



DICOM



CONFORMANCE STATEMENT



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1. Introduction

1.1 General information

This document is the DICOM Conformance Statement for Version 1.0 of the SmartRAD system manufactured CMT Medical Technologies Ltd. The purpose of this document is to describe how the SmartRAD product line collaborates in a DICOM network with other Medical Imaging applications that conform to the DICOM 3.0 standard.

1.2 References

The digital Imaging and Communications in Medicine (DICOM) standard, parts 1 through 16 (NEMA PS 3.1-16), 2003.

1.3 Definitions

DICOM definitions, terms and abbreviations are used throughout this Conformance Statement. For a description of these, please refer to the 2003 revision of the Digital Imaging and Communications in Medicine (DICOM) standard, PS 3.3 and PS 3.4.

The name **CMT** used in this document refers to CMT Medical Technologies Ltd.

1.4 Symbols and Abbreviations

- ASCII American Standard Code for Information Interchange
- AE Application Entity
- ANSI American National Standards Institute
- CR Computerized Radiography
- DICOM Digital Imaging and Communications in Medicine
- DIMSE DICOM Message Service Element
- DIMSE-C DICOM Message Service Element - Composite
- DIMSE-N DICOM Message Service Element - Normalized
- DR Digital Radiography
- HIS Hospital Information System
- IE Information Entity
- IOD Information Object Definition
- ISO International Standards Organization
- MWM Modality Worklist Management
- NEMA National Electrical Manufacturers Association
- OSI Open Systems Interconnection
- PDU Protocol Data Unit

- RIS Radiology Information System
- SCP Service Class Provider
- SCU Service Class User
- SOP Service-Object Pair
- TCP/IP Transmission Control Protocol/Internet Protocol
- UID Unique Identifier

1.5 Important considerations for the reader

The DICOM Conformance Statement by itself is not sufficient to guarantee successful connectivity between the SmartRAD and equipment from other vendors. The following considerations should be made:

- The integration of equipment from different vendors (including CMT) goes beyond the scope of the DICOM 3.0 standard and the DICOM Conformance Statement from CMT and other vendors. It is the responsibility of the user (or the user's agent) to assess the application requirements and to design a solution that integrates CMT equipment with equipment from other vendors.
- When the comparison of this DICOM Conformance Statement with a similar document produced by another vendor indicates that connectivity should be possible, it is the responsibility of the user (or user's agent) to verify this by carrying out the necessary validation tests and to check whether all the required functionality is met.
- CMT reserves the right to make changes in the SmartRAD architecture in order to assure compliance with future DICOM requirements. The user (or user's agent) should ensure that any equipment connected via DICOM to CMT's equipment also follows the future evolution of the DICOM 3.0 standard. Failure to do so may result in partial loss of connectivity.

2. Implementation Model

The SmartRAD provides the following features:

- Support of the DICOM **Verification** Service.
- **Store** Images to a remote DICOM-compliant system.
- **Print** Images in a remote DICOM-compliant printer.
- Querying a DICOM **Worklist** Server for a list of scheduled patients procedures.

2.1 Application Data Flow Diagram

The SmartRAD behaves as a system with one Application Entity (AE). Its related Implementation Model is shown in Figure 1. It shows the AE and graphically depicts the relationship of the AE use of DICOM to Real World Activities. In the left-hand side, the

local Real-World Activities are shown, while in the right-hand side the remote Real-World activities are presented.

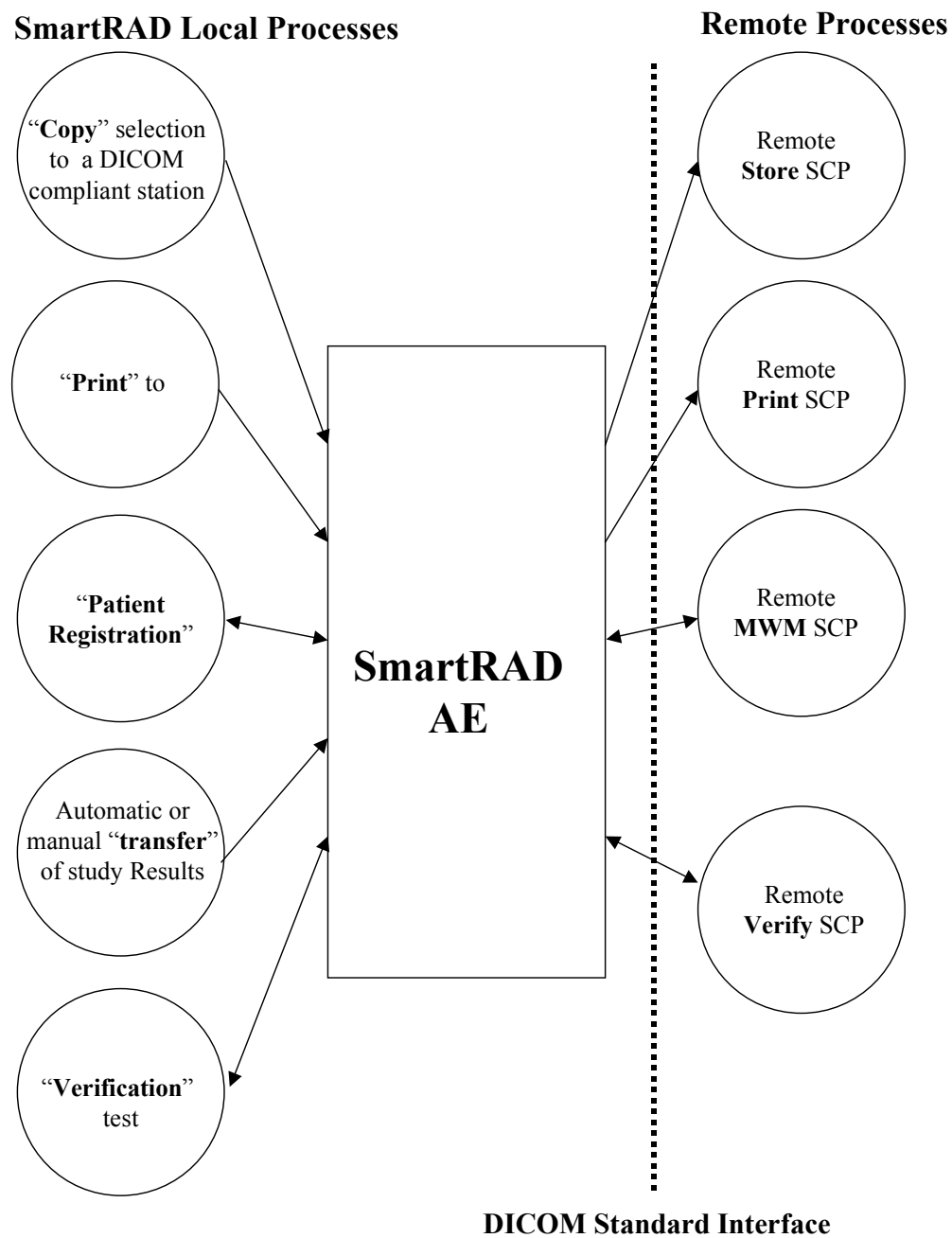


Figure 1: Implementation Model

As documented in the PS 3.4, the arrows in the diagrams have the following meanings:

- An arrow pointing to the right indicates the local application initiates an association.
- An arrow pointing to the left indicates the local application accepts an association.

2.2 Functional description of Application Entities

2.2.1 Verify (SCU) Real-World Activity

The SmartRAD AE is used to **verify** that a remote DICOM device is active on the network (Figure 2). It therefore performs the following tasks:

- Establishes a DICOM association with a remote DICOM device.
- Performs verification of the presence of a remote DICOM device in the network.
- Closes the association after the verification process is completed.

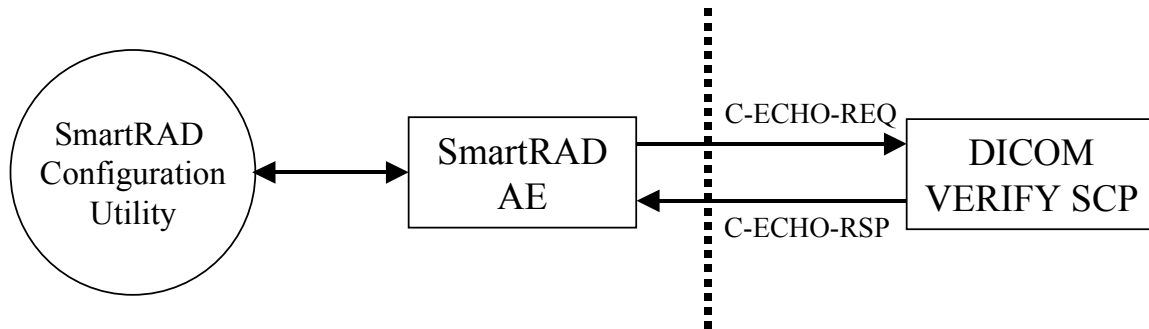


Figure 2: Verification Model

2.2.2 Store (SCU) Real-World Activities

The SmartRAD AE application entity performs all the functions to transmit images and associated data to network servers and/or workstations (Figure 3). It therefore performs the following tasks:

- Builds DICOM CR, DX or SC Information Objects
- Establishes a DICOM association with a remote DICOM device
- Performs storage of DICOM CR/DX/SC Information Object to a DICOM device
- Closes the association after each Information Object is transferred

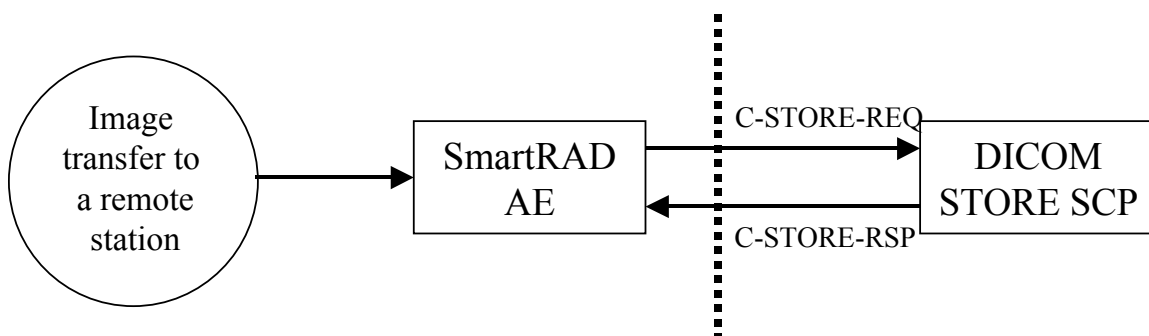


Figure 3: Store Model

2.2.3 Print (SCU) Real-World Activities

The SmartRAD AE provides all aspects of the Print Management SCU (**Error! Reference source not found.**). The SmartRAD AE performs the following tasks:

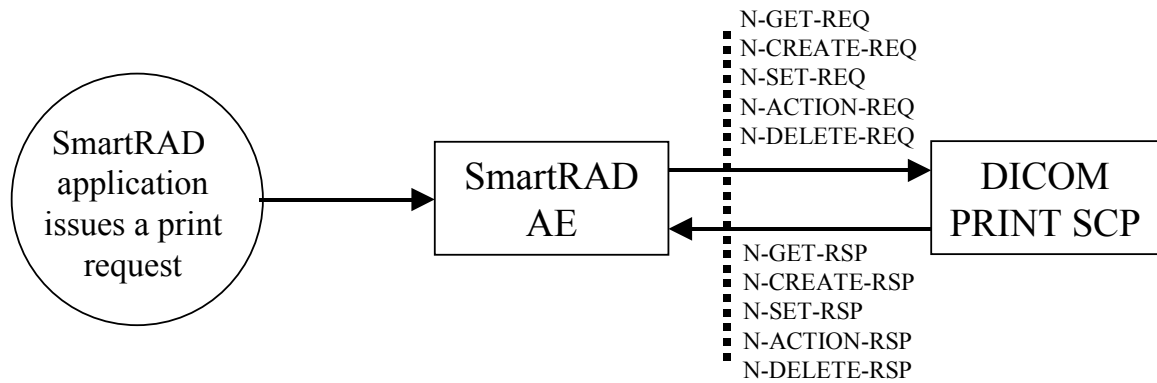


Figure 4: Print Model

- Builds DICOM Basic Grayscale Print Objects
- Establishes an association with a remote DICOM device
- Performs transmit DICOM Basic Grayscale Print Objects to a remote DICOM device
- Closes the association after Information Objects are transferred.

2.2.4 Worklist (SCU) Real-World Activity

The SmartRAD AE supports the DICOM Basic Worklist Management as a SCU. The AE initiates an association to the active Worklist server when a Worklist query is selected via the Patient Registration screen. The SmartRAD AE performs the following tasks:

- Establishes a DICOM association with a remote DICOM device.
- Performs request of DICOM Modality Worklist Objects to a remote DICOM device.
- Retrieves patient list with Scheduled Procedure Step information from a remote DICOM device.
- Closes the association once a matching list is received from the Worklist server.

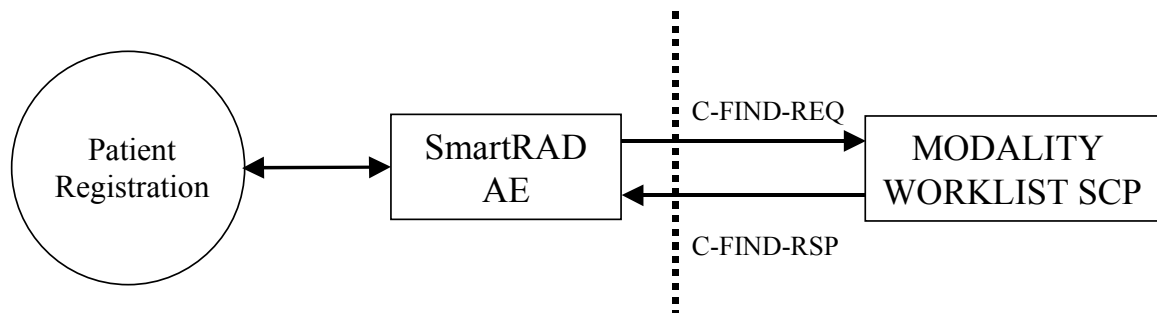


Figure 5: Modality Worklist Model

2.3 Sequencing of Real-World Activities

2.3.1 Features

2.3.1.1 *Manual verification (available in Service Mode only)*

- Upon pressing the TEST button in the DICOM configuration utility, the SmartRAD verifies the existence of a remote DICOM device in the network.
- IP address and port number must be specified.

2.3.1.2 *Automatic or manual transfer of images, series, study or patient unit*

- Acquired images are automatically sent upon registration of a new patient.
- Images may be transferred as **full-resolution** images or in **sub-divided** format, according to the selected acquisition mode.
- The operator requests to send specific images after selecting them from any of the SmartRAD's applications.
- In case the image transfer fails, the operator can manually attempt to resend the image at a later stage.
- The requests are placed on a queue and executed in the background.

2.3.1.3 *Automatic or manual transfer of images to a DICOM-compliant imager*

- Acquired images are automatically sent upon registration of a new patient.
- Films are always printed with a layout 1 x 1.
- The operator requests to print specific images after selecting them from the SmartRAD's applications.
- In case an error occurs during the printing process, the operator can manually attempt to resend the film at a later stage.
- The requests are placed on a queue and executed in the background.

2.3.1.4 *Manual request of patients list*

- The operator requests the patient information from the Modality Worklist Management server by entering matching values in the Patient Query Graphical User Interface (GUI).
- The operator retrieves the patient information list with Scheduled Procedure Step information.
- The user selects a patient from the patient list GUI and transfers the data to the Patient Registration GUI.
- The following data fields will be populated on the patient screen if available from the Modality Worklist server:

Table I: MWM attributes used during the Patient Registration process

Attribute Name	Tag
Patients Full Name	(0010,0010)
Patient ID	(0010,0020)
Accession Number	(0008,0050)
Date of Birth	(0010,0030)
Patient Sex	(0010,0040)
Referring Physician	(0008,0090)
Remarks (Patient Comments)	(0010,4000)
Requesting Physician	(0032,1032) or (0008,0090)*
Scheduled Procedure	(0040,0007) or (0032,1060)*

(*) Configurable via a SmartRAD internal software key.

- If more than 75 matching records are found in the query, the user will be prompted to limit the search by entering additional search criteria.

2.3.1.5 Automatic Request of a Patients List

- The SmartRAD automatically queries the Modality Worklist Management server at specific intervals defined by a SmartRAD internal software key.
- Patients retrieved are automatically added to the “Patient List” in the Patient Registration GUI.
- The automatic query procedure may be enabled/disabled via a SmartRAD internal software key.

2.3.2 Operation

2.3.2.1 Manual verification

- In DICOM Configuration utility, select the desired DICOM device.
- Press the TEST button.
- In case of Success an OK message will appear.
- In case of failure, a failure message will appear.

2.3.2.2 Automatic or manual transfer of images, series, study or patient unit

The operation for **manual** image transfer is as follows:

1. **Select** the images/series/studies/patients to be transferred to the network server or workstation.
2. Select the **destination** of the selection.
3. **Request** the transfer.

In case the **automatic** transfer capability is enabled, images acquired for the **current** patient and **accepted** by the operator are **immediately** transferred to the network server/workstation.

2.3.2.3 Automatic or manual transfer of images to a DICOM-compliant printer

The operation for **manual** printing of images is as follows:

1. **Select** the images/series/studies/patients to be transferred to the DICOM-compliant printer.
2. Select the **destination** of the selection.
3. **Request** the printing.

In case the **automatic** transfer capability is enabled, images acquired for the **current** patient and **accepted** by the operator are immediately transferred to the DICOM-compliant.

2.3.2.4 Manual request of patients list

The operation for **querying** a Worklist from the server is as follows:

1. **Select** the criteria patients should be sorted according to.
2. Press the **Query IS** button in the patient registration screen.
3. **Confirm** the request.
4. **Register** a **new** patient or **add** a group of patients to a **list** prepared in advance.

In case the **automatic query** capability is enabled, the SmartRAD issues a relevant request to the Modality Worklist Management server. Once the server returns the patient list, **new** patients added after the last query are automatically added to the **patients list** in the Patient Registration GUI.

3. AE Specifications

The following specifications apply to the AE as described in Figure 1.

3.1 SmartRAD AE specification

The SmartRAD AE provides conformance to the following DICOM Services SOP Classes as an SCU:

Table II: Supported SOP Classes

Service SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1
Computed Radiography Image Store	1.2.840.10008.5.1.4.1.1.1
Digital X-Ray Image Storage for Presentation	1.2.840.10008.5.1.4.1.1.1.1
Digital X-Ray Image Storage for Processing	1.2.840.10008.5.1.4.1.1.1.1.1
Secondary Capture Image Information Object	1.2.840.10008.5.1.4.1.1.7
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

Basic Film Box SOP Class	1.2.840.10008.5.1.1.2
Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4
Printer SOP Class	1.2.840.10008.5.1.1.16
Modality Worklist Information Model -FIND SOP Class	1.2.840.10008.5.1.4.31

3.1.1 Association Establishment Policies

3.1.1.1 General

The SmartRAD AE will utilize and understand the following Application Context Name:

Table III: Application Context Name

DICOM V3.0 Application Context	1.2.840.10008.3.1.1.1.1
--------------------------------	-------------------------

The maximum PDU size of the SmartRAD AE is 16Kbyte.

3.1.1.2 Number of Associations

The SmartRAD AE can only establish one association at a time, independent of the number of destinations chosen.

3.1.1.3 Asynchronous Nature

The SmartRAD AE allows a single outstanding operation on any association. Therefore, the SmartRAD AE does not support asynchronous window negotiations.

3.1.1.4 Implementation Identifying Information

- Implementation class UID 2.16.840.1.113669.632.3.1.1.2.7
- Implementation Version Name: SmartRAD 1.1

3.1.1.5 Configurable Parameters

- Time Out.
- Most of the IOD attributes.

3.1.1.6 Support of Extended Character Sets

The SmartRAD supports the following character sets:

- ISO-IR 6
- ISO-IR 100
- ISO-IR 87

3.1.2 Association Initiation by Real-World Activities

The SmartRAD AE initiates an association when the operator chooses any of the following activities:

- Automatic or Manual transfer of images, series, study or patient unit

Storage. Transfers a CR, DX or SC image to a remote DICOM device.

- Automatic or Manual print request

Print. Transfers images to a remote DICOM printer.

- Manual request of patient list

MWM. Queries a Modality Worklist Management server and retrieves a patient list.

3.1.3 Real-World Activity – Verification (SCU)

The SmartRAD systems supports Verification service Class as SCU. Verification is invoked in the DICOM configuration utility specifically for each DICOM service.

3.1.3.1 Proposed Presentation Contents – Verification

The SmartRAD AE proposes the following Presentation Contents shown below:

Table IV: Verification Presentation Context Table

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Verification	1.2.840.10008.1.1	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

3.1.4 Real-World Activity – Store (SCU)

The DICOM Image Export can be performed in the following ways:

- The operator requests via the User Interface the export of the selected SmartRAD images to one or more DICOM Store SCP.
- The **acceptance** of a new SmartRAD image by the operator will result in the **automatic** export of that image when the system is configured in automatic export mode.

For each export request, the SmartRAD establishes an association with one identified DICOM device (i.e. one of the Network Archive Servers, Workstation Servers) at a time. The association is released when the transfer is ended. Transferred images are not automatically deleted from the system.

3.1.4.1 Associated Real-World Activities

An association is established when the user initiates a “Copy to” operation from any of the SmartRAD applications.

Individual images or entire examinations can be transferred to the selected DICOM Store device. The association is opened and closed for each image transfer. In case the transfer

fails, images are queued and operator's intervention is required in order to resume data transfer.

3.1.4.2 Proposed Presentation Context

The SmartRAD AE proposes the following Presentation Contents shown in the Table V.

Table V: Store Presentation Context Table

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
CR Image Storage	1.2.840.10008.5.1.4.1.1.1	Implicit VR Little Endian	1.2.840. 10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840. 10008.1.2.1		
Digital X-Ray Image Storage for Presentation	1.2.840.10008.5.1.4.1.1.1.1	Implicit VR Little Endian	1.2.840. 10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840. 10008.1.2.1		
Digital X-Ray Image Storage for Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Implicit VR Little Endian	1.2.840. 10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840. 10008.1.2.1		
SC Image Storage	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian	1.2.840. 10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840. 10008.1.2.1		

The SmartRAD system always acts as a SCU and is the client in a client-server model.

3.1.4.3 Specific Conformance – Store

The SmartRAD AE operation involves the following sequence of steps for each image transfer:

1. Association establishment (requestor only).
2. Data transfer (SCU only).
3. Association release (requestor only).

The SmartRAD AE judges that the transfer of an image was successful when the result of step (2) above is “success”, even if the result of step (3) is “failure”.

3.1.4.4 AE Title/Presentation Address Mapping

This mapping is defined during the SmartRAD installation procedure.

Both the local and remote names can be arbitrary defined. Local AE Titles for the different services should be different.

3.1.4.5 CR Information Object Definition

Table VI denotes the attributes included in the CR Image Object as implemented on the SmartRAD system. Attributes **not** listed are **not** used.

Table VI: CR IOD Attributes

Attribute Name	Tag	Notes
Patient Module		
Patient Name	(0010,0010)	From Patient Registration GUI. Value is set to NULL if no patient name is specified.
Patient ID	(0010,0020)	From Patient Registration GUI. This field should always be specified.
Patient Birth Date	(0010,0030)	From Patient Registration GUI. Value is set to NULL if no birth date is specified.
Patient Sex	(0010,0040)	From Patient Registration GUI. Value is set to NULL if no patient sex is specified.
Other Patient IDs	(0010,1000)	This information is present only if retrieved from the MWM server.
Referenced Patient Sequence	(0008,1120)	This information is present only if retrieved from the MWM server.
>Referenced SOP Class UID	(0008,1150)	
>Referenced Instance UID	(0008,1155)	
Ethnic Group	(0010,2160)	This information is present only if retrieved from the MWM server.
Patient Comments	(0010, 4000)	From Patient Registration GUI.
General Study Module		
Study Instance UID	(0020,000D)	From MWM server or internally generated.
Study Date	(0008,0020)	Date the study number is generated.
Study Time	(0008,0030)	Time the study number is generated.
Referring Physician's Name	(0008,0090)	From Patient Registration screen. May be edited by the user.
Study ID	(0020,0010)	Internally generated by the SmartRAD.
Accession Number	(0008,0050)	From MWM server or internally generated.
Study Description	(0008,1030)	SmartRAD internal protocol name. Selected by the user.

Physician(s) of Record	(0008,1048)	This information is present only if retrieved from the MWM server.
Referenced Study Sequence	(0008,1110)	This information is present only if retrieved from the MWM server.
>Referenced SOP Class UID	(0008,1150)	
>Referenced SOP Instance UID	(0008,1155)	
Patient Study Module		
Patient's Age	(0010,1010)	From Patient Registration screen.
Additional Patient's History	(0010,21B0)	This information is present only if retrieved from the MWM server.
General Series Module		
Modality	(0008,0060)	CR
Series Instance UID	(0020,000E)	Internally generated by the SmartRAD.
Series Number	(0020,0011)	Always set to 1.
Laterality	(0020,0060)	Laterality of body part examined. Possible values: L and R. A NULL value is sent in case laterality is not defined or both body parts are examined.
Series Date	(0008,0021)	Date the series number is generated.
Series Time	(0008,0031)	Time the series number is generated.
Performing Physician's Name	(0008,1050)	From Patient Registration screen. May be edited by the user.
Protocol Name	(0018,1030)	SmartRAD internal protocol name. Selected by the user.
Operator's name	(0008, 1070)	This tag is sent in case the operator's name is inputted via the Patient Registration GUI.
Referenced Study Component Sequence	(0008,1111)	Always NULL.
>Referenced SOP Class UID	(0008,1150)	
>Referenced SOP Instance UID	(0008,1155)	
Body Part Examined	(0018,0015)	From Patient Registration GUI. May be edited by the user. DICOM defined and user-preset terms may be specified.
Requested Attributes Sequence	(0040,0275)	Sent if the tag is received from the MWM server. This information is present only if the MWM service is enabled.
> Requested Attributes ID	(0040,1001)	Sent if the tag is received from the MWM server. This information is present only if the MWM service is enabled.

>Scheduled Procedure Step ID	(0040,0009)	Sent if the tag is received from the MWM server. This information is present only if the MWM service is enabled.
>Scheduled Procedure Step Description	(0040,0007)	Sent if the tag is received from the MWM server. This information is present only if the MWM service is enabled.
>Scheduled Action Item Code Sequence	(0040,0008)	Sent if the tag is received from the MWM server. This information is present only if the MWM service is enabled.
>>Code Value	(0008,0100)	Sent if the tag is received from the MWM server. This information is present only if the MWM service is enabled.
>>Coding Scheme Designator	(0008,0102)	Sent if the tag is received from the MWM server. This information is present only if the MWM service is enabled.
>>Coding Scheme Version	(0008,0103)	Sent if the tag is received from the MWM server. This information is present only if the MWM service is enabled.
>>Coding Meaning	(0008,0104)	Sent if the tag is received from the MWM server. This information is present only if the MWM service is enabled.
Performed Procedure Step ID	(0040,0253)	SmartRAD internal protocol name. Selected by the user.
Performed Procedure Step Start Date	(0040,0244)	Date the study number is generated.
Performed Procedure Step Start Time	(0040,0245)	Time the study number is generated.
Performed Procedure Step Description	(0040,0254)	From Patient Registration screen. May be edited by the user.
Performed Action Item Code Sequence	(0040,0260)	Always NULL.
CR Series Module		
Body Part Examined	(0018,0015)	From Patient Registration GUI. May be edited by the user. DICOM defined and user-preset terms may be specified.
View Position	(0018,5101)	Always NULL
General Equipment Module		
Manufacturer	(0008,0070)	CMT
Institution Name	(0008,0080)	Hospital Name (for each image)
Station Name	(0008,1010)	From Configuration Utility (name + location).
Manufacturer's Model Name	(0008,1090)	SmartRAD.
Software Version	(0018,1020)	1.1

General Image Module		
Instance Number	(0020,0013)	Internally generated by the SmartRAD.
Patient Orientation	(0020,0020)	Always NULL.
Acquisition Date	(0008,0022)	
Image Date	(0008,0023)	
Acquisition Time	(0008,0032)	
Image Time	(0008,0033)	
Image Type	(0008,0008)	ORIGINAL/DERIVED. PRIMARY/SECONDARY. SINGLE PLANE.
Derivation Description	(0008,2111)	Sent only if (0008,0008) is DERIVED.
Image Comments	(0020,4000)	
Burned in Annotation	(0028,0301)	YES or NOT, depending on whether the relevant option was selected via the SmartRAD's DICOM setup menu.
Lossy Image Compression	(0028,2110)	Set to 00.
Image Pixel Module		
Samples Per Pixels	(0028,0002)	Set to 1.
Photometric Interpretation	(0028,0004)	Set to Monochrome 2.
Rows	(0028,0010)	3072/1536/1024
Columns	(0028,0011)	3072/1536/1024
Bits Allocated	(0028,0100)	16.
Bits Stored	(0028,0101)	14.
High Bit	(0028,0102)	13.
Pixel Representation	(0028,0103)	Set to 0000H.
Pixel Data	(7FE0,0010)	
CR Image Module		
Photometric Interpretation	(0028,0004)	Set to Monochrome 2.
KVP	(0018,0060)	Present only if digital communication between the SmartRAD and the X-ray generator is available.
Exposure Time	(0018,1150)	Present only if digital communication between the SmartRAD and the X-ray generator is available.
X-ray Tube Current	(0018,1151)	Present only if digital communication between the SmartRAD and the X-ray generator is available.

Exposure	(0018,1152)	Present only if digital communication between the SmartRAD and the X-ray generator is available.
Display Shutter Module ⁽¹⁾		
Shutter Shape	(0018,1600)	Always RECTANGULAR
Left Vertical Edge	(0018,1602)	
Right Vertical Edge	(0018,1604)	
Upper Horizontal Edge	(0018,1606)	
Lower Horizontal Edge	(0018,1608)	
Presentation Value	(0018,1622)	Always 0000H
VOI LUT Module		
Window Center	(0028,1050)	
Window Width	(0028,1051)	
SOP Common Module		
SOP Class UID	(0008,0016)	1.2.840.10008.5.1.4.1.1.1
SOP Instance UID	(0008,0018)	Internally generated by SmartRAD
Specific Character Set	(0008,0005)	- / "ISO_IR 100" / NULL + "ISO 2022 IR 87

(1) Used only if a shutter shape is defined when the image is created

3.1.4.6 DX Information Object Definition

The following table denotes the attributes included in the DX Image Object as implemented on the SmartRAD system. Attributes **not** listed are **not** used.

Table VII: DX IOD Attributes

Attribute Name	Tag	Notes
Patient Module		
Patient Name	(0010,0010)	From Patient Registration GUI. Value is set to NULL if no patient name is specified.
Patient ID	(0010,0020)	From Patient Registration GUI. This field should always be specified.
Patient Birth Date	(0010,0030)	From Patient Registration GUI. Value is set to NULL if no birth date is specified.
Patient Sex	(0010,0040)	From Patient Registration GUI. Value is set to NULL if no patient sex is specified.
Other Patient IDs	(0010,1000)	This information is present only if retrieved from the MWM server.
Referenced Patient Sequence	(0008,1120)	This information is present only if retrieved from the MWM server.
>Referenced SOP Class UID	(0008,1150)	
>Referenced Instance UID	(0008,1155)	
Ethnic Group	(0010,2160)	This information is present only if retrieved from the MWM server.
Patient Comments	(0010, 4000)	From Patient Registration GUI.
General Study Module		
Study Instance UID	(0020,000D)	From MWM server or internally generated.
Study Date	(0008,0020)	Date the study number is generated.
Study Time	(0008,0030)	Time the study number is generated.
Referring Physician's Name	(0008,0090)	From Patient Registration screen. May be edited by the user.
Study ID	(0020,0010)	Internally generated by the SmartRAD.
Accession Number	(0008,0050)	From MWM server or internally generated.
Study Description	(0008,1030)	SmartRAD internal protocol name. Selected by the user.
Physician(s) of Record	(0008,1048)	This information is present only if retrieved from the MWM server.
Referenced Study Sequence	(0008,1110)	This information is present only if retrieved from the MWM server.
>Referenced SOP Class UID	(0008,1150)	

>Referenced SOP Instance UID	(0008,1155)	
Patient Study Module		
Patient's Age	(0010,1010)	From Patient Registration screen.
Additional Patient's History	(0010,21B0)	This information is present only if retrieved from the MWM server.
General Series Module		
Modality	(0008,0060)	DX
Series Instance UID	(0020,000E)	Internally generated by the SmartRAD.
Series Number	(0020,0011)	Always set to 1.
Series Date	(0008,0021)	Date the series number is generated.
Series Time	(0008,0031)	Time the series number is generated..
Performing Physician's Name	(0008,1050)	From Patient Registration screen. May be edited by the user.
Protocol Name	(0018,1030)	SmartRAD internal protocol name. Selected by the user.
Operator's name	(0008, 1070)	This tag is sent in case the operator's name is inputted via the Patient Registration GUI.
Referenced Study Component Sequence	(0008,1111)	Always NULL.
>Referenced SOP Class UID	(0008,1150)	>Referenced SOP Class UID
>Referenced SOP Instance UID	(0008,1155)	>Referenced SOP Instance UID
Body Part Examined	(0018,0015)	From Patient Registration screen. May be edited by the user.
Requested Attributes Sequence	(0040,0275)	Sent if the tag is received from the MWM server. This information is present only if the MWM service is enabled.
> Requested Attributes ID	(0040,1001)	Sent if the tag is received from the MWM server. This information is present only if the MWM service is enabled.
>Scheduled Procedure Step ID	(0040,0009)	Sent if the tag is received from the MWM server. This information is present only if the MWM service is enabled.
>Scheduled Procedure Step Description	(0040,0007)	Sent if the tag is received from the MWM server. This information is present only if the MWM service is enabled.
>Scheduled Action Item Code Sequence	(0040,0008)	Sent if the tag is received from the MWM server. This information is present only if the MWM service is enabled.

>>Code Value	(0008,0100)	Sent if the tag is received from the MWM server. This information is present only if the MWM service is enabled.
>>Coding Scheme Designator	(0008,0102)	Sent if the tag is received from the MWM server. This information is present only if the MWM service is enabled.
>>Coding Scheme Version	(0008,0103)	Sent if the tag is received from the MWM server. This information is present only if the MWM service is enabled.
>>Coding Meaning	(0008,0104)	Sent if the tag is received from the MWM server. This information is present only if the MWM service is enabled.
Performed Procedure Step ID	(0040,0253)	SmartRAD internal study name. Selected by the user.
Performed Procedure Step Start Date	(0040,0244)	
Performed Procedure Step Start Time	(0040,0245)	
Performed Procedure Step Description	(0040,0254)	From Patient Registration screen. May be edited by the user.
Performed Action Item Code Sequence	(0040,0260)	Always NULL.
DX Series Module		
Modality	(0008,0060)	DX
Presentation Intent Type	(0008,0068)	FOR PRESENTATION or FOR PROCESSING
General Equipment Module		
Manufacturer	(0008,0070)	CMT
Institution Name	(0008,0080)	Hospital Name (for each image)
Station Name	(0008,1010)	From Configuration Utility (name + location).
Manufacturer's Model Name	(0008,1090)	SmartRAD.
Software Version	(0018,1020)	1.1
General Image Module		
Instance Number	(0020,0013)	Internally generated by the SmartRAD.
Patient Orientation	(0020,0020)	Always NULL.
Acquisition Date	(0008,0022)	
Image Date	(0008,0023)	
Acquisition Time	(0008,0032)	
Image Time	(0008,0033)	

Image Type	(0008,0008)	ORIGINAL/DERIVED. PRIMARY/SECONDARY. SINGLE PLANE.
Derivation Description	(0008,2111)	Sent only if (0008,0008) is DERIVED.
Image Comments	(0020,4000)	
Burned in Annotation	(0028,0301)	YES or NOT, depending on whether the relevant option was selected via the SmartRAD's DICOM setup menu.
Lossy Image Compression	(0028,2110)	Set to 00.

Image Pixel Module

Samples Per Pixels	(0028,0002)	Set to 1.
Photometric Interpretation	(0028,0004)	Set to Monochrome 2.
Rows	(0028,0010)	3072/1536/1024
Columns	(0028,0011)	3072/1536/1024
Bits Allocated	(0028,0100)	16.
Bits Stored	(0028,0101)	14.
High Bit	(0028,0102)	13.
Pixel Representation	(0028,0103)	Set to 0000H.
Pixel Data	(7FE0,0010)	

DX Anatomy Imaged Module

Image Laterality	(0020,0062)	Defined Values: R, L, U, B.
Anatomic Region Sequence	(0008,2218)	Always NULL.

DX Image Module

Image Type	(0008,0008)	ORIGINAL/DERIVED. PRIMARY/SECONDARY. SINGLE PLANE.
Samples Per Pixels	(0028,0002)	Set to 1.
Photometric Interpretation	(0028,0004)	Set to Monochrome 2.
Bits Allocated	(0028,0100)	16.
Bits Stored	(0028,0101)	14.
High Bit	(0028,0102)	13.
Pixel Representation	(0028,0103)	Set to 0000H.
Pixel Intensity Relationship	(0028,1040)	LIN.

Pixel Intensity Relationship Sign	(0028,1041)	Set to 1 for positive images and -1 for negative images.
Rescale Intercept	(0028, 1052)	Set to 0.
Rescale Slope	(0028, 1053)	Set to 1.
Rescale Type	(0028, 1054)	Set to US.
Presentation LUT shape	(2050,0020)	Set to IDENTITY
Lossy Image Compression	(0028,2110)	Set to 00.
Derivation Description	(0008,2111)	Sent only if (0008,0008) is DERIVED.
Patient Orientation	(0020,0020)	Two values defining the anatomical direction of the positive row and column axes. Applied values: A, P, H, F, L and R.
Burned in Annotation	(0028,0301)	YES or NOT, depending on whether the relevant option was selected via the SmartRAD's DICOM setup menu.
Window Center	(0028,1050)	
Window Width	(0028,1051)	
Display Shutter Module ⁽¹⁾		
Shutter Shape	(0018,1600)	Always RECTANGULAR
Left Vertical Edge	(0018,1602)	
Right Vertical Edge	(0018,1604)	
Upper Horizontal Edge	(0018,1606)	
Lower Horizontal Edge	(0018,1608)	
Presentation Value	(0018,1622)	Always 0000H
DX Detector Module		
Detector Type	(0018,7004)	SCINTILLATOR.
Detector Configuration	(0018,7005)	AREA.
Detector Description	(0018,7006)	Thales Pixium 4600.
Field of View Shape	(0018,1147)	RECTANGLE.
Field of View Dimension(s)	(0018,1149)	439 / 439
Field of View Origin	(0018,7030)	0 / 0
Field of View Rotation	(0018,7032)	From DB (0,90,180,270)
Field of View Horizontal Flip	(0018,7034)	YES, NO.
Imager Pixel Spacing	(0018,1164)	0.143 / 0.143
Detector Element Physical Size	(0018,7020)	0.143 / 0.143
Detector Element Spacing	(0018,7022)	0.143 / 0.143

Spacing		
Detector Active Shape	(0018,7024)	RECTANGLE.
Detector Active Dimension(s)	(0018,7026)	439.296 / 439.296
VOI LUT Module		
Window Center	(0028,1050)	
Window Width	(0028,1051)	
Acquisition Context Module		
Acquisition Context Sequence	(0040,0555)	Always NULL.
SOP Common Module		
SOP Class UID	(0008,0016)	1.2.840.10008.5.1.4.1.1.1.1 or 1.2.840.10008.5.1.4.1.1.1.1.1
SOP Instance UID	(0008,0018)	Internally generated by SmartRAD
Specific Character Set	(0008,0005)	- / "ISO_IR 100" / NULL + "ISO 2022 IR 87

⁽¹⁾ Used only if a shutter shape is defined when the image is created

3.1.4.7 Secondary Capture IOD Information Object Definition

The following table denotes the attributes included in the SC Image Object as implemented on the SmartRAD system. Attributes **not** listed are **not** used.

Table VIII: SC IOD Attributes

Attribute Name	Tag	Notes
Patient Module		
Patient Name	(0010,0010)	From Patient Registration screen. Value is set to NULL if no patient name is specified.
Patient ID	(0010,0020)	From Patient Registration screen. This field should always be specified.
Patient Birth Date	(0010,0030)	From Patient Registration screen. Value is set to NULL if no birth date is specified.
Patient Sex	(0010,0040)	From Patient Registration screen. Value is set to NULL if no patient sex is specified.
Other Patient IDs	(0010,1000)	From MWM
Referenced Patient Sequence	(0008,1120)	This information is present only if retrieved from the MWM server.
>Referenced SOP Class UID	(0008,1150)	
>Referenced Instance UID	(0008,1155)	
Ethnic Group	(0010,2160)	From MWM
Patient Comments	(0010, 4000)	As in Patient Remarks.
General Study Module		
Study Instance UID	(0020,000D)	From MWM server or internally generated.
Study Date	(0008,0020)	Date the study number is generated.
Study Time	(0008,0030)	Time the study number is generated..
Referring Physician's Name	(0008,0090)	From Patient Registration screen. May be edited by the user.
Study ID	(0020,0010)	Internally generated by the SmartRAD.
Accession Number	(0008,0050)	From MWM server or internally generated. This information is present only if the MWM service is enabled.
Study Description	(0008,1030)	SmartRAD internal study name. Selected by the user.
Physician(s) of Record	(0008,1048)	From MWM
Referenced Study Sequence	(0008,1110)	Sent if the tag is received from the MWM server.
>Referenced SOP Class UID	(0008,1150)	

>Referenced SOP Instance UID	(0008,1155)	
Patient Study Module		
Patients Age	(0010,1010)	From Patient Registration screen.
Additional Patients History	(0010,21B0)	From MWM
General Series Module		
Modality	(0008,0060)	OT or DX
Series Instance UID	(0020,000E)	Internally generated by the SmartRAD.
Series Number	(0020,0011)	Internally generated by the SmartRAD.
Series Date	(0008,0021)	
Series Time	(0008,0031)	
Performing Physician's Name	(0008,1050)	From Patient Registration screen. May be edited by the user.
Protocol Name	(0018,1030)	SmartRAD study name. Selected by the user.
Series Description	(0008,103E)	Series label. May be edited by the user.
Referenced Study Component Sequence	(0008,1111)	Always NULL.
Body Part Examined	(0018,0015)	From Patient Registration screen. May be edited by the user. Value is set to NULL if no body part is specified.
Requested Attributes Sequence	(0040,0275)	Sent if the tag is received from the MWM server. This information is present only if the MWM service is enabled.
> Requested Attributes ID	(0040,1001)	Sent if the tag is received from the MWM server. This information is present only if the MWM service is enabled.
>Scheduled Procedure Step ID	(0040,0009)	Sent if the tag is received from the MWM server. This information is present only if the MWM service is enabled.
>Scheduled Procedure Step Description	(0040,0007)	Sent if the tag is received from the MWM server. This information is present only if the MWM service is enabled.
>Scheduled Action Item Code Sequence	(0040,0008)	Sent if the tag is received from the MWM server. This information is present only if the MWM service is enabled.
>>Code Value	(0008,0100)	Sent if the tag is received from the MWM server. This information is present only if the MWM service is enabled.
>>Coding Scheme Designator	(0008,0102)	Sent if the tag is received from the MWM server. This information is present only if the MWM service is enabled.

>>Coding Scheme Version	(0008,0103)	Sent if the tag is received from the MWM server. This information is present only if the MWM service is enabled.
>>Coding Meaning	(0008,0104)	Sent if the tag is received from the MWM server. This information is present only if the MWM service is enabled.
Performed Procedure Step ID	(0040,0253)	SmartRAD internal study name. Selected by the user.
Performed Procedure Step Start Date	(0040,0244)	
Performed Procedure Step Start Time	(0040,0245)	
Performed Procedure Step Description	(0040,0254)	From Patient Registration screen. May be edited by the user.
Performed Action Item Code Sequence	(0040,0260)	Always NULL.
General Equipment Module		
Manufacturer	(0008,0070)	CMT
Institution Name	(0008,0080)	Hospital Name (for each image)
Station Name	(0008,1010)	From Configuration Utility (name + location).
Manufacturer's Model Name	(0008,1090)	Name displayed on the system's welcome screen.
Device Serial Number	(0018,1000)	Sent for SmartRAD systems.
Software Version	(0018,1020)	The Software version
Conversion Type	(0008,0064)	Set to DI
General Image Module		
Instance Number	(0020,0013)	Internally generated from SmartRAD.
Patient Orientation	(0020,0020)	Always NULL.
Acquisition Date	(0008,0022)	
Image Date	(0008,0023)	
Acquisition Time	(0008,0032)	
Image Time	(0008,0033)	
Image Type	(0008,0008)	Always DERIVED, SECONDARY and SINGLE PLANE
Image Comments	(0020,4000)	
Burned in Annotation	(0028,0301)	YES or NOT, depending on whether the relevant option was selected via the SmartRAD's DICOM setup menu.
Lossy Image Compression	(0028,2110)	Set to 00.

Image Pixel Module		
Samples Per Pixels	(0028,0002)	Set to 1.
Photometric Interpretation	(0028,0004)	Set to Monochrome 2.
Rows	(0028,0010)	3072/1536/1024
Columns	(0028,0011)	3072/1536/1024
Bits Allocated	(0028,0100)	16.
Bits Stored	(0028,0101)	14.
High Bit	(0028,0102)	13.
Pixel Representation	(0028,0103)	Set to 0000H.
Pixel Data	(7FE0, 0010)	
SC Ray Image Module		
Date of Secondary Capture	(0018,1012)	
Time of Secondary Capture	(0018,1014)	
VOI LUT Module		
Window Center	(0028,1050)	
Window Width	(0028,1051)	
SOP Common Module		
SOP Class UID	(0008,0016)	1.2.840.10008.5.1.4.1.1.7
SOP Instance UID	(0008,0018)	Internally generated by SmartRAD
Specific Character Set	(0008,0005)	- / "ISO_IR 100" / NULL + "ISO 2022 IR 87

3.1.5 Real-World Activity – Print (SCU)

The SmartRAD can be configured to **automatically** send the images to a DICOM-compliant printer immediately after the operator accepts them. After the image is transferred, the association is closed.

The SmartRAD user can **manually** send selected images at any time. An association is opened and all selected images are transferred. After all images are transferred, the association is closed.

3.1.5.1 Associated Real-World Activities

An association is established when the user initiates a “Print” operation from either the “Film Previewer” or the “Extended FOV” applications.

Individual images or entire examinations can be transferred to the DICOM - compliant device. The association is opened when the first selected image is transferred and closed when the last image transfer is completed. In case an error occurs during the printing process, the operator can manually attempt to resend the film at a later stage.

3.1.5.2 Proposed Presentation Context

SmartRAD will use the Presentation Context shown in the following table:

Table IX: Print Presentation Context Table

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Basic Grayscale Print Management Meta SOP Class	1.2.840.	DICOM	1.2.840.	SCU	None
	10008.5.1.1.9	Implicit VR	10008.1.2		
		Little Endian			

3.1.5.3 SOP Specific Conformance to Basic Grayscale Print Management Meta SOP Class

The Print AE provides standard conformance of the Grayscale Meta SOP class as an SCU. Specifically, with respect to the Basic Grayscale Print Management Meta SOP Class, this means conformance to the underlying SOP classes:

Table X: Supported SOP Classes

SOP Class Name	SOP Class UID	Conformance Level
Basic Film Session SOP Class	1.2.840.100008.5.1.1.1	Standard
Basic Film Box SOP Class	1.2.840.100008.5.1.1.2	Standard
Basic Grayscale Image Box SOP Class	1.2.840.100008.5.1.1.4	Standard
Printer SOP Class	1.2.840.100008.5.1.1.16	Standard

The SmartRAD provides standard conformance to the DICOM V3.0 Verification Service Class as an SCU for the Verification Class, UID = 1.2.840.10008.1.1.

3.1.5.4 Specific Conformance – Print

The SmartRAD AE operation involves the following sequence of steps for each film print:

1. N – GET (Printer SOP Instance)
2. N – CREATE (Film Session SOP Instance)
 - The command is sent only once.
 - A response without any data but with the status SUCCESS is expected.
3. N – CREATE (Film Box SOP Instance)
 - The command is sent only once.
 - A response with status SUCCESS is expected from the SCP containing the following items:
 - a. (2110,0510) Referenced Image Box Sequence
 - b. >(0008,1150) SOP Class UID (Ignored by SCU)
 - c. >(0008,1155) SOP Instance UID
 - The received SOP Instance UIDs are stored in an array and later used when sending individual images.
4. N – SET (Grayscale Image Box SOP Instance)
 - The command is sent once for each image on the film.
 - A response without any data but with the status SUCCEES is expected.
5. N – ACTION (Film Box SOP Instance)
 - The command is transmitted to the SCP without any data but indicating that the PRINT operation is to be performed. The command is sent only once.
 - A response without any data but with status SUCCESS is expected.
6. N-DELETE
 - Deletes the Film Session. Issued after the session is completed.

3.1.5.5 AE Title/Presentation Address Mapping

This mapping is defined during the SmartRAD installation procedure.

Both the local and remote names can be arbitrary defined. Local AE Titles for the different services should be different.

3.1.5.6 Specific Conformance to Basic Film Session SOP Class

Table XI: Supported Basic Film Session SOP Class Elements

Attribute Name	Tag	Usage ¹	Range	Description
Number of Copies	(2000,0010)	U	1-99	Number of requested film copies
Print Priority	(2000,0020)	C	HIGH, MED, LOW	Set at configuration.

Medium Type	(2000,0030)	U	CLEAR FILM BLUE FILM PAPER	Media used for hardcopy.
Film Destination	(2000,0040)	U	MAGAZINE PROCESSOR	
Film Session Label	(2000,0050)	A	Always sent as NULL	

¹ A: Attribute always sent with value not editable.

C: Attribute sent with value set in the configuration screen.

U: Attribute sent with value set by user.

3.1.5.7 Specific Conformance to Basic Film Box SOP Class

Table XII: Optional Attributes set for the Basic Film Box SOP Class

Attribute Name	Tag	Usage ¹	Range	Description
Image Display Format	(2010,0010)	U	1	
Referenced Film Session Sequence	(2010,0500)	A		
>Referenced SOP Class UID	(0008,1150)	A		
>Referenced SOP Instance UID	(0008,1155)	A		
Film Orientation	(2010,0040)	U	LANDSCAPE PORTRAIT	
Film Size ID	(2010,0050)	U	8INX10IN 8.5INX11IN 10INX12IN 10INX14IN 11INX14IN 11INX17IN 14INX14IN 14INX17IN 24CMX24CM 24CMX30CM	
Magnification Type	(2010,0060)	U	REPLICATE BILINEAR CUBIC NONE	
Max Density	(2010,0130)	U	1.5 – 3.2	Printer Specific
Smoothing Type	(2010,0080)	U	Value set at installation.	Printer Specific. Sent only in CUBIC magnification.

Border Density	(2010,0100)	U	BLACK WHITE i	Where i represents the desired image density in tenths of OD.
Empty Image Density	(2010,0110)	U	BLACK WHITE i	Where i represents the desired image density in tenths of OD
Min Density	(2010,0120)	U	0-1	Printer specific
Trim	(2010,0140)	U	YES NO	
Configuration Information	(2010,0150)	U	Value set at installation.	Printer Specific

¹ A: Attribute always sent with value not editable.

C: Attribute sent with value set in the configuration screen.

U: Attribute sent with value set by user.

3.1.5.8 Specific Conformance to Basic Grayscale Image SOP Class

Table XIII: Optional Attributes set for the Basic Grayscale Image Box SOP Class

Attribute Name	Tag	Usage ¹	Range	Description
Image Position	(2020,0010)	A	1 – N	Depends on the Image Display format chosen.
Basic Grayscale Image Sequence	(2020,0110)	A		
>Samples Per Pixel	(0028,0002)	A	Set to 1	
>Photometric Interpretation	(0028,0004)	A	Monochrome 2	
>Rows	(0028,0010)	A	Set to 1024, 2048 or 4096	2048 and 4096 resolutions are used for E-FOV images
>Columns	(0028,0011)	C	1024-1280 2048-2560	Selectable via SmartRAD internal software keys.
>Pixel Aspect Ratio	(0028,0034)	A	Set to 1\1	
>Bits Allocated	(0028,0100)	A	Set to 8	
>Bits Stored	(0028,0101)	A	Set to 8	
>High Bit	(0028,0102)	A	Set to 7	
>Pixel Representation	(0028,0103)	A	Set to 0000H	
>Pixel Data	(7FE0,0010)	A		
Polarity	(2020,0020)	A	Set to NORMAL	

Magnification Type	(2010,0060)	U	REPLICATE BILINEAR CUBIC NONE	
Smoothing Type	(2010,0080)	U	Value set at installation.	Printer Specific. Same value as in FILM BOX.
Configuration Information	(2010,0150)	U	Value set at installation.	Printer Specific. Same value as in FILM BOX.

¹ A: Attribute always sent with value not editable.

C: Attribute sent with value set in the configuration screen.

U: Attribute sent with value set by user.

Table XIV: Supported SOP Class Elements

Attribute Name	Tag	Description
Printer Status	(2110,0010)	The behavior depends on the returned value: NORMAL: Association goes on. WARNING: Association goes on. FAILURE: Association is aborted.
Printer Status Info	(2110,0020)	Printer shall return error message. Error is displayed on the SmartRAD's Printer Queue.
Printer Name	(2110,0030)	Printer shall return value.
Manufacturer	(0008,0070)	Printer shall return value.
Manufacturer Model Name	(0008,1090)	Printer shall return value.
Device Serial Number	(0018,1000)	Printer shall return value.
Software Versions	(0018,1020)	Printer shall return value.
Date of Last Calibration	(0018,1200)	Printer shall return value.
Time of Last Calibration	(0018,1201)	Printer shall return value

3.1.6 Real-World Activity – MWM (SCU)

The user requests a patient’s list from the “Query IS” in the “Patient Registration Screen”. When the operator retrieves the patient information list, the SmartRAD establishes an association with the remote DICOM device.

3.1.6.1 Associated Real-World Activities

An association is established when the user initiates a “Query IS” operation from the SmartRAD “Patient Registration” screen.

Individual Patients or a group of patients can be registered from the Modality Worklist Management server. The association is opened when the user requests the patient information list and completed when all requested information is transferred.

3.1.6.2 Proposed Presentation Context

The SmartRAD will use the Presentation Context shown in the following table:

Table XV: Worklist Presentation Context Table

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Modality Worklist Information Model -FIND	1.2.840.10008.5.1.4.31	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Modality Worklist Information Model -FIND	1.2.840.10008.5.1.4.31	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

3.1.6.3 Specific Conformance – MWM

The SmartRAD AE operation involves the following sequence of steps for each patient list transfer:

1. Association establishment (requestor only)
2. Data transfer
3. Association release

The SmartRAD AE judges that the query was successful when the result of step (2) above is “success”.

3.1.6.4 AE Title/Presentation Address Mapping

This mapping is defined during the SmartRAD installation procedure.

Both the local and remote names can be arbitrary defined. Local AE Titles for the different services should be different.

3.1.6.5 Specific Conformance to Modality Worklist Service SOP Class

The Worklist AE provides conformance to the following DICOM Service SOP Classes as an SCU all at a standard extended level of conformance.

Table XVI: Supported SOP Classes

SOP Class Name	SOP Class UID	Conformance Level
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Standard Extended

3.1.6.6 Modality Worklist Find SOP Class Information Object Definition

The following table provides the list of attributes requested in the Modality Worklist Query.

Request of most of the listed attributes depends on an internal software key that may be configured by the Installation/Service Engineer.

Table XVII: Modality Worklist Information Model Attributes

Attribute Name	Tag	Notes
SOP Common Module		
Specific Character Set	(0008,0005)	<ul style="list-style-type: none"> • ISO-IR 100 character set (Latin Alphabet) • ISO-IR 87 JIS X 0208 (Kanji, Hiragana) .
Scheduled Procedure Step Module		
Scheduled Procedure Step Sequence	(0040,0100)	
>Scheduled Station AE Title	(0040,0001)	
>Scheduled Procedure Start Date	(0040,0002)	See Note 2.
>Scheduled Procedure Start Time	(0040,0003)	
>Modality	(0008,0060)	CR or DX.
>Scheduled Performing Physician's Name	(0040,0006)	Used as Study Physician in the Patient Registration Screen.
>Scheduled Procedure Step Description	(0040,0007)	This attribute or (0032,1060) is used as Requested Procedure in the Patient Registration Screen.
>Scheduled Station Name	(0040,0010)	See Note 2
>Scheduled Procedure Step Location	(0040,0011)	
>Scheduled Action Item Code Sequence	(0040,0008)	
>>Code Value	(0008,0100)	
>>Coding Scheme Designator	(0008,0102)	
>>Coding Scheme Version	(0008,0103)	
>>Coding Meaning	(0008,0104)	
>Pre-Medication	(0040,0012)	
>Scheduled Procedure Step ID	(0040,0009)	
>Requested Contrast Agent	(0032,1070)	

Requested Procedure Module		
Requested Procedure ID	(0040,1001)	
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)	
>Coding Meaning	(0008,0104)	
Study Instance UID	(0020,000D)	
Referenced Study Sequence	(0008,1110)	
>Referenced SOP Class UID	(0008,1150)	
>Referenced SOP Instance UID	(0008,1155)	
Requested Procedure Comments	(0040,1400)	
Names of Intended Recipients of Results	(0040,1010)	
Requesting Service	(0032,1033)	

Imaging Service Request Module

Accession Number	(0008,0050)	See Note 2.
Requesting Physician	(0032,1032)	This attribute or (0008,0090) is used as Referring Physician in the Patient Registration Screen.
Referring Physician's Name	(0008,0090)	
Imaging Service Request Comments	(0040,2400)	
Referred Patient Sequence	(0008,1120)	
>Referenced SOP Class UID	(0008,1150)	
>Referenced SOP Instance UID	(0008,1155)	

Patient Identification Module

Patient's Name	(0010,0010)	See Note 2.
Patient ID	(0010,0020)	A response with data is expected from the MWM server. See Note 2.
Other Patient IDs	(0010,1000)	

Visit Identification Module

Current Patient Location	(0038,0300)	
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Patient Demographic Module

Patient Birth Date	(0010,0030)	
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Patient Sex	(0010,0040)	
Ethnic Group	(0010,2160)	
Patient Comment	(0010,4000)	
Patient Medical Module		
Pregnancy Status	(0010,21C0)	
Medical Alerts	(0010,2000)	
Additional Patient History	(0010,21B0)	

² Used as Query Criteria.

4. Communication Profiles

4.1 TCP/IP Stack

Each process inherits its TCP/IP stack from the operating system TCP/IP stack of the SmartRAD system.

4.2 Physical Media Support

Standard representations of IEEE 802.3 (10BASE2 (“thinwire”), Fiber Optic (both SMA and ST style connectors) and 10BaseT (“twisted pair”)) are supported and the system interfaces and transceivers configured to meet customer site-specific requirements.

5. Configuration

The SmartRAD Networking and DICOM parameters can be configured through the system’s DICOM Configuration screen (available to the Service Engineer only) and the set-up menus (available to both, the Service Engineer and the User). The following configuration is supported:

- Basic System Configuration
- Network
- DICOM Store.
- DICOM Print.
- DICOM Worklist.
- DICOM Modality Performed Procedure Set
- Study types.

5.1 Basic System Configuration

The following system parameters can be configured via the SmartRAD System DICOM configuration screen or the set-up menu:

- Hospital Name
- Local Station Name
- Local Station Location

5.1.1 Hospital Name

The user can enter the Hospital Name as a text string in the relevant field in the Acquisition set-up menu. The Hospital Name is transferred to DICOM devices as Institution name, DICOM data element (0008,0080).

5.1.2 Local Station Name

The Service Engineer can enter the name of the station where the examination is going to be performed in the DICOM Configuration screen. The station name will be transferred to DICOM devices as Station Name, DICOM data element (0040,0010).

5.1.3 Local Station Location

The Service Engineer can enter the name of the location where the examination is going to be performed in the DICOM Configuration screen. The station name will be transferred to DICOM devices as Station Location, DICOM data element (0040,0011).

5.2 DICOM Network Configuration

The SmartRAD network parameters are configurable. The following network parameters can be configured for the SmartRAD system:

- Host Name
- IP address
- DICOM Application Entity (for each service)
- Network time-out (for each service)

5.3 DICOM Store Configuration

Remote DICOM Storage service class providers (up to 10) are provided through the DICOM-Store page of the DICOM Configuration menu (available to the Service Engineer only).

The following parameters can be configured:

- Number of Remote Servers.
- Local AE.
- Communication time out.
- Remote Station displayed name.
- Remote AE.
- Host Address.
- Port Number.

Images may be **automatically** transferred to any of the configured remote stations either by the appropriate setup time-out or upon registration of a new patient.

Selection of manual or automatic transfer of images to the remote station is user-selectable.

5.4 DICOM Print Configuration

Remote DICOM –compliant printers (up to 10) are provided through the DICOM-Print page of the DICOM Configuration menu (available to the Service Engineer only).

The following parameters can be configured:

- Number of Printers.
- Local AE.
- Communication time out.

- Printer name.
- Remote AE.
- Host Address.
- Port Number.
- Pixel Resolution.

The following data is configurable by the user via the DICOM Print setup menu. The user can change each field at any time during the operation of the SmartRAD system. The effect of changing the parameters of the DICOM Print sever will be seen on the next film sheet.

The user-configurable parameters are described in Table XI of this Conformance Statement.

5.5 DICOM Worklist Configuration

A remote DICOM Worklist Service Class Providers can be configured through the DICOM-Worklist page of the DICOM Configuration menu (available to the Service Engineer only).

The following parameters can be configured:

- Station AE.
- Station Location
- Remote AE.
- Remote Host Address.
- Remote Port.
- Communication time out.

Note: Additional stations can be added and assigned a Station Name, AE & Location via the DICOM-Worklist page of the DICOM Configuration menu.

5.6 Study Types Configuration

User-configurable protocols are supported through the SmartRAD's preset examinations screen. These user-defined protocols are available for selection in the Patient Registration screen. Protocols are mapped to the DICOM Protocol Name (0018,1030) and Performed Procedure Step ID (0040,0253).