger Time	0018,1060	-
Low R-R Value	0018,1081	-
High R-R Value	0018,1082	-
Intervals Acquired	0018,1083	-
Intervals Rejected	0018,1084	-
Heart Rate	0018,1088	-
Reconstruction Diameter	0018,1100	Filled with the field of view in [mm]. Applied value: $\text{Max}(\text{Rows}, \text{Columns}) * \text{PixelSpacing}$
Receive Coil Name	0018,1250	-
Transmit Coil Name	0018,1251	-
Acquisition Matrix	0018,1310	-
In-plane Phase Encoding Direction	0018,1312	-
Flip Angle	0018,1314	-
Temporal Position Identifier	0020,0100	-
Number of Temporal Positions	0020,0105	-
Samples per Pixel	0028,0002	Applied value: 1
Photometric Interpretation	0028,0004	Applied values: MONOCHROME1, MONOCHROME2
Bits Allocated	0028,0100	Applied value: 16

Table 74. MR Image Storage SOP Class – Overlay Plane Module

Attribute Name	Tag	Note
Overlay Rows	60xx,0010	-
Overlay Columns	60xx,0011	-
Overlay Type	60xx,0040	-
Overlay Origin	60xx,0050	-
Overlay Bits Allocated	60xx,0100	Applied value: 1
Overlay Bit Position	60xx,0102	Applied value: 0
Overlay Data	60xx,3000	-

Table 75. MR Image Storage SOP Class – Modality LUT Module

Attribute Name	Tag	Note
Rescale Intercept	0028,1052	-
Rescale Slope	0028,1053	-
Rescale Type	0028,1054	-

Table 76. MR Image Storage SOP Class – VOI LUT Module

Attribute Name	Tag	Note
Window Center	0028,1050	-
Window Width	0028,1051	-

Table 77. MR Image Storage SOP Class – SOP Common Module

Attribute Name	Tag	Note
Specific Character Set	0008,0005	Applied value: ISO_IR 100
Instance Creation Date	0008,0012	-
Instance Creation Time	0008,0013	-
Instance Creator UID	0008,0014	-
SOP Class UID	0008,0016	Applied value: 1.2.840.10008.5.1.4.1.1.4
SOP Instance UID	0008,0018	-

Table 78. MR Image Storage SOP Class – Private Group

Attribute Name	Tag	Note
Private Creator Group 2001	2001,0010	VR = LO, VM = 1
Chemical Shift	2001,1001	VR = FL, VM = 1
Chemical Shift Number MR	2001,1002	VR = IS, VM = 1
Diffusion B-Factor	2001,1003	VR = FL, VM = 1
Diffusion Direction	2001,1004	VR = CS, VM = 1
Image Enhanced	2001,1006	VR = CS, VM = 1
Image Type ED ES	2001,1007	VR = CS, VM = 1
Phase Number	2001,1008	VR = IS, VM = 1
Slice Number MR	2001,100A	VR = IS, VM = 1
Slice Orientation	2001,100B	VR = CS, VM = 1
Diffusion Echo Time	2001,1011	VR = FL, VM = 1
Dynamic Series	2001,1012	VR = CS, VM = 1
EPI Factor	2001,1013	VR = SL, VM = 1
Number of Echoes	2001,1014	VR = SL, VM = 1
Number of Locations	2001,1015	VR = SS, VM = 1
Number of PC Directions	2001,1016	VR = SS, VM = 1
Number of Phases MR	2001,1017	VR = SL, VM = 1
Number of Slices MR	2001,1018	VR = SL, VM = 1
Partial Matrix Scanned	2001,1019	VR = CS, VM = 1
PC Velocity	2001,101A	VR = FL, VM = 1-n
Prepulse Delay	2001,101B	VR = FL, VM = 1
Prepulse Type	2001,101C	VR = CS, VM = 1
Reconstruction Number MR	2001,101D	VR = IS, VM = 1
Respiration Sync	2001,101F	VR = CS, VM = 1
SPIR	2001,1021	VR = CS, VM = 1
Water Fat Shift	2001,1022	VR = FL, VM = 1
Stack Sequence	2001,105F	VR = SQ, VM = 1
>Private Creator Group 2001	2001,0010	VR = LO, VM = 1
>Number of Stack Slices	2001,102D	VR = SS, VM = 1
>Stack Radial Angle	2001,1032	VR = FL, VM = 1-n
>Stack Radial Axis	2001,1033	VR = CS, VM = 1-n
>Stack Slice Number	2001,1035	VR = SS, VM = 1-n
>Stack Type	2001,1036	VR = CS, VM = 1-n
Number of Stacks	2001,1060	VR = SL, VM = 1
Number of Dynamic Scans	2001,1081	VR = IS, VM = 1

Attribute Name	Tag	Note
Private Creator Group 2005	2005,0010	VR = LO, VM = 1
Number of Chemical Shifts	2005,1020	VR = SL, VM = 1
Syncra Scan Type	2005,10A1	VR = CS, VM = 1

Table 79. Valid combinations of Image Type applied values

Image Type Value (1)	Image Type Value (2)	Image Type Value (3)	Image Type Value (4)	Image Type value (5)	Scanning Sequence (1)
ORIGINAL	PRIMARY	R_SE	R	SE	SE
ORIGINAL	PRIMARY	M_SE	M	SE	SE
ORIGINAL	PRIMARY	PHASE MAP	P	SE	SE
ORIGINAL	PRIMARY	R_IR	R	IR	IR
ORIGINAL	PRIMARY	I_IR	I	IR	IR
ORIGINAL	PRIMARY	M_IR	M	IR	IR
ORIGINAL	PRIMARY	PHASE MAP	P	IR	IR
ORIGINAL	PRIMARY	OTHER	CR	IR	IR
DERIVED	PRIMARY	T0	T0	DERIVED	RM
ORIGINAL	PRIMARY	T1 MAP	T1	US	RM
ORIGINAL	PRIMARY	T2 MAP	T2	US	RM
ORIGINAL	PRIMARY	DENSITY MAP	RHO	US	RM
ORIGINAL	PRIMARY	R_FFE	R	FFE	GR
ORIGINAL	PRIMARY	I_FFE	I	FFE	GR
ORIGINAL	PRIMARY	M_FFE	M	FFE	GR
ORIGINAL	PRIMARY	PHASE MAP	P	FFE	GR
ORIGINAL	PRIMARY	R_SI	R	SI	RM
ORIGINAL	PRIMARY	I_SI	I	SI	RM
ORIGINAL	PRIMARY	M_SI	M	SI	RM
ORIGINAL	PRIMARY	M_PCA	M	PCA	GR
ORIGINAL	PRIMARY	VELOCITY MAP	P	PCA	GR
DERIVED	PRIMARY	DERIVED	DERIVED	DERIVED	RM
DERIVED	PRIMARY	R	R	DERIVED	RM
DERIVED	PRIMARY	I	I	DERIVED	RM
DERIVED	PRIMARY	M	M	DERIVED	RM
DERIVED	PRIMARY	PHASE MAP	P	DERIVED	RM
DERIVED	PRIMARY	DIFFUSION MAP	ADC	DERIVED	RM
DERIVED	PRIMARY	RCBV	RCBV	DERIVED	RM
DERIVED	PRIMARY	RCBF	RCBF	DERIVED	RM
DERIVED	PRIMARY	MTT	MTT	DERIVED	RM
DERIVED	PRIMARY	TTP	TTP	DERIVED	RM
DERIVED	PRIMARY	FA	FA	DERIVED	RM

ANNEX 2. Overview applied Secondary Capture Image IOD

Table 80. Secondary Capture Image Storage SOP Class - Patient Module

Attribute Name	Tag	Note
Patient's Name	0010,0010	The characters '=' and '\' are not used. Received from RIS or entered by the operator.
Patient ID	0010,0020	Received from RIS or entered by the operator (Registration Number on UI).
Patient's Birth Date	0010,0030	Received from RIS or entered by the operator.
Patient's Sex	0010,0040	Received from RIS or entered by the operator.
Patient Comments	0010,4000	-

Table 81. Secondary Capture Image Storage SOP Class - General Study Module

Attribute Name	Tag	Note
Study Date	0008,0020	Received from RIS or entered by the operator.
Study Time	0008,0030	Received from RIS or generated by the Intera system.
Accession Number	0008,0050	Received from RIS, entered by the operator or has zero length.
Referring Physician's Name	0008,0090	Received from RIS, entered by the operator or has zero length.
Study Description	0008,1030	Received from RIS as Scheduled Procedure Step Description) or entered by the operator (visible as Exam Name).
Study Instance UID	0020,000D	Received from RIS or generated by the Intera system.
Study ID	0020,0010	Value received from RIS or generated by the Intera system.

Table 82. Secondary Capture Image Storage SOP Class - Patient Study Module

Attribute Name	Tag	Note
Patient's Weight	0010,1030	Weight of the patient, in kilograms.

Table 83. Secondary Capture Image Storage SOP Class - General Series Module

Attribute Name	Tag	Note
Series Date	0008,0021	-
Series Time	0008,0031	-
Series Description	0008,103E	-
Performing Physician's Name	0008,1050	Name of the Physicians administering the Series.
Operator's Name	0008,1070	Technologist(s) supporting the series.
Protocol Name	0018,1030	-
Series Instance UID	0020,000E	-
Series Number	0020,0011	-

Table 84. Secondary Capture Image Storage SOP Class - General Equipment Module

Attribute Name	Tag	Note
Manufacturer	0008,0070	-
Institution Name	0008,0080	-
Institution Address	0008,0081	-
Station Name	0008,1010	-
Institutional Department Name	0008,1040	-
Manufacturer's Model Name	0008,1090	Manufacturers model number of the equipment that produced the digital images.
Device Serial Number	0018,1000	-
Software Version(s)	0018,1020	-

Table 85. Secondary Capture Image Storage SOP Class - SC Equipment Module

Attribute Name	Tag	Note
Modality	0008,0060	-
Conversion Type	0008,0064	-
Secondary Capture Device ID	0018,1010	-
Secondary Capture Device Manufacturer	0018,1016	-
Secondary Capture Device Manufacturer's Model Name	0018,1018	-
Secondary Capture Device Software Version(s)	0018,1019	-
Video Image Format Acquired	0018,1022	-
Digital Image Format Acquired	0018,1023	-

Table 86. Secondary Capture Image Storage SOP Class - General Image Module

Attribute Name	Tag	Note
Content Date	0008,0023	-
Content Time	0008,0033	-
Acquisition Number	0020,0012	-
Instance Number	0020,0013	-
Patient Orientation	0020,0020	Attribute always empty.
Lossy Image Compression	0028,2110	-

Table 87. Secondary Capture Image Storage SOP Class - Image Pixel Module

Attribute Name	Tag	Note
Samples per Pixel	0028,0002	-
Photometric Interpretation	0028,0004	-
Planar Configuration	0028,0006	Attribute is always present.
Rows	0028,0010	-
Columns	0028,0011	-
Pixel Aspect Ratio	0028,0034	-
Bits Allocated	0028,0100	-
Bits Stored	0028,0101	-
High Bit	0028,0102	-
Pixel Representation	0028,0103	-

Attribute Name	Tag	Note
Pixel Data	7FE0,0010	-

Table 88. Secondary Capture Image Storage SOP Class - SC Image Module

Attribute Name	Tag	Note
Date of Secondary Capture	0018,1012	-
Time of Secondary Capture	0018,1014	-

Table 89. Secondary Capture Image Storage SOP Class - SOP Common Module

Attribute Name	Tag	Note
Specific Character Set	0008,0005	Applied value: ISO_IR 100
Instance Creation Date	0008,0012	-
Instance Creation Time	0008,0013	-
Instance Creator UID	0008,0014	-
SOP Class UID	0008,0016	Applied value: 1.2.840.10008.5.1.4.1.1.7
SOP Instance UID	0008,0018	-

ANNEX 3. Overview applied Grayscale Softcopy Presentation State IOD

The details of the applied modules are given in the tables below. The situation that an attribute is present conditionally/optionally or that an attribute may contain a zero length value is indicated too. Conditions and Defined/Enumerated Values of DICOM 3.0 are applicable but are not shown in the tables. The specified attributes are present and filled except for what is specified in the notes.

Table 90. Softcopy Presentation State Storage SOP Class - Patient Module

Attribute Name	Tag	Note
Patient's Name	0010,0010	The characters '=' and '\' are not used. Received from RIS or entered by the operator.
Patient ID	0010,0020	Received from RIS or entered by the operator (Registration Number on UI).
Patient's Birth Date	0010,0030	Received from RIS or entered by the operator.
Patient's Sex	0010,0040	Received from RIS or entered by the operator.
Patient Comments	0010,4000	-

Table 91. Softcopy Presentation State Storage SOP Class - General Study Module

Attribute Name	Tag	Note
Study Date	0008,0020	Received from RIS or entered by the operator.
Study Time	0008,0030	Received from RIS or generated by the Intera system.
Accession Number	0008,0050	Received from RIS, entered by the operator or has zero length.
Referring Physician's Name	0008,0090	Received from RIS, entered by the operator or has zero length.
Study Description	0008,1030	Received from RIS as Scheduled Procedure Step Description) or entered by the operator (visible as Exam Name).
Study Instance UID	0020,000D	Received from RIS or generated by the Intera system.
Study ID	0020,0010	Value received from RIS or generated by the Intera system.

Table 92. Softcopy Presentation State Storage SOP Class - Patient Study Module

Attribute Name	Tag	Note
Patient's Weight	0010,1030	Weight of the Patient, in kilograms.

Table 93. Softcopy Presentation State Storage SOP Class - General Series Module

Attribute Name	Tag	Note
Series Date	0008,0021	-
Series Time	0008,0031	-
Series Description	0008,103E	-
Referenced Performed Procedure Step Sequence	0008,1111	-
Protocol Name	0018,1030	-

Attribute Name	Tag	Note
Series Instance UID	0020,000E	Generated by Intera system.
Series Number	0020,0011	-
Performed Procedure Step Start Date	0040,0244	-
Performed Procedure Step Start Time	0040,0245	-
Performed Procedure Step ID	0040,0253	-
Performed Procedure Step Description	0040,0254	-
Request Attributes Sequence	0040,0275	Only send if received from RIS.
>Scheduled Procedure Step Description	0040,0007	Value as received from RIS.
>Scheduled Procedure Step ID	0040,0009	-
>Requested Procedure ID	0040,1001	-
Comments on the Performed Procedure Steps	0040,0280	-

Table 94. Softcopy Presentation State Storage SOP Class - Presentation Series Module

Attribute Name	Tag	Note
Modality	0008,0060	-

Table 95. Softcopy Presentation State Storage SOP Class - General Equipment Module

Attribute Name	Tag	Note
Manufacturer	0008,0070	Applied value: Philips Medical Systems
Institution Name	0008,0080	Configured on the system.
Station Name	0008,1010	Same as the Host Name.
Manufacturer's Model Name	0008,1090	Manufacturers model number of the equipment that produced the digital images. Applied value: Intera
Device Serial Number	0018,1000	-
Software Version(s)	0018,1020	-

Table 96. Softcopy Presentation State Storage SOP Class - Overlay Plane Module

Attribute Name	Tag	Note
Overlay Rows	60xx,0010	-
Overlay Columns	60xx,0011	-
Overlay Type	60xx,0040	-
Overlay Origin	60xx,0050	-
Overlay Bits Allocated	60xx,0100	Applied value: 1
Overlay Bit Position	60xx,0102	Applied value: 0
Overlay Data	60xx,3000	-

Table 97. Softcopy Presentation State Storage SOP Class – Displayed Area Module

Attribute Name	Tag	Note
Displayed Area Selection Sequence	0070,005A	-
>Displayed Area Top Left Hand Corner	0070,0052	Applied value: 1\1
>Displayed Area Bottom Right Hand Corner	0070,0053	Number of Rows/Columns.
>Presentation Size Mode	0070,0100	Applied value: SCALE TO FIT

Table 98. Softcopy Presentation State Storage SOP Class - Graphic Annotation Module

Attribute Name	Tag	Note
Graphic Annotation Sequence	0070,0001	-
>Referenced Image Sequence	0008,1140	-
>>Referenced SOP Class UID	0008,1150	Uniquely identifies the referenced SOP Class.
>>Referenced SOP Instance UID	0008,1155	Uniquely identifies the referenced SOP Instance.
>Graphic Layer	0070,0002	-
>Text Object Sequence	0070,0008	-
>>Bounding Box Annotation Units	0070,0003	Applied values: DISPLAY, PIXEL
>>Anchor Point Annotation Units	0070,0004	Applied values: DISPLAY, PIXEL
>>Unformatted Text Value	0070,0006	-
>>Bounding Box Top Left Hand Corner	0070,0010	-
>>Bounding Box Bottom Right Hand Corner	0070,0011	-
>>Bounding Box Text Horizontal Justification	0070,0012	Applied values: CENTER, LEFT, RIGHT
>>Anchor Point	0070,0014	-
>>Anchor Point Visibility	0070,0015	Applied values: N, Y
>Graphic Object Sequence	0070,0009	-
>>Graphic Annotation Units	0070,0005	Applied values: DISPLAY, PIXEL
>>Graphic Dimensions	0070,0020	Applied value: 2
>>Number of Graphic Points	0070,0021	-
>>Graphic Data	0070,0022	-
>>Graphic Type	0070,0023	Applied values: CIRCLE, ELLIPSE, INTERPOLATED, POINT, POLYLINE
>>Graphic Filled	0070,0024	Applied values: N, Y

Table 99. Softcopy Presentation State Storage SOP Class - Spatial Transformation Module

Attribute Name	Tag	Note
Image Horizontal Flip	0070,0041	-
Image Rotation	0070,0042	-

Table 100. Softcopy Presentation State Storage SOP Class - Graphic Layer Module

Attribute Name	Tag	Note
Graphic Layer Sequence	0070,0060	-
>Graphic Layer	0070,0002	-
>Graphic Layer Order	0070,0062	-
>Graphic Layer Recommended Display Grayscale Value	0070,0066	-
>Graphic Layer Description	0070,0068	-

Table 101. Softcopy Presentation State Storage SOP Class - Modality LUT Module

Attribute Name	Tag	Note
Rescale Intercept	0028,1052	-
Rescale Slope	0028,1053	-
Rescale Type	0028,1054	-

Table 102. Softcopy Presentation State Storage SOP Class - Softcopy Presentation LUT Module

Attribute Name	Tag	Note
Presentation LUT Shape	2050,0020	-

Table 103. Softcopy Presentation State Storage SOP Class - Softcopy VOI LUT Module

Attribute Name	Tag	Note
Softcopy VOI LUT Sequence	0028,3110	-
>Referenced Image Sequence	0008,1140	-
>>Referenced SOP Class UID	0008,1150	Uniquely identifies the referenced SOP Class.
>>Referenced SOP Instance UID	0008,1155	Uniquely identifies the referenced SOP Instance.
>Window Center	0028,1050	-
>Window Width	0028,1051	-

Table 104. Softcopy Presentation State Storage SOP Class - Presentation State Module

Attribute Name	Tag	Note
Referenced Series Sequence	0008,1115	-
>Referenced Image Sequence	0008,1140	-
>>Referenced SOP Class UID	0008,1150	-
>>Referenced SOP Instance UID	0008,1155	-
>Series Instance UID	0020,000E	-
Instance Number	0020,0013	-
Presentation Label	0070,0080	-
Presentation Description	0070,0081	-
Presentation Creation Date	0070,0082	-
Presentation Creation Time	0070,0083	-

Table 105. Softcopy Presentation State Storage SOP Class - SOP Common Module

Attribute Name	Tag	Note
Specific Character Set	0008,0005	Applied value: ISO_IR 100
Instance Creation Date	0008,0012	-
Instance Creation Time	0008,0013	-
Instance Creator UID	0008,0014	-
SOP Class UID	0008,0016	Applied value: 1.2.840.10008.5.1.4.1.1.11.1
SOP Instance UID	0008,0018	-