

# SecurView®

Breast Imaging Workstation



## SecurView® DX Workstation

DICOM Conformance Statement

Software Version 10.3

MAN-05778 Revision 002

**HOLOGIC®**

# SecurView<sup>®</sup> DX

Breast Imaging Workstation

## DICOM Conformance Statement

For Software Version 10.3

Part Number MAN-05778

Revision 002

October 2019

### Product Support

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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 markings/annotations and 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) |
|---|-----------------------|---------------------------|
| <b>Transfer</b>   |                       |                           |
| 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                       |
| Breast Tomosynthesis Image Storage  | No                    | Yes                       |
| Breast Projection X-Ray Image Storage – For Presentation  | No                    | Yes                       |
| Breast Projection X-Ray Image Storage – For Processing  | No                    | Option                    |
| 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                       |
| <b>Print Management</b>   |                       |                           |
| 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                        |
| <b>Query/Retrieve</b>   |                       |                           |
| Study Root Query/Retrieve Information Model – FIND  | Yes                   | No                        |
| Study Root Query/Retrieve Information Model – MOVE  | Yes                   | No                        |

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

**Table 1-2 – Media Services**

| <b>Media Storage Application Profile</b> | <b>Write Files (FSC or FSU)</b> | <b>Read Files (FSR)</b> |
|--|---------------------------------|-------------------------|
| <b>Compact Disk - Recordable</b>         |                                 |                         |
| General Purpose CD-R                     | Yes                             | Yes                     |
| <b>DVD</b>                               |                                 |                         |
| General Purpose DVD-RAM                  | Yes                             | Yes                     |
| <b>USB</b>                               |                                 |                         |
| General Purpose USB                      | Yes                             | Yes                     |

## 2. Table of Contents

|  |           |
|--|-----------|
| <b>1. Overview .....</b>   | <b>1</b>  |
| <b>2. Table of Contents .....</b>                                  | <b>3</b>  |
| <b>3. Introduction .....</b>                                       | <b>5</b>  |
| <b>3.1. Audience.....</b>  | <b>5</b>  |
| <b>3.2. Remarks.....</b>   | <b>5</b>  |
| <b>3.3. Definitions, Terms and Abbreviations.....</b>              | <b>5</b>  |
| <b>3.4. References .....</b>                                       | <b>6</b>  |
| <b>4. Networking.....</b>  | <b>7</b>  |
| <b>4.1. Implementation Model.....</b>                              | <b>7</b>  |
| 4.1.1. Application Data Flow .....                                 | 7         |
| 4.1.2. Functional Definition of AEs .....                          | 8         |
| 4.1.3. Sequencing of Real-World Activities .....                   | 9         |
| <b>4.2. AE Specifications .....</b>                                | <b>11</b> |
| 4.2.1. SCU AE.....   | 11        |
| 4.2.2. SCP AE.....   | 25        |
| <b>4.3. Network Interfaces .....</b>                               | <b>30</b> |
| 4.3.1. Physical Network Interface.....                             | 30        |
| 4.3.2. Additional Protocols .....                                  | 30        |
| <b>4.4. Configuration .....</b>                                    | <b>30</b> |
| 4.4.1. AE Title/Presentation Address Mapping.....                  | 30        |
| 4.4.2. Configuration Parameters .....                              | 30        |
| <b>5. Media Interchange.....</b>                                   | <b>33</b> |
| <b>5.1. Implementation Model.....</b>                              | <b>33</b> |
| 5.1.1. Application Data Flow Diagram.....                          | 33        |
| 5.1.2. Functional Definition of AEs .....                          | 33        |
| 5.1.3. Sequencing of Real-World Activities .....                   | 33        |
| 5.1.4. File Meta Information for Implementation Class Version..... | 33        |
| <b>5.2. AE Specifications .....</b>                                | <b>34</b> |
| 5.2.1. Media Server AE Specification.....                          | 34        |
| <b>5.3. Augmented and Private Application Profiles .....</b>       | <b>36</b> |
| <b>5.4. Media Configuration .....</b>                              | <b>36</b> |
| <b>6. Support of Character Sets .....</b>                          | <b>37</b> |
| <b>7. Security .....</b>   | <b>37</b> |
| <b>8. Annexes .....</b>  | <b>38</b> |
| <b>8.1. IOD Contents.....</b>                                      | <b>38</b> |
| 8.1.1. Created SOP Instance(s).....                                | 38        |

|  |           |
|--|-----------|
| 8.1.2. Usage of Attributes from Received IODs .....                | 48        |
| 8.1.3. Attribute Mapping .....                                     | 52        |
| 8.1.4. Coerced/Modified Attributes .....                           | 52        |
| <b>8.2. Data Dictionary of Private Attributes.....</b>             | <b>52</b> |
| <b>8.3. Coded Terminology and Templates .....</b>                  | <b>52</b> |
| <b>8.4. Grayscale Image Consistency.....</b>                       | <b>52</b> |
| <b>8.5. Standard Extended/Specialized/Private SOP Classes.....</b> | <b>52</b> |
| <b>8.6. Private Transfer Syntaxes .....</b>                        | <b>52</b> |

## 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® and Selenia Dimensions® full-field digital mammography systems.

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 10.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

**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

### 3.4. References

NEMA PS3 / ISO 12052, *Digital Imaging and Communications in Medicine (DICOM) Standard*, National Electrical Manufacturers Association, Rosslyn, VA, USA (available free at <http://medical.nema.org/>)



## 4. Networking

### 4.1. Implementation Model

#### 4.1.1. Application Data Flow

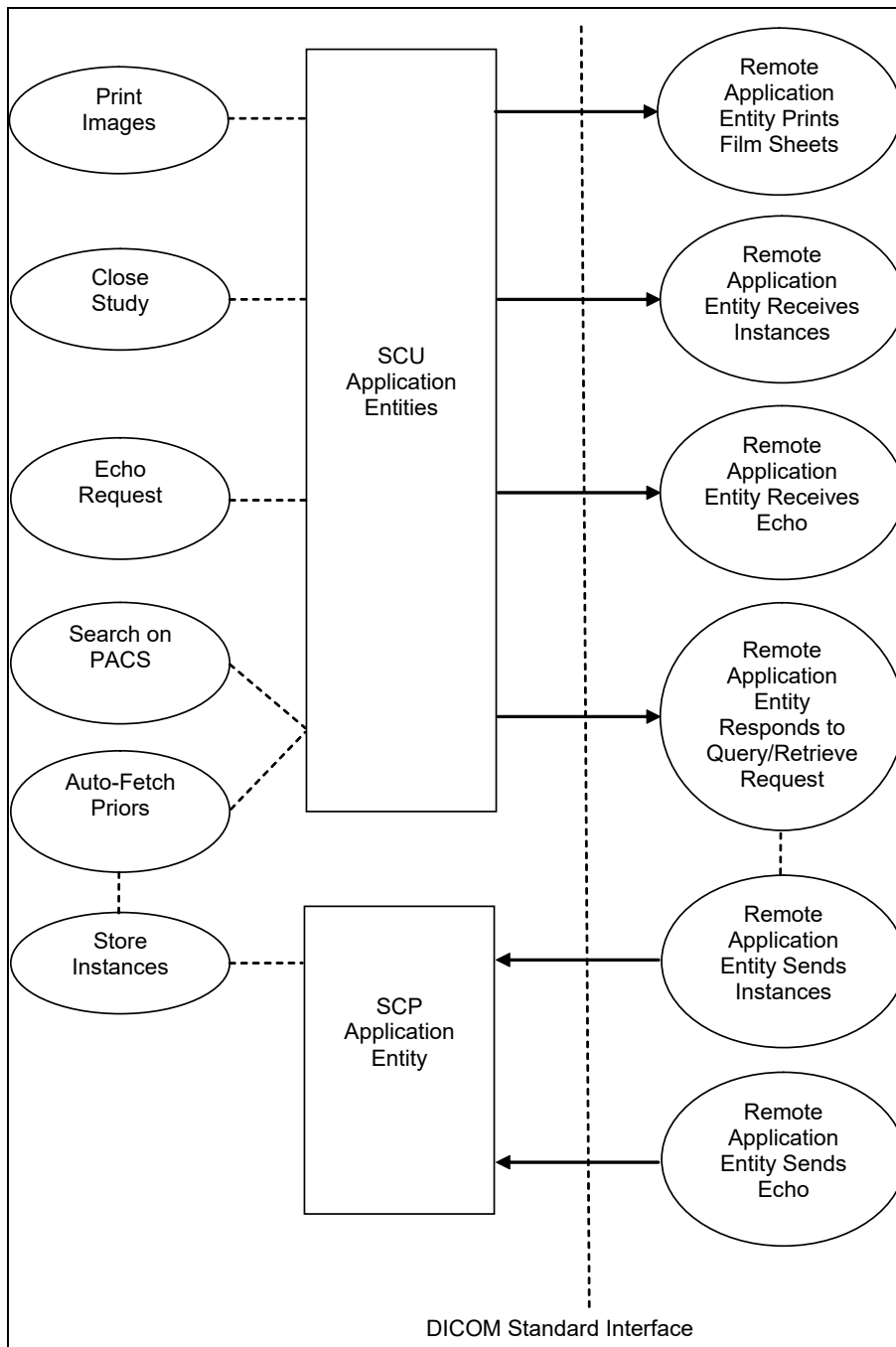


Figure 4.1-1: Functional Overview

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 or tagged tomosynthesis slices) 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

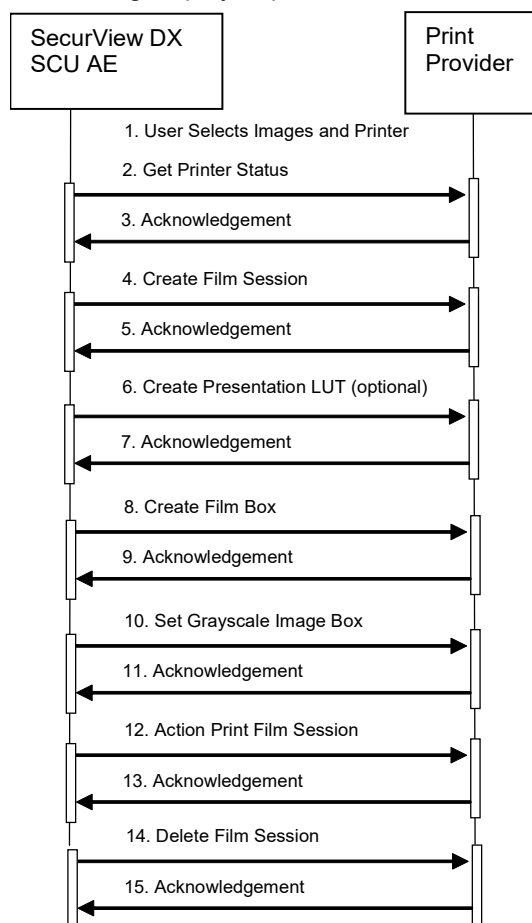
The SCU Application Entities initiate Print, Store, Echo, and Query/Retrieve requests as needed by the SecurView DX workstation.

##### 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

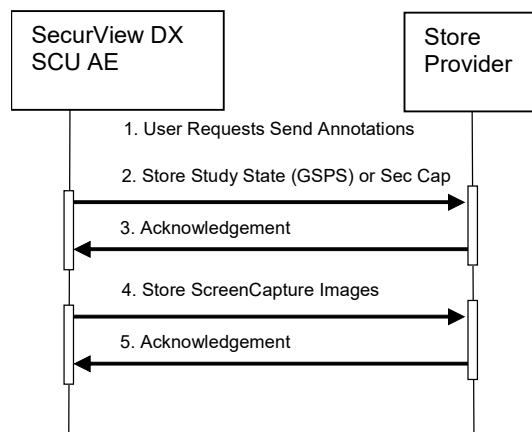
For Print Images, a user triggers an SCU AE to perform DICOM print by selecting one or more images, or a portion of the screen from the reviewing display to print to a selected Print Provider.



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

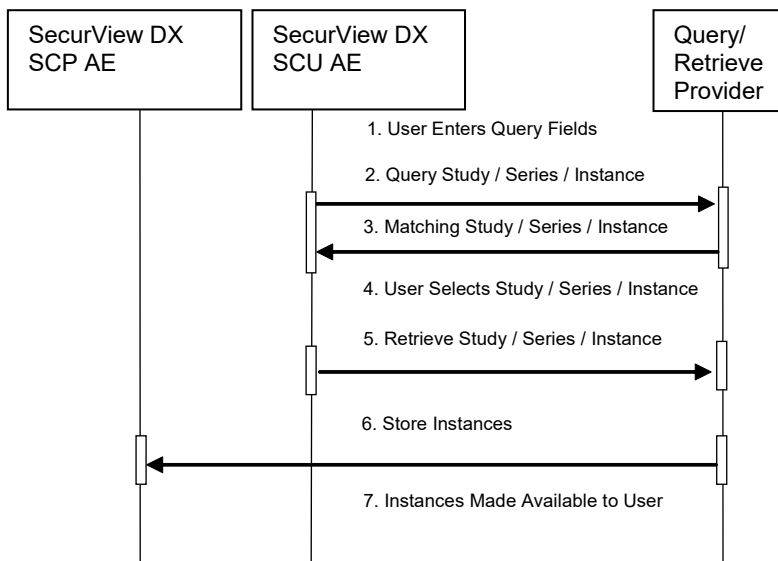
Note that Print Images behaves slightly differently for the multimodality viewer. Action is performed for the Film Box rather than Film Session, along with Delete for the Film Box prior to delete for the Film Session.

For Close Study, a user triggers an SCU AE to perform DICOM store by requesting new or changed markings/annotations to be sent for studies.



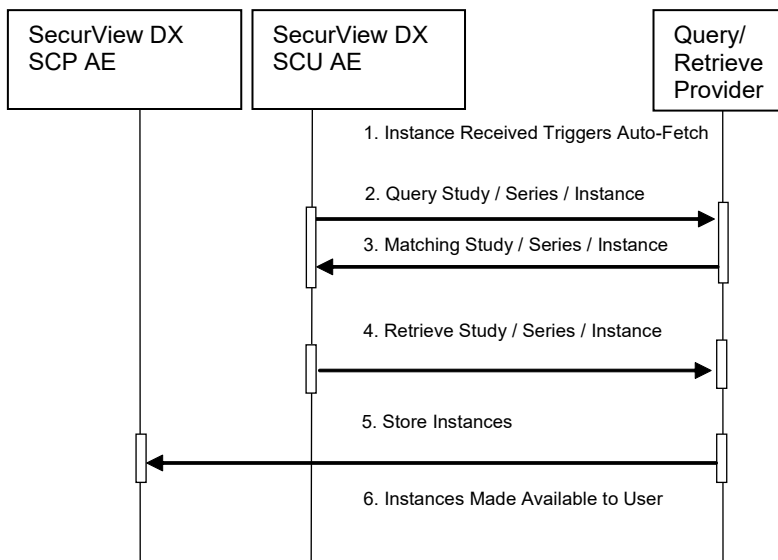
**Figure 4.1-3: Close Study Sequence Diagram**

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    | 1.3.6.1.4.1.34261.273440546401752.16168.148654468<br>4.0.1003000 |
| Implementation Version Name | MBC_SCR_1003000  |

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

|                             |                             |
|-----------------------------|-----------------------------|
| Implementation Class UID    | 1.2.276.0.7230010.3.0.3.5.4 |
| Implementation Version Name | OFFIS_DCMTK_354             |

### 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 (default=30). The SCU AE retries a configurable number of times (default=30) after a response timeout. 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<br>CLEAR FILM<br>MAMMO BLUE FILM<br>PAPER  | Predefined per Printer                                |
| Film Destination | (2000,0040) | PROCESSOR<br>MAGAZINE<br>(multimodality viewer only) | Predefined per Printer<br>(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<br>LANDSCAPE  |  |
| Film Size ID                         | (2010,0050) | 8INX10IN<br>10INX12IN<br>10INX10IN<br>10INX14IN<br>11INX14IN<br>14INX14IN<br>14INX17IN<br>Multimodality viewer also:<br>A4<br>(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<br>Multimodality viewer also:<br>REPLICATE<br>BILINEAR<br>NONE   | CUBIC (mammography viewer)<br><br>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<br>Multimodality viewer also:<br>WHITE<br>150  | BLACK (mammography viewer)<br>Configurable per printer (multimodality viewer)  |
| Empty Image Density                  | (2010,0110) | BLACK<br>Multimodality viewer also:<br>WHITE<br>150  | BLACK (mammography viewer)<br><br>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)<br>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)<br>10 (multimodality viewer, not configurable)   |
| Resolution ID                        | (2020,0050) | STANDARD<br>HIGH<br>(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 behavior of the SCU AE when encountering status codes in the N-CREATE response is summarized in the table below.

**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)<br>8 (multimodality viewer) |  |
| > Bits Stored                  | (0028,0101) | 8 or 12 (mammography viewer)<br>8 (multimodality viewer) |  |
| > High Bit                     | (0028,0102) | 7 or 11 (mammography viewer)<br>7 (multimodality viewer) |  |
| > Pixel Representation         | (0028,0103) | 0  | 0  |
| > Pixel Data                   | (7FE0,0010) | Per printed image  |  |
| Polarity                       | (2020,0020) | NORMAL<br>REVERSE<br>(multimodality viewer only)         | Configurable per Printer   |
| Configuration Information      | (2010,0150) | Configurable per printer<br>(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) |

| 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<br>LIN OD (mammography viewer only) | Configurable per printer for mammography viewer<br>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 requests new or changed markings/annotations on one or more studies to be sent before closing the patient. Close Study can be configured to trigger the SCU AE automatically to send study state instances (and/or secondary capture images) that include new or changed radiologist markings and annotations or tagged tomosynthesis slices 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 on which the radiologist created markings and annotations, or is a tagged tomosynthesis reconstructed slice 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 or that represents a tagged tomosynthesis reconstructed slice.

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                    |
| 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 |
| 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    |

**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 '1.3.6.1.4.1.34261'.

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 has new markings/annotations. Each study state GSPS instance references all the images in the study that are present on the SecurView DX workstation when the user triggers new markings/annotations to be sent. 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 or a single image that represents a tagged tomosynthesis slice. 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 behavior of the SCU AE when encountering status codes in a C-FIND or C-MOVE response 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 4.2.1-29 – 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.<br>For C-FIND, perform follow-up query or move, or display results to the user.<br>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.<br>For C-MOVE, the SCU AE continues to wait for additional messages.  |
| Warning or Failure | Any                                      | Any        | The SCU AE releases the association.<br>For Search on PACS C-FIND, failure is reported to the user in a status bar in the Search on PACS dialog.<br>For Auto-Fetch Priors C-FIND, failure is reported to the user in the patient list.<br>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                                | <p>The SCU AE releases the association.</p> <p>For Search on PACS C-FIND, failure is reported to the user in a status bar in the Search on PACS dialog.</p> <p>For Auto-Fetch Priors C-FIND, failure is reported to the user in the patient list.</p> <p>For C-MOVE, failure is reported to the user either in the Search on PACS dialog or the patient list.</p> |
| Association rejected or aborted by SCP | <p>For Search on PACS C-FIND, failure is reported to the user in a status bar in the Search on PACS dialog.</p> <p>For Auto-Fetch Priors C-FIND, failure is reported to the user in the patient list.</p> <p>For C-MOVE, failure is reported to the user either in the Search on PACS dialog or the patient list.</p>   |

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, Images in Acquisition, Number of Frames, Concept Name Code Sequence, Content Template Sequence) individually. The maximum number of displayed matches for a query is 1000. The association is released after receiving 1000 matching responses.



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

| Matching Key Attribute              | Tag         | Matching Type   |
|-------------------------------------|-------------|---|
| <b>Study Level</b>                  |             |   |
| 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) | Single Value or Universal Matching (Optional)   |
| Patient's Sex                       | (0010,0040) | Universal Matching (Optional)   |
| <b>Series Level</b>                 |             |   |
| 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)   |
| <b>Image (Instance) Level</b>       |             |   |
| 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)   |
| Images in Acquisition               | (0020,1002) | Universal Matching (Optional)   |
| Number of Frames                    | (0028,0008) | Universal Matching (Optional)   |
| Concept Name Code Sequence          | (0040,A043) | Sequence or Universal Matching (Optional)   |
| >Code Value                         | (0008,0100) | Universal Matching (Optional)   |
| >Coding Scheme Designator           | (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)   |

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  |
|------------------------|-------------|--|
| <b>Study Level</b>     |             |  |
| 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) |
| <b>Series Level</b>    |             |  |
| 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   |
| <b>Image Level</b>     |             |  |
| 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 |
| Breast Tomosynthesis Image Storage                         | 1.2.840.10008.5.1.4.1.1.13.1.3 | No  | Yes |
| Breast Projection X-Ray Image Storage – For Presentation   | 1.2.840.10008.5.1.4.1.1.13.1.4 | No  | Yes |
| Breast Projection X-Ray Image Storage – For Processing     | 1.2.840.10008.5.1.4.1.1.13.1.5 | No  | Opt |
| 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 |
|--------------------------|-----------------------|

#### 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    | 1.3.6.1.4.1.34261.273440546401752.16168.148654468<br>4.0.1003000 |
| Implementation Version Name | MBC_SCR_1003000  |

#### 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                 |

| Presentation Context Table                                 |                                |                   |     |      |                      |
|--|--------------------------------|-------------------|-----|------|----------------------|
| Abstract Syntax  |                                | Transfer Syntax   |     | Role | Extended Negotiation |
| Name   | UID                            | Name              | UID |      |                      |
| 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                 |
| Breast Tomosynthesis Image Storage                         | 1.2.840.10008.5.1.4.1.1.13.1.3 | See Table 4.2.2-6 |     | SCP  | None                 |
| Breast Projection X-Ray Image Storage – For Presentation   | 1.2.840.10008.5.1.4.1.1.13.1.4 | See Table 4.2.2-6 |     | SCP  | None                 |
| Breast Projection X-Ray Image Storage – For Processing     | 1.2.840.10008.5.1.4.1.1.13.1.5 | 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                       | 1.2.840.10008.5.1.4.1.1.3.1    | 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. Presentation contexts containing compression transfer syntaxes can be disabled if necessary:

**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                    |
| Explicit VR Little Endian   | 1.2.840.10008.1.2.1    |
| Implicit VR Little Endian   | 1.2.840.10008.1.2      |
| 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 |
| RLE Lossless  | 1.2.840.10008.1.2.5    |
| JPEG 2000 Image Compression (Lossless Only)   | 1.2.840.10008.1.2.4.90 |

The order of transfer syntaxes is different for the Breast Tomosynthesis Image Storage and Breast Projection X-Ray Image Storage SOP Classes. The JPEG lossless compression transfer syntaxes are first (.70, .90) and the uncompressed transfer syntaxes are last.

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

| Transfer Syntax Table   |                        |
|---|------------------------|
| Name  | UID                    |
| Explicit VR Little Endian   | 1.2.840.10008.1.2.1    |
| Implicit VR Little Endian   | 1.2.840.10008.1.2      |
| 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 |
| JPEG Baseline (Process 1): Default Transfer Syntax for Lossy JPEG 8 Bit Image Compression   | 1.2.840.10008.1.2.4.50 |
| JPEG 2000 Image Compression (Lossless Only)   | 1.2.840.10008.1.2.4.90 |

#### 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 Breast Tomosynthesis Image instances produced by any digital breast tomosynthesis manufacturer. Breast Tomosynthesis Image instances from a specific manufacturer and/or model can be configured to be accepted and discarded if SecurView does not display the reconstructed slices as expected.

The SecurView DX workstation displays Breast Projection X-Ray Image – For Presentation instances produced by any digital breast tomosynthesis manufacturer. Breast Projection X-Ray Image instances from a specific manufacturer and/or model can be configured to be accepted and discarded if SecurView does not display the tomosynthesis projection images as expected. The SecurView DX workstation can be configured to accept Breast Projection X-Ray Image – For Processing, but does not display the images.

The SecurView DX workstation mammography viewer supports display of breast tomosynthesis reconstructed slices received as CT Image.

The SecurView DX workstation supports display of the first DICOM 6000 overlay contained in received images routed to the mammography viewer only if the overlay is the same size as the image (see **8.1.2. Usage of Attributes from Received IODs**). The DICOM 6000 overlays in images from a specific manufacturer and/or model application can be configured to be ignored if SecurView does not display the overlay content as expected.

The SecurView DX workstation displays Mammography CAD SR instances produced by any manufacturer. Mammography CAD SR instances produced by Hologic, Inc., iCAD, Inc., or VuCOMP, Inc. (2D content only; breast tomosynthesis content is ignored) 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     |
|---|-----------------------|-------------------|
| <b>Remote Print AE for Mammography Viewer</b>   |                       |                   |
| 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          |
| <b>Remote Print AE for Multimodality Viewer</b>   |                       |                   |
| 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 |



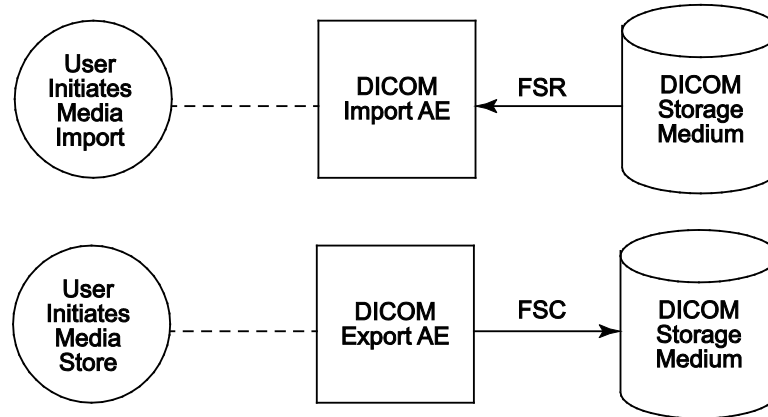
| Parameter  | Configurable (Yes/No) | Default Value     |
|--|-----------------------|-------------------|
| MaxPDU (4096...65536)                                      | Yes                   | Per known printer |
| SupportsTrim (true, false)                                 | Yes                   | 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     |
|---|-----------------------|-------------------|
| <b>General Parameters</b>   |                       |                   |
| 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                   | 28672             |
| <b>Modules that Invoke SCU AE</b>                                       |                       |                   |
| 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                |
| <b>SCP AE</b>   |                       |                   |
| 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 and DICOM Import AE provide a means to export and import patient images using DICOM Part 10: Media Storage and File Format for Media Interchange. Patient images can be recorded to or read from removable media. These features are provided as a matter of convenience for users to move images from one system to another via removable media. The export 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 removable media.

The DICOM Import AE can read patient images from removable media.

The SecurView DX workstation supports DICOM Media Storage as FSC and FSR.

#### 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 the selected removable media drive. The export is performed in the foreground, so the user must wait for completion (or cancel) before initiating another activity in the application.

The SecurView DX workstation Patient List has an Import button to select the drive from which to import all detected DICOM files from removable media. The DICOMDIR file is not read. The import is performed in the background, so the user may continue to use the application while the import is in progress (or cancel).

#### 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    | 1.3.6.1.4.1.34261.273440546401752.16168.14865<br>44684.0.1003000 |
| Implementation Version Name | MBC_SCR_1003000  |

## 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 |
|-------------------------------|-----------------------------|-------|
| STD-GEN-CD                    | User Initiates Media Store  | FSC   |
|                               | User Initiates Media Import | FSR   |
| STD-GEN-DVD-RAM               | User Initiates Media Store  | FSC   |
| STD-GEN-DVD-JPEG              | User Initiates Media Import | FSR   |
| STD-GEN-USB                   | User Initiates Media Store  | FSC   |
| STD-GEN-USB-JPEG              | User Initiates Media Import | FSR   |

#### 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 when requested to export images to removable media.

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 selected removable media drive. Images can be recorded to any removable media, 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.

The DICOM Export AE supports the STD-GEN-DVD-RAM Application Profile. An empty DVD is required for each export. Only ISO 9660 is supported, without multi-session writes. UDF is not supported.

The DICOM Export AE supports the STD-GEN-USB Application Profile. If the user selects a folder other than the root for USB export, it is possible for more than one DICOMDIR file to be written to a USB.

##### 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<br>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<br>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<br>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<br>Little Endian | 1.2.840.10008.1.2.1 |

| SOP Class Name   | SOP Class UID                  | Transfer Syntax              | Transfer Syntax UID |
|--|--------------------------------|------------------------------|---------------------|
| Digital Mammography X-Ray Image Storage – For Processing   | 1.2.840.10008.5.1.4.1.1.1.2.1  | Explicit VR<br>Little Endian | 1.2.840.10008.1.2.1 |
| Breast Tomosynthesis Image Storage                         | 1.2.840.10008.5.1.4.1.1.13.1.3 | Explicit VR<br>Little Endian | 1.2.840.10008.1.2.1 |
| Breast Projection X-Ray Image Storage – For Presentation   | 1.2.840.10008.5.1.4.1.1.13.1.4 | Explicit VR<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>Little Endian | 1.2.840.10008.1.2.1 |
| MR Image Storage   | 1.2.840.10008.5.1.4.1.1.4      | Explicit VR<br>Little Endian | 1.2.840.10008.1.2.1 |
| Positron Emission Tomography Image Storage                 | 1.2.840.10008.5.1.4.1.1.128    | Explicit VR<br>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<br>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<br>Little Endian | 1.2.840.10008.1.2.1 |
| CT Image Storage   | 1.2.840.10008.5.1.4.1.1.2      | Explicit VR<br>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<br>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<br>Little Endian | 1.2.840.10008.1.2.1 |

#### 5.2.1.2.2. Activity – User Initiates Media Import

The DICOM Import AE acts as an FSR when requested to import images from removable media.

To load images from removable media the user selects the Import button on the Patient List, and then selects a removable media drive. All Image, Mammography CAD SR, and Grayscale Softcopy Presentation State Instances that are detected on the selected removable media drive as DICOM Part 10 files are read and made available to the application except Breast Projection X-Ray Image – For Processing, which if configured to be accepted are discarded.

##### 5.2.1.2.2.1. Media Storage Application Profile

The DICOM Import AE supports the STD-GEN-CD, STD-GEN-DVD-JPEG and STD-GEN-USB-JPEG Application Profiles.

**5.2.1.2.2.1.1. Options**

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

**Table 5.2-3 – 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<br>Little Endian | 1.2.840.10008.1.2.1 |
| Computed Radiography Image Storage                         | 1.2.840.10008.5.1.4.1.1.1      | See Table 4.2.2-6            |                     |
| Digital X-Ray Image Storage – For Presentation             | 1.2.840.10008.5.1.4.1.1.1.1    | See Table 4.2.2-6            |                     |
| 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            |                     |
| 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            |                     |
| Breast Tomosynthesis Image Storage                         | 1.2.840.10008.5.1.4.1.1.13.1.3 | See Table 4.2.2-6            |                     |
| Breast Projection X-Ray Image Storage – For Presentation   | 1.2.840.10008.5.1.4.1.1.13.1.4 | See Table 4.2.2-6            |                     |
| Breast Projection X-Ray Image Storage – For Processing     | 1.2.840.10008.5.1.4.1.1.13.1.5 | See Table 4.2.2-6            |                     |
| Secondary Capture Image Storage                            | 1.2.840.10008.5.1.4.1.1.7      | See Table 4.2.2-6            |                     |
| 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            |                     |
| 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            |                     |
| 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            |                     |
| Ultrasound Image Storage                                   | 1.2.840.10008.5.1.4.1.1.6.1    | See Table 4.2.2-7            |                     |
| Ultrasound Multi-frame Image Storage                       | 1.2.840.10008.5.1.4.1.1.3.1    | See Table 4.2.2-7            |                     |
| Ultrasound Image Storage (Retired)                         | 1.2.840.10008.5.1.4.1.1.6      | See Table 4.2.2-7            |                     |
| Ultrasound Multi-frame Image Storage (Retired)             | 1.2.840.10008.5.1.4.1.1.3      | See Table 4.2.2-7            |                     |
| Enhanced MR Image Storage                                  | 1.2.840.10008.5.1.4.1.1.4.1    | See Table 4.2.2-6            |                     |
| MR Image Storage   | 1.2.840.10008.5.1.4.1.1.4      | See Table 4.2.2-6            |                     |
| Positron Emission Tomography Image Storage                 | 1.2.840.10008.5.1.4.1.1.128    | See Table 4.2.2-6            |                     |
| Enhanced CT Image Storage                                  | 1.2.840.10008.5.1.4.1.1.2.1    | See Table 4.2.2-6            |                     |
| Nuclear Medicine Image Storage                             | 1.2.840.10008.5.1.4.1.1.20     | See Table 4.2.2-6            |                     |
| CT Image Storage   | 1.2.840.10008.5.1.4.1.1.2      | See Table 4.2.2-6            |                     |
| Mammography CAD SR Storage                                 | 1.2.840.10008.5.1.4.1.1.88.50  | Explicit VR<br>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<br>Little Endian | 1.2.840.10008.1.2.1 |

**5.3. Augmented and Private Application Profiles**

None.

**5.4. Media Configuration**

None. The Source AE Title used by the DICOM Export AE is 'MBC SCR'.

## 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.

## 8. Annexes

### 8.1. BIOD 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 per image in referenced series          | 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 per image in referenced series  | 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<br>Table 8.1.1-18 | ALWAYS             |
| Series    | General Series                               | Table 8.1.1-19 or<br>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 / SC Image / General Reference | Table 8.1.1-22                      | ALWAYS             |
|           | Image Pixel                                  | Table 8.1.1-23 or<br>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 / SC 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 or set to MG for tomosynthesis | 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 & SC Image Modules 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) | Screen Capture 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   |

| Attribute Name                | Tag         | Value  | Presence of Value | Source |
|-------------------------------|-------------|--|-------------------|--------|
| Burned in Annotation          | (0028,0301) | screen capture only, YES if patient information overlay was active in inspector when created; NO otherwise, or when created from work area | 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   |
| 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   |

**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<br>Copied from newest image set in<br>content for screen capture                               | ALWAYS            | AUTO   |
| SOP Class UID          | (0008,0016) | Secondary Capture Image Storage<br>or Multi-frame Grayscale Word<br>Secondary Capture Image Storage<br>(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   |

### 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 when enumerated values are expected |
| 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:<br>'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 (0018,1164) 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  |
| Overlay Rows                 | (6000,0010) | If present must be same as Rows (0028,0010) value  |
| Overlay Columns              | (6000,0011) | If present must be same as Columns (0028,0011) value   |
| Overlay Type                 | (6000,0040) | If present only G (Graphics) is supported  |
| Overlay Origin               | (6000,0050) | If present only 1\1 is supported   |
| Overlay Bits Allocated       | (6000,0100) | If present only 1 is permitted   |
| Overlay Bit Position         | (6000,0102) | If present only 0 is permitted   |
| Overlay Data                 | (6000,3000) | If present must have Rows*Columns pixels   |
| Pixel Data                   | (7FE0,0010) | Rows*Columns*(Bits Allocated / 8)*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', 'iCAD, Inc.' or 'VuCOMP': 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 Cenova server. For additional information, refer to the 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<br>(DISPLAY is not supported)                                      |
| >>Anchor Point Annotation Units              | (0070,0004) | PIXEL<br>(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<br>(RIGHT and CENTER are not supported)        |
| >>Anchor Point                               | (0070,0014) |  |
| >>Anchor Point Visibility                    | (0070,0015) | N<br>(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<br>(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,<br>ELLIPSE is displayed with enclosing circle if major and minor axes are not horizontal and vertical<br>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

Private Attributes contained in created Grayscale Softcopy Presentation State SOP Instances do not include patient identification information.

## 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.