

SecurView® DX 7.2 DICOM Conformance Statement

MAN-01944 Rev 001





SecurView® DX 7.2

DICOM Conformance Statement

MAN-01944 Rev 001



The Women's Health Company

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1. Overview

The Hologic SecurView DX workstation is used primarily to display and facilitate interpretation of digital mammography and other breast imaging procedures. The SecurView DX workstation implements the necessary DICOM services to receive images and related information from networked devices, query for images and related information from a networked storage device, retrieve images and related information from a networked storage device, store user created screen capture images to a networked storage device, and print to a networked hardcopy device.

Table 1-1 provides an overview of the network services supported by the SecurView DX workstation.

Table 1-1 – Network Services

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Transfer		
Computed Radiography Image Storage	No	Yes
Digital X-Ray Image Storage – For Presentation	No	Yes
Digital Mammography X-Ray Image Storage – For Presentation	No	Yes
Digital Mammography X-Ray Image Storage – For Processing	No	Yes
Secondary Capture Image Storage	Yes	Yes
Multi-frame Grayscale Byte Secondary Capture Image Storage	No	Yes
Multi-frame Grayscale Word Secondary Capture Image Storage	Option	Yes
Multi-frame True Color Secondary Capture Image Storage	No	Yes
Ultrasound Image Storage	No	Yes
Ultrasound Multi-frame Image Storage	No	Yes
Ultrasound Image Storage (Retired)	No	Yes
Ultrasound Multi-frame Image Storage (Retired)	No	Yes
MR Image Storage	No	Option
Enhanced MR Image Storage	No	Option
Positron Emission Tomography Image Storage	No	Option
CT Image Storage	No	Option
Enhanced CT Image Storage	No	Option
Nuclear Medicine Image Storage	No	Option
Mammography CAD SR	No	Yes
Grayscale Softcopy Presentation State Storage	Yes	Yes
Print Management		
Basic Grayscale Print Management Meta SOP Class: <i>includes Basic Film Session, Basic Film Box, Basic Grayscale Image Box, Printer</i>	Yes	No
Presentation LUT	Option	No
Query/Retrieve		
Study Root Query/Retrieve Information Model – FIND	Yes	No
Study Root Query/Retrieve Information Model – MOVE	Yes	No

1. Overview

Table 1-2 provides an overview of the Media Storage Application Profiles supported by the SecurView DX workstation.

Table 1-2 – Media Services

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

2. Table of Contents

1. Overview	1
2. Table of Contents	3
3. Introduction	5
3.1. Audience	5
3.2. Remarks	5
3.3. Definitions, Terms and Abbreviations	6
3.4. References	6
4. Networking	7
4.1. Implementation Model	7
4.1.1. Application Data Flow	7
4.1.2. Functional Definition of AEs	8
4.1.3. Sequencing of Real-World Activities	9
4.2. AE Specifications	11
4.2.1. SCU AE	11
4.2.2. SCP AE	25
4.3. Network Interfaces	29
4.3.1. Physical Network Interface	29
4.3.2. Additional Protocols	29
4.4. Configuration	29
4.4.1. AE Title/Presentation Address Mapping	29
4.4.2. Configuration Parameters	30
5. Media Interchange	32
5.1. Implementation Model	32
5.1.1. Application Data Flow Diagram	32
5.1.2. Functional Definition of AEs	32
5.1.3. Sequencing of Real-World Activities	32
5.1.4. File Meta Information for Implementation Class Version	32
5.2. AE Specifications	32
5.2.1. Media Server AE Specification	32
5.3. Augmented and Private Application Profiles	34
5.4. Media Configuration	34
6. Support of Character Sets	34
7. Security	34

8. Annexes	35
8.1. IOD Contents	35
8.1.1. Created SOP Instance(s)	35
8.1.2. Usage of Attributes from Received IODs	45
8.1.3. Attribute Mapping	49
8.1.4. Coerced/Modified Attributes	49
8.2. Data Dictionary of Private Attributes	49
8.3. Coded Terminology and Templates	49
8.4. Grayscale Image Consistency	49
8.5. Standard Extended/Specialized/Private SOP Classes	49
8.6. Private Transfer Syntaxes	49

3. Introduction

Hologic, Inc. develops and markets a full line of mammography products including the SecurView DX workstation, which is the Diagnostic Review Workstation for the Selenia full-field digital mammography system.

The SecurView DX workstation provides a user interface to radiologic technologists and radiologists, for reviewing digital mammography and other breast imaging procedures. The SecurView DX workstation includes a graphical user interface (GUI) with a dedicated workflow keypad, pointing device, keyboard, and two, three, or four displays.

3.1. Audience

This document contains the DICOM conformance claim for the SecurView DX workstation. This document is intended to aid in connecting the SecurView DX workstation to other components that make use of the DICOM standard for interconnecting networked diagnostic review workstation devices.

The information within this document applies to SecurView DX Software version 7-x. The reader of this document should be familiar with the DICOM standard and PACS components that utilize the standard.

3.2. Remarks

A DICOM conformance statement – the structure and content of which are stipulated by the DICOM standard – is intended to aid in determining the suitability of interconnecting digital imaging devices. References to specific functionality in a conformance statement are not sufficient to guarantee interoperability between components. The following should be considered when evaluating interoperability:

- The SecurView DX workstation conformance statement provides a starting point for ascertaining whether the product can communicate with other systems.
- The only way to know for certain whether the SecurView DX workstation can interoperate with other systems is to perform connectivity testing.
- This document represents a best effort to document the functionality of commercial versions of the SecurView DX workstation and is not a functional specification of any Hologic component or product. Hologic reserves the right to make changes at any time to the functionality of the DICOM components described herein, and is committed to following the evolution of the DICOM standard.

3.3. Definitions, Terms and Abbreviations

ACR: American College of Radiology

AE: Application Entity

CAD: Computer Aided Detection

CT: Computed Tomography

DICOM: Digital Imaging and Communications in Medicine

DIMSE: DICOM Message Service Element

GSPPS: Grayscale Softcopy Presentation State

IOD: Information Object Definition

JPEG: Joint Photographic Experts Group (data compression techniques)

LUT: Lookup Table

MR: Magnetic Resonance

NEMA: National Electrical Manufacturers Association

NM: Nuclear Medicine

PACS: Picture Archive and Communications System (image management & long-term storage)

PET: Positron Emission Tomography

PDU: Protocol Data Unit

Q/R: Query/Retrieve

RLE: Run Length Encoding (data compression technique)

SC: Secondary Capture

SCP: Service Class Provider

SCU: Service Class User

SOP: Service Object Pair

SR: Structured Report

TCP/IP: Transmission Control Protocol/Internet Protocol

UID: Unique Identifier

VOI: Value of Interest

VPN: Virtual Private Network

3.4. References

ACR-NEMA DICOM Standard

4. Networking

4.1. Implementation Model

4.1.1. Application Data Flow

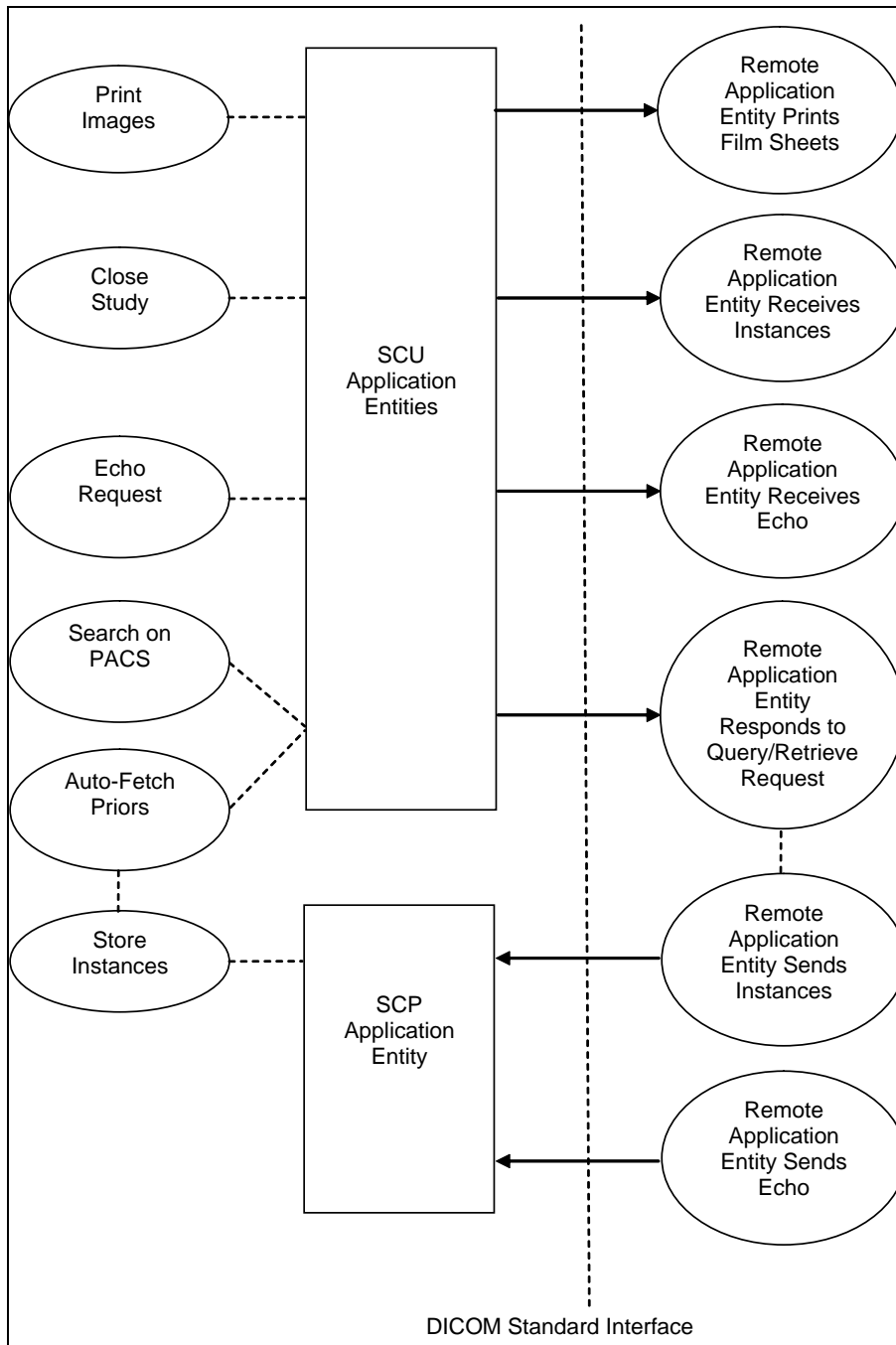


Figure 4.1-1: Functional Overview

An overview of the real-world activities and AEs is provided below:

- The **Print Images** real-world activity triggers an SCU Application Entity to print selected images to film on a selected remote AE (Printer).
- If configured to do so, the **Close Study** real-world activity triggers an SCU Application Entity to send study state instances (or secondary capture images with annotations) and/or screen capture images created by the reading radiologist to a pre-selected remote AE.
- The **Echo Request** real-world activity triggers an SCU Application Entity to send an echo request to a selected remote AE.
- The **Search on PACS** real-world activity triggers an SCU Application Entity to query a remote AE for patient studies, series, or instances (based on configured query level) and provides the list of matching responses. The user selects patient studies, series, or instances to be retrieved. The SCU Application Entity issues a retrieve request for each selected study, series, or instance, based on the configured level.
- The SCP Application Entity is always available to receive instances from a remote AE, and triggers the **Store Instances** real-world activity to make them available to the user.
- If configured to do so, the **Store Instances** real-world activity may trigger the **Auto-Fetch Priors** real-world activity. The **Auto-Fetch Priors** real-world activity triggers an SCU Application Entity to query and retrieve prior studies, series, or instances related to a received instance. The amount and types of instances to retrieve are configurable.

4.1.2. Functional Definition of AEs

The SCU Application Entities and SCP Application Entity are implemented as separate processes that run in the background. They are started automatically during startup of the SecurView DX workstation.

4.1.2.1. Functional Definition of SCU Application Entities

The SCU Application Entities initiate Print, Store, Echo, and Query/Retrieve requests as needed by the SecurView DX workstation.

4.1.2.2. Functional Definition of SCP Application Entity

The SCP Application Entity is available to accept echo and storage requests whenever the SecurView DX workstation is running. The SCP Application Entity stores received instances locally.

4.1.3. Sequencing of Real-World Activities

For Print Images, a user triggers an SCU AE to perform DICOM print by selecting one or more images, or a portion of the screen from the reviewing display to print to a selected Print Provider.

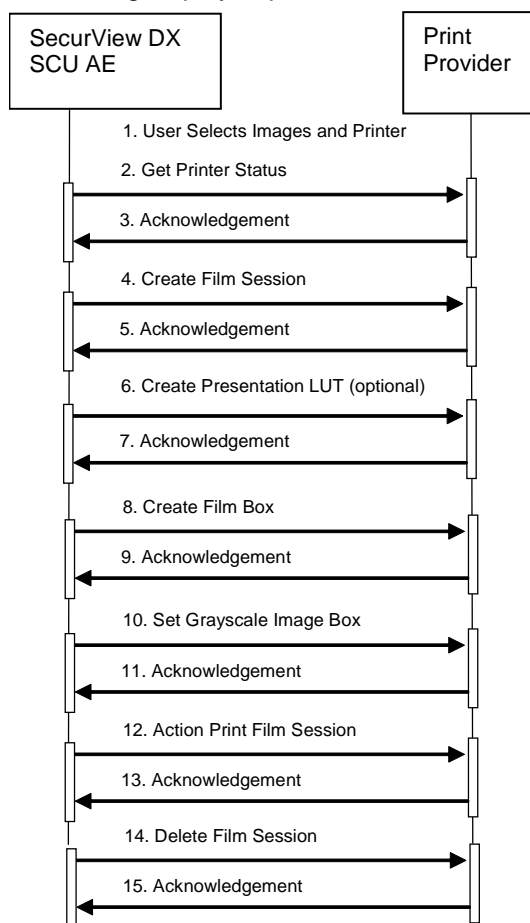


Figure 4.1-2: Print Images Sequence Diagram for Mammography Viewer

Note that Print Images behaves slightly differently for the Multimodality Viewer. Action is performed for the Film Box rather than Film Session, along with Delete for the Film Box prior to delete for the Film Session.

For Close Study, a user triggers an SCU AE to perform DICOM store by marking one or more studies for a patient as read.

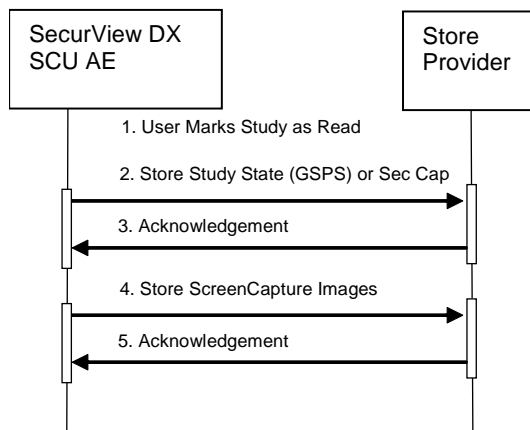


Figure 4.1-3: Close Study Sequence Diagram

For Search on PACS, a user triggers an SCU AE to perform DICOM query/retrieve by entering search criteria and executing a query. The matching patients' studies, series, or instances are displayed to the user, based on query level configuration. The user selects one or more series to retrieve and executes a retrieve request. The SCP AE receives the instances sent by the Query/Retrieve Provider in response to the retrieve request.

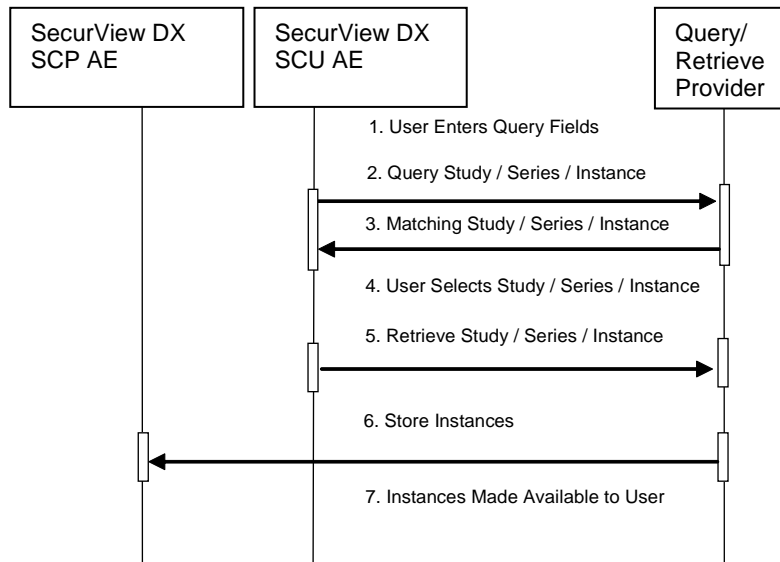


Figure 4.1-4: Search on PACS Sequence Diagram

For Auto-Fetch Priors, receiving an instance such as the first newly captured digital mammography image for a patient triggers an SCU AE to perform DICOM query/retrieve to search for studies matching the patient. Configurable auto-fetch criteria determine types of received instances that trigger auto-fetch, and the (if configured) follow-up series and instance level query content. The SCU AE retrieves the matching studies, series, or instances that meet the auto-fetch criteria. The SCP AE receives the instances sent by the Query/Retrieve Provider.

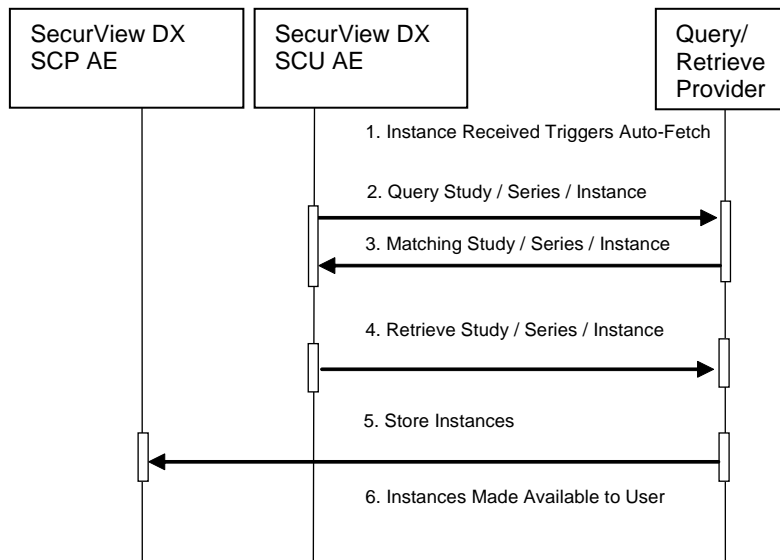


Figure 4.1-5: Auto-Fetch Priors Sequence Diagram

4.2. AE Specifications

4.2.1. SCU AE

4.2.1.1. SOP Classes

The SCU AE provides Standard Conformance to the following SOP Classes:

Table 4.2.1-1 – SOP Classes for SCU AE

SOP Class Name	SOP Class UID	SCU	SCP
Basic Grayscale Print Management Meta	1.2.840.10008.5.1.1.9	Yes	No
Presentation LUT	1.2.840.10008.5.1.1.23	Yes	No
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	Yes	No
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Yes	No
Multi-frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	Yes	No
Verification	1.2.840.10008.1.1	Yes	No
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Yes	No
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Yes	No

4.2.1.2. Association Policies

4.2.1.2.1. General

The DICOM standard Application context shall be specified.

Table 4.2.1-2 – DICOM Application Context

Application Context Name	1.2.840.10008.3.1.1.1
--------------------------	-----------------------

4.2.1.2.2. Number of Associations

The SCU AE supports multiple associations. There are no enforced limits for the number of open associations.

4.2.1.2.3. Asynchronous Nature

The SecurView DX workstation does not support asynchronous operations (multiple outstanding transactions over a single Association).

4.2.1.2.4. Implementation Identifying Information

Table 4.2.1-3 – DICOM Implementation Class and Version for SCU AE

Implementation Class UID	1.2.276.0.28.3.0.12.701000
Implementation Version Name	MBC_SCR_0701000

Table 4.2.1-4 – DICOM Implementation Class and Version for Multimodality Print SCU AE

Implementation Class UID	1.2.276.0.7230010.3.0.3.5.2
Implementation Version Name	OFFIS_DCMTK_352

4.2.1.3. Association Initiation Policy

4.2.1.3.1. Print Images

4.2.1.3.1.1. Description and Sequencing of Activities

Print Images is triggered when a user selects to print selected images to a selected remote Print AE for diagnostic print or screen capture print from the mammography viewer, or print from the multimodality viewer. The SCU AE attempts to establish an association with a remote Print AE when a request to print one or more images is received. A remote Print AE configuration is predefined for each known printer manufacturer, model, and default film size. Use of the Presentation LUT SOP Class is configurable per printer.

Print requests can be queued, in that a new print request can be initiated before previous print requests are completed. For the mammography viewer, each print request consists of Printer N-GET, Film Session N-CREATE, Presentation LUT N-CREATE (optional), Film Box N-CREATE, Grayscale Image Box N-SET, Film Session N-ACTION, and Film Session N-DELETE. For the multimodality viewer, each print request consists of Printer N-GET, Film Session N-CREATE, Presentation LUT N-CREATE (optional), Film Box N-CREATE, Grayscale Image Box N-SET, Film Box N-ACTION, Film Box N-DELETE, and Film Session N-DELETE. One association is negotiated per print film request. The association is released after the final N-DELETE response is received, if not released earlier due to failure.

4.2.1.3.1.2. Proposed Presentation Contexts

The SCU AE attempts to establish associations using the following presentation contexts:

Table 4.2.1-5 – Proposed Presentation Contexts for Print Images

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Basic Grayscale Print Management Meta	1.2.840.10008.5.1.9	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR, Little Endian	1.2.840.10008.1.2.1	SCU	None
Presentation LUT	1.2.840.10008.5.1.23	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR, Little Endian	1.2.840.10008.1.2.1	SCU	None

4.2.1.3.1.3. SOP Specific Conformance for Print

The general behavior of the SCU AE during communication failure is summarized in the table below. This behavior is common to all print SOP Classes supported by the SCU AE. For printing from the mammography viewer, the number of seconds to wait for a response from the remote Print AE before timing out is configurable. For printing from the multimodality viewer, timeouts are not configurable. The Print SCU waits up to 30 seconds for an association response. There is no timeout waiting for a DIMSE response.

Table 4.2.1-6 – Print Command Communication Failure Behavior

Exception	Behavior
Timeout	The SCU AE releases the association, and the error is recorded in a user-accessible log.
Association rejected or aborted by SCP	The error is recorded in a user-accessible log.

The SCU AE provides baseline conformance. The SCU AE uses 12-bit grayscale images for print from the mammography viewer if supported by the remote Print AE. 8-bit grayscale is used otherwise, and for

print from the multimodality viewer. This section describes the DIMSE services and the attributes supported for various remote Print AEs.

4.2.1.3.1.3.1. Specific Conformance to Basic Film Session SOP Class

Table 4.2.1-7 – Basic Film Session SOP Class: Supported DIMSE Operations

Name	Description
N-CREATE	Creates the film session
N-ACTION	Prints the film session (mammography viewer only)
N-DELETE	Deletes the film session

Table 4.2.1-8 – Basic Film Session SOP Class: Supported Attributes

Attribute Name	Tag	Supported Values	Default Value
Number Of Copies	(2000,0010)	1	1
Print Priority	(2000,0020)	MED	MED
Medium Type	(2000,0030)	BLUE FILM CLEAR FILM MAMMO BLUE FILM PAPER	Predefined per Printer
Film Destination	(2000.0040)	PROCESSOR MAGAZINE (multimodality viewer only)	Predefined per Printer (multimodality viewer only)

The behavior of the SCU AE when encountering status codes in the N-CREATE, N-ACTION or N-DELETE response is summarized in the table below.

Table 4.2.1-9 – Film Session SOP Class Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The remote Print AE has completed the operation successfully. Proceed to next step.
Warning	Any	Any	If relaxed error handling is enabled for the mammography viewer, proceed to next step as if successful. If not, the SCU AE releases the association and the error is recorded in a user-accessible log. For the multimodality viewer, 0xB000 through 0xBFFF are interpreted as success, proceed to the next step. Other warning status values are treated as failure.
Failure	Any	Any	The SCU AE releases the association, and the error is recorded in a user-accessible log.

4.2.1.3.1.3.2. Specific Conformance to Basic Film Box SOP Class

Table 4.2.1-10 – Basic Film Box SOP Class: Supported DIMSE operations

Name	Description
N-CREATE	Creates the film box
N-ACTION	Prints the film box (multimodality viewer only)
N-DELETE	Deletes the film box (multimodality viewer only)

Table 4.2.1-11 – Basic Film Box SOP Class: Supported Attributes

Attribute Name	Tag	Supported Values	Default Value
Image Display Format	(2010,0010)	STANDARD\1,1	STANDARD\1,1
Film Orientation	(2010,0040)	PORTRAIT LANDSCAPE	
Film Size ID	(2010,0050)	8INX10IN 10INX12IN 10INX10IN 10INX14IN 11INX14IN 14INX14IN 14INX17IN Multimodality viewer also: A4 (Configurable per printer)	Configured per each printer's requirements with image matrix size, or set to calculate automatically for true size printing (mammography viewer)
Magnification Type	(2010,0060)	CUBIC Multimodality viewer also: REPLICATE BILINEAR NONE	CUBIC (mammography viewer) Configurable per printer (multimodality viewer)
Smoothing Type	(2010,0080)	NONE (multimodality viewer only)	Configurable per printer to send NONE or omit (multimodality viewer)
Border Density	(2010,0100)	BLACK Multimodality viewer also: WHITE 150	BLACK (mammography viewer) Configurable per printer (multimodality viewer)
Empty Image Density	(2010,0110)	BLACK Multimodality viewer also: WHITE 150	BLACK (mammography viewer) Configurable per printer (multimodality viewer)
Min Density	(2010,0120)	Configurable per printer	Predefined per Printer
Max Density	(2010,0130)	Configurable per printer	Predefined per Printer
Trim	(2010,0140)	NO	NO
Configuration Information	(2010,0150)	Configurable per printer (mammography viewer only)	Predefined per Printer (mammography viewer only)
Illumination	(2010,015E)	Sent only if Presentation LUT is sent; configurable per printer for mammography viewer	5000 (mammography viewer) 2000 (multimodality viewer, not configurable)
Reflected Ambient Light	(2010,0160)	Sent only if Presentation LUT is sent; configurable per printer for mammography viewer	10 (mammography viewer) 10 (multimodality viewer, not configurable)
Resolution ID	(2020.0050)	STANDARD HIGH (multimodality viewer only)	Predefined per Printer
Referenced Film Session Sequence	(2010,0500)	One sequence Item identifies the film session for this film box	
Referenced Presentation LUT Sequence	(2050,0500)	One sequence Item identifies the Presentation LUT for this film box, sent only if Presentation LUT is sent	

The following table summarizes the behavior of the SCU AE when encountering status codes in the N-CREATE response.

Table 4.2.1-12 – Film Box SOP Class Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The remote Print AE has completed the operation successfully. Proceed to next step.
Warning	Any	Any	If relaxed error handling is enabled for the mammography viewer, proceed to next step as if successful. If not, the SCU AE releases the association and the error is recorded in a user-accessible log. For the multimodality viewer, 0xB000 through 0xBFFF are interpreted as success, proceed to the next step. Other warning status values are treated as failure.
Failure	Any	Any	The SCU AE releases the association, and the error is recorded in a user-accessible log.

4.2.1.3.1.3.3. Specific Conformance to Basic Grayscale Image Box SOP Class

Table 4.2.1-13 – Basic Grayscale Image Box SOP Class: Supported DIMSE operations

Name	Description
N-SET	Updates an image box in a previously created film box.

Table 4.2.1-14 – Basic Grayscale Image Box SOP Class: Supported Attributes

Attribute Name	Tag	Supported Values	Default Value
Image Box Position	(2020,0010)	1	1
Basic Grayscale Image Sequence	(2020,0110)		
> Samples Per Pixel	(0028,0002)	1	1
> Photometric Interpretation	(0028,0004)	MONOCHROME2	MONOCHROME2
> Rows	(0028,0010)	Per printed image	
> Columns	(0028,0011)	Per printed image	
> Pixel Aspect Ratio	(0028,0034)	1\1	1\1
> Bits Allocated	(0028,0100)	8 or 16 (mammography viewer) 8 (multimodality viewer)	
> Bits Stored	(0028,0101)	8 or 12 (mammography viewer) 8 (multimodality viewer)	
> High Bit	(0028,0102)	7 or 11 (mammography viewer) 7 (multimodality viewer)	
> Pixel Representation	(0028,0103)	0	0
> Pixel Data	(7FE0,0010)	Per printed image	
Polarity	(2020,0020)	NORMAL REVERSE (multimodality viewer only)	Configurable per Printer
Configuration Information	(2010,0150)	Configurable per printer (mammography viewer only)	Predefined per Printer
Magnification Type	(2010,0060)	CUBIC (mammography viewer only)	CUBIC
Smoothing Type	(2010,0080)	NONE (multimodality viewer only)	Configurable per printer to send NONE or omit (multimodality viewer)

4. Networking

Attribute Name	Tag	Supported Values	Default Value
Requested Image Size	(2020,0030)	For diagnostic print, set to desired width per printer (mammography viewer only)	Predefined per Printer

The behavior of the SCU AE when encountering status codes in the N-SET response is summarized in the table below:

Table 4.2.1-15 – Image Box SOP Class N-SET Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The remote Print AE has completed the operation successfully. Proceed to next step.
Warning	Any	Any	If relaxed error handling is enabled for the mammography viewer, proceed to next step as if successful. If not, the SCU AE releases the association and the error is recorded in a user-accessible log. For the multimodality viewer, 0xB000 through 0xBFFF are interpreted as success, proceed to the next step. Other warning status values are treated as failure.
Failure	Any	Any	The SCU AE releases the association, and the error is recorded in a user-accessible log.

4.2.1.3.1.3.4. Specific Conformance to Presentation LUT SOP Class

Table 4.2.1-16 – Presentation LUT SOP Class: Supported DIMSE operations

Name	Description
N-CREATE	Creates a Presentation LUT to be referenced by a film box

Table 4.2.1-17 – Presentation LUT SOP Class: Supported Attributes

Attribute Name	Tag	Supported Values	Default Value
Presentation LUT Shape	(2050,0020)	IDENTITY LIN OD (mammography viewer only)	Configurable per printer for mammography viewer IDENTITY for multimodality viewer, not configurable

The behavior of the SCU AE when encountering status codes in the N-CREATE response is summarized in the table below:

Table 4.2.1-18 – Presentation LUT SOP Class N-CREATE Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The remote Print AE has completed the operation successfully. Proceed to next step.
Warning	Any	Any	If relaxed error handling is enabled, proceed to next step as if successful. If not, the SCU AE releases the association and the error is recorded in a user-accessible log. For the multimodality viewer, 0xB000 through 0xBFFF are interpreted as success, proceed to the next step. Other warning status values are treated as failure.
Failure	Any	Any	The SCU AE releases the association, and the error is recorded in a user-accessible log.

4.2.1.3.1.3.5. Specific Conformance to Printer SOP Class

Table 4.2.1-19 – Printer SOP Class: Supported DIMSE operations

Name	Description
N-EVENT-REPORT	Receives status notification.
N-GET	Retrieves an instance of a physical printer.

- N-EVENT-REPORT requests are accepted up until the Film Session N-DELETE response is received.
- In the N-GET request for the mammography viewer, the SCU AE requests Printer Status, Printer Status Info, Printer Name, Manufacturer and Manufacturer's Model Name.
- In the N-GET request for the multimodality viewer, the attribute identifier list is empty, requesting all supported attributes to be returned.
- The behavior of the SCU AE when encountering status codes in the N-GET response is summarized in the table below:

Table 4.2.1-20 – Printer SOP Class N-GET Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	If Printer Status returned is NORMAL, proceed to next step. If not, the SCU AE releases the association and the error is recorded in a user-accessible log.
Warning	Any	Any	If relaxed error handling is enabled for the mammography viewer and Printer Status is NORMAL, proceed to next step as if successful. If not, the SCU AE releases the association and the error is recorded in a user-accessible log. For the multimodality viewer, 0xB000 through 0xBFFF are interpreted as success, proceed to the next step. Other warning status values are treated as failure.
Failure	Any	Any	The SCU AE releases the association, and the error is recorded in a user-accessible log.

4.2.1.3.2. Close Study

4.2.1.3.2.1. Description and Sequencing of Activities

Close Study is triggered when a radiologist user marks one or more studies for a patient as read. Close Study can be configured to trigger the SCU AE automatically to send study state instances (and/or secondary capture images) that include radiologist markings and annotations and multimodality viewer screen capture images created by the reading radiologist to a pre-selected remote Store AE. The SCU AE negotiates a separate association with the pre-selected remote Store AE to send each instance. The SCU AE releases each association upon completion of the storage request.

The secondary capture image is offered as an alternative for remote Store AEs that do not support GSPS. A secondary capture image is created for each image in each study marked as read on which the radiologist has created markings and annotations in the SecurView DX workstation Mammography Viewer. The pixel data of each secondary capture image contains one image that has the user created markings and/or measurements burned in.

The pixel data of a screen capture image contains the current content of the SecurView DX workstation multimodality viewer display when the user requests creation of a screen capture image.

4.2.1.3.2.2. Proposed Presentation Contexts

The SCU AE attempts to establish associations using the following presentation contexts:

Table 4.2.1-21 – Proposed Presentation Contexts for Close Study

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR, Little Endian	1.2.840.10008.1.2.1	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	See Table 4.2.1-22		SCU	None
				SCU	None
Multi-frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	See Table 4.2.1-22		SCU	None
				SCU	None

Table 4.2.1-22 – Proposed Transfer Syntaxes for Image Instances

Transfer Syntax Table	
Name	UID
Implicit VR Little Endian	1.2.840.10008.1.2
Explicit VR Little Endian	1.2.840.10008.1.2.1
RLE Lossless	1.2.840.10008.1.2.5
JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14 [Selection Value 1]): Default Transfer Syntax for Lossless JPEG Image Compression	1.2.840.10008.1.2.4.70

4.2.1.3.2.3. SOP Specific Conformance for Storage

The behavior of the SCU AE when encountering status codes in a C-STORE response is summarized in the table below.

Table 4.2.1-23 – C-STORE Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The remote Store SCP has successfully stored the SOP Instance. Job complete.
Warning or Failure	Any	Any	The SCU AE releases the association, and the error is reported to the user.

The behavior of the SCU AE during communication failure is summarized in the table below. A failed store request is automatically retried a configurable number of times before reporting failure.

Table 4.2.1-24 – Storage Communication Failure Behavior

Exception	Behavior
Timeout	The SCU AE releases the association, and the error is reported to the user.
Association rejected or aborted by SCP	The error is reported to the user.

Instance UIDs are globally unique for all SOP instances generated by the SCU AE. The UID root is “1.2.276.0.28.3”.

The SCU AE provides standard conformance to the Grayscale Softcopy Presentation State Storage SOP Class. Color images may be referenced in the study state instances that are stored as GSPS instances. A separate study state GSPS instance is created for each study that is marked as read. Each study state GSPS instance references all the images in the study that are present on the SecurView DX workstation when the user marks the study as read. Each study state GSPS instance contains the markings, annotations and measurements made by the radiologist on any of the referenced images.

In addition to GSPS, the SCU AE provides standard conformance to the Secondary Capture Image Storage SOP Class and to the Multi-frame Grayscale Word Secondary Capture Image Storage SOP Class. It is configurable per destination whether to store radiologist markings and annotations made in the Mammography Viewer as GSPS and/or Secondary Capture Image or Multi-frame Grayscale Word Secondary Capture Image. Each secondary capture image instance contains a single image with burned in markings and annotations. Each secondary capture image instance is assigned to the same Study as the source image. Each secondary capture image instance is assigned to a separate Series.

The SCU AE provides standard conformance to the Secondary Capture Image Storage SOP Class. Multimodality screen capture images are stored as Secondary Capture Image.

All multimodality viewer screen capture instances are assigned to the newest Study represented in the screen capture content. Each screen capture instance is assigned to a separate Series.

4.2.1.3.3. Echo Request

4.2.1.3.3.1. Description and Sequencing of Activities

From the DICOM configuration dialog, the service user requests an Echo to test DICOM communication with a configured remote AE. The SCU AE issues a C-ECHO request to the remote AE, and provides the response to the user interface.

4.2.1.3.3.2. Proposed Presentation Contexts

The SCU AE attempts to establish associations using the following presentation contexts:

Table 4.2.1-25 – Proposed Presentation Contexts for Echo Request

Presentation Context Table					
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
		Explicit VR, Little Endian	1.2.840.10008.1.2.1	SCU	None

4.2.1.3.3.3. SOP Specific Conformance for Verification

The SCU AE provides baseline conformance. The behavior of the SCU AE when encountering status codes in a C-ECHO response is summarized in the table below.

Table 4.2.1-26 – Verification C-ECHO Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	Success is reported to the user.

The behavior of the SCU AE during communication failure is summarized in the table below.

Table 4.2.1-27 – Verification Communication Failure Behavior

Exception	Behavior
Timeout	The SCU AE releases the association, and the error is reported to the user.
Association rejected or aborted by remote AE	The error is reported to the user.

4.2.1.3.4. Search on PACS / Auto-Fetch Priors

4.2.1.3.4.1. Description and Sequencing of Activities

Search on PACS is triggered by user interaction. The user may enter matching keys that the SCU AE uses to query a selected remote Query/Retrieve AE using the C-FIND operation. The SCU AE then displays a list of patient studies, series or instances returned in the C-FIND responses. The user may select one or more patient studies, series or instances from the list to retrieve, which signals the SCU AE to generate a C-MOVE request to the remote Query/Retrieve AE, specifying the SCP AE as the move destination. The instances received are made available for the user to view on the SecurView DX workstation.

The default Search on PACS behavior is for the SCU AE to send an initial Study Root, Study Level hierarchical query, followed by Study Root, Series Level hierarchical queries for each study returned. Matching responses are displayed to the user at the series level. The default retrieve behavior is to send a Study Root, Series Level hierarchical move request for each selected patient series. Alternate behavior can be configured such that only Study Level hierarchical queries and retrieves are performed. Alternate behavior can be configured such that Study, Series, and Instance Level hierarchical queries with Instance level retrieves are performed.

When configured as enabled, Auto-Fetch Priors is triggered when the first newly captured digital mammography image for a patient is received. The SCU AE performs C-FIND and C-MOVE operations in the background with a predefined remote Query/Retrieve AE. The default behavior is to send a Study Root, Study Level hierarchical query for the patient identified in the received image. Based on the configured Auto-Fetch Query/Retrieve level (Study, Series, or Image), the SCU AE may send follow-up

Study Root, Series Level and Study Root, Image Level hierarchical queries to the remote Query/Retrieve AE. Based on the configured Auto-Fetch Query/Retrieve level, Studies, Series, or Instances are retrieved one at a time via Study Root, configured level hierarchical move request. If a remote Query/Retrieve AE does not support Image Level C-FIND or C-MOVE, it is configurable to stop at the Series Level C-FIND and perform Series Level C-MOVE. If a remote Query/Retrieve AE does not support Series Level C-FIND or C-MOVE, and the remote Query/Retrieve AE supports Modalities in Study (0008,0061) as a C-FIND return key, it is configurable to stop at the Study Level C-FIND and perform Study Level C-MOVE. The default Auto-Fetch Query/Retrieve level is Series.

For each Search on PACS or Auto-Fetch Priors occurrence, the SCU AE negotiates one association within which all configured levels of C-FIND requests are sent. The SCU AE negotiates a separate consecutive association for each C-MOVE request.

4.2.1.3.4.2. Proposed Presentation Contexts

The SCU AE attempts to establish associations using the following presentation contexts:

Table 4.2.1-28 – Proposed Presentation Contexts for Search on PACS

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR, Little Endian	1.2.840.10008.1.2.1	SCU	None
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR, Little Endian	1.2.840.10008.1.2.1	SCU	None

4.2.1.3.4.3. SOP Specific Conformance for Query/Retrieve

The following table summarizes the behavior of the SCU AE when encountering status codes in a C-FIND or C-MOVE response. For Auto-Fetch Priors, a failed request is retried automatically a predefined number of times before reporting failure.

Table 4.2.1-29 – C-FIND and C-MOVE Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Matching or sub-operations are complete	0000	The remote SCP has successfully returned all matching information, or all sub-operations are complete. For C-FIND, perform follow-up query or move, or display results to the user. For C-MOVE, success is reported to the user either in the Search on PACS dialog or the patient list.
Pending	Matches or sub-operations are continuing	FF00	For C-FIND, the matching query result contained in the Identifier is collected for display or automated follow-up. For C-MOVE, the SCU AE continues to wait for additional messages.
Warning or Failure	Any	Any	The SCU AE releases the association. For Search on PACS C-FIND, failure is reported to the user in a status bar in the Search on PACS dialog. For Auto-Fetch Priors C-FIND, failure is reported to the user in the patient list. For C-MOVE, failure is reported to the user either in the Search on PACS dialog or the patient list.

The behavior of the SCU AE during communication failure is summarized in the table below. For Auto-Fetch Priors, a failed request is retried automatically a predefined number of times before reporting failure.

Table 4.2.1-30 – C-FIND and C-MOVE Communication Failure Behavior

Exception	Behavior
Timeout	The SCU AE releases the association. For Search on PACS C-FIND, failure is reported to the user in a status bar in the Search on PACS dialog. For Auto-Fetch Priors C-FIND, failure is reported to the user in the patient list. For C-MOVE, failure is reported to the user either in the Search on PACS dialog or the patient list.
Association rejected or aborted by SCP	For Search on PACS C-FIND, failure is reported to the user in a status bar in the Search on PACS dialog. For Auto-Fetch Priors C-FIND, failure is reported to the user in the patient list. For C-MOVE, failure is reported to the user either in the Search on PACS dialog or the patient list.

The SCU AE provides standard conformance to the Study Root Information Model, hierarchical method only. The Relational method is not supported.

For Search on PACS, by default the SCU AE performs Study Level queries with follow-up Series Level queries as needed, and Series Level retrieves. It is possible to configure Study Level only queries and retrieves. It is possible to configure Study, Series, and Instance Level queries with Instance level retrieves.

For Auto-Fetch Priors, by default the SCU AE performs Study Level and Series Level queries, and Series Level retrieves. It is possible to configure Study Level queries and retrieves if Series Level is not supported by the remote Query/Retrieve AE. It is possible to configure Study, Series, and Instance Level queries with Instance Level retrieves.

For Search on PACS, the SCU AE supports query Matching Key Attributes as defined in the following table. The user supplies Matching Key Attribute values, either by manual entry, drop list selection, or date range selection. Wild Card matching is requested only if the user specifies a wild card character during manual entry. It is configurable to omit optional Study level matching key attributes (Modalities in Study, Referring Physician's Name, Study Description, Patient's Birth Date, Patient's Sex) individually. It is configurable to omit optional Series level matching key attributes (Series Description, Body Part Examined, Performed Procedure Step Start Date, Performed Procedure Step Start Time, Request Attributes Sequence.Scheduled Procedure Step ID, Request Attribute Sequence.Requested Procedure ID) individually. It is configurable to omit optional Image (Instance) level matching key attributes (SOP Class UID, Concept Name Code Sequence, Content Template Sequence) individually.

Table 4.2.1-31 – Supported C-FIND Matching Key Attributes (Search on PACS)

Matching Key Attribute	Tag	Matching Type
Study Level		
Patient's Name	(0010,0010)	Wild Card or Universal Matching
Patient ID	(0010,0020)	Single Value, Wild Card or Universal Matching
Study Date	(0008,0020)	Single Value, Range or Universal Matching
Study Time	(0008,0030)	Range or Universal Matching
Accession Number	(0008,0050)	Single Value, Wild Card or Universal Matching
Modalities in Study	(0008,0061)	Single Value, Wild Card or Universal Matching; used only if alternate Study Level only query is configured (Optional)
Study ID	(0020,0010)	Single Value or Wild Card Matching
Study Instance UID	(0020,000D)	Single Value or Universal Matching
Referring Physician's Name	(0008,0090)	Wild Card or Universal Matching (Optional)
Study Description	(0008,1030)	Universal Matching (Optional)
Patient's Birth Date	(0010,0030)	Universal Matching (Optional)
Patient's Sex	(0010,0040)	Universal Matching (Optional)
Series Level		
Study Instance UID	(0020,000D)	Single Value Matching (from Study level result)
Series Instance UID	(0020,000E)	Single Value or Universal Matching
Series Number	(0020,0011)	Single Value or Universal Matching
Modality	(0008,0060)	Single Value, Wild Card or Universal Matching
Series Description	(0008,103E)	Universal Matching (Optional)
Body Part Examined	(0018,0015)	Single Value or Universal Matching (Optional)
Performed Procedure Step Start Date	(0040,0244)	Single Value, Range or Universal Matching (Optional)
Performed Procedure Step Start Time	(0040,0245)	Range or Universal Matching (Optional)
Request Attributes Sequence	(0040,0275)	Sequence or Universal Matching (Optional)
>Scheduled Procedure Step ID	(0040,0009)	Single Value or Universal Matching (Optional)
>Requested Procedure ID	(0040,1001)	Single Value or Universal Matching (Optional)
Image (Instance) Level		
Study Instance UID	(0020,000D)	Single Value Matching (from Study level result)
Series Instance UID	(0020,000E)	Single Value Matching (from Series level result)
Instance Number	(0020,0013)	Single Value or Universal Matching
SOP Instance UID	(0008,0018)	Single Value or Universal Matching
SOP Class UID	(0008,0016)	Universal Matching (Optional)
Concept Name Code Sequence	(0040,A043)	Sequence or Universal Matching (Optional)
>Code Value	(0008,0100)	Universal Matching (Optional)
>Code Meaning	(0008,0102)	Universal Matching (Optional)
>Code Meaning	(0008,0104)	Universal Matching (Optional)
Content Template Sequence	(0040,A504)	Sequence or Universal Matching (Optional)
>Mapping Resource	(0008,0105)	Universal Matching (Optional)
>Template Identifier	(0040,DB00)	Universal Matching (Optional)

4. Networking

For Auto-Fetch Priors, the SCU AE requires the remote Query/Retrieve SCP to support query Matching Key Attributes as defined in the following table.

Table 4.2.1-32 – Supported C-FIND Matching Key Attributes (Auto-Fetch Priors)

Matching Key Attribute	Tag	Matching Type
Study Level		
Patient ID	(0010,0020)	Single Value Matching
Patient's Name	(0010,0010)	Universal Matching
Study Date	(0008,0020)	Universal Matching
Study Instance UID	(0020,000D)	Universal Matching
Study ID	(0020,0010)	Universal Matching
Modalities in Study	(0008,0061)	Universal Matching (sent only if Auto-Fetch level is set to Study)
Series Level		
Study Instance UID	(0020,000D)	Single Value Matching (from Study level result)
Series Instance UID	(0020,000E)	Universal Matching
Series Number	(0020,0011)	Universal Matching
Modality	(0008,0060)	Universal Matching
Image Level		
Study Instance UID	(0020,000D)	Single Value Matching (from Study level result)
Series Instance UID	(0020,000E)	Single Value Matching (from Series level result)
SOP Instance UID	(0008,0018)	Universal Matching

4.2.1.4. Association Acceptance Policy

The SCU AE does not accept associations.

4.2.2. SCP AE

4.2.2.1. SOP Classes

The SCP AE provides Standard Conformance to the following SOP Classes:

Table 4.2.2-1 – SOP Classes for SCP AE

SOP Class Name	SOP Class UID	SCU	SCP
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	No	Yes
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	No	Yes
Digital Mammography X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.2	No	Yes
Digital Mammography X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	No	Yes
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	No	Yes
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	No	Yes
Multi-frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	No	Yes
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	No	Yes
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	No	Yes
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	No	Yes
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	No	Yes
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	No	Yes
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	No	Yes
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	No	Yes
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	No	Yes
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	No	Yes
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	No	Yes
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	No	Yes
Mammography CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.50	No	Yes
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	No	Yes
Verification SOP Class	1.2.840.10008.1.1	No	Yes

4.2.2.2. Association Policies

4.2.2.2.1. General

The DICOM standard Application context shall be specified.

Table 4.2.2-2 – DICOM Application Context

Application Context Name	1.2.840.10008.3.1.1.1
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4.2.2.2.2. Number of Associations

The SCP AE supports multiple associations. There are no enforced limits for the number of open associations.

4.2.2.2.3. Asynchronous Nature

The SecurView DX workstation does not support asynchronous operations (multiple outstanding transactions over a single Association).

4.2.2.2.4. Implementation Identifying Information

Table 4.2.2-3 – DICOM Implementation Class and Version for SCP AE

Implementation Class UID	1.2.276.0.28.3.0.12.701000
Implementation Version Name	MBC_SCR_0701000

4.2.2.3. Association Initiation Policy

The SCP AE does not initiate associations.

4.2.2.4. Association Acceptance Policy

When the SCP AE accepts an association, it will respond to storage and echo requests.

4.2.2.4.1. Activity – Store Instances

4.2.2.4.1.1. Description and Sequencing of Activities

The SCP AE is always running. Store Instances is triggered when a remote Application Entity requests to store instances to the SCP AE. Expected instances include images of several accepted modalities, Mammography CAD SR, and Grayscale Softcopy Presentation State. The SCP AE stores the instances received so that they can be made available to the user. If a received instance is a duplicate of an existing stored instance it is ignored. Instances remain on the SecurView DX workstation until all studies for the associated patient are read, until a configurable maximum storage period is reached, or until they are manually deleted.

4.2.2.4.1.2. Accepted Presentation Contexts

The SCP AE accepts associations using the following presentation contexts:

Table 4.2.2-4 – Acceptable Presentation Contexts for Store Instances

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	See Table 4.2.2-6		SCP	None
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	See Table 4.2.2-6		SCP	None
Digital Mammography X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.2	See Table 4.2.2-6		SCP	None
Digital Mammography X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	See Table 4.2.2-6		SCP	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	See Table 4.2.2-6		SCP	None
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	See Table 4.2.2-6		SCP	None
Multi-frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	See Table 4.2.2-6		SCP	None
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	See Table 4.2.2-6		SCP	None
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	See Table 4.2.2-7		SCP	None
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.4.1	See Table 4.2.2-7		SCP	None
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	See Table 4.2.2-7		SCP	None
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	See Table 4.2.2-7		SCP	None
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	See Table 4.2.2-6		SCP	None
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	See Table 4.2.2-6		SCP	None
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	See Table 4.2.2-6		SCP	None
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	See Table 4.2.2-6		SCP	None
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	See Table 4.2.2-6		SCP	None
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	See Table 4.2.2-6		SCP	None
Mammography CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.50	See Table 4.2.2-5		SCP	None
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	See Table 4.2.2-5		SCP	None

The SCP AE accepts presentation contexts using the following transfer syntaxes:

Table 4.2.2-5 – Acceptable Transfer Syntaxes for Non-Image Instances

Transfer Syntax Table	
Name	UID
Implicit VR Little Endian	1.2.840.10008.1.2
Explicit VR Little Endian	1.2.840.10008.1.2.1

Table 4.2.2-6 – Acceptable Transfer Syntaxes for Image Instances (Except Ultrasound)

Transfer Syntax Table	
Name	UID
Implicit VR Little Endian	1.2.840.10008.1.2
Explicit VR Little Endian	1.2.840.10008.1.2.1
RLE Lossless	1.2.840.10008.1.2.5
JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14 [Selection Value 1]): Default Transfer Syntax for Lossless JPEG Image Compression	1.2.840.10008.1.2.4.70

Table 4.2.2-7 – Acceptable Transfer Syntaxes for Ultrasound Image Instances

Transfer Syntax Table	
Name	UID
Implicit VR Little Endian	1.2.840.10008.1.2
Explicit VR Little Endian	1.2.840.10008.1.2.1
RLE Lossless	1.2.840.10008.1.2.5
JPEG Baseline (Process 1): Default Transfer Syntax for Lossy JPEG 8 Bit Image Compression	1.2.840.10008.1.2.4.50
JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14 [Selection Value 1]): Default Transfer Syntax for Lossless JPEG Image Compression	1.2.840.10008.1.2.4.70

4.2.2.4.1.3. SOP Specific Conformance for Storage SOP Classes

The SCP AE provides Level 2 (full) conformance to all of the accepted Storage SOP Classes. All received attributes of Type 1, 2, 3, and Private Attributes are stored without modification, and may be used by the SecurView DX workstation. Instances that are stored successfully are not accessible by remote systems.

The SCP AE does not preserve or replace digital signatures.

The SecurView DX workstation displays MR, CT, PET and NM images only if the multimodality viewer option is enabled.

The SecurView DX workstation displays Mammography CAD SR instances produced by any manufacturer. Mammography CAD SR instances produced by Hologic, Inc. or iCAD, Inc. are displayed according to the manufacturer's guidelines.

The SecurView DX workstation displays the Presentation State Identification and Graphic Annotation module content of any manufacturer's Grayscale Softcopy Presentation State instances (see 8.1.2, Usage of Attributes from Received IODs). All other Presentation State level module content is ignored (e.g. Shutter, Mask, Displayed Area, Graphic Layer, Softcopy VOI LUT). If a received Grayscale Softcopy Presentation State instance does not contain the Graphic Annotation module, it will be accepted and discarded. The Grayscale Softcopy Presentation State instances from a specific manufacturer and/or model application can be configured to be accepted and discarded if SecurView does not display the Graphic Annotation module content as expected.

The SCP AE will behave as described in the table below when generating the C-STORE response.

Table 4.2.2-8 – Storage C-STORE Response Status

Service Status	Further Meaning	Error Code	Reason
Success	Success	0000	Image is stored locally and made available to the user.
Failure	Refused: Out of Resources	A700	There is not enough local storage capacity to store the instance.

4.2.2.4.2. Activity – Receive Echo Request

4.2.2.4.2.1. Description and Sequencing of Activities

The SCP AE is always available to respond to echo requests from any remote Application Entity.

4.2.2.4.2.2. Accepted Presentation Contexts

The SCP AE accepts associations using the following presentation contexts:

Table 4.2.2-9 – Acceptable Presentation Contexts for Receive Echo Request

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Verification SOP Class	1.2.840.10008.1.1	Implicit VR, Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR, Little Endian	1.2.840.10008.1.2.1	SCP	None

4.2.2.4.2.3. SOP Specific Conformance for Verification SOP Class

The SCP AE provides standard conformance to the Verification Service Class.

4.3. Network Interfaces

4.3.1. Physical Network Interface

The SecurView DX workstation is tested and supports using 100-BaseT and 1000-BaseT Ethernet media.

4.3.2. Additional Protocols

None.

4.4. Configuration

4.4.1. AE Title/Presentation Address Mapping

A service user configures the SecurView DX workstation's SCU AE and SCP AE, and remote SCP AEs during site installation, by entering the AE Title, IP Address, and TCP/IP port number for each. When configuring a remote Print AE, a predefined printer specific configuration is also selected. In the multimodality viewer, the SCU AE Title for printing is configured per printer destination. There are no dedicated ports associated with dedicated services.

4.4.2. Configuration Parameters

The following are some of the relevant configurable items for the local and remote AEs:

Table 4.4-1 – Configuration Parameters

Parameter	Configurable (Yes/No)	Default Value
Remote Print AE for Mammography Viewer		
Printer name (manufacturer, model, default film size)	Yes	Per known printer
Configuration info	Yes	Per known printer
Dmin	Yes	Per known printer
Dmax	Yes	Per known printer
Portrait matrix (n x m)	Yes	Per known printer
Landscape matrix (n x m)	Yes	Per known printer
Portrait pixel spacing (n x m)	Yes	Per known printer
Landscape pixel spacing (n x m)	Yes	Per known printer
Bit depth (12 or 8)	Yes	Per known printer
Medium Type (blue film, clear film, mammo blue film, paper)	Yes	Per known printer
Medium Size (8inx10in ,10inx10in, 10inx12in, 10inx14in, 11inx14in, 14inx14in, 14inx17in)	Yes	Per known printer
Printer LUT	Yes	P_to_LIN_at_5000
Print Mode (Standard, Presentation LUT)	Yes	Standard
Luminescence (Presentation LUT mode only)	Yes	5000
Reflected ambient light (Presentation LUT mode only)	Yes	10
Presentation LUT Shape (Presentation LUT mode only)	Yes	IDENTITY
Remote Print AE for Multimodality Viewer		
Printer name (to identify printer on user interface)	Yes	Per known printer
SupportsPresentationLUT (true, false) <true means Presentation LUT SOP Class is used>	Yes	Per known printer
FilmSizeID (8inx10in ,10inx10in, 10inx12in, 10inx14in, 11inx14in, 14inx14in, 14inx17in, A4)	Yes	Per known printer
BlackOnWhite (true, false) <Polarity>	Yes	Per known printer
MaxPDU (4096...65536)	Yes	Per known printer
SupportsTrim (true, false)	Yes	Per known printer
MediumType (blue film, clear film, mammo blue film, paper)	Yes	Per known printer
ResolutionID (STANDARD, HIGH)	Yes	Per known printer
Magnification Type (CUBIC, REPLICATE, BILINEAR, NONE)	Yes	Per known printer
Smoothing Type (NONE or omit)	Yes	Per known printer
BorderDensity (BLACK, WHITE, 150)	Yes	Per known printer
EmptyImageDensity (BLACK, WHITE, 150)	Yes	Per known printer
MinDensity	Yes	Per known printer
MaxDensity	Yes	Per known printer
Film Destination (PROCESSOR, MAGAZINE)	Yes	Per known printer

Parameter	Configurable (Yes/No)	Default Value
General Parameters		
Number of seconds to wait for association request or release	Yes	30
Number of seconds to wait for reply to association request	Yes	15
Number of seconds to wait for reply to association release	Yes	15
Maximum PDU size the local AE can receive	Yes	28K
Modules that Invoke SCU AE		
Font size for text in multimodality viewer printing	Yes	6
Font size for patient info in mammography viewer diagnostic printing	Yes	12
Font size for all other text in mammography viewer diagnostic printing	Yes	10
Font size for annotations in mammography viewer screen capture printing	Yes	18
Relaxed error handling in mammography viewer (for print)	Yes	On
Destination(s) for GSPS state instances	Yes	None
Destination(s) for secondary captures	Yes	None
SOP Class for secondary captures (SC Image/Multi-frame Grayscale Word)	Yes	SC Image
Destination(s) for screen captures	Yes	None
Number of automatic retries on store before reporting failure	Yes	3
Auto-Fetch Digital Mammography images (On/Off)	Yes	On
Auto-Fetch Hologic Screen Capture images (On/Off)	Yes	Off
Number of priors to auto-fetch	Yes	1
Number of years of priors to auto-fetch	Yes	2
Number of automatic retries on auto-fetch before reporting failure	No	5
Auto-Fetch Q/R Level (Study, Series, Image)	Yes	Series
Search on PACS Q/R Level (Study, Series, Image)	Yes	Series
Search on PACS sends optional Study level attributes (On/Off)	Yes	On
Search on PACS optional Study level attributes to send (On/Off)	Yes	some On, some Off
Search on PACS sends optional Series level attributes (On/Off)	Yes	On
Search on PACS optional Series level attributes to send (On/Off)	Yes	some On, some Off
Search on PACS sends optional Image level attributes (On/Off)	Yes	On
Search on PACS optional Image level attributes to send (On/Off)	Yes	some On, some Off
(Search on PACS) Number of minutes to wait for C-FIND / C-MOVE response	Yes	10
(Auto-Fetch) Number of minutes to wait for C-MOVE response	Yes	11
SCP AE		
Auto-Fetch trigger (On/Off)	Yes	Off
Received Mammography CAD SR triggers auto-fetch (On/Off)	Yes	Off
Received GSPS triggers auto-fetch (On/Off)	Yes	Off

5. Media Interchange

5.1. Implementation Model

5.1.1. Application Data Flow Diagram

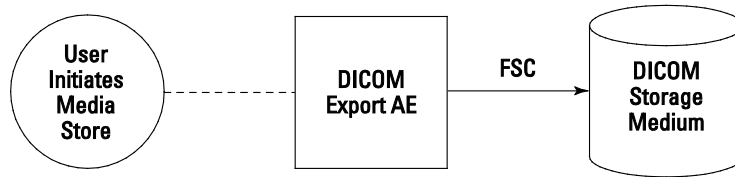


Figure 5.1-1: Application Data Flow Diagram for Media Storage

The DICOM Export AE provides a means to export patient images using DICOM Part 10: Media Storage and File Format for Media Interchange. Patient images can be recorded via a CD/DVD drive. This feature is provided as a matter of convenience for users to move images from one system to another via removable media. This feature is not intended to serve as an archive for permanently storing images.

5.1.2. Functional Definition of AEs

The DICOM Export AE can store patient images to CD-R.

DICOM Part 10 files can be imported from media using a service utility. For information on the import service utility, please refer to service documentation for the SecurView DX workstation.

The SecurView DX workstation supports DICOM Media Storage as FSC.

5.1.3. Sequencing of Real-World Activities

The SecurView DX Workstation Patient List provides a context menu item to export all images and related objects for selected patients to removable media.

5.1.4. File Meta Information for Implementation Class Version

The implementation information written to the File Meta Header in each file is:

Table 5.1-1 – DICOM Implementation Class and Version for Media Storage

Implementation Class UID	1.2.276.0.28.3.0.12.701000
Implementation Version Name	MBC_SCR_0701000

5.2. AE Specifications

5.2.1. Media Server AE Specification

The DICOM Export AE provides standard conformance to the DICOM Interchange Option of the Media Storage Service Class (SC). The Application Profiles and roles are listed below:

Table 5.2-1 – AE-Related Application Profiles, Real-World Activities, and Roles

Supported Application Profile	Real-World Activity	Roles	SC Option
STD-GEN-CD	User Initiates Media Store	FSC	Interchange

5.2.1.1. File Meta Information for Media Server AE

The Source Application Entity Title included in the File Meta Header is the local AE Title of the SecurView DX workstation.

5.2.1.2. Real-World Activities

5.2.1.2.1. Activity – User Initiates Media Store

The DICOM Export AE acts as an FSC using the interchange option when requested to export images to CD-R.

To store images to removable media, the user selects one or more patients from the Patient List, and then selects the <Export to media> context menu item. All Image, Mammography CAD SR, and Grayscale Softcopy Presentation State Instances that are available locally for the selected patients are stored to the disc. Images can be added to any disc, provided the capacity is available to record all Instances for the selected patients.

5.2.1.2.1.1. Media Storage Application Profile

The DICOM Export AE supports the STD-GEN-CD Application Profile. An empty CD is required for each export. Multi-session writes are not supported.

5.2.1.2.1.1.1. Options

The DICOM Export AE supports the SOP Classes and Transfer Syntaxes listed in the table below:

Table 5.2-2 – SOP Classes and Transfer Syntaxes for Media Server

SOP Class Name	SOP Class UID	Transfer Syntax	Transfer Syntax UID
Media Storage Directory Storage	1.2.840.10008.1.3.10	Explicit VR Little Endian	1.2.840.10008.1.2.1
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1
Digital Mammography X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.2	Explicit VR Little Endian	1.2.840.10008.1.2.1
Digital Mammography X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	Explicit VR Little Endian	1.2.840.10008.1.2.1
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Explicit VR Little Endian	1.2.840.10008.1.2.1
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	Explicit VR Little Endian	1.2.840.10008.1.2.1
Multi-frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	Explicit VR Little Endian	1.2.840.10008.1.2.1
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Explicit VR Little Endian	1.2.840.10008.1.2.1
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Explicit VR Little Endian	1.2.840.10008.1.2.1
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Explicit VR Little Endian	1.2.840.10008.1.2.1
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	Explicit VR Little Endian	1.2.840.10008.1.2.1
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	Explicit VR Little Endian	1.2.840.10008.1.2.1
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	Explicit VR Little Endian	1.2.840.10008.1.2.1
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Explicit VR Little Endian	1.2.840.10008.1.2.1

6. Support of Character Sets

SOP Class Name	SOP Class UID	Transfer Syntax	Transfer Syntax UID
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	Explicit VR Little Endian	1.2.840.10008.1.2.1
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	Explicit VR Little Endian	1.2.840.10008.1.2.1
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	Explicit VR Little Endian	1.2.840.10008.1.2.1
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Explicit VR Little Endian	1.2.840.10008.1.2.1
Mammography CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.50	Explicit VR Little Endian	1.2.840.10008.1.2.1
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	Explicit VR Little Endian	1.2.840.10008.1.2.1

5.3. Augmented and Private Application Profiles

None.

5.4. Media Configuration

None.

6. Support of Character Sets

The SecurView DX workstation supports the following character sets:

- Default: ISO-IR 6
- Latin Alphabet No. 1: ISO-IR 100

7. Security

The SecurView DX workstation does not support any specific DICOM security measures.

It is assumed that the SecurView DX workstation is used within a secured environment. For additional information about Hologic security policies, see Hologic's Enterprise Cybersecurity Best Practices, SecurView 7.x Cybersecurity Product Report and SecurView 7.x Antivirus Software Installation documents.

8. Annexes

8.1. IOD Contents

8.1.1. Created SOP Instance(s)

Abbreviations for Presence of Value:

ALWAYS	Attribute always present with a value
ANAP	Attribute not always present
EMPTY	Attribute is sent without a value (zero length)
VNAP	Attribute value not always present (zero length if no value is present)

Abbreviations for Source:

AUTO	Attribute value is generated automatically
CONFIG	Attribute value source is a configurable parameter
MWL	Attribute value is the same as the value received using Modality Worklist
USER	Attribute value source is from User input

8.1.1.1. Grayscale Softcopy Presentation State IOD

The attributes that are contained in created GSPS Instances are listed in the following tables.

Table 8.1.1-1 – IOD of Created GSPS SOP Instances

IE	Module	Reference	Presence of Module
Patient	Patient	Table 8.1.1-2	ALWAYS
Study	General Study	Table 8.1.1-3	ALWAYS
	Patient Study	Table 8.1.1-4	ALWAYS
Series	General Series	Table 8.1.1-5	ALWAYS
	Presentation Series	Table 8.1.1-5	ALWAYS
Equipment	General Equipment	Table 8.1.1-6	ALWAYS
Presentation State	Presentation State	Table 8.1.1-7	ALWAYS
	Displayed Area	Table 8.1.1-8	ALWAYS
	Graphic Annotation	Table 8.1.1-9	ANAP
	Graphic Layer	Table 8.1.1-10	ANAP
	Softcopy VOI LUT	Table 8.1.1-11	ALWAYS
	Softcopy Presentation LUT	Table 8.1.1-12	ALWAYS
	SOP Common	Table 8.1.1-13	ALWAYS

8.1.1.2. Grayscale Softcopy Presentation State Modules

Table 8.1.1-2 – Patient Module of Created GSPS Instances

Attribute Name	Tag	Value	Presence of Value	Source
Patient's Name	(0010,0010)	Copied from current patient	ALWAYS	AUTO
Patient ID	(0010,0020)	Copied from current patient	ALWAYS	AUTO
Patient's Birth Date	(0010,0030)	Copied from current patient	VNAP	AUTO
Patient's Sex	(0010,0040)	Copied from current patient	VNAP	AUTO
All other Patient Attributes		Copied from current patient	ANAP	AUTO

Table 8.1.1-3 – General Study Module of Created GSPS Instances

Attribute Name	Tag	Value	Presence of Value	Source
Study Date	(0008,0020)	Copied from current study	ALWAYS	AUTO
Study Time	(0008,0030)	Copied from current study	ALWAYS	AUTO
Accession Number	(0008,0050)	Copied from current study	VNAP	AUTO
Referring Physician's Name	(0008,0090)	Copied from current study	VNAP	AUTO
Study Description	(0008,1030)	Copied from current study	ANAP	AUTO
Study Instance UID	(0020,000D)	Copied from current study	ALWAYS	AUTO
Study ID	(0020,0010)	Copied from current study	VNAP	AUTO
All other Study Attributes		Copied from current study	ANAP	AUTO

Table 8.1.1-4 – Patient Study Module of Created GSPS Instances

Attribute Name	Tag	Value	Presence of Value	Source
Patient's Age	(0010,1010)	Copied from current patient	ANAP	AUTO
All other Patient Study Attributes		Copied from current patient or study	ANAP	AUTO

Table 8.1.1-5 – General & Presentation Series Modules of Created GSPS Instances

Attribute Name	Tag	Value	Presence of Value	Source
Modality	(0008,0060)	PR	ALWAYS	AUTO
Series Instance UID	(0020,000E)	Unique worldwide	ALWAYS	AUTO
Series Number	(0020,0011)	1	ALWAYS	AUTO
Operators' Name	(0008,1070)	Copied from referenced series	ANAP	AUTO
Series Description	(0008,103E)	SecurView GSPS	ALWAYS	AUTO

Table 8.1.1-6 – General Equipment Module of Created GSPS Instances

Attribute Name	Tag	Value	Presence of Value	Source
Manufacturer	(0008,0070)	HOLOGIC, Inc.	ALWAYS	AUTO
Institution Name	(0008,0080)		ALWAYS	CONFIG
Institution Address	(0008,0081)		ANAP	CONFIG
Station Name	(0008,1010)	Local SCU AE Title	ALWAYS	CONFIG
Manufacturer's Model Name	(0008,1090)	SecurView	ALWAYS	AUTO
Software Versions	(0018,1020)	The current software version	ALWAYS	AUTO

Table 8.1.1-7 – Presentation State Module of Created GSPS Instances

Attribute Name	Tag	Value	Presence of Value	Source
Referenced Series Sequence	(0008,1115)	One Item per series in current study available on SecurView DX	ALWAYS	AUTO
>Series Instance UID	(0020,000E)		ALWAYS	AUTO
>Referenced Image Sequence	(0008,1140)	One Item per image in referenced series	ALWAYS	AUTO
>>Referenced SOP Class UID	(0008,1150)		ALWAYS	AUTO
>>Referenced SOP Instance UID	(0008,1155)		ALWAYS	AUTO
Instance Number	(0020,0013)	1	ALWAYS	AUTO
Content Label	(0070,0080)	HOLOGIC REPORT	ALWAYS	AUTO
Content Description	(0070,0081)	User name, Date, Time	ALWAYS	AUTO
Presentation Creation Date	(0070,0082)		ALWAYS	AUTO
Presentation Creation Time	(0070,0083)		ALWAYS	AUTO
Content Creator's Name	(0070,0084)	Current user name	ALWAYS	AUTO

Table 8.1.1-8 – Displayed Area Module of Created GSPS Instances

Attribute Name	Tag	Value	Presence of Value	Source
Displayed Area Selection Sequence	(0070,005A)	One Item per image in Referenced Series Sequence	ALWAYS	AUTO
>Referenced Image Sequence	(0008,1140)	One Item	ALWAYS	AUTO
>>Referenced SOP Class UID	(0008,1150)		ALWAYS	AUTO
>>Referenced SOP Instance UID	(0008,1155)		ALWAYS	AUTO
>Displayed Area Top Left Hand Corner	(0070,0052)	0\0	ALWAYS	AUTO
>Displayed Area Bottom Right Hand Corner	(0070,0053)	Columns\Rows	ALWAYS	AUTO
>Presentation Size Mode	(0070,0100)	SCALE TO FIT	ALWAYS	AUTO
>Presentation Pixel Aspect Ratio	(0070,0102)	1\1	ALWAYS	AUTO

Table 8.1.1-9 – Graphic Annotation Module of Created GSPS Instances

Attribute Name	Tag	Value	Presence of Value	Source
Graphic Annotation Sequence	(0070,0001)	Zero or more Items	ANAP	USER
>Referenced Image Sequence	(0008,1140)	One Item	ALWAYS	AUTO
>>Referenced SOP Class UID	(0008,1150)		ALWAYS	AUTO
>>Referenced SOP Instance UID	(0008,1155)		ALWAYS	AUTO
>>Referenced Frame Number	(0008,1160)	Only if referenced SOP Class is multi-frame	ANAP	AUTO
>Graphic Layer	(0070,0002)	LAYER0	ALWAYS	AUTO
>Text Object Sequence	(0070,0008)	Zero or more Items	ANAP	USER
>>Anchor Point Annotation Units	(0070,0004)	PIXEL	ALWAYS	AUTO
>>Unformatted Text Value	(0070,0006)		ALWAYS	USER
>>Anchor Point	(0070,0014)		ALWAYS	AUTO
>>Anchor Point Visibility	(0070,0015)	N	ALWAYS	AUTO
>Graphic Object Sequence	(0070,0009)	Zero or more Items	ANAP	USER
>>Graphic Annotation Units	(0070,0005)	PIXEL	ALWAYS	AUTO
>>Graphic Dimensions	(0070,0020)	2	ALWAYS	AUTO
>>Number of Graphic Points	(0070,0021)	Depends on Graphic Type	ALWAYS	AUTO
>>Graphic Data	(0070,0022)	Depends on Graphic Type	ALWAYS	USER
>>Graphic Type	(0070,0023)	ELLIPSE or POLYLINE	ALWAYS	USER
>>Graphic Filled	(0070,0024)	N	ALWAYS	AUTO

Table 8.1.1-10 – Graphic Layer Module of Created GSPS Instances

Attribute Name	Tag	Value	Presence of Value	Source
Graphic Layer Sequence	(0070,0060)	One Item, if Graphic Annotation Sequence is present	ANAP	AUTO
>Graphic Layer	(0070,0002)	LAYER0	ALWAYS	AUTO
>Graphic Layer Order	(0070,0062)	1	ALWAYS	AUTO
>Graphic Layer Recommended Display Grayscale Value	(0070,0066)	FFFFH	ALWAYS	AUTO

Table 8.1.1-11 – Softcopy VOI LUT Module of Created GSPS Instances

Attribute Name	Tag	Value	Presence of Value	Source
Softcopy VOI LUT Sequence	(0028,3110)	One Item per image in Referenced Series Sequence. Item will contain either one VOI LUT Sequence Item or one pair of WC/WW values	ANAP	AUTO
>Referenced Image Sequence	(0008,1140)	One Item	ALWAYS	AUTO
>>Referenced SOP Class UID	(0008,1150)		ALWAYS	AUTO
>>Referenced SOP Instance UID	(0008,1155)		ALWAYS	AUTO
>Window Center	(0028,1050)	Single value, if present	ANAP	USER
>Window Width	(0028,1051)	Single value, if present	ANAP	USER
>VOI LUT Function	(0028,1056)	LINEAR or SIGMOID, if present	ANAP	USER
>VOI LUT Sequence	(0028,3010)	One Item, if present	ANAP	USER
>>LUT Descriptor	(0028,3002)		ANAP	USER
>>LUT Data	(0028,3006)		ANAP	USER

Table 8.1.1-12 – Softcopy Presentation LUT Module of Created GSPS Instances

Attribute Name	Tag	Value	Presence of Value	Source
Presentation LUT Shape	(2050,0020)	IDENTITY or INVERSE	ALWAYS	AUTO

Table 8.1.1-13 – SOP Common Module of Created GSPS Instances

Attribute Name	Tag	Value	Presence of Value	Source
Specific Character Set	(0008,0005)	ISO_IR 100	ALWAYS	AUTO
Instance Creation Date	(0008,0012)	Current date	ALWAYS	AUTO
Instance Creation Time	(0008,0013)	Current time	ALWAYS	AUTO
SOP Class UID	(0008,0016)	Grayscale Softcopy Presentation State Storage	ALWAYS	AUTO
SOP Instance UID	(0008,0018)	Unique worldwide	ALWAYS	AUTO

8.1.1.3. Secondary Capture Image IODs

The attributes that are contained in created Secondary Capture Image and Multi-frame Grayscale Word Secondary Capture Image Instances are listed in the following tables.

Table 8.1.1-14 – IOD of Created SC Image Instances

IE	Module	Reference	Presence of Module
Patient	Patient	Table 8.1.1-16	ALWAYS
Study	General Study	Table 8.1.1-17 or Table 8.1.1-18	ALWAYS
Series	General Series	Table 8.1.1-19 or Table 8.1.1-20	ALWAYS
Equipment	General Equipment	Table 8.1.1-21	ALWAYS
	SC Equipment	Table 8.1.1-21	ALWAYS
Image	General Image	Table 8.1.1-22	ALWAYS
	Image Pixel	Table 8.1.1-23 or Table 8.1.1-24	ALWAYS
	VOI LUT	Table 8.1.1-25	ALWAYS
	SOP Common	Table 8.1.1-26	ALWAYS

Table 8.1.1-15 – IOD of Created Multi-frame SC Image Instances

IE	Module	Reference	Presence of Module
Patient	Patient	Table 8.1.1-16	ALWAYS
Study	General Study	Table 8.1.1-18	ALWAYS
Series	General Series	Table 8.1.1-20	ALWAYS
Equipment	General Equipment	Table 8.1.1-21	ALWAYS
	SC Equipment	Table 8.1.1-21	ALWAYS
Image	General Image	Table 8.1.1-22	ALWAYS
	Image Pixel	Table 8.1.1-24	ALWAYS
	Multi-frame	Table 8.1.1-27	ALWAYS
	SC Multi-frame Image	Table 8.1.1-28	ALWAYS
	SOP Common	Table 8.1.1-26	ALWAYS

8.1.1.4. Secondary Capture Image Modules

Table 8.1.1-16 – Patient Module of Created SC Image Instances

Attribute Name	Tag	Value	Presence of Value	Source
Patient's Name	(0010,0010)	Copied from current patient	ALWAYS	AUTO
Patient ID	(0010,0020)	Copied from current patient	ALWAYS	AUTO
Patient's Birth Date	(0010,0030)	Copied from current patient	VNAP	AUTO
Patient's Sex	(0010,0040)	Copied from current patient	VNAP	AUTO
All other Patient Attributes		Copied from current patient	ANAP	AUTO

Table 8.1.1-17 – General Study Module of Created Screen Capture Image Instances

Attribute Name	Tag	Value	Presence of Value	Source
Study Date	(0008,0020)	Copied from newest study in content	VNAP	AUTO
Study Time	(0008,0030)	Copied from newest study in content	VNAP	AUTO
Accession Number	(0008,0050)	Copied from newest study in content	VNAP	AUTO
Referring Physician's Name	(0008,0090)	Copied from newest study in content	VNAP	AUTO
Study Description	(0008,1030)	Copied from newest study in content	ANAP	AUTO
Study Instance UID	(0020,000D)	Copied from newest study in content	ALWAYS	AUTO
Study ID	(0020,0010)	Copied from newest study in content	VNAP	AUTO

Table 8.1.1-18 – General Study Module of Created Secondary Capture Image Instances

Attribute Name	Tag	Value	Presence of Value	Source
Study Date	(0008,0020)	Copied from source image	ALWAYS	AUTO
Study Time	(0008,0030)	Copied from source image	VNAP	AUTO
Accession Number	(0008,0050)	Copied from source image	VNAP	AUTO
Referring Physician's Name	(0008,0090)	Copied from source image	VNAP	AUTO
Study Description	(0008,1030)	Copied from source image	ANAP	AUTO
Study Instance UID	(0020,000D)	Copied from source image	ALWAYS	AUTO
Study ID	(0020,0010)	Copied from source image	VNAP	AUTO

Table 8.1.1-19 – General Series Module of Created Screen Capture Image Instances

Attribute Name	Tag	Value	Presence of Value	Source
Series Date	(0008,0021)	Current date	ALWAYS	AUTO
Series Time	(0008,0031)	Current time	ALWAYS	AUTO
Modality	(0008,0060)	OT	ALWAYS	AUTO
Series Description	(0008,103E)	Name of result folder	ALWAYS	USER
Performing Physician's Name	(0008,1050)	Current user name	ALWAYS	AUTO
Body Part Examined	(0018,0015)	Copied from newest image set in content	ANAP	AUTO
Protocol Name	(0018,1030)	Copied from newest image set in content	ANAP	AUTO
Series Instance UID	(0020,000E)	Unique worldwide	ALWAYS	AUTO
Series Number	(0020,0011)	74200000	ALWAYS	AUTO
Laterality	(0020,0060)	Copied from newest image set in content	ANAP	AUTO

Table 8.1.1-20 – General Series Module of Created Secondary Capture Image Instances

Attribute Name	Tag	Value	Presence of Value	Source
Series Date	(0008,0021)	Current date	ALWAYS	AUTO
Series Time	(0008,0031)	Current time	ALWAYS	AUTO
Modality	(0008,0060)	Copied from source image	ALWAYS	AUTO
Series Description	(0008,103E)	SecurView Secondary Capture	ALWAYS	AUTO
Performing Physician's Name	(0008,1050)	Current user name	ALWAYS	AUTO
Body Part Examined	(0018,0015)	Copied from source image	ANAP	AUTO
Protocol Name	(0018,1030)	Copied from source image	ANAP	AUTO
Series Instance UID	(0020,000E)	Unique worldwide	ALWAYS	AUTO
Series Number	(0020,0011)	74100000	ALWAYS	AUTO
Laterality	(0020,0060)	Copied from source image	ANAP	AUTO

Table 8.1.1-21 – General & SC Equipment Modules of Created SC Image Instances

Attribute Name	Tag	Value	Presence of Value	Source
Conversion Type	(0008,0064)	WSD	ALWAYS	AUTO
Manufacturer	(0008,0070)	HOLOGIC, Inc.	ALWAYS	AUTO
Institution Name	(0008,0080)		ALWAYS	CONFIG
Institution Address	(0008,0081)		ALWAYS	CONFIG
Station Name	(0008,1010)	Local SCU AE Title	ALWAYS	CONFIG
Manufacturer's Model Name	(0008,1090)	SecurView	ALWAYS	AUTO
Software Versions	(0018,1020)	Current software version	ALWAYS	AUTO

Table 8.1.1-22 – General Image Module of Created SC Image Instances

Attribute Name	Tag	Value	Presence of Value	Source
Image Type	(0008,0008)	DERIVED\SECONDARY	ALWAYS	AUTO
Acquisition Date	(0008,0022)	Current date	ALWAYS	AUTO
Content Date	(0008,0023)	Current date	ALWAYS	AUTO
Acquisition Time	(0008,0032)	Current time	ALWAYS	AUTO
Content Time	(0008,0033)	Current time	ALWAYS	AUTO
Derivation Description	(0008,2111)	ScreenCapture or Secondary Capture	ALWAYS	AUTO
Source Image Sequence	(0008,2112)	secondary capture only, one Item, reference represented image	ALWAYS	AUTO
>Referenced SOP Class UID	(0008,1150)		ALWAYS	AUTO
>Referenced SOP Instance UID	(0008,1155)		ALWAYS	AUTO
Instance Number	(0020,0013)	1	ALWAYS	AUTO
Patient Orientation	(0020,0020)	secondary capture only, if known	ANAP	AUTO
Image Comments	(0020,4000)	screen capture only, SecurView ScreenCapture	ALWAYS	AUTO
Burned in Annotation	(0028,0301)	screen capture only, YES if patient information overlay is included, NO otherwise	ALWAYS	AUTO
Pixel Spacing	(0028,0030)	secondary capture only, if known	ANAP	AUTO
Nominal Scanned Pixel Spacing	(0018,2010)	secondary capture only, if known	ANAP	AUTO

Table 8.1.1-23 – Image Pixel Module of Created Screen Capture Image Instances

Attribute Name	Tag	Value	Presence of Value	Source
Samples per Pixel	(0028,0002)	3	ALWAYS	AUTO
Photometric Interpretation	(0028,0004)	RGB	ALWAYS	AUTO
Planar Configuration	(0028,0006)	0	ALWAYS	AUTO
Rows	(0028,0010)	# rows in screen capture	ALWAYS	AUTO
Columns	(0028,0011)	# rows in screen capture	ALWAYS	AUTO
Bits Allocated	(0028,0100)	8	ALWAYS	AUTO
Bits Stored	(0028,0101)	8	ALWAYS	AUTO
High Bit	(0028,0102)	7	ALWAYS	AUTO
Pixel Representation	(0028,0103)	0	ALWAYS	AUTO
Pixel Data	(7FE0,0010)		ALWAYS	USER

Table 8.1.1-24 – Image Pixel Module of Created Secondary Capture Image Instances

Attribute Name	Tag	Value	Presence of Value	Source
Samples per Pixel	(0028,0002)	1	ALWAYS	AUTO
Photometric Interpretation	(0028,0004)	MONOCHROME2	ALWAYS	AUTO
Rows	(0028,0010)	# rows in secondary capture	ALWAYS	AUTO
Columns	(0028,0011)	# rows in secondary capture	ALWAYS	AUTO
Bits Allocated	(0028,0100)	16	ALWAYS	AUTO
Bits Stored	(0028,0101)	12	ALWAYS	AUTO
High Bit	(0028,0102)	11	ALWAYS	AUTO
Pixel Representation	(0028,0103)	0	ALWAYS	AUTO
Pixel Data	(7FE0,0010)		ALWAYS	USER

Table 8.1.1-25 – VOI LUT Module of Created SC Image Instances

Attribute Name	Tag	Value	Presence of Value	Source
Window Center	(0028,1050)	2048	ALWAYS	AUTO
Window Width	(0028,1051)	4096	ALWAYS	AUTO

Table 8.1.1-26 – SOP Common Module of Created SC Image Instances

Attribute Name	Tag	Value	Presence of Value	Source
Specific Character Set	(0008,0005)	ISO_IR 100 for secondary capture Copied from newest image set in content for screen capture	ALWAYS	AUTO
SOP Class UID	(0008,0016)	Secondary Capture Image Storage or Multi-frame Grayscale Word Secondary Capture Image Storage (secondary capture only)	ALWAYS	CONFIG
SOP Instance UID	(0008,0018)	Unique worldwide	ALWAYS	AUTO

Table 8.1.1-27 – Multi-frame Module of Created Secondary Capture Image Instances

Attribute Name	Tag	Value	Presence of Value	Source
Number of Frames	(0028,0008)	1	ALWAYS	AUTO

Table 8.1.1-28 – SC Multi-frame Image Module of Created Secondary Capture Image Instances

Attribute Name	Tag	Value	Presence of Value	Source
Burned in Annotation	(0028,0301)	NO	ALWAYS	AUTO
Rescale Intercept	(0028,1052)	0	ALWAYS	AUTO
Rescale Slope	(0028,1052)	1	ALWAYS	AUTO
Rescale Type	(0028,1053)	US	ALWAYS	AUTO
Presentation LUT Shape	(2050,0020)	IDENTITY	ALWAYS	AUTO

Table 8.1.1-29 – Standard Extended Attributes of Created Secondary Capture Image Instances

Attribute Name	Tag	Value	Presence of Value	Source
View Position	(0018,5101)	Copied from source image	ANAP	AUTO
View Code Sequence	(0054,0220)	Copied from source image	ANAP	AUTO
>Code Value	(0008,0100)	Copied from source image	ANAP	AUTO
>Coding Scheme Designator	(0008,0102)	Copied from source image	ANAP	AUTO
>Code Meaning	(0008,0104)	Copied from source image	ANAP	AUTO
>View Modifier Code Sequence	(0054,0222)	Copied from source image	ANAP	AUTO

8.1.2. Usage of Attributes from Received IODs

Attributes with incorrect values may cause undesirable behaviors, or disable certain SecurView DX workstation functionality. In most instances, it is not possible for the SecurView DX workstation software to detect incorrect attribute values.

The following attributes and values are expected for successful interpretation of received SOP Instances.

Table 8.1.2-1 – Expected Attributes in All Received Instances

Attribute Name	Tag	Expected Value
SOP Class UID	(0008,0016)	Matches the Pixel Data
SOP Instance UID	(0008,0018)	Unique worldwide
Study Date	(0008,0020)	Non-zero length
Modality	(0008,0060)	Matches the SOP Class UID
Patient's Name	(0010,0010)	Non-zero length
Patient ID	(0010,0020)	Non-zero length
Patient's Birth Date	(0010,0030)	Zero length accepted
Study Instance UID	(0020,000D)	Unique worldwide
Series Instance UID	(0020,000E)	Unique worldwide

Table 8.1.2-2 – Expected Attributes in All Received Image Instances

Attribute Name	Tag	Expected Value
Patient Orientation	(0020,0020)	Required for automatic hanging of mammography images
Laterality	(0020,0060)	If the anatomy is a paired body part, required for automatic hanging: “L”, “R”, or “B”
Image Laterality	(0020,0062)	
Samples per Pixel	(0028,0002)	1 or 3
Photometric Interpretation	(0028,0004)	MONOCHROME1, MONOCHROME2, RGB, PALETTE COLOR, YBR_FULL, YBR_FULL_422, or YBR_PARTIAL_422
Planar Configuration	(0028,0006)	Expected with Samples per Pixel > 1
Rows	(0028,0010)	Matches the Pixel Data
Columns	(0028,0011)	Matches the Pixel Data
Pixel Spacing	(0028,0030)	Required to convert measurement units to mm, if Imager Pixel Spacing is not present, or for Ultrasound images in the multimodality viewer, if Physical Delta X (0018,602C) within an Item of Sequence of Ultrasound Regions (0018,6011) is not present
Bits Allocated	(0028,0100)	Up to 16, matches Pixel Data
Bits Stored	(0028,0101)	Up to 16, matches Pixel Data
View Code Sequence	(0054,0220)	Required for automatic hanging of mammography images
>View Modifier Code Sequence	(0054,0222)	Values factored into automatic hanging of mammography images when present
Pixel Data	(7FE0,0010)	Rows*Columns*Bits Allocated*Samples per Pixel

Table 8.1.2-3 – Expected Attributes in Digital Mammography X-Ray Images

Attribute Name	Tag	Expected Value
Presentation Intent Type	(0008,0068)	FOR PRESENTATION or FOR PROCESSING
Manufacturer	(0008,0070)	Manufacturer of the equipment used to create the image
Source Image Sequence	(0008,2112)	FOR PRESENTATION images only, to match with corresponding Mammography CAD SR
>Referenced SOP Class UID	(0008,1150)	Digital Mammography X-Ray Image – For Processing
>Referenced SOP Instance UID	(0008,1155)	SOP Instance UID
Estimated Radiographic Magnification Factor	(0018,1114)	Used in sizing images for display and to convert measurement units to mm
Imager Pixel Spacing	(0018,1164)	Used in sizing images for display and to convert measurement units to mm
Pixel Padding Value	(0028,0120)	Used to maintain black background during W/L interaction
Pixel Padding Range Limit	(0028,0121)	Used to maintain black background during W/L interaction
Window Center	(0028,1050)	Valid values if present
Window Width	(0028,1051)	Valid values if present
VOI LUT Function	(0028,1052)	Used to interpret WC/WC values; default to LINEAR if not present
Rescale Intercept	(0028,1052)	0
Rescale Slope	(0028,1053)	1
Rescale Type	(0028,1054)	US
VOI LUT Sequence	(0028,3010)	Valid values in Items if present

Note: In addition, all other attributes that the IHE Mammography Image profile requires to be made available for display, if present.

Table 8.1.2-4 – Expected Attributes in Hologic Selenia Digital Mammography X-Ray Images

Attribute Name	Tag	Expected Value
Manufacturer	(0008,0070)	“LORAD” or “HOLOGIC, Inc.”
Private Attributes	(0019,xxxx)	Creator ID = LORAD Selenia

Table 8.1.2-5 – Expected Attributes in Mammography CAD SR Instances

Attribute Name	Tag	Expected Value
Manufacturer	(0008,0070)	“HOLOGIC, Inc.”, “R2 Technology, Inc.”, “CADx” or “iCAD, Inc.”: to display appropriate logo and to display CAD marks according to manufacturer preference
Software Versions	(0018,1020)	Non-zero length value

Table 8.1.2-6 – Supported Content Items in Any Mammography CAD SR Instance

Template	Rows	Expected Value
TID 4000, Mammography CAD Document Root	1-9	All mandatory content items
TID 4001, Mammography CAD Overall Impression/Recommendation	1, 3	All mandatory content items
TID 4003, Mammography CAD Individual Impression/Recommendation	1, 2, 5	All mandatory content items
TID 4006, Mammography CAD Single Image Finding	1-2, 4, 7	
TID 4015, CAD Detections Performed	1-4	All mandatory content items
TID 4016, CAD Analyses Performed	1-4	All mandatory content items
TID 4017, CAD Detection Performed	1, 2, 4	
TID 4018, CAD Analysis Performed	1, 2, 4	
TID 4019, CAD Algorithm Performed	1-3	
TID 4020, CAD Image Library Entry	1-12	All mandatory content items
TID 4021, Mammography CAD Geometry	1-4	Row 3, Outline: POLYLINE, CIRCLE, ELLIPSE

Note: Additional Mammography CAD SR Content Items are supported from the Hologic R2 Cenova server. For additional information, refer to the R2 Cenova DICOM Conformance Statement.

Table 8.1.2-7 – Expected Attributes in Grayscale Softcopy Presentation State Instances

Attribute Name	Tag	Expected Value
Referenced Series Sequence	(0008,1115)	One or more Items
Graphic Annotation Sequence	(0070,0001)	One or more Items, otherwise GSPS is discarded
>Referenced Image Sequence	(0008,1140)	One or more Items if annotations do not apply to all referenced images
>Graphic Layer	(0070,0002)	Ignored, all graphic and text objects are displayed at once
>Text Object Sequence	(0070,0008)	One or more items in Text Object Sequence and/or Graphic Object Sequence
>> Bounding Box Annotation Units	(0070,0003)	PIXEL (DISPLAY is not supported)
>>Anchor Point Annotation Units	(0070,0004)	PIXEL (DISPLAY is not supported)
>>Unformatted Text Value	(0070,0006)	Text is interpreted as ISO-IR 100
>>Bounding Box Top Left Hand Corner	(0070,0010)	
>>Bounding Box Bottom Right Hand Corner	(0070,0011)	
>>Bounding Box Text Horizontal Justification	(0070,0012)	Text will be LEFT aligned (RIGHT and CENTER are not supported)
>>Anchor Point	(0070,0014)	
>>Anchor Point Visibility	(0070,0015)	N (Y is not supported)
>Graphic Object Sequence	(0070,0009)	One or more items in Text Object Sequence and/or Graphic Object Sequence
>>Graphic Annotation Units	(0070,0005)	PIXEL (DISPLAY is not supported)
>>Graphic Dimensions	(0070,0020)	2

Attribute Name	Tag	Expected Value
>>Number of Graphic Points	(0070,0021)	According to Graphic Type
>>Graphic Data	(0070,0022)	According to Graphic Type
>>Graphic Type	(0070,0023)	POINT, POLYLINE, CIRCLE, ELLIPSE is displayed with enclosing circle if major and minor axes are not horizontal and vertical INTERPOLATED is displayed the same as POLYLINE
>>Graphic Filled	(0070,0024)	If Y, then the filling is grayscale value 160 from the range 0..255
Presentation Creation Date	(0070,0082)	Used to identify annotations on display
Presentation Creation Time	(0070,0083)	Used to identify annotations on display
Content Creator's Name	(0070,0084)	Used to identify annotations on display

8.1.3. Attribute Mapping

Not applicable.

8.1.4. Coerced/Modified Attributes

Regarding received Instances, the SecurView DX workstation will attempt to fill in missing attributes and correct invalid attribute values that are required for internal use. All Patient and Study attributes and Referenced SOP Instance UIDs that are copied from received instances to create new instances use the unmodified values as they were received.

If the Referenced SOP Instance UID (0008,1155) within a Source Image Sequence (0008,2112) Item of a Hologic Selenia Digital Mammography – For Presentation image is detected to be incorrect, it is corrected for use within the SecurView DX workstation.

8.2. Data Dictionary of Private Attributes

Not applicable.

8.3. Coded Terminology and Templates

Not applicable.

8.4. Grayscale Image Consistency

Display calibrations are performed according to the DICOM Grayscale Standard Display Function.

8.5. Standard Extended/Specialized/Private SOP Classes

When communicating with Siemens Magic-Store PACS as a remote Query/Retrieve AE, the SCU AE sends a non-conformant C-MOVE request at the Study Level prior to sending C-MOVE requests at the Series or Image Level. The non-conformant aspect is that (0000,0600) Move Destination is sent zero length. This behavior is expected by Siemens Magic-Store PACS.

8.6. Private Transfer Syntaxes

None.

