# Change of the Authorized Representative

This document updates your product manuals to change the address of the European Commission Authorized Representative (EC Rep). This change is effective on the first day of November 2015. The new address is:

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Place this document with your product manuals for future reference.

C-View™
Synthesized 2D

# C-View 1.0

## DICOM Conformance Statement

MAN-02865 Rev 001

HOLOGIC®

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MergeCOM-3 Advanced Integrator's Tool Kit is a product of Merge Healthcare.

# 1. Overview

C-View uses proprietary software applications developed by Hologic to generate a synthesized 2D mammography image from a Hologic Selenia Dimensions tomosynthesis data set by collapsing a tomosynthesis volume to a single slice, similar to a CT MIP. This synthesized 2D image preserves geometric features (lines and spots) of the tomosynthesis slices commonly found in mass lesions and architectural distortions, and bright spots that are commonly found in microcalcifications.

C-View implements the necessary DICOM services for interoperability between this product, other Hologic products, and products from other vendors. It also provides information necessary to configure other vendors' products to communicate with this product via DICOM.

The following table provides an overview of the network services supported by C-View.

| SOP Classes | User of Service (SCU) | Provider of Service (SCP) |
|---|---|---|
| **Transfer** | | |
| Digital Mammography X-Ray Image Storage – For Processing | No | Yes |
| Digital Mammography X-Ray Image Storage – For Presentation | Yes | Yes |
| Secondary Capture Image Storage | No | Yes |

C-View does not support Media Storage Application Profiles.

# 2. Contents

# 3. Introduction

Hologic, Inc. develops and markets a full line of mammography products including Selenia Dimensions with digital breast tomosynthesis option and C-View. In general, C-View accepts Hologic digital breast tomosynthesis raw projection images and reconstructed slices as a Service Class Provider (SCP) of the Storage Service Class, performs synthesized image generation, and exports C-View images as a Service Class User (SCU) of the Storage Service Class. The system also serves as an SCU and SCP of the Verification Service Class.

## 3.1. Revision History

The information in this document applies to C-View software version 1.0.

## 3.2. Audience

This document is intended to aid in connecting C-View to other components that make use of the DICOM standard for interconnecting networked imaging devices. The reader of this document should be familiar with the DICOM standard and PACS components that utilize the standard.

## 3.3. Remarks

A DICOM conformance statement – the structure and content of which are specified 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 DICOM conformance statement for C-View provides a starting point for ascertaining whether the product can communicate with other systems.
- The only way to know whether C-View can interoperate with other systems is to perform connectivity testing.
- This document represents a best effort to document the functionality of commercial versions of C-View 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.

## 3.4. Definitions, Terms and Abbreviations

This document uses the following acronyms.

| | |
|---|---|
| AE | Application Entity |
| CT | Computed Tomography |
| DICOM | Digital Imaging and Communications in Medicine |
| IOD | Information Object Definition |
| MIP | Maximum Intensity Projection |
| PDU | Protocol Data Unit |
| SCP | Service Class Provider |
| SCU | Service Class User |
| SOP | Service Object Pair |
| UID | Unique Identifier |
| VR | Value Representation |

## 3.5. References

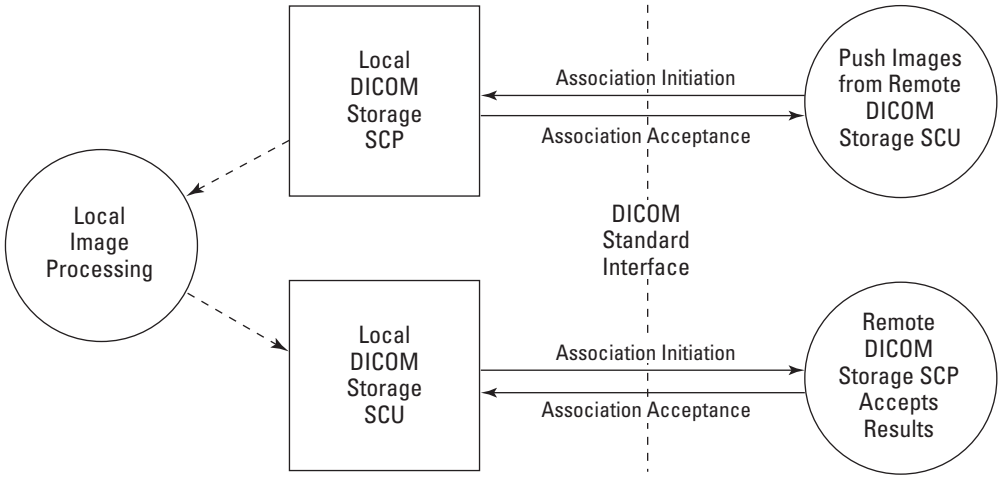
NEMA PS3 / ISO 12052, Digital Imaging and Communications in Medicine (DICOM) Standard, National Electrical Manufacturers Association, Rosslyn, VA, USA (available free at http://medical.nema.org/)

# 4. Networking

## 4.1. Implementation Model

### 4.1.1. Application Data Flow

The following diagram depicts the Application Entities (AE) and their relationships to Real-World Activities.




**Application Data Flow**

The Local Image Processing is initiated at system startup. The Local DICOM Storage SCU and Local DICOM storage SCP are executed at system startup and exist in one executable program using two AE titles.

A Remote DICOM Storage SCU initiates a push of images to the Local DICOM Storage SCP. Each accepted image is passed to Local Image Processing. Upon completion of synthesized image generation, the C-View image passes to the Local DICOM Storage SCU, which pushes the C-View image to a Remote DICOM Storage SCP.

Images that are accepted by the Local DICOM Storage SCP are stored temporarily, until synthesized image generation is completed and the C-View image is exported successfully.

### 4.1.2. Functional Definition of AE's

The Local DICOM Storage SCP AE supports the following functions:

- Accepts DICOM association requests
- Accepts DICOM storage requests
- Validates images for synthesized image generation, checks for disk space, and stores images to disk files

The Local DICOM Storage SCU AE supports the following functions:

- Negotiates and establishes DICOM association with remote destination
- Stores C-View image to remote destination

### 4.1.3. Sequencing of Real-World Activities

#### 4.1.3.1. Local Image Processing

When Local Image Processing is triggered by Hologic digital breast tomosynthesis images pushed from a remote application:

- The Local DICOM Storage SCP AE responds to DICOM association initiation, and selects a matching Presentation Context (Abstract Syntax and Transfer Syntax).
- The Local DICOM Storage SCP AE accepts an association and waits for a C-STORE request.
- Upon receiving a C-STORE request, the Local DICOM Storage SCP validates the attributes in the message, performs a license check, stores the image object to disk, and queues the synthesized image generation.
- The Local DICOM Storage SCP sends a C-STORE response.
- Upon completion of synthesized image generation, the C-View image is formatted into DICOM Digital Mammography X-Ray Image – For Presentation.
- The Local DICOM Storage SCU is executed, which initiates an association to a remote application.
- The Local DICOM Storage SCU sends a C-STORE request containing the C-View image, and waits for a C-STORE response.
- The Local DICOM Storage SCU closes the association and exits.

## 4.2. AE Specifications

### 4.2.1. Local DICOM Storage SCP

#### 4.2.1.1. SOP Classes

This Application Entity provides Standard Conformance to the following DICOM SOP Classes as an SCP:

| SOP Class Name | SOP Class UID |
|---|---|
| Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7 |
| Digital Mammography X-Ray Image Storage – For Processing | 1.2.840.10008.5.1.4.1.1.1.2.1 |
| Digital Mammography X-Ray Image Storage – For Presentation | 1.2.840.10008.5.1.4.1.1.1.2 |
| Verification SOP Class | 1.2.840.10008.1.1 |

#### 4.2.1.2. Association Policies

The Local DICOM Storage SCP accepts associations, but does not initiate associations.

##### 4.2.1.2.1. General

The maximum PDU size accepted is 64234. If during association negotiation the maximum sized PDU of the system negotiating with the application is larger than this value, the PDU size will be limited to this value. This value is defined in the mergecom.pro file provided with the MergeCOM-3 Advanced Integrator's Tool Kit.

The DICOM standard Application context is accepted:

| DICOM Application Context for Local DICOM Storage SCP | |
|---|---|
| Application Context Name | 1.2.840.10008.3.1.1.1 |

##### 4.2.1.2.2. Number of Associations

The Local DICOM Storage SCP accepts up to six simultaneous associations.

##### 4.2.1.2.3. Asynchronous Nature

Asynchronous mode is not supported. All operations are performed synchronously.

##### 4.2.1.2.4. Implementation Identifying Information

The Implementation Class UID is '2.16.840.1.1.2.840.113986', and the Implementation Version Name is 'MergeCOM3_390'. These values are defined in the mergecom.pro file provided with the MergeCOM-3 Advanced Integrator's Tool Kit.

#### 4.2.1.3. Association Initiation Policy

The Local DICOM Storage SCP does not initiate associations.

### 4.2.1.4. Association Acceptance Policy

The Local DICOM Storage SCP accepts an association when it receives a valid association request, with at least one matching presentation context. If the number of simultaneous associations has reached the maximum, an association request remains pending (i.e., no response is returned) until an opened association is closed or the remote SCU aborts the association.

#### 4.2.1.4.1. Push Images from Remote DICOM Storage SCU

##### *4.2.1.4.1.1. Description and Sequencing of Activities*

The Real-World Activity (i.e., Local Image Processing) is associated with a C-STORE SCP operation (i.e., Local DICOM Storage SCP Application Entity), and is triggered by Push images from Remote DICOM Storage SCU. This results in storage and synthesized image generation on C-View for received Hologic digital breast tomosynthesis raw projection images and corresponding reconstructed slices. The C-STORE SCP operation will respond with a failure status if it is unable to store the images.

The Local DICOM Storage SCP is always available to respond to echo requests from any Remote DICOM Storage SCU.

##### *4.2.1.4.1.2. Accepted Presentation Contexts*

The Local DICOM Storage SCP accepts the Presentation Contexts shown in the following table:

| Abstract Syntax Name / UID | Transfer Syntax Name | Transfer Syntax UID | Role | Extended Negotiation |
|---|---|---|---|---|
| Secondary Capture Image Storage / 1.2.840.10008.5.1.4.1.1.7 | JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14 [Selection Value 1]) | 1.2.840.10008.1.2.4.70 | SCP | None |
| | JPEG 2000 Image Compression (Lossless Only) | 1.2.840.10008.1.2.4.90 | SCP | None |
| | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCP | None |
| | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | None |
| | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | SCP | None |
| Digital Mammography X-Ray Image Storage – For Processing / 1.2.840.10008.5.1.4.1.1.1.2.1 | JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14 [Selection Value 1]) | 1.2.840.10008.1.2.4.70 | SCP | None |
| | JPEG 2000 Image Compression (Lossless Only) | 1.2.840.10008.1.2.4.90 | SCP | None |
| | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCP | None |
| | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | None |
| | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | SCP | None |
| Digital Mammography X-Ray Image Storage – For Presentation / 1.2.840.10008.5.1.4.1.1.1.2 | JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14 [Selection Value 1]) | 1.2.840.10008.1.2.4.70 | SCP | None |
| | JPEG 2000 Image Compression (Lossless Only) | 1.2.840.10008.1.2.4.90 | SCP | None |
| | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCP | None |
| | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | None |

| Abstract Syntax Name / UID | Transfer Syntax Name | Transfer Syntax UID | Role | Extended Negotiation |
|---|---|---|---|---|
| | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | SCP | None |
| Verification / 1.2.840.10008.1.1 | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCP | None |
| | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | None |
| | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | SCP | None |

When presented with multiple transfer syntaxes within one requested Presentation Context, the Local DICOM Storage SCP accepts one transfer syntax according to the order of the table above.

#### *4.2.1.4.1.3. SOP Specific Conformance*

The Local DICOM Storage SCP provides Level 2 (Full) conformance to all of the accepted Storage SOP Classes. It does not provide Digital Signature support. No coercion of Attributes is performed. Images that are stored successfully may not be accessed by remote systems.

Only Secondary Capture Images created by Hologic Selenia Dimensions that represent raw projection images and reconstructed slices of digital breast tomosynthesis are accepted and queued. Other Secondary Capture Images are rejected. All instances of other SOP Classes are accepted and discarded.

The following table lists the possible values for the Status (0000,0900) attribute of the C-STORE response:

| Service Status | Further Meaning | Status Code | Reason |
|---|---|---|---|
| Success | Success | 0000 | Image accepted, and either queued for synthesized image generation or discarded. |
| Refused | Out of resources | A700 | Not enough disk space to store the image. Error Comment (0000,0902) contains 'Out of resources'. |
| Error | Data set does not match SOP Class. | A900 | Offending Element (0000,0901) is the Attribute Tag that is missing or has an invalid value, returned for a Secondary Capture Image that is not Hologic tomosynthesis. |
| Error | License attribute missing | C010 | Offending Element (0000,0901) is the missing Attribute Tag that is required for license check. |
| Error | License validation failed | C011 | Offending Element (0000,0901), if present, is the Attribute Tag that failed the license check. |
| Error | Required attribute missing | C012 | Offending Element (0000,0901) is the missing Attribute Tag that is required for synthesized image generation. |
| Error | Attribute value out of range | C013 | Offending Element (0000,0901) is the Attribute Tag for which the value is out of range (includes zero-length value) for synthesized image generation. |
| Error | Image will not be processed | C014 | Reason internal to C-View. |

### 4.2.2. Local DICOM Storage SCU

#### 4.2.2.1. SOP Classes

This Application Entity provides Standard Conformance to the following DICOM SOP Class as an SCU:

| SOP Class Name | SOP Class UID |
|---|---|
| Digital Mammography X-Ray Image Storage – For Presentation | 1.2.840.10008.5.1.4.1.1.1.2 |

#### 4.2.2.2. Association Policies

The Local DICOM Storage SCU initiates associations, but does not accept associations.

##### 4.2.2.2.1. General

The maximum PDU size offered is 64234. This value is defined in the mergecom.pro file provided with the MergeCOM-3 Advanced Integrator's Tool Kit. The DICOM standard Application context is proposed:

| DICOM Application Context for Local DICOM Storage SCU | |
|---|---|
| Application Context Name | 1.2.840.10008.3.1.1.1 |

##### 4.2.2.2.2. Number of Associations

Up to two Local DICOM Storage SCU instances may be executed simultaneously.

##### 4.2.2.2.3. Asynchronous Nature

Asynchronous mode is not supported. All operations are performed synchronously.

##### 4.2.2.2.4. Implementation Identifying Information

The Implementation Class UID is '2.16.840.1.1.2.840.113986', and the Implementation Version Name is 'MergeCOM3_390'. These values are defined in the mergecom.pro file provided with the MergeCOM-3 Advanced Integrator's Tool Kit.

### 4.2.2.3. Association Initiation Policy

#### 4.2.2.3.1. Local Image Processing

##### *4.2.2.3.1.1. Description and Sequencing of Activities*

The Real-World Activity (i.e., Remote DICOM Storage SCP Accepts Results) is associated with a C-STORE SCU operation (i.e., Local DICOM Storage SCU Application Entity) and is triggered by the completion of Local Image Processing, which initiates the sending of a C-View image to a Remote DICOM Storage SCP.

##### *4.2.2.3.1.2. Proposed Presentation Contexts*

The following Presentation Contexts will be proposed in each association request, with one Presentation Context per SOP Class containing all of the proposed transfer syntaxes:

| Abstract Syntax Name / UID | Transfer Syntax Name | Transfer Syntax UID | Role | Extended Negotiation |
|---|---|---|---|---|
| Digital Mammography X-Ray Image Storage – For Presentation / 1.2.840.10008.5.1.4.1.1.1.2 | JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14 [Selection Value 1]) | 1.2.840.10008.1.2.4.70 | SCU | None |
| | JPEG 2000 Image Compression (Lossless Only) | 1.2.840.10008.1.2.4.90 | SCU | None |
| | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCU | None |
| | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | SCU | None |
| Verification / 1.2.840.10008.1.1 | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCU | None |
| | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | SCU | None |

Additional SOP Classes may be proposed in the association request but these are the only SOP Classes that are used.

#### *4.2.2.3.1.3. SOP Specific Conformance*

The Verification SCU is part of the Web-based Configuration Tool, to send a C-ECHO request to a configured destination manually.

The behavior of the Local DICOM Storage SCU when encountering status codes in a C-STORE response is summarized in the table below:

| Service Status | Further Meaning | Status Code | Reason |
|---|---|---|---|
| Success | Success | 0000 | The Remote Store SCP successfully stored the SOP Instance. The C-View image and associated images shall be permitted to be deleted. |
| Warning | Coercion of data elements, Data set does not match SOP Class, Elements discarded | B000, B007, B006 | Treated as Success. The C-View image and associated images shall be permitted to be deleted. |
| Failure | Any | Any | The Local Storage SCU releases the association, and the error is reported to the user after the configured retry attempts have failed. |

The behavior of the Local DICOM Storage SCU during communication failure is summarized in the table below.

| Exception | Behavior |
|---|---|
| Timeout | Local DICOM Storage SCU aborts the association. Failure is logged. The association will be reattempted at a later time, according to the retry strategy. |
| Association rejected or aborted by SCP | Failure is logged. The association will be reattempted at a later time, according to the retry strategy. |

Instance UIDs are globally unique for all SOP Instances generated by the Local DICOM Storage SCU. The UID root is copied from the source image and is likely to be '1.2.840.113681'.

The local DICOM Storage SCU provides standard conformance to the Digital Mammography X-Ray Image Storage – For Presentation SOP Class for C-View images. See section **8.1.1**, '**Created SOP Instance(s)**' for details.

### 4.2.2.4. Association Acceptance Policy

The Local DICOM Storage SCU does not accept associations.

## 4.3. Network Interfaces

### 4.3.1. Physical Network Interface

C-View is tested and supports using 100-BaseT and 1000-Base T Ethernet media.

### 4.3.2. Additional Protocols

None

## 4.4. Configuration

A Web-based Configuration Tool is used for DICOM configuration.

### 4.4.1. AE Title/Presentation Address Mapping

The user configures C-View's Local Storage SCU AE and Local Storage SCP AE, and remote SCU AEs and SCP AEs by entering the AE Title, IP Address, and TCP/IP port number (SCPs only). There are no dedicated ports associated with dedicated services.

### 4.4.2. Configurable Parameters

The following fields are configurable for each output device (Remote DICOM Storage SCP):

- Retry Interval (in minutes)
- Retry Duration (in hours)

# 5. Media Interchange

None.

# 6. Support of Character Sets

C-View supports the following character sets:

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

# 7. Security Profiles

C-View does not support any specific DICOM security measures.

It is assumed that C-View is used within a secured environment. For additional information about Hologic security policies, see Hologic's Enterprise Cybersecurity Best Practices.

# 8. Annexes

## 8.1. IOD Contents

### 8.1.1. Created SOP Instance(s)

Abbreviations for Presence of Value:

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

Abbreviations for Source:

| | |
|---|---|
| AUTO | Attribute value is generated automatically |
| CONFIG | Attribute value source is a configurable parameter |

The attributes contained in created Digital Mammography X-Ray Image – For Presentation Instances are listed in the following tables.

**Table 1: IOD of Created Digital Mammography X-Ray Image – For Presentation Instances**

| IE | Module | Reference | Presence of Module |
|---|---|---|---|
| Patient | Patient | Table 2 | ALWAYS |
| Study | General Study | Table 3 | ALWAYS |
| | Patient Study | Table 4 | ANAP |
| Series | General Series | Table 5 | ALWAYS |
| | DX Series | Table 6 | ALWAYS |
| | Mammography Series | Table 6 | ALWAYS |
| | Frame of Reference | Table 7 | ALWAYS |
| Equipment | General Equipment | Table 8 | ALWAYS |
| Image | General Image | Table 9 | ALWAYS |
| | Image Pixel | Table 10 | ALWAYS |
| | DX Anatomy Imaged | Table 11 | ALWAYS |
| | DX Image | Table 12 | ALWAYS |
| | DX Detector | Table 13 | ALWAYS |
| | DX Positioning | Table 14 | ALWAYS |
| | X-Ray Acquisition Dose | Table 15 | ALWAYS |
| | X-Ray Generation | Table 16 | ALWAYS |
| | X-Ray Filtration | Table 17 | ALWAYS |

| | | | |
|---|---|---|---|
| | X-Ray Grid | Table 18 | ALWAYS |
| | Mammography Image | Table 19 | ALWAYS |
| | VOI LUT | Table 12 | ALWAYS |
| | Acquisition Context | Table 20 | ALWAYS |
| | SOP Common | Table 21 | ALWAYS |

**Table 2: Patient Module of Created SOP Instances**

| Attribute Name | Tag | Value | Presence of Value | Source |
|---|---|---|---|---|
| Patient's Name | (0010,0010) | Copied from source image header | ALWAYS | AUTO |
| Patient ID | (0010,0020) | Copied from source image header | ALWAYS | AUTO |
| Patient's Birth Date | (0010,0030) | Copied from source image header | VNAP | AUTO |
| Patient's Sex | (0010,0040) | Copied from source image header | VNAP | AUTO |
| All other Patient Attributes | | Copied from source image header, if present | ANAP | AUTO |

**Table 3: General Study Module of Created SOP Instances**

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

**Table 4: Patient Study Module of Created SOP Instances**

| Attribute Name | Tag | Value | Presence of Value | Source |
|---|---|---|---|---|
| Patient's Age | (0010,1010) | Copied from source image header, if present | ANAP | AUTO |
| All other Patient Study Attributes | | Copied from source image header, if present | ANAP | AUTO |

**Table 5: General Series Module of Created SOP Instances**

| Attribute Name | Tag | Value | Presence of Value | Source |
|---|---|---|---|---|
| Series Date | (0008,0021) | Copied from source image header | ALWAYS | AUTO |
| Series Time | (0008,0031) | Copied from source image header | ALWAYS | AUTO |
| Modality | (0008,0060) | See Table 6 | | |
| Protocol Name | (0018,1030) | Copied from source image header | ALWAYS | AUTO |
| Series Description | (0008,103E) | Default = laterality + view + 'C-View' | ALWAYS | CONFIG |

| Attribute Name | Tag | Value | Presence of Value | Source |
|---|---|---|---|---|
| Operators' Name | (0008,1070) | Copied from source image header | ALWAYS | AUTO |
| Series Instance UID | (0020,000E) | Generated automatically with configurable suffix | ALWAYS | CONFIG |
| Series Number | (0020,0011) | Copied from source image header | ALWAYS | CONFIG |
| Body Part Examined | (0018,0015) | Copied from source image header | ALWAYS | AUTO |
| Performed Procedure Step ID | (0040,0253) | Copied from source image header, if present | ANAP | AUTO |
| Performed Procedure Step Description | (0040,0254) | Copied from source image header, if present | ANAP | AUTO |
| Performed Procedure Step Start Date | (0040,0244) | Copied from source image header, if present | ANAP | AUTO |
| Performed Procedure Step Start Time | (0040,0245) | Copied from source image header, if present | ANAP | AUTO |
| Performed Protocol Code Sequence | (0040,0260) | One Item, copied from source image header, if present | ANAP | AUTO |
| > Code Value | (0008,0100) | Copied from source image header, if present | ANAP | AUTO |
| > Coding Scheme Designator | (0008,0102) | Copied from source image header, if present | ANAP | AUTO |
| > Code Meaning | (0008,0104) | Copied from source image header, if present | ANAP | AUTO |

**Table 6: DX Series / Mammography Series Module of SOP Instances**

| Attribute Name | Tag | Value | Presence of Value | Source |
|---|---|---|---|---|
| Modality | (0008,0060) | MG | ALWAYS | AUTO |
| Presentation Intent Type | (0008,0068) | FOR PRESENTATION | ALWAYS | AUTO |
| Referenced Performed Procedure Step Sequence | (0008,1111) | Copied from source image header, if present | ANAP | AUTO |
| > Referenced SOP Class UID | (0008,1150) | Copied from source image header, if present | ANAP | AUTO |
| > Referenced SOP Instance UID | (0008,1155) | Copied from source image header, if present | ANAP | AUTO |
| Request Attributes Sequence | (0040,0275) | One Item, copied from source image header, if present | ANAP | AUTO |
| > Requested Procedure Description | (0032,1060) | Copied from source image header, if present | ANAP | AUTO |
| > Scheduled Procedure Step Description | (0040,0007) | Copied from source image header, if present | ANAP | AUTO |
| > Scheduled Protocol Code Sequence | (0040,0008) | One Item, copied from source image header, if present | ANAP | AUTO |
| >> Code Value | (0008,0100) | Copied from source image header, if present | ANAP | AUTO |
| >> Coding Scheme Designator | (0008,0102) | Copied from source image header, if present | ANAP | AUTO |
| >> Code Meaning | (0008,0104) | Copied from source image header, if present | ANAP | AUTO |
| > Scheduled Procedure Step ID | (0040,0009) | Copied from source image header, if present | ANAP | AUTO |

| | | | | |
|---|---|---|---|---|
| > Requested Procedure ID | (0040,1001) | Copied from source image header, if present | ANAP | AUTO |

**Table 7: Frame of Reference Module of Created SOP Instances**

| Attribute Name | Tag | Value | Presence of Value | Source |
|---|---|---|---|---|
| Frame of Reference UID | (0020,0052) | Copied from source image header | ALWAYS | AUTO |
| Position Reference Indicator | (0020,1040) | | EMPTY | AUTO |

**Table 8: General Equipment Module of Created SOP Instances**

| Attribute Name | Tag | Value | Presence of Value | Source |
|---|---|---|---|---|
| Manufacturer | (0008,0070) | Copied from source image header | ALWAYS | AUTO |
| Institution Name | (0008,0080) | Copied from source image header, if present | ANAP | AUTO |
| Institution Address | (0008,0081) | Copied from source image header, if present | ANAP | AUTO |
| Station Name | (0008,1010) | Copied from source image header | ALWAYS | AUTO |
| Institutional Department Name | (0008,1040) | Copied from source image header, if present | ANAP | AUTO |
| Manufacturer's Model Name | (0008,1090) | Copied from source image header | ALWAYS | AUTO |
| Device Serial Number | (0018,1000) | Copied from source image header | ALWAYS | AUTO |
| Software Versions | (0018,1020) | Copied from source image header | ALWAYS | AUTO |
| Pixel Padding Value | (0028,0120) | Copied from source image header | ALWAYS | AUTO |

**Table 9: General Image Module of Created SOP Instances**

| Attribute Name | Tag | Value | Presence of Value | Source |
|---|---|---|---|---|
| Instance Number | (0020,0013) | Copied from source image header | ALWAYS | AUTO |
| Patient Orientation | (0020,0020) | See **Table 12** | | |
| Content Date | (0008,0023) | Copied from source image header | ALWAYS | AUTO |
| Content Time | (0008,0033) | Copied from source image header | ALWAYS | AUTO |
| Image Type | (0008,0008) | See **Table 12** | | |
| Acquisition Date | (0008,0022) | Copied from source image header | ALWAYS | AUTO |
| Acquisition Time | (0008,0032) | Copied from source image header | ALWAYS | AUTO |
| Source Image Sequence | (0008,2112) | One Item that identifies the source raw projection images, copied from source image header | ALWAYS | AUTO |
| > Referenced SOP Class UID | (0008,1150) | SOP Class UID of raw projection image | ALWAYS | AUTO |
| > Referenced SOP Instance UID | (0008,1155) | SOP Instance UID of raw projection image | ALWAYS | AUTO |
| > Purpose of Reference | (0040,A170) | One Item, copied from source image | ANAP | AUTO |

| Attribute Name | Tag | Value | Presence of Value | Source |
|---|---|---|---|---|
| Code Sequence | | header, if present | | |
| >> Code Value | (0008,0100) | Copied from source image header, if present | ANAP | AUTO |
| >> Coding Scheme Designator | (0008,0102) | Copied from source image header, if present | ANAP | AUTO |
| >> Code Meaning | (0008,0104) | Copied from source image header, if present | ANAP | AUTO |
| > Spatial Locations Preserved | (0028,135A) | NO | ALWAYS | AUTO |
| Image Comments | (0020,4000) | Default = 'C-View' | ALWAYS | CONFIG |
| Burned In Annotation | (0028,0301) | See **Table 12** | | |
| Lossy Image Compression | (0028,2110) | See **Table 12** | | |

**Table 10: Image Pixel Module of Created SOP Instances**

| Attribute Name | Tag | Value | Presence of Value | Source |
|---|---|---|---|---|
| Samples per Pixel | (0028,0002) | See **Table 12** | | |
| Photometric Interpretation | (0028,0004) | See **Table 12** | | |
| Rows | (0028,0010) | Generated by the system | ALWAYS | AUTO |
| Columns | (0028,0011) | Generated by the system | ALWAYS | AUTO |
| Bits Allocated | (0028,0100) | See **Table 12** | | |
| Bits Stored | (0028,0101) | See **Table 12** | | |
| High Bit | (0028,0102) | See **Table 12** | | |
| Pixel Representation | (0028,0103) | See **Table 12** | | |
| Pixel Padding Range Limit | (0028,0121) | Copied from source image header | ALWAYS | AUTO |
| Pixel Data | (7FE0,0010) | Generated by the system | ALWAYS | AUTO |

**Table 11: DX Anatomy Imaged Module of SOP Instances**

| Attribute Name | Tag | Value | Presence of Value | Source |
|---|---|---|---|---|
| The supported attributes are overridden by the Mammography Image module. See **Table 19**. | | | | |

**Table 12: DX Image Module of Created SOP Instances**

| Attribute Name | Tag | Value | Presence of Value | Source |
|---|---|---|---|---|
| Image Type | (0008,0008) | DERIVED\PRIMARY, copied from source image header | ALWAYS | AUTO |
| Samples per Pixel | (0028,0002) | 1 | ALWAYS | AUTO |
| Photometric Interpretation | (0028,0004) | MONOCHROME2 | ALWAYS | AUTO |
| Bits Allocated | (0028,0100) | 16 | -ALWAYS | AUTO |
| Bits Stored | (0028,0101) | 10 | ALWAYS | AUTO |
| High Bit | (0028,0102) | 9 | ALWAYS | AUTO |
| Pixel Representation | (0028,0103) | 0 | ALWAYS | AUTO |
| Pixel Intensity Relationship | (0028,1040) | LOG | ALWAYS | AUTO |
| Pixel Intensity Relationship Sign | (0028,1041) | –1 | ALWAYS | AUTO |

| Attribute Name | Tag | Value | Presence of Value | Source |
|---|---|---|---|---|
| Rescale Intercept | (0028,1052) | 0 | ALWAYS | AUTO |
| Rescale Slope | (0028,1053) | 1 | ALWAYS | AUTO |
| Rescale Type | (0028,1054) | US | ALWAYS | AUTO |
| Presentation LUT Shape | (2050,0020) | IDENTITY | ALWAYS | AUTO |
| Lossy Image Compression | (0028,2110) | 00 | ALWAYS | AUTO |
| Patient Orientation | (0020,0020) | Copied from source image header | ALWAYS | AUTO |
| Burned In Annotation | (0028,0301) | NO, copied from source image header | ALWAYS | AUTO |
| Window Center | (0028,1050) | Generated by the system | ALWAYS | CONFIG |
| Window Width | (0028,1051) | Generated by the system | ALWAYS | CONFIG |

**Table 13: DX Detector Module of Created SOP Instances**

| Attribute Name | Tag | Value | Presence of Value | Source |
|---|---|---|---|---|
| Detector Type | (0018,7004) | Copied from source image header | ALWAYS | AUTO |
| Detector ID | (0018,700A) | Copied from source image header | ALWAYS | AUTO |
| Date of Last Detector Calibration | (0018,700C) | Copied from source image header | ALWAYS | AUTO |
| Time of Last Detector Calibration | (0018,700E) | Copied from source image header | ALWAYS | AUTO |
| Detector Conditions Nominal Flag | (0018,7000) | Copied from source image header | ALWAYS | AUTO |
| Detector Temperature | (0018,7001) | Copied from source image header | ALWAYS | AUTO |
| Detector Binning | (0018,701A) | Copied from source image header | ALWAYS | AUTO |
| Field of View Origin | (0018,7030) | Copied from source image header | ALWAYS | AUTO |
| Field of View Rotation | (0018,7032) | Copied from source image header | ALWAYS | AUTO |
| Field of View Horizontal Flip | (0018,7034) | Copied from source image header | ALWAYS | AUTO |
| Imager Pixel Spacing | (0018,1164) | Derived from source image | ALWAYS | AUTO |
| Pixel Spacing | (0028,0030) | Derived from source image | ALWAYS | AUTO |

**Table 14: DX Positioning Module of Created SOP Instances**

| Attribute Name | Tag | Value | Presence of Value | Source |
|---|---|---|---|---|
| View Position | (0018,5101) | Copied from source image header | ALWAYS | AUTO |
| View Code Sequence | (0054,0220) | See **Table 19** | | |
| Distance Source to Detector | (0018,1110) | Copied from source image header | ALWAYS | AUTO |
| Distance Source to Patient | (0018,1111) | Copied from source image header | ALWAYS | AUTO |
| Estimated Radiographic Magnification Factor | (0018,1114) | 1.0 | ALWAYS | AUTO |
| Positioner Type | (0018,1508) | See **Table 19** | | |
| Positioner Primary Angle | (0018,1510) | See **Table 19** | | |
| Body Part Thickness | (0018,11A0) | Copied from source image header | ALWAYS | AUTO |
| Compression Force | (0018,11A2) | Copied from source image header | ALWAYS | AUTO |

**Table 15: X-Ray Acquisition Dose Module of Created SOP Instances**

| Attribute Name | Tag | Value | Presence of Value | Source |
|---|---|---|---|---|
| KVP | (0018,0060) | See **Table 16** | | |
| X-Ray Tube Current | (0018,1151) | See **Table 16** | | |
| Exposure Time | (0018,1150) | See **Table 16** | | |
| Exposure | (0018,1152) | See **Table 16** | | |
| Exposure in uAs | (0018,1153) | Copied from source image header | ALWAYS | AUTO |
| Exposure Time in uS | (0018,8150) | Copied from source image header | ALWAYS | AUTO |
| Distance Source to Detector | (0018,1110) | See **Table 14** | | |
| Distance Source to Patient | (0018,1111) | See **Table 14** | | |
| Body Part Thickness | (0018,11A0) | See **Table 14** | | |
| Entrance Dose | (0040,0302) | Copied from source image header | ALWAYS | AUTO |
| Entrance Dose in mGy | (0040,8302) | Copied from source image header | ALWAYS | AUTO |
| Half Value Layer | (0040,0314) | Copied from source image header | ALWAYS | AUTO |
| Organ Dose | (0040,0316) | Copied from source image header | ALWAYS | AUTO |
| Organ Exposed | (0040,0318) | See **Table 19** | | |
| Anode Target Material | (0018,1191) | See **Table 16** | | |
| Filter Material | (0018,7050) | Copied from source image header | ALWAYS | AUTO |
| Filter Thickness Minimum | (0018,7052) | Copied from source image header | ALWAYS | AUTO |
| Filter Thickness Maximum | (0018,7054) | Copied from source image header | ALWAYS | AUTO |
| Relative X-Ray Exposure | (0018,1405) | Copied from source image header | ALWAYS | AUTO |

**Table 16: X-Ray Generation Module of Created SOP Instances**

| Attribute Name | Tag | Value | Presence of Value | Source |
|---|---|---|---|---|
| KVP | (0018,0060) | Copied from source image header | ALWAYS | AUTO |
| X-Ray Tube Current | (0018,1151) | Copied from source image header | ALWAYS | AUTO |
| Exposure Time | (0018,1150) | Copied from source image header | ALWAYS | AUTO |
| Exposure | (0018,1152) | Copied from source image header | ALWAYS | AUTO |
| Focal Spot(s) | (0018,1190) | Copied from source image header | ALWAYS | AUTO |
| Anode Target Material | (0018,1191) | Copied from source image header | ALWAYS | AUTO |
| Exposure Control Mode | (0018,7060) | Copied from source image header | ALWAYS | AUTO |
| Exposure Control Mode Description | (0018,7062) | Copied from source image header | ALWAYS | AUTO |

**Table 17: X-Ray Filtration Module of SOP Instances**

| Attribute Name | Tag | Value | Presence of Value | Source |
|---|---|---|---|---|
| The supported attributes are overridden by the X-Ray Acquisition Dose module. See **Table 15**. | | | | |

**Table 18: X-Ray Grid Module of Created SOP Instances**

| Attribute Name | Tag | Value | Presence of Value | Source |
|---|---|---|---|---|
| Grid | (0018,1166) | Copied from source image header | ALWAYS | AUTO |

**Table 19: Mammography Image Module of Created SOP Instances**

| Attribute Name | Tag | Value | Presence of Value | Source |
|---|---|---|---|---|
| Positioner Type | (0018,1508) | Copied from source image header | ALWAYS | AUTO |
| Positioner Primary Angle | (0018,1510) | Copied from source image header | ALWAYS | AUTO |
| Image Laterality | (0020,0062) | Copied from source image header | ALWAYS | AUTO |
| Organ Exposed | (0040,0318) | Copied from source image header | ALWAYS | AUTO |
| Breast Implant Present | (0028,1300) | Copied from source image header, if present | ANAP | AUTO |
| Partial View | (0028,1350) | Copied from source image header, if present | ANAP | AUTO |
| Anatomic Region Sequence | (0008,2218) | One Item | ALWAYS | AUTO |
| > Code Value | (0008,0100) | T-04000 | ALWAYS | AUTO |
| > Coding Scheme Designator | (0008,0102) | SNM3 | ALWAYS | AUTO |
| > Code Meaning | (0008,0104) | Breast | ALWAYS | AUTO |
| View Code Sequence | (0054,0220) | One Item | ALWAYS | AUTO |
| > Code Value | (0008,0100) | Copied from source image header | ALWAYS | AUTO |
| > Coding Scheme Designator | (0008,0102) | Copied from source image header | ALWAYS | AUTO |
| > Code Meaning | (0008,0104) | Copied from source image header | ALWAYS | AUTO |
| > View Modifier Code Sequence | (0054,0222) | All Items copied from source image header, if present | VNAP | AUTO |
| >> Code Value | (0008,0100) | Copied from source image header, if present | ANAP | AUTO |
| >> Coding Scheme Designator | (0008,0102) | Copied from source image header, if present | ANAP | AUTO |
| >> Code Meaning | (0008,0104) | Copied from source image header, if present | ANAP | AUTO |

**Table 20: Acquisition Context Module of Created SOP Instances**

| Attribute Name | Tag | Value | Presence of Value | Source |
|---|---|---|---|---|
| Acquisition Context Sequence | (0040,0555) | | EMPTY | AUTO |

**Table 21: SOP Common Module of Created SOP Instances**

| Attribute Name | Tag | Value | Presence of Value | Source |
|---|---|---|---|---|
| SOP Class UID | (0008,0016) | '1.2.840.10008.5.1.4.1.1.1.2' | ALWAYS | AUTO |
| SOP Instance UID | (0008,0018) | Generated automatically with configurable suffix | ALWAYS | CONFIG |
| Specific Character Set | (0008,0005) | Copied from source image header, if present | ANAP | AUTO |

## 8.2. Usage of Attributes from Received IODs

The following attributes are required to be present with a valid value (not zero length), in order for an image instance to be accepted for synthesized image generation:

- (0008,0020) Study Date
- (0008,0070) Manufacturer
- (0008,1090) Manufacturer's Model Name
- (0018,1000) Device Serial Number

### 8.2.1. Attribute Mapping

Patient and Study level attributes are copied from the received image SOP Instances to the corresponding C-View image SOP Instances. See tables in section **8.1.1**, '**Created SOP Instance(s)**' for details and additional information copied from the source images to the corresponding C-View images.

### 8.2.2. Coerced/Modified Attributes

None

## 8.3. Data Dictionary of Private Attributes

Created SOP Instances contain a Private Group (0019) labeled HOLOGIC, Inc., containing proprietary image characteristics.

## 8.4. Coded Terminology and Templates

Not Applicable

## 8.5. Grayscale Image Consistency

Not Applicable

## 8.6. Standard Extended/Specialized/Private SOP Classes

None

## 8.7. Private Transfer Syntaxes

None