

# MammoWorkstation



## DICOM V3.0 Conformance Statement

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DICOM MergeCOM3 Advanced Integrator's Tool Kit  
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## 0 Introduction

This is a conformance statement for the “MammoWorkstation” Mammography Workstation. MammoWorkstation is a diagnostic softcopy-reading workstation for digital or digitized mammograms and related modalities. The system includes report generation. MERGECOM-3™ Advanced Integrator’s Tool Kit is used to implement and provide DICOM services.

### 0.1 Definition, Acronyms, Abbreviations

This document uses the following abbreviations.

AE	Application Entity
CAD	Computer Aided Detection
DICOM	Digital Imaging and Communications in Medicine
DIMSE	DICOM Message Service Element
IOD	Information Object Definition
LUT	Look-up Table
PDU	Protocol Data Unit
SCP	Service Class Provider
SCU	Service Class User
SOP	Service Object Pair
SR	Structured Report
TCP/IP	Transmission Control Protocol/Internet Protocol
UID	Unique Identifier
VR	Value Representation

# 1 Implementation model

## 1.1 Application data flow diagram

The application data flow models for the MammoWorkstation are shown in the following illustration:

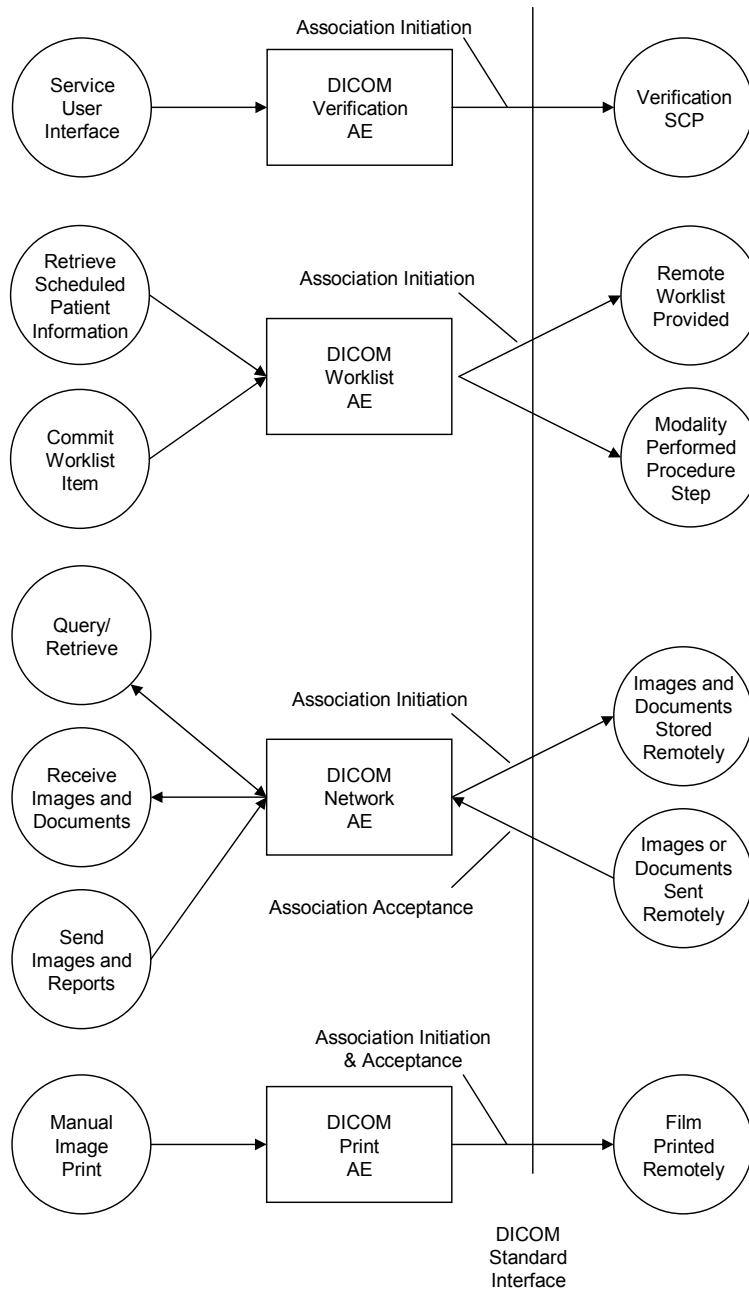


Figure 1.1-1 (Part1) – Application data flow diagram



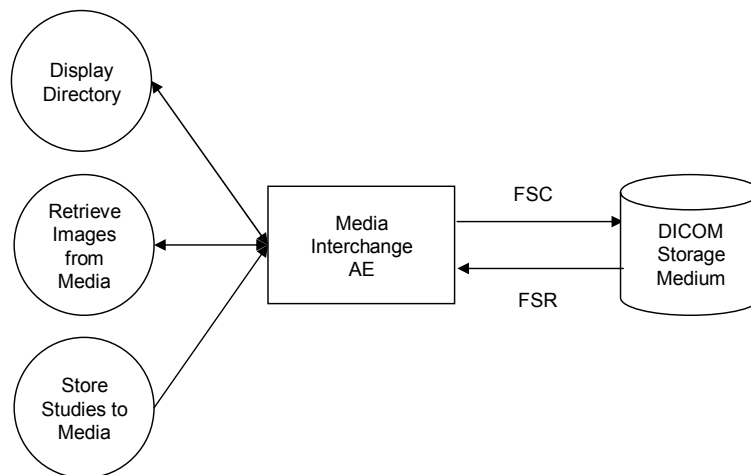


Figure 1.1-1 (Part2) – Application data flow diagram

The MammoWorkstation application is composed of the following Application Entities (AE): The DICOM Worklist Application Entity, the DICOM Network AE, the DICOM Print AE, and the DICOM Media Interchange AE.

The **DICOM Verification** Application Entity provides DICOM protocol verification with remote DICOM Services. The DICOM Verification AE is activated when an user with administrative privileges opens the configuration settings user interface and activates the “Echo” function for selected DICOM partner configuration.

The DICOM Verification AE provides the following Real World Activities:

- Verify the ability of a foreign DICOM application on a remote node to respond to DICOM messages (DICOM Verification SCU).

The **DICOM Worklist** Application Entity provides DICOM protocol communication with remote DICOM Modality Worklist Servers. The DICOM Worklist AE is activated when the user opens the worklist tab of the MammoWorkstation.

The DICOM Worklist AE provides the following Real World Activities:

- Retrieve scheduled patient information from a remote Worklist Server (DICOM Modality Worklist SCU).

The **DICOM Network** Application Entity provides DICOM protocol communication for images, structured reports and mammography CAD documents. The DICOM Network AE is automatically brought up when the MammoWorkstation is powered on.

The DICOM Network AE provides the following Real World Activities:

- Manual and automatic Query/Retrieve a remote DICOM archive to obtain a list of data at Patient level by clicking on the icon that represents the wanted remote DICOM AE (DICOM Query/Retrieve SCU). From the list the user can select an entry and retrieve the SOP Classes supported by the MammoWorkstation from the remote DICOM AE. The query is selective based on criteria described below in the document.
- Receive images and documents (structured reports, mammography CAD) sent from a remote DICOM AE to the MammoWorkstation (DICOM Receive SCP).
- Send images and reports to remote DICOM Storage stations (DICOM Store SCU).

The **DICOM Print** Application Entity provides DICOM protocol communication with Remote DICOM Printers. The DICOM Print AE is activated when the user requests for a print.

The DICOM Print AE provides the following Real World Activities:

- 
- Manual Image Print (DICOM Print SCU). For this operation the operator selects an image in the Viewer, then prints the image using the “Print” function.

The **DICOM Media Interchange** Application Entity is activated when the user requests to browse a DICOM Media.

The DICOM Media Interchange AE provides the following Real World Activities:

- Display Directory of a DICOM Storage Medium.
- Retrieve Images from a DICOM Storage Medium.
- Store studies to a DICOM Storage Medium.

Possible Media are local disk, CD or DVD.

## 1.2 Functional definition of Application Entities (AE)

### Verification AE:

The DICOM Verification AE initiates the following operations:

- Verify the ability of a foreign DICOM application on a remote node to respond to DICOM messages.

### Worklist AE:

When the user clicks on the “Worklist” tab in the patient selection window, he can search in the scheduled procedure steps inserted in a remote RIS using different filters (e.g. scheduled station, scheduled date). Then the scheduled procedure steps are shown in a list control contained in the dialog box. The user can select one item and start to review the corresponding patient. The Performed Procedure Step Manager is used to update status information.

### Network AE:

The DICOM Network AE initiates the following operations:

- Access patient demographics and pixel data in the local database.
- Initiate a DICOM association to ask for remote patient demographics.
- Initiate a DICOM association to ask for transmit SOP Classes (images, structured reports, mammography CAD documents) from a remote DICOM AE to MammoWorkstation
- Initiate a DICOM association to send DICOM SOP Classes (secondary capture images, structured reports) to a remote DICOM AE.

The DICOM Network AE waits for association requests from Remote AE:

- Answer to DICOM associations transmitting DICOM SOP Classes (images, structured reports, mammography CAD documents) to be stored on the MammoWorkstation

### Print AE:

The DICOM Print AE initiates the following operations:

- Initiate a DICOM association to send DICOM SOP Classes (corresponding to the DICOM Print Management service class) to a remote DICOM Printer.

### Media Interchange AE:

The DICOM **Media Interchange AE** initiates the following operations:

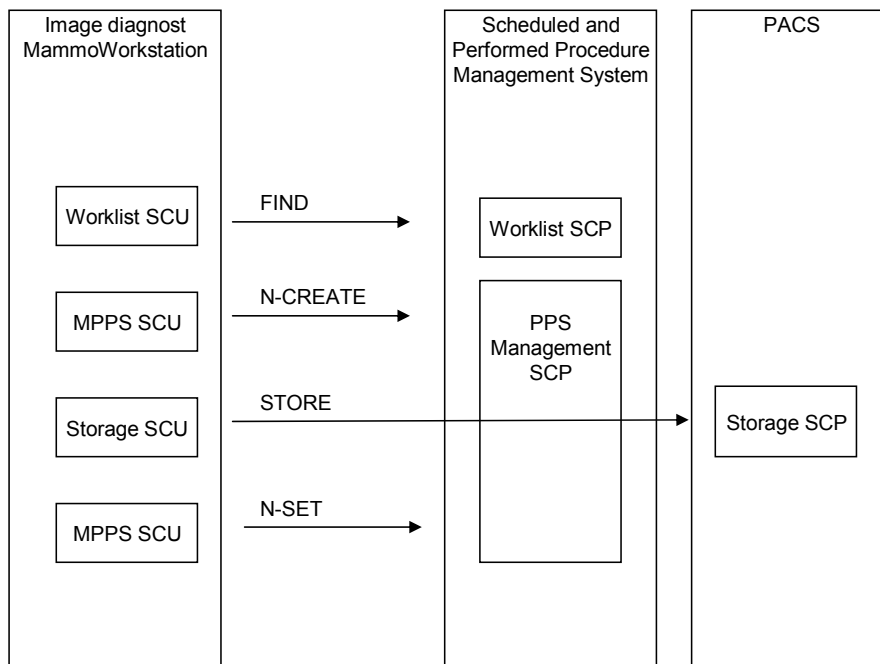
- When the user clicks on a configured “DICOM CD” source, referring to an existing media, the user can browse the media and he can select and import studies from the media.
- When the user clicks on the “Export to DICOM CD” button, the user can create a new media containing the selected studies.

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## 1.3 Sequencing of real-world activities

### 1.3.1 Modality Performed Procedure Step

Sequencing of worklist, storage and performed procedure step management activities:



### 1.3.2 Manual Image Print

1. The user selects an image in the viewer and opens the Print Manager dialog.
2. The Print Manager dialog is displayed with the "Print" button initially locked. The Print manager retrieves the printer status by activating the DICOM Print SCU AE that initiates the following actions.
3. Initiates a DICOM association and selects a Presentation Context
4. N-GETs printer status from the Printer SOP Instance
  - a. If Printer Status is NORMAL
    - i. Association is released
    - ii. The Print manager enables the "Print" button, i.e. the user may initiate printing.
  - b. Else
    - i. Signal printer failure to the user
    - ii. The "Print" function remains locked
    - iii. Association is aborted
5. The user may select options in the Print Manager such as applying a calibration LUT and then prints the image using the "Print" button.
6. The Print Manager receives the "Print" request, composes a film, and activates the DICOM Print AE again. The AE then initiates the following actions:
7. Initiate a DICOM association and select the Presentation Context
8. N-CREATEs a Basic Film Session SOP instance
9. N-CREATEs a Basic Film Box SOP instance for the current film

- 
10. N-SETs the Basic Film Box SOP Instance with the Image Box SOP Instance for each image on the film.
  11. If the user selected a calibration LUT:
    - a. composes the corresponding Presentation LUT
    - b. N-CREATEs a Presentation LUT SOP instance for the current film
    - c. Creates a Referenced Presentation LUT Sequence in the Basic Film SOP Instance that contains a reference to this Presentation LUT SOP instance
  12. N-ACTIONs on the Basic Film Box SOP Instance
  13. N-DELETEs on the Basic Film Box SOP Instance
  14. Releases the DICOM association after printing is successful or failure has been signaled to the user.

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## 2 AE specifications

### 2.1 Verification AE

The Verification AE, in conjunction with MergeCOM-3, provides Standard Conformance to the following DICOM V3.0 Service Object Pair (SOP) Class as a Modality Worklist Service Class User (SCU):

SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1

#### 2.1.1 Association establishment policies

##### 2.1.1.1 General

The VERIFICATION AE will initiate an association for DIMSE C-ECHO service operations.

##### 2.1.1.2 Number of associations

The VERIFICATION AE allows a single association for association initiation.

##### 2.1.1.3 Asynchronous nature

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

##### 2.1.1.4 Implementation identifying information

The Implementation Class Unique Identifier (UID) for the WORKLIST AE is:

Implementation UID	1.2.276.0.69.25.1.1
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#### 2.1.2 Association initiation by real-world activity

The following real world activities initiate association for the VERIFICATION AE:

1. Verify the ability of a foreign DICOM application on a remote node to respond to DICOM messages

##### 2.1.2.1 Real-world activity: "Verification"

###### 2.1.2.1.1 Associated real-world activity for "Request verification"

The DICOM Verification AE is activated when an user with administrative privileges opens the configuration settings user interface and activates the "Echo" function for selected DICOM partner configuration. The status of the C-ECHO Response from the remote application is indicated in the user interface. A green lamp indicates "success". A red lamp indicates all other statuses.

###### 2.1.2.1.2 Proposed presentation contexts for "Request verification"

The presentation contexts that are proposed by VERIFICATION AE for the verification operation are:

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Verification	1.2.840.10008.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		

### 2.1.3 Association Acceptance Policy

VERIFICATION AE does not respond to attempts by a remote AE to open an association.

## 2.2 Worklist AE

The Worklist AE, in conjunction with MergeCOM-3, provides Standard Conformance to the following DICOM V3.0 Service Object Pair (SOP) Class as a Modality Worklist Service Class User (SCU):

SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3

### 2.2.1 Association establishment policies

#### 2.2.1.1 General

The WORKLIST AE will initiate an association as a Modality Worklist Service Class User requesting Application Entity Title and patient data.

The PDU size is 28672 bytes.

#### 2.2.1.2 Number of associations

The WORKLIST AE allows a single association for association initiation.

#### 2.2.1.3 Asynchronous nature

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

#### 2.2.1.4 Implementation identifying information

The Implementation Class Unique Identifier (UID) for the WORKLIST AE is:

Implementation UID	1.2.276.0.69.25.1.1
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### 2.2.2 Association initiation by real-world activity

The following real world activities initiate association for the WORKLIST AE:

2. Retrieve Scheduled Patient information
3. User Commits Worklist item

**2.2.2.1 Real-world activity: “Retrieve Scheduled Patient information”**

2.2.2.1.1 Associated real-world activity for “Retrieve Scheduled Patient information”

When the user clicks on the “Worklist” tab from the MammoWorkstation and then on the “Refresh” button, the Worklist AE initiates an association for the appropriate Modality Worklist Service Class that corresponds to the set of data requested to be transferred. Then the Worklist AE performs a C-FIND and it is closed when all the response items are received from the remote SCP.

2.2.2.1.2 Proposed presentation contexts for “Retrieve Scheduled Patient information”

The presentation contexts that are proposed by WORKLIST AE for the FIND operation are:

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	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		

2.2.2.1.2.1 SOP Specific Conformance Statement for Modality Worklist Find

WORKLIST AE provides standard conformance as an SCU to the Modality Worklist Service Class and uses the following elements for this SOP class.:

Description / Name	Tag	Matching Key Type	Return Key Type
<b>SOP Common</b>			
Specific Character Set	(0008,0005)	O	1C
<b>Scheduled Procedure Step</b>			
Scheduled Procedure Step Sequence	(0040,0100)	R	1
>Scheduled Station AE Title	(0040,0001)	R	1
>Scheduled Procedure Step Start Date	(0040,0002)	R	1
>Scheduled Procedure Step Start Time	(0040,0002)	R	1
>Modality	(0008,0060)	R	1
>Scheduled Performing Physician’s Name	(0040,0006)	R	2
>Scheduled Procedure Step Description	(0040,0007)	O	1C
>Scheduled Station Name	(0040,0010)	O	2
>Scheduled Procedure Step ID	(0040,0009)	O	1
<b>Requested Procedure</b>			
Requested Procedure ID	(0040,1001)	O	1
Requested Procedure Description	(0032,1060)	O	1C
Study Instance UID	(0020,000D)	O	1

<b>Imaging Service Request</b>			
Accession Number	(0008,0050)	O	2
Referring Physician's Name	(0008,0090)	O	2
<b>Patient Identification</b>			
Patient's Name	(0010,0010)	R	1
Patient ID	(0010,0020)	R	1
<b>Patient Demographic</b>			
Patient's Birth Date	(0010,0030)	O	2
Patient's Sex	(0010,0040)	O	2

### 2.2.2.2 Real-world activity: "Commit Worklist item"

#### 2.2.2.2.1 Associated real-world activity for "Commit Worklist item"

When the user select an item from the worklist, the MammoWorkstation sends a N-CREATE request.

#### 2.2.2.2.2 Proposed presentation contexts for "Commit Worklist item"

The presentation contexts that are proposed by WORKLIST AE for the FIND operation are:

<b>Presentation Context Table</b>					
<b>Abstract Syntax</b>		<b>Transfer Syntax</b>		<b>Role</b>	<b>Extended Negotiation</b>
<b>Name</b>	<b>UID</b>	<b>Name List</b>	<b>UID List</b>		
Modality Performed Procedure Step	1.2.840.10008.3.1. 2.3.3	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		

### 2.2.3 Association Acceptance Policy

WORKLIST AE does not respond to attempts by a remote AE to open an association.



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## 2.3 NETWORK AE

The Network AE, in conjunction with MergeCOM-3, provides Standard Conformance to the following DICOM V3.0 Service Object Pair (SOP) Classes as a Service Class User (SCU):

SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1
Computed Radiography Image Storage	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
Digital Mammography X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.2
Digital Mammography X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.2.1
CT Image Storage	1.2.840.10008.5.1.4.1.1.2
MR Image Storage	1.2.840.10008.5.1.4.1.1.4
US Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1
Basic Text SR	1.2.840.10008.5.1.4.1.1.88.11
Mammography CAD SR	1.2.840.10008.5.1.4.1.1.88.50
Patient Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1
Patient Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1
Study Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2

The Network AE, in conjunction with MergeCOM-3, provides Standard Conformance to the following DICOM V3.0 Service Object Pair (SOP) Classes as a Service Class Provider (SCP):

SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1
Computed Radiography Image Storage	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
Digital Mammography X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.2
Digital Mammography X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.2.1
CT Image Storage	1.2.840.10008.5.1.4.1.1.2
MR Image Storage	1.2.840.10008.5.1.4.1.1.4
US Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1
Basic Text SR	1.2.840.10008.5.1.4.1.1.88.11
Mammography CAD SR	1.2.840.10008.5.1.4.1.1.88.50

### 2.3.1 Association establishment policies

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### 2.3.1.1 General

The Network AE will initiate an association as an SCU of Storage Services when

- a local operator requests to send images or structured reports over the network to a remote Storage Service Class provider.

The PDU size is 28672 bytes.

### 2.3.1.2 Number of associations

The Network AE opens one Store association for each image to be sent to the storage station. The Network AE will accept up to five associations at the same time.

### 2.3.1.3 Asynchronous nature

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

### 2.3.1.4 Implementation identifying information

The Implementation Class Unique Identifier (UID) for the NETWORK AE is:

Implementation UID	1.2.276.0.69.25.1.1
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## 2.3.2 Association initiation by real-world activity

### 2.3.2.1 Real-world activity: “Query/Retrieve”

#### 2.3.2.1.1 Associated real-world activity for “Query/Retrieve”

The operator queries a Remote database by selecting the “search” tab and clicking on the icon representing the DICOM Remote AE. A list control displays the results upon successful query.

Then the operator can select one or several Patients and can either click the “Pull” icon to retrieve the selection on the MammoWorkstation database or click the “Select” icon to retrieve the selection on the MammoWorkstation and start reviewing the first Patient in the list.

These operations will cause:

- The DICOM NETWORK AE to initiate a DICOM association
- The DICOM NETWORK AE to emit a C-FIND request to get a list of patients regarding the criteria listed below, the to get the appropriate studies, series or images for the selected list of patients.
- The DICOM NETWORK AE to emit a C-FIND request to specify a selected list of studies/series/images to be sent by the Remote Host to the MammoWorkstation

#### 2.3.2.1.2 Association Initiation Policy

The NETWORK AE initiates a new association for querying Patient Folders (or Studies/Series/Images) on a remote DICOM AE. This association corresponds to one Real World Activity:

#### 2.3.2.1.3 Proposed presentation contexts for “Query/Retrieve”

The presentation contexts that are proposed by NETWORK AE for the FIND and MOVE operation are:

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Patient Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
Patient Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.1.2	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		

2.3.2.1.3.1 SOP Specific Conformance Statement for the Model Patient Root Query/Retrieve Information Model – FIND SOP Class

Following are the status codes that are more specifically processed when receiving messages from a Query SCP equipment:

Service Status	Status Codes	Further Meaning	Application Behaviour When receiving Status Codes	Related Fields Processed if received
Refused	A700	Out of resources	Association is closed. Appropriate message is displayed to the user.	(0000,0902)
	0122	SOP Class not Supported	Association is closed. Appropriate message is displayed to the user.	(0000,0902)
Failed	A900	Identifier does not match SOP Class	Association is closed. Error message is displayed to the user.	(0000,0901) (0000,0902)
	Cxxx	Unable to process	Association is closed. Error message is displayed to the user.	(0000,0901) (0000,0902)
Cancel	FE00	Matching terminated due to cancel	Association is closed. Error message is displayed to the user.	None
Success	0000	Matching is complete – No final identifier is supplied		None
Pending	FF00	Matches are continuing – Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys		Identifier

	FF01	Matches are continuing – Warning that one or more Optional Keys were not supported for existence and/or matching for this Identifier.		Identifier
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### 2.3.2.1.3.2 SOP Specific Conformance Statement for the Model Study Root Query/Retrieve Information Model – FIND SOP Class

See section on Patient Root Query/Retrieve Information Model – FIND SOP Class.

### 2.3.2.2 Real-world activity: “Send Images and Reports”

#### 2.3.2.2.1 Associated real-world activity for “Send Images and Reports”

When the user selects some studies/series/images, clicks on the “DICOM Store” button from the MammoWorkstation database and then selects the remote AE, the NETWORK AE initiates an association for each image contained in the selected study/series/image list. Every association is closed when the image has been sent (successfully or not) to the remote SCP. The NETWORK AE supports JPEG 2000 compression. Compression can be configured in the MammoWorkstation and is invoked automatically.

#### 2.3.2.2.2 Proposed presentation contexts for “Send Images and Reports”

The presentation contexts that are proposed by NETWORK AE for the “Manual Storing” real world activity are:

Presentation Context Table - Proposed					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Verification	1.2.840.10008.1	Implicit VR Little Endian	1.2.840.10008.1.1	SCU	None
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90		
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90		
Digital X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90		

		JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91		
Digital Mammography X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.2	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90		
		JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91		
Digital Mammography X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90		
		JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91		
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90		
		JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91		
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90		
		JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91		
US Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90		
		JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91		
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90		
		JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91		
Grayscale Presentation Softcopy State Storage	1.2.840.10008.5.1.4.1.1.11.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90		
		JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91		

Basic Text SR	1.2.840.10008.5.1.4.1.1 .88.11	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
Mammography CAD SR	1.2.840.10008.5.1.4.1.1 .88.50	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		

### 2.3.2.2.2.1 SOP Specific Conformance Statement for Digital Mammography Image Storage – For Presentation SOP Class

The NETWORK AE will react in the following ways to the different C-STORE response status:

- Refused: the SCU will show the FAILED status for the image to be sent.
- Error: the SCU will show the FAILED status for the image to be sent.
- Warning: the SCU will show the SUCCESS status for the image to be sent.
- Success: the SCU will show the SUCCESS status for the image to be sent.

NETWORK AE will not attempt any extended negotiation.

### 2.3.2.2.2.2 SOP Specific Conformance Statement for Digital Mammography Image Storage – For Processing SOP Class

Same as SOP Specific Conformance Statement for Digital Mammography Image Storage – For Presentation SOP Class.

## 2.3.3 Association Acceptance Policy

When the NETWORK AE accepts an association, it will receive any images transmitted on that association and store the supported SOP Classes on disk. Any Remote DICOM AE can send images to the NETWORK AE.

### 2.3.3.1 Real-world activity: “Receive Images and Documents”

The NETWORK AE accepts an association when it receives a valid association request from a DICOM Storage SCU.

#### 2.3.3.1.1 Associated real-world activity for “Receive Images and Documents”

The NETWORK AE waits for any association. No operator is required to receive an image.

#### 2.3.3.1.2 Accepted presentation contexts for “Receive Images and Documents”

Presentation Context Table – Accepted					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Verification	1.2.840.10008.1	Implicit VR Little Endian	1.2.840.10008.1.1	SCP	None
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1 .1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
		Implicit VR Little Endian	1.2.840.10008.1.2		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90		

		JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91		
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
		Implicit VR Little Endian	1.2.840.10008.1.2		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90		
		JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91		
Digital X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
		Implicit VR Little Endian	1.2.840.10008.1.2		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90		
		JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91		
Digital Mammography X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.2	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
		Implicit VR Little Endian	1.2.840.10008.1.2		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90		
		JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91		
Digital Mammography X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
		Implicit VR Little Endian	1.2.840.10008.1.2		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90		
		JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91		
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
		Implicit VR Little Endian	1.2.840.10008.1.2		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90		
		JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91		
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
		Implicit VR Little Endian	1.2.840.10008.1.2		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90		
		JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91		
US Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
		Implicit VR Little Endian	1.2.840.10008.1.2		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90		
		JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91		

Secondary Image Storage	Capture	1.2.840.10008.5.1.4.1.1.7	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
			Implicit VR Little Endian	1.2.840.10008.1.2		
			Explicit VR Big Endian	1.2.840.10008.1.2.2		
			JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90		
			JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91		
Grayscale Presentation Storage	Softcopy State	1.2.840.10008.5.1.4.1.1.11.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
			Implicit VR Little Endian	1.2.840.10008.1.2		
			Explicit VR Big Endian	1.2.840.10008.1.2.2		
			JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90		
			JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91		
Basic Text SR		1.2.840.10008.5.1.4.1.1.88.11	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
			Implicit VR Little Endian	1.2.840.10008.1.2		
			Explicit VR Big Endian	1.2.840.10008.1.2.2		
Mammography CAD SR		1.2.840.10008.5.1.4.1.1.88.50	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
			Implicit VR Little Endian	1.2.840.10008.1.2		
			Explicit VR Big Endian	1.2.840.10008.1.2.2		

### 2.3.3.1.2.1 SOP Specific DICOM Conformance Statement for Storage SOP Classes

Following are the status codes the Application may send back to the SCU Equipment after performing the requested Storage:

Service Status	Status Codes	Further Meaning	Application Behaviour When receiving Status Codes	Related Fields Processed if received
Refused	A7xx	Out of resources	Indicated that there was not enough space or some other internal resource to store the image. The user should attempt to recovery by removing some images from the MammoAorkstation database	(0000,0902)
Error	0110	Processing Failure	Indicates that an internal system call has failed while processing the image	(0000,0902)
Success	0000			None

**Note:** Images sent in JPEG-2000 transfer syntax are decompressed by the NETWORK AE.

**Note:** Correct transmission of images through the Network AE by itself does not guarantee an image to be visualized on MammoWorkstation. Only MG images are guaranteed to display correctly. The display of other modality images is not guaranteed. All modalities are managed by the database.

For images to be displayed on MammoWorkstation they must meet certain minimum DICOM requirements. Functionality, such as automatically sorted images in the Patient Folder can only be guaranteed when these DICOM requirements are met:



Tag	Attribute Name	Accepted Values
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**1. Accepted Modalities for X-ray mammography**

General Series Module Attributes (C.7-5)

0008,0060	Modality	MG   CR*   OT
0018,0015	Body Part Examined	BREAST

Images from other modalities are not interpreted as X-Ray Mammography. Instead they appear in the “Additional Series” list.

\*For Fuji-CR there is a “MG-Option” which is to be used instead of CR.

**2. Sorted Patient Folder**

General Image Module Attributes (C.7-9)

0020,0020	Patient Orientation	P,FL   A,FR   P,L   A,R   P,F   A,F
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Mammography Image Module Attributes (C.8-70)

0020,0062	Image Laterality	R   L
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CR-Image (C.8-2), X-Ray Image (C.8-26), DX Positioning Module Attr. (C.8-68)

0018,5101	View Position	CC   MLO   ML
-----------	---------------	---------------

Remark: For Agfa CR also the Series Description Description (0008,103E, General Series Module Attributes C.7-5) is interpreted.

Translation table for standard orientations:

Patient Orientation	Image Laterality	View Position
P, L	R	CC
A, R	L	CC
P, FL	R	MLO
A, FR	L	MLO
P, F	R	ML
A, F	L	ML

MammoWorkstation supports additional values for patient orientation with automatic flip and rotation of images for proper display.

If Patient Orientation is missing, the „View Code Sequence“ is used according to SNM3:

Code Value	Code Meaning	equivalent View Position	View Position in Workstation
R-10242	cranio caudal	CC	CC
R-10224	medio-lateral	ML	ML
R-10226	medio-lateral oblique	MLO	MLO
R-10244	caudo-cranial	FB	CC
R-10228	latero-medial	LM	ML
R-10230	latero-medial oblique	LMO	MLO

The following “View Modifier Sequences” are supported:

Code Value	Code Meaning	Image type in Workstation
R-102D6	Magnification	Magnification

If none of the above values are set, then the MammoWorkstation cannot sort the images according to laterality and view position. The images will be displayed unsorted in the Patient Folder.

### 3. Measurements and Scales, Quadrant-Zoom, DICOM-Print

CR-Image Module Attributes (C.8-2) / X-Ray Image Module Attributes (C.8-26)  
0018,1164 Imager Pixel Spacing

The following attribute overrides the Imager Pixel Spacing:

Image Plane Module Attributes (C.7-10)  
0028,0030 Pixel Spacing

If none of these values are available, then the 1:1cm display function will be deactivated. Furthermore, the scales in the Magnifying Glass and measurement function will be deactivated. DICOM print is, as well, not possible.

### 4. Windowing

VOI LUT Module Attributes (C.11-2)  
0028,1050 Window Center  
0028,1051 Window Width  
0028,1055 Window Center & Width Explanation  
0028,3010 VOI LUT Sequence

If a VOI LUT Sequence is present, it overrides the Window attributes.

If none of these values are set, the MammoWorkstation applies default values.

In addition, the VOI LUT Module is supported, cf. Appendix

#### 2.3.3.1.3 VOI LUT Attributes Module

Attribute name	Tag	Attribute Description
VOI LUT Sequence	(0028,3010)	Defines a sequence of VOI LUTs.
> LUT Descriptor	(0028,3002)	Specifies the format of the LUT Data in this Sequence. See C.11.2.1.1 for further explanation. Required if the VOI LUT Sequence (0028,3010) is sent..
> LUT Explanation	(0028,3003)	No used
> LUT Data	(0028,3006)	LUT Data in this Sequence. Required if the VOI LUT Sequence (0028,3010) is sent.
Window Center	(0028,1050)	Window Center for display. See C.11.2.1.2 for further explanation
Window Width	(0028,1051)	Window Width for display. See C.11.2.1.2 for further explanation. Required if Window Center (0028,1050) is sent.
Window Center & Width Explanation	(0028,1055)	Free form explanation of the meaning of the Window Center and Width. Multiple values correspond to multiple Window

---

#### 2.3.3.1.4 Presentation Context Acceptance Criterion

Only known SOP Classes are accepted.

## 2.4 PRINT AE

The Print AE, in conjunction with MergeCOM-3, provides Standard Conformance to the following DICOM V3.0 Service Object Pair (SOP) Class as DICOM Print SCU.

SOP Class Name	SOP Class UID
Basic Grayscale Print Management (META)	1.2.840.10008.5.1.1.9
Basic Film Session	1.2.840.10008.5.1.1.1
Basic Film Box	1.2.840.10008.5.1.1.2
Basic Grayscale Image Box	1.2.840.10008.5.1.1.4
Printer	1.2.840.10008.5.1.1.16
Presentation LUT	1.2.840.10008.5.1.1.23

### 2.4.1 Association establishment policies

#### 2.4.1.1 General

The PRINT AE will initiate an association as DICOM Basic Print Class User.

The PDU size is 28672 bytes.

The Print Management Service Class does not support extended negotiation.

#### 2.4.1.2 Number of associations

The PRINT AE supports only one association at a time. Requests are internally queued.

#### 2.4.1.3 Asynchronous nature

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

#### 2.4.1.4 Implementation identifying information

The Implementation Class Unique Identifier (UID) for the PRINT AE is:

Implementation UID	1.2.276.0.69.25.1.1
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### 2.4.2 Association initiation by real-world activity

There is only one real world activity that initiates association for the PRINT AE:

1. Manual Image Print

The PRINT AE initiates one association with the selected remote DICOM Printer. No other association can be opened by the PRINT AE while the current association is active.

---

### 2.4.2.1 Real-world activity: “Manual Image Print”

#### 2.4.2.1.1 Associated real-world activity for “Manual Image Print”

The user has the possibility to select an image in the Viewer and to print it through the “Print” function of the Print Manager. The Print Manager allows to manipulate some print parameters like the number of copies. When the user requests to print by pushing the “Print” button, the PRINT AE tries to establish the association with the requested printer and sends the images to printing.

#### 2.4.2.1.2 Proposed Presentation contexts for “Manual Image Print”

Presentation Context Table – Proposed					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Presentation LUT	1.2.840.10008.5.1.1.23	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

#### 2.4.2.1.2.1 SOP Specific DICOM Conformance Statement for Print Management SOP Class

For each of the supported Print Management SOP and Meta SOP Classes, the optional attributed and service elements supported, the valid range of values for mandatory and optional attributes, and the status code behavior are described in Annex.

### 2.4.3 Association Acceptance Policy

PRINT AE does not respond to attempts by a remote AE to open an association.

---

## 2.5 MEDIA INTERCHANGE AE

### 2.5.1 Introduction

The Media Interchange AE, in conjunction with MergeCOM-3, provides Standard Conformance to DICOM V3.0 Media Interchange. Service Object Pair (SOP) Class as File-Set Creator (FSC) and File-Set Reader (FSR).

MammoWorkstation provides capabilities to DICOM interchange on CD-Rs (Compact Disc-Recordable), and on CDROMs (Compact Disc Read Only Memory). The MammoWorkstation accepts Secondary capture (SC), Digital Mammography X-Ray (MG) For Processing, Digital Mammography X-Ray (MG) For Presentation, and Computed Radiography (CR) images.

### 2.5.2 Implementation Model

#### 2.5.2.1 Application Data Flow Diagram

Please confer to Figure 1.1.1.

### 2.5.3 Functional definition of the Media Interchange AE

The Media Interchange AE supports the following features:

- access to patient demographics and pixel data in the local database.
- generate a DICOM File Set (FSC) on the local disk to be burned on a CD-R.
- read a DICOM File Set (FSR) on a CD-R/CDROM or from local disk for showing the media directory.
- read a DICOM File Set (FSR) on a CD-R/CDROM or from local disk for importing the selected studies.

### 2.5.4 File Meta Information For Implementation Class And Version

File Meta Information Version	1
Implementation UID	1.2.276.0.69.25.1.1

### 2.5.5 AE SPECIFICATION

#### 2.5.5.1 Media Interchange AE Specification

The DICOM CDR/CDROM SERVER Application Entity provides standard conformance to DICOM Interchange Option of the Media Storage Service Class. The application Profiles and roles are listed below.

Application Profiles Supported	Real World Activity	Role	SC Option
STD-AP	CD-R burning	FSC	Interchange
	CD-R/CDROM reading	FSR	Interchange

#### 2.5.5.2 File Meta Information for the Application Entity

File Meta Information Version	1
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**2.5.5.3 Real world activities for the Media Interchange AE**

2.5.5.3.1 Display Directory

2.5.5.3.2 Real world activity “CD-R burning”

In this fashion the Media Interchange AE acts as File-Set Creator (FSC) using the Interchange Option. After selecting at least one study the user can create a new DICOM file set by first clicking the DICOM CD button afterwards the Burn CD button. The Directory Information Module is always created and the Basic Directory IOD Definition Model is made from standard tags either of type 1 or 2 and from the Study Instance UID tag which is of type 1C.

2.5.5.3.2.1 Media Storage Application Profile

Please see the 2.4.2.1 Section.

2.5.5.3.2.2 Options

Following are the SOP Classes supported by the “CD-burning” activity:

Presentation Context Table				
Abstract Syntax		Transfer Syntax		Role
UID	Name	Name List	UID List	
1.2.840.10008.1.3.10	Media Storage Directory Storage	Explicit VR Little Endian	1.2.840.10008.1.2.1	FSC
1.2.840.10008.5.1.4.1.1 .1.2	Digital Mammography Image Storage - For Processing			
1.2.840.10008.5.1.4.1.1 .1.2.1	Digital Mammography Image Storage - For Presentation			
1.2.840.10008.5.1.4.1.1 .1	Computed Radiography Image Storage			
1.2.840.10008.5.1.4.1.1 .7	Secondary Capture Image Storage			

2.5.5.3.3 Real world activity “CD-R/CDROM reading”

In this fashion the Media Interchange acts as File-Set Reader (FSR) using the Interchange Option and the application entity supports any Basic Directory IOD made from tags either of type 1 (1C) or 2.

The user can browse a DICOM file set from a CD-R/CDROM by first clicking the DICOM CD button and then the Import CD button. At this point a new Dialog Window is displayed on the screen where there is the list of the studies burned on the CD-R/CDROM: the user may select one or more studies to import into the local database by clicking the Import Studies button.

2.5.5.3.3.1 Media Storage Application Profile

Please see the 2.4.2.1 Section.

2.5.5.3.3.2 Options

Following are the SOP Classes supported by the “CD-R/CDROM reading” activity:

Presentation Context Table				
Abstract Syntax		Transfer Syntax		Role
UID	Name	Name List	UID List	
1.2.840.10008.1.3.10	Media Storage Directory Storage	Explicit VR Little Endian	1.2.840.10008.1.2.1	FSC
1.2.840.10008.5.1.4.1.1.1.2	Digital Mammography Image Storage - For Processing			
1.2.840.10008.5.1.4.1.1.1.2.1	Digital Mammography Image Storage - For Presentation			
1.2.840.10008.5.1.4.1.1.1	Computed Radiography Image Storage			
1.2.840.10008.5.1.4.1.1.7	Secondary Capture Image Storage			

**2.5.6 Augmented And Private Application Profiles**

No augmented or private application profiles are implemented by this application entity.

**2.5.7 Extensions, Specializations And Privatizations Of SOP Classes And Transfer Syntaxes**

No extensions, specialization or privatizations of SOP classes or transfer syntaxes are implemented by this application entity

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## 3 Communication profiles

### 3.1 Supported Communication Stacks

MammoWorkstation provides DICOM V3.0 TCP/IP Network Communication Support as defined in PS 3.8.

### 3.2 TCP/IP Stack

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

#### 3.2.1 Physical Media Support

The MammoWorkstation is indifferent to the physical medium over which TCP/IP executes; it inherits this from the operating system on which it exists.

## 4 Extensions/specializations/privatizations

### 4.1 Standard extended/specialized/private SOPs

None supported.

### 4.2 Private Transfer Syntaxes

None supported.

## 5 Configuration

The DICOM configuration is set by a MammoWorkstation configuration dialog available from the Login Screen. The operator may set the following parameters:

- MammoWorkstation AE Title and receive SCP Port
- Add or remove Sources (DICOM Query/Retrieve, DICOM Media)
- Add or remove Destinations (DICOM Store)
- Configure DICOM Modality Worklist SCU
- Configure remote DICOM Printer

### 5.1 AE title/presentation address mapping

Before communicating with a remote AE (WORKLIST AE, NETWORK AE, PRINT AE) the operator must register it by using the MammoWorkstation DICOM configuration. This task requires to specify the following information:

1. Remote AE Title
2. Remote IP Address
3. Listening TCP/IP Port Number

This information is used by the MergeCOM-3 Advanced DICOM Tool Kit to communicate over the TCP/IP protocol stack.



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## 5.2 Configurable parameters

VERIFICATION AE:

NETWORK AE:

PRINT AE:

For this AE (local), the following fields are configurable:

- Local AE Title
- Local IP Address

**Note:** The local Port Number is not applicable because the product is never responding to an association request.

The following fields are configurable for every remote DICOM AE:

- Remote AE Title
- Remote IP Address
- Listening TCP/IP Port Number

**Note:** All configurations must be performed by an Image Diagnost Field Engineer or a certified partner.

## 6 Support of extended character sets

Not supported.

## 7 Annex: Structured Reporting SOP Class Definition

### 7.1 Introduction

This section of the DICOM Conformance Statement specifies the supported DICOM Structured Report SOP Classes, the optional attributes supported, and the valid range of values for mandatory and optional attributes.

### 7.2 Structured Report SOP Class Definitions

Image Diagnost follows DICOM Standard Part 16 und Supplement 79 for encoding for Mammography Structured Reports.

#### 7.2.1 Templates

##### 7.2.1.1 TID 4200 BREAST IMAGING REPORT

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Constraint	Set
1			CONTAINER	EV (111400, DCM, "Breast Imaging Report")	1	M			
2	>	HAS CONCEPT MOD	INCLUDE	DTID (1204) Language of Content Item and Descendants	1	M			
3	>	CONTAINS	INCLUDE	DTID (4202) Breast Imaging Report Narrative	1	M			
4	>	CONTAINS	INCLUDE	DTID (4208) Breast Imaging Report Supplementary Data	1	U			

##### 7.2.1.2 TID 1204 LANGUAGE OF CONTENT ITEM AND DESCENDANTS

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1		CONCEPT MOD	CODE	EV (121049,DCM,"Language of Content Item and Descendants"	1	M		DCID(5000) Image Diagnost wert ist: (RFC 3066, de-1996)
2		CONCEPT MOD	CODE	(121046,DCM,"Country of Language")	1	U		DCID(5001)

##### 7.2.1.3 TID 4202 BREAST IMAGING REPORT NARRATIVE

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Constraint	Set
1			CONTAINER	EV (111412, DCM, "Narrative Summary"	1	M			
2	>	CONTAINS	CONTAINER	BCID (6052) Breast Imaging Report Section Title	1-n	M			
3	>>	HAS OBS CONTEXT	INCLUDE	DTID (1002) Observer Context	1-n	U	Not used by Image Diagnost		
4	>>	CONTAINS	TEXT	BCID (6053) Breast Imaging Report Elements	1	M			
5	>>>	INFERRED FROM	INCLUDE	DTID (350) References to Supporting Evidence	1	U	Not used by Image Diagnost		

#### 7.2.1.4 TID 4208 BREAST IMAGING REPORT SUPPLEMENTARY DATA

	NL	Rel Parent	with	VT	Concept Name	VM	Req Type	Condition	Value Constraint	Set
1				CONTAINER EV	(111414, DCM, "Supplementary Data")	1	M			
2	>	CONTAINS		INCLUDE	DTID (4201) Breast Imaging Procedure Reported	1-n	M			
3	>	CONTAINS		CODE	EV (111403, DCM, "Baseline screening mammogram")	1	U	Not used by Image Diagnost	DCID (230) Yes-No	
4	>	CONTAINS		CODE	EV (111404, DCM, "First mammogram ever")	1	U	Not used by Image Diagnost	DCID (230) Yes-No	
5	>	CONTAINS		INCLUDE	DTID (4205) Breast Composition Section	1	U			
6	>	CONTAINS		INCLUDE	DTID (4206) Breast Imaging Report Finding Section	1-n	U			
7	>	CONTAINS		INCLUDE	DTID (4204) Breast Imaging Report Intervention Section	1-n	U	Not used by Image Diagnost		
8	>	CONTAINS		CONTAINER	EV (IDI, I-420010) Additional Information	1	U		Image Diagnost Extension	
9	>>	CONTAINS		CODE	EV (IDI, I-604400) Image Quality Assessment	1-2	U		Image Diagnost Extension	
10	>>	CONTAINS		CONTAINER EV	(111413, DCM, "Overall Assessment")	1	U			
11	>>>	CONTAINS		INCLUDE	DTID (4203) Breast Imaging Assessment	1	M			
12	>>	CONTAINS		CONTAINER	EV (IDI, I-420025) Conference Participants	1	U		Image Diagnost Extension	
13	>>>	CONTAINS		CODE	EV (IDI, I-X990500) "First reading physician present"	1	U		Image Diagnost Extension	
13	>>	CONTAINS		TEXT	(IDI, IMAGE_ITEM, "Image Item")	1-n	U		Image Diagnost Extension	
14	>>	CONTAINS		TEXT	(121106, DCM, "Comment")	1	U			

#### 7.2.1.5 TID 4205 BREAST COMPOSITION SECTION

	NL	Rel Parent	with	VT	Concept Name	VM	Req Type	Condition	Value Constraint	Set
1				CONTAINER	EV (F-01710, SRT, "Breast composition")	1	M			
2	>	CONTAINS		INCLUDE	DTID (4201) Breast Imaging Procedure Reported	1-n	U	Not used by Image Diagnost		
3	>	CONTAINS		CODE	EV (F-01710, SRT, "Breast composition")	1-n	MC	At least one of row 3, 5 shall be present	DCID (6000) Overall Breast Composition	
4	>>	HAS CONCEPT MOD		CODE	EV (G-C171, SRT, "Laterality") 1		M		DCID (6022) Side	
5	>	CONTAINS		NUM	EV (111046, DCM, "Percent Glandular Tissue")	1-n	MC	At least one of row 3, 5 shall be present. Not used by Image Diagnost	UNITS = (% , UCUM "Percent")	
6	>>	HAS CONCEPT MOD		CODE	EV (G-C171, SRT, "Laterality") 1		M	Not used by Image Diagnost	DCID (6022) Side	

#### 7.2.1.6 TID 4206 BREAST IMAGING REPORT FINDING SECTION

	NL	Rel Parent	with	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1				CONTAINER	EV (121070, DCM, "Findings")	1	M		

2	>	HAS OBS CONTEXT	INCLUDE	DTID (1002) Observer Context	1-n	U	Not used by Image Diagnost	
3	>	CONTAINS	INCLUDE	DTID (4201) Breast Imaging Procedure Reported	1	M		
4	>	CONTAINS	CODE	EV (121071, DCM, "Finding")	1-n	M		DCID (6054) Breast Imaging Findings (includes CID 6016, 6057, 6064)
5	>>	HAS CONCEPT MOD	CODE	EV (111405, DCM, "Implant type") 1-n		UC	May be present if value of row 4 is (A-04010, SRT, "Implant") . Not used by Image Diagnost	DCID (6059) Breast Implant Types
6	>>	HAS PROPERTIES	INCLUDE	DTID (4203) Breast Imaging Assessment	1	U		
7	>>	HAS PROPERTIES	CODE	EV (111014, DCM, "Clockface or region")		U	only if „Region in one plane“ not set	DCID (6018) Clockface Location or Region
8	>>	HAS PROPERTIES	CODE	EV (111048, DCM, "Quadrant location")		U	Not used by Image Diagnost	DCID (6020) Quadrant Location
9	>>	HAS PROPERTIES	CODE	EV (I-601800, IDI, „Region in one plane“)	1	U	only if "Clockface or region" not set	Image Diagnost Extension
10	>>	HAS PROPERTIES	INCLUDE	DTID (1400) Linear Measurement	1-n	U		
11	>>	HAS PROPERTIES	INCLUDE	DTID (1401) Area Measurement	1-n	U	Not used by Image Diagnost	
12	>>	HAS PROPERTIES	INCLUDE	DTID (1402) Volume Measurement	1-n	U	Not used by Image Diagnost	
13	>>	HAS PROPERTIES	CODE	EV (111020, DCM, "Depth") 1		U	Not used by Image Diagnost	DCID (6024) Depth
14	>>	HAS PROPERTIES	CODE	EV (111035, DCM, "Lesion Density") 1		U	Not used by Image Diagnost	DCID (6008) Density Modifier
15	>>	HAS PROPERTIES	CODE	EV (M-020F9, SRT, "Shape") 1-n		U	Not used by Image Diagnost	DCID (6004) Mammography Characteristics of Shape
16	>>	HAS PROPERTIES	CODE	EV (111037, DCM, "Margins") 1-n		U	Not used by Image Diagnost	DCID (6006) Mammography Characteristics of Margin
17	>>	HAS PROPERTIES	CODE	EV (111009, DCM, "Calcification Type") 1-n		U	Not used by Image Diagnost	DCID (6010) Mammography Calcification Types
18	>>	HAS PROPERTIES	CODE	EV (111008, DCM, "Calcification Distribution") 1		U	Not used by Image Diagnost	DCID (6012) Calcification Distribution Modifier
19	>>	HAS PROPERTIES	NUM	EV (111038, DCM, "Number of calcifications") 1		U	Not used by Image Diagnost	UNITS = EV ({calcifications}, UCUM, "calcifications") Value = Integer 1 – n
20	>>	HAS PROPERTIES	CODE	EV (111407, DCM, "Implant finding") 1-n		U	Not used by Image Diagnost	DCID (6072) Breast Implant Findings
21	>>	HAS PROPERTIES	CODE	EV (G-C189, SRT, "Associated Finding") 1-n		U	Not used by Image Diagnost	DCID (6056) Associated Findings for Breast (includes CID 6015 )
22	>>	HAS PROPERTIES	NUM	EV (111406, DCM, "Number of similar findings") 1		U	Not used by Image Diagnost	UNITS = EV ({findings}, UCUM, "findings") Value = Integer 2 – n
23	>>	HAS PROPERTIES	CODE	EV (F-01720, SRT, "Change since last mammogram") 1-n		U	Not used by Image Diagnost	DCID (6002) Change Since Last Mammogram or Prior Surgery
24	>>	INFERRED FROM	INCLUDE	DTID (350) References to Supporting Evidence	1	U	Not used by Image Diagnost	
25	>	CONTAINS	CODE	EV (IDI, I-420012) Finding Position in Report GUI	1-n	U		Image Diagnost Extension
26	>>	HAS PROPERTIES	TEXT	(IDI, MLO_POS_X, "MLO Position X")	1	U		Image Diagnost Extension

27	>	CONTAINS	INCLUDE	Apply DTID (4206) Breast Imaging Report Finding Section with modifications: 1. CONTAINER EV is (IDI, I-420011) Related Finding in Other Procedure 2. Laterality is not used	1-n	U		Image Diagnost Extension
----	---	----------	---------	--	-----	---	--	--------------------------

### 7.2.1.7 TID 4201 BREAST IMAGING PROCEDURE REPORTED

NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1		CODE	EV (121058, DCM, "Procedure reported")	1	M		DCID (6050) Breast Procedure Reported  Image Diagnost supported values: DCM 111408 Film Screen Mammography DCM 111409 Digital Mammography SRT P5-B8500 Ultrasonography of breast SRT P5-0900D MRI of breast
2	>	HAS CONCEPT MOD	EV (111464, DCM, "Procedure Modifier") 1-	n	U	Not used by Image Diagnost	DCID (6058) Procedure Modifiers for Breast
3	>	HAS CONCEPT MOD	EV (G-C171, SRT, "Laterality") 1		M		DCID (6022) Side
4	>	HAS PROPERTIES	EV (111401, DCM, "Reason for procedure") 1		U	Not used by Image Diagnost	DCID (6051) Breast Procedure Reason  Image Diagnost supported values SRT R-42453 Screening DCM 111402 Clinical finding
5	>>	HAS CONCEPT MOD	EV (G-D709, SRT, "Relative time") 1		U	Not used by Image Diagnost	DCID (12102) Temporal Periods Relating To Procedure or Therapy
6	>>	HAS CONCEPT MOD	EV (111402, DCM, "Clinical Finding") 1-	n	UC	IFF row 4 value is "Clinical Finding". Not used by Image Diagnost	DCID (6055) Breast Clinical Finding or Indicated Problem
7	>>>	HAS PROPERTIES	EV (G-C171, SRT, "Laterality") 1		U	Not used by Image Diagnost	DCID (6022) Side
8	>	HAS PROPERTIES	EV (111060, DCM, "Study Date") 1		U	Not used by Image Diagnost	

### 7.2.1.8 TID 4203 BREAST IMAGING ASSESSMENT

NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1		CODE	EV (111005, DCM, "Assessment Category")	1	M		DCID (6026) Mammography Assessment
2		CODE	EV (111053, DCM, "Recommended Follow-up")	1-n	U		BCID (6028) Mammography Recommended Follow-up
3	>	HAS CONCEPT MOD	EV (G-C171, SRT, "Laterality") 1		U	Not used by Image Diagnost	DCID (6022) Side
4	>	HAS PROPERTIES	EV (111055, DCM, "Recommended Follow-up Interval") 1		U	Not used by Image Diagnost	UNITS = DCID (6046) Units of Follow-up Interval Values = Integer ≥ 0, where 0 = immediate follow-up
5	>	HAS PROPERTIES	EV (111054, DCM, "Recommended Follow-up")		U	Not used by Image Diagnost	

				Date") 1				
6	>	HAS PROPERTIES	INCLUDE	DTID (4207) Breast Imaging Pathology Results	1-n	U	Not used by Image Diagnost	

### 7.2.1.9 TID 1400 LINEAR MEASUREMENT

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			NUM	DCID (7470) "Linear Measurements"  Image Diagnost is using SNM3 M-02550 Diameter	1	M		UNITS = DCID(7460) "Units of Linear Measurement"
2	>	INFERRED FROM	SCoord	EV (121055,DCM, "Path")	1	UC	XOR Row 5. Not used by Image Diagnost	GRAPHIC TYPE = {POLYLINE, CIRCLE, ELLIPSE}
3	>>	RSELECTED FROM	IMAGE		1	MC	XOR Row 4. Not used by Image Diagnost	
4	>>	SELECTED FROM	IMAGE		1	MC	XOR Row 3. Not used by Image Diagnost	
5	>>	INFERRED FROM	SCoord	SCoord EV (121230, DCM, "Path Vertex")	2-n	UC	XOR Row 2. Not used by Image Diagnost	GRAPHIC TYPE = {POINT}
6	>>	RSELECTED FROM	IMAGE		1	MC	XOR Row 7. Not used by Image Diagnost	
7	>>	SELECTED FROM	IMAGE		1	MC	XOR Row 6. Not used by Image Diagnost	

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## 8 Annex: Print Management SOP Class Definition

### 8.1 Introduction

This section of the DICOM Conformance Statement specifies the supported Print Management SOP and Meta SOP Classes, the optional attributes and service elements supported, the valid range of values for mandatory and optional attributes, and the status code behavior.

### 8.2 Print Management SOP Class Definitions

#### 8.2.1 Basic Film Session SOP Class

The DICOM Print SCU AE supports the N-CREATE DIMSE Service Element for the Basic Film Session SOP Class.

- The N-CREATE DIMSE Service element sent by the DICOM Print SCU AE requests the Remote DICOM Print SCP to create an instance of Basic Film Session.

##### 8.2.1.1 IOD Description

###### 8.2.1.1.1 IOD Modules

Module	Reference	Module Description
SOP Common	C.12.1	Contains SOP Common information
Basic Film Session Presentation Module	C.13.1	Contains Film Session presentations information
Basic Film Session Relationship	C.13.2	References to related SOPs

###### 8.2.1.1.2 Basic Film Session Presentation Module

Attribute name	Tag	Attribute Description
Number of Copies	(2000,0010)	1 to 99; default is set to 1.
Print Priority	(2000,0020)	HIGH or MED or LOW depending of configuration of associated Remote DICOM printer.
Film Session Label	(2000,0050)	Empty
Medium Type	(2000,0030)	PAPER or CLEAR FILM or BLUE FILM depending of configuration of associated Remote DICOM printer
Film Destination	(2000,0040)	Empty

###### 8.2.1.1.3 Basic Film Session Relationship Module

Attribute name	Tag	Attribute Description
Referenced Film Box Sequence	(2000,0500)	Empty
>Referenced SOP Class UID	(0008,1150)	Empty
>Referenced SOP Instance UID	(0008,1155)	Empty

### 8.2.1.2 DIMSE Service Group

DIMSE Service Element	Usage SCU
N-CREATE	M
N-SET	Not used
N-DELETE	Not used
N-ACTION	Not used

#### 8.2.1.2.1 N-CREATE

##### 8.2.1.2.1.1 Attributes

Attribute name	Tag	Usage SCU
Number of Copies	(2000,0010)	Used
Print Priority	(2000,0020)	Used
Medium Type	(2000,0030)	Used
Film Session Label	(2000,0050)	Not used
Memory Allocation	(2000,0060)	Not used
Film Destination	(2000,0040)	Not used

##### 8.2.1.2.1.2 Status

Service Status	Status Codes	Further Meaning	Application Behaviour When receiving Status Codes
Warning	B600	Memory allocation not supported	Association is aborted
Success	0000	Film session successfully created	Next step describe in the sequencing of Real-World Activities paragraph is performed

##### 8.2.1.2.1.3 Behavior

No specific behavior.

## 8.2.2 Basic Film Box SOP Class

The DICOM Print SCU AE supports the following DIMSE Service Element for the Basic Film Box SOP Class.

- The N-CREATE DIMSE Service element sent by the DICOM Print SCU AE requests the Remote DICOM Print SCP to create an instance of Basic Film Box
- The N-ACTION DIMSE Service element sent by the DICOM Print SCU AE requests the Remote DICOM Print SCP to print the Basic Film Box onto the hard copy printer.
- The N-DELETE DIMSE Service element sent by the DICOM Print SCU AE requests the Remote DICOM Print SCP to release the Basic Film Box instance.

### 8.2.2.1 IOD Description

#### 8.2.2.1.1 IOD Modules

Module	Reference	Module Description
SOP Common	C.12.1	Contains SOP Common information
Basic Film Box Presentation Module	C.13.3	Contains Film Box presentations information
Basic Film Box Relationship	C.13.4	References to related SOPs



### 8.2.2.1.2 Basic Film Box Presentation Module

<b>Attribute name</b>	<b>Tag</b>	<b>Attribute Description</b>
Image Display Format	(2010,0010)	STANDARD\1,1 STANDARD\1,2 STANDARD\2,2 STANDARD\2,3 STANDARD\3,3 STANDARD\3,4 STANDARD\3,5 STANDARD\4,4 STANDARD\4,5 STANDARD\4,6
Annotation Display Format ID	(2010,0030)	Not sent.
Film Orientation	(2010,0040)	Not sent.
Film Size ID	(2010,0050)	8INX10IN 10INX12IN 10INX14IN 11INX14IN 14INX14IN 14INX17IN 24CMX24CM 24CMX30CM DIN A4 DIN A3
Border density	(2010,0100)	Not sent.
Empty Image Density	(2010,0110)	Not sent.
Magnification Type	(2010,0060)	Not sent.
Smoothing Type	(2010,0080)	Not sent.
Min Density	(2010,0120)	Not sent.
Max Density	(2010,0130)	Not sent.
Trim	(2010,0140)	Not sent.
Configuration Information	(2010,0150)	Not sent.
Requested Resolution ID	(2020,0050)	Empty by default or set to LOW (150 dpi) STANDARD (300dpi) HIGH (600 dpi)

### 8.2.2.1.3 Basic Film Box Relationship Module

<b>Attribute name</b>	<b>Tag</b>	<b>Attribute Description</b>
Referenced Film Session Sequence	(2010,0500)	Empty
>Referenced SOP Class UID	(0008,1150)	Empty
>Referenced SOP Instance UID	(0008,1155)	Empty
Referenced Image Box Sequence	(2010,0510)	Empty
>Referenced SOP Class UID	(0008,1150)	Empty
>Referenced SOP Instance UID	(0008,1155)	Empty

Referenced Basic Annotation Box Sequence	(2010,0520)	Empty
>Referenced SOP Class UID	(0008,1150)	Empty
>Referenced SOP Instance UID	(0008,1155)	Empty
Referenced Presentation LUT Sequence	(2050,0500)	Used if Presentation LUT SOP was created
>Referenced SOP Class UID	(0008,1150)	Used if Presentation LUT SOP was created
>Referenced SOP Instance UID	(0008,1155)	Used if Presentation LUT SOP was created

### 8.2.2.2 DIMSE Service Group

DIMSE Service Element	Usage SCU
N-CREATE	M
N-ACTION	M
N-DELETE	Used

#### 8.2.2.2.1 N-CREATE

##### 8.2.2.2.1.1 Attributes

Attribute name	Tag	Usage SCU
Image Display Format	(2010,0010)	M
Referenced Film Session Sequence	(2010,0500)	M
>Referenced SOP Class UID	(0008,1150)	M
>Referenced SOP Instance UID	(0008,1155)	M
Referenced Image Box Sequence	(2010,0510)	Not used
>Referenced SOP Class UID	(0008,1150)	Not used
>Referenced SOP Instance UID	(0008,1155)	Not used
Referenced Basic Annotation Box Sequence	(2010,0520)	Not used
>Referenced SOP Class UID	(0008,1150)	Not used
>Referenced SOP Instance UID	(0008,1155)	Not used
Film Orientation	(2010,0040)	Not used
Film Size ID	(2010,0050)	Used
Magnification Type	(2010,0060)	Not used
Max Density	(2010,0130)	Not used
Configuration Information	(2010,0150)	Not used
Referenced Presentation LUT Sequence	(2050,0500)	Used
>Referenced SOP Class UID	(0008,1150)	Used
>Referenced SOP Instance UID	(0008,1155)	Used
Annotation Display Format ID	(2010,0030)	Not used
Smoothing Type	(2010,0080)	Not used
Border Density	(2010,0100)	Not used
Empty Image Density	(2010,0110)	Not used
Min Density	(2010,0120)	Not used
Trim	(2010,0140)	Not used
Requested Resolution ID	(2020,0050)	Used, not sent if empty

#### 8.2.2.2.1.2 Status

There are no specific status codes.

#### 8.2.2.2.1.3 Behavior

There is no specific behavior.

#### 8.2.2.2.2 N-DELETE

##### 8.2.2.2.2.1 Behavior

The SCU uses the N-DELETE to request the SCP to delete the Basic Film Box SOP Instance hierarchy.

##### 8.2.2.2.3 N-ACTION

N-ACTION is used to print the current film of the film session.

##### 8.2.2.2.3.1 Attributes

Action Type Name	Action Type ID	Attribute	Tag	Usage SCU
Print	1	Referenced Print Job Sequence	(2100,0500)	Not used
		>Referenced SOP Class UID	(0008,1150)	Not used
		>Referenced SOP Instance UID	(0008,1155)	Not used

##### 8.2.2.2.3.2 Status

Service Status	Status Codes	Further Meaning	Application Behaviour When receiving Status Codes
Success	0000	Film accepted for printing.	Next Step described in the sequencing of Real-World Activities paragraph is performed
Warning	B603	Film Box SOP Instance hierarchy does not contain Image Box SOP Instances (empty page)	This case should not happen. This warning is considered as an error. Association is aborted.
Failure	C602	Unable to create Print Job SOP Instance; print queue is full	Appropriate message is returned to the user. Association is aborted.
	C604	Image position collision : multiple images assigned to single image position	Appropriate message is returned to the user. Association is aborted.
	C603	Image size is larger than image box size (by using the specified magnification value)	Appropriate message is returned to the user. Association is aborted.

##### 8.2.2.2.3.3 Behavior

SCU uses the N-ACTION to request the SCP to print one or more copies of a single film of the film session.

## 8.2.3 Image Box SOP Class

### 8.2.3.1 Basic Grayscale Image Box SOP Class

The DICOM Print SCU AE supports the following DIMSE Service Element for the Basic Grayscale Image Box SOP Class.

- The N-SET DIMSE Service element sent by the DICOM Print SCU AE requests the Remote DICOM Print SCP to set the attributes of the Basic Grayscale Image Box Instance.

8.2.3.1.1 IOD Description

8.2.3.1.1.1 IOD Modules

Module	Reference	Module Description
SOP Common	C.12.1	Contains SOP Common information
Image Box Presentation Module	C.13.5	Contains Image Box presentations information

8.2.3.1.1.2 Image Box Pixel Presentation Module

Attribute name	Tag	Attribute Description
Image Position	(2020,0010)	1
Polarity	(2020,0020)	NORMAL = pixels shall be printed as specified by the Photometric Interpretation (0028,0004) REVERSE = pixels shall be printed with the opposite polarity as specified by the Photometric Interpretation (0028,0004)
Magnification Type	(2010,0060)	Not Sent.
Smoothing Type	(2010,0080)	Not Sent
Configuration Information	(2010,0150)	Not Sent
Requested Image Size	(2020,0030)	Set to Original Film Size if Requested Resolution ID is not set.
Preformatted Grayscale Image Sequence	(2020,0110)	This sequence is always included if the Image Box is a Basic Grayscale Image Box
>Samples Per Pixel	(0028,0002)	1
>Photometric Interpretation	(0028,0004)	MONOCHROME1 or MONOCHROME2 depending of configuration of associated Remote DICOM printer.
>Rows	(0028,0010)	Original image height
>Columns	(0028,0011)	Original image width
>Pixel Aspect Ratio	(0028,0034)	1\1
>Bits Allocated	(0028,0100)	Depends on the original image pixel depth (8 or 16).
>Bits Stored	(0028,0101)	Original image pixel depth (8, 10 or 12 bits).
>High Bit	(0028,0102)	Depends on the original image pixel depth (7, 9 or 11).
>Pixel Representation	(0028,0103)	0 (Unsigned Integer)
>Pixel Data	(7FE0,0010)	

8.2.3.1.2 DIMSE Service Group

DIMSE Service Element	Usage SCU
N-SET	M

8.2.3.1.2.1 N-SET

8.2.3.1.2.1.1 Attributes

Attribute name	Tag	Usage SCU
Image Position	(2020,0010)	M
Preformatted Grayscale Image Sequence	(2020,0110)	M
>Samples Per Pixel	(0028,0002)	M
>Photometric Interpretation	(0028,0004)	M
>Rows	(0028,0010)	M

>Columns	(0028,0011)	M
>Pixel Aspect Ratio	(0028,0034)	1/1
>Bits Allocated	(0028,0100)	M
>Bits Stored	(0028,0101)	M
>High Bit	(0028,0102)	M
>Pixel Representation	(0028,0103)	M
>Pixel Data	(7FE0,0010)	M
Polarity	(2020,0020)	Used
Referenced Overlay Sequence	(0008,1130)	Not used
>SOP Class UID	(0008,1150)	Not used
>SOP Instance UID	(0008,1155)	Not used
Configuration Information	(2010,0150)	Used, not sent if empty
Magnification Type	(2010,0060)	Used
Smoothing Type	(2010,0080)	Used, not sent if empty or magnification is not equal to CUBIC
Requested Image Size	(2020,0030)	Used, not sent if empty

#### 8.2.3.1.2.1.2 Status

Service Status	Status Codes	Further Meaning	Application Behaviour When receiving Status Codes
Failure	C605	Insufficient memory in printer to store the image.	Appropriate message is returned to the user. Association is aborted.

#### 8.2.3.1.2.1.3 Behavior

There is no specific behavior.

The SCU does not instruct the SCP to erase the image in the image position by setting a zero length and no value in the Attribute Pre-formatted Grayscale Image Sequence (2020,0110) or Pre-formatted Grayscale Image Sequence (2020,0111).

### 8.2.4 Printer SOP Class

The DICOM Print SCU AE supports the following DIMSE Service Element for the Basic Printer SOP Class.

- The N-EVENT\_REPORT DIMSE Service element sent by the DICOM Print SCP to the local DICOM Print SCU AE. The DICOM Print SCU handles the Printer Status and Printer Status Info fields. All other received data are ignored.
- The N-GET DIMSE Service element sent by the DICOM Print SCU AE requests the Remote DICOM Print SCP to give information on the Remote DICOM Printer.

#### 8.2.4.1 IOD Description

##### 8.2.4.1.1 IOD Modules

Module	Reference	Module Description
SOP Common	C.12.1	Contains SOP Common information
Printer Module	C.13.9	Contains status information to monitor printer

##### 8.2.4.1.2 Printer Module

Attribute name	Tag	Attribute Description
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Printer Status	(2110,0010)	The behavior defined for the following term NORMAL : Association goes on. FAILURE : Association is released. WARNING : Association is released.
Printer Status Info	(2110,0020)	Printer shall return value
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

#### 8.2.4.2 DIMSE Service Group

DIMSE Service Element	Usage SCU
N-EVENT-REPORT	M
N-GET	U

##### 8.2.4.2.1 N-EVENT-REPORT

###### 8.2.4.2.1.1 Attributes

Event Type Name	Event Type ID	Attribute	Tag	Usage SCU
Normal	1			
Warning	2	Printer Name	(2110,0030)	
		Printer Status Info	(2110,0020)	
Failure	3	Printer Name	(2110,0030)	
		Printer Status Info	(2110,0020)	

###### 8.2.4.2.1.2 Behavior

If Printer Status is FAILURE or WARNING

Signal print failure to the user

Else

Signal print success to the user

##### 8.2.4.2.2 N-GET

###### 8.2.4.2.2.1 Attributes

Attribute name	Tag	Attribute Description
Printer Status	(2110,0010)	Used
Printer Status Info	(2110,0020)	Used
Printer Name	(2110,0030)	Used
Manufacturer	(0008,0070)	Used
Manufacturer Model Name	(0008,1090)	Used
Device Serial Number	(0018,1000)	Used
Software Versions	(0018,1020)	Used
Date Of Last Calibration	(0018,1200)	Used

Time Of Last Calibration	(0018,1201)	Used
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#### 8.2.4.2.2.2 Behavior

If Printer Status is FAILURE

Signal print failure to the user

Else If Printer Status is WARNING and Printer Status Info is not equal to SUPPLY LOW or SUPPLY EMPTY

Signal print warning to the user

Else

Signal print success to the user

### 8.2.5 Presentation LUT SOP Class

The DICOM Print SCU AE supports the following DIMSE Service Element for the Presentation LUT SOP Class.

- The N-CREATE DIMSE Service element sent by the DICOM Print SCU AE requests the Remote DICOM Print SCP to create an Instance of Presentation LUT.

#### 8.2.5.1 IOD Description

##### 8.2.5.1.1 IOD Modules

Module	Reference	Module Description
SOP Common	C.12.1	Contains SOP Common information
Presentation LUT Module	C.11.4	Contains Image presentation LUT information

##### 8.2.5.1.2 Presentation LUT Module

Attribute name	Tag	Attribute Description
Presentation LUT Sequence	(2050,0010)	Defines a sequence of Presentation LUTs.
>LUT Descriptor	(0028,3002)	Depends on original image pixel depth. For example a 12 bit image leads to 4096\0\12
>LUT Explanation	(0028,3003)	Set to "Printer_PLUT"
>LUT Data	(0028,3006)	LUT Data in this Sequence.
Presentation LUT Shape	(2050,0020)	Not sent.

#### 8.2.5.2 DIMSE Service Group

DIMSE Service Element	Usage SCU
N-CREATE	M
N-DELETE	Not used

##### 8.2.5.2.1 N-CREATE

###### 8.2.5.2.1.1 Attributes

Attribute name	Tag	Usage SCU
Presentation LUT Sequence	(2050,0010)	Used
>LUT Descriptor	(0028,3002)	Used
>LUT Explanation	(0028,3003)	Used
>LUT Data	(0028,3006)	Used
Presentation LUT Shape	(2050,0020)	Not sent.

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#### 8.2.5.2.1.2 Status

<b>Service Status</b>	<b>Status Codes</b>	<b>Further Meaning</b>	<b>Application Behaviour When receiving Status Codes</b>
Warning	B605	Requested Min Density or Max Density outside of printer's operating range. The printer will use its respective minimum or maximum density value instead.	
Success	0000	Presentation LUT successfully created	

#### 8.2.5.2.1.3 Behavior

There is no specific behavior.