GE Healthcare

Technical Publications

Direction DOC1460176
Revision 2

Senographe Crystal Version 1.0.0
DICOM CONFORMANCE STATEMENT

[Study, Series Entity Modules]

[Image Entity Modules]

- Changed the values of The Patient Orientation in Table 4-11 PATIENT ORIENTATION OF CLINICAL VIEW

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CONFORMANCE STATEMENT OVERVIEW

The Senographe Crystal Acquisition Workstation is implemented to acquire mammography imaging for examining breasts of patient. This acquisition workstation supports DICOM networking to recive scheduled procedures from remote application entity and to transfer images to remote storage and DICOM print.

Table 0.1 provides an overview of the network services supported by Senographe Crystal Acquisition Workstation.

Table 0.1 – NETWORK SERVICES

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Transfer		
Digital Mammography X-Ray Image Storage – For Presentation	Yes	No
Digital Mammography X-Ray Image Storage – For Processing	Yes	No
Verification SOP Class	Yes	No
Print Management		
Verification SOP Class	Yes	No
Basic Film Session SOP Class	Yes	No
Basic Film Box SOP Class	Yes	No
Basic Grayscale Image Box SOP Class	Yes	No
Workflow Management		
Verification SOP Class	Yes	No
Modality Worklist Information Model – FIND SOP Class	Yes	No

Table 0.2 provides an overview of the Media Storage Application Profiles supported by Senographe Crystal.

Table 0.2 - MEDIA SERVICES

Media Storage Application Profile	Write Files (FSC or FSU)	Read Files (FSR)
Compact Disk - Recordable		
General Purpose CD-R	Yes	No

TABLE OF CONTENTS

1. INTRODUCTION

1.1 OVERVIEW

This DICOM Conformance Statement is divided into Sections as described below:

Section 1 Introduction, which describes the overall structure, intent, and references for this Conformance Statement

Section 2 Network Conformance Statement, which specifies the GEHC equipment compliance to the DICOM requirements for the implementation of Networking features.

Section 3 Media Storage Conformance Statement, which specifies the GEHC equipment compliance to the DICOM requirements for the implementation of Media Storage features.

Section 4 Digital Mammography X-ray Information Object Implementation, which specifies the GEHC equipment compliance to DICOM requirements for the implementation of a MG Image Information Object features.

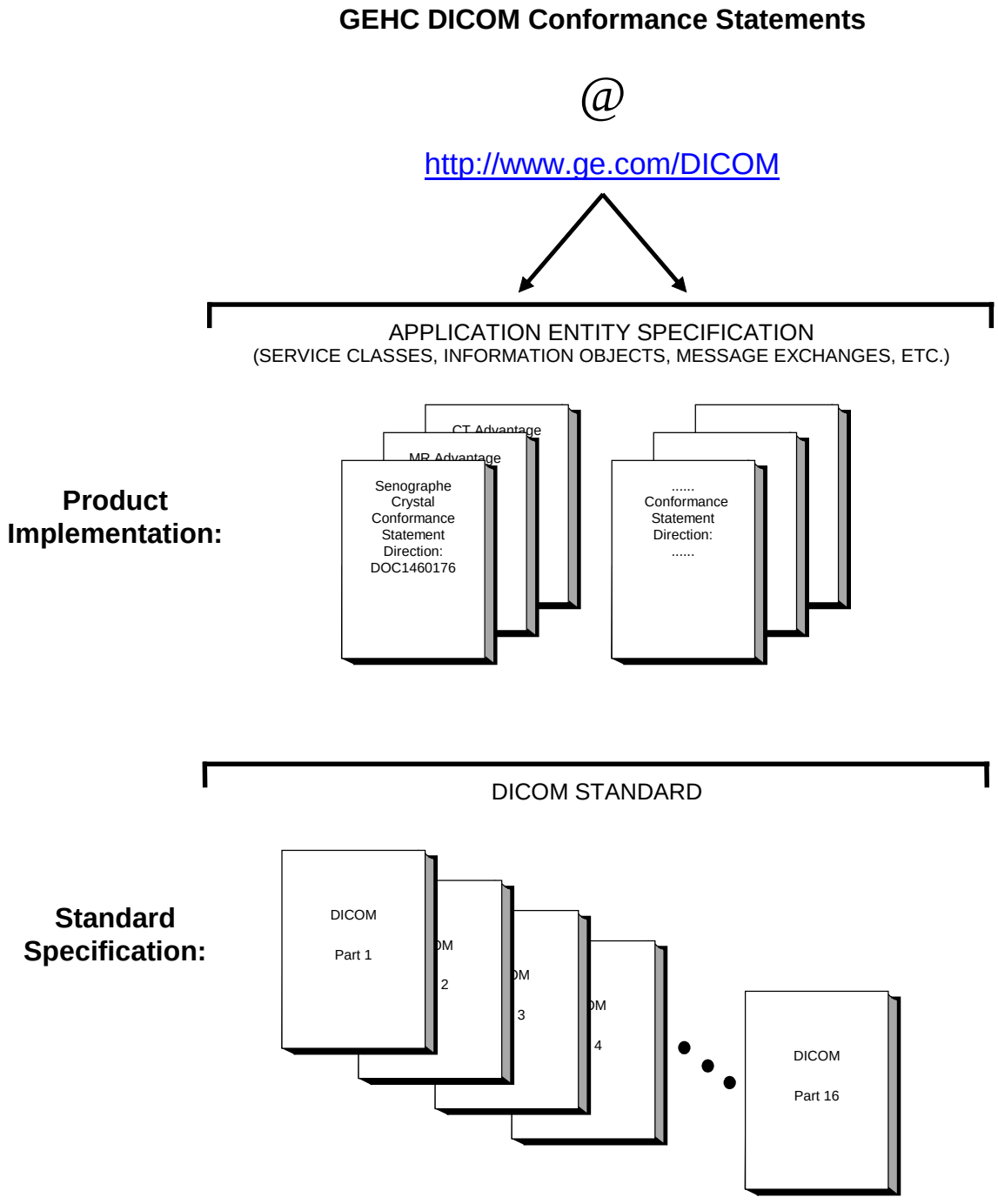
Section 5 Modality Worklist Query Implementation, which specifies the GEHC equipment compliance to DICOM requirements for the implementation of the Modality Worklist Query Information features.

Section 6 Basic Directory Information Object Implementation, which specifies the GEHC equipment compliance to DICOM requirements for the implementation of the Directory Information Object features.

Section 7 Print Management Implementation, which specifies the GEHC equipment compliance to DICOM requirements for the implementation of the Print Management Information features.

1.2 OVERALL DICOM CONFORMANCE STATEMENT DOCUMENT STRUCTURE

The Documentation Structure of the GEHC DICOM Conformance Statements is shown in the Illustration below.



This document specifies the DICOM implementation. It is entitled:

Senographe Crystal Acquisition Version 1.0.0
Conformance Statement for DICOM
Direction ***DOC1460176***

This DICOM Conformance Statement documents the DICOM Conformance Statement and Technical Specification required to interoperate with the GEHC network interface.

The GEHC Conformance Statement, contained in this document, also specifies the Lower Layer communications which it supports (e.g., TCP/IP). However, the Technical Specifications are defined in the DICOM Part 8 standard.

For more information regarding DICOM, copies of the Standard may be obtained on the Internet at http://medical.nema.org. Comments on the Standard may be addressed to:

DICOM Secretariat
NEMA
1300 N. 17th Street, Suite 1752
Rosslyn, VA 22209
USA
Phone: +1.703.841.3200

1.3 INTENDED AUDIENCE

The reader of this document is concerned with software design and/or system integration issues. It is assumed that the reader of this document is familiar with the DICOM Standard and with the terminology and concepts which are used in that Standard.

1.4 SCOPE AND FIELD OF APPLICATION

It is the intent of this document to provide an unambiguous specification for GEHC implementations. This specification, called a Conformance Statement, includes a DICOM Conformance Statement and is necessary to ensure proper processing and interpretation of GEHC medical data exchanged using DICOM. The GEHC Conformance Statements are available to the public.

The reader of this DICOM Conformance Statement should be aware that different GEHC devices are capable of using different Information Object Definitions. For example, a GEHC CT Scanner may send images using the CT Information Object, MR Information Object, Secondary Capture Object, etc.

Included in this DICOM Conformance Statement are the Module Definitions which define all data elements used by this GEHC implementation. If the user encounters unspecified private data elements while parsing a GEHC Data Set, the user is well advised to ignore those data elements (per the DICOM standard). Unspecified private data element information is subject to change without notice. If, however, the device is acting as a "full fidelity storage device", it should retain and re-transmit all of the private data elements which are sent by GEHC devices.

1.5 IMPORTANT REMARKS

The use of these DICOM Conformance Statements, in conjunction with the DICOM Standards, is intended to facilitate communication with GE imaging equipment. However, **by itself, it is not sufficient to ensure that inter-operation will be**

successful. The **user (or user's agent)** needs to proceed with caution and address at least four issues:

- **Integration** - The integration of any device into an overall system of interconnected devices goes beyond the scope of standards (DICOM v3.0), and of this introduction and associated DICOM Conformance Statements when interoperability with non-GE equipment is desired. The responsibility to analyze the applications requirements and to design a solution that integrates GE imaging equipment with non–GE systems is the **user's** responsibility and should not be underestimated. The **user** is strongly advised to ensure that such an integration analysis is correctly performed.

- **Validation** - Testing the complete range of possible interactions between any GE device and non–GE devices, before the connection is declared operational, should not be overlooked. Therefore, the **user** should ensure that any non–GE provider accepts full responsibility for all validation required for their connection with GE devices. This includes the accuracy of the image data once it has crossed the interface between the GE imaging equipment and the non–GE device and the stability of the image data for the intended applications.

  Such a validation is required before any clinical use (diagnosis and/or treatment) is performed. It applies when images acquired on GE imaging equipment are processed/displayed on a non-GE device, as well as when images acquired on non-GE equipment is processed/displayed on a GE console or workstation.

- **Future Evolution** - GE understands that the DICOM Standard will evolve to meet the user's growing requirements. GE is actively involved in the development of the DICOM Standard. DICOM will incorporate new features and technologies and GE may follow the evolution of the Standard. The GEHC protocol is based on DICOM as specified in each DICOM Conformance Statement. Evolution of the Standard may require changes to devices which have implemented DICOM. **In addition, GE reserves the right to discontinue or make changes to the support of communications features (on its products) described by these DICOM Conformance Statements**. The **user** should ensure that any non–GE provider, which connects with GE devices, also plans for the future evolution of the DICOM Standard. Failure to do so will likely result in the loss of function and/or connectivity as the DICOM Standard changes and GE Products are enhanced to support these changes.

- **Interaction** - It is the sole responsibility of the **non–GE provider** to ensure that communication with the interfaced equipment does not cause degradation of GE imaging equipment performance and/or function.

1.6 REFERENCES

NEMA PS3	Digital Imaging and Communications in Medicine (DICOM) Standard, available free at http://medical.nema.org/

1.7 DEFINITIONS

Informal definitions are provided for the following terms used in this Conformance Statement. The DICOM Standard is the authoritative source for formal definitions of these terms.

Abstract Syntax – the information agreed to be exchanged between applications, generally equivalent to a Service/Object Pair (SOP) Class. Examples : Verification SOP Class, Modality Worklist Information Model Find SOP Class, Computed Radiography Image Storage SOP Class.

Application Entity (AE) – an end point of a DICOM information exchange, including the DICOM network or media interface software; i.e., the software that sends or receives DICOM information objects or messages. A single device may have multiple Application Entities.

Application Entity Title – the externally known name of an *Application Entity*, used to identify a DICOM application to other DICOM applications on the network.

Application Context – the specification of the type of communication used between *Application Entities*. Example: DICOM network protocol.

Association – a network communication channel set up between *Application Entities*.

Attribute – – a unit of information in an object definition; a data element identified by a *tag*. The information may be a complex data structure (Sequence), itself composed of lower level data elements. Examples: Patient ID (0010,0020), Accession Number (0008,0050), Photometric Interpretation (0028,0004), Procedure Code Sequence (0008,1032).

Information Object Definition (IOD) – the specified set of *Attributes* that comprise a type of data object; does not represent a specific instance of the data object, but rather a class of similar data objects that have the same properties. The *Attributes* may be specified as Mandatory (Type 1), Required but possibly unknown (Type 2), or Optional (Type 3), and there may be conditions associated with the use of an Attribute (Types 1C and 2C). Examples: MR Image IOD, CT Image IOD, Print Job IOD.

Joint Photographic Experts Group (JPEG) – a set of standardized image compression techniques, available for use by DICOM applications.

Media Application Profile – the specification of DICOM information objects and encoding exchanged on removable media (e.g., CDs)

Module – a set of *Attributes* within an *Information Object Definition* that are logically related to each other. Example: Patient Module includes Patient Name, Patient ID, Patient Birth Date, and Patient Sex.

Negotiation – first phase of *Association* establishment that allows *Application Entities* to agree on the types of data to be exchanged and how that data will be encoded.

Presentation Context – the set of DICOM network services used over an *Association*, as negotiated between *Application Entities*; includes *Abstract Syntaxes* and *Transfer Syntaxes*.

Protocol Data Unit (PDU) – a packet (piece) of a DICOM message sent across the network. Devices must specify the maximum size packet they can receive for DICOM messages.

Security Profile – a set of mechanisms, such as encryption, user authentication, or digital signatures, used by an *Application Entity* to ensure confidentiality, integrity, and/or availability of exchanged DICOM data

Service Class Provider (SCP) – role of an *Application Entity* that provides a DICOM network service; typically, a server that performs operations requested by another *Application Entity* (*Service Class User*). Examples: Picture Archiving and Communication System (image storage SCP, and image query/retrieve SCP), Radiology Information System (modality worklist SCP).

Service Class User (SCU) – role of an *Application Entity* that uses a DICOM network service; typically, a client. Examples: imaging modality (image storage SCU, and modality worklist SCU), imaging workstation (image query/retrieve SCU)

Service/Object Pair (SOP) Class – the specification of the network or media transfer (service) of a particular type of data (object); the fundamental unit of DICOM interoperability specification. Examples: Ultrasound Image Storage Service, Basic Grayscale Print Management.

Service/Object Pair (SOP) Instance – an information object; a specific occurrence of information exchanged in a *SOP Class*. Examples: a specific x-ray image.

Tag – a 32-bit identifier for a data element, represented as a pair of four digit hexadecimal numbers, the "group" and the "element". If the "group" number is odd, the tag is for a private (manufacturer-specific) data element. Examples: (0010,0020) [Patient ID], (07FE,0010) [Pixel Data], (0019,0210) [private data element]

Transfer Syntax – the encoding used for exchange of DICOM information objects and messages. Examples: *JPEG* compressed (images), little endian explicit value representation.

Unique Identifier (UID) – a globally unique "dotted decimal" string that identifies a specific object or a class of objects; an ISO-8824 Object Identifier. Examples: Study Instance UID, SOP Class UID, SOP Instance UID.

Value Representation (VR) – the format type of an individual DICOM data element, such as text, an integer, a person's name, or a code. DICOM information objects can be transmitted with either explicit identification of the type of each data element (Explicit VR), or without explicit identification (Implicit VR); with Implicit VR, the receiving application must use a DICOM data dictionary to look up the format of each data element.

1.8 SYMBOLS AND ABBREVIATIONS

AE	Application Entity
AET	Application Entity Title
CAD	Computer Aided Detection
CDA	Clinical Document Architecture
CD-R	Compact Disk Recordable
CSE	Customer Service Engineer
CR	Computed Radiography
CT	Computed Tomography
DHCP	Dynamic Host Configuration Protocol
DICOM	Digital Imaging and Communications in Medicine

DIT	Directory Information Tree (LDAP)
DN	Distinguished Name (LDAP)
DNS	Domain Name System
DX	Digital X-ray
FSC	File-Set Creator
FSU	File-Set Updater
FSR	File-Set Reader
GSDF	Grayscale Standard Display Function
GSPS	Grayscale Softcopy Presentation State
HIS	Hospital Information System
HL7	Health Level 7 Standard
IHE	Integrating the Healthcare Enterprise
IOD	Information Object Definition
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
ISO	International Organization for Standards
IO	Intra-oral X-ray
JPEG	Joint Photographic Experts Group
LDAP	Lightweight Directory Access Protocol
LDIF	LDAP Data Interchange Format
LUT	Look-up Table
MAR	Medication Administration Record
MPEG	Moving Picture Experts Group
MG	Mammography (X-ray)
MPPS	Modality Performed Procedure Step
MSPS	Modality Scheduled Procedure Step
MTU	Maximum Transmission Unit (IP)
MWL	Modality Worklist

NM	Nuclear Medicine
NTP	Network Time Protocol
O	Optional (Key Attribute)
OP	Ophthalmic Photography
OSI	Open Systems Interconnection
PACS	Picture Archiving and Communication System
PET	Positron Emission Tomography
PDU	Protocol Data Unit
R	Required (Key Attribute)
RDN	Relative Distinguished Name (LDAP)
RF	Radiofluoroscopy
RIS	Radiology Information System
RT	Radiotherapy
SC	Secondary Capture
SCP	Service Class Provider
SCU	Service Class User
SOP	Service-Object Pair
SPS	Scheduled Procedure Step
SR	Structured Reporting
TCP/IP	Transmission Control Protocol/Internet Protocol
U	Unique (Key Attribute)
UL	Upper Layer
US	Ultrasound
VL	Visible Light
VR	Value Representation
XA	X-ray Angiography

2. NETWORK CONFORMANCE STATEMENT

2.1 INTRODUCTION

This section of the DICOM Conformance Statement specifies the Senographe Crystal Acquisition Workstation compliance to DICOM requirements for **Networking** features on this GEHC product. Note that the format of this section strictly follows the format defined in DICOM Standard PS 3.2 (Conformance). Please refer to that part of the standard while reading this section.

Senographe Crystal is a Digital X-Ray mammography Acquisition System :

- It uses DICOM Storage SOP services class to export images to remote workstations as a service class user(SCU).
- It allows a user to query for and display DICOM modality worklist information from a remote hospital or radiology department information system computer. For example, a user may wish to query for all scheduled procedures to be performed on the system. In this situation, Senographe Crystal Acquisition Workstation is using the DICOM Modality Worklist SOP service class as a service class user.
- It uses the DICOM Print Management service class to send images to hard copy printers as a service class user.

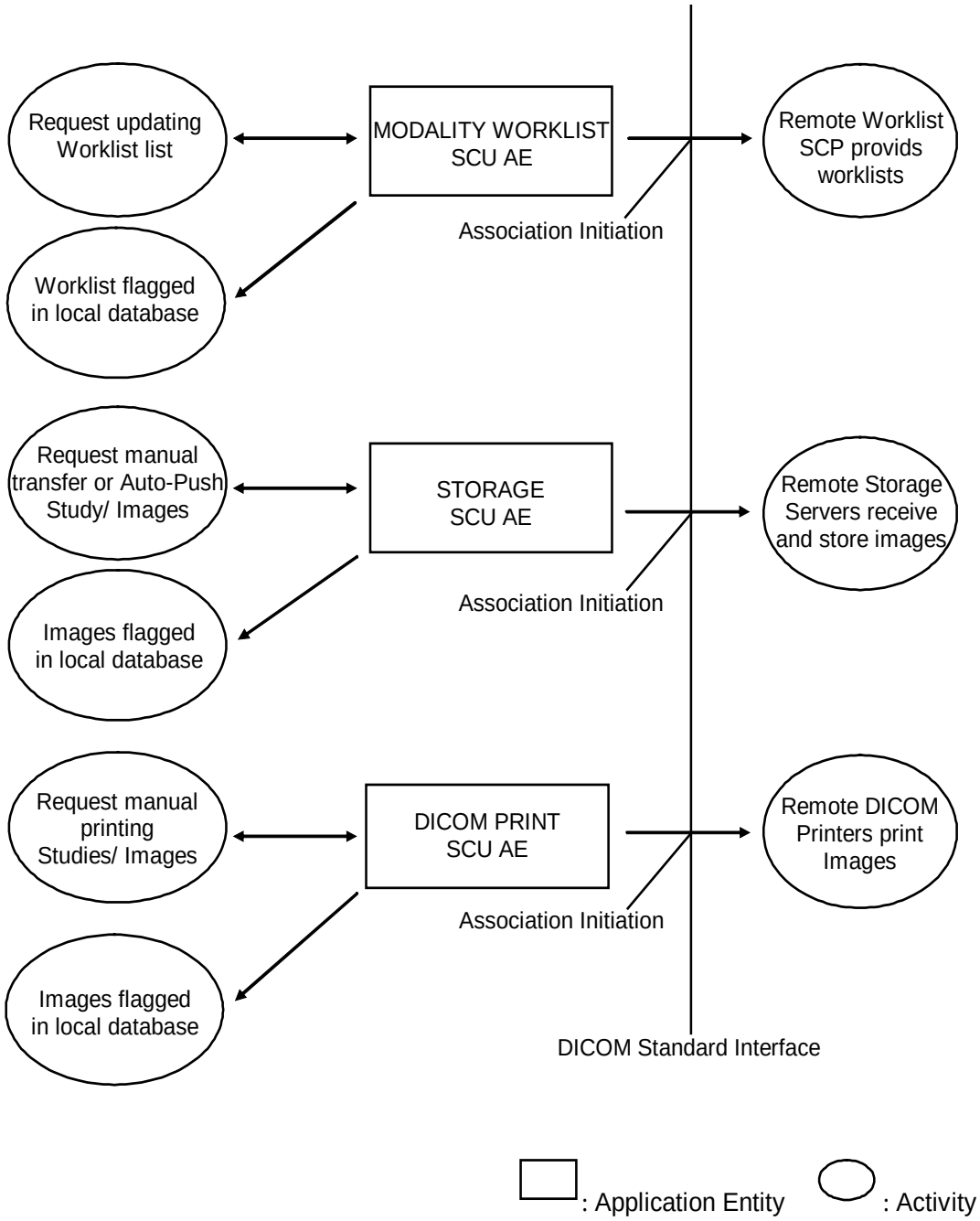
2.2 IMPLEMENTATION MODEL

2.2.1 Application Data Flow Diagram

The network application model for the Senographe Crystal Acquisition Workstation is shown in the following Illustration :

ILLUSTRATION 2–1

SENOGRAPHE CRYSTAL ACQUISITION WORKSTATION NETWORK APPLICATION MODEL AND DATA FLOW DIAGRAM



The product supports updating Worklist list which performs Search Patient functions; the result of that functionality are communicated to remote SCP for requesting scheduled Worklists.

The product supports the transfer of images or a study which performs Send functions; the result of that functionality are communicated to remote SCP. A remote storage servers receive and store images or a study.

The product supports manual printing which performs Print functions; the results of that functionality are communicated to remote SCP. A remote DICOM Printers receive and print images or a study on the requested film.

2.2.2 Functional Definition of AE's

The Senographe Crystal contains tree Application Entities(AE), MODALITY WORKLIST SCU, STORAGE SCU and DICOM PRINT SCU. Each individual local Application Entity is defined as follows.

MODALITY WORKLIST SCU AE:
MODALITY WORKLIST SCU AE is an application entity, which requests and receives Worklist information from a remote SCP AE. It is invoked by the Search Patient button that is performed as a result of a user request or automatically at specific time intervals. At this time a user can filter Worklist using searching criteria.

- MODALITY WORKLIST SCU AE is automatically brought up when the acquisition workstation of Senographe Crystal is running.
- All remote Worklist SCPs must be manually configured on the acquisition workstation of Senographe Crystal by a field engineer. The configuration of remote Worklist SCP is done through the Worklist Server on the Setting Mode.
- MODALITY WORKLIST SCU AE is invoked by the real world activity: Search Patient button. For this operation, the user clicks on the Search Patient button on the Worklist mode screen in order to obtain latest modality worklist from the RIS. The MODALITY WORKLIST SCU AE sends a query defined by the user to remote AEs and returns the results to the user interface. Received Worklists have a flag in the local database.
- The MODALITY WORKLIST SCU AE initiates the following functions:
  Build the Worklist query according to the criteria defined by the user in the Search View. Send the query to Worklist Provider: Initiates a DICOM association with the Worklist Provider. If the remote Worklist Provider accepts a presentation context applicable to modality worklist, the MODALITY WORKLIST SCU AE issues a modality worklist query request via the C-FIND service.

STORAGE SCU AE:
The STORAGE SCU AE is an application entity, which sends images to a remote SCP AE. It is invoked by the Send button that is performed as a result of a user request on the Viewer mode or the Close Study button that is performed as Auto-push on the Capture mode.

- The STORAGE SCU AE is automatically brought up when the acquisition workstation of Senographe Crystal is running.
- All remote Storage SCPs must be manually configured on the acquisition workstation of Senographe Crystal by a field engineer. The configuration of remote Storage SCP is done through the Storage Server on the Setting Mode.
- The STORAGE SCU AE is invoked by the real world activity: Send button and Close Study button.
  For this operation, the user selects a study on the Browser mode and enter the Viewer mode. Click the Send button and select the transfer unit, a study or images, in order to send images to remote SCP.
  Other method for this operation is clicking Close Study button. The user chooses the closing option as Auto-Push Yes in order to send images to the remote SCP automatically.

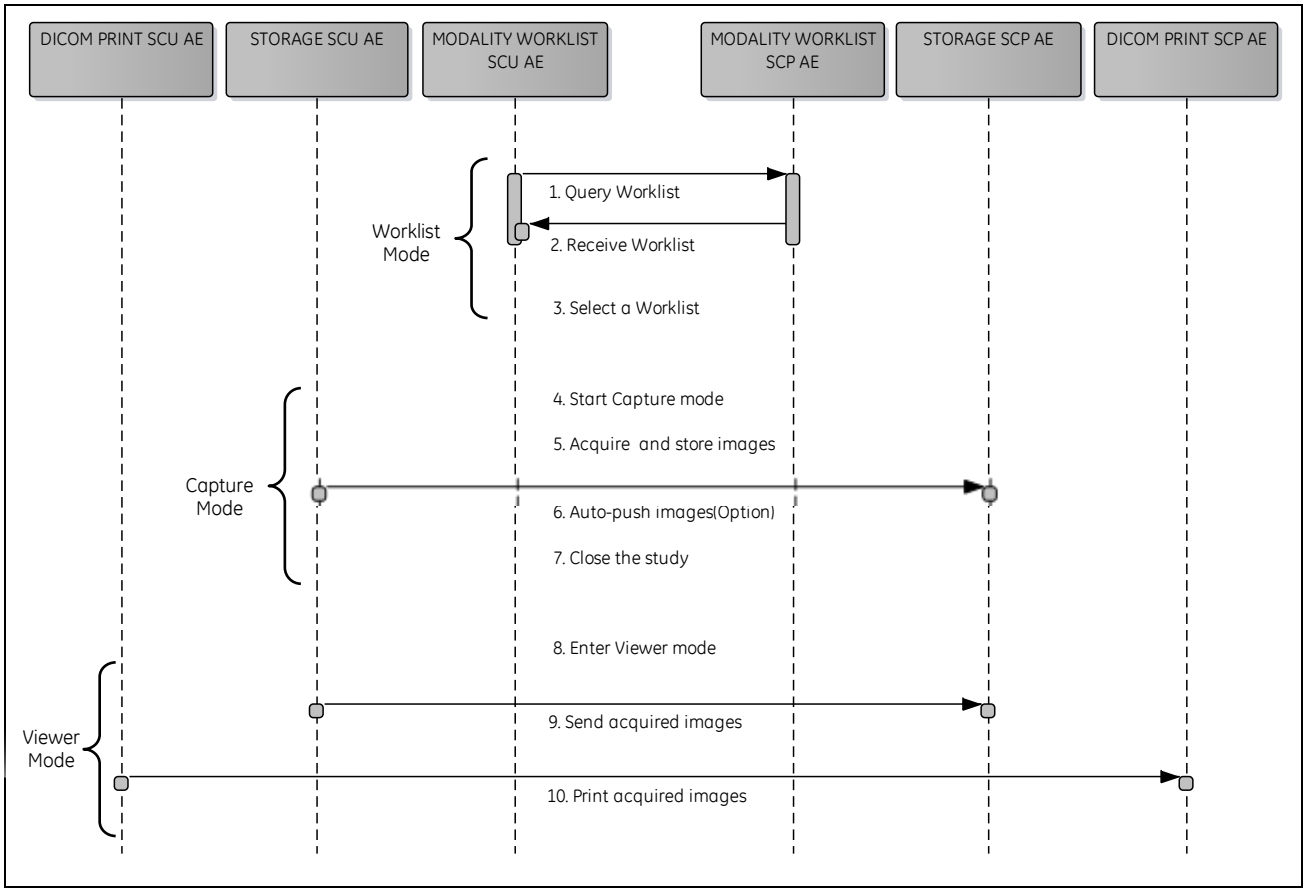
The Remote SCPs return the result to the user interface as icons on the thumbnail images. Also sent images have a flag in the local database.

- The STORAGE SCU AE initiates the following functions:
  Initiate a DICOM association to send DICOM SOP Classes to a remote DICOM AE. Initiate a DICOM association with the Storage Provider. If the remote Storage Provider accepts a presentation context applicable, the STORAGE SCU AE issues a Store request via the C-STORE service.

DICOM PRINT SCU AE:
DICOM PRINT SCU AE is an application entity, which prints images to film on a remote SCP AE(Printer). It is invoked by the Pint button that is performed as a result of a user request. At this time a user can configure images using print options.

- DICOM PRINT SCU AE is automatically brought up when the acquisition workstation of Senographe Crystal is running.
- All remote Print SCPs must be manually configured on the acquisition workstation of Senographe Crystal by a field engineer. The configuration of remote Print SCP is done through the Printer List on the Setting Mode.
- DICOM PRINT SCU AE is invoked by the real world activity: Print button.
  For this operation, the user selects a study on the Browser mode and enter the Viewer mode. Click the Print button and select options and the printer unit, a study or images, in order to print images on the remote Printer. Printed images have a flag in the local database.
- The DICOM PRINT SCU AE initiates the following functions:
  Initiate a DICOM association to send DICOM SOP Classes to a remote DICOM Printer. If the remote DICOM Printer accepts a presentation context applicable, the DICOM PRINT SCU AE issues a film session request via N-CREATE service.

2.2.3 Sequencing of Real-World Activities



The user usually refresh the Worklist before the image acquisition in order to get the latest information from the RIS.

1. MODALITY WORKLIST SCU initiates a modality worklist query to the MODALITY WORKLIST SCP with a given set of query parameters upon the user request.

2. MODALITY WORKLIST SCP returns responses which match the query parameters. Items from the returned worklist responses are filtered according to the query parameters. Some parameters are set by the user on the Worklist mode.

3. The user selects one of the returned worklist to perform acquisition.

The user usually clicks the Capture button to enter the Capture mode with selected worklist.

4. The Senographe Crystal starts the acquisition in accordance with procedures upon the user request.

5. Acquired image is stored on the local driver of the Senographe Crystal.

The user usually clicks the Close Study button when procedures are completed. Then the Senographe Crystal asks the user whether or not Auto-Push is used. If the user uses the Auto-Push, acquired images are sent to connected storage SCP.

6. STORAGE SCU initiates Digital X-Ray Image Storage - For Presentation requests to send acquired images to a SCP.

7. The Capture mode is closed.

The user usually enters the Viewer mode to handle acquired images after finishing the Capture mode.

8. The user finds scanned patient on the Browser mode. Then the user enters the Viewer mode with selected one of closed studies.

The user usually clicks the Send button to send the image or study to a remote SCP manually.

9. STORAGE SCU initiates Digital X-Ray Image Storage - For Presentation requests. If images are reprocessed as Raw, STORAGE SCU initiates Digital X-Ray Image Storage - For Processing requests.

The user sometimes prints images or a study to films on the Viewer mode. The user clicks the Print button and sets options for printing on a remote SCP AE(Printer).

10. DICOM PRINT SCU initiates the following actions
    N-CREATEs a Basic Film Session SOP Instance
    N-CREATEs a Basic Film Box SOP Instance for the current film
    N-SETs the Basic Film Box SOP Instance with the Image Box SOP Instance for each image on the film
    N-ACTIONs on the Basic Film Box SOP Instance
    N-DELETEs on the Basic Film Box SOP Instance

2.3 AE SPECIFICATIONS

2.3.1 MODALITY WORKLIST SCU AE Specification

The MODALITY WORKLIST SCU Application Entity provides Standard Conformance to the following DICOM SOP Classes as an **SCU**:

SOP Class Name	SOP Class UID	SCU	SCP
Verification SOP Class	1.2.840.10008.1.1	Yes	No
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Yes	No

2.3.1.1 Association Establishment Policies

2.3.1.1.1 General

The DICOM Application Context Name (ACN), which is always proposed, is:

Application Context Name	1.2.840.10008.3.1.1.1

The maximum length PDU receive size for the MODALITY WORKLIST SCU is:

Maximum Length PDU	46726bytes

2.3.1.1.2 Number of Associations

The MODALITY WORKLIST SCU will initiate a maximum of one simultaneous associations to remote nodes.

2.3.1.1.3 Asynchronous Nature

Asynchronous mode is not supported. All operations will be performed synchronously.

2.3.1.1.4 Implementation Identifying Information

The Implementation UID for this DICOM Implementation is:

Senographe SenoCrystal Acquisition Workstation Implementation UID	1.2.840.113619.6.373
Senographe SenoCrystal Acquisition Workstation Implementation Version Name	SenoCrystal_V1

2.3.1.2 Association Initiation Policy

When the MODALITY WORKLIST SCU Application Entity initiates an Association for any Real-World Activity, it will propose the Presentation Contexts for all Real-World Activities; i.e., there is only a single, comprehensive Presentation Context Negotiation proposed for the AE.

2.3.1.2.1 Real-World Activity - Worklist Update

The request for a Worklist Update is initiated by pressing the button “Search Patient” on Worklist mode or automatically at specific time intervals, configurable by a user. The automated query mechanism with “Search Patient” is performed immediately on request in Worklist mode which has a search criteria and an interactive query can be performed.

The interactive Patient Worklist Query will display a entering data as search criteria on the interface. When the Query is started on user request, only the matched data with keys will be inserted.

With automated worklist queries (including “Worklist Update”) the MODALITY WORKLIST SCUAE always requests all items with a search criterial such as a Scheduled Procedure Step Start Date, Modality, Patient’s name, Patient’s ID, Accession number. Worlist Query Modality and Procedure Description Filter are configurable on the Settings mode.

The other search criteria can be entered by a user in Worklist mod about Patient Name, Patient ID, Accession Number and date. Detailed

Patient Name: The user can insert one patient's the last name, first name, middle names which are separated by the separators(^) in the Patient Name section.

Patient ID: The user can insert one of the Patient ID in the Patient ID section.

Accession Number: The user can insert one of the Accession Number in the Accession Number.

Date: The user can select one period in the follow enumerated values.

Today
A day ago - Today
Two day ago - Today
A week ago - Today
A month ago – Today

Modality: An administrator can set an attribute of Worklist Query Modality in Settings mode. The default value is MG.

An administrator can set a value of **Procedure description Filter** in Settings mode. When interactive query is finished, the items are inserted in the local database after filtering using the value of Procedure Description Filter.

2.3.1.2.1.1 Associated Real-World Activity

A possible sequence of interactions between the Worklist Modality AE and a Departmental Scheduler such as a RIS or HIS which supports the Modality Worklist SOP Class as an SCP is as follows.

1. The MODALITY WORKLIST SCU AE opens an association with the Departmental Scheduler.

2. The MODALITY WORKLIST SCU AE send a C-FIND request to the Departmental Scheduler containing the Worklist Query attributes.

3. The Departmental Scheduler returns a C-FIND response containing the requested attributes of the first matching Worklist item.

4. The Departmental Scheduler returns another C-FIND response containing the requested attributes of the second matching Worklist item.

5. The Departmental Scheduler returns other C-FIND response containing the requested attributes of the matching Worklist items until no further matching Worklist items exist.

6. The Departmental Scheduler returns another C-Find response with status Success indicating that no further matching Worklist items exist.

7. The MODALITY WORKLIST SCU AE closes the association with the Departmental Scheduler.

8. The user select a Worklist item from the Worklist mode and prepares to acquire new images.

2.3.1.2.1.2 Proposed Presentation Context Table

The MODALITY WORKLIST SCUAE will propose Presentation Contexts as shown in the following table:

Presentation Context Table – Proposed by AE MODALITY WORKLIST SCU for Activity Updating Worklists					
Abstract Syntax		**Transfer Syntax**		**Role**	
Name	**UID**	**Name List**	**UID List**		
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	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
Verification SOP Class	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

2.3.1.2.1.2.1 SOP Specific DICOM Conformance Statement for the Modality Worklist Information Model - FIND SOP Class

The MODALITY WORKLIST SCU AE includes matching keys in the Modality Worklist queries as described in Section 2.3.1.2.1 giving query details.

The interface on Worklist mode which contains worklist list are updated when returned C-Find responses are saved in the local databased. The Scheduled Procedure Steps are displayed to users, they can select one item to acquired new images.

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

Service Status	Status Code	Further Meaning	Application Behavior When Receiving Status Code
Failure	A700	Refused: Out of resources	The Status is recorded in the log file as RefusedOutOfResources.
	0122	SOP Class Not Supported	The Status is recorded in the log file as ClassNotSupported.
	C001	Error: Unable to process	The Status is recorded in the log file as Failure.
Cancel	FE00	Matching terminated due to cancel	The Status is recorded in the log file as Cancel.
Success	0000	Matching is complete - No final identifier is supplied	Worklist lit are updated on the Worklist mode from the databased which is recorded when receiving matched Worklist items.
Pending	FF00	Matches are continuing - Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys.	The Status is recorded in the log file as Pending.

	FF01	Matches are continuing - Warning that one or more Optional Keys were not supported for existence for this Identifier	The Status is recorded in the log file as PendingWarning.

2.3.2 STORAGE SCU AE Specification

The STORAGE SCU Application Entity provides Standard Conformance to the following DICOM SOP Classes as an **SCU.**

SOP Class Name	SOP Class UID	SCU	SCP
Verification SOP Class	1.2.840.10008.1.1	Yes	No
Digital Mammography Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.2	Yes	No
Digital Mammography Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	Yes	No

2.3.2.1 Association Establishment Policies

2.3.2.1.1 General

The DICOM Application Context Name (ACN), which is always proposed, is:

Application Context Name	1.2.840.10008.3.1.1.1

The maximum length PDU receive size for the STORAGE SCU is:

Maximum Length PDU	46726Bytes

2.3.2.1.2 Number of Associations

The Storage SCU will initiate a maximum of one simultaneous associations to remote nodes. The Storage SCU initiates one Association at a time for each destination to which a transfer request is being processed in the active job queue list. Only one job will be active at a time, the other remains rending until the active job is completed or failed.

2.3.2.1.3 Asynchronous Nature

Asynchronous mode is not supported. All operations will be performed synchronously.

2.3.2.1.4 Implementation Identifying Information

The Implementation UID for this DICOM Implementation is:

Senographe SenoCrystal Acquisition Workstation	1.2.840.113619.6.373

Implementation UID	
Senographe SenoCrystal Acquisition Workstation Implementation Version Name	**Not supported**

2.3.2.2 Association Initiation Policy

When the STORAGE SCU Application Entity initiates an Association for any Real-World Activity, it will propose the Presentation Contexts for all Real-World Activities; i.e., there is only a single, comprehensive Presentation Context Negotiation proposed for the AE.

2.3.2.2.1 Real-World Activity –Send Images

A user can select images or a study and request them to be sent to multiple destinations by “Send” button on Viewer mode. Each request is forwarded to the job queue and processed individually.

When “Auto-send” is triggered by the button “Close Study” after acquiring images on the Capture mode, images are sent to target destination automatically.

The status of the transfer is reported through an indicator on interface and the indicator's tool-tip which contain a detail status each destination.

2.3.2.2.1.1 Associated Real-World Activity

A possible sequence of interactions between the Storage SCU AE and an Image Manager such as storage or archive device supporting the Storage SOP Classes as a SCP is as follows.

1. The STORAGE SCU AE opens an association with the Image manager.
2. An acquired image is transmitted to the Image Manager using a C-STORE request and the Image Manager replies with a C-STORE response (status success).
3. Another acquired image is transmitted to the Image Manager using a C-STORE request and the Image Manager replies with a C-STORE response (status success).
4. Step4 and 5 repeat until no further image acquired images.
5. The Storage AE closes the association with the Image Manager.
6. If other storage servers exist, new sequence is started in accordance with above steps.

2.3.2.2.2 Proposed Presentation Context Table

The Storage SCU AE will propose Presentation Contexts as shown in the following table:

Presentation Context Table – Proposed by AE STORAGE SCU for Activity Transferring Image or Study

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	**UID**	**Name List**	**UID List**		
Digital Mammography X-Ray Image Storage- For Presentation	1.2.840.10008.5.1.4.1.1.1.2	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
Digital Mammography X-Ray Image Storage- For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	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
Verification SOP Class	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

SOP Class Name	Related General SOP Class Name
Digital Mammography Image Storage - For Presentation	Digital X-Ray Image Storage – For Presentation
Digital Mammography Image Storage - For Processing	Digital X-Ray Image Storage – For Processing

2.3.2.2.2.1.1 SOP Specific DICOM Conformance Statement for All Storage SOP Classes

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

Service Status	Status Code	Further Meaning	Application Behavior When Receiving Status Code
Failure	A700	Refused: Out of resources	The sending indicator is changed to the icon for failure. The Status is recorded in the database for the Queue as "**** Storage failed with status: RefusedOutOfResources".
	A701	Refused unable to calculate matches	The sending indicator is changed to the icon for failure. The Status is recorded in the database for the Queue as "**** Storage failed with status: RefusedUnableToCalculateMatches".
	A702	Refused unable to perform suboperations	The sending indicator is changed to the icon for failure. The Status is recorded in the database for the Queue as "**** Storage failed with status: RefusedUnableToPerformSuboperation".

	A801	Refused move destination unknown	The sending indicator is changed to the icon for failure. The Status is recorded in the database for the Queue as "**** Storage failed with status: RefusedMoveDestinationUnknownRefusedOutOfResources".
	C001	Failure	The sending indicator is changed to the icon for failure. The Status is recorded in the database for the Queue as "**** Storage failed with status: Failure".
	0122	SOP Class Not Supported	The sending indicator is changed to the icon for failure. The Status is recorded in the database for the Queue as "**** Storage failed with status: UnrecognizedOperation".
Warning	B000	Coercion of Data Elements	The sending indicator is changed to the icon for failure. The Status is recorded in the database for the Queue as "**** Storage failed with status: Warning".
Success	0000		The sending indicator is changed to the icon for success. The Status is recorded in the database for the Queue as “**** Storage completed successfully ****".

2.3.3 DICOM PRINT SCU AE Specification

The DICOM PRINT SCU Application Entity provides Standard Conformance to the following DICOM SOP Classes as an **SCU**:

SOP Class Name	SOP Class UID
Verification SOP Class	1.2.840.10008.1.1
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

2.3.3.1 Association Establishment Policies

2.3.3.1.1 General

The DICOM Application Context Name (ACN), which is always proposed, is:

Application Context Name	1.2.840.10008.3.1.1.1

The maximum length PDU receive size for the DICOM PRINT SCU is:

Maximum Length PDU	16384bytes

2.3.3.1.2 Number of Associations

The DICOM PRINT SCU AE will initiate a maximum of one simultaneous associations to remote nodes. The DICOM PRINT SCU AE initiates one Association at a time for each DICOM printer to which a transfer request is being processed in the active job queue list. Only one job will be active at a time, the other remains rending until the active job is completed or failed.

2.3.3.1.3 Asynchronous Nature

Asynchronous mode is not supported. All operations will be performed synchronously.

2.3.3.1.4 Implementation Identifying Information

The Implementation UID for this DICOM Implementation is:

Senographe SenoCrystal Acquisition Workstation Implementation UID	1.2.840.114257.1123456
Senographe SenoCrystal Acquisition Workstation Implementation Version Name	Not supported

2.3.3.2 Association Initiation Policy

The DICOM PRINT SCU proposes only a single Transfer Syntax in each Presentation Context; i.e., for each Abstract Syntax in the following Presentation Context Tables, the AE proposes one Presentation Context for each specified Transfer Syntax.

2.3.3.2.1 Real-World Activity –Film Images

A user requests that is sent to a specific DICOM PRINT SCU AE by pressing the button “Print” on Viewer mode. The user can select the desired film format and number of copies. A user composes images onto film sheets and then each print-job is forwarded to the job queue and processed individually.

2.3.3.2.1.1 Associated Real-World Activity

A typical sequence of DIMSE messages sent over an association between DICOM PRINT SCU AE and a DICOM Printer is as follows.

1. DICOM PRINT SCU AE opens an association with the Printer.

2. N-CREATE on the Film Session SOP Class creates a Film Session.

3. N-CREATE on the Film Box SOP Class creates a Film Box linked to the Film Session. A single Image Box will be created as the result of this operation.

4. N-SET on the Image Box SOP Class transfers the contents of the film sheet to the printer. The printer does not support the Presentation LUT SOP Class, the image data will be passed through a printer-specific correction LUT before being sent.

5. The printer prints the requested number of film sheets.

6. N-DELETE on the Film Session SOP Class deletes the complete Film Session SOP Instance hierarchy.

7. Hardcopy AE closes the association with the Printer.

2.3.3.2.1.2 Proposed Presentation Context Table

The Print SCU AE will propose Presentation Contexts as shown in the following table:

Presentation Context Table – Proposed by AE DICOM PRINT SCU for Activity Printing Image or Study					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Verification SOP Class	1.2.840.10008.1.1	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	1.2.840.10008.1.2	SCU	None
Basic Film Box SOP Class	1.2.840.10008.5.1.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

2.3.3.2.1.2.1 SOP Specific DICOM Conformance Statement for Basic Grayscale SOP Classes

The DICOM PRINT SCU uses the following DIMSE services of the supported SOP Classes:

SOP Class	SOP Class UID	DIMSE Service Element	SCU Usage
Basic Film Session	1.2.840.10008.5.1.1.1	N-CREATE	Used (Mandatory)
		N-SET	Not used
		N-DELETE	Used
		N-ACTION	Not used
Basic Film Box	1.2.840.10008.5.1.1.2	N-CREATE	Used (Mandatory)
		N-ACTION	Used (Mandatory)
		N-DELETE	Used
		N-SET	Used

Basic Grayscale Image Box	1.2.840.10008.5.1.1.4	N-SET	Used (Mandatory)

.

When a manual print operation is initiated, the AE:

1. initiates a DICOM association and negotiates Presentation Contexts
2. N-CREATEs a Basic Film Session SOP Instance
3. N-CREATEs a Basic Film Box SOP Instance for each film
4. N-SETs the Image Box SOP Instance for each image on the film
5. If the SCP supports collation by trying an N-ACTION on the Film Session, prints by an N-ACTION on the Basic Film Session SOP Instance, followed by an N-DELETE of the Basic Film Session SOP Instance.
6. If the SCP does not support collation, prints by a series of N-ACTIONs on the Basic Film Box SOP Instances, each followed by N-DELETEs of the Basic Film Box SOP Instance
7. Releases the DICOM association after printing is successful or failure has been signaled to the user

The DICOM PRINT SCU includes data elements in the SOP Instances with associated value sets as described in Section PRINT Management Implementation.

2.4 COMMUNICATION PROFILES

2.4.1 Supported Communication Stacks

The DICOM Upper Layer Protocol is supported using TCP/IP, as specified in DICOM PS3.8.

The TCP/IP stack is inherited from the Windows 7 Professional Operating System.

2.4.2 Physical Media Support

The product is provided with a 10/100/1000 Mb/s auto-sensing Ethernet interface. Additional or alternate network interfaces may be available.

Note: For more information about the Physical Media available on Windows 7 Professional, please refer to the Product Data Sheet.

System	Descriotion
Processor	Inter® Core™ i3 CPU 540 @3.07GHz 3.07GHz
Installed memory(RAM)	4.00GB
System type	32-bit Operationg System

2.4.3 Additional Protocols

Dynamic Host Configuration Protocol (DHCP) is supported. If necessary, it can be set on the PC of Senographe Crystal Acquisition Workstation

2.4.4 IPv4 and IPv6 Support

Senographe Crystal Acquisition Workstation supports only IPv4.

2.5 CONFIGURATION

2.5.1 AE Title/Presentation Address Mapping

2.5.2 Configurable Parameters

The following fields are configurable for this AE (local):

- Local AE Title *
- Local IP Address
- Local Listening Port Number
- Local IP Netmask

The Local IP Address, Local Listening Port number and Local IP Netmask is set by an operating system.

The following fields are configurable for every remote DICOM AE:

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

Only a default router IP Address for all remote nodes can be configure.

The following fields are configurable:

- Association Establishment Timer *
- Store, Find, Move, Timers
- Inactivity Timers
- Maximum Length PDU
- Number of simultaneous associations

Note: Checked * configurations must be performed by a GE Field Engineer.

2.6 SUPPORT OF EXTENDED CHARACTER SETS

The Senographe Crystal Acquisition Workstation is configurable with a single single-byte extended character set, either the default ISO_IR 100 (Latin alphabet Number 1

supplementary set). If the specific character set is not ISO_IR 100, Senographe Crystal decodes it as ISO_IR 100..

2.7 CODES AND CONTROLLED TERMINOLOGY

The product uses no coded terminology.

2.8 SECURITY PROFILES

The product does not conform to any defined DICOM Security Profiles.

It is assumed that the product is used within a secured environment. It is assumed that a secured environment includes at a minimum:

1. Firewall or router protections to ensure that only approved external hosts have network access to the product.
2. Firewall or router protections to ensure that the product only has network access to approved external hosts and services.
3. Any communications with external hosts and services outside the locally secured environment use appropriate secure network channels (such as a Virtual Private Network (VPN))

3. MEDIA STORAGE CONFORMANCE STATEMENT

3.1 INTRODUCTION

This section of the DICOM conformance statement specifies the Senographe SenoCrystal Acquisition Workstation compliance to DICOM requirements for **Media Interchange**. It details the DICOM Media Storage Application Profiles and roles that are supported by this product.

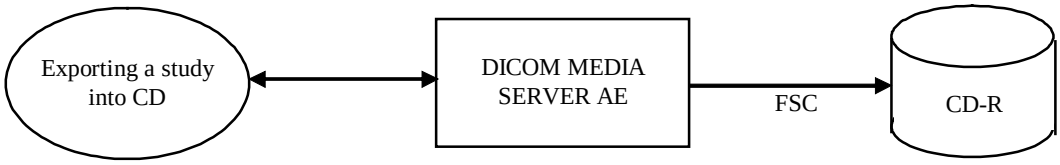
The Senographe SenoCrystal Acquisition Workstation exports the DICOM files with an independent viewer into the CD. The archived DICOM can be browsed and read by this viewer.

3.2 IMPLEMENTATION MODEL

3.2.1 Application Data Flow Diagram

The media interchange application model for the Senographe SenoCrystal Acquisition Workstation is shown in the following Illustration :

ILLUSTRATION 3–1
SENOGRAPHE SENOCRYSTAL ACQUISITION WORKSTATION MEDIA INTERCHANGE APPLICATION MODEL AND DATA FLOW DIAGRAM



The product supports exporting a study into media storage which is performed by DICOM MEDIA AE; the results of that functionality are written to CD-R.

3.2.2 Functional Definition of AE's

DICOM MEDIA AE:
DICOM MEDIA AE is an application entity, which exchanges data information on media using the DICOM File Service. This File Service is provides operations that support basic roles, which are File-set Creator(FSC), File-set Reader(FSR), and File-set Update(FSU). The role, File-set Creator(FSC) is placed between the local Application Entity and the ICOM Storage media on which the role is applied.

The CD-R Media Server Application Entity supports the functions: accessible to patient demographics and pixel data in the local database, generate a DICOM File Set (FSC) for Digital Mammography X-Ray (MG) For Presentation, and write the DICOM File Set on a CD-R

3.2.3 Sequencing of Real-World Activities

For writing image on a CD-R:

1. Browse a study for writing
2. Load Study on Viewer
3. Click the Data Export button on the UI menu
4. System writes images.

3.2.4 File Meta Information Options (See PS3.10)

The File Meta-Information for this implementation is :

File Meta-Information Version	1
Senographe SenoCrystal Acquisition Workstation Implementation UID	1.2.840.113619.6.373
Implementation Version Name	SenoCrystal_V1

3.3 AE SPECIFICATIONS

3.3.1 DICOM MEDIA AE Specification

The DICOM MEDIA Application Entity provides standard conformance to DICOM Interchange Option of the Media Storage Service Class. The supported Application Profiles and roles are listed below.

Supported Application Profile	Real World Activity	Role	Option
STD-GEN-CD	Data Export	FSC	Interchange

3.3.1.1 File Meta Information for the DICOM MEDIA Application Entity

Following are the values set in the File Meta Information for this AE Title :

Source Application Entity Title	The value is set to system hostname
Senographe SenoCrystal Acquisition Workstation Implementation UID	1.2.840.113619.6.373
Senographe SenoCrystal Acquisition Workstation Implementation Version Name	SenoCrystal_V10

3.3.1.2 Real-World Activities for the DICOM MEDIA Application Entity

3.3.1.2.1 Real-World Activity – Data Export

The CD-R DICOM MEDIA AE acts as an FSC using the interchange option when requested to copy SOP Instances from the local database to the CD-R.
The user has to insert a blank CD into the CD-R drive and selects and loads a study to be archived on the CD-R. Then, the user start to export the DICOM MEDIA and an archiving status on CD-R is displayed.

3.3.1.2.1.1 Media Storage Application Profile for the RWA – Data Export

For the list of Application Profiles that invoke this AE for the Real-World Activity Data Export, see the Table in Section "DICOM MEDIA AE Specification " describing this AE, Section 3.3.1 where the table describing the Application Profiles and Real-World Activity is defined.

3.3.1.2.1.1.1 Options for STD-GEN-CD Application Profile

Following are the optional SOP Classes supported by this AE. All SOP Instances use the Explicit VR Little Endian Uncompressed Transfer Syntax, UID 1.2.840.10008.1.2.1.

SOP Class	SOP Class UID
Digital Mammography Image Storage - For Presentation	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

Common DICOMDIR Directory Records created by this AE will include key attributes as described in Section 6.2.2. Following are the Additional DICOMDIR Keys supported for this profile:

ADDITIONAL DICOMDIR KEYS

Key Attribute	Tag	Directory Record Type	Type	Notes
Image Type	(0008,0008)	IMAGE	1C	The value is set according to source when exporting images.

3.4 AUGMENTED AND PRIVATE APPLICATION PROFILES

No augmented/private profile is implemented.

3.5 EXTENSIONS / SPECIALIZATIONS / PRIVATIZATIONS

3.5.1 Standard Extended / Specialized / Private SOP Classes

Not applicable to this product.

3.5.2 Private Transfer Syntaxes

No Private Transfer Syntax is supported.

3.6 CONFIGURATION

The source AE Title is encoded from Local AE Title in Settings mode.

3.7 SUPPORT OF EXTENDED CHARACTER SETS

The Senographe SenoCrystal Acquisition Workstation supports extended character sets as specified in Section 2. Networking section on Support Of Extended Character Sets.

The Senographe Crystal Acquisition Workstation will support only the ISO_IR 100 (ISO 8859-1:1987 Latin alphabet N 1. Supplementary set) as extended character sets.

4. DIGITAL MAMMOGRAPHY X-RAY INFORMATION OBJECT IMPLEMENTATION

4.1 INTRODUCTION

This section specifies the use of the DICOM Digital Mammography X-Ray Image IOD to represent the information included in MG Images produced by this implementation. Corresponding attributes are conveyed using the module construct.

4.2 SENOGRAPHE SENOCRYSTAL ACQUISITION WORKSTATION MAPPING OF DICOM ENTITIES

The Senographe SenoCrystal Acquisition Workstation maps DICOM Information Entities to local Information Entities in the product's database and user interface.

TABLE 4-1
MAPPING OF DICOM ENTITIES TO SENOGRAPHE SENOCRYSTAL ACQUISITION WORKSTATION ENTITIES

DICOM IE	Senographe SenoCrystal Acquisition Workstation Entity
Patient	Patient
Study	Study
Series	Series
Image	Image

4.3 IOD MODULE TABLE

The MG Image Information Object Definition comprises the modules of the following table, plus Standard Extended and Private attributes. Standard Extended and Private attributes are described in Section 4.5.

TABLE 4-2
MG IMAGE IOD MODULES

Entity Name	Module Name	Usage	Reference
Patient	Patient	Used	4.4.1.1
Study	General Study	Used	4.4.2.1
	Patient Study	Used	4.4.2.2
Series	General Series	Used	4.4.3.1
	DX Series	Used	4.4.3.2
	Mammography Series	Used	4.4.3.3
Equipment	General Equipment	Used	4.4.4.1
Image	General Image	Used	4.4.5.1
	Image Pixel	Used	4.4.5.2
	DX Anatomy Imaged	Used	4.4.5.3

	DX Image	Used	4.4.5.4
	DX Detector	Used	4.4.5.5
	X-Ray Collimator	Used	4.4.5.6
	DX Positioning	Used	4.4.5.7
	X-Ray Acquisition Dose	Used	4.4.5.8
	X-Ray Generation	Used	4.4.5.9
	X-Ray Filtration	Used	4.4.5.10
	Mammography Image	Used	4.4.5.11
	VOI LUT	Used Required if Presentation Intent Type (0008,0068) is FOR PRESENTATION	4.4.5.12
	Acquisition Context	Used	4.4.5.13
	SOP Common	Used	4.4.5.14

4.4 INFORMATION MODULE DEFINITIONS

Please refer to DICOM Part 3 (Information Object Definitions) for a description of each of the entities, modules, and attributes contained within the Digital Mammography X-Ray Information Object.

The following modules are included to convey Enumerated Values, Defined Terms, and Optional Attributes supported. Type 1 & Type 2 Attributes are also included for completeness and to define what values they may take and where these values are obtained from when generating the instance. It should be noted that they are the same ones as defined in the DICOM Standard Part 3 (Information Object Definitions). Also note that Attributes not present in tables are not supported.

4.4.1 Patient Entity Modules

4.4.1.1 Patient Module

This section specifies the attributes of the patient that describe and identify the patient who is the subject of a diagnostic study. The module contains attributes of patient that are needed for diagnostic interpretation of the image and are common for all studies performed on the patient.

TABLE 4-3
PATIENT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Patient's Name	(0010,0010)	2	The value is loaded from HIS/RIS or is entered by the user using the Manual Entry as the patient's full name.
Patient ID	(0010,0020)	2	The value is loaded from HIS/RIS or is entered by the user using the Manual Entry as the primary hospital identification number or code for the patient.
Issuer of Patient ID	(0010,0021)	3	Not used
Patient's Birth Date	(0010,0030)	2	The value is loaded from HIS/RIS or is entered by the user using the Manual Entry as the day of birth.
Patient's Sex	(0010,0040)	2	The value is loaded from HIS/RIS or is entered by the user using the Manual Entry as the sex of the named patient. Enumerated Values: M = male F = female O = other
Referenced Patient Sequence	(0008,1120)	3	Not used
Patient's Birth Time	(0010,0032)	3	Not used
Other Patient IDs	(0010,1000)	3	Not used
Other Patient IDs Sequence	(0010,1002)	3	Not used
Other Patient Names	(0010,1001)	3	Not used
Ethnic Group	(0010,2160)	3	Not used
Patient Comments	(0010,4000)	3	Not used
Patient Species Description	(0010,2201)	1C	Not used
Patient Species Code Sequence	(0010,2202)	1C	Not used
Patient Breed Description	(0010,2292)	2C	Not used
Patient Breed Code Sequence	(0010,2293)	2C	Not used
Breed Registration Sequence	(0010,2294)	2C	Not used
Responsible Person	(0010,2297)	2C	Not used
Responsible Person Role	(0010,2298)	1C	Not used
Responsible Organization	(0010,2299)	2C	Not used
Patient Identity Removed	(0012,0062)	3	Not used
De-identification Method	(0012,0063)	1C	Not used
De-identification Method Code Sequence	(0012,0064)	1C	Not used

4.4.2 Study Entity Modules

4.4.2.1 General Study Module

This section specifies the Attributes which describe and identify the Study performed upon the patient.

TABLE 4-4
GENERAL STUDY MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Study Instance UID	(0020,000D)	1	The value is loaded from HIS/RIS or is generated by the system as the unique identifier for the Study.
Study Date	(0008,0020)	2	The value is set by the system as the today's date when generating a new Study.
Study Time	(0008,0030)	2	The value is set by the system as current time when generating a new Study.
Referring Physician's Name	(0008,0090)	2	The value is loaded from HIS/RIS as the name of the patient's referring physician.
Referring Physician Identification Sequence	(0008,0096)	3	Not used
Study ID	(0020,0010)	2	The value is loaded from HIS/RIS as the Study identifier.
Accession Number	(0008,0050)	2	The value is loaded from HIS/RIS or is entered by the user using the Manual Entry as the information of accession
Study Description	(0008,1030)	3	The value is set to "Mammography Routine".
Physician(s) of Record	(0008,1048)	3	Not used
Physician(s) of Record Identification Sequence	(0008,1049)	3	Not used
Name of Physician(s) Reading Study	(0008,1060)	3	Not used
Physician(s) Reading Study Identification Sequence	(0008,1062)	3	Not used
Referenced Study Sequence	(0008,1110)	3	Not used
Procedure Code Sequence	(0008,1032)	3	Not used

4.4.2.2 Patient Study Module

This section specifies the Attributes which provide information about the patient at the time the study was performed.

TABLE 4-5
PATIENT STUDY MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Admitting Diagnoses Description	(0008,1080)	3	Not used
Admitting Diagnoses Code Sequence	(0008,1084)	3	Not used

Patient's Age	(0010,1010)	3	The value is generated by the system when the patient's birth date (0010, 0030) is entered
Patient's Size	(0010,1020)	3	Not used
Patient's Weight	(0010,1030)	3	Not used
Occupation	(0010,2180)	3	Not used
Additional Patient's History	(0010,21B0)	3	Not used
Admission ID	(0038,0010)	3	Not used
Issuer of Admission ID	(0038,0011)	3	Not used
Service Episode ID	(0038,0060)	3	Not used
Issuer of Service Episode ID	(0038,0061)	3	Not used
Service Episode Description	(0038,0062)	3	Not used
Patient's Sex Neutered	(0010,2203)	2C	Not used

4.4.3 Series Entity Modules

4.4.3.1 General Series Module

TABLE 4-6
GENERAL SERIES MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	1	The value is loaded from HIS/RIS or is generated by the system as the type of DICOM Encoding Modality. Enumerated Values: CR = Computed Radiography DX = Digital Radiography MG = Mammography
Series Instance UID	(0020,000E)	1	The value is set by the system as the unique identifier of the Series.
Series Number	(0020,0011)	2	The value is set by the system as a number that identifies this Series.
Laterality	(0020,0060)	2C	Not used
Series Date	(0008,0021)	3	The system sets it to today's date when generating a new Series.
Series Time	(0008,0031)	3	The system sets it to current time when generating a new Series.
Performing Physicians' Name	(0008,1050)	3	Not used
Performing Physician Identification Sequence	(0008,1052)	3	Not used
Protocol Name	(0018,1030)	3	Not used
Series Description	(0008,103E)	3	The value is loaded from HIS/RIS as the description of the Series.

Operators' Name	(0008,1070)	3	The value is set by the system as the name of the operator supporting the Series.
Operator Identification Sequence	(0008,1072)	3	Not used
Referenced Performed Procedure Step Sequence	(0008,1111)	3	Not used
Related Series Sequence	(0008,1250)	3	Not used The Series is a one-to-one correspondence with the Study
Body Part Examined	(0018,0015)	3	The value is set to BREAST
Patient Position	(0018,5100)	2C	Not used Patient Orientation Code Sequence(0054,0410) is present.
Smallest Pixel Value in Series	(0028,0108)	3	Not used
Largest Pixel Value in Series	(0028,0109)	3	Not used
Request Attributes Sequence	(0040,0275)	3	Not used
Reason for the Requested Procedure	(0040,1002)	3	Not used
Reason for Requested Procedure Code Sequence	(0040,100A)	3	Not used
Performed Procedure Step ID	(0040,0253)	3	Not used
Performed Procedure Step Start Date	(0040,0244)	3	Not used
Performed Procedure Step Start Time	(0040,0245)	3	Not used
Performed Procedure Step Description	(0040,0254)	3	The value is loaded from HIS/RIS as the description.
Performed Protocol Code Sequence	(0040,0260)	3	Not used
Comments on the Performed Procedure Step	(0040,0280)	3	Not used

4.4.3.2 DX Series Module

TABLE 4-7
DX SERIES MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	1	See 4.4.3.1.
Referenced Performed Procedure step Sequence	(0008,1111)	1C	Not used
Presentation Item Type	(0008,0068)	1	Specify which Enumerated Values are sent: FOR PRESENTATION FOR PROCESSING

4.4.3.3 Mammography Series Module

TABLE 4-8
MAMMOGRAPHY SERIES MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	1	See 4.4.3.1.
Request Attributes Sequence	(0040,0275)	3	Not used
Reason for the Requested Procedure	(0040,1002)	3	Not used
Reason for Requested Procedure Code Sequence	(0040,100A)	3	Not used

4.4.4 Equipment Entity Modules

4.4.4.1 General Equipment Module

This section specifies the Attributes which identify and describe the piece of equipment which produced a Series of Images.

TABLE 4-9
GENERAL EQUIPMENT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Manufacturer	(0008,0070)	2	The value is set to GE MEDICAL SYSTEMS.
Institution Name	(0008,0080)	3	The value comes from system configuration.
Institution Address	(0008,0081)	3	The value comes from system configuration.
Station Name	(0008,1010)	3	The value comes from environment information about computer. The value is set to name of computer..
Institutional Department Name	(0008,1040)	3	Not used
Manufacturer's Model Name	(0008,1090)	3	The values is set to Senographe_Crystal.
Device Serial Number	(0018,1000)	3	Not used
Software Versions	(0018,1020)	3	The value is set to Release information of SenoCrystal.
Gantry ID	(0018,1008)	3	Not used
Spatial Resolution	(0018,1050)	3	Not used
Date of Last Calibration	(0018,1200)	3	Not used
Time of Last Calibration	(0018,1201)	3	Not used
Pixel Padding Value	(0028,0120)	1C	Only the image for presentation exists. The Value is set to zero(0).

4.4.5 Image Entity Modules

4.4.5.1 General Image Module

This section specifies the Attributes which identify and describe an image within a particular series.

TABLE 4-10
GENERAL IMAGE MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Instance Number	(0020,0013)	2	The value is set by the system as a number that identifies image.
Patient Orientation	(0020,0020)	2C	See 4.4.5.1.1.
Content Date	(0008,0023)	2C	The value is set by the system when building the image.
Content Time	(0008,0033)	2C	The value is set by the system when building the image.
Image Type	(0008,0008)	3	See 4.4.5.4.1
Acquisition Number	(0020,0012)	3	Not used.
Acquisition Date	(0008,0022)	3	The value is set by the system when starting acquisition as date.
Acquisition Time	(0008,0032)	3	The value is set by the system when starting acquisition as time.
Acquisition DateTime	(0008,002A))	3	Not used
Referenced Image Sequence	(0008,1140)	3	Not used
Derivation Description	(0008,2111)	3	Not used
Derivation Code Sequence	(0008,9215)	3	Not used
Source Image Sequence	(0008,2112)	3	Only the image for presentation exists.
Referenced Instance Sequence	(0008,114A)	3	Not used
>Purpose of Reference Code Sequence	(0040,A170)	1	Not used
Images in Acquisition	(0020,1002)	3	Not used
Image Comments	(0020,4000)	3	Not used
Quality Control Image	(0028,0300)	3	The value is loaded from HIS/RIS or the value is set to No by the systems.
Burned In Annotation	(0028,0301)	3	The value is set to No
Lossy Image Compression	(0028,2110)	3	The value is set to 00. Enumerated Values: 00 = Image has not been subjected to lossy compression.
Lossy Image Compression Ratio	(0028,2112)	3	Not used
Lossy Image Compression Method	(0028,2114)	3	Not used
Icon Image Sequence	(0088,0200)	3	Not used
Presentation LUT Shape	(2050,0020)	3	The value is set to follow. Enumerated Values: IDENTITY is used if Photometric Interpretation (0028,0004) is MONOCHROME2. INVERSE is used if Photometric Interpretation (0028,0004) is MONOCHROME1.

4.4.5.1.1 Patient Orientation

Patient Orientation is set according to the Clinical View, as describe in the following table:

TABLE 4-11
PATIENT ORIENTATION OF CLINICAL VIEW

Clinical View	Patient Orientation (Row orientation \ Column orientation)
RCC, RCV, RXCCL, RXCCM, RFB	P\L
LCC, LCV, LXCCL, LXCCM, LFB	A\R
RMLO, RAT, RLMO	P\FL
LMLO, LAT, LLMO	A\FR
RML, RLM	P\F
LML, LLM	A\F
RSIO	P\HL
LSIO	A\HR

4.4.5.2 Image Pixel Module

This Section specifies the Attributes that describe the pixel data of the image.

TABLE 4-12
IMAGE PIXEL MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Samples per Pixel	(0028,0002)	1	The value is always set to 1.
Photometric Interpretation	(0028,0004)	1	The value is set to MONOVHROME1 for Processing images. The value is set to MONOCHROME2 for Presentation images.
Rows	(0028,0010)	1	Depending of Field of View, the value is set to 3296 in SFOV. Or the value is set to 4244 in LFOV.
Columns	(0028,0011)	1	Depending of Field of View, the value is set to 2424 in SFOV. Or the value is set to 3290 in LFOV.
Bits Allocated	(0028,0100)	1	The value is set to 16.
Bits Stored	(0028,0101)	1	The value is set to 14 for Processing. The value is set to 12 for Presentation.
High Bit	(0028,0102)	1	The value is set to 13 for Processing. The value is set to 11 for Presentation.
Pixel Representation	(0028,0103)	1	The value is set to 0000H.
Pixel Data	(7FE0,0010)	1	Always sent
Planar Configuration	(0028,0006)	1C	Not required.
Pixel Aspect Ratio	(0028,0034)	1C	Not required.

Smallest Image Pixel Value	(0028,0106)	3	Not used.
Largest Image Pixel Value	(0028,0107)	3	Not used.
Red Palette Color Lookup Table Descriptor	(0028,1101)	1C	Not required.
Green Palette Color Lookup Table Descriptor	(0028,1102)	1C	Not required.
Blue Palette Color Lookup Table Descriptor	(0028,1103)	1C	Not required.
Red Palette Color Lookup Table Data	(0028,1201)	1C	Not required.
Green Palette Color Lookup Table Data	(0028,1202)	1C	Not required.
Blue Palette Color Lookup Table Data	(0028,1203)	1C	Not required.
ICC Profile	(0028,2000)	3	Not used.
Pixel Data Provider URL	(0028,7FE0)	1C	Not required.
Pixel Padding Range Limit	(0028,0121)	1C	The value is set by result of Device Processing.

4.4.5.3 DX Anatomy Imaged Module

This Section specifies the Attributes that describe the anatomy contained in IOD.

TABLE 4-13
DX ANATOMY IMAGED MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Image Laterality	(0020,0062)	1	The value is set according to laterality of selected protocol. Supported values: R = right L = left
Anatomic Region Sequence	(0008,2218)	2	Always sent
> *Code Value*	(0008,0100)	1C	The value is set to code, T-04000.
> *Coding Scheme Designator*	(0008,0102)	1C	The value is set SRT.
> *Code meaning*	(0008,0104)	1C	The value is set to Breast
> Anatomic Region Modifier Sequence	(0008,2220)	3	Not used.
Primary Anatomic Structure Sequence	(0008,2228)	3	Not used.

4.4.5.4 DX Image Module

This Section specifies the Attributes that describe the DX image.

TABLE 4-14
DX IMAGE MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Image Type	(0008,0008)	1	See 4.4.5.4.1
Samples per Pixel	(0028,0002)	1	The value is set to 1.

Photometric Interpretation	(0028,0004)	1	The value is set to MONOCHROME1 for Processing images. The value is set to MONOCHROME2 for Presentation images.
Bits Allocated	(0028,0100)	1	The value is set to 16.
Bits Stored	(0028,0101)	1	The value is set to 14 for Processing images. The value is set to 12 for Presentation images.
High Bit	(0028,0102)	1	Bits Stored (0028,0101) value – 1
Pixel Representation	(0028,0103)	1	Value is 0000H
Pixel Intensity Relationship	(0028,1040)	1	The value is set to LIN for Processing images. The value is set to LOG for Presentation images. LIN = Linearly proportional to X-Ray beam intensity LOG = Logarithmically proportional to Xray beam intensity
Pixel Intensity Relationship Sign	(0028,1041)	1	The value is set to 1 for Processing images. Enumerated Values 1 means that lower pixel values correspond to less X-Ray beam intensity. The value is set to -1 for Presentation images. Enumerated Values -1 means that higher pixel values correspond to less X-Ray beam intensity.
Rescale Intercept	(0028,1052)	1	The value is set to 0.
Rescale Slope	(0028,1053)	1	The value is set to 1.
Rescale Type	(0028,1054)	1	The value is set to US.
Presentation LUT Shape	(2050,0020)	1	The value is set to follow. Enumerated Values: IDENTITY is used if Photometric Interpretation (0028,0004) is MONOCHROME2. INVERSE is used if Photometric Interpretation (0028,0004) is MONOCHROME1.
Lossy Image Compression	(0028,2110)	1	The value is set to 00.
Lossy Image Compression Ratio	(0028,2112)	1C	Not used. Image has NOT been subjected to lossy compression.
Derivation Description	(0008,2111)	3	Not used.
Acquisition Device Processing Description	(0018,1400)	3	Only the image for Presentation images exists. Depending of visual processing performed on the images prior to exchange, the value is set to one of the below. eContrast_Light, eContrast_Medium, eContrast_Intense, eContrast_Implant

Acquisition Device Processing Code	(0018,1401)	3	The value is set to version of Device Processing.
Patient Orientation	(0020,0020)	1	See 4.4.5.1.1.
Calibration Image	(0050,0004)	3	Not used.
Burned In Annotation	(0028,0301)	1	See 4.4.5.1.
VOI LUT Sequence	(0028,3010)	1C	Not used.
Window Center	(0028,1050)	1C	Only the image for Presentation images exists. See 4.4.5.12.
Window Width	(0028,1051)	1C	Only the image for Presentation images exists. See 4.4.5.12.
Window Center & Width Explanation	(0028,1055)	3	See 4.4.5.12.

4.4.5.4.1 Image Type

Define the values of Image Type (0008,0008) that may be sent and under what circumstances, or refer to the more general description in the General Image Module.

- Specify which Enumerated Values of Value 1 are created:
  - ORIGINAL identifies an Original Image
- Specify which Enumerated Values of Value 2 are created:
  - PRIMARY identifies a Primary Image

Per DICOM requirement, Value 3 has a zero length value (null value)

4.4.5.5 DX Detector Module

This Section specifies the Attributes that describe the DX detector.

TABLE 4-15
DX DETECTOR MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Detector Type	(0018,7004)	2	The value is set to SCINTILLATOR.
Detector Configuration	(0018,7005)	3	Not used.
Detector Description	(0018,7006)	3	Not used.
Detector Mode	(0018,7008)	3	Not used.
Detector ID	(0018,700A)	3	Not used.
Date of Last Detector Calibration	(0018,700C)	3	Not used.
Time of Last Detector Calibration	(0018,700E)	3	Not used.
Exposures on Detector Since Last Calibration	(0018,7010)	3	Not used.
Exposures on Detector Since Manufactured	(0018,7011)	3	Not used.
Detector Time Since Last Exposure	(0018,7012)	3	Not used.
Detector Binning	(0018,701A)	3	Not used.
Detector Manufacturer Name	(0018,702A)	3	Not used.
Detector Manufacturer's Model Name	(0018,702B)	3	Not used.

Detector Conditions Nominal Flag	(0018,7000)	3	Not used.
Detector Temperature	(0018,7001)	3	Not used.
Sensitivity	(0018,6000)	3	Detector Sensitivity in manufacturer specific units.
Detector Element Physical Size	(0018,7020)	3	Not used.
Detector Element Spacing	(0018,7022)	3	Not used.
Detector Active Shape	(0018,7024)	3	Not used.
Detector Active Dimension(s)	(0018,7026)	3	Not used.
Detector Active Origin	(0018,7028)	3	Not used.
Detector Active Time	(0018,7014)	3	Not used.
Detector Activation Offset From Exposure	(0018,7016)	3	Not used.
Field of View Shape	(0018,1147)	3	The value is set to RECTANGULAR.
Field of View Dimension(s)	(0018,1149)	3	Not Used.
Field of View Origin	(0018,7030)	1C	.
Field of View Rotation	(0018,7032)	1C	The value is set to clockwise rotation in degrees of Field of View, if Field of View Horizontal Flip(0018,7034) is present. Enumerated Values: 0, 90, 180, 270
Field of View Horizontal Flip	(0018,7034)	1C	The value is set to whether or not a horizontal flip has been applied to the Field of View. Enumerated Values: YES NO
Imager Pixel Spacing	(0018,1164)	1	The value is set to 0.07\0.07
Pixel Spacing	(0028,0030)	1C	The pixel spacing is computed based on the Distance source to Patience (0018,1111) and the distance Source to Detector (0018,1110).
Pixel Spacing Calibration Type	(0028,0A02)	3	Not used.
Pixel Spacing Calibration Description	(0028,0A04)	1C	Not used.
Cassette ID	(0018,1007)	3	Not used.
Plate ID	(0018,1004)	3	Not used.

4.4.5.6 X-Ray Collimator Module

This Section specifies the Attributes that describe the X-Ray Collimator.

TABLE 4-16
X-RAY COLLIMATOR MODULE

Attribute Name	Tag	Type	Attribute Description
Collimator Shape	(0018,1700)	1	The value is set to RECTANGULAR.
Collimator Left Vertical Edge	(0018,1702)	1C	The value is set according to shape of

			Collimator.
Collimator Right Vertical Edge	(0018,1704)	1C	The value is set according to shape of Collimator.
Collimator Upper Horizontal Edge	(0018,1706)	1C	The value is set according to shape of Collimator.
Collimator Lower Horizontal Edge	(0018,1708)	1C	The value is set according to shape of Collimator.
Center of Circular Collimator	(0018,1710)	1C	Not used.
Radius of Circular Collimator	(0018,1712)	1C	Not used.
Vertices of the Polygonal Collimator	(0018,1720)	1C	Not used.

4.4.5.7 DX Positioning Module

TABLE 4-17
DX POSITIONING MODULE

Attribute Name	Tag	Type	Attribute Description
Projection Eponymous Name Code Sequence	(0018,5104)	3	Not used.
Patient Position	(0018,5100)	3	Not used.
View Position	(0018,5101)	3	The value is set to ACR BI-RADS Equivalent of View Code. See 4.6.
View Code Sequence	(0054,0220)	3	One item is described in this sequence.
>*Code Value*	(0008,0100)	1	The value is set to one of the Code Value in the View Codes list. See 4.6.
>*Code Scheme Descriptor*	(0008,0102)	1	The value is set to SRT.
>*Code Meaning*	(0008,0104)	1	The value is set to the correlating Code Meaning with the Code Value in the View Codes List. See See 4.6.
>View Modifier Code Sequence	(0054,0222)	3	Zero or more items can be described in this sequence.
>> Code Value	(0008,0100)	1C	The value is set to one of the Code Value in the View Modifier Codes list. See 4.4.3.3.
>> Code Scheme Descriptor	(0008,0102)	1C	The value is set to SRT
>> Code Meaning	(0008,0104)	1C	The value is set to the correlating Code Meaning with the Code Value in the View Modifier Codes list. See 4.4.3.3.
Patient Orientation Code Sequence	(0054,0410)	3	Not used.
Patient Gantry Relationship Code Sequence	(0054,0414)	3	Not used.
Distance Source to Patient	(0018,1111)	3	The value is equal to subtract Body Part Thickness(0018,11A0) from Distance Source to Detector (0018,1110).
Distance Source to Detector	(0018,1110)	3	Distance in mm from source to detector center on the chest wall line.
Estimated Radiographic Magnification	(0018,1114)	3	The value is set to 1 or 1.5 or 1.8.

Factor			
Positioner Type	(0018,1508)	2	The value is set to MAMMOGRAPHIC.
Positioner Primary Angle	(0018,1510)	3	The value is set to position in degrees of the X-ray beam vector in the coronal anatomical plane.
Positioner Secondary Angle	(0018,1511)	3	Not used.
Detector Primary Angle	(0018,1530)	3	Not used.
Detector Secondary Angle	(0018,1531)	3	Not used.
Column Angulation	(0018,1450)	3	Not used.
Table Type	(0018,113A)	3	Not used.
Table Angle	(0018,1138)	3	Not used.
Body Part Thickness	(0018,11A0)	3	The value is set to the average thickness in mm of the body part examined when compressed. When there is no compression force, the value is set to distance between bucky and compression paddle.
Compression Force	(0018,11A2)	3	The value is set to the compression force applied to the breast part during exposure, measured in Newtons.

4.4.5.8 X-Ray Acquisition Dose Module

TABLE 4-18
X-RAY ACQUISITION DOSE MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
KVP	(0018,0060)	3	The value is set to peak kilo voltage output of the X-Ray generator used.
X-Ray Tube Current	(0018,1151)	3	X-Ray Tube current in mA.
X-Ray Tube Current in μA	(0018,8151)	3	Not used.
Exposure Time	(0018,1150)	3	The value is set to duration of X-ray exposure in msec.
Exposure Time in μS	(0018,8150)	3	Not used.
Exposure	(0018,1152)	3	The value is set to the exposure expressed in mAs.
Exposure in μAs	(0018,1153)	3	The value is set to the exposure expressed in μAs.
Distance Source to Detector	(0018,1110)	3	See 4.4.5.7
Distance Source to Patient	(0018,1111)	3	See 4.4.5.7
Image and Fluoroscopy Area Dose Product	(0018,115E)	3	Not used.
Body Part Thickness	(0018,11A0)	3	See 4.4.5.7
Relative X-Ray Exposure	(0018,1405)	3	The value is set to the Exposure
Entrance Dose	(0040,0302)	3	Not used.
Entrance Dose in mGy	(0040,8302)	3	The value is set to average entrance dose value

			measured in mGy.
Exposed Area	(0040,0303)	3	Not used.
Distance Source to Entrance	(0040,0306)	3	Not used.
Comments on Radiation Dose	(0040,0310)	3	Not used.
X-Ray Output	(0040,0312)	3	Not used.
Half Value Layer	(0040,0314)	3	Not used.
Organ Dose	(0040,0316)	3	The value is set to the average organ dose value measured in dGy during the acquisition of image.
Organ Exposed	(0040,0318)	3	The value is set to BREAST.
Anode Target Material	(0018,1191)	3	The value is set to TUNGSTEN.
Filter Material	(0018,7050)	3	The value is set to RHODIUM.
Filter Thickness Minimum	(0018,7052)	3	Not used.
Filter Thickness Maximum	(0018,7054)	3	Not used.
Rectification Type	(0018,1156)	3	Not used.

4.4.5.9 X-Ray Generation Module

TABLE 4-19
X-RAY GENERATION MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
KVP	(0018,0060)	3	See 4.4.5.7
X-Ray Tube Current	(0018,1151)	3	See 4.4.5.7
X-Ray Tube Current in μA	(0018,8151)	3	Not used.
Exposure Time	(0018,1150)	3	See 4.4.5.7
Exposure Time in μS	(0018,8150)	3	Not used.
Exposure	(0018,1152)	3	See 4.4.5.7
Exposure in μAs	(0018,1153)	3	See 4.4.5.7
Exposure Control Mode	(0018,7060)	3	Depending of acquired mode, the value is set to follows. Enumerated values: MANUAL AUTOMATIC
Exposure Control Mode Description	(0018,7062)	3	Described in AUTOMATIC and MANUAL but less values are sent when MANUAL MODE When automatic is sent, the field contains 8 elements - AEC xxx where xxx is the AEC mode used (values are STD, MAG or SPOT) - RECTANGLE xx pix yy pix aa pix bb pix where xx, yy, aa and bb, are the coordinate and size of the AEC cell used for this image - EXP DOSE xx nGy where xx is the detector

			dose computed for the exposure in nGy - PRE-EXP PV xx pixel value where xx is the mean pixel value in AEC cell on the pre-exposure shot - MAIN-EXP PV xx pixel value where xx is the mean pixel value in main-exposure shot or manual shot - PADDLE xx indicates if a paddle has been detected in the FOV - SAT x indicates if image contain saturated area - MAX xxxxx indicates maximum value on saturated area
Exposure Status	(0018,7064)	3	The value is set to NORMAL.
Phototimer Setting	(0018,7065)	3	Not used.
Focal Spot	(0018,1190)	3	The value is set to 0.1or 0.3.
Anode Target Material	(0018,1191)	3	See 4.4.5.7
Rectification Type	(0018,1156)	3	Not used.
Generator ID	(0018,1005)	3	Not used.

4.4.5.10 X-Ray Filtration Module

TABLE 4-20
X-RAY FILTRATION MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Filter Type	(0018,1160)	3	Not used.
Filter Material	(0018,7050)	3	See 4.4.5.7
Filter Thickness Minimum	(0018,7052)	3	Not used.
Filter Thickness Maximum	(0018,7054)	3	Not used.

4.4.5.11 Mammography Image Module

TABLE 4-21
MAMMOGRAPHY IMAGE MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Positioner Type	(0018,1508)	1	See 4.4.5.7
Distance Source to Detector	(0018,1110)	3	See 4.4.5.7
Distance Source to Patient	(0018,1111)	3	See 4.4.5.7
Positioner Primary Angle	(0018,1510)	3	See 4.4.5.7
Positioner Secondary Angle	(0018,1511)	3	Not used.
Image Laterality	(0020,0062)	1	See 4.4.5.7
Organ Exposed	(0040,0318)	1	Value is BREAST
Implant Present	(0028,1300)	3	The value is set to whether or not the imaged

			breast contains a breast implant. Enumerated Values: YES NO
Partial View	(0028,1350)	3	Not used.
Partial View Description	(0028,1351)	3	Not used.
Partial View Code Sequence	(0028,1352)	3	Not used.
Anatomic Region Sequence	(0008,2218)	1	See 4.4.5.7
Primary Anatomic Structure Sequence	(0008,2228)	3	Not used.
View Code Sequence	(0054,0220)	1	See 4.4.5.7

4.4.5.12 VOI LUT Module

TABLE 4-22
VOI LUT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
VOI LUT Sequence	(0028,3010)	1C	Not used.
Window Center	(0028,1050)	1C	Only the image for presentation exists. The value is configured as follow elements: custom value\standard center\high center\low center. Depending on the selected option, the order can be changed and there shall not contain custom value.
Window Width	(0028,1051)	1C	Only the image for presentation exists. The value is configured as follow elements: custom value\standard width\high width\low width. Depending on the selected option, the order can be changed and there shall not contain custom value.
Window Center & Width Explanation	(0028,1055)	3	Only the image for presentation exists. The value is set to explanation of the meaning of the Window Center and Width. Multiple values correspond to multiple Window Center and Width values.. Example1] CUSTOM\NORMAL\HARDER\SOFTER Example2] HARDER\NORMAL\SOFTER

4.4.5.13 Acquisition Context Module

TABLE 4-23
ACQUISITION CONTEXT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Acquisition Context Sequence	(0040,0555)	2	Zero length value is set.

Acquisition Context Description	(0040,0556)	3	Not used.

4.4.5.14 SOP Common Module

TABLE 4-24
SOP COMMON MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
SOP Class UID	(0008,0016)	1	The value is set to 1.2.840.10008.5.1.4.1.1.1.2.1 for Processing. The value is set to 1.2.840.10008.5.1.4.1.1.1.2 for Presentation.
SOP Instance UID	(0008,0018)	1	The value is set by the system as unique SOP Instance UIDs using mechanism.
Specific Character Set	(0008,0005)	1C	Defined Terms include: ISO_IR 100 = Latin Alphabet No. 1
Instance Creation Date	(0008,0012)	3	Not used.
Instance Creation Time	(0008,0013)	3	Not used.
Instance Creator UID	(0008,0014)	3	Not used.
Related General SOP Class UID	(0008,001A)	3	Not used.
Original Specialized SOP Class UID	(0008,001B)	3	Not used.
Coding Scheme Identification Sequence	(0008,0110)	3	Not used.
Instance Number	(0020,0013)	3	The value is set to the order of image in the series by the system
SOP Instance Status	(0100,0410)	3	Not used.
SOP Authorization Date and Time	(0100,0420)	3	Not used.
SOP Authorization Comment	(0100,0424)	3	Not used.
Authorization Equipment Certification Number	(0100,0426)	3	Not used.
MAC Parameters Sequence	(4FFE,0001)	3	Not used.
Digital Signatures Sequence	(FFFA,FFFA)	3	Not used.
Encrypted Attributes Sequence	(0400,0500)	1C	Not used.
Original Attributes Sequence	(0400,0561)	3	Not used.
HL7 Structured Document Reference Sequence	(0040,A390)	1C	Not used.

4.5 STANDARD EXTENDED AND PRIVATE DATA ATTRIBUTES

The Product supports the Standard and Private Attributes defined in the following sections in Standard Extended Digital Mammography X-Ray SOP Instances as Type 3 data elements.

4.5.1 Standard Attributes

Not applicable to this product.

4.5.2 Private Group GEMS_SENOCRYSTAL_V1

Private Group GEMS_SENOCRYSTAL_V1 is modeled as part of the Image Information Entity.

TABLE 4-25
PRIVATE GROUP GEMS_SENOCRYSTAL_V1

Attribute Name	Tag	VR	VM	Attribute Description and Use
Private Creator Identification	(0055,0010)	LO	1	GEMS_SENOCRYSTAL_V1
Clinical View	(0055,1000)	CS	1	The value describes the position name of Clinical View to be displayed on image.
Exposure Dose	(0055,1001)	IS	1	The value describes the exposure dose. Unit: nGy Refer to Exposure Control Mode Description values section 4.4.5.9.
Implant Displacement	(0055,1002)	IS	1	The value describes whether or not the imaged breast contains a breast implant. If there is an image with implant the value is set to 1 or not 0.
Paddle Type	(0055,1003)	IS	1	The value describes the type of paddle. Enumerate Value: 0 – indicates Standard paddle 1 – indicates Magnification paddle 2 – indicates Spot paddle Refer to Exposure Control Mode Description values section 4.4.5.9.
Processing Type	(0055,1004)	IS	1	The value describes the type of reprocessing.
Windowing Type	(0055,1005)	IS	1	The value describes the type of windowing.
Saturation	(0055,1006)	IS	1	The value is set to 1 or 0. The value indicates if image contain saturated area. Refer to Exposure Control Mode Description values section 4.4.5.9.
Clip	(0055,1007)	IS	1	The value indicates maximum value on saturated area. Unit: Pixel value

				Refer to Exposure Control Mode Description values section 4.4.5.9.

4.6 MAMMOGRAPHY VIEW CODE

The Product supports the View Codes from the American College of Radiology(ACR) Breast Imaging Reporting and Data System(BI-RADS). The following sections are included to convey values about view codes.

4.6.1 Mammography View Codes

The following table list of View codes defined for Mammography.

TABLE 4-26
MAMMOGRAPHY VIEW CODES

Code Value (0008,0100)	Code Meaning (0008,0104)	ACR BI-RADS Equivalent
R-10224	Medio-lateral	ML
R-10226	Meio-lateral oblique	MLO
R-10228	Latero-medial	LM
R-10230	Latero-medial oblique	LMO
R-10242	Cranio-caudal	CC
R-10244	Caudo-cranial (from below)	FB
R-102D0	Superolateral to inferomedial oblique	SIO
R-1024A	Cranio-caudal exaggerated laterally	XCCL
R-1024B	Cranio-caudal exaggerated medially	XCCM

4.6.2 Mammography View Modifier Codes

The following table list of View Modifier codes defined for Mammography.

TABLE 4-27
MAMMOGRAPHY VIEW MODIFIER CODES

Code Value (0008,0100)	Code Meaning (0008,0104)	Applies only when view is:	ACR BI-RADS Equivalent
R-102D2	Cleavage	CC	CV
R-102D1	Axillary Trail	MLO	AT
R-102D3	Rolled lateral	Any	…RL
R-102D4	Rolled Medial	Any	…RM
R-102CA	Rolled Inferior	Any	…RI
R-102C9	Rolled Superior	Any	…RS
R-102D5	Implant Displaced	Any	…ID
R-102D6	Magnification	Any	M…

R-102D7	Spot Compression	Any	S…
R-102C2	Tangential	any	…TAN

5. MODALITY WORKLIST QUERY IMPLEMENTATION

5.1 INTRODUCTION

This section specifies the use of the DICOM Modality Worklist Information Model used to organize data and against which a Modality Worklist Query will be performed.

5.2 SENOGRAPHE SENOCRYSTAL ACQUISITION WORKSTATION MAPPING OF DICOM ENTITIES

The Senographe SenoCrystal Acquisition Workstation maps DICOM Information Entities to local Information Entities in the product's database and user interface.

TABLE 5-1
MAPPING OF DICOM ENTITIES TO SENOGRAPHE SENOCRYSTAL ACQUISITION WORKSTATION ENTITIES

DICOM	Senographe SenoCrystal Acquisition Workstation Entity
Scheduled Procedure Step	Series
Requested Procedure	Study/Exam
Imaging Service Request	Study/Exam
Patient	Patient

5.3 WORKLIST QUERY MODULE TABLE

See DICOM PS 3.3 and PS 3.4 for a complete definition of the entities, modules, and attributes.

TABLE 5-2
MODALITY WORKLIST INFORMATION MODEL MODULES

Entity Name	Module Name	Reference
Scheduled Procedure Step	SOP Common	5.4.1.1
	Scheduled Procedure Step	5.4.1.2
Requested Procedure	Requested Procedure	5.4.2.1
Imaging Service Request	Imaging Service Request	5.4.3.1
Patient	Patient Identification	5.4.4.1
	Patient Demographic	5.4.4.2

5.4 WORKLIST QUERY MODULE DEFINITIONS

Please refer to DICOM Standard PS 3.3. (Information Object Definitions) for a description of each of the query key attributes contained within the Modality Worklist Information Model.

The following Module descriptions are included to specify what data elements are supported and what type of matching can be applied. It should be noted that they are the same ones as defined in the DICOM v3.0 Standard PS 3.4 (Service Class Specifications) and include:

Expected Matching Key Type:

Symbol	Description
U	Unique Key Attribute
R	Required Key Attribute
O	Optional Key Attribute

5.4.1 Common Scheduled Procedure Step Entity Modules

5.4.1.1 SOP Common Module

TABLE 5-3
□SOP COMMON MODULE ATTRIBUTES

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into Instance	Note
Specific Character Set	(0008,0005)	O	1C	No	This attribute is never sent nor used. It is assumed to be ISO_IR 100.

5.4.1.1.1 Specific Character Set

<Describe the use of Specific Character Set (0008,0005) when encoding queries and interpreting responses, e.g.> The attribute Specific Character Set (0008,0005) will not be sent, unless Patient Name is sent with a matching key that includes a non-ASCII character; in that case, the configured extended character set identifier will be sent. Only non-ASCII characters that may be entered from the console keyboard, as described in Section 2.6, may be included in the matching key value.

The AE will use any Specific Character Set value returned in a Scheduled Procedure Step Identifier in the images created pursuant to that Scheduled Procedure Step. Text attributes, including Patient and Physician names, that include non-ASCII characters will be displayed as described in Section 2.6.

5.4.1.2 Scheduled Procedure Step Module

TABLE 5-4
SCHEDULED PROCEDURE STEP MODULE ATTRIBUTES

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into Instance	Note
Scheduled Procedure Step Sequence	(0040,0100)	R	1	No	
>Scheduled Station AE Title	(0040,0001)	R	1	No	

>Scheduled Procedure Step Start Date	(0040,0002)	R	1 *	No	Range Matching is supported. The value is selected by a user to one of range type. Supported date: Today A day ago - Today: Two day ago - Today A week ago - Today A month ago - Today [Today] Set to YYYYMMDD-YYYYMMDD, where YYYYMMDD is the current date. [Others] Set to YYYYMMDD-YYYYMMDD, where YYYYMMDD is set to given from date and YYYYMMDD is set to given to date, respectively.
>Scheduled Procedure Step Start Time	(0040,0003)	R	1*	No	Range Matching is supported. The value is requested as the time of the day. Set to 000000-235959.
>Scheduled Procedure Step End Date	(0040,0004)	O	3	No	Not requested
>Scheduled Procedure Step End Time	(0040,0005)	O	3	No	Not requested
>Modality	(0008,0060)	R	1	No	The value is requested as set modality in the system.
>Scheduled Performing Physician's Name	(0040,0006)	R	2	Yes	
>Scheduled Procedure Step Description	(0040,0005)	O	1C*	Yes	
>Scheduled Station Name	(0040,0010)	O	2	No	
>Scheduled Procedure Step Location	(0040,0011)	O	2	No	
>Scheduled Protocol Code Sequence	(0040,0008)	O	1C		Not requested.
>Pre-Medication	(0040,0012)	O	2C	No	
>Scheduled Procedure Step ID	(0040,0009)	O	1	No	
>Requested Contrast Agent	(0032,1070)	O	2C	No	
>Scheduled Procedure Step Status	(0040,0020)	O	3	No	

>Comments on the Scheduled Procedure Step	(0040,0400)	O	3		Not requested.

Note: * in the *Expected Return Key Type* column indicates that this information is displayed on screen, if available

5.4.2 Common Requested Procedure Entity Modules

5.4.2.1 Requested Procedure Module

TABLE 5-5
REQUESTED PROCEDURE MODULE ATTRIBUTES

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into Instance	Note
Requested Procedure ID	(0040,1001)	O	1	Yes	
Requested Procedure Description	(0032,1060)	O	1C	No	
Requested Procedure Code Sequence	(0032,1064)	O	1C		Not requested.
Study Instance UID	(0020,000D)	O	1	No	
Study Date	(0008,0020)	O	3	No	
Study Time	(0008,0030)	O	3	No	
Referenced Study Sequence	(0008,1110)	O	2	No	
>Referenced SOP Class UID	(0008,1150)	O	1C	No	
>Referenced SOP Instance UID	(0008,1155)	O	1C	No	
Requested Procedure Priority	(0040,1003)	O	2	No	
Patient Transport Arrangements	(0040,1004)	O	2	No	
Requested Procedure Location	(0040,1005)	O	3		Not requested.
Confidentiality Code	(0040,1008)	O	3		Not requested.
Reporting Priority	(0040,1009)	O	3		Not requested.
Names of Intended Recipients of Results	(0040,1010)	O	3		Not requested.
Reason for the Requested Procedure	(0040,1002)	O	3		Not requested.
Requested Procedure Comments	(0040,1400)	O	3		Not requested.

5.4.2.1.1 Study Instance UID

The system generate UID as 1.2.840.113619.2.373.YYYYMMDDHHMMSS,

YYYYMMDDHHMMSS is derived from the MAC address , date/time when the object is created and application defined values

5.4.3 Common Imaging Service Request Entity Modules

5.4.3.1 Imaging Service Request Module

TABLE 5-6
IMAGING SERVICE REQUEST MODULE ATTRIBUTES

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into Instance	Note
Accession Number	(0008,0050)	O	2 *	Yes	Wildcard Matching is supported. If any value for matching exists, the asterisk (*) wildcard is add in front and rare of the trimmed value.
Requesting Physician	(0032,1032)	O	2	No	
Referring Physician's Name	(0008,0090)	O	2	Yes	
Requesting Service	(0032,1033)	O	3		Not requested.
Reason for the Imaging Service Request	(0040,2001)	O	3		Not requested.
Imaging Service Request Comments	(0040,2400)	O	3		Not requested.
Issue Date of Imaging Service Request	(0040,2004)	O	3		Not requested.
Issue Time of Imaging Service Request	(0040,2005)	O	3		Not requested.
Placer Order Number / Imaging Service Request	(0040,2016)	O	3		Not requested.
Filler Order Number / Imaging Service Request	(0040,2017)	O	3		Not requested.
Order entered by ...	(0040,2008)	O	3		Not requested.
Order Enterer’s Location	(0040,2009)	O	3		Not requested.
Order Callback Phone Number	(0040,2010)	O	3		Not requested.

Note: * in the *Expected Return Key Type* column indicates that this information is displayed on screen, if available

5.4.4 Common Patient Entity Modules

5.4.4.1 Patient Identification

TABLE 5-7
PATIENT IDENTIFICATION MODULE ATTRIBUTES

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into Instance	Note
Patient's Name	(0010,0010)	R	1 *	Yes	Wildcard Matching is supported. If any value for matching exists, the asterisk (*) wildcard is add in front and rare of the trimmed value.
Patient ID	(0010,0020)	R	1 *	Yes	Wildcard Matching is supported. If any value for matching exists, the asterisk (*) wildcard is add in front and rare of the trimmed value.
Issuer of Patient ID	(0010,0021)	O	3		Not requested.
Other Patient IDs	(0010,1000)	O	3		Not requested.
Other Patient Names	(0010,1001)	O	3		Not requested.
Patient's Birth Name	(0010,1005)	O	3		Not requested.
Patient's Mother's Birth Name	(0010,1060)	O	3		Not requested.
Medical Record Locator	(0010,1090)	O	3		Not requested.

Note: * in the *Expected Return Key Type* column indicates that this information is displayed on screen, if available

5.4.4.2 Patient Demographic

TABLE 5-8
PATIENT DEMOGRAPHIC MODULE ATTRIBUTES

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into Instance	Note
Patients Birth Date	(0010,0030)	O	2	Yes	
Patient's Sex	(0010,0040)	O	2*	Yes	
Patient's Weight	(0010,1030)	O	2	No	
Confidentiality constraint on patient data	(0040,3001)	O	2	No	
Patient’s Size	(0010,1020)	O	3		Not requested.
Patient’s Address	(0010,1040)	O	3		Not requested.

Patient’s Telephone Numbers	(0010,2154)	O	3		Not requested.
Patient's Age	(0010,1010)	O	3		Not requested.
Occupation	(0010,2180)	O	3		Not requested.
Patient’s Birth Time	(0010,0032)	O	3		Not requested.
Patient's Insurance Plan Code Sequence	(0010,0050)	O	3		Not requested.
Patient’s Primary Language Code Sequence	(0010,0101)	O	3		Not requested.
> Patient’s Primary Language Code Modifier Sequence	(0010,0102)	O	3		Not requested.
Military Rank	(0010,1080)	O	3		Not requested.
Branch of Service	(0010,1081)	O	3		Not requested.
Country of Residence	(0010,2150)	O	3		Not requested.
Region of Residence	(0010,2152)	O	3		Not requested.
Patient’s Telephone Numbers	(0010,2154)	O	3		Not requested.
Ethnic Group	(0010,2160)	O	3		Not requested.
Patient's Religious Preference	(0010,21F0)	O	3		Not requested.
Patient Comments	(0010,4000)	O	3		Not requested.

Note: * in the *Expected Return Key Type* column indicates that this information is displayed on screen, if available

6. BASIC DIRECTORY INFORMATION OBJECT IMPLEMENTATION

6.1 IOD MODULE TABLE

Table 6-1 identifies the defined modules within the entities which comprise the Basic Directory IOD. Modules are identified by Module Name.

See DICOM Part 3 for a complete definition of the entities, modules, and attributes.

TABLE 6-1
BASIC DIRECTORY IOD MODULES

Entity Name	Module Name	Reference
File Set Identification	File Set Identification	6.2.1
Directory Information	Directory Information	6.2.2

The FSC of this implementation creates a Directory Information Module, and the FSR supports it.

6.2 INFORMATION MODULE DEFINITIONS

Please refer to DICOM Standard Part 3 (Information Object Definitions) for a description of each of the entities and modules contained within the Basic Directory Information Object.

The following modules are included to convey Enumerated Values, Defined Terms, and Optional Attributes supported. Type 1 & Type 2 Attributes are also included for completeness and to define what values they may take and where these values are obtained from. It should be noted that they are the same ones as defined in the DICOM Standard Part 3 (Information Object Definitions). Also note that Attributes not present in tables are not supported.

6.2.1 File Set identification Module

TABLE 6-2
FILE-SET IDENTIFICATION MODULE

Attribute Name	Tag	Type	Attribute Description
File-set ID	(0004,1130)	2	The value is created as IDENTIFIER by an FSC.
File-set Descriptor File ID	(0004,1141)	3	Not supported.
Specific Character Set of File-set Descriptor File	(0004,1142)	1C	Not supported.

6.2.2 Directory Information Module

TABLE 6-3
DIRECTORY INFORMATION MODULE

Attribute Name	Tag	Type	Attribute Description

Offset of the First Directory Record of the Root Directory Entity	(0004,1200)	1	
Offset of the Last Directory Record of the Root Directory Entity	(0004,1202)	1	
File-set Consistency Flag	(0004,1212)	1	The value is created as 0000H by an FSC. 0000H: no known inconsistencies
Directory Record Sequence	(0004,1220)	2	The value is a zero length. It indicates no Directory Records are contained in the Root Directory Entity.
>Offset of the Next Directory Record	(0004,1400)	1C	The value is offset of the first byte of the next Directory Record of the same Directory Entity. If the value is zero, there is no other Directory Record of the same Directiy Entitiy.
>Record In-use Flag	(0004,1410)	1C	The value is created as FFFFH by an FSC.
>Offset of Referenced Lower-Level Directory Entity	(0004,1420)	1C	
>Directory Record Type	(0004,1430)	1C	Enumerated Values are created by an FSC and which are supported by an FSR: PATIENT STUDY SERIES IMAGE
>Private Record UID	(0004,1432)	1C	Not used.
>Referenced File ID	(0004,1500)	1C	The value exists only when Directory Record Type is Image.
>Referenced SOP Class UID in File	(0004,1510)	1C	The value exists only when Directory Record Type is Image.
>Referenced SOP Instance UID in File	(0004,1511)	1C	The value exists only when Directory Record Type is Image.
>Referenced Transfer Syntax UID in File	(0004,1512)	1C	The value exists only when Directory Record Type is Image.
> Referenced Related General SOP Class UID in File	(0004,151A)	1C	Not used.
>Record Selection Keys			See 6.2.3.

6.2.3 Definition of Specific Directory Records

6.2.3.1 Patient Directory Record Definition

TABLE 6-4
PATIENT KEYS

Key	Tag	Type	Attribute Description
Specific Character Set	(0008,0005)	1C	The value is created as ISO_IR 100 by an FSC.
Patient's Name	(0010,0010)	2	The value is taken from the attribute of the Patient Entity by an FSC.
Patient ID	(0010,0020)	1	The value is taken from the attribute of the Patient Entity by an FSC.

Patient's Birth Date	(0010,0030)	2	The value is taken from the attribute of the Patient Entity by an FSC.
Patient's Sex	(0010,0040)	2	The value is taken from the attribute of the Patient Entity by an FSC.

6.2.3.2 Study Directory Record Definition

TABLE 6-5
STUDY KEYS

Key	Tag	Type	Attribute Description
Specific Character Set	(0008,0005)	1C	The value is created as ISO_IR 100 by an FSC.
Study Date	(0008,0020)	1	The value is taken from the attribute of the Study Entity by an FSC.
Study Time	(0008,0030)	1	The value is taken from the attribute of the Study Entity by an FSC.
Study Description	(0008,1030)	2	The value is taken from the attribute of the Study Entity by an FSC.
Study Instance UID	(0020,000D)	1C	The value is taken from the attribute of the Study Entity by an FSC.
Study ID	(0020,0010)	1	The value is taken from the attribute of the Study Entity by an FSC.
Accession Number	(0008,0050)	2	The value is taken from the attribute of the Study Entity by an FSC.

6.2.3.3 Series Directory Record Definition

TABLE 6-6
SERIES KEYS

Key	Tag	Type	Attribute Description
Specific Character Set	(0008,0005)	1C	The value is created as ISO_IR 100 by an FSC.
Series Date	(0008,0021)	3	The value is taken from the attribute of the Series Entity by an FSC.
Series Time	(0008,0031)	3	The value is taken from the attribute of the Series Entity by an FSC.
Modality	(0008,0060)	1	The value is taken from the attribute of the Series Entity by an FSC.
Series Instance UID	(0020,000E)	1	The value is taken from the attribute of the Series Entity by an FSC.
Series Number	(0020,0011)	1	The value is taken from the attribute of the Series Entity by an FSC.
Icon Image Sequence	(0088,0200)	3	Not used.

6.2.3.4 Image Directory Record Definition

TABLE 6-7
IMAGE KEYS

Key	Tag	Type	Attribute Description
Specific Character Set	(0008,0005)	1C	The value is created as ISO_IR 100 by an FSC.
Instance Number	(0020,0013)	1	The value is taken from the attribute of the Image Entity by an FSC.
Icon Image Sequence	(0088,0200)	3	Not used.

7. PRINT MANAGEMENT IMPLEMENTATION

7.1 INTRODUCTION

This section of the DICOM Conformance Statement specifies the implementation for the specific SOP Classes supported in the grayscale print management SOP Classes, the attributes supported for both IODs and services, and the valid range of values for mandatory and optional attributes.

7.2 BASIC FILM SESSION SOP CLASS

7.2.1 Basic Film Session N-Create Attributes

This table lists the attributes that are sent in the Basic Film Session N-Create Request:

Attribute name	Tag	Use
Specific Character Set	(0008,0005)	Not used.
Number of Copies	(2000,0010)	The value is selected by a user using the Printer Manager. It is integers from 1 to 9.
Print Priority		The value is selected by a user using the Printer Manager. Enumerated Values: HIGH or MED or LOW
Medium Type	(2000,0030)	The value is selected by a user using the Printer Manager. Enumerated Values: CLEAR FILM or BLUE FILM
Film Destination	(2000,0040)	The value is selected by a user using the Printer Manager. Enumerated Values: MAGAZINE or PROCESSOR
Film Session Label	(2000,0050)	Empty.
Memory Allocation	(2000,0060)	Not used
Owner ID	(2100,0160)	Empty.

7.2.2 Basic Film Session N-Delete

The SCU requests the N-DELETE to Print SCP to delete the Basic Film Session SOP Instance.

7.3 BASIC FILM BOX SOP CLASS

7.3.1 Basic Film Box N-Create Attributes

This table lists the attributes that are sent to the SCP in the Basic Film Box N-Create Request, and that are received in the Basic Film Box N-Create Response from the SCP

Attribute Name	Tag	Use
Image Display Format	(2010,0010)	The value is set to follows. STANDARD\Column,Row Column and Row are integers from 1 to 9: R rows of image boxes and C columns of image boxes
Referenced Film Session Sequence	(2010,0500)	The value is used as received in previous message exchange when received in the N-Create Response from SCP.
>Referenced SOP Class UID	(0008,1150)	The value is set to Affected SOP Class UID of previous message exchange from SCP.
>Referenced SOP Instance UID	(0008,1155)	The value is set to Affected SOP Instance UID of previous message exchange from SCP.
Referenced Image Box Sequence	(2010,0510)	Sent empty and used to identify the instance when setting Basic Grayscale Image Box.
>Referenced SOP Class UID	(0008,1150)	Sent empty and used to identify the instance when setting Basic Grayscale Image Box.
>Referenced SOP Instance UID	(0008,1155)	Sent empty and used to identify the instance when setting Basic Grayscale Image Box.
Referenced Basic Annotation Box Sequence	(2010,0520)	Not supported.
Film Orientation	(2010,0040)	The value is selected by a user using the Printer Manager. PORTRAIT or LANDSCAPE
Film Size ID	(2010,0050)	The value is selected by a user using the Printer Manager. Enumerated Values: 8INX10IN or 10INX12IN or 10INX14IN or 11INX14IN or 14INX14IN or 14INX17IN or 24CMX24CM or 24CMX30CM
Magnification Type	(2010,0060)	Interpolation type by which the printer magnifies the image in order to fit the image in the image box on film; The value is selected by a user using the Printer Manager. Enumerated Values: REPLICATE BILINEAR CUBIC NONE
Max Density	(2010,0130)	The value is set by a user using the Printer Manager.

Configuration Information	(2010,0150)	Empty.
Referenced Presentation LUT Sequence	(2050,0500)	Not used.
Annotation Display Format ID	(2010,0030)	Not used.
Smoothing Type	(2010,0080)	Only valid for Magnification Type (2010,0060) = CUBIC
Border Density	(2010,0100)	The value is set by a user using the Printer Manager Enumerated Values: . BLACK or WHITE
Empty Image Density	(2010,0110)	The value is set by a user using the Printer Manager. Enumerated Values: BLACK or WHITE
Min Density	(2010,0120)	The value is set by a user using the Printer Manager.
Trim	(2010,0140)	The value is set by a user using the Printermanager. Enumerated Values: YES or NO
Illumination	(2010,015E)	Not used.
Reflected Ambient Light	(2010,0160)	Not used.
Requested Resolution ID	(2020,0050)	The value is set by a user using the Printer manager. Enumerated Values: STANDARD or HIGH
ICC Profile	(0028,2000)	Not used.

7.3.2 Basic Film Box N-Action Attributes

Following are the Action Reply arguments that are supported if present in the N-Action response of the Basic Film Box SOP Class

Action Type Name	Action Type ID	Attribute	Tag	Usage SCU
Print	1	Referenced Print Job Sequence	(2100,0500)	Not supported.

7.3.2.1 Basic Film Box N-Set Attributes

The SCU requests the N-SET to Print SCP to set the Basic Film Box SOP Instance.

7.3.3 Basic Film Box N-Delete

The SCU requests the N-DELETE to Print SCP to delete the Basic Film Box SOP Instance.

7.4 BASIC GRAYSCALE IMAGE BOX SOP CLASS

7.4.1 Basic Grayscale Image Box Pixel N-Set Attributes

This table lists the attributes that are sent in the Basic Grayscale Image Box N-Set Request:

Attribute Name	Tag	Use
Image Position	(2020,0010)	Not used
Basic Grayscale Image Sequence	(2020,0110)	Include this sequence
>Samples Per Pixel	(0028,0002)	The value is set to 1.
>Photometric Interpretation	(0028,0004)	The value is set to MONOCHROME1 for Processing images. The value is set to MONOCHROME2 for Presentation images.
>Rows	(0028,0010)	The value is set up to 4244.
>Columns	(0028,0011)	The value is set up to 3290.
>Pixel Aspect Ratio	(0028,0034)	Specify range of values sent. Specify if the aspect ration is ever other than 1\1
>Bits Allocated	(0028,0100)	The value is set to 8.
>Bits Stored	(0028,0101)	The value is set to 8.
>High Bit	(0028,0102)	(0028,0101) Bits Stored - 1
>Pixel Representation	(0028,0103)	The value is set to 0000H.
>Pixel Data	(7FE0,0010)	
Polarity	(2020,0020)	The value is empty.So the SCP shall print with NORMAL polarity.
Magnification Type	(2010,0060)	The value is same as the value defined in the Film Box.
Smoothing Type	(2010,0080)	The value is same as the value defined in the Film Box.
Min Density	(2010,0120)	The value is same as the value defined in the Film Box.
Max Density	(2010,0130)	The value is same as the value defined in the Film Box.
Configuration Information	(2010,0150)	The value is same as the value defined in the Film Box.
Requested Image Size	(2020,0030)	Not used.
Requested Decimate/Crop Behavior	(2020,0040)	The value is empty
Referenced Presentation LUT Sequence	(2050,0500)	Not used.

7.5 PRINTER SOP CLASS

Not applicable to this product.

7.6 PRESENTATION LUT SOP CLASS

Not applicable to this product.

7.7 BASIC ANNOTATION BOX SOP CLASS

Not applicable to this product.