DAR-8000 Series
DICOM Conformance Statement

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[NO TEXT]

0.0 Revision History:

Revision	Date	Description
First Edition	2005/08/03	New Release
A	2005/11/09	Added Worklist
B	2006/03/02	Modified for Ver.02.00.00
C	2006/06/22	Modified for Ver.03.00.00 Added XRF Positioner, and XA Positioner Module
D	2006/10/06	Modified for Ver.03.01.00 Added MPPS SCU, and MPPS Attributes
E	2008/06/10	Modified for Ver.03.60.00
F	2009/07/03	Added “Note” to “ANNEX - C Worklist AE Attributes”.
G	2016/04/13	Deleted “Image Area Dose Product” attribute from X-Ray Acquisition Module.

1.0 Purpose:

Define the DICOM Conformance statement associated with DAR-8000 systems.

2.0 Scope:

This document describes the DICOM Conformance statement in accordance with the document DICOM PS 3.2 Conformance.

3.0 References:

DICOM PS 3.2 Conformance
DICOM PS 3.3 Information Object Definitions
DICOM PS 3.4 Service Class Specifications
DICOM PS 3.5 Data Structures and Encoding
DICOM PS 3.6 Data Dictionary
DICOM PS 3.7 Message Exchange
DICOM PS 3.8 Network Communication Support for Message Exchange
DICOM PS 3.10 Media Storage and File Format for Media Interchange
DICOM PS 3.11 Media Storage Application Profiles
DICOM PS 3.12 Media Formats and Physical Media for Media Interchange

4.0 Equipment/Materials:

N/A

5.0 Responsibilities:

N/A

6.0 Definitions:

AE – Application Entity
FSC – File Set Creator
FSR – File Set Reader
FSU – File Set Updater
IOD – Information Object Definition
SCU – Service Class User
SCP – Service Class Provider
SOP – Service Object Pair
UID – Unique Identifier

7.0 Instructions:

The rest of this document is written in the format specified for DICOM Conformance statements in the DICOM PS 3.2 Conformance standard document.

8.0 Introduction

This conformance statement details the DAR-8000 system's compliance to DICOM 3.0. It covers all service class roles that are supported by this product:
Storage Service Class (SCU) roles
Verification Service Class (SCU) roles
Basic Grayscale Print Management Class (SCU) roles
Modality Worklist Management Service Class (SCU) roles
Modality Performed Procedure Step Service Class (SCU) roles
Media Storage for Data Interchange Service Class (FSC, FSU & FSR) roles

8.1 Implementation Model

DICOM capabilities of the DAR-8000 system include:
The DAR-8000 system can send images to a remote AE by initiating the DICOM C-STORE request as a SCU.
The DAR-8000 system supports the DICOM Verification operation as a SCU.
The DAR-8000 system can send images to a DICOM Print Server AE by utilizing the services of the Basic Grayscale Print Management Meta SOP Class as a SCU.
The DAR-8000 system can query DICOM Modality Worklist SCP systems for patient/study information using the Modality Worklist Management Service Class.
The DAR-8000 system can report back Performed Procedure information to a Modality Worklist SCP using the Modality Performed Procedure Step service.
The DAR-8000 system can store images for interchange using the STD-XA1K-CD Application Profile Class and the General Purpose CD-R Image Interchange Profile Class.

8.1.1 Application Data Flow Diagrams

See figures 8.1.1-1, 8.1.1-2, 8.1.1-3, and 8.1.1-4.

Figure 8.1.1-1 Storage SCU

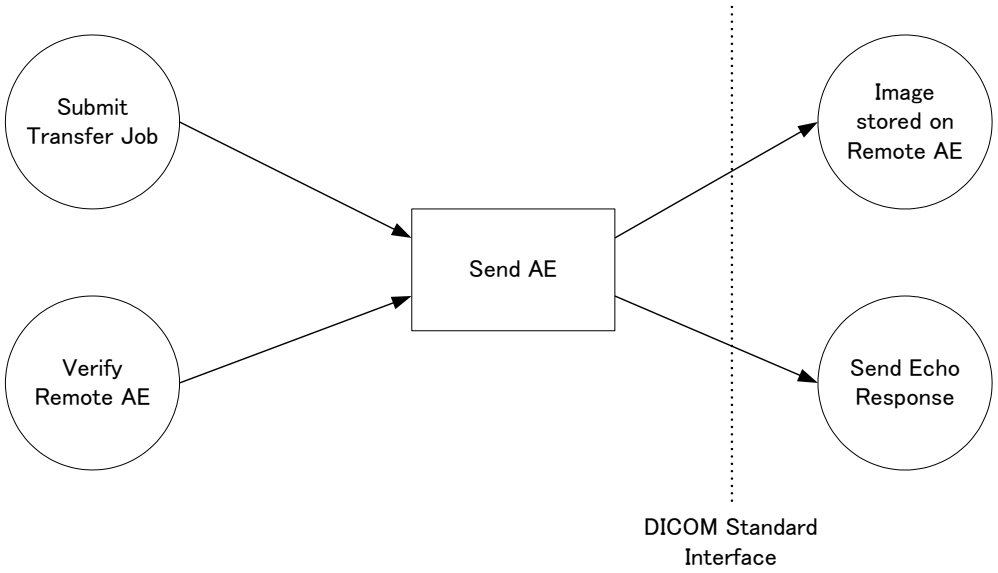


Figure 8.1.1-2 Print SCU

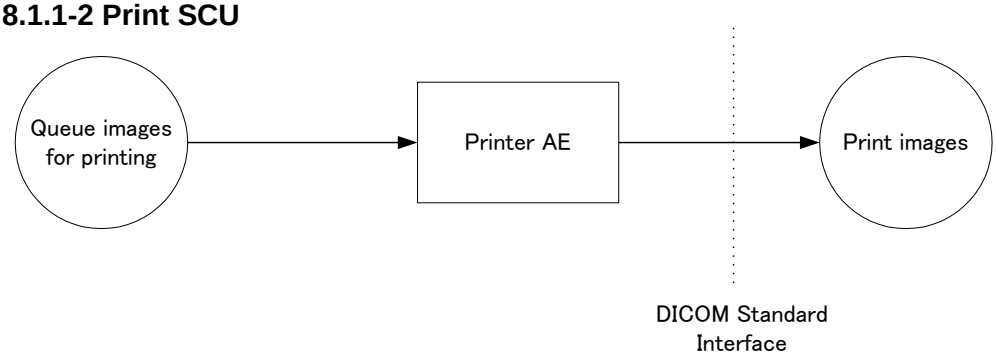


Figure 8.1.1-3 Worklist and MPPS SCU

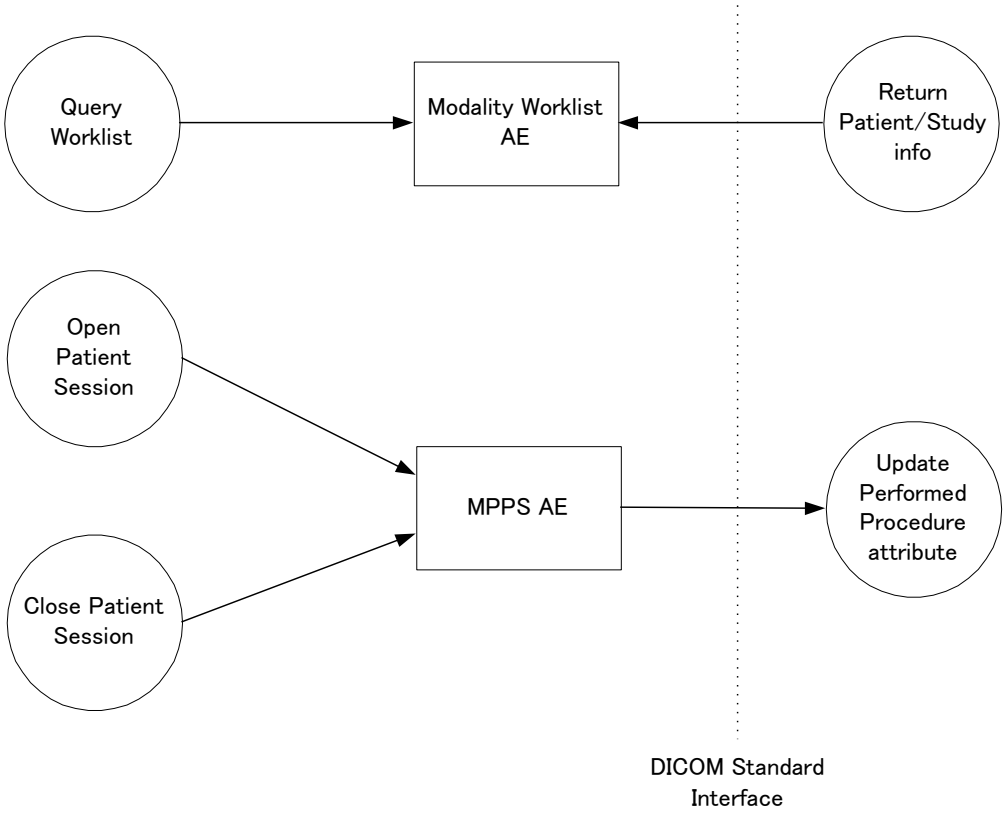
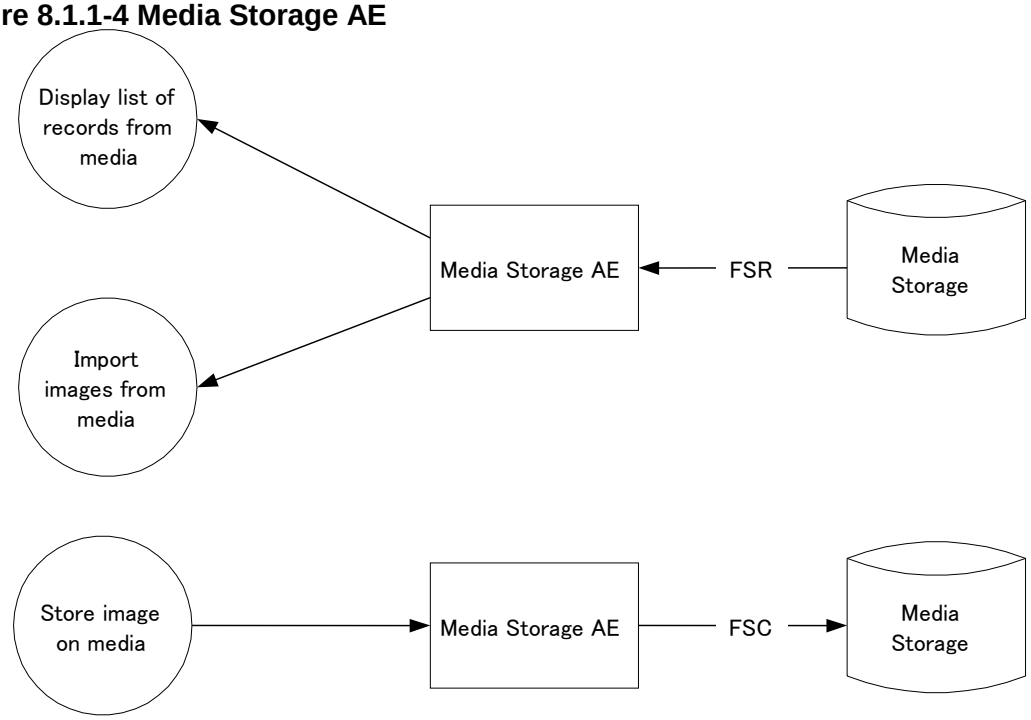


Figure 8.1.1-4 Media Storage AE



The Media Storage AE can initialize CD-R/DVD-R media by acting as an FSC to create a new DICOM File-set on 120mm CD-R/DVD-R media. It creates the DICOM File-set and writes the specified images using the STD-XA1K-CD Application Profile or the General Purpose CD Application Profile onto the CD-R/DVD-R.
The Media Storage AE can read images from a CD-R/DVD-R by acting as an FSR of the DICOM Media Storage for Data Interchange service. The Media Storage AE reads the DICOM File-set and displays the directory listing and allows the user to select a DICOM file to be read and stored in the local database. The Media Storage AE can read the STD-XA1K-CD Application Profile and the General Purpose CD Application Profile file-sets.
The Media Storage AE can update images from a STD-XA1K-CD or General Purpose CD by acting as an FSU of the DICOM Media Storage for Data Interchange service. When updating a CD-R/DVD-R, the Media Storage AE reads the existing DICOMDIR from the CD-R/DVD-R media in the tray, appends and modifies the DICOMDIR as necessary, and updates the fileset on the CD-R/DVD-R media by overwriting the existing DICOMDIR and adding new image files accordingly. Existing records in the DICOMDIR, and the image files to which they refer, are maintained. The media must have sufficient capacity for the intended transfer, and the media may not be closed to further session writing. The user may elect to “close” the media after writing (disallow further update operations).

8.1.2 Functional definition of AEs

Send AE:

The Send AE initiates an association with a remote AE and acts as a SCU of the Storage Service Class to store images on a remote AE that acts as a SCP of the Storage Service Class.
When the image transfer is completed, the send function waits for the DIMSE-C-STORE Response from the receiving AE to indicate the status of the transfer (success or fail).
When the Send AE system initiates the DICOM Echo Request, it first proposes an Association with the Verification Class Presentation Context. When the DICOM Association Accept message is received, the system sends the DIMSE-C-ECHO Request message to initiate the Verification function on the receiving AE. The status of the Verification response (success or fail) is displayed.

Print AE:

The Print AE initiates an Association with a user selected remote Print AE and acts as a SCU of the Basic Grayscale Print Management Service Class. When all of the images for a particular Film Session have been transferred, the Association is closed.
If the remote printer SCP supports the Print Job service then the Print AE can monitor the status of the Print Job on the remote printer SCP.

Modality Worklist AE:

The Modality Worklist AE initiates an Association with a user selected remote Worklist AE and acts as a SCU of the Modality Worklist Management Service Class. The Modality Worklist AE sends a C-FIND request based on parameters set by the user. The user can configure the Modality Worklist AE to query for any/all modalities supported by the local system. The user can configure the Worklist to query for exams scheduled for any AE configured in the system as a Worklist SCU. One request is sent for each modality/AE title pair configured by the user.

Modality Performed Procedure Step AE:

The Modality Performed Procedure Step AE acts as a SCU of the Modality Performed Procedure Step Service Class and initiates an Association with remote Modality Performed Procedure Step SCP. The MPPS SCU informs the MPPS SCP to create an instance of MPPS SOP class when a study begins. When the study is closed, the MPPS SCU set attributes of the created MPPS SOP instance.

Media Storage AE:

The Media Storage AE can perform the following functions:

1. It can initialize a piece of media, writing a new DICOM File-set onto the media.
2. It can display a directory listing of the File-set on a piece of media.
3. It can copy SOP instances from the media onto local storage.
4. It can update existing filesets as capacity and session status allow.

8.1.3 Sequencing of Real World Activities

8.1.3.1 Storage Operations

The following describes the sequence of events that occurs when performing a storage operation with a network storage server AE:

1. The user queues up a send job from the GUI.
2. The Send AE sends a DICOM Association Request to the storage server AE.
3. If the DICOM Association request fails then the send job is aborted.
4. If the DICOM Association request is successful then the Send AE sends a C-STORE Request message to the storage server and waits for the C-STORE response.
   a. SUCCESS – Continue with send operation.
   b. WARNING – Continue with send operation.
   c. FAILURE (0110, A700, A900, C000, C002) – The send job is aborted. The Send AE sends a DICOM Association Abort Request message to the storage server AE.
5. When the send job is completed the Send AE sends a DICOM Association Release Request to the storage server AE.

8.1.3.2 Print Operations

The following describes the sequence of events that occurs when performing a print operation:

1. The user queues up a print job from the GUI.
2. The Print AE sends a DICOM Association Request to the print server AE.
3. If the DICOM Association request fails then the print job is aborted.
4. If the DICOM Association request is successful then the Print AE requests the printer status with the Printer N-GET message.
   a. NORMAL – Continue with print operation.
   b. WARNING – Display warning message on status screen and continue with print operation.
   c. FAILURE – The print job is aborted.
5. The Print AE sends the Basic Film Session N-CREATE message to the print server and waits for the N-CREATE Response.
   a. SUCCESS – Continue print operation.
   b. WARNING - Display warning message on status screen and continue with print operation.
   c. FAILURE – The print job is aborted.
6. The Print AE sends the Basic Film Box N-CREATE message to the print server and waits forthe N-CREATE Response.
   a. SUCCESS – Continue print operation.
   b. WARNING - Display warning message on status screen and continue with print operation.
   c. FAILURE (C616) – The print job is aborted.
7. The Print AE sends an Image Box N-SET message to the print server and waits for the N-SET response.
   a. SUCCESS – Continue print operation.
   b. WARNING - Display warning message on status screen and continue with print operation.
   c. FAILURE (C603, C605, C613) – The print job is aborted.
8. When the Film Box is full or the last image in the print job has been added to the Film Box then the Print AE sends a Film Box N-ACTION message to the print server and waits for the N-ACTION response.
   a. SUCCESS – Continue with print operation.
   b. WARNING - Display warning message on status screen and continue with print operation.
   c. FAILURE (C602, C603, C613) – The print job is aborted.
9. When the print job is completed (or aborted) the Print AE sends a DICOM Association Release Request to the print server.

8.1.3.3 Worklist Operations

The following describes the sequence of events that occurs when performing a worklist operation with a worklist server AE:

1. The user initiates a Worklist query from the GUI.
2. The Worklist AE sends a DICOM Association Request to the worklist server AE.
3. If the DICOM Association request fails then the status display on the GUI indicates that the Association failed.
4. If the DICOM Association request is successful then the Worklist AE sends a C-FIND Request message to the worklist server and waits for a C-FIND response.
   a. SUCCESS – C-FIND is completed.
   b. PENDING (FF00, FF01) – Matches are continuing. If the number of matches exceeds the maximum defined by the user then the Worklist AE sends a C-CANCEL Request message to the worklist server.
   c. CANCEL (FE00) – C-FIND is cancelled.
   d. FAILED (A900, Cxxx) – The Worklist AE sends a DICOM Association Abort Request to the worklist server.
5. For the SUCCESS and CANCEL cases, the Worklist AE sends a DICOM Association Release Request to the worklist server. The status display on the GUI indicates that the worklist query is completed and the list of matching records is displayed.

8.1.3.4 Modality Performed Procedure Step Operations

The following describes the sequence of events that occurs when performing a MPPS operation with a MPPS server AE:

1. The user opens an empty Patient/Study.
2. The MPPS AE sends a DICOM Association Request to the MPPS server AE.
3. If the DICOM Association request fails then the MPPS operation is aborted.
4. If the DICOM Association request is successful then the MPPS AE sends a Modality Performed Procedure Step N-CREATE Request message to the MPPS server AE and waits for a N-CREATE response.
   a. SUCCESS – Continue with MPPS operation.
   b. FAILURE – MPPS operation is terminated.
5. The MPPS AE sends a DICOM Association Release Request to the MPPS server AE.
6. The user acquires images into the Patient/Study and then closes the Patient/Study.
7. The MPPS AE sends a DICOM Association Request to the MPPS server AE.
8. If the DICOM Association request fails then the MPPS operation is aborted.
9. If the DICOM Association request is successful then the MPPS AE sends a Modality Performed Procedure Step N-SET Request message to the MPPS server AE and waits for the N-SET response.
   a. SUCCESS – MPPS operation is successfully completed.
   b. FAILURE – MPPS operation is terminated.
10. The MPPS AE sends a DICOM Association Release request to the MPPS server AE.

8.1.4 File Meta Information Options

Implementation Class UID = “1.2.840.113698.7”

Implementation Version Name = “Orion_100”

The Implementation Class UID is part of the File Meta Information written into every file and therefore necessary for any device that acts as an FSC.

8.2 AE Specifications

8.2.1 Send AE - Specification

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

SOP Class Name	SOP Class UID
Verification SOP Class	1.2.840.10008.1.1
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Multi-Frame Grayscale Word SC	1.2.840.10008.5.1.4.1.1.7.3
X-Ray Angiographic Image Store	1.2.840.10008.5.1.4.1.1.12.1
X-Ray RF Image Store	1.2.840.10008.5.1.4.1.1.12.2
Storage Commitment Push Model	1.2.840.10008.1.20.1

8.2.1.1 Association establishment policies

8.2.1.1.1 General

The DICOM Application Context name is 1.2.840.10008.3.1.1.1.

The AE Title of the Send AE is a configurable parameter. The default title is “DAR8k_StoreSCU”.

The Send AE establishes an association whenever a transfer job comes to the top of the transfer queue.

The Send AE establishes an association whenever the user attempts to verify the DICOM connection with a remote AE.

The maximum PDU size is 30720 bytes.

8.2.1.1.2 Number of Associations

The Send AE attempts only one Association establishment at a time.

8.2.1.1.3 Asynchronous nature

The Send AE does not perform asynchronous operations.

8.2.1.1.4 Implementation Identifying Information

The Send AE provides a single Implementation Class UID which is “1.2.840.113698.7”.

8.2.1.2 Association initiation policy

The Send AE initiates a new association for the DIMSE-C-STORE service operation for each transfer job that comes to the top of the job queue.

The Send AE initiates a new association for the Storage Commit service operation.

The Send AE initiates a new association for the DIMSE-C-ECHO service operation.

8.2.1.2.1 Transfer Image Object to a Remote AE

8.2.1.2.1.1 Associated Real-World Activity – Queue image(s) for transfer to remote AE

The associated Real-World activity is a C-Store Request initiated by the Send AE when a transfer job comes to the top of the job queue. A transfer job is created by the user selecting an image or group of images to be sent to a remote AE.

8.2.1.2.1.2 Proposed presentation contexts

The Send AE proposes Presentation Contexts as shown in table 8.2.1.2.1.2-1.

The receiving AE returns which Presentation Contexts it supports in the Association Accept message.

The Secondary Capture Abstract Syntax will only be used if the receiving AE does not support any of the other proposed Abstract Syntaxes. In this case, only the modules defined for the SC IOD in Annex A will be supported.

Table 8.2.1.2.1.2-1 Proposed Presentation Contexts for Send AE

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Secondary Capture Image Store	1.2.840.10008.5.1.4.1.1.7	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
X-Ray Angiographic Image Store	1.2.840.10008.5.1.4.1.1.12.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		JPEG Lossless Process 14	1.2.840.10008.1.2.4.70	SCU	None
X-Ray RF Image Store	1.2.840.10008.5.1.4.1.1.12.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Storage Commitment Push Model	1.2.840.10008.1.20.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Verification Service Class	1.2.840.10008.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Multi Frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

8.2.1.2.1.2.1 SOP Specific Conformance

When a successful response to a C-STORE operation is received, the status display is updated to indicate that the next image in the transfer job is being transferred.

If an Association request fails or if a Failed, Refused or Warning response to a C-STORE operation is received then the currently active transfer job is aborted from the Active transfer queue and moved to the Inactive queue.

Extended negotiation is not supported.

See Annex A for a description of the IOD modules supported.

8.2.1.2.2 Send Storage Commit Request to Remote AE

8.2.1.2.2.1 Associated Real-World Activity – Request Storage Commit for previously transferred images

The associated Real-World activity is a N-Action Request initiated by the Send AE with a list of UIDs for the images from a successfully completed transfer job.

8.2.1.2.2.2 Proposed presentation contexts

The Send AE proposes Presentation Contexts as shown in table 8.2.1.2.1.2-1.

The receiving AE returns which Presentation Contexts it supports in the Association Accept message.

8.2.1.2.2.2.1 SOP Specific Conformance

If a transfer job is completed successfully and the remote AE that the images were sent to is configured for the Storage Commit Service as a SCP then the Send AE intiates a Storage Commit Request message for the images in the transfer job. If the Storage Commit request is successful for an image then the local database record for that image indicates that the image has been archived.

Extended negotiation is not supported.

8.2.1.2.3 Send Echo Request to Remote AE

8.2.1.2.3.1 Associated Real-World Activity - Verify DICOM connection with remote AE

The associated Real-World activity is a C-Echo Request initiated by the user to determine if a remote DICOM AE is responding.

8.2.1.2.3.2 Proposed presentation contexts

The Send AE proposes a Presentation Context as shown in table 8.2.1.2.1.2-1.

8.2.1.2.3.2.1 SOP Specific Conformance

The Send AE provides standard conformance to the DICOM Verification Service Class as a SCU.

8.2.1.3 Association acceptance policy

The Send AE never accepts associations.

8.2.2 Print AE - Specification

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

SOP Class Name	SOP Class UID
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9
Basic Film Session	1.2.840.10008.5.1.1.1
Basic Film Box	1.2.840.10008.5.1.1.2
Basic Grayscale Image Box	1.2.840.10008.5.1.1.4
Printer	1.2.840.10008.5.1.1.16
Verification Service Class	1.2.840.10008.1.1
Print Job	1.2.840.10008.5.1.1.14

8.2.2.1 Association establishment policies

8.2.2.1.1 General

The DICOM Application Context name is 1.2.840.10008.3.1.1.1.

The AE Title of the Print AE is a configurable parameter. The default title is "DAR8k_PrintSCU".

The Print AE establishes an association whenever a local print job comes to the top of the print queue.

The maximum PDU size is 30720 bytes.

8.2.2.1.2 Number of Associations

The Print AE can have multiple associations open at a time:

One for the Basic Grayscale Print Management service.

8.2.2.1.3 Asynchronous nature

The Print AE does not perform asynchronous operations.

8.2.2.1.4 Implementation Identifying Information

The Print AE provides a single Implementation Class UID which is "1.2.840.113698.7".

8.2.2.2 Association initiation policy

The Print AE initiates a new association for the Print Service Class whenever a print job reaches the top of the print queue. The Association is closed when all of the images from the print job have been sent to the Print Server.

8.2.2.2.1 Print Image

8.2.2.2.1.1 Associated Real-World Activity – Queue images for printing

The user creates a local print job by selecting individual images or a group of images to be printed. When the local print job comes to the top of the print queue an Association Request is made. Once the Print Image Association has been established, the Print AE sends a Basic Film Session N_CREATE message to the Basic Print SCP. This is followed by a Basic Film Box N_CREATE message. The Print AE then sends a Basic Grayscale Image Box N_SET message. Finally, an N_ACTION message is sent to print images at the Basic Film Box level.

8.2.2.2.1.2 Proposed presentation contexts

The Presentation Contexts proposed by the Print AE are defined in table 8.2.2.2.1.2-1.

Table 8.2.2.2.1.2-1 Proposed Presentation Contexts for Print AE

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Basic Grayscale Print Management (META)	1.2.840.10008.5.1.1.9	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Verification Service Class	1.2.840.10008.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Print Job	1.2.840.10008.5.1.1.14	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

8.2.2.2.1.2.1 SOP Specific Conformance

See Annex B for a description of the attribute values for SOP Classes proposed by the Print AE.

As individual images from the local print job are transferred to the Printer SCP the status display is updated to indicate how many images have been transferred.

If the Print Job service is supported then the Print AE can monitor the remote Print Job status and the local print job will not be removed from the print queue until a Success or Failed notification is received from the Printer SCP.

If the Print Job service is not supported then the local print job is considered completed when all of the images in the job have been transferred to the Printer SCP.

Extended negotiation is not supported.

8.2.2.3 Association acceptance policy

The Print AE never accepts associations.

8.2.3 Modality Worklist AE - Specification

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

SOP Class Name	SOP Class UID
Modality Worklist Find	1.2.840.10008.5.1.4.31
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3
Verification SOP Class	1.2.840.10008.1.1

8.2.3.1 Association establishment policies

8.2.3.1.1 General

The DICOM Application Context name is 1.2.840.10008.3.1.1.1.

The AE Title of the Modality Worklist AE is a configurable parameter. The default title is "DAR8k_MWMSCU".

The Modality Worklist AE establishes associations under the following conditions:

1. When the user initiates a manual query.
2. Periodically, as set up in the Auto Query configuration.
3. To create a Modality Performed Procedure Step notification object.
4. When the user attempts to verify the DICOM connection with a remote Worklist AE

The maximum PDU size is 30720 bytes.

8.2.3.1.2 Number of Associations

The Modality Worklist AE can have multiple Associations open at one time:

1. One association establishment for each SCP configured for automatic query, and one additional association if/when the user initiates a manual query.
2. One association to initiate a Performed Procedure Step Notification.
3. One association to initiate a Verification Service Echo request.

8.2.3.1.3 Asynchronous nature

The Modality Worklist AE does not perform asynchronous operations.

8.2.3.1.4 Implementation Identifying Information

The Modality Worklist AE provides a single Implementation Class UID which is "1.2.840.113698.7".

8.2.3.2 Association initiation policy

The Modality Worklist AE initiates a new association for the Worklist Management Class for each query session. A query session is defined as a group of queries required to completely satisfy the input from the user. The Association is closed when all of the results from the query session have been received.

If Patient/Study information was received from a worklist SCP then the Modality Worklist AE initiates a new association to handle the Performed Procedure Step Notification service when the Patient/Study record is "opened" for image acquisition.

The Modality Worklist AE initiates a new association to verify a DICOM connection with a remote Worklist AE when the user selects the verify option for the remote AE.

8.2.3.2.1 Worklist Query Operations

The Modality Worklist AE initiates associations to perform C-FINDs and Performed Procedure Step notifications. The association is closed after an error or when the initiator requests that it be closed.

8.2.3.2.1.1 Associated Real-World Activity – Query for Scheduled Procedure information

Once the Worklist Query association has been established, the Modality Worklist AE sends a series of Worklist C-FIND messages to the Worklist SCP. One C-FIND message is sent for each Modality selected by the user. One C-FIND message is also sent for each AE title selected by the user. After each C-FIND message is sent, the Modality Worklist AE waits for a C-FIND response from the SCP. If the total number of records received during the active association exceeds the maximum limit set by the user, a C-CANCEL-FIND message is sent to the SCP. Response messages are read in until a C-FIND response of Success is received. After receiving the C-FIND [Success] response, the Modality Worklist AE will send a C-FIND message for the next modality/AE Title pair. This sequence continues until all modality/AE Title pairs are queried, at which time the association is closed.

8.2.3.2.1.2 Proposed presentation contexts

The Presentation Contexts proposed by the Modality Worklist AE are defined in table 8.2.3.2.1.2-1.

Table 8.2.3.2.1.2-1 Proposed Presentation Contexts for Modality Worklist AE

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Modality Worklist Find	1.2.840.10008.5.1.4.31	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Verification Service Class	1.2.840.10008.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

8.2.3.2.1.2.1 SOP Specific Conformance

The Modality Worklist AE provides standard conformance to the DICOM Modality Worklist Find Service Class as a SCU.

See Annex C for a description of the attribute values for the Modality Worklist Find operation proposed by the Modality Worklist AE.

Extended negotiation is not supported.

8.2.3.2.2 Worklist Performed Procedure Step Operations

8.2.3.2.2.1 Associated Real-World Activity – Notify Remote AE of Performed Procedure Step Status

8.2.3.2.2.2 Proposed presentation contexts

The Presentation Contexts proposed by the Modality Worklist AE are defined in table 8.2.3.2.1.2-1.

8.2.3.2.2.2.1 SOP Specific Conformance

The Modality Worklist AE provides standard conformance to the DICOM Modality Performed Procedure Step Service Class as a SCU.

When the system opens a Patient/Study/Series record for image acquisition, if the patient information was received from a remote Worklist AE and if the system has been configured for the Performed Procedure Step service then the Modality Worklist AE will attempt to establish an Association to create and update a Performed Procedure Step object.

The Association is closed when the Patient record is closed by the user.

If an error occurs then the Association is closed.

Extended negotiation is not supported.

8.2.3.2.3 Verify DICOM Connection with Worklist SCP

8.2.3.2.3.1 Associated Real-World Activity – User selects verify option for a remote Worklist AE

When the user selects the Verify option for a selected remote Worklist AE the Modality Worklist AE initiates an Association to execute the Verification Service class.

8.2.3.2.3.2 Proposed presentation contexts

The Presentation Contexts proposed by the Modality Worklist AE are defined in table 8.2.3.2.1.2-1.

8.2.3.2.3.2.1 SOP Specific Conformance

The Modality Worklist AE provides standard conformance to the DICOM Verification Service Class as a SCU.

The status of a C-ECHO request message is displayed (SUCCESS or FAIL).

Extended negotiation is not supported.

8.2.3.3 Association acceptance policy

The Modality Worklist AE never accepts associations.

8.2.4 Media Storage AE - Specification

The Media Storage AE provides Standard Conformance to the DICOM Data Interchange option of the Media Storage Service Class. The Application Profiles and roles are listed in table 8.2.4-1

Table 8.2.4-1 Supported Application Profiles

Application Profiles Supported	Real World Activity	Role	Service Class Option
STD-XA1K-CD	Create CD	FSC	Data Interchange
	Display Directory	FSR	Data Interchange
	Copy to Local Storage	FSR	Data Interchange
	Append Fileset	FSU	Data Interchange
STD-GEN-CD	Create CD	FSC	Data Interchange
	Display Directory	FSR	Data Interchange
	Copy To Local Storage (Supported SOPs)	FSR	Data Interchange
	Append Fileset	FSU	Data Interchange

8.2.4.1 File Meta Information for Media Storage AE

The source AE Title is a configurable parameter (default is “DAR8k_MEDIAFSC”).

8.2.4.2 Real-World Activities for Media Storage AE

The Application Profiles and SOPs supported are specified in Table 8.2.4.2-1.

Table 8.2.4.2-1 Application Profiles

Profile	IOD	SOP UID	Transfer Syntax & UID	Role
STD-XA1K-CD	Basic Directory	1.2.840.10008.1.3.10	Explicit VR Little Endian 1.2.840.10008.1.2.1	FSC, FSR
STD-GEN-CD	Basic Directory	1.2.840.10008.1.3.10	Explicit VR Little Endian 1.2.840.10008.1.2.1	FSC, FSR, FSU
STD-XA1K-CD	X-Ray Angiographic Image	1.2.840.10008.5.1.4.1.1.12.1	JPEG Lossless Process 14 1.2.840.10008.1.2.4.70	FSC, FSR
STD-GEN-CD	X-Ray Angiographic Image Store	1.2.840.10008.5.1.4.1.1.12.1	Explicit VR Little Endian 1.2.840.10008.1.2.1 JPEG Lossless Process 14 1.2.840.10008.1.2.4.70	FSC, FSR, FSU
STD-GEN-CD	X-Ray RF Image Store	1.2.840.10008.5.1.4.1.1.12.2	Explicit VR Little Endian 1.2.840.10008.1.2.1 JPEG Lossless Process 14 1.2.840.10008.1.2.4.70	FSC, FSR, FSU
STD-GEN-CD	Secondary Capture Image Store	1.2.840.10008.5.1.4.1.1.7	Explicit VR Little Endian 1.2.840.10008.1.2.1	FSC, FSR, FSU
STD-GEN-CD	Multi-Frame Grayscale Word Secondary Capture Image Store	1.2.840.10008.5.1.4.1.1.7.3	Explicit VR Little Endian 1.2.840.10008.1.2.1	FSC, FSR, FSU

8.2.4.2.1 Real-World Activity: Create Media Request

The Media Storage AE acts as an FSC using the Interchange option when requested to initialize media. This occurs when the user selects a set of images to create a transfer job designated for the CD-R/DVD-R.

The requested SOP instances are written to the media and a corresponding DICOMDIR is created.

8.2.4.2.1.1 Application Profiles for Create Media

For the list of Application Profiles that invoke this AE for the Create Real-World Activity, see table 8.2.4.2-1.

There are no extensions or private profiles.

8.2.4.2.2 Real-World Activity: Display Media Directory

The Media Storage AE acts as an FSR using the Interchange option when requested to provide a directory listing. The AE will read the File-set and display the DICOMDIR Patient record entries for those SOP Instances in the File-set that correspond to the user selected Application Profile as defined in table 8.2.4.2-1.

8.2.4.2.2.1 Application Profiles for Display Media Directory Listing

For the list of Application Profiles that invoke this AE for the Display Directory Real-World Activity, see table 8.2.4.2-1. There are no extensions or private profiles.

8.2.4.2.3 Real World Activity - Copy to Local Storage

The Media Storage AE acts as an FSR when copying from the CD-R/DVD-R to local storage. SOP instances that do not match the Application Profile defined in table 8.2.4.2-1 will be filtered out.

8.2.4.2.3.1 Application Profiles for Copy to Local Storage

For the list of Application Profiles that invoke this AE for the Copy to Local Storage Real-World Activity, see table 8.2.4.2-1. There are no extensions or private profiles.

8.2.4.2.4 Real World Activity – Append Fileset

The Media Storage AE acts as an FSU when the user has selected a set of images to be transferred to multi-session CD-R/DVD-R media. Images already on the media are maintained.

Optionally, CD-R/DVD-R media that already contains DICOM filesets in one or more sessions and that has not been "closed" may be updated with a new fileset that does not reference the fileset(s) already on the media. Existing SOPs on the media will not be accessible by standard DICOM fileset readers. (The data contained in previous sessions is in no way actually erased, and specialized software may be used to retrieve it.)

Media may optionally be "closed" as part of the FSU operation, effectively preventing further writes to the media.

8.2.4.2.4.1 Application Profiles for the RWA: Append Fileset

For the list of Application Profiles that invoke this AE for the Copy to Local Storage Real-World Activity, see table 8.2.4.2-1. There are no extensions or private profiles.

8.3 Network Communication Profiles

8.3.1 Supported Communication Stacks

The DAR-8000 system provides DICOM V3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard (PS 3.8).

8.3.2 OSI Stack

No OSI Stack communications are provided.

8.3.3 TCP/IP Stack

The DAR-8000 system supports the TCP/IP stack.

8.3.3.2 Physical media support

The DAR-8000 system is indifferent to the physical medium over which TCP/IP executes.

8.3.4 Point-to-Point Stack

No Point-to-Point Stack communications are provided.

8.4 Extensions/Specializations/Privatizations

The Storage AEs (SendAE and MediaStorageAE) support private attributes as defined in Annex E.

8.5 Configuration

The DAR-8000 system obtains its configuration information from the following files:

merge.ini - Identifies the other three configuration files.

mergecom.pro - Defines run-time parameters.

mergecom.app - Defines services on remote AEs to which connections are possible.

mergecom.srv - Service and sequence definitions.

8.5.1 AE title/presentation address mapping

The presentation address mapping is defined in the ‘mergecom.app’ file. The destination AE title, host name, listen port and service list for each remote AE that the DAR-8000 system can connect to are defined in this file. The mapping of the hostname to an IP address is defined in the ‘hosts’ file.

8.5.2 Configurable Parameters

The following parameters may be configured:

In the 'mergecom.app' file:

1. Local AE Titles
2. Station name
3. Media storage File-Set ID
4. Remote AEs:
    a. AE Title
    b. Hostname
    c. Port number

In the 'mergecom.pro' file:

1. Timeouts
    a. Wait for Association request timeout
    b. Wait for Association reply timeout
    c. Wait for Association release timeout
    d. Network write timeout
    e. Network connect timeout
    f. Network inactivity timeout
2. Maximum PDU size
3. Number of simultaneous associations

In the 'hosts' file:

1. IP Addresses of remote AEs

The local network address, netmask and gateway are configured via the standard Windows Network configuration utility.

8.6 Support of Extended Character Sets

The DAR-8000 system supports the ISO_IR 100 Character set and ISO_IR 87 Character set.

ANNEX A – DICOM Data Elements Supported

MODULES COMMON TO SC, MF SC GW, XA and RF IODs

Patient Module PS3.3 section C.7.1.1			
Attribute Name	**Tag**	**Type**	**Description**
Patient's name	0010,0010	2	Patient's full legal name.
Patient ID	0010,0020	2	Primary hospital ID number or code for the patient.
Patient's birth date	0010,0030	2	Birth date of patient.
Patient's sex	0010,0040	2	Sex of patient.

General Study Module PS3.3 section C.7.2.1			
Attribute Name	**Tag**	**Type**	**Description**
Study Instance UID	0020,000D	1	Unique identifier for study.
Study Date	0008,0020	2	Date the Study started.
Study Time	0008,0030	2	Time the Study started.
Referring Physician's name	0008,0090	2	Patient's referring physician.
Study ID	0020,0010	2	User or equipment generated Study Identifier.
Accession Number	0008,0050	2	A RIS generated study number.
Study Description	0008,1030	3	User defined description of the Study. In case of MWM study, the system can inherit the value from MWM server (optional feature). Refer to Exhibit for detailed information.
Physician of Record	0008,1048	3	Physician responsible for patient care at time of Study. See "S517-1070_Exhibit(MPPS Attributes)" for detailed information.
Name of Physician(s) Reading Study	0008,1060	3	Names of the physician(s) reading the Study.

Patient Study Module PS3.3 section C.7.2.2			
Attribute Name	**Tag**	**Type**	**Description**
Patient's Age	0010,1010	3	Age of the patient. If Patient's birth date exists, the age calculated by the system will be set.
Patient's Size	0010,1020	3	Height in meters.
Patient's Weight	0010,1030	3	Weight in kilograms.
Occupation	0010,2180	3	Occupation of the Patient.

General Series Module PS3.3 section C.7.3.1			
Attribute Name	**Tag**	**Type**	**Description**
Modality	0008,0060	1	Type of equipment that acquired image data.
Series instance UID	0020,000E	1	Unique identifier of the Series.
Series number	0020,0011	2	A number that identifies this Series.
Laterality	0020,0060	2C	Laterality of (paired) body part examined.
Series Date	0008,0021	3	Date the Series started.

Series Time	0008,0031	3	Time the Series started.
Performing physician's name	0008,1050	3	Name of physician administering the Series. The value set before starting a study will be set. This attribute will be set as zero length data, if this is modified or entered after finishing a study. See "S517-1070_Exhibit(MPPS Attributes)" for detailed information.
Protocol Name	0018,1030	3	User defined description of conditions under which Series was performed.
Series Description	0008,103E	3	User defined description of Series.
Operator's Name	0008,1070	3	Technologist(s) supporting the Series. This attribute is not currently used.
Body Part Examined	0018,0015	3	Text description of the part of the body Examined. This attribute is not currently used.
Patient Position	0018,5100	3	Patient position descriptor relative to the Equipment. This attribute is not currently used.
Request Attributes Sequence	0040,0275	3	Sequence that contains attributes from the Imaging Service Request. The sequence may have one or more Items.
> Requested Procedure ID	0040,1001	1C	ID of the Requested Procedure in the Imaging Service Request.
> Scheduled Procedure Step ID	0040,0009	1C	ID of the Scheduled Procedure Step.
Performed Procedure Step ID	0040,0253	3	ID of that part of a Procedure that has been carried out within this step.

General Equipment Module PS3.3 section C.7.5.1			
Attribute Name	**Tag**	**Type**	**Description**
Manufacturer	0008,0070	2	Manufacturer of equipment that produced images.
Institution name	0008,0080	3	Institution where equipment that produced images is located.
Institution Address	0008,0081	3	Mailing address of the institution where the equipment is located that produced the digital images.
Station name	0008,1010	3	User defined name identifying the machine that produced the images.
Manufacturer's model name	0008,1090	3	Manufacturer's model number of the equipment that produced the images.
Device Serial Number	0018,1000	3	Manufacturer's serial number of the equipment that produced the digital images.
Software version	0018,1020	3	Manufacturer's designation of software version of equipment that produced images.

General Image Module PS3.3 section C.7.6.1			
Attribute Name	**Tag**	**Type**	**Description**
Image (instance) number	0020,0013	2	A number that identifies the image.

Patient Orientation	0020,0020	2C	Patient direction of the rows and columns of the image.
Image (content) date	0008,0023	2C	Date the image pixel data creation started.
Image (content) time	0008,0033	2C	Time the image pixel data creation started.
Image type	0008,0008	3	See IOD specific Image Module.
Acquisition Number	0020,0012	3	A number identifying the single continuous gathering of data over a period of time which resulted in this image.
Acquisition Date	0008,0022	3	The date the acquisition of data that resulted in this image started.
Acquisition Time	0008,0032	3	The time the acquisition of data that resulted in this image started.
Source Image Sequence	0008,2112	3	A Sequence that identifies the set of Image SOP Class/Instance pairs of the Images that were used to derive this Image.
> Referenced SOP Class UID	0008,1150	1C	Uniquely identifies the referenced SOP Class.
> Referenced SOP Instance UID	0008,1155	1C	Uniquely identifies the referenced SOP Instance.
Images in Acquisition	0020,1002	3	Number of images that resulted from this acquisition of data.
Image comments	0020,4000	3	User defined comments about image.
Lossy Image Compression	0028,2110	3	Specifies whether an image has undergone lossy compression.

Image Pixel Module PS3.3 section C.7.6.3			
Attribute Name	**Tag**	**Type**	**Description**
Samples per pixel	0028,0002	1	Number of samples (planes) in this image. (1)
Photometric interpretation	0028,0004	1	Specifies the intended interpretation of the pixel data. (MONOCHROME2)
Rows	0028,0010	1	Number of rows in image.
Columns	0028,0011	1	Number of columns in image.
Bits allocated	0028,0100	1	See IOD Image Module.
Bits stored	0028,0101	1	See IOD Image Module.
High bit	0028,0102	1	See IOD Image Module.
Pixel representation	0028,0103	1	See IOD Image Module.
Pixel data	7FE0,0010	1	Data stream of pixel samples which comprise the image.

Modality LUT Module (Optional) PS3.3 section C.11.1			
Attribute Name	**Tag**	**Type**	**Description**
Modality LUT Sequence	0028,3000	1C	Sequence of Modality LUTs. (Not present if Rescale Intercept (0028,1052) is present)
> LUT Descriptor	0028,3002	1C	Format of LUT Data in Sequence.
> LUT Explanation	0028,3003	3	Free Form Text.
> LUT Type	0028,3004	1C	Specifies output values of this Modality LUT.

> LUT Data	0028,3006	1C	LUT Data. (Mapping of pixel value to pixel intensity)
Rescale Intercept	0028,1052	1C	Required if Modality LUT sequence is not present.
Rescale Slope	0028,1053	1C	Required if Rescale Intercept is present.
Rescale Type	0028,1054	1C	Required if Rescale Intercept is present.

VOI LUT Module (Optional) PS3.3 section C.11.2			
Attribute Name	**Tag**	**Type**	**Description**
Window center	0028,1050	3	Window center for display.
Window width	0028,1051	1C	Window width for display. Required if Window center (0028,1050) is sent.
VOI LUT Sequence	0028,3010	3	Sequence of VOI LUT.
> LUT Descriptor	0028,3002	1C	Format of LUT Data in Sequence.
> LUT Explanation	0028,3003	3	Free Form Text.
> LUT Data	0028,3006	1C	LUT Data. (Mapping of pixel value to pixel intensity)

MODULES COMMON TO XA and RF IODs

Contrast/Bolus Module (Conditional) PS3.3 section C.7.6.4 Required if contrast media used in this image			
Attribute Name	**Tag**	**Type**	**Description**
Contrast/Bolus agent	0018,0010	2	Contrast or bolus agent.

CINE Module (Conditional) PS3.3 section C.7.6.5 Required if pixel data is Multi-Frame Cine data			
Attribute Name	**Tag**	**Type**	**Description**
Frame time	0018,1063	1C	Nominal time (msec) per individual frame. Required if Frame Increment Pointer (0028,0009) points to Frame Time.
Frame time vector	0018,1065	1C	An array which contains the real time increments (msec) between frames for a Multi-frame image. Required if Frame Increment Pointer (0028,0009) points to Frame Time Vector.
Cine Rate	0018,0040	3	Number of frames per second.

Multi-Frame Module (Conditional) PS3.3 section C.7.6.6 Required if pixel data is Multi-Frame Cine data			
Attribute Name	**Tag**	**Type**	**Description**
Number of frames	0028,0008	1	Number of frames in a Multi-frame image.
Frame increment pointer	0028,0009	1	Contains the Data Element Tag of the attribute which is used as the frame increment in Multi-frame pixel data.

Mask Module (Conditional) PS3.3 section C.7.6.10 Required if image may be subtracted			
Attribute Name	**Tag**	**Type**	**Description**
Mask Subtraction Sequence	0028,6100	1	Defines a sequence which describe mask subtraction operations for a multi-frame image.
> Mask Operation	0028,6101	1	Identify the type of mask operation to be performed (“AVG_SUB”).
> Mask Frame Numbers	0028,6110	1C	Specifies the frame numbers of the pixel data used to generate the mask.
Recommended Viewing Mode	0028,1090	2	Specifies recommended viewing protocols. (“SUB”)

X-Ray Image Module PS3.3 section C.8.7.1			
Attribute Name	**Tag**	**Type**	**Description**
Frame increment pointer	0028,0009	1C	Required if Multi-frame image. Contains Data Element Tag of the attribute which is used as the Frame increment in Multi-frame image pixel data.
Image type	0008,0008	1	Image identification characteristics.

Pixel intensity relationship	0028,1040	1	The relationship between the pixel sample values and the X-Ray beam intensity.
Samples per pixel	0028,0002	1	Number of samples (planes) in the image. (1)
Photometric interpretation	0028,0004	1	Specifies the intended interpretation of the pixel data. (MONOCHROME2)
Bits allocated	0028,0100	1	Number of bits allocated for each pixel sample. (16)
Bits stored	0028,0101	1	Number of bits stored for each pixel sample. 12 : DAR-8000i 16 : DAR-8000f
High bit	0028,0102	1	Most significant bit for pixel sample data. 11 : DAR-8000i 15 : DAR-8000f
Pixel representation	0028,0103	1	Data representation of the pixel samples. (0)

X-Ray Acquisition Module PS3.3 section C.8.7.2			
Attribute Name	**Tag**	**Type**	**Description**
KVP	0018,0060	2	Peak kilo voltage output of the X-Ray generator used.
Exposure Time	0018,1150	2C	Duration of X-Ray exposure in msec. Required if Exposure (0018,1152) not present.
Tube Current	0018,1151	2C	X-Ray Tube Current in mA. Required if Exposure (0018,1152) not present.
Exposure	0018,1152	2C	The product of exposure time and X-Ray tube current expressed in mAs. Required if either Exposure Time (0018,1150) or X-Ray Tube Current (0018,1151) are not present.
Radiation setting	0018,1155	1	Identify the general level of X-Ray dose exposure.
Intensifier Size	0018,1162	3	Diameter of X-ray intensifier in mm.
Exposure Time in microseconds	0018,8150	3	Duration of X-Ray exposure in microsec.
Tube Current	0018,8151	3	X-Ray Tube Current in microAmps
Pixel Spacing	0028,0030	1C	Pixel distance in the patient between the center of each pixel, specified by a numeric pair – adjacent row spacing (delimiter) adjacent column spacing in mm. This attributes is NOT set for SDA image (acquired and combined). This attributes is set only in the system with Sonialvision.

Display Shutter Module (Optional) PS3.3 section C.7.6.11			
Attribute Name	**Tag**	**Type**	**Description**
Shutter shape	0018,1600	1	Shape of the shutter defined for display. (CIRCULAR or POLYGONAL)
Center of circular shutter	0018,1610	1C	Required if shutter shape is CIRCULAR.

Radius of circular shutter	0018,1612	1C	Required if shutter shape is CIRCULAR.
Vertices of the Polygonal Shutter	0018,1620	1C	Required if Shutter Shape (0018,1600) is POLYGONAL. Multiple Values where the first set of two values are: row of the origin vertex, column of the origin vertex.

X-Ray Collimator Module (Optional) PS3.3 section C.8.7.3			
Attribute Name	**Tag**	**Type**	**Description**
Collimator shape	0018,1700	1	Shape of collimator. (RECTANGULAR)
Collimator left vertical edge	0018,1702	1C	Required if collimator shape is RECTANGULAR.
Collimator right vertical edge	0018,1704	1C	Required if collimator shape is RECTANGULAR.
Collimator upper horizontal edge	0018,1706	1C	Required if collimator shape is RECTANGULAR.
Collimator lower horizontal edge	0018,1708	1C	Required if collimator shape is RECTANGULAR.

SECONDARY CAPTURE IOD

Image Pixel Module PS3.3 section C.7.6.3			
Attribute Name	**Tag**	**Type**	**Description**
Bits allocated	0028,0100	1	Number of bits allocated for each pixel sample. (16)
Bits stored	0028,0101	1	Number of bits stored for each pixel sample.
High bit	0028,0102	1	Most significant bit for pixel sample data.
Pixel representation	0028,0103	1	Data representation of the pixel samples. (0)

SC Equipment Module PS3.3 section C.8.6.1			
Attribute Name	**Tag**	**Type**	**Description**
Conversion Type	0008,0064	1	Describes the kind of image conversion.

SC Image Module PS3.3 section C.8.6.2			
Attribute Name	**Tag**	**Type**	**Description**
Date of secondary capture	0018,1012	3	Date image was acquired.
Time of secondary capture	0018,1014	3	Time image was acquired.

SOP Common Module PS3.3 section C.12.1			
Attribute Name	**Tag**	**Type**	**Description**
Specific Character Set	0008,0005	1C	Character Set that expands or replaces the Basic Graphic Set. Japanese ISO 2022 IR 87 is supported.
SOP class UID	0008,0016	1	Uniquely identifies the SOP class Secondary Capture Image Storage. “1.2.840.10008.5.1.4.1.1.7 ”.
SOP instance UID	0008,0018	1	Uniquely identifies the SOP instance.

MULTI-FRAME GRAYSCALE WORD SECONDARY CAPTURE IOD

Multi-Frame Module PS3.3 section C.7.6.6			
Attribute Name	**Tag**	**Type**	**Description**
Number of frames	0028,0008	1	Number of frames in a Multi-frame image.

SC Multi-Frame Image Module PS3.3 section C.8.6.3			
Attribute Name	**Tag**	**Type**	**Description**
Burned in Annotation	0028,0301	1	Indicate whether image contains sufficient burned in annotation to identify the patient and the date the image was acquired.
Presentation LUT Shape	2050,0020	1C	Specifies an identity transformation for the LUT shape. Required if Photometric Interpretation (0028,0004) is MONOCHROME2 and Bits Stored (0028,0101) is greater than 1.

SOP Common Module PS3.3 section C.12.1			
Attribute Name	**Tag**	**Type**	**Description**
Specific Character Set	0008,0005	1C	Character Set that expands or replaces the Basic Graphic Set. Japanese ISO 2022 IR 87 is supported.
SOP class UID	0008,0016	1	Uniquely identifies the SOP class Multi-Frame Grayscale Word Secondary Capture Image Storage. “1.2.840.10008.5.1.4.1.1.7.3” .
SOP instance UID	0008,0018	1	Uniquely identifies the SOP instance.

X-Ray XA IOD

X-Ray Table Module (Conditional) PS3.3 section C.8.7.4 Required if image is created with table motion			
Attribute Name	**Tag**	**Type**	**Description**
Table motion	0018,1134	2	Is table moving or not.

XA Positioner Module PS3.3 section C.8.7.5			
Attribute Name	**Tag**	**Type**	**Description**
Distance Source to Detector	0018,1110	3	Distance in mm from source to detector center.
Distance Source to Patient	0018,1111	3	Distance in mm from source to isocenter.
Estimated Radiographic Magnification Factor	0018,1114	3	Ratio of Source Image Receptor Distance (SID) over Source Object Distance (SOD).
Positioner motion	0018,1500	2C	Used to describe activity of imaging device.
Positioner primary angle	0018,1510	2	Position of the X-Ray image intensifier about the patient from the RAO to LAO direction.
Positioner secondary angle	0018,1511	2	Position of the X-Ray image intensifier about the patient from the CAU to CRA direction.

SOP Common Module PS3.3 section C.12.1			
Attribute Name	**Tag**	**Type**	**Description**
Specific Character Set	0008,0005	1C	Character Set that expands or replaces the Basic Graphic Set. Japanese ISO 2022 IR 87 is supported.
SOP class UID	0008,0016	1	Uniquely identifies the SOP class X-Ray Angiographic Image Storage “1.2.840.10008.5.1.4.1.1.12.1” .
SOP instance UID	0008,0018	1	Uniquely identifies the SOP instance.

X-Ray RF IOD

XRF POSITIONER MODULE ATTRIBUTES PS3.3 section C.8.7.6			
Attribute Name	**Tag**	**Type**	**Description**
Distance Source to Detector	0018,1110	3	Distance in mm from source to detector center.
Distance Source to Patient	0018,1111	3	Distance in mm from source to isocenter (center of field of view).
Estimated Radiographic Magnification Factor	0018,1114	3	Ratio of SID (Source Image Receptor Distance) over SOD (Source Object Distance).

SOP Common Module PS3.3 section C.12.1			
Attribute Name	**Tag**	**Type**	**Description**
Specific Character Set	0008,0005	1C	Character Set that expands or replaces the Basic Graphic Set. Japanese ISO 2022 IR 87 is supported.
SOP class UID	0008,0016	1	Uniquely identifies the SOP class X-Ray Radiofluoroscopic Image Storage “1.2.840.10008.5.1.4.1.1.12.2” .
SOP instance UID	0008,0018	1	Uniquely identifies the SOP instance.

ANNEX B – Print AE Attributes

SOP Class Name	Command	Attribute Name	Valid Range
Basic Film Session	N_CREATE	Number of Copies	1-5
		Print Priority	HIGH, MEDIUM, LOW
Basic Film Box	N_CREATE	Image Display Format	
		Film Orientation	PORTRAIT, LANDSCAPE
		Film Size ID	8INX10IN, 10INX12IN 10INX14IN, 11INX14IN 14INX14IN, 14INX17IN 24CMX24CM, 24CMX30CM
		Min Density	Depends on Printer
		Max Density	Depends on Printer
		Border Density	WHITE, BLACK
		Empty Image Density	WHITE, BLACK
		Trim	YES, NO
	N_ACTION	Referenced Print Job Sequence	Print Job UID returned
Basic Grayscale Image Box	N_SET	Image Position	1 - 12
		Samples Per Pixel	1
		Photometric Interpretation	MONOCHROME1, MONOCHROME2
		Rows	Number of rows in image
		Columns	Number of columns in image
		Pixel Aspect Ratio	1/1
		Bits Allocated	Number of bits allocated for each pixel sample
		Bits Stored	Number of bits stored for each pixel sample
		High Bit	Most significant bit for pixel sample data
		Pixel Representation	0000
Printer	N_GET/ N_EVENT_ REPORT	Printer Status	Returned values: NORMAL, WARNING, FAILURE
		Printer Status Info	NORMAL if Printer Status is NORMAL, else see printers DICOM Conformance Statement for supported values
		Printer Name	NA
		Manufacturer	NA
		Manufacturer Model Name	NA
		Software Version	NA

ANNEX C – Worklist AE Attributes

NOTE

The following characters are not supported by this system.
*, /, :, <, >, ?, ¥

NOTE

Size of Study Instance UID (0020, 000D) should be less than 56 characters, if Worklist function is used with MPPS function.

Scheduled Procedure Step Module PS3.3 section C.4-10			
Attribute Name	**Tag**	**Description**	**Field Use**
Scheduled Procedure Step Sequence	0040,0100	One or more Scheduled Procedure Steps for one Requested Procedure.	Sequence
> Scheduled Station AE Title	0040,0001	The AE title of the modality on which the Scheduled Procedure Step is scheduled to be performed.	Match
> Scheduled Procedure Step Start Date	0040,0002	Date on which the Scheduled Procedure Step is scheduled to start. This is used to initially define the Study Date.	Match
> Scheduled Procedure Step Start Time	0040,0003	Time at which the Scheduled Procedure Step is scheduled to start. This is used to initially define the Study Time.	Match
> Modality	0008,0060	Source equipment for the image. See Section C.7.3.1.1.1 for Enumerated Values.	Match
> Scheduled Performing Physician Name	0040,0006	Name of the physician scheduled to administer the Scheduled Procedure Step. Loaded from a worklist.	Return
> Scheduled Procedure Step Description	0040,0007	Institution-generated description or classification of the Scheduled Procedure Step to be performed. Loaded from a worklist.	Match/Return
> Scheduled Protocol Code Sequence	0040,0008	Sequence describing the Scheduled Protocol following a specified coding scheme. This sequence contains one or more Items.	Return
> Scheduled Procedure Step ID	0040,0009	Identifier that identifies the Scheduled Procedure Step. Loaded from a Worklist.	Match/Return

Requested Procedure Module PS3.3 section C.4-11			
Attribute Name	**Tag**	**Description**	**Field Use**
Requested Procedure ID	0040,1001	Identifier that identifies the Requested Procedure in the Imaging Service Request. Loaded from a Worklist.	Return
Study Instance UID	0020,000D	Unique identifier to be used to identify the Study. Loaded from worklist or generated by system when study is created.	Return
Requested Procedure Description	0032,1060	Institution-generated administrative description or classification of Requested Procedure	Return
Requested Procedure Priority	0040,1003	Requested Procedure Type urgency.	Return

Patient Identification Module PS3.3 section C.2-2			
Attribute Name	**Tag**	**Description**	**Field Use**
Patient's Name	0010,0010	Both First Name and Last Name in alphanumeric characters are required. And First Name and Last Name has to be delimited by the caret "^" character (0x5E).	Match
Patient ID	0010,0020		Match

Patient Demographic Module PS3.3 section C.2-3			
Attribute Name	**Tag**	**Description**	**Field Use**
Patient's Birth Date	0010,0030		Return
Patient's Sex	0010,0040		Return
Patient's Weight	0010,1030	Weight of the patient in kilograms. Value is loaded from a worklist.	Return

Imaging Service Request Module PS3.3 section C.4-12			
Attribute Name	**Tag**	**Description**	**Field Use**
Requesting Physician	0032,1032	Name of the physician who requested the Imaging Service Request. Loaded from a worklist. Both First Name and Last Name in alphanumeric characters are required. And First Name and Last Name has to be delimited by the caret "^" character (0x5E).	Return
Referring Physician	0008,0090	Name of the patient's referring physician for this Imaging Service Request. Both First Name and Last Name in alphanumeric characters are required. And First Name and Last Name has	Match/Return

		to be delimited by the caret "^" character (0x5E).	
Accession Number	0008,0050	A RIS generated number that identifies the order for the Study. Value is loaded from a worklist, or is entered by the user when creating or editing a patient in the patient list using the 'New' button or the 'Edit' button.	Match

Visit Identification Module PS3.3 section C.3-2			
Attribute Name	**Tag**	**Description**	**Field Use**
Admission ID	0038,0010	Identification number of the visit as assigned by the healthcare provider.	Return

ANNEX D – MPPS attributes

See S517-1070_Exhibit(MPPS Attributes).

ANNEX E – DAR-8000 Private Attributes

Table F.1 Patient level private attributes

Attribute Name	Tag	VR	VM	Description
Patient UID	1011,1000	UI	1	Unique identifier for Patient record.
Miscellaneous text	1011,1002	LO	1-4	Programmable text fields.
Equipment ID	1011,1004	UL	1	Acquisition Equipment ID.
Acquisition type	1011,1006	UL	1	Acquisition type.

Table F.2 Frame attributes

Attribute Name	Tag	VR	VM	Description
Frame Sequence	1021,1080	SQ	1	Sequence of frame data.
> Study/Series ID	1021,1000	UL	1	System generated ID.
> Image/Frame ID	1021,1002	UL	1	System generated ID.
> Status Flag	1021,1004	UL	1	Frame status attributes.
> Frame Instance UID	1021,1006	UI	1	Unique identifier for Frame record.
> Date	1021,1008	DA	1	Date that the frame was acquired.
> Time	1021,100A	TM	1	Time that the frame was acquired.
> DateTime	1021,100C	FD	1	Floating point representation of Frame Date/Time.
> Horizontal pixel shift	1021,100E	FL	1	Sub-pixel shift of frame (column direction).
> Vertical pixel shift	1021,1010	FL	1	Sub-pixel shift of frame (row direction).
> Min AIO window	1021,1012	UL	1	Auto Image Optimization minimum window value.
> Max AIO window	1021,1014	UL	1	Auto Image Optimization maximum window value.
> Avg AIO window	1021,1016	UL	1	Auto Image Optimization average window value.
> Tag Fields	1021,1018	UL	1	Acquisition system generated bit settings.
> Original Study/Series ID	1021,101A	UL	1	Acquisition system generated ID.
> Original Image/Frame ID	1021,101C	UL	1	Acquisition system generated ID.
> Acquisition Rate	1021,101E	FL	1	Rate at which frame was acquired.
> Supplemental data sequence	1021,1020	SQ	1	Sequence of supplemental data associated with frame.
> > Annotation	1041,1032	OB	1	Frame annotation information.
> > Graphic	1041,1034	OB	1	Frame graphical information.
> Positioner Angle	1021,1026	UL	1	Primary positioner angle in 1/10 degrees.
> Positioner Skew	1021,1028	UL	1	Secondary positioner angle in 1/10 degrees.
> KV	1021,102A	UL	1	KV * 10 (to preserve one decimal place).
> mA	1021,102C	UL	1	mA * 100 (to preserve two decimal places).
> mAs	1021,102E	UL	1	mAs * 100 (to preserve two decimal places).
> Window Center	1021,1030	DS	1	Frame Window Center value.
> Window Width	1021,1032	DS	1	Frame Window Width value.
> Table Height	1021,1034	FL	1	Table Height in mm.
> Table Lateral Position	1021,1036	FL	1	Table Lateral Position in mm.
> Table Longitudinal Position	1021,1038	FL	1	Table Longitudinal Position in mm.
> C-Arm Tilt Angle	1021,103A	FL	1	Angle in degrees of C-Arm tilt.

Table F.3 Acquisition attributes

Attribute Name	Tag	VR	VM	Description
Next available Study ID	1031,1000	UL	1	System generated ID.
Next available DMF ID	1031,1002	UL	1	System generated ID.
Study ID	1031,1004	UL	1	System generated Study ID.
Next available Series ID	1031,1006	UL	1	System generated ID.
Acquisition type	1031,1008	UL	1	Acquisition type.
Series ID	1031,100A	UL	1	System generated Series ID.
Next available Image ID	1031,100C	UL	1	System generated ID.
Original Study/Series ID	1031,100E	UL	1	System generated Study/Series ID.
Image Type	1031,1020	UL	1	System generated image type.
Integration level	1031,1022	UL	1	Integration level used for acquisition.
Image Study/Series ID	1031,1024	UL	1	System generated Study/Series ID stored with image record.
Image/Frame ID	1031,1026	UL	1	System generated Image/Frame ID stored with image record.
Image status flags	1031,1028	UL	1	System generated image status bits.
Image edge table	1031,102A	UL	1	Identifies edge table used at acquisition.
Image landmarking	1031,102C	UL	1	Identifies landmarking used at acquisition.
Image flip H/V	1031,102E	UL	1	Identifies Horizontal & Vertical flipping used at acquisition.
Image processing default settings	1031,1030	UL	1	Identifies default processing applied to image at acquisition.
Image AIO Average goal	1031,1032	UL	1	Auto Image Optimization average goal used during acquisition.
Image AIO Maximum goal	1031,1034	UL	1	Auto Image Optimization maximum goal used during acquisition.
Image AIO Minimum goal	1031,1036	UL	1	Auto Image Optimization minimum goal used during acquisition.
LUT control points	1031,1038	UL	1-8	Control points for display LUT.
Original image UID	1031,103A	UI	1	Original UID for image.
Digital stepping information	1031,103C	UL	1	Bit settings for digital stepping information.
Acquisition Angle	1031,103E	UL	1	Acquisition angle in 1/10 degrees.
Acquisition Skew	1031,1040	UL	1	Acquisition skew in 1/10 degrees.
APR value	1031,1042	UL	1	Anatomical Programmed Radiology value used at acquisition.
APR table version	1031,1044	UL	1	Anatomical Programmed Radiology table version.
Associated acquisition ID	1031,1046	UL	1	Loop/Frame ID value of an associated image (e.g. bi-plane images would reference each other).
Rotate degrees	1031,1048	UL	1	Degrees of rotation during acquisition.
Patient position	1031,104A	SH	1	Code for patient position during acquisition.
Procedure description	1031,104C	LO	1	Procedure description for Study record.
Magnification Factor	1031,104E	US	1	Magnification factor of acquistion system.
Target to image distance	1031,1050	FL	1	Distance from target to imaging plane in millimeters.

Accumulated Dose Area Product	1031,1052	UL	1	Study level attribute related to dosage exposure.
Accumulated Dose per Area	1031,1054	UL	1	Study level attribute related to dosage exposure.
Heart Rate	1031,1058	UL	1	Heart rate in Beats Per Minute.
Acquisition Window Width	1031,105A	US	1	Window Width setting when image was acquired.
Acquisition Window Center	1031,105C	US	1	Window Center setting when image was acquired.
AIO Window value	1031,105E	US	1	AIO Window Width setting.
AIO Level value	1031,1060	US	1	AIO Window Center setting.
Processing Default setting	1031,1062	US	1	AIO Acquisition processing setting.
Acquired with AIO setting	1031,1064	UL	1	Identifies images acquired with AIO.
AIO Min value	1031,1066	UL	1	AIO Minimum value.
AIO Max value	1031,1068	UL	1	AIO Maximum value.
AIO Avg value	1031,106A	UL	1	AIO Average value.
RF Creater Data Element	6911,0010	LO	1	Set 'SHRF1110.1'. Required for definition (6911, 10xx).
Pixel Spacing	6911,1020	DS	2	Required for measurement calibration.
Acquisition Rate	6911,1030	DS	1-n	Acquisition rate in FPS unit.
System Code of RF Table	6911,1050	IS	1	System Code of RF Table.
Coefficient for Virtual Layer Height	6911,1051	IS	1	Coefficient for Virtual Layer Height.
Oblique Angle	6911,1060	IS	1	Oblique Angle.
Sagittal Angle	6911,1061	IS	1	Sagittal Angle.
C-Arm Tilting Angle	6911,1063	IS	1	C-Arm Tilting Angle.
Ceiling Travel Longitudinal Position	6911,1064	IS	1	Ceiling Travel Longitudinal Position.
Ceiling Travel Transversal Position	6911,1065	IS	1	Ceiling Travel Transversal Position.
ISO Center Height	6911,1066	IS	1	ISO Center Height.
Table Height	6911,1067	IS	1	Table Height.
Table Longitudinal Position	6911,1068	IS	1	Table Longitudinal Position.
Table Transversal Position	6911,1069	IS	1	Table Transversal Position.
Subdivisional Acquisition Format	6911,1070	CS	1	Identifies the Subdivisional Acquisition Format that was selected when the image was acquired.

Table F.4 Review attributes

Attribute Name	Tag	VR	VM	Description
Shutter type	1041,1000	UL	1	Indicate type of shutter to apply to image (Auto low, Auto med, Auto high, manual).
Polarity	1041,1002	UL	1	Indicate if image is displayed normal or inverted.
Edge level	1041,1004	UL	1	Edge enhancement level to apply to image.
Zoom level	1041,1006	UL	1	Zoom factor to apply to image (2x, 3x, …).
Zoom x/y	1041,1008	UL	1	Center point of zoom region (x in high word, y in low word).
Mask Image/Frame ID	1041,100A	UL	1	System generated Image/Frame ID for mask image.
Region of Interest	1041,100C	UL	2	Upper/Left and Lower/Right coordinates of ROI.

Flip Horizontal/Vertical	1041,100E	UL	1	Indicate flip to apply to image (vertical in high word, horizontal in low word).
Loop Begin/End frames	1041,1020	UL	2	First element is start frame, second element is end frame for loop replay.
Supplemental data sequence	1041,1030	SQ	1	Sequence of supplemental data associated with image.
> Annotation	1041,1032	OB	1	Image annotation information.
> Graphic	1041,1034	OB	1	Image graphical information.
> XARF Modality Data	1041,103A	OB	1	Image acquisition modality data.
Image description	1041,1036	ST	1	User defined description of image.
Presentation Intent	1041,103C	CS	1	Identifies “For Processing” or “For Presentation”.

[NO TEXT]