



Technical Publications

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Senographe Crystal Nova V1.0.0 Ext3 DICOM CONFORMANCE STATEMENT

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CONFORMANCE STATEMENT OVERVIEW

The Senographe Crystal Nova Acquisition Workstation is implemented to acquire mammography imaging for examining breasts of patient. This acquisition workstation supports DICOM networking to receive scheduled procedures from remote application entity and to update status of procedure. Also It supports to transfer and archive images to remote application entity and to request printing.

Table 0.1 provides an overview of the network services supported by Senographe Crystal Nova 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
Print Management		
Basic Film Session SOP Class	Yes	No
Basic Film Box SOP Class	Yes	No
Basic Grayscale Image Box SOP Class	Yes	No
Workflow Management		
Storage Commitment Push Model SOP Class	Yes	No
Modality Performed Procedure Step 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 Nova Acquisition Workstation.

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	Yes
DVD		
General Purpose JPEG DVD	Yes	Yes
USB		
General Purpose JPEG USB	Yes	Yes

Option*: This means that this service can be purchased separately

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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 service.

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

Section 4 Modality Worklist Query Implementation, which specifies the GEHC equipment compliance to DICOM requirements for the implementation of the Modality Worklist Query Information service.

Section 5 Modality Performed Procedure Step Implementation, which specifies the GEHC equipment compliance to DICOM requirements for the implementation of the Modality Performed Procedure Step service.

Section 6 Storage Commitment Push Model Implementation, which specifies the GEHC equipment compliance to DICOM requirements for the implementation of the Storage Commitment service.

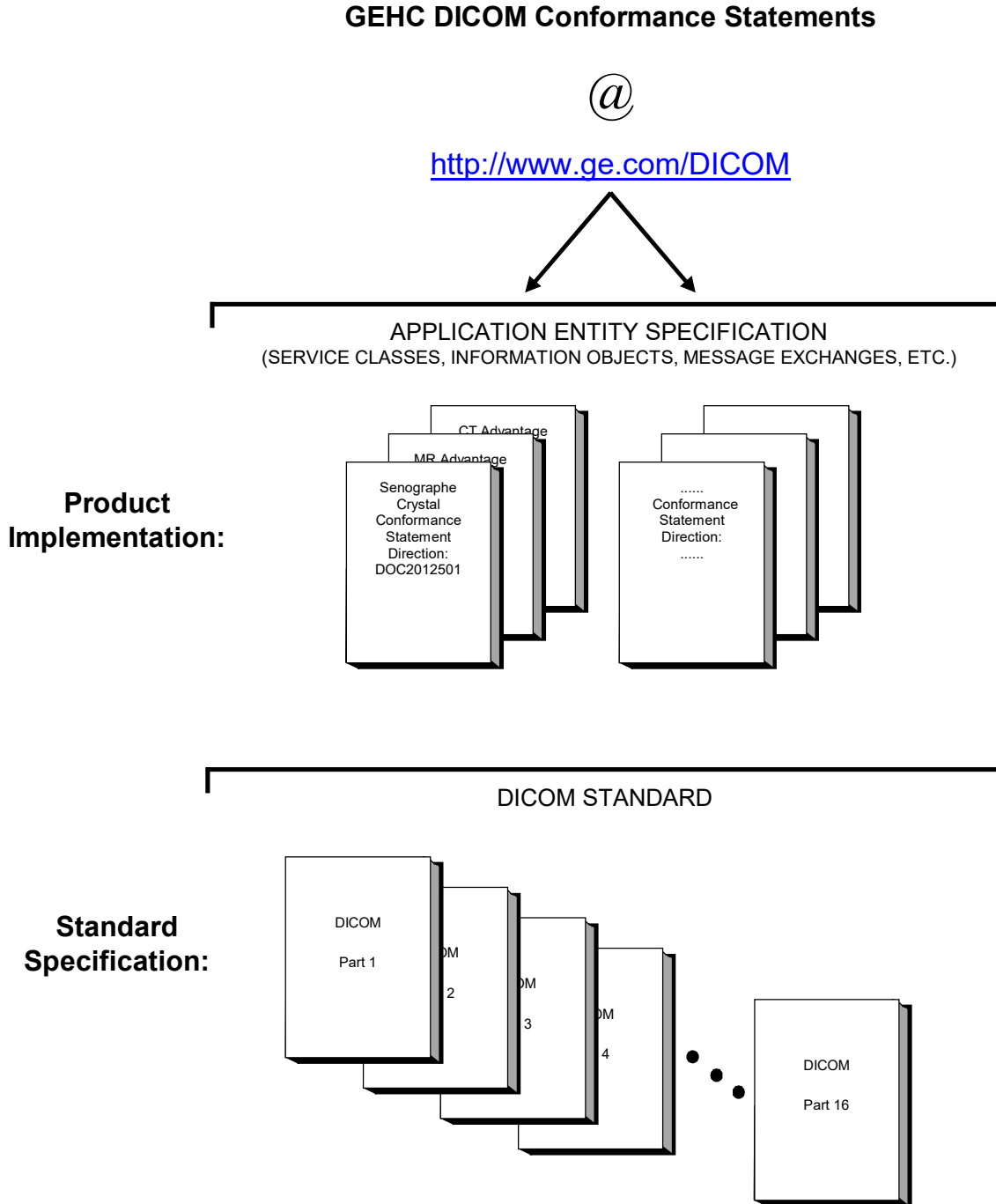
Section 7 Basic Directory Information Object Implementation, which specifies the GEHC equipment compliance to DICOM requirements for the implementation of the Directory Information Object service.

Section 8 Print Management Implementation, which specifies the GEHC equipment compliance to DICOM requirements for the implementation of the Print Management Information service.

Section 9 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 service.

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:

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
CD-R	Compact Disk Recordable
CR	Computed Radiography
DHCP	Dynamic Host Configuration Protocol
DICOM	Digital Imaging and Communications in Medicine
DIT	Directory Information Tree (LDAP)
DN	Distinguished Name (LDAP)
DX	Digital X-ray
FSC	File-Set Creator
FSU	File-Set Updater
FSR	File-Set Reader
HIS	Hospital Information System
HL7	Health Level 7 Standard
IOD	Information Object Definition
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
ISO	International Organization for Standards
JPEG	Joint Photographic Experts Group
LDAP	Lightweight Directory Access Protocol
LUT	Look-up Table
MAR	Medication Administration Record

MG	Mammography (X-ray)
MPPS	Modality Performed Procedure Step
MWL	Modality Worklist
O	Optional (Key Attribute)
PACS	Picture Archiving and Communication System
PDU	Protocol Data Unit
R	Required (Key Attribute)
RIS	Radiology Information System
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
USB	Universal Serial Bus
VR	Value Representation

2. NETWORK CONFORMANCE STATEMENT

2.1 INTRODUCTION

This section of the DICOM Conformance Statement specifies the Senographe Crystal Nova 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.

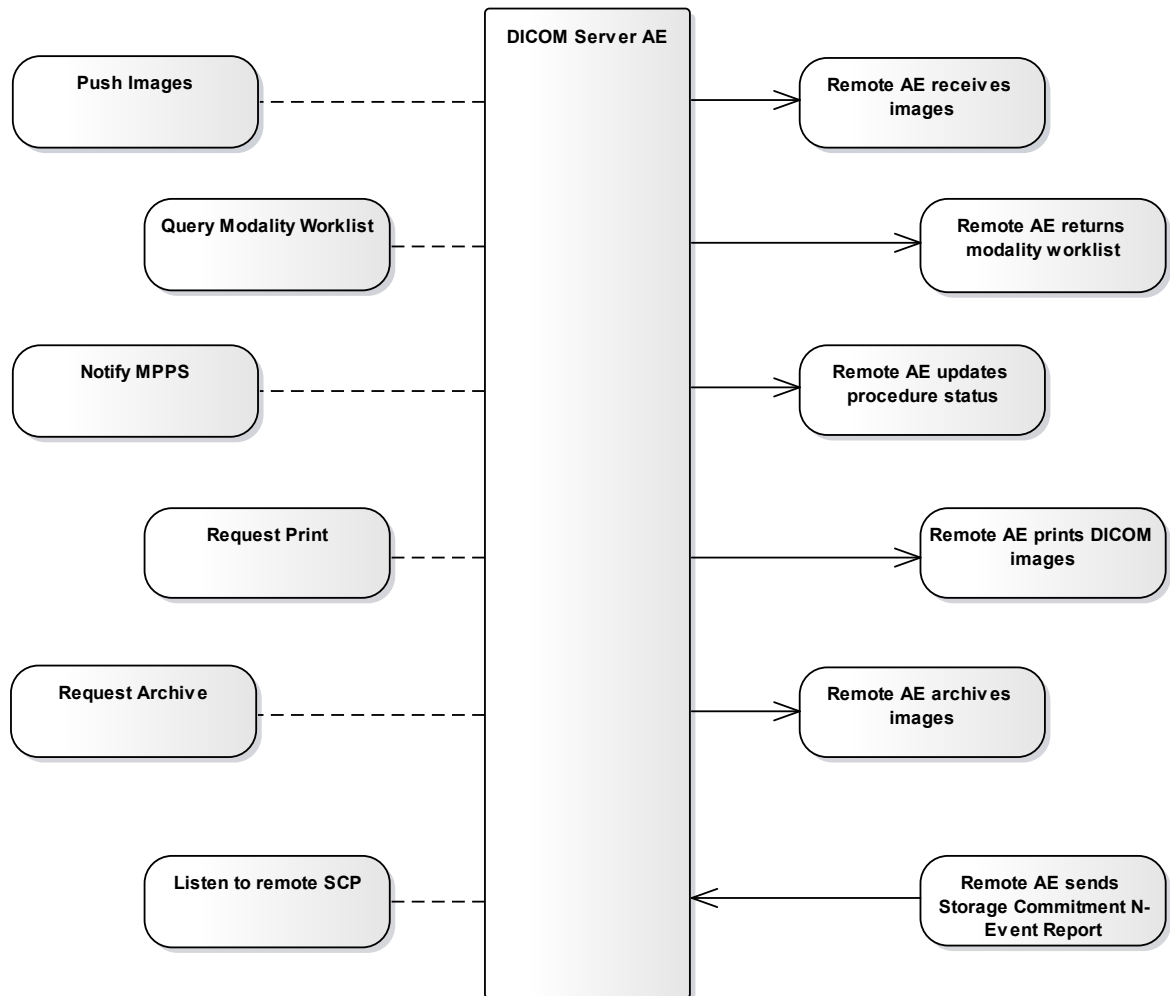
2.2 IMPLEMENTATION MODEL

2.2.1 Application Data Flow Diagram

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

ILLUSTRATION 2-1

SENOGRAPHE CRYSTAL NOVA ACQUISITION WORKSTATION NETWORK APPLICATION MODEL AND DATA FLOW DIAGRAM



The DICOM Server AE is invoked by the following Real World Activities:

Push Images:

The product supports the transfer of images or studies unit which is invoked by Send button or Close study button. The results of the functionality is displayed on a specific icon and task manager. The sending module communicates with remote SCP and the remote SCP receives images.

Query Modality Worklist:

The product supports querying Worklist list which is invoked by Search Patient button. The result of that functionality is displayed on a Worklist mode. The querying module communicates with remote SCP and the remote SCP returns modality worklists.

Notify MPPS:

The product supports notifying Modality Performed Procedure Step which is invoked by acquisition. The result of the functionality is displayed on a specific icon. The notifying module communicates with remote SCP and the remote SCP updates the status of procedure.

Request Print:

The product supports printing images which is invoked by Print button or Close study button. The results of the

functionality is displayed on a specific icon and task manager. The printing module communicates with remote SCP and the remote SCP prints images in accordance with options.

Request Archive:

The product supports to request archiving image unit which is invoked by Send button or Close study button. The results of the functionality is displayed on a specific icon and task manager. The archiving module communicates with remote SCP and the remote SCP archives images.

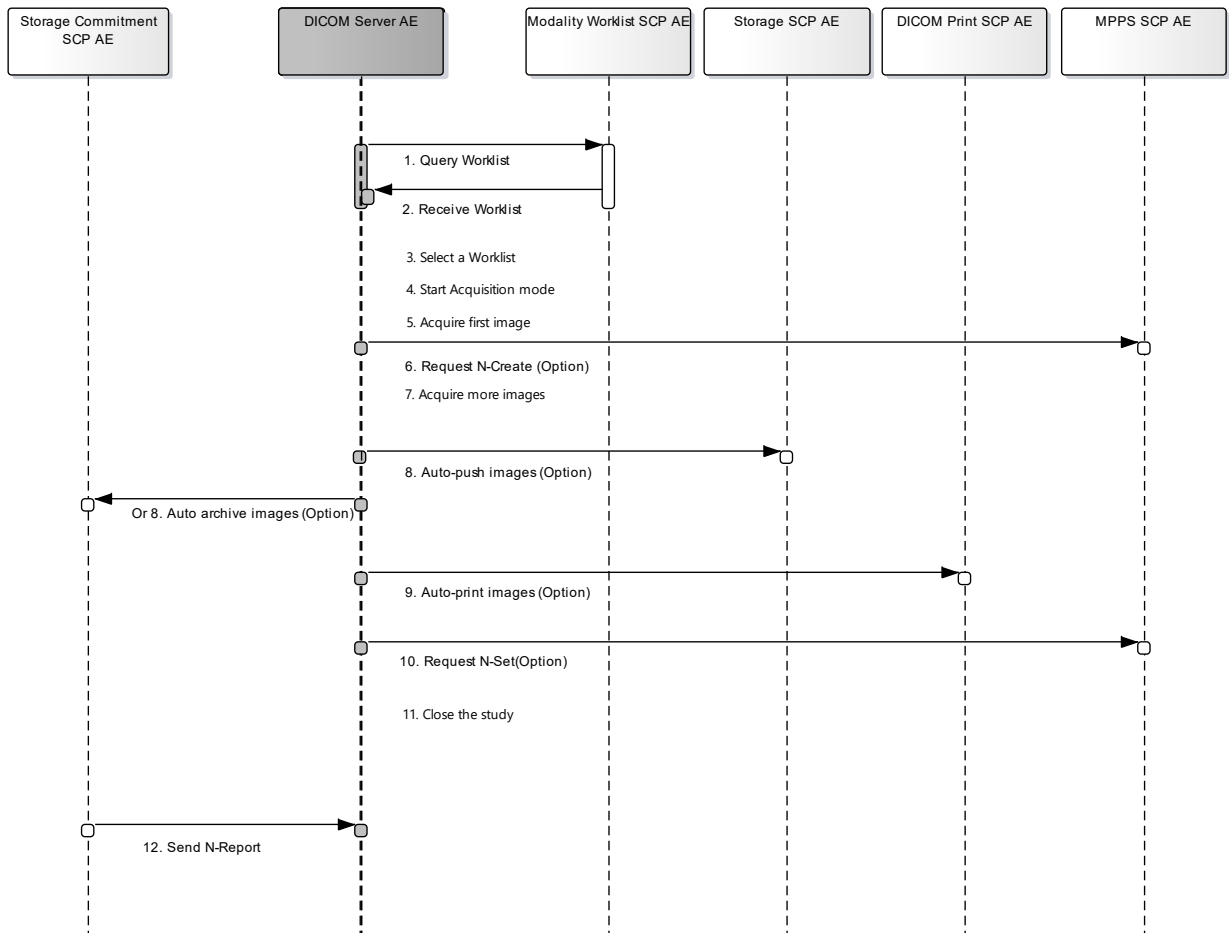
Listen to remote SCP:

The product supports listening for association request from SCP. Using this module, the result of archiving data updates to receive a N-EVENT-REPORT(for Storage Commitment).

2.2.2 Functional Definition of AE's

The DICOM Server AE can act the Modality Worklist SCU, Storage SCU, Print SCU, MPPS SCU and Storage Commitment SCU. Each SCU is started by users or automatically as a part of the Senographe Crystal Nova Acquisition Workstation. Once started, the DICOM Server AE can try to connect other DICOM Application Entities and also can wait some requests to execute DICOM service.

2.2.3 Sequencing of Real-World Activities



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

1. DICOM Server AE initiates and request C-FIND to the Modality Worklist SCP AE with some parameters which are set by the user on the Worklist mode.
2. Modality Worklist SCP AE returns the modality worklists which be matched with the query parameters. Items from the returned worklist responses are inserted in local database and displayed on the Worklist mode.
3. The user selects one of the returned worklist to perform acquisition. The user usually clicks the Acquisition button to enter the Acquisition mode.
4. The Senographe Crystal Nova Acquisition Workstation is ready to acquisition in accordance with procedures upon the user request.
5. The user pushes the exposure button, then first acquired image is stored on the local driver of the Senographe Crystal Nova Acquisition Workstation.
6. DICOM Server AE requests N-Create to MPPS SCP AE if there is declared remote MPPS SCP AE.
7. The user acquires more images.

The user usually clicks the Close Study button when procedures are completed. Then the Senographe Crystal Nova Acquisition Workstation asks the user the completed status; Completed or Discontinued ; if there is declared remote MPPS SCP AE.

If the user set the Auto-push or Auto-archive or Auto-print, acquired images are forwarded to connected SCPs.

8. DICOM Server AE initiates and request C-Store to Storage SCP AE or Storage Commitment SCP AE if the Auto-Push option is set.
9. DICOM Server AE initiates and request print to DCIOM Print SCP AE if the Auto-Print option is set.
10. DICOM Server AE requests N-Set to MPPS SCP AE if there is declared remote MPPS SCP AE.
11. The Senographe Crystal Nova Acquisition Workstation closes the Study.
12. The Storage Commitment SCP AE send the N-Report containing result of archiving and the DICOM Server AE receives and updates that results if the archiving is requested. The user can check the result on Browser mode.

2.3 AE SPECIFICATIONS

2.3.1 DICOM Server AE Specification

The DICOM Server 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
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Yes	No
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Yes	No
Storage Commitment Push Model	1.2.840.10008.1.20.1	Yes	No
Basic Film Session SOP Class	1.2.840.10008.5.1.1.1	Yes	No
Basic Film Box SOP Class	1.2.840.10008.5.1.1.2	Yes	No
Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4	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 DICOM Server AE is:

Maximum Length PDU	46726bytes Not Configurable
---------------------------	--

2.3.1.1.2 Number of Associations

The DICOM Server of the Application Entity will initiate a maximum of one simultaneous associations to remote nodes.

The DICOM Server of the Application Entity will support a maximum of one simultaneous associations initiated by 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:

Implementation UID	1.2.840.113619.6.373
Implementation Version Name	AWSApp_V1

2.3.1.2 Association Initiation Policy

When the DICOM Server 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 Push Images

2.3.1.2.1.1 Associated Real-World Activity

The user first selects the study/ image on the local browser and selects Remote DICOM AEs to which the user desires to send data.

If Sending Type is chosen to Single on configurations of remote DICOM AE, one association will be established for each of the image. If Sending Type is chosen to Group, one association will be established for each of the study or a group of selected images.

2.3.1.2.1.2 Proposed Presentation Context Table

Presentation Context Table – Proposed by AE DICOM Server for Activity Push Images					
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	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
Digital Mammography X-Ray Image Storage-For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		

2.3.1.2.1.2.1 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-A7FF	Refused: Out of resources	The indicator is changed to the icon for failure and log file is updated.
	A900-A9FF	Error: Data Set does not match SOP Class	The indicator is changed to the icon for failure and log file is updated.
	C000-	Error: Cannot Understand	The indicator is changed to the icon for failure and

	CFFF		log file is updated.
	0122	SOP Class Not Supported	The indicator is changed to the icon for failure and log file is updated.
Warning	B000	Coercion of Data Elements	The indicator is changed to the icon for success and log file is updated.
	B006	Elements Discarded	The indicator is changed to the icon for success and log file is updated.
	B007	Data Set does not match SOP Class	The indicator is changed to the icon for success and log file is updated.
Success	0000		The indicator is changed to the icon for success and log file is updated.
*	*	Any other status code.	The indicator is changed to the icon for failure and log file is updated.

2.3.1.2.2 Real-World Activity Query Modality Worklist

2.3.1.2.2.1 Associated Real-World Activity

The system initiates a query for a modality worklist by pressing the Search Patient button or by automatically triggering at specific time intervals, configurable by a user. The association is closed upon receipt of the final query response from the remote AE. The association can also be closed by the DICOM SERVER AE upon receipt of error status from the remote AE or upon expiration of association timers.

2.3.1.2.2.2 Proposed Presentation Context Table

Presentation Context Table – Proposed by AE DICOM Server for Activity Query Modality Worklist					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		

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

When interactive query is finished, the query response information are inserted in the local database and displayed on Worklist. The user can select one of them and start the Acquisition mode.

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	Logs the error and displays all the persisted worklists.
	A900	Error: Identifier does not match SOP Class	Logs the error and displays all the persisted worklists.
	C000-CFFF	Error: Unable to process	Logs the error and displays all the persisted worklists.
	0122	SOP Class Not Supported	Logs the error and displays all the persisted worklists.
Cancel	FE00	Matching terminated due to cancel	Close the association.
Success	0000	Matching is complete - No final identifier is supplied	Displays all the worklists items obtained from the SCP.
Pending	FF00	Matches are continuing - Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys.	Continues to wait for worklists items from SCP.
	FF01	Matches are continuing - Warning that one or more Optional Keys were not supported for existence for this Identifier	Continues to wait for worklists items from SCP.
*	*	Any other status code.	Logs the error and displays all the persisted worklists.

2.3.1.2.3 Real-World Activity Notify MPPS

2.3.1.2.3.1 Associated Real-World Activity

The DICOM Server AE initiates association to the remote MPPS SCP AE for the following functions during real world activity Modality Performed Procedure Step Notification:

- Start PPS: Initiates a DICOM association in order to create a DICOM Modality Performed Procedure Step SOP instance in the remote AE. If the remote AE accepts a presentation context applicable to Modality performed Procedure Step, the SCU will issue a request to create the SOP instance in the remote AE via the N-CREATE service.

- Complete PPS: Initiates a DICOM association in order to update a DICOM Modality Performed Step instance that is already created with the remote AE. If the remote AE accepts a presentation context applicable to Modality performed Procedure Step, the SCU will issue a request to update the SOP instance in the remote AE via the N-SET service. The PPS Status is set to 'COMPLETED'.

- Discontinue PPS: Initiates a DICOM association in order to update a DICOM Modality Performed Step instance that is already created with the remote AE. If the remote AE accepts a presentation context applicable to Modality performed Procedure Step, the SCU will issue a request to update the SOP instance in the remote AE via the N-SET service. The PPS Status is set to 'DISCONTINUED'.

2.3.1.2.3.2 Proposed Presentation Context Table

Presentation Context Table – Proposed by AE DICOM Server for Activity Notify MPPS					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

2.3.1.2.3.2.1 SOP Specific DICOM Conformance Statement for Modality Performed Procedure Step SOP Class

Following are the status codes that are more specifically processed when receiving an N-Create response from an MPPS SCP equipment:

Service Status	Status Code	Further Meaning	Application Behavior When Receiving Status Code
Failure	0119	Class-instance conflict	Logs the error.
	0210	Duplicate invocation	Logs the error.
	0111	Duplicate SOP Instance	Logs the error.
	0106	Invalid attribute value	Logs the error.
	0117	Invalid SOP instance	Logs the error.
	0120	Missing attribute	Logs the error.
	0121	Missing attribute value	Logs the error.
	0212	Mistyped argument	Logs the error.
	0105	No such attributes	Logs the error.
	0118	No such SOP Class	Logs the error.
	0112	No such SOP Instance	Logs the error.
	0110	Processing failure	Logs the error.
	0213	Resource limitation	Logs the error.
0211	Unrecognized operation	Logs the error.	
Success	0000		Logs the success.

*	*	Any other status code.	Logs the error.
---	---	------------------------	-----------------

Following are the status codes that are more specifically processed when receiving an N-Set response from an **MPPS** SCP equipment:

Service Status	Status Code	Further Meaning	Application Behavior When Receiving Status Code
Failure	0119	Class-instance conflict	The indicator is changed to the icon for failure and log file is updated.
	0210	Duplicate invocation	The indicator is changed to the icon for failure and log file is updated.
	0106	Invalid attribute value	The indicator is changed to the icon for failure and log file is updated.
	0212	Mistyped argument	The indicator is changed to the icon for failure and log file is updated.
	0117	Invalid SOP instance	The indicator is changed to the icon for failure and log file is updated.
	0121	Missing attribute value	The indicator is changed to the icon for failure and log file is updated.
	0105	No such attributes	The indicator is changed to the icon for failure and log file is updated.
	0118	No such SOP Class	The indicator is changed to the icon for failure and log file is updated.
	0112	No such SOP Instance	The indicator is changed to the icon for failure and log file is updated.
	0110	Processing failure	The indicator is changed to the icon for failure and log file is updated.
	0213	Resource limitation	The indicator is changed to the icon for failure and log file is updated.
	0211	Unrecognized operation	The indicator is changed to the icon for failure and log file is updated.
Success	0000		The indicator is changed to the icon for success and log file is updated.
*	*	Any other status code.	The indicator is changed to the icon for failure and log file is updated.

2.3.1.2.4 Real-World Activity Request Print

2.3.1.2.4.1 Associated Real-World Activity

Application can be triggered in different ways to print images:

- Auto print when closing study
- Manual print with selected images

2.3.1.2.4.2 Proposed Presentation Context Table

Presentation Context Table – Proposed by AE DICOM Server for Activity Request Print					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
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

2.3.1.2.4.2.1 SOP Specific DICOM Conformance Statement for Basic Grayscale Print Management SOP Classes

The DICOM Server 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	Not Used
Basic Grayscale Image Box	1.2.840.10008.5.1.1.4	N-SET	Used (Mandatory)

When a print operation is initiated, the AE:

1. Initiates a DICOM association.
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. 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
6. Followed by an N-DELETE of the Basic Film Session SOP Instance
7. Releases the DICOM association after printing is successful or failure has been signaled to the user

2.3.1.2.4.2.1.1 Basic Film Session SOP Class

Following are the status codes that are more specifically processed when receiving messages from a **Print SCP** equipment for the Basic Film Session SOP Class N-CREATE:

Service Status	Status Codes	Further Meaning	Application Behavior When receiving Status Codes
Failure	0119	Class-instance conflict	The indicator is changed to the icon for failure and log file is updated.
	0210	Duplicate invocation	The indicator is changed to the icon for failure and log file is updated.
	0111	Duplicate SOP Instance	The indicator is changed to the icon for failure and log file is updated.
	0106	Invalid attribute value	The indicator is changed to the icon for failure and log file is updated.
	0117	Invalid SOP instance	The indicator is changed to the icon for failure and log file is updated.
	0120	Missing attribute	The indicator is changed to the icon for failure and log file is updated.
	0121	Missing attribute value	The indicator is changed to the icon for failure and log file is updated.
	0212	Mistyped argument	The indicator is changed to the icon for failure and log file is updated.
	0105	No such attributes	The indicator is changed to the icon for failure and log file is updated.
	0118	No such SOP Class	The indicator is changed to the icon for failure and log file is updated.
	0112	No such SOP Instance	The indicator is changed to the icon for failure and log file is updated.
	0110	Processing failure	The indicator is changed to the icon for failure and log file is updated.

	0213	Resource limitation	The indicator is changed to the icon for failure and log file is updated.
	0211	Unrecognized operation	The indicator is changed to the icon for failure and log file is updated.
Warning	B600	Memory allocation not supported	The indicator is changed to the icon for failure and log file is updated.
Success	0000	Film session successfully created	Logs status and proceeds.
*	*	Any other status code.	The indicator is changed to the icon for failure and log file is updated.

Following are the status codes that are more specifically processed when receiving messages from a **Print SCP** equipment for the Basic Film Session SOP Class N-DELETE:

Service Status	Status Codes	Further Meaning	Application Behavior When receiving Status Codes
Failure	0119	Class-instance conflict	Logs the error.
	0210	Duplicate invocation	Logs the error.
	0117	Invalid SOP instance	Logs the error.
	0212	Mistyped argument	Logs the error.
	0118	No such SOP Class	Logs the error.
	0112	No such SOP Instance	Logs the error.
	0110	Processing failure	Logs the error.
	0213	Resource limitation	Logs the error.
	0211	Unrecognized operation	Logs the error.
Success	0000	Film session successfully deleted	Logs status and proceeds.
*	*	Any other status code.	Logs the error.

2.3.1.2.4.2.1.2 Basic Film Box SOP Class

Following are the status codes that are more specifically processed when receiving messages from a **Print SCP** equipment for the Basic Film Box SOP Class N-CREATE:

Service Status	Status Codes	Further Meaning	Application Behavior When receiving Status Codes
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Failure	C616	There is an existing Film Box that has not been printed and N-ACTION at the Film Session level is not supported. A new Film Box will not be created when a previous Film Box has not been printed.	The indicator is changed to the icon for failure and log file is updated.
	0119	Class-instance conflict	The indicator is changed to the icon for failure and log file is updated.
	0210	Duplicate invocation	The indicator is changed to the icon for failure and log file is updated.
	0111	Duplicate SOP Instance	The indicator is changed to the icon for failure and log file is updated.
	0106	Invalid attribute value	The indicator is changed to the icon for failure and log file is updated.
	0117	Invalid SOP instance	The indicator is changed to the icon for failure and log file is updated.
	0120	Missing attribute	The indicator is changed to the icon for failure and log file is updated.
	0121	Missing attribute value	The indicator is changed to the icon for failure and log file is updated.
	0212	Mistyped argument	The indicator is changed to the icon for failure and log file is updated.
	0105	No such attributes	The indicator is changed to the icon for failure and log file is updated.
	0118	No such SOP Class	The indicator is changed to the icon for failure and log file is updated.
	0112	No such SOP Instance	The indicator is changed to the icon for failure and log file is updated.
	0110	Processing failure	The indicator is changed to the icon for failure and log file is updated.
	0213	Resource limitation	The indicator is changed to the icon for failure and log file is updated.
	0211	Unrecognized operation	The indicator is changed to the icon for failure and log file is updated.
Warning	B605	Requested Min Density or Max Density outside of printer's operating range. The printer will use its respective minimum or maximum density value instead.	The indicator is changed to the icon for failure and log file is updated.

Success	0000	Film box successfully created	Logs status and proceeds.
*	*	Any other status code.	The indicator is changed to the icon for failure and log file is updated.

Following are the status codes that are more specifically processed when receiving messages from a **Print SCP** equipment for the Basic Film Box SOP Class N-ACTION:

Service Status	Status Codes	Further Meaning	Application Behavior When receiving Status Codes
Failure	C602	Unable to create Print Job SOP Instance; print queue is full	The indicator is changed to the icon for failure and log file is updated.
	C603	Image size is larger than image box size (by using the specified magnification value)	The indicator is changed to the icon for failure and log file is updated.
	C604	Image position collision : multiple images assigned to single image position	The indicator is changed to the icon for failure and log file is updated.
	C613	Combined Print Image size is larger than the Image Box size	The indicator is changed to the icon for failure and log file is updated.
	0119	Class-instance conflict	The indicator is changed to the icon for failure and log file is updated.
	0210	Duplicate invocation	The indicator is changed to the icon for failure and log file is updated.
	0115	Invalid argument value	The indicator is changed to the icon for failure and log file is updated.
	0117	Invalid SOP Instance	The indicator is changed to the icon for failure and log file is updated.
	0212	Mistyped argument	The indicator is changed to the icon for failure and log file is updated.
	0123	No such action	The indicator is changed to the icon for failure and log file is updated.
	0114	No such argument	The indicator is changed to the icon for failure and log file is updated.
	0118	No such SOP Class	The indicator is changed to the icon for failure and log file is updated.
	0112	No such SOP Instance	The indicator is changed to the icon for failure and log file is updated.
	0110	Processing failure	The indicator is changed to the icon for failure and log file is updated.
0213	Resource limitation	The indicator is changed to the icon for failure and log file is updated.	
0211	Unrecognized operation	The indicator is changed to the icon for failure and log file is updated.	

Warning	B603	Film Box SOP Instance hierarchy does not contain Image Box SOP Instances (empty page)	The indicator is changed to the icon for failure and log file is updated.
	B604	Image size is larger than image box size, the image has been demagnified.	The indicator is changed to the icon for failure and log file is updated.
	B609	Image size is larger than the Image Box size. The Image has been cropped to fit.	The indicator is changed to the icon for failure and log file is updated.
	B60A	Image size or Combined Print Image size is larger than the Image Box size. Image or Combined Print Image has been decimated to fit.	The indicator is changed to the icon for failure and log file is updated.
Success	0000	Film accepted for printing; if supported, the Print Job SOP Instance is created	The indicator is changed to the icon for success and log file is updated.
*	*	Any other status code.	The indicator is changed to the icon for failure and log file is updated.

Following are the status codes that are more specifically processed when receiving messages from a **Print SCP** equipment for the Basic Film Box SOP Class N-DELETE:

Service Status	Status Codes	Further Meaning	Application Behavior When receiving Status Codes
Failure	0119	Class-instance conflict	Logs the error.
	0210	Duplicate invocation	Logs the error.
	0117	Invalid SOP instance	Logs the error.
	0212	Mistyped argument	Logs the error.
	0118	No such SOP Class	Logs the error.
	0112	No such SOP Instance	Logs the error.
	0110	Processing failure	Logs the error.
	0213	Resource limitation	Logs the error.
	0211	Unrecognized operation	Logs the error.
Success	0000	Film box successfully deleted	Logs status and proceeds.
*	*	Any other status code.	Logs the error.

2.3.1.2.4.2.1.3 Basic Grayscale Image Box SOP Class

Following are the status codes that are more specifically processed when receiving messages from a **Print SCP** equipment for the Basic Grayscale Image Box SOP Class N-SET:

Service Status	Status Codes	Further Meaning	Application Behavior When receiving Status Codes
Failure	C603	Image size is larger than image box size	The indicator is changed to the icon for failure and log file is updated.
	C605	Insufficient memory in printer to store the image	The indicator is changed to the icon for failure and log file is updated.
	C613	Combined Print Image size is larger than the Image Box size	The indicator is changed to the icon for failure and log file is updated.
	0119	Class-instance conflict	The indicator is changed to the icon for failure and log file is updated.
	0210	Duplicate invocation	The indicator is changed to the icon for failure and log file is updated.
	0106	Invalid attribute value	The indicator is changed to the icon for failure and log file is updated.
	0212	Mistyped argument	The indicator is changed to the icon for failure and log file is updated.
	0117	Invalid SOP instance	The indicator is changed to the icon for failure and log file is updated.
	0121	Missing attribute value	The indicator is changed to the icon for failure and log file is updated.
	0105	No such attributes	The indicator is changed to the icon for failure and log file is updated.
	0118	No such SOP Class	The indicator is changed to the icon for failure and log file is updated.
	0112	No such SOP Instance	The indicator is changed to the icon for failure and log file is updated.
	0110	Processing failure	The indicator is changed to the icon for failure and log file is updated.
	0213	Resource limitation	The indicator is changed to the icon for failure and log file is updated.
0211	Unrecognized operation	The indicator is changed to the icon for failure and log file is updated.	
Warning	B604	Image size larger than image box size, the image has been demagnified.	The indicator is changed to the icon for failure and log file is updated.
	B605	Requested Min Density or Max Density outside of printer's operating range. The printer will use its respective minimum	The indicator is changed to the icon for failure and log file is updated.

		or maximum density value instead.	
	B609	Image size is larger than the Image Box size. The Image has been cropped to fit.	The indicator is changed to the icon for failure and log file is updated.
	B60A	Image size or Combined Print Image size is larger than the Image Box size. The Image or Combined Print Image has been decimated to fit.	The indicator is changed to the icon for failure and log file is updated.
Success	0000	Image successfully stored in Image Box	Logs status and proceeds.
*	*	Any other status code.	The indicator is changed to the icon for failure and log file is updated.

2.3.1.2.5 Real-World Activity Request Archive

2.3.1.2.5.1 Associated Real-World Activity

Storage Commitment Provider is declared on the system, one instance is archived when image is successfully sent. The N-ACTION-RQ request is sent to Storage Commitment Provider in a new association. The system waits for N-ACTION-RSP from Storage Commitment Provider. On reception of success, system is ready to receive at any time from Storage Commitment Provider the N-EVENT-REPORT-RQ notification. N-EVENT-REPORT can be in the same association than the N-ACTION or in a new one. On reception of the N-EVENT-REPORT-RQ notification from Storage Commitment Provider, system updates the status of archive and sends a N-EVENT-REPORT-RSP to the Storage Commitment Provider.

2.3.1.2.5.2 Proposed Presentation Context Table

Presentation Context Table – Proposed by AE DICOM Server for Activity Request Archive					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Storage Commitment Push Model	1.2.840.10008.1.20.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		

2.3.1.2.5.2.1 SOP Specific DICOM Conformance Statement for the Storage Commitment Push Model SOP Class SCU

The DICOM Server uses DICOM network storage services to transfer SOP Instances which are to be committed. Following are the status codes that are more specifically processed when receiving N-Action responses from a **Storage Commitment** SCP equipment:

Service Status	Status Code	Further Meaning	Application Behavior When Receiving Status Code
Failure	0119	Class-instance conflict	The indicator is changed to the icon for failure and log file is updated.
	0210	Duplicate invocation	The indicator is changed to the icon for failure and

			log file is updated.
0115	Invalid argument value		The indicator is changed to the icon for failure and log file is updated.
0117	Invalid SOP Instance		The indicator is changed to the icon for failure and log file is updated.
0212	Mistyped argument		The indicator is changed to the icon for failure and log file is updated.
0123	No such action		The indicator is changed to the icon for failure and log file is updated.
0114	No such argument		The indicator is changed to the icon for failure and log file is updated.
0118	No such SOP Class		The indicator is changed to the icon for failure and log file is updated.
0112	No such SOP Instance		The indicator is changed to the icon for failure and log file is updated.
0110	Processing failure		The indicator is changed to the icon for failure and log file is updated.
0213	Resource limitation		The indicator is changed to the icon for failure and log file is updated.
0211	Unrecognized operation		The indicator is changed to the icon for failure and log file is updated.
Success	0000		Logs the status and waits N-Report-Request.
*	*	Any other status code.	The indicator is changed to the icon for failure and log file is updated.

2.3.1.2.6 Real-World Activity Verify Connectivity

2.3.1.2.6.1 Associated Real-World Activity

The user can choose to verify a remote Application Entity, then the DICOM Server AE requests C-Echo to selected remote Application Entity. In case of failure, the verification is not retried.

2.3.1.2.6.2 Proposed Presentation Context Table

Presentation Context Table – Proposed by AE DICOM Server for Activity Verify Connectivity					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

2.3.1.3 Association Acceptance Policy

2.3.1.3.1 Real-World Activity Listen to Remote SCP

2.3.1.3.1.1 Associated Real-World Activity

The DICOM Server AE monitors the association request. Then the Storage Commitment Provider initiating the association must use the role selection negotiation. Once the N-Event-Report response is received from the SPC, the system update the indicator shown archive status.

2.3.1.3.1.2 Accepted Presentation Context Table

Presentation Context Table - Accepted by AE <AE name> for Activity <local Real-World Activity>					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Storage Commitment Push Model	1.2.840.10008.1.20.1	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

2.3.1.3.1.2.1 SOP Specific DICOM Conformance Statement for the Storage Commitment Push Model SOP Class SCU

The DICOM Server will only accept the SCU role within a Presentation Context for the Storage Commitment Push Model SOP Class.

Upon receiving a Storage Commitment N-EVENT-REPORT (Storage Commitment Result), the DICOM Server will validate the Transaction UID against its list of outstanding Storage Commitment Request Transaction UIDs. If it matches an outstanding Request, the indicator is changed to the icon for success. If the Storage Commitment Result indicates any failure status, the indicator is changed to the icon for failure, and the error will be written to the error log.

Following are the status codes the Application may send back in the **N-Event-Report** response command to the **Storage Commitment** SCP Equipment that sent the N-Event-Report request:

Service Status	Status Code	Further Meaning	Status Code Explanation	Related Fields Sent Back to the SCU
	0110	Processing failure	The indicator is changed to the icon for failure and log file is updated.	None
Success	0000		The indicator is changed to the icon for success and log file is updated.	None

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 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.

2.4.3 Additional Protocols

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

2.4.4 IPv4 and IPv6 Support

Senographe Crystal Nova 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 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:

- Store, Find, Timers *
- Inactivity Timers *

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

2.6 SUPPORT OF EXTENDED CHARACTER SETS

The Senographe Crystal Nova Acquisition Workstation is configurable with a 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 Nova 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 Crystal Nova 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.

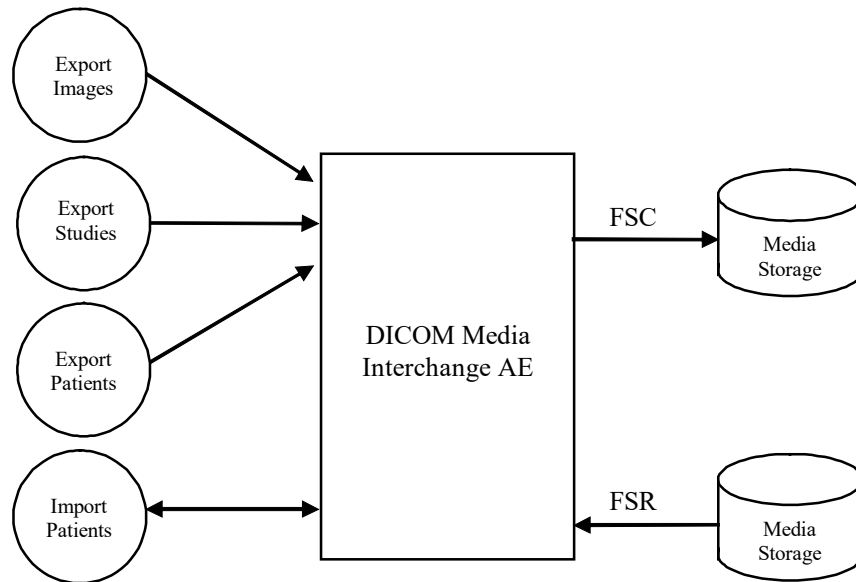
The Senographe Crystal Nova Acquisition Workstation can export the DICOM files into the media storages. The archived DICOM files can be browsed and read by independent viewer. Also it can import DICOM files from the media storages.

3.2 IMPLEMENTATION MODEL

3.2.1 Application Data Flow Diagram

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

ILLUSTRATION 3-1
THE SENOGRAPHE CRYSTAL NOVA ACQUISITION WORKSTATION
MEDIA INTERCHANGE APPLICATION MODEL AND DATA FLOW DIAGRAM



The product supports exporting images, studies or patients which performs Export functions; the results of that functionality are written to media.

The product supports importing patients which performs the Import function; the results of that functionality are DICOM images to be read and saved from media.

3.2.2 Functional Definition of AE's

The DICOM Media Interchange AE has a local storage that may contain various SOP instances. These may have been obtained by original creation locally or by importing from other application entities with the same version system.

The DICOM Media Interchange AE acts as an FSC to create a new DICOM File-set on a CD/DVD/USB Storage. It initializes the DICOM File-set and writes all the specified SOP instances onto the blank Media at once. The SOP instances written will be limited to instances that match the criteria of one of the Application Profiles that is supported. Updating the media is not supported.

The DICOM Media Interchange AE acts as an FSR when requested to browse and import the data such that user can select the SOP instances. The DICOM Media Interchange AE copy the data which the user want on the local database.

3.2.3 Sequencing of Real-World Activities

For writing image on a Media:

1. Browse patients, studies or images for writing.
2. Click the Export button on the UI menu.
3. Select media type and set options.
4. Try to start Export.
5. System writes images.

For reading image on a Media:

1. Click the Import button on the UI menu.
2. Select data.
3. Try to start Import.
4. System reads, saves and browses 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 Crystal Nova Acquisition Workstation Implementation UID	1.2.840.113619.6.373
Implementation Version Name	AWSApp_V1

3.3 AE SPECIFICATIONS

3.3.1 DICOM Media Interchange AE Specification

The DICOM Media Interchange 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
STD-GEN-CD	Export images, studies, patients	FSC
	Import patients	FSR
STD-GEN-DVD-JPEG	Export images, studies, patients	FSC
	Import patients	FSR
STD-GEN-USB-JPEG	Export images, studies, patients	FSC
	Import patients	FSR

3.3.1.1 File Meta Information for the DICOM Media Interchange 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
DICOM Media Interchange Implementation UID	1.2.840.113619.6.373
DICOM Media Interchange Implementation Version Name	AWSApp_V1

3.3.1.2 Real-World Activities for the DICOM Media Interchange Application Entity

3.3.1.2.1 Real-World Activity Export images/ studies/ patients

The DICOM MEDIA Interchange AE acts as an FSC using the interchange option when requested to copy SOP Instances from the local database to the media.

The user has to insert a blank CD, DVD or USB into the drive and selects and loads images, studies or patients to be archived on the Media. Then, the user starts to export the data and an archiving status is displayed.

3.3.1.2.2 Real-World Activity Import patients

The DICOM MEDIA Interchange AE acts as an FSR using the interchange option when requested to copy SOP instance from media to the local database.

The user has to connect a medial CD, DVD or USB and select images to be archived on the local database. Then the user starts to import the data and an archiving status is displayed.

3.3.1.2.2.1 Media Storage Application Profile for the RWA Export, Import Data

For the list of Application Profiles that invoke this AE for the Real-World Activity Export images/studies/patients, 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..

3.3.1.2.2.1.1 Options for STD-GEN-CD/ STD-GEN-DVD-JPEG/ STD-GEN-USB-JPEG 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 7 Basic Directory Information Object Implementation.

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

4. MODALITY WORKLIST QUERY IMPLEMENTATION

4.1 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.

4.2 SENOGRAPHE CRYSTAL MAPPING OF DICOM ENTITIES

The Senographe Crystal Nova 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 CRYSTAL NOVA ENTITIES

DICOM	Senographe Crystal Nova Entity
Scheduled Procedure Step	
Requested Procedure	Study
Imaging Service Request	Study
Visit	Study
Patient	Patient

4.3 WORKLIST QUERY MODULE TABLE

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

**TABLE 4-2
MODALITY WORKLIST INFORMATION MODEL MODULES**

Entity Name	Module Name	Reference
Scheduled Procedure Step	SOP Common	4.4.1.1
	Scheduled Procedure Step	4.4.1.2
Requested Procedure	Requested Procedure	4.4.2.1
Imaging Service Request	Imaging Service Request	4.4.3.1
Visit	Visit Identification	4.4.4.1
	Visit Status	4.4.4.2
	Visit Relationship	4.4.4.3
	Visit Admission	4.4.4.4
Patient	Patient Relationship	4.4.5.1
	Patient Identification	4.4.5.2
	Patient Demographic	4.4.5.3
	Patient Medical	4.4.5.4

4.4 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

4.4.1 Common Scheduled Procedure Step Entity Modules

4.4.1.1 SOP Common Module

**TABLE 4-3
□SOP COMMON MODULE ATTRIBUTES**

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

4.4.1.1.1 Specific Character Set

ISO_IR_100 is the Specific Character Set (0008, 0005) value sent during querying and while interpreting response.

TABLE 4-4
 SCHEDULED PROCEDURE STEP MODULE ATTRIBUTES

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into Instance / MPPS	Note
Scheduled Procedure Step Sequence	(0040,0100)	R	1	No/No	Requested in the MWL queries.
>Scheduled Station AE Title	(0040,0001)	R	1	No/No	Requested in the MWL queries. Matching is supported as one of the following: 1. No AE title is supplied (universal matching), 2. Worklist AET is supplied for matching (Wildchar matching). In case of universal matching, if attribute is absent or empty in response, the SPS will be accepted.
>Scheduled Procedure Step Start Date	(0040,0002)	R	1 *	No/No	Requested in the MWL queries. Matching is supported as one of the following: 1. A start date and a end date is supplied for matching (Range of date matching). The value is selected by a user. If attribute is absent or empty in answer, the SPS is accepted.
>Scheduled Procedure Step Start Time	(0040,0003)	R	1 *	No/No	Requested in the MWL queries with the time of the day, 000000-235959. Matching is supported as one of the following: 1. A start date and a end date is supplied for matching (Range of date matching). If attribute is absent or empty in answer, the SPS is accepted.

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>Scheduled Procedure Step End Date	(0040,0004)	O	3	No/No	Not requested.
>Scheduled Procedure Step End Time	(0040,0005)	O	3	No/No	Not requested.
>Modality	(0008,0060)	R	1	No/No	Requested in the MWL queries. Matching is supported as follows: 1. No modality is supplied (universal matching). 2. Single Value is supplied for matching (Single value matching). Supported options: MG, DX, CR If attribute is absent or empty in answer, the SPS is accepted.
>Scheduled Performing Physician's Name	(0040,0006)	R	2 *	Yes /Yes	Requested in the MWL queries with zero-length value. Value is copied to image in attribute Performing Physician's Name (0008,1050). If element is absent or empty in response, the SPS will be accepted.
>Scheduled Procedure Step Description	(0040,0007)	O	1C *	Yes/Yes	Requested in the MWL queries with zero-length value. If element is absent or empty in answer, the SPS will be accepted. This value is copied to images into Study description (0008,1030), if Requested Procedure Description (0032,1060) tag value is absent or empty.
>Scheduled Station Name	(0040,0010)	O	2	No/No	Not requested.
>Scheduled Procedure Step Location	(0040,0011)	O	2	No/No	Not requested.
>Scheduled Protocol Code Sequence	(0040,0008)	O	1C	Yes /Yes	Requested in the MWL queries. Sequence is copied in MPPS within Scheduled Step Attributes Sequence(0040,0270). Sequence is copied in images within sequence Request Attribute Sequence(0040,0275). If the sequence is absent or empty in answer, the SPS will be accepted and attribute will not be copied to images.
>>Code Value	(0008,0100)	O	1	Yes /Yes	Requested in the MWL queries. If absent or empty in answer, SPS is accepted.

>>Coding Scheme Designator	(0008,0102)	O	1	Yes /Yes	Requested in the MWL queries. If absent or empty in answer, SPS is accepted. If missing in the sequence, will have the code 99LOCAL.
>>Coding Scheme Version	(0008,0103)	O	3	No/No	Requested in the MWL queries. If absent or empty in answer, SPS is accepted.
>>Code Meaning	(0008,0104)	O	3	Yes /Yes	Requested in the MWL queries. If absent or empty in answer, SPS is accepted.
>Pre-Medication	(0040,0012)	O	2C	No/No	Requested in the MWL queries. If absent or empty in answer, SPS is accepted.
>Scheduled Procedure Step ID	(0040,0009)	O	1	Yes /Yes	Requested in the MWL queries. If value is not correct in answer, SPS will be accepted. If absent or empty in answer, replaced by (0040,1001). Copied to images in Request Attribute Sequence (0040,0275).
>Requested Contrast Agent	(0032,1070)	O	2C	No/No	Requested in the MWL queries. If value is not correct in answer, SPS will be accepted.
>Scheduled Procedure Step Status	(0040,0020)	O	3	No/No	Requested in the MWL queries. If value is not correct in answer, SPS will be accepted.
>Comments on the Scheduled Procedure Step	(0040,0400)	O	3	No/No	Requested in the MWL queries. If value is not correct in answer, SPS will be accepted.

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

4.4.2 Common Requested Procedure Entity Modules

4.4.2.1 Requested Procedure Module

**TABLE 4-5
REQUESTED PROCEDURE MODULE ATTRIBUTES**

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into Instance / MPPS	Note
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Requested Procedure ID	(0040,1001)	O	1 *	Yes /Yes	Requested in the MWL queries. Matching is supported as follows: 1. No value is supplied (universal matching). 2. ID value is supplied for matching (Wildchar matching). If element is absent or empty in answer, the SPS will be accepted. Attribute is copied to image within Request Attribute Sequence(0040,0275) and its value is copied to Study ID (0020,0010). This value will end truncated if it exceeds 16 characters.
Requested Procedure Description	(0032,1060)	O	1C	Yes /Yes	Requested in the MWL queries with zero-length value. If element is absent or empty in answer, the SPS will be accepted. Attribute is copied to image within Request Attribute Sequence(0040,0275) and its value is copied to image within Study Description (0008,1030). This value will end truncated if it exceeds 64 characters.
Requested Procedure Code Sequence	(0032,1064)	O	1C	Yes/Yes	Requested in the MWL queries. Sequence content is copied in images in Procedure Code Sequence(0008,1032). If element is absent or empty in answer, the SPS will be accepted.
>Code Value	(0008,0100)	O	1	Yes/Yes	Requested in the MWL queries. If answer is received with absent or empty code value in code sequence, the SPS will be accepted.
>Coding Scheme Designator	(0008,0102)	O	1	Yes/Yes	Requested in the MWL queries. If answer is received with absent or empty code value in code sequence, the SPS will be accepted.
>Coding Scheme Version	(0008,0103)	O	3	No/No	Requested in the MWL queries. If answer is received with absent or empty code value in code sequence, the SPS will be accepted.
>Code Meaning	(0008,0104)	O	3 *	Yes /Yes	Requested in the MWL queries. If answer is received with absent or empty code value in code sequence, the SPS will be accepted.
Study Instance UID	(0020,000D)	O	1	Yes/Yes	Requested in the MWL queries. If absent or empty in answer, SPS is not accepted.

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Study Date	(0008,0020)	O	3	No/No	Requested in the MWL queries. If absent or empty in answer, SPS is accepted.
Study Time	(0008,0030)	O	3	No/No	Requested in the MWL queries. If absent or empty in answer, SPS is accepted.
Referenced Study Sequence	(0008,1110)	O	2	Yes/Yes	Requested in the MWL queries. If absent or empty in answer, SPS is accepted and sequence is not copied to images.
>Referenced SOP Class UID	(0008,1150)	O	1C	Yes /Yes	Requested in the MWL queries. If absent or empty in answer, SPS is accepted and sequence is not copied to images.
>Referenced SOP Instance UID	(0008,1155)	O	1C	Yes /Yes	Requested in the MWL queries. If absent or empty in answer, SPS is accepted and sequence is not copied to images.
Requested Procedure Priority	(0040,1003)	O	2	No/No	Not requested.
Patient Transport Arrangements	(0040,1004)	O	2	No/No	Not requested.
Requested Procedure Location	(0040,1005)	O	3	No/No	Not requested.
Confidentiality Code	(0040,1008)	O	3	No/No	Not requested.
Reporting Priority	(0040,1009)	O	3	No/No	Not requested.
Names of Intended Recipients of Results	(0040,1010)	O	3	No/No	Not requested.
Reason for the Requested Procedure	(0040,1002)	O	3	No/No	Not requested.
Requested Procedure Comments	(0040,1400)	O	3	No/No	Not requested.

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

4.4.3 Common Imaging Service Request Entity Modules

4.4.3.1 Imaging Service Request Module

**TABLE 4-6
IMAGING SERVICE REQUEST MODULE ATTRIBUTES**

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into Instance / MPPS	Note
Accession Number	(0008,0050)	O	2 *	Yes/Yes	Requested in the MWL queries. Matching is supported as follows: 1. No value is supplied (universal matching). 2. ID value is supplied for matching (Wildchar matching). If element is absent or empty in answer, the SPS will be accepted. Attribute is copied to image within Accession Number (0008,0050). This value will end truncated if it exceeds 16 characters.
Requesting Physician	(0032,1032)	O	2	No/ No	Requested in the MWL queries. If absent or empty in answer, SPS is accepted.
Referring Physician's Name	(0008,0090)	O	2	Yes/ No	Requested in the MWL queries. If absent or empty in answer, SPS is accepted. Attribute is copied to image within Referring Physician's Name (0008,0090). This value will end truncated if it exceeds 63 characters.
Requesting Service	(0032,1033)	O	3	No/No	Requested in the MWL queries. If absent or empty in answer, SPS is accepted.
Issue Date of Imaging Service Request	(0040,2004)	O	3	No/No	Not requested.
Issue Time of Imaging Service Request	(0040,2005)	O	3	No/No	Not requested.
Order entered by ...	(0040,2008)	O	3	No/No	Not requested.
Order Enterer's Location	(0040,2009)	O	3	No/No	Not requested.
Order Callback Phone Number	(0040,2010)	O	3	No/No	Not requested.

<Delete the following note if no * is present in the Table>

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

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4.4.4 Common visit Entity Modules

4.4.4.1 Visit Identification

**TABLE 4-7
VISIT IDENTIFICATION MODULE ATTRIBUTES**

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into Instance / MPPS	Note
Institution Name	(0008,0080)	O	3	No/No	Not requested.
Institution Address	(0008,0081)	O	3	No/No	Not requested.
Institution Code Sequence	(0008,0082)	O	3	No/No	Not requested.
Issuer of Admission ID	(0038,0011)	O	3	No/No	Not requested.

4.4.4.2 Visit Status

No data elements are requested.

4.4.4.3 Visit Relationship

No data elements are requested.

4.4.4.4 Visit Admission

No data elements are requested.

4.4.5 Common Patient Entity Modules

4.4.5.1 Patient Relationship

No data elements are requested.

4.4.5.2 Patient Identification

**TABLE 4-8
PATIENT IDENTIFICATION MODULE ATTRIBUTES**

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into Instance / MPPS	Note
----------------	-----	----------------------------	----------------------------	-----------------------------	------

Patient's Name	(0010,0010)	R	1 *	Yes/Yes	Requested in the MWL queries. Matching is supported as follows: 1. No value is supplied (universal matching). 2. Value is supplied for matching (Wildchar matching). If element is absent or empty in answer, the SPS will not be accepted. Attribute is copied to image within Patient's Name (0010,0010). This value will end truncated if it exceeds 63 characters.
Patient ID	(0010,0020)	R	1 *	Yes/Yes	Requested in the MWL queries. Matching is supported as follows: 1. No value is supplied (universal matching). 2. ID value is supplied for matching (Wildchar matching). If element is absent or empty in answer, the SPS will not be accepted. Attribute is copied to image within Patient ID (0010,0020). This value will end truncated if it exceeds 16 characters.
Issuer of Patient ID	(0010,0021)	O	3	No/ No	Requested in the MWL queries. If absent or empty in answer, SPS is accepted.
Other Patient IDs	(0010,1000)	O	3	Yes/ No	Requested in the MWL queries. If absent or empty in answer, SPS is accepted.
Other Patient Names	(0010,1001)	O	3	No/ No	Not requested.
Patient's Birth Name	(0010,1005)	O	3	No/ No	Not requested.
Patient's Mother's Birth Name	(0010,1060)	O	3	No/ No	Not requested.

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

4.4.5.3 Patient Demographic

**TABLE 4-9
PATIENT DEMOGRAPHIC MODULE ATTRIBUTES**

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into Instance / MPPS	Note
Patients Birth Date	(0010,0030)	O	2 *	Yes/Yes	Requested in the MWL queries. If absent or empty in answer, the SPS is accepted. Attribute is copied to image within Patients Birth Date (0010,0030).

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Patient's Sex	(0010,0040)	O	2 *	Yes/Yes	Requested in the MWL queries. If absent or empty in answer, the SPS is accepted. Attribute is copied to image within Patient's Sex (0010,0040).
Patient's Weight	(0010,1030)	O	2	No/No	Requested in the MWL queries. If absent or empty in answer, SPS is accepted.
Confidentiality constraint on patient data	(0040,3001)	O	2	No/No	Requested in the MWL queries. If absent or empty in answer, SPS is accepted.
Patient's Address	(0010,1040)	O	3	No/No	Not requested.
Patient's Age	(0010,1010)	O	3	No/No	Not requested.
Occupation	(0010,2180)	O	3	No/No	Not requested.
Patient's Birth Time	(0010,0032)	O	3	No/No	Not requested.
Patient's Insurance Plan Code Sequence	(0010,0050)	O	3	No/No	Not requested.
Patient's Primary Language Code Sequence	(0010,0101)	O	3	No/No	Not requested.
Military Rank	(0010,1080)	O	3	No/No	Not requested.
Branch of Service	(0010,1081)	O	3	No/No	Not requested.
Country of Residence	(0010,2150)	O	3	No/No	Not requested.
Region of Residence	(0010,2152)	O	3	No/No	Not requested.
Patient's Telephone Numbers	(0010,2154)	O	3	No/No	Not requested.
Ethnic Group	(0010,2160)	O	3	No/No	Not requested.
Patient's Religious Preference	(0010,21F0)	O	3	No/No	Not requested.

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

4.4.5.4 Patient Medical

No data elements are requested.

4.4.5.5 Extended Elements

**TABLE 4-10
EXTENDED ELEMENTS MODULE ATTRIBUTES**

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into Instance	Note
Implant Breast Present	(0028,1300)	O	3	Yes	

5. MODALITY PERFORMED PROCEDURE STEP IMPLEMENTATION

5.1 INTRODUCTION

This section specifies the use of the DICOM Modality Performed Procedure Step information to be communicated to the Hospital/Radiology information system.

This feature works in conjunction with DICOM Modality Worklist feature, if installed. However the conformance of this feature is independent of Modality Worklist feature. For information on conformance of Modality Worklist feature to DICOM standard please refer to the appropriate section in this document.

5.2 RELATIONSHIP BETWEEN SCHEDULED AND PERFORMED PROCEDURE STEPS

Senographe Crystal Nova Acquisition Workstation supports a one-to-one relationship, a one-to-multiple relationship (aka Append Case or Post-processing), a zero-to-one relationship (aka Unscheduled Case or Acquisition without MWL Data) between Scheduled Procedure Step and PPS.

5.3 MODALITY PERFORMED PROCEDURE STEP MODULE TABLE

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

TABLE 5-1
MODALITY PERFORMED PROCEDURE STEP MODULES

Module Name	Reference
SOP Common	5.4.1
Performed Procedure Step Relationship	5.4.2
Performed Procedure Step Information	5.4.3
Image Acquisition Results	5.4.4
Radiation Dose	5.4.5
Billing and Material Management Codes	5.4.6

5.4 MODALITY PERFORMED PROCEDURE STEP MODULE DEFINITIONS

Please refer to DICOM Standard PS 3.3. (Information Object Definitions) for a description of each of the attributes contained within the Modality Performed Procedure Step Information Object Definition.

5.4.1 SOP Common Module

TABLE 5-2
SOP COMMON MODULE ATTRIBUTES

Attribute Name	Tag	Type for SCU N-CREATE	Type for SCU N-SET	Use
Specific Character Set	(0008,0005)	1C	1C	Set to "ISO_IR_100".

5.4.2 Performed Procedure Step Relationship Module

**TABLE 5-3
PERFORMED PROCEDURE STEP RELATIONSHIP MODULE ATTRIBUTES**

Attribute Name	Tag	Type for SCU - N-CREATE	
		Acquisition without MWL Entry	Acquisition with MWL Entry
Scheduled Step Attributes Sequence	(0040,0270)	1, Only one item.	1,
>Study Instance UID	(0020,000D)	1, Created by the modality.	1, Same as SPS if present. Otherwise generated by the modality.
>Referenced Study Sequence	(0008,1110)	2, Sent empty.	2, Same as SPS if present the sequence is complete. (0008,1150) and (0008,1155) shall be present, else sent empty. Only 1 item.
>>Referenced SOP Class UID	(0008,1150)	1, Not sent	1, Same as SPS if present. Otherwise not sent.
>>Referenced SOP Instance UID	(0008,1155)	1, Not sent	1, Same as SPS if present. Otherwise not sent.
>Accession Number	(0008,0050)	2, Sent the value entered by the user on the modality. Otherwise sent empty.	2, Same as SPS if present. Otherwise sent empty.
>Requested Procedure ID	(0040,1001)	2, Present and empty.	2, Same as SPS if present. Otherwise sent empty.
>Requested Procedure Code Sequence	(0032,1064)	3, Not sent.	2, Same as SPS if present. Otherwise sent empty.
>>Code Value	(0008,0100)	1, Not sent.	2, Same as SPS if present. Otherwise sent empty.
>>Coding Scheme Designator	(0008,0102)	1, Not sent.	2, Same as SPS if present. Otherwise sent empty.
>>Code Meaning	(0008,0104)	1, Not sent.	2, Same as SPS if present. Otherwise sent empty.
>Requested Procedure Description	(0032,1060)	2, Sent empty.	2, Same as SPS if present. Otherwise sent empty.
>Scheduled Procedure Step ID	(0040,0009)	2, Sent empty.	2, Same as SPS if present. Otherwise sent empty.
>Scheduled Procedure Step Description	(0040,0007)	2, Sent empty.	2, Same as SPS if present. Otherwise sent empty.
>Scheduled Protocol Code Sequence	(0040,0008)	2, Sent empty.	2, Same as SPS if present. Otherwise sent empty.
>>Code Value	(0008,0100)	1, Not sent.	1, Same as SPS
>>Coding Scheme Designator	(0008,0102)	1, Not sent.	1, Same as SPS
>>Code Meaning	(0008,0104)	3, Not sent.	1, Same as SPS

Patient's Name	(0010,0010)	2, Sent the value entered by the user on the modality.	2, Same as SPS if present.
Patient ID	(0010,0020)	2, Sent the value entered by the user on the modality.	2, Same as SPS if present.
Patient's Birth Date	(0010,0030)	2, Sent the value entered by the user on the modality. Otherwise sent empty.	2, Same as SPS if present. Otherwise sent empty.
Patient's Sex	(0010,0040)	2, Sent the value entered by the user on the modality.	2, Same as SPS if present. Otherwise sent "F".
Referenced Patient Sequence	(0008,1120)	2, Sent empty.	2, Sent empty.

5.4.3 Performed Procedure Step Information Module

**TABLE 5-4
PERFORMED PROCEDURE STEP INFORMATION MODULE ATTRIBUTES**

Attribute Name	Tag	Type for SCU N-CREATE	Type for SCU N-SET	Use
Performed Procedure Step ID	(0040,0253)	1	-	Set unique string generated by the modality.
Performed Station AE Title	(0040,0241)	1	-	Local system's SCU AE Title.
Performed Station Name	(0040,0242)	2	-	Local system's institution name.
Performed Location	(0040,0243)	2	-	Sent empty.
Performed Procedure Step Start Date	(0040,0244)	1	-	Same as date of first image.
Performed Procedure Step Start Time	(0040,0245)	1	-	Same as time of first image.
Performed Procedure Step Status	(0040,0252)	1	3	N-CREATE: Set to IN PROGRESS. N-SET: Set to COMPLETED or DISCONTINUED according to user selection when closing study.
Performed Procedure Step Description	(0040,0254)	2	3	Same as Study Description.
Performed Procedure Type Description	(0040,0255)	2	3	N-CREATE: Sent empty. N-SET: Not sent
Procedure Code Sequence	(0008,1032)	2	3	Copied from (0032, 1064) when present in the MWL.
>Code Value	(0008,0100)	1	1	Copied from code value in (0032, 1064) if present, else absent.
>Coding Scheme Designator	(0008,0102)	1	1	Copied from code value in (0032,1064) if present, else absent.
>Code Meaning	(0008,0104)	3	3	Copied from code value in (0032, 1064) if present, else absent.

Performed Procedure Step End Date	(0040,0250)	2	3	N-CREATE: Not sent. N-Set: Date when user chooses Complete or Discontinue action.
Performed Procedure Step End Time	(0040,0251)	2	3	N-CREATE: Not sent. N-Set: Time when user chooses Complete or Discontinue action.

5.4.4 Image Acquisition Results Module

**TABLE 5-5
IMAGE ACQUISITION RESULTS MODULE ATTRIBUTES**

Attribute Name	Tag	Type for SCU N-CREATE	Type for SCU N-SET	Use
Modality	(0008,0060)	1	-	Sent the value, MG.
Study ID	(0020,0010)	2	-	Same as SPS if present, otherwise unique string generated by the modality. Copied from image.
Performed Protocol Code Sequence	(0040,0260)	2	3	Configured procedure code sequence acquired during exam.
>Code Value	(0008,0100)	1	1	Code acquired during exam.
>Coding Scheme Designator	(0008,0102)	1	1	Copied from value in (0049,0008) if present.
>Code Meaning	(0008,0104)	3	3	Meaning acquired during exam.
Performed Series Sequence	(0040,0340)	2	3	N-CREATE: Sent empty. N-SET: Contains as many items as corresponding DICOM series acquired during study.
>Performing Physician's Name	(0008,1050)	2	2	N-CREATE: Not sent. N-SET: Same as SPS, filled in by user or empty.
>Protocol Name	(0018,1030)	1	1	N-CREATE: Not sent. N-SET: Sent to "ROUTINE".
>Operator's Name	(0008,1070)	2	2	N-CREATE: Not sent. N-SET: Sent the names of user who acquired the images in the series.
>Series Instance UID	(0020,000E)	1	1	N-CREATE: Not sent. N-SET: Sent Series Instance UID of the referenced series.
>Series Description	(0008,103E)	2	2	N-CREATE: Not sent . N-SET: Sent Series Description of the referenced series.
>Retrieve AE Title	(0008,0054)	2	2	N-CREATE: Not sent. N-SET: Sent empty.
>Referenced Image Sequence	(0008,1140)	2	2	N-CREATE: Not sent. N-SET: Contains as many items as images in corresponding series. Each item contains a SOP Class UID / SOP.

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>>Referenced SOP Class UID	(0008,1150)	1	1	N-CREATE: Not sent. N-SET: SOP Class UID of the created image.
>>Referenced SOP Instance UID	(0008,1155)	1	1	N-CREATE: Not sent. N-SET: SOP Instance UID of the created image.
>Referenced Non-Image Composite SOP Instance Sequence	(0040,0220)	2	2	N-CREATE: Not sent. N-SET: Sent empty.

5.4.5 Radiation Dose Module

**TABLE 5-6
RADIATION DOSE MODULE ATTRIBUTES**

Attribute Name	Tag	Type for SCU N-CREATE	Type for SCU N-SET	Use
Total Number of Exposures	(0040,0301)	3	3	N-CREATE: Not sent. N-SET: Set the number of exposures.
Entrance Dose in mGy	(0040,8302)	3	3	N-CREATE: Not sent. N-SET: Set the sum of the “Organ Dose” for images. Copied from image.

5.4.6 Billing and Material Management Codes Module

This module is not used.

5.5 STANDARD EXTENDED AND PRIVATE DATA ATTRIBUTES

None.

5.6 STANDARD EXTENDED AND PRIVATE CONTEXT GROUPS

None.

6. STORAGE COMMITMENT PUSH MODEL IMPLEMENTATION

6.1 STORAGE COMMITMENT PUSH MODEL INFORMATION OBJECT DEFINITION

Please refer to DICOM Part 3 (Information Object Definitions) for a description of each of the attributes contained within the Storage Commitment Information Object.

The Storage Commitment Information Object is used both for N-ACTION Storage Commitment Requests by the SCU and N-EVENT-REPORT Storage Commitment Notifications by the SCP.

6.1.1 STORAGE COMMITMENT MODULE FOR N-ACTION

TABLE 6-1
 STORAGE COMMITMENT MODULE FOR N-ACTION

Attribute Name	Tag	SCU Use
Transaction UID	(0008,1195)	Set unique string generated by the modality.
Storage Media File-Set ID	(0088,0130)	Not used
Storage Media File-Set UID	(0088,0140)	Not used
Referenced SOP Sequence	(0008,1199)	Sent one item.
>Referenced SOP Class UID	(0008,1150)	SOP Class UID corresponding to image for which storage commit is requested.
>Referenced SOP Instance UID	(0008,1155)	SOP Instance UID corresponding to image for which storage commit is requested.
>Storage Media File-Set ID	(0088,0130)	Not used
>Storage Media File-Set UID	(0088,0140)	Not used

6.1.2 STORAGE COMMITMENT MODULE FOR N-EVENT-REPORT

TABLE 6-2
 STORAGE COMMITMENT MODULE FOR N-EVENT-REPORT

Attribute Name	Tag	SCU Use
Transaction UID	(0008,1195)	Value received from SCP.
Retrieve AE Title	(0008,0054)	Not used
Storage Media File-Set ID	(0088,0130)	Not used
Storage Media File-Set UID	(0088,0140)	Not used
Referenced SOP Sequence	(0008,1199)	The Archived indicator is updated to the Success icon
>Referenced SOP Class UID	(0008,1150)	SOP Class UID corresponding to image for which storage commit is requested.
>Referenced SOP Instance UID	(0008,1155)	SOP Instance UID corresponding to image for which storage commit is requested.
>Retrieve AE Title	(0008,0054)	Not used

>Storage Media File-Set ID	(0088,0130)	Not used
>Storage Media File-Set UID	(0088,0140)	Not used
Failed SOP Sequence	(0008,1198)	The Archived indicator is updated to the Failure icon.
>Referenced SOP Class UID	(0008,1150)	SOP Class UID corresponding to image for which storage commit is requested.
>Referenced SOP Instance UID	(0008,1155)	SOP Instance UID corresponding to image for which storage commit is requested.
>Failure Reason	(0008,1197)	See Section 6.1.2.1 for the list of processed values.

6.1.2.1 Processing of Failure Reason when received in a N-Event-Report

When receiving a N-Event-Report request with a Event Type ID equal to 2, meaning that Storage Commitment is complete, but failure exists, following is the set of value that this Storage Commitment SCU AE is able to process:

Failure Reason	Meaning	Application Behavior When Receiving Reason Code
0110H	Processing failure	Log file updated, Processing Failure.
0112H	No such object instance	Log file updated, No such object instance.
0213H	Resource limitation	Log file updated, Resource limitation.
0122H	Referenced SOP Class not supported	Log file updated, Referenced SOP Class not supported.
0119H	Class / Instance conflict	Log file updated, Class / Instance conflict.
0131H	Duplicate transaction UID	Log file updated, Duplicate transaction UID.
*	Other Failure Reason code values	Log file updated, Unknown Failure.

7. BASIC DIRECTORY INFORMATION OBJECT IMPLEMENTATION

7.1 IOD MODULE TABLE

Table 7-1 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 7-1
BASIC DIRECTORY IOD MODULES**

Entity Name	Module Name	Reference
File Set Identification	File Set Identification	7.2.1
Directory Information	Directory Information	7.2.2

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

7.2 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.

7.2.1 File Set identification Module

**TABLE 7-2
FILE-SET IDENTIFICATION MODULE**

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

7.2.2 Directory Information Module

**TABLE 7-3
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. 0000H: no known inconsistencies
Directory Record Sequence	(0004,1220)	2	
>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 Directory Entity.
>Record In-use Flag	(0004,1410)	1C	The value is created as FFFFH.
>Offset of Referenced Lower-Level Directory Entity	(0004,1420)	1C	The value is set by application.

>Directory Record Type	(0004,1430)	1C	Enumerated Values are created: 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 7.2.3

7.2.3 Definition of Specific Directory Records

7.2.3.1 Patient Directory Record Definition

**TABLE 7-4
PATIENT KEYS**

Key	Tag	Type	Attribute Description
Specific Character Set	(0008,0005)	1C	The value is created as ISO_IR 100.
Patient's Name	(0010,0010)	2	The value is taken from the attribute of the Patient Entity.
Patient ID	(0010,0020)	1	The value is taken from the attribute of the Patient Entity.
Patient's Birth Date	(0010,0030)	2	The value is taken from the attribute of the Patient Entity.
Patient's Sex	(0010,0040)	2	The value is taken from the attribute of the Patient Entity.

7.2.3.2 Study Directory Record Definition

**TABLE 7-5
STUDY KEYS**

Key	Tag	Type	Attribute Description
Specific Character Set	(0008,0005)	1C	The value is created as ISO_IR 100.
Study Date	(0008,0020)	1	The value is taken from the attribute of the Study Entity.
Study Time	(0008,0030)	1	The value is taken from the attribute of the Study Entity.
Study Description	(0008,1030)	2	The value is taken from the attribute of the Study Entity.

Study Instance UID	(0020,000D)	1C	The value is taken from the attribute of the Study Entity.
Study ID	(0020,0010)	1	The value is taken from the attribute of the Study Entity.
Accession Number	(0008,0050)	2	The value is taken from the attribute of the Study Entity.

7.2.3.3 Series Directory Record Definition

**TABLE 7-6
SERIES KEYS**

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

7.2.3.4 Image Directory Record Definition

**TABLE 7-7
IMAGE KEYS**

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

8. PRINT MANAGEMENT IMPLEMENTATION

8.1 INTRODUCTION

This section of the DICOM Conformance Statement specifies the implementation for the specific SOP Classes supported in the Basic Grayscale Print Management Meta SOP Class, the attributes supported for both IODs and services, and the valid range of values for mandatory and optional attributes.

8.2 BASIC FILM SESSION SOP CLASS

8.2.1 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, it is integers from 1 to 99.
Print Priority	(2000,0020)	The value is set to MED.
Medium Type	(2000,0030)	The value is set depending on configurations of declared remote host by service engineer. Enumerated Values: PAPER, CLEAR FILM, BLUE FILM MAMMO CLEAR FILM, MAMMO BLUE FILM
Film Destination	(2000,0040)	The value is set depending on configurations of declared remote host by service engineer. Enumerated values: MAGAZINE PROCESSOR BIN_i
Film Session Label	(2000,0050)	Empty.
Memory Allocation	(2000,0060)	Not used.
Owner ID	(2100,0160)	Empty.

8.2.2 Basic Film Session N-Delete

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

8.3 BASIC FILM BOX SOP CLASS

8.3.1 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 selected by a user. Enumerated Value: STANDARD\ Column, Row Column, Row are set to integer for the layout and are validated from 1 to 2.
Referenced Film Session Sequence	(2010,0500)	
>Referenced SOP Class UID	(0008,1150)	The value is set to 1.2.840.10008.5.1.1.1.
>Referenced SOP Instance UID	(0008,1155)	The value is set to Film session SOP instance UID.
Referenced Image Box Sequence	(2010,0510)	
>Referenced SOP Class UID	(0008,1150)	The value is set to 1.2.840.10008.5.1.1.4.
>Referenced SOP Instance UID	(0008,1155)	The value is set to Image Box SOP instance UID.
Referenced Basic Annotation Box Sequence	(2010,0520)	Not supported.
Film Orientation	(2010,0040)	The value is selected by a user. Enumerated Value: PORTRAIT LANDSCAPE
Film Size ID	(2010,0050)	The value is selected by a user. Enumerated Values: 8INX10IN 10INX12IN 10INX14IN 11INX14IN 14INX14IN 14INX17IN 24CMX24CM 24CMX30CM
Magnification Type	(2010,0060)	The value is set depending on configurations of declared remote host by service engineer. Interpolation type by which the printer magnifies the image in order to fit the image in the image box on film. Enumerated Values: REPLICATE BILINEAR CUBIC NONE
Max Density	(2010,0130)	The value is set depending on configurations of declared remote host by service engineer.
Configuration Information	(2010,0150)	Empty.

Referenced Presentation LUT Sequence	(2050,0500)	Not supported.
Annotation Display Format ID	(2010,0030)	Not supported.
Smoothing Type	(2010,0080)	Empty.
Border Density	(2010,0100)	The value is set depending on configurations of declared remote host by service engineer. Enumerated Value: BLACK WHITE Empty
Empty Image Density	(2010,0110)	The value is set depending on configurations of declared remote host by service engineer. Enumerated Value: BLACK WHITE Empty
Min Density	(2010,0120)	The value is set depending on configurations of declared remote host by service engineer.
Trim	(2010,0140)	The value is set depending on configurations of declared remote host by service engineer. Enumerated Value: YES NO
Illumination	(2010,015E)	Not supported.
Reflected Ambient Light	(2010,0160)	Not supported.
Requested Resolution ID	(2020,0050)	The value is set depending on configurations of declared remote host by service engineer. Enumerated Value: STANDARD HIGH
ICC Profile	(0028,2000)	Not supported.

8.3.2 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)	Ignored.
		>Referenced SOP Class UID	(0008,1150)	Ignored.
		>Referenced SOP Instance UID	(0008,1155)	Ignored.

	>Print Job ID	(2100,0010)	Not supported.
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8.3.3 Basic Film Box N-Delete

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

8.4 BASIC GRAYSCALE IMAGE BOX SOP CLASS

8.4.1 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)	Not used.
Polarity	(2020,0020)	Not used.
Magnification Type	(2010,0060)	Not used.
Smoothing Type	(2010,0080)	Not used.
Min Density	(2010,0120)	Not used.
Max Density	(2010,0130)	Not used.
Configuration Information	(2010,0150)	Not used.
Requested Image Size	(2020,0030)	Not used.
Requested Decimate/Crop Behavior	(2020,0040)	Not used.
Referenced Presentation LUT Sequence	(2050,0500)	Not used.

9. DIGITAL MAMMOGRAPHY X-RAY INFORMATION OBJECT IMPLEMENTATION

9.1 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.

9.2 SENOGAPHE CRYSTAL NOVA ACQUISITION WORKSTATION MAPPING OF DICOM ENTITIES

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

**TABLE 9-1
MAPPING OF DICOM ENTITIES TO SENOGAPHE CRYSTAL NOVA ACQUISITION WORKSTATION ENTITIES**

DICOM IE	Senographe Crystal Nova Acquisition Workstation Entity
Patient	Patient
Study	Study
Series	Series
Image	Image

9.3 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 9.5.

**TABLE 9-2
MG IMAGE IOD MODULES**

Entity Name	Module Name	Usage	Reference
Patient	Patient	Used	9.4.1.1
Study	General Study	Used	9.4.2.1
	Patient Study	Used	9.4.2.2
Series	General Series	Used	9.4.3.1
	DX Series	Used	9.4.3.2
	Mammography Series	Used	9.4.3.3
Equipment	General Equipment	Used	9.4.4.1
Image	General Image	Used	9.4.5.1
	Image Pixel	Used	9.4.5.2
	DX Anatomy Imaged	Used	9.4.5.3
	DX Image	Used	9.4.5.4
	DX Detector	Used	9.4.5.5

X-Ray Collimator	Used	9.4.5.6
DX Positioning	Used	9.4.5.7
X-Ray Acquisition Dose	Used	9.4.5.8
X-Ray Generation	Used	9.4.5.9
X-Ray Filtration	Used	9.4.5.10
Mammography Image	Used	9.4.5.11
VOI LUT	Used Required if Presentation Intent Type (0008,0068) is FOR PRESENTATION	9.4.5.12
Acquisition Context	Used	9.4.5.13
SOP Common	Used	9.4.5.14

9.4 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.

9.4.1 Patient Entity Modules

9.4.1.1 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 9-3
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	The value is loaded from HIS/RIS.
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

9.4.2 Study Entity Modules

9.4.2.1 General Study Module

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

**TABLE 9-4
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 or is entered/updated by the user using the Manual Entry as the name of the referring physician.
Referring Physician Identification Sequence	(0008,0096)	3	Not used
Study ID	(0020,0010)	2	The value is loaded from HIS/RIS, using information in Requested Procedure ID (0040, 1001).
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 loaded from HIS/RIS using information in Procedure description attribute (0032, 1060), or is entered by the user using the Manual Entry as the Study Description.
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	The value is loaded from HIS/RIS or attribute is not sent otherwise.
> Referenced SOP Class UID	(0008,1150)	1	The value is loaded from HIS/RIS or attribute is not sent otherwise.
> Referenced SOP Class Instance UID	(0008,1155)	1	The value is loaded from HIS/RIS or attribute is not sent otherwise.
Procedure Code Sequence	(0008,1032)	3	The value is loaded from HIS/RIS or attribute is not sent otherwise.
> Code Value	(0008,0100)	1C	The value is loaded from HIS/RIS or attribute is not sent otherwise. If missing in sequence, copied with code

			meaning.
> Coding Scheme Designator	(0008,0102)	1C	The value is loaded from HIS/RIS or attribute is not sent otherwise. If missing in sequence, copied with 99LOCAL.
>Code Meaning	(0008,0104)	1	The value is loaded from HIS/RIS or attribute is not sent otherwise.

9.4.2.2 Patient Study Module

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

**TABLE 9-5
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 provided.
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
Service Episode ID	(0038,0060)	3	Not used
Service Episode Description	(0038,0062)	3	Not used
Patient's Sex Neutered	(0010,2203)	2C	Not used

9.4.3 Series Entity Modules

9.4.3.1 General Series Module

**TABLE 9-6
GENERAL SERIES MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	1	The value is set to MG. 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.

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Laterality	(0020,0060)	2C	Not used
Series Date	(0008,0021)	3	The value is set by the system as the today's date when generating a new Series.
Series Time	(0008,0031)	3	The value is set by the system as current time when generating a new Series.
Performing Physicians' Name	(0008,1050)	3	The value is loaded from HIS/RIS, using information in Scheduled Performing Physician's Name (0040, 0006) or is entered/updated by the user using the Manual Entry.
Performing Physician Identification Sequence	(0008,1052)	3	Not used
Protocol Name	(0018,1030)	3	Not used
Series Description	(0008,103E)	3	The value is set by the system as following: <ImageType>_<Series Number> <ImageType> = RAW/PROC
Operators' Name	(0008,1070)	3	The value is set to user's name of log-in.
Operator Identification Sequence	(0008,1072)	3	Not used
Referenced Performed Procedure Step Sequence	(0008,1111)	3	The Sequence shall have one Item. The value is set to the uniquely identifies of Performed Procedure Step SOP Instance to which the Series is related.
> Referenced SOP Class UID	(0008,1150)	1	The value is set to 1.2.840.10008.3.1.2.3.3.
> Referenced SOP Instance UID	(0008,1155)	1	MPPS SOP instance UID generated by the system at acquisition.
Related Series Sequence	(0008,1250)	3	The Sequence shall have one Item. The value is set to the uniquely identifies of related Series.
>Study Instance UID	(0020,000D)	1	The value is set to Study Instance UID of related Series.
>Series Instance UID	(0020,000E)	1	The value is set to Series Instance UID of related Series.
>Purpose of Reference Code Sequence	(0040,A170)	2	
>>Code Value	(0008,0100)	1C	The value is set to "122400"
>>Coding Scheme Designator	(0008,0102)	1C	The value is set to "DCM"
>>Code Meaning	(0008,0104)	1	The value is set to "Simultaneously Acquired"
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	Sequence that contains attributes from the Imaging Service Request. The sequence may have one or more Items. This information is present only if retrieved from HIS/RIS.

> Requested Procedure ID	(0040,1001)	1C	Identifier that identifies the Requested Procedure in the Imaging Service Request. This information is present only if retrieved from HIS/RIS.
> Requested Procedure Description	(0032,1060)	3	This information is present only if retrieved from HIS/RIS.
> Scheduled Procedure Step ID	(0040,0009)	1C	Identifier that identifies the Scheduled Procedure Step. This information is present only if retrieved from HIS/RIS.
> Scheduled Procedure Step Description	(0040,0007)	3	Institution-generated description or classification of the Scheduled Procedure Step to be performed. This information is present only if retrieved from HIS/RIS.
> Scheduled Protocol code sequence	(0040,0008)	3	Sequence describing the Scheduled Protocol following a specific coding scheme. This sequence contains one or more Items and is present only if retrieved from HIS/RIS.
>> Code Value	(0008,0100)	1C	This information is present only if retrieved from HIS/RIS.
>> Coding Scheme Designator	(0008,0102)	1C	This information is present only if retrieved from HIS/RIS. If missing in the sequence, will have the code 99LOCAL.
>> Code Meaning	(0008,0104)	1	This information is present only if retrieved from HIS/RIS.
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 set to "Mammography".
Performed Protocol Code Sequence	(0040,0260)	3	Not used
>Code Value	(0008,0100)	1C	Not used
>Coding Scheme Designator	(0008,0102)	1C	Not used
>Coding Scheme Version	(0008,0103)	1C	Not used
>Code Meaning	(0008,0104)	1	Not used
Comments on the Performed Procedure Step	(0040,0280)	3	Not used

9.4.3.2 DX Series Module

**TABLE 9-7
DX SERIES MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	1	See 9.4.3.1.
Referenced Performed Procedure step Sequence	(0008,1111)	1C	See 9.4.3.1.
> Referenced SOP Class UID	(0008,1150)	1	See 9.4.3.1.
> Referenced SOP Instance UID	(0008,1155)	1	See 9.4.3.1.
Presentation Item Type	(0008,0068)	1	Specify which Enumerated Values are sent:

		FOR PRESENTATION FOR PROCESSING
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9.4.3.3 Mammography Series Module

**TABLE 9-8
MAMMOGRAPHY SERIES MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	1	See 9.4.3.1.
Request Attributes Sequence	(0040,0275)	3	See 9.4.3.1.
> Requested Procedure ID	(0040,1001)	1C	See 9.4.3.1.
> Requested Procedure Description	(0032,1060)	3	See 9.4.3.1.
> Scheduled Procedure Step ID	(0040,0009)	1C	See 9.4.3.1.
> Scheduled Procedure Step Description	(0040,0007)	3	See 9.4.3.1.
> Scheduled Protocol Code Sequence	(0040,0008)	3	See 9.4.3.1.
>> Code Value	(0008,0100)	1C	See 9.4.3.1.
>> Coding Scheme Designator	(0008,0102)	1C	See 9.4.3.1.
>> Code Meaning	(0008,0104)	1	See 9.4.3.1.

9.4.4 Equipment Entity Modules

9.4.4.1 General Equipment Module

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

**TABLE 9-9
GENERAL EQUIPMENT MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Manufacturer	(0008,0070)	2	The value is set to “GE HEALTHCARE”.
Institution Name	(0008,0080)	3	The value copied from system configuration.
Institution Address	(0008,0081)	3	The value copied from system configuration.
Station Name	(0008,1010)	3	The value copied from system configuration.
Institutional Department Name	(0008,1040)	3	The value copied from system configuration.
Manufacturer's Model Name	(0008,1090)	3	The values is set to “Senographe_Crystal”.
Device Serial Number	(0018,1000)	3	The value copied from system configuration.
Software Versions	(0018,1020)	3	The value is set to AWS software release version string.
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).
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9.4.5 Image Entity Modules

9.4.5.1 General Image Module

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

**TABLE 9-10
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 incrementing new acquired image in the series.
Patient Orientation	(0020,0020)	2C	The value is set to follow: Value1\Value2 Value1 is set to anatomical direction of the positive row axis(left to right). Value2 is set to positive column axis(Top to bottom). The value is set depends on the clinical view selected by the user. See 9.4.5.1.1.
Content Date	(0008,0023)	2C	The value is set by the system when building the image (= saving the DICOM file).
Content Time	(0008,0033)	2C	The value is set by the system when building the image (= saving the DICOM file)..
Image Type	(0008,0008)	3	The multiple values are set to follows: Value1\Value2\Value3 See 9.4.5.1.2.
Acquisition Number	(0020,0012)	3	Not used.
Acquisition Date	(0008,0022)	3	The value is set by the system when image is acquired.
Acquisition Time	(0008,0032)	3	The value is set by the system when image is acquired.
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 SOP Class UID	(0008,1150)	1C	The value is set to the 1.2.840.10008.5.1.4.1.1.2.1, For Processing SOP class.
> Referenced SOP Instance UID	(0008,1155)	1C	The value is set to SOP Instance UID of For Processing image that was used to generate the related composite For Presentation.
> Spatial Location Preserved	(0028,135A)	3	The value is set to "YES".

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 set in accordance with acquisition mode: Clinical Acquisition mode : No QAP, Service Acquisition mode : Yes
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 follows. Enumerated Values: IDENTITY is used if Photometric Interpretation (0028,0004) is MONOCHROME2. INVERSE is used if Photometric Interpretation (0028,0004) is MONOCHROME1.

9.4.5.1.1 Patient Orientation

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

**TABLE 9-11
PATIENT ORIENTATION OF CLINICAL VIEW**

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

9.4.5.1.2 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, for all For Processing images
 - DERIVED identifies an Derived Image, for all For Presentation images
- 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)

9.4.5.2 Image Pixel Module

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

**TABLE 9-12
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 2850 in largest FOV images. The value is set to 2340 in smallest FOV images.
Columns	(0028,0011)	1	Depending of Field of View, The value is set to 2394 in largest FOV images. The value is set to 2340 in smallest FOV 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	The value is set to 13 for Processing images. The value is set to 11 for Presentation images.
Pixel Representation	(0028,0103)	1	The value is set to 0000H.
Pixel Data	(7FE0,0010)	1	The value is set to the actual image pixel data.
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 image processing for Presentation images.

9.4.5.3 DX Anatomy Imaged Module

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

**TABLE 9-13
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 clinical view. Supported values: R = right L = left B = both
Anatomic Region Sequence	(0008,2218)	2	The value is set to anatomic region sequence.
> <i>Code Value</i>	(0008,0100)	1C	The value is set to code, T-04000.
> <i>Coding Scheme Designator</i>	(0008,0102)	1C	The value is set SRT.
> <i>Code meaning</i>	(0008,0104)	1	The value is set to Breast
> Anatomic Region Modifier Sequence	(0008,2220)	3	Not used.
Primary Anatomic Structure Sequence	(0008,2228)	3	Not used.

9.4.5.4 DX Image Module

This Section specifies the Attributes that describe the DX image.

**TABLE 9-14
DX IMAGE MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Image Type	(0008,0008)	1	Described in General Image Module. See 9.4.5.1.
Samples per Pixel	(0028,0002)	1	Described in Image Pixel Module. See 4.4.5.2.
Photometric Interpretation	(0028,0004)	1	Described in Image Pixel Module. See 4.4.5.2.
Bits Allocated	(0028,0100)	1	Described in Image Pixel Module. See 4.4.5.2.

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Bits Stored	(0028,0101)	1	Described in Image Pixel Module. See 4.4.5.2.
High Bit	(0028,0102)	1	Described in Image Pixel Module. See 4.4.5.2.
Pixel Representation	(0028,0103)	1	Described in Image Pixel Module. See 4.4.5.2.
Pixel Intensity Relationship	(0028,1040)	1	The value is set to LIN for Processing images. The value is set to LOG for Presentation images. Enumerated Values: LIN means that Linearly proportional to X-Ray beam intensity LOG means that Logarithmically proportional to Xray beam intensity
Pixel Intensity Relationship Sign	(0028,1041)	1	The value is set to 1 for Processing images. The value is set to -1 for Presentation images. Enumerated Values: 1 means that lower pixel values correspond to less X-Ray beam intensity. -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 INVERSE for Processing images. The value is set to IDENTITY for Presentation images. 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	Described in General Image Module.
Lossy Image Compression Ratio	(0028,2112)	1C	Not required. 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. The value is set to one type of Image processing for Presentation images. Image Processing Type : eContrast_Light,

			eContrast_Medium, eContrast_Intense, eContrast_Implant
Acquisition Device Processing Code	(0018,1401)	3	The value is set to version of Image Processing.
Patient Orientation	(0020,0020)	1C	Described in General Image Module. See 9.4.5.1.
Calibration Image	(0050,0004)	3	Not used.
Burned In Annotation	(0028,0301)	1	Described in General Image Module. See 9.4.5.1.
VOI LUT Sequence	(0028,3010)	1C	Only the image for Presentation images exists. See 9.4.5.12.
Window Center	(0028,1050)	1C	Only the image for Presentation images exists. See 9.4.5.12.
Window Width	(0028,1051)	1C	Only the image for Presentation images exists. See 9.4.5.12.
Window Center & Width Explanation	(0028,1055)	3	Only the image for Presentation images exists. See 9.4.5.12.

9.4.5.5 DX Detector Module

This Section specifies the Attributes that describe the DX detector.

**TABLE 9-15
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	The serial number of the detector used to acquire this image.
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	The value is set to follows: row offset\column offset
Field of View Rotation	(0018,7032)	1C	The value is set to 0 ° or 180°.
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 0.1\0.1
Pixel Spacing	(0028,0030)	1C	Not requested.
Pixel Spacing Calibration Type	(0028,0A02)	3	Not used.
Pixel Spacing Calibration Description	(0028,0A04)	1C	Not requested.
Cassette ID	(0018,1007)	3	Not used.
Plate ID	(0018,1004)	3	Not used.

9.4.5.6 X-Ray Collimator Module

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

**TABLE 9-16
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 type and position of Collimation Plate.
Collimator Right Vertical Edge	(0018,1704)	1C	The value is set according to type and position of Collimation Plate.
Collimator Upper Horizontal Edge	(0018,1706)	1C	The value is set according to type and position of Collimation Plate.
Collimator Lower Horizontal Edge	(0018,1708)	1C	The value is set according to type and position of Collimation Plate.
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.

9.4.5.7 DX Positioning Module

**TABLE 9-17
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 9.6.
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 9.6.
>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 9.6.
>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 9.4.3.3.
>> 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 9.4.3.3.
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 Factor	(0018,1114)	3	The value is set to around 1 or 1.5 or 1.8 in accordance with magnification.
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.

9.4.5.8 X-Ray Acquisition Dose Module

**TABLE 9-18
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 μ A	(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 μ S	(0018,8150)	3	Not used.
Exposure	(0018,1152)	3	The value is set to the exposure expressed in mAs.
Exposure in μ As	(0018,1153)	3	The value is set to the exposure expressed in μ As.
Distance Source to Detector	(0018,1110)	3	Described in DX Positioning Module. See 9.4.5.7
Distance Source to Patient	(0018,1111)	3	Described in DX Positioning Module. See 9.4.5.7
Image and Fluoroscopy Area Dose Product	(0018,115E)	3	Not used.
Body Part Thickness	(0018,11A0)	3	Described in DX Positioning Module. See 9.4.5.7
Relative X-Ray Exposure	(0018,1405)	3	The value is set to Skin Dose in μ Gy received during 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.

9.4.5.9 X-Ray Generation Module

**TABLE 9-19
X-RAY GENERATION MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
KVP	(0018,0060)	3	Described in X-Ray Acquisition Dose Module. See 9.4.5.8
X-Ray Tube Current	(0018,1151)	3	Described in X-Ray Acquisition Dose Module. See 9.4.5.8
X-Ray Tube Current in μ A	(0018,8151)	3	Described in X-Ray Acquisition Dose Module. See 9.4.5.8
Exposure Time	(0018,1150)	3	Described in X-Ray Acquisition Dose Module. See 9.4.5.8
Exposure Time in μ S	(0018,8150)	3	Described in X-Ray Acquisition Dose Module. See 9.4.5.8
Exposure	(0018,1152)	3	Described in X-Ray Acquisition Dose Module. See 9.4.5.8
Exposure in μ As	(0018,1153)	3	Described in X-Ray Acquisition Dose Module. See 9.4.5.8
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

			<p>where xx, yy, aa and bb, are the coordinate and size of the AEC cell used for this image</p> <ul style="list-style-type: none"> - 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
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 0.1 or 0.3.
Anode Target Material	(0018,1191)	3	Described in X-Ray Acquisition Dose Module. See 9.4.5.8
Rectification Type	(0018,1156)	3	Not used.
Generator ID	(0018,1005)	3	Not used.

9.4.5.10 X-Ray Filtration Module

**TABLE 9-20
X-RAY FILTRATION MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Filter Type	(0018,1160)	3	Not used.
Filter Material	(0018,7050)	3	Described in X-Ray Acquisition Dose Module. See 9.4.5.8
Filter Thickness Minimum	(0018,7052)	3	Not used.
Filter Thickness Maximum	(0018,7054)	3	Not used.

9.4.5.11 Mammography Image Module

**TABLE 9-21
MAMMOGRAPHY IMAGE MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Image Type	(0008,0008)	1	Described in General Image Module. See 9.4.5.1.
Positioner Type	(0018,1508)	1	Described in DX Positioning Module. See 9.4.5.7
Distance Source to Detector	(0018,1110)	3	Described in DX Positioning Module. See 9.4.5.7

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Distance Source to Patient	(0018,1111)	3	Described in DX Positioning Module. See 9.4.5.7
Positioner Primary Angle	(0018,1510)	3	Described in DX Positioning Module. See 9.4.5.7
Positioner Secondary Angle	(0018,1511)	3	Described in DX Positioning Module. See 9.4.5.7
Image Laterality	(0020,0062)	1	Described in DX Anatomy Imaged Module. See 9.4.5.3
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	Described in DX Anatomy Imaged Module. See 9.4.5.3
Primary Anatomic Structure Sequence	(0008,2228)	3	Described in DX Anatomy Imaged Module. See 9.4.5.3
View Code Sequence	(0054,0220)	1	Described in DX Positioning Module. See 9.4.5.7
>Code Value	(0008,0100)	1	Described in DX Positioning Module. See 9.4.5.7
>Code Scheme Descriptor	(0008,0102)	1	Described in DX Positioning Module. See 9.4.5.7
>Code Meaning	(0008,0104)	1	Described in DX Positioning Module. See 9.4.5.7
>View Modifier Code Sequence	(0054,0222)	3	Described in DX Positioning Module. See 9.4.5.7
>> Code Value	(0008,0100)	1C	Described in DX Positioning Module. See 9.4.5.7
>> Code Scheme Descriptor	(0008,0102)	1C	Described in DX Positioning Module. See 9.4.5.7
>> Code Meaning	(0008,0104)	1C	Described in DX Positioning Module. See 9.4.5.7

**TABLE 9-22
VOI LUT MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
VOI LUT Sequence	(0028,3010)	1C	Only the image for presentation exists. 3 items or 4 items can be described in this sequence. The item's order is changed in accordance with selected type of windows.
>LUT Descriptor	(0028,3002)	1	The value is set to in accordance with selected type of Windowing.
>LUT Explanation	(0028,3003)	3	The following values are set one by one in each item. The order is changed in accordance with selected type of windows. Values: NORMAL HARDER SOFTER If windows is adjusted by user, this value is set as first. CUSTOM
>LUT Data	(0028,3006)	1	The value is set to the array having values of intensity in accordance with selected type of Windowing.
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
VOI LUT Function	(0028,1056)	3	Only the image for presentation exists. The value is set to LINEAR or SIGMOID in according to settings.

9.4.5.13 Acquisition Context Module

**TABLE 9-23
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.

9.4.5.14 SOP Common Module

**TABLE 9-24
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.

9.5 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.

9.5.1 Standard Attributes

Not applicable to this product.

9.5.2 Private Group GEMS_SENOCRYSTAL

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

**TABLE 9-25
PRIVATE GROUP GEMS_SENOCRYSTAL**

Attribute Name	Tag	VR	Type	Attribute Description and Use
Private Creator Identification	(0055,0010)	LO	3	Set to: PRivateTag
Clinical View	(0055,1000)	CS	3	The value describes the name of Clinical View to be displayed on image.
Exposure Dose	(0055,1001)	IS	3	The value describes the exposure dose. Unit: nGy Refer to Exposure Control Mode Description values section 9.4.5.9.
Radiological Thickness	(0055,1008)	DS	3	The value describes the breast radiological thickness for source image, and used as parameter for processing algorithm Unit: nm
IFF ROI X	(0055,1009)	IS	3	The value describes the x coordination of Image Feedback Function ROI.
IFF ROI Y	(0055,100A)	IS	3	The value describes the y coordination of Image Feedback Function ROI.
IFF ROI Width	(0055,100B)	IS	3	The value describes the width of Image Feedback Function ROI.
IFF ROI Height	(0055,100C)	IS	3	The value describes the height of Image Feedback Function ROI.
IFF ROI Average	(0055,100D)	IS	3	The value describes the average pixel value in Image Feedback Function cell on the pre-exposure shot.
Main ROI Average	(0055,100E)	IS	3	The value describes the average pixel value in main-exposure shot or manual shot.
Asymmetric Offset	(0055,1010)	IS	3	The value describes the vertical offset when moving images by the Asymmetric module.
Pixel Spacing For Computation	(0055,1012)	DS	3	The value describes the pixel spacing for measurement.
Breast ROI X	(0055,1013)	IS	3	Only the image for presentation exists.

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				The value describes the x coordinate of the left top for Breast ROI.
Breast ROI Y	(0055,1014)	IS	3	Only the image for presentation exists. The value describes the y coordinate of the left top for Breast ROI.
Breast ROI Width	(0055,1015)	IS	3	Only the image for presentation exists. The value describes the width for Breast ROI.
Breast ROI Height	(0055,1016)	IS	3	Only the image for presentation exists. The value describes the height for Breast ROI.
Magnification Factor	(0055,1017)	DS	3	The value describes that the factor of magnification. 1 – indicates Normal 1.5 – indicates 1.5 magnification 1.8 – indicates 1.8 magnification
Breast Type	(0055,1018)	IS	3	The value describes the type of breast. Enumerate Value: 0 – indicates Normal 1 – indicates Implant
Exposure Mode	(0055,1019)	IS	3	The value describes the type of Exposure Mode. Enumerate Value: 1 – AOP STD Plus 2 – AOP STD 3 – AOP DOSE Minus 4 – FAST Implant 5 – FAST STD 6 – Manual
AOP Pre Exposure Dose	(0055,101A)	IS	3	The value describes the AOP Pre Exposure Dose in Auto Mode. The value is set to -1 if the image acquired in Manual mode. Unit: nGy
AOP Breast Composition	(0055,101B)	DS	3	The value describes the AOP Breast Composition in Auto Mode. The value is set to -1 if the image acquired in Manual mode.
Paddle Type	(0055,101C)	IS	3	The value describes the type of paddle. Enumerate Value: 0 – indicates Standard 24x29 paddle 1 – indicates Magnification paddle (1.5x) 2 – indicates Magnification paddle (1.8x)

			3 – indicates Spot paddle 4 – indicates 2D Localization Sliding Perforated 18x24 paddle 5 – indicates Sliding 18x24 paddle 6 – indicates Sliding Small breast/Implant 10x24 paddle
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9.6 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.

9.6.1 Mammography View Codes

The following table list of View codes defined for Mammography.

**TABLE 9-26
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

9.6.2 Mammography View Modifier Codes

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

**TABLE 9-27
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

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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