

**SIEMENS**

***MammoTest***

**SP**

## **DICOM Conformance Statement**

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## History of released Versions

<u>Version</u>	<u>Release Date</u>	<u>Product Version</u>
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## **1 Introduction**

### **1.1 Overview**

The Conformance Statement describes the DICOM interface for the Siemens MammoTest in terms of part 2 of [DICOM].

This introduction describes the application's implemented DICOM functionality in general terms.

## 1.2 Scope and Field

MammoTest is an X-ray based biopsy workstation. The supported DICOM Services allow a smooth integration in the clinical network. The MammoTest DICOM network implementation acts as SCU and SCP for the DICOM Storage, as SCU for the DICOM Retrieve and as SCU for the DICOM Print Services. Verification is supported in SCU and SCP role.

## 1.3 Audience

This document is intended for hospital staff, health system integrators, software designers or implementers. It is assumed that the reader has a working understanding of DICOM.

## 1.4 Remarks

DICOM, by itself, does not guarantee interoperability. However, the Conformance Statement facilitates a first-level validation for interoperability between different applications supporting the same DICOM functionality as SCU and SCP, respectively.

This Conformance Statement is not intended to replace validation with other DICOM equipment to ensure proper exchange of information intended.

The scope of this Conformance Statement is to facilitate communication with Siemens and other vendors' Medical equipment. The Conformance Statement should be read and understood in conjunction with the DICOM 3.0 Standard [DICOM]. However, by itself it is not guaranteed to ensure the desired interoperability and a successful interconnectivity.

The user should be aware of the following important issues:

- The comparison of different conformance statements is the first step towards assessing interconnectivity between Siemens and non-Siemens equipment.
- Test procedures should be defined and tests should be performed by the user to validate the connectivity desired. DICOM itself and the conformance parts do not specify this.
- The standard will evolve to meet the users' future requirements. Siemens is actively involved in developing the standard further and therefore reserves the right to make changes to its products or to discontinue its delivery.
- Siemens reserves the right to modify the design and specifications contained herein without prior notice. Please contact your local Siemens representative for the most recent product information.

## 1.5 Definitions, Terms and Abbreviations

Definitions, terms and abbreviations used in this document are defined within the different parts of the DICOM standard.

Additional Abbreviations and terms are as follows:

AE	DICOM Application Entity
DB	Database
DCS	DICOM Conformance Statement
IOD	DICOM Information Object Definition
NEMA	National Electrical Manufacturers Association
PDU	DICOM Protocol Data Unit
SCU	DICOM Service Class User (DICOM client)
SCP	DICOM Service Class Provider (DICOM server)
SOP	DICOM Service-Object Pair

**1.6 References**

[DICOM] Digital Imaging and Communications in Medicine (DICOM), NEMA PS 3.1-3.15, 2001

## 2 Implementation Model Verification

MammoTest supports the Verification Service Class. Responding to Verification requests from remote nodes is handled by the Storage SCP application.

### 2.1 Application Data Flow Diagram

The MammoTest DICOM network implementation acts as SCU for the C-ECHO DICOM network service. The product target Operating System is Windows 2000.

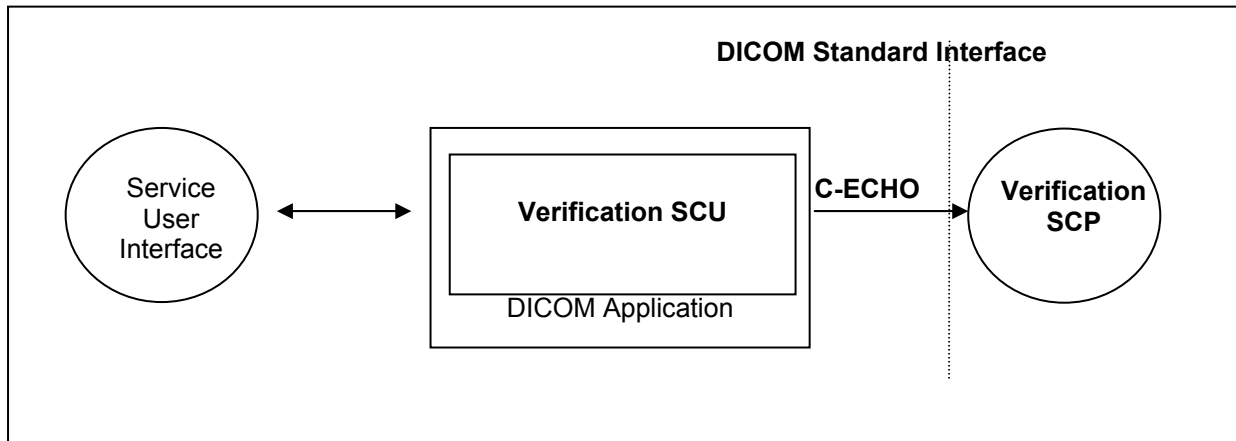


Figure 1: Application Data Flow Diagram - Verification SCU

### 2.2 Functional Definitions of Applications

#### 2.2.1 DICOM Verification as SCU

MammoTest will send out verification request as a SCU when user selects a DICOM entity to verify.

### 2.3 Sequencing of Real-World Activities

Not Applicable.

### 3 Application Entity Specification Verification

#### 3.1 Verification AE Specification

##### 3.1.1 Association Establishment Policies

###### 3.1.1.1 General

MammoTest attempts to open an association for verification request whenever the “verification” function is activated during network configuration of a remote DICOM application.

###### 3.1.1.2 Number of Associations

MammoTest initiates one association at a time to request verification.

###### 3.1.1.3 Asynchronous Nature

MammoTest does not support asynchronous communication (multiple outstanding transactions over a single association).

###### 3.1.1.4 Implementation Identifying Information

Implementation Class UID	1.2.124.113532.1.1
Implementation Version Name	MITRA22JAN97

##### 3.1.2 Association Initiation Policy

MammoTest attempts to initiate a new association for

- DIMSE C-ECHO service operations.

###### 3.1.2.1 Associated Real-World Activity - Verification

###### 3.1.2.1.1 Associated Real-World Activity – Request Verification “verification”

MammoTest sends out verification request as a SCU when user selects a DICOM entity to verify.

###### 3.1.2.1.2 Proposed Presentation Contexts

MammoTest will propose Presentation Contexts as shown in the following table:

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

**3.1.2.1.3 SOP Specific Conformance – Verification SCU**

The Application conforms to the definitions of the Verification SCU in accordance to the DICOM Standard.

**3.1.3 Association Acceptance Policy**

The Verification SCP is part of the Storage SCP – see section 5.1.3.

## 4 Implementation Model Storage

MammoTest both originates associations for Storage of DICOM Composite Information Objects in Remote Application Entities and accepts association requests for Storage from Remote Application Entities.

### 4.1 Application Data Flow Diagram

The MammoTest DICOM network implementation acts as SCU and SCP for the C-STORE DICOM network service and as SCP for the C-ECHO DICOM network service. The product target Operating System is Windows 2000.

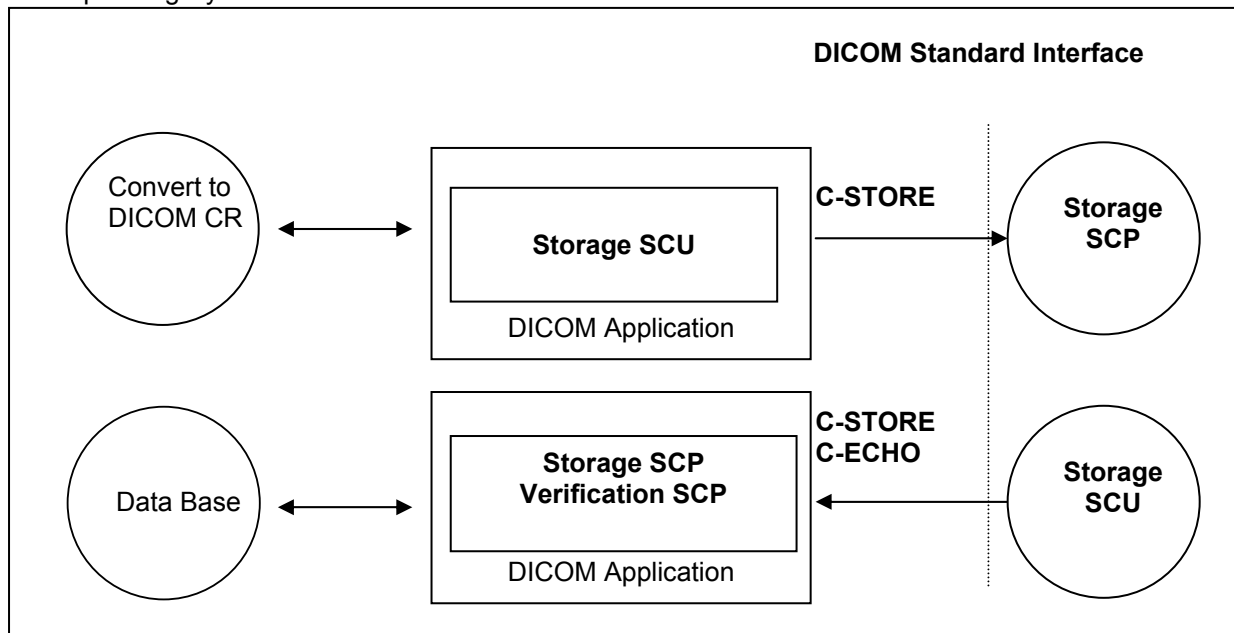


Figure 2: Application Data Flow Diagram – Storage SCU/SCP

### 4.2 Functional Definitions of Application Entities

MammoTest will transfer DICOM images to a SCP when the user requests to archive a patient exam. Upon exam selection, MammoTest will initiate a negotiation of an association with the requested SCP. If the association is accepted, then images are transferred from the MammoTest application to the SCP over that association. Once the transfer is complete MammoTest will close the association.

Verification requests will be processed and responded by Storage SCP component too.

### 4.3 Sequencing of Real-World Activities

Procedures have to be ended and saved to local storage / database before its images can be converted to DICOM IODs and then be archived to DICOM Servers.

## 5 Application Entity Specification Storage

### 5.1 Storage AEs Specification

MammoTest provides Standard Conformance to the following DICOM V3.0 SOP Classes as an SCU:

SOP Class Name	SOP Class UID
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1

MammoTest provides Standard Conformance to the following DICOM V3.0 SOP Classes as an SCP:

SOP Class Name	SOP Class UID
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1
Verification SOP Class	1.2.840.10008.1.1

#### 5.1.1 Association Establishment Policies

##### 5.1.1.1 General

The default PDU size used will be 100 KB.

##### 5.1.1.2 Number of Associations

MammoTest allows a single outstanding operation on any association. Therefore, MammoTest does not support asynchronous operations window negotiation, other than the default as specified by the DICOM specification.

##### 5.1.1.3 Asynchronous Nature

MammoTest does not support asynchronous communication (multiple outstanding transactions over a single association).

##### 5.1.1.4 Implementation Identifying Information

Implementation Class UID	1.2.124.113532.1.1
Implementation Version Name	MITRA22JAN97

**5.1.2 Association Initiation Policy**

MammoTest attempts to initiate a new association for

- DIMSE C-STORE

service operations.

**5.1.2.1 Associated Real-World Activity - Send**

**5.1.2.1.1 Associated Real-World Activity – Send Image Objects to a Network Destination**

**5.1.2.1.2 Proposed Presentation Context – Send Images**

MammoTest will propose Presentation Contexts as shown in the following table:

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Computed Radiography Image	1.2.840.10008.5.1.4.1.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

**5.1.2.1.3 SOP Specific Conformance – Store SCU**

Manipulation of images, e.g. annotations, will not be stored and sent in the DICOM Header.

**5.1.3 Association Acceptance Policy**

MammoTest attempts to accept a new association for

- DIMSE C-ECHO
- DIMSE C-STORE

service operations.

**5.1.3.1 Associated Real-World Activity - Receive**

**5.1.3.1.1 Associated Real-World Activity – Receiving Images from a Remote Node**

MammoTest will accept an association and will receive images transmitted on that association and will store the images on disk in the own database, if the user requests to restore a patient exam.

**5.1.3.1.2 Accepted Presentation Context – Receiving Images**

MammoTest will accept Presentation Contexts as shown in the following table:

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Computed Radiography Image	1.2.840.10008.5.1.4.1.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

## 6 Implementation Model Retrieve

MammoTest will retrieve DICOM images from a SCP when the user requests to restore a patient exam. Upon exam selection, MammoTest will initiate a negotiation of an association with the requested SCP. If the association is accepted, and the exam exists on the server, then images are asked to be transferred from the SCU to MammoTest SCP over another association. Once the transfer is complete MammoTest will close the association. DICOM query is not supported.

### 6.1 Application Data Flow Diagram

MammoTest acts as SCU for the retrieve network service. The product target Operating System is Windows 2000.

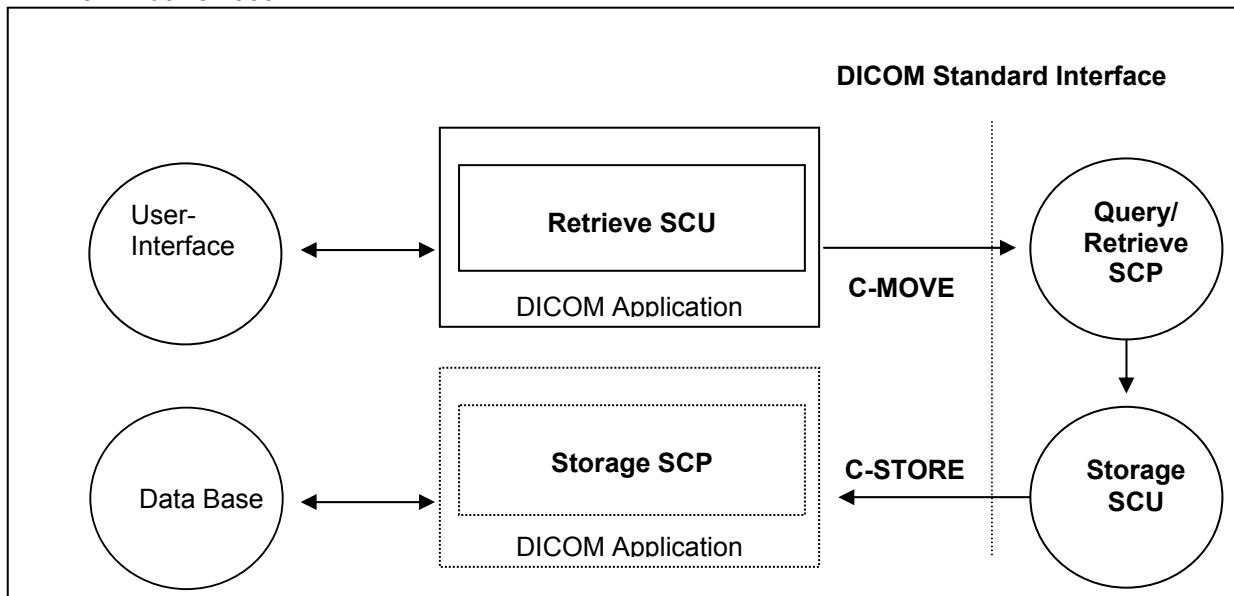


Figure 4: MammoTest Application Data Flow Diagram –Retrieve SCU

### 6.2 Functional Definitions of Application Entities

MammoTest will retrieve DICOM images from a SCP when the user requests to restore a patient exam. Upon exam selection, MammoTest will initiate a negotiation of an association with the requested SCP. If the association is accepted, and the exam exists on the server, then images are asked to be transferred from the SCU to MammoTest SCP over another association. Once the transfer is complete MammoTest will close the association.

### 6.3 Sequencing of Real-World Activities

Images have to be archived and deleted before the images can be retrieved. Once the images are archived, the database entry is allowed to be deleted.

## 7 Application Entity Specification Retrieve

### 7.1 Retrieve Service AEs Specification

MammoTest provides Standard Conformance to the following DICOM V3.0 SOP Classes as SCP:

SOP Class Name	SOP Class UID
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2

**Note:** See also the Storage DICOM Conformance Statement to compare for conformance of the C-STORE sub-operation generated by C-MOVE DIMSE services. Furthermore compare the supported Storage Service SOP classes described in the Storage DICOM Conformance Statement of the Modality to which the images shall be transferred to.

#### 7.1.1 Association Establishment Policies

##### 7.1.1.1 General

The default PDU size used will be 100 KB.

##### 7.1.1.2 Number of Associations

MammoTest initiates one association at a time to request a retrieve.

##### 7.1.1.3 Asynchronous Nature

MammoTest does not support asynchronous communication (multiple outstanding transactions over a single association).

##### 7.1.1.4 Implementation Identifying Information

Implementation Class UID	1.2.124.113532.1.1
Implementation Version Name	MITRA22JAN97

#### 7.1.2 Association Initiation Policy

When requesting to restore a patient exam, the retrieve application to send a C-MOVE request to the related remote node. Images will then be received by the Storage SCP as described in the related section.

**7.1.2.1 Real-World Activity – Move SCU**

**7.1.2.1.1 Associated Real-World Activity – Move SCU “Restore”**

When selecting a patient and activate the “Restore” function, MammoTest will issue a C-MOVE request.

The transferred image data are processed as described in the storage class SCP descriptions.

The possibility to request the remote C-MOVE provider (remote application that responded to the C-FIND) to move data to an application entity other than the MammoTest is NOT USED.

**7.1.2.1.2 Proposed Presentation Contexts - Move SCU “Restore”**

MammoTest will propose Presentation Contexts as shown in the following table:

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Study Root Query/Retrieve Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

**Note:** C-MOVE extended negotiation will not be supported by the SCU

## 8 Implementation Model Print

The Print Management Service Classes define an application-level class of services, which facilitate the printing of images on a hardcopy medium. The print management SCU and print management SCP are peer DICOM print management application entities. MammoTest supports the print management DIMSE services to act as SCU.

### 8.1 Application Data Flow Diagram

MammoTest acts as SCU for the print management network service. The product target Operating System is Windows 2000.

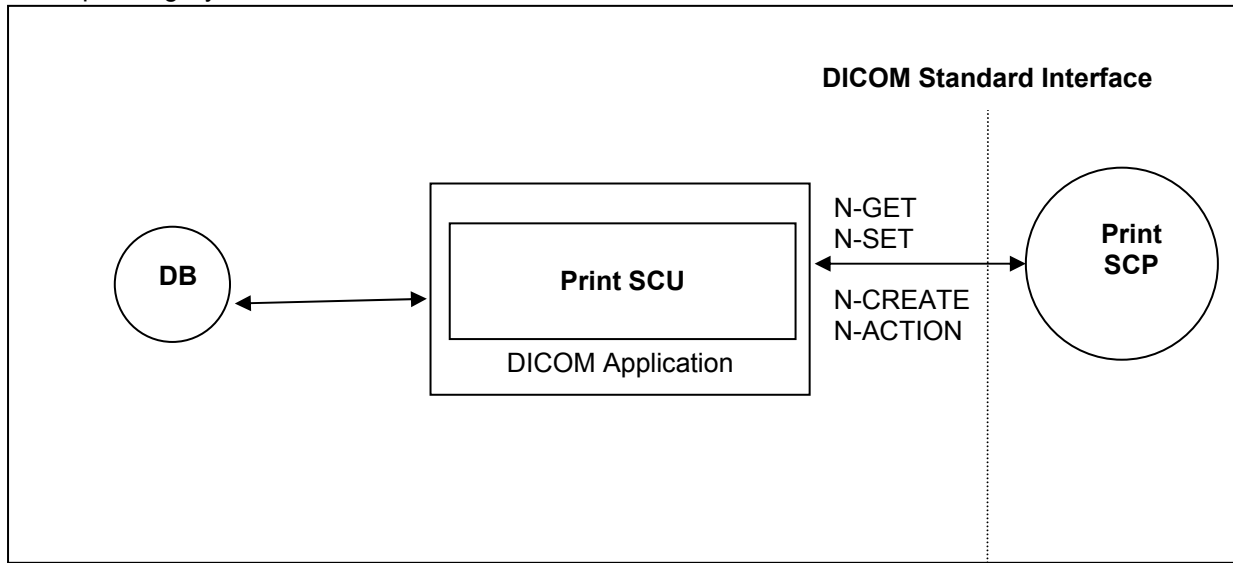


Figure 6: DICOM Application Data Flow Diagram – Print SCU

### 8.2 Functional Definition of Application Entities

MammoTest will transfer DICOM images to a Print Services provider upon request from the user. When an image is to be printed, MammoTest will initiate the negotiation of an association with the requested Print Services provider. If the association is accepted, then the images are transferred from the MammoTest application to the Print Services provider over that association. Once the transfer is complete, MammoTest will close the association.

### 8.3 Sequencing of Real-World Activities

Not applicable

## 9 Application Entity Specification Print

### 9.1 Print Management AE Specification

MammoTest provides Standard Conformance to the following DICOM V3.0 Print Management Meta SOP Classes as an 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 SOP Class	1.2.840.10008.5.1.1.1
- Basic Film Box SOP Class	1.2.840.10008.5.1.1.2
- Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4
- Printer SOP Class	1.2.840.10008.5.1.1.16
Print Job SOP Class	1.2.840.10008.5.1.1.14
Basic Annotation Box	1.2.840.10008.5.1.1.15

#### 1.1.1 Association Establishment Policies

##### 9.1.1.1 General

The default PDU size used will be 100 KB.

##### 9.1.1.2 Number of Associations

MammoTest initiates one association at a time for each different print device configured.

##### 9.1.1.3 Asynchronous Nature

MammoTest does not support asynchronous communication (multiple outstanding transactions over a single association).

##### 9.1.1.4 Implementation Identifying Information

Implementation Class UID	1.2.124.113532.1.1
Implementation Version Name	MITRA22JAN97

**9.1.2 Association Initiation Policy**

**9.1.2.1 Associated Real-World Activity**

**9.1.2.1.1 Associated Real-World Activity – Printing**

MammoTest will issue Print Management requests to a SCP supporting the DICOM V3.0 Print services, in order to produce hard copy representations of DICOM images.

**9.1.2.1.2 Proposed Presentation Context (Presentation Context Table)**

MammoTest will propose Presentation Contexts as shown in the following table:

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
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
Basic film session SOP class	1.2.840.10008.5.1.1.1	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
Basic Film Box SOP class	1.2.840.10008.5.1.1.2	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
Basic Grayscale Image Box SOP class	1.2.840.10008.5.1.1.4	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
Printer SOP class	1.2.840.10008.5.1.1.16	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Print Job SOP class	1.2.840.10008.5.1.1.14	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Basic Annotation Box	1.2.840.10008.5.1.1.15	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

**9.1.2.1.3 SOP specific Conformance Statement – Meta SOP Classes**

**9.1.2.1.3.1.1.1 Basic Film Session SOP class**

MammoTest issues the following DIMSE-N commands for the Basic Film Session SOP Class:  
**N-Create** and **N-Action Print**.

**9.1.2.1.3.1.1.2 Basic Film Box SOP class**

MammoTest issues the following DIMSE-N commands for the Basic Film Box SOP Class:  
**N-Create, N-Delete, and N-Action Print.**

#### 9.1.2.1.3.1.1.1.3 Basic Grayscale Image Box SOP Class

MammoTest issues the following DIMSE-N commands for the Basic Image Box SOP Class:  
**N-Set.**

#### 9.1.2.1.3.1.1.1.4 Printer SOP Class

MammoTest issues the following DIMSE-N commands for the Printer SOP Class: **N-Get.**

#### 9.1.2.1.3.1.1.1.5 Print Job SOP Class

The Print Job SOP Class is the possibility to monitor the execution of the print process.

### 9.1.3 Association Acceptance Policy

Not applicable

## **10 Communication Profiles**

### **10.1 TCP/IP Stack**

MammoTest inherits its TCP/IP stack from the system upon which it executes.  
Physical Media Support

## **11 Extensions / Specializations / Privatizations**

Not Applicable.

## **12 Configuration**

### **12.1 Configurable Parameters**

MammoTest obtains the following configuration information from the database:

- List of all UIDs known to MammoTest
- Preferred transfer syntaxes for the SOP classes supported by MammoTest.

MammoTest obtains the following configuration information from the MammoTest configuration file:

- Local / Remote Application Entity Title
- Local / Remote IP and port number
- Printer Properties