# Lumify DICOM Conformance Statement

Lumify 1.0.X

989605449840015 Rev B

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PHILIPS

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# 1 DICOM Conformance Statement Overview

This document is the DICOM Conformance Statement for the Philips Medical Systems Lumify 1.0.X. The Lumify is an app-based Ultrasound system.

It provides the following features:

- Verification of application level communication
- Storage of images on a remote DICOM system

**Table 1 Network Services**

| SOP Class | | User of Service (SCU) | Provider of Service (SCP) |
|---|---|---|---|
| **Name** | **UID** | | |
| **Other** | | | |
| Verification SOP Class | 1.2.840.10008.1.1 | Yes | No |
| **Transfer** | | | |
| Ultrasound Multi-frame Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.3.1 | Yes | No |
| Ultrasound Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.6.1 | Yes | No |

# 2 Table of Contents

# 3 Introduction

## 3.1 Revision History

**Table 2 Revision History**

| Document Version | Date of Issue | Status | Description |
|---|---|---|---|
| Rev A | 01-November-2015 | Approved | Final version |
| Rev B | 13-November-2015 | Approved | Fixed clerical errors |

## 3.2 Audiences

This Conformance Statement is intended for:

- (Potential) customers
- System integrators of medical equipment
- Marketing staff interested in system functionality
- Software designers implementing DICOM interfaces

It is assumed that the reader is familiar with the DICOM standard.

## 3.3 Remarks

The DICOM Conformance Statement is contained in chapter 4 through 8 and follows the contents and structuring requirements of DICOM PS 3.2.

This DICOM Conformance Statement by itself does not guarantee successful interoperability of Philips equipment with non-Philips equipment. The user (or user's agent) should be aware of the following issues:

- **Interoperability**
  Interoperability refers to the ability of application functions, distributed over two or more systems, to work successfully together. The integration of medical devices into an IT environment may require application functions that are not specified within the scope of DICOM. Consequently, using only the information provided by this Conformance Statement does not guarantee interoperability of Philips equipment with non-Philips equipment.
  It is the user's responsibility to analyse thoroughly the application requirements and to specify a solution that integrates Philips equipment with non-Philips equipment.
- **Validation**
  Philips equipment has been carefully tested to assure that the actual implementation of the DICOM interface corresponds with this Conformance Statement.
  Where Philips equipment is linked to non-Philips equipment, the first step is to compare the relevant Conformance Statements. If the Conformance Statements indicate that successful information exchange should be possible, additional validation tests will be necessary to ensure the functionality, performance, accuracy and stability of image and image related data. It is the responsibility of the user (or user's agent) to specify the appropriate test suite and to carry out the additional validation tests.
- **New versions of the DICOM Standard**
  The DICOM Standard will evolve in future to meet the user's growing requirements and to incorporate new features and technologies. Philips is actively involved in this evolution and plans to adapt its equipment to future versions of the DICOM Standard. In order to do so, Philips reserves the right to make changes to its products or to discontinue its delivery. The user should ensure that any non-Philips provider linking to Philips equipment also adapts to future versions of the DICOM Standard. If not, the incorporation of DICOM enhancements into Philips equipment may lead to loss of connectivity (in case of networking) and incompatibility (in case of media).

## 3.4 Definitions, Terms and Abbreviations

**Table 3 Definition, Terms and Abbreviations**

| Abbreviation/Term | Explanation |
|---|---|
| AE | Application Entity |
| ANSI | American National Standard Institute |
| AP | Application Profile |
| BOT | Basic Offset Table |
| CD | Compact Disc |
| CD-R | CD-Recordable |
| CD-M | CD-Medical |
| CR | Computed Radiography |
| CT | Computed Tomography |
| DCR | Dynamic Cardio Review |
| DICOM | Digital Imaging and Communications in Medicine |
| DIMSE | DICOM Message Service Element |
| DIMSE-C | DIMSE-Composite |
| DIMSE-N | DIMSE-Normalized |
| DX | Digital X-Ray |
| EBE | DICOM Explicit VR Big Endian |
| ELE | DICOM Explicit VR Little Endian |
| FSC | File-set Creator |
| FSR | File-set Reader |
| FSU | File-set Updater |
| GUI | Graphic User Interface |
| HIS | Hospital Information System |
| HL7 | Health Level Seven |
| ILE | DICOM Implicit VR Little Endian |
| IOD | Information Object Definition |
| ISIS | Information System - Imaging System |
| MOD | Magneto-Optical Disk |
| MPPS | Modality Performed Procedure Step |
| MR | Magnetic Resonance |
| NEMA | National Electrical Manufacturers Association |
| NM | Nuclear Medicine |
| PDU | Protocol Data Unit |
| RF | X-Ray Radiofluoroscopic |
| RIS | Radiology Information System |
| RT | Radiotherapy |
| RWA | Real-World Activity |
| SC | Secondary Capture |
| SCM | Study Component Management |
| SCP | Service Class Provider |
| SCU | Service Class User |
| SOP | Service Object Pair |
| TCP/IP | Transmission Control Protocol/Internet Protocol |
| UID | Unique Identifier |
| US | Ultrasound |
| USMF | Ultrasound Multi-frame |
| WLM | Worklist Management |
| XA | X-Ray Angiographic |

## 3.5 References

[DICOM] Digital Imaging and Communications in Medicine, Parts 1 - 20 (NEMA PS 3.1- PS 3.20),
National Electrical Manufacturers Association (NEMA)
Publication Sales 1300 N. 17th Street, Suite 1752 Rosslyn, Virginia. 22209, United States of America
Internet: http://medical.nema.org/

Note that at any point in time the official standard consists of the most recent yearly edition of the base standard (currently 2011) plus all the supplements and correction items that have been approved as Final Text.

# 4 Networking

## 4.1 Implementation model

### 4.1.1 Application Data Flow

The Lumify system consists of one single application, the Storage Application Entity. The figure below shows the networking application data flow as a functional overview of the Storage AE.

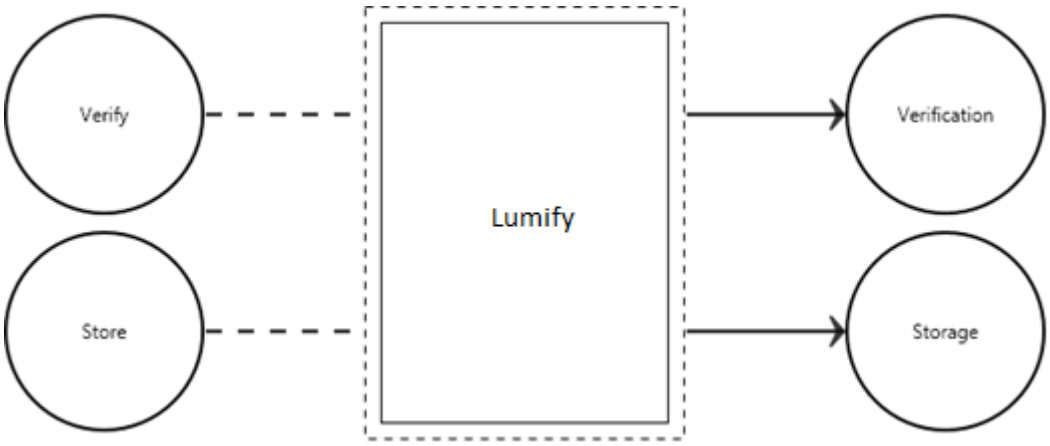


**Figure 1 Application Data Flow Diagram**

The system sends Images to one or more remote AEs. Acquisition of single frame images is associated with the local real-world activity “Freeze” and “Save Image” and the acquisition of Multiframe images is assocoated with local real world activty “Save Loop” for save loops or clips. Sending or exporting of images depends on user configuration, either ”Batch” when End Exam is pressed, (or) Manual.

### 4.1.2 Functional Definition of Application Entities

This section contains a functional definition for each individual local Application Entity.

#### 4.1.2.1 *Functional Definition of Storage AE*

A Network Store queue with associated network destination will activate the Storage AE. An association request is sent to the destination AE and upon successful negotiation of a Presentation Context the image transfer is started. If the association cannot be opened, the related queue’s Status is set to RETRY as displayed in the Job Manager. The user may select “Retry Job” to attempt re-send. After the automatic retries have failed, the job is set to ERROR. The user may “Delete Job” and re-send manually. Deleting a job does not remove the data, as it is still present on the system. Only the request to transfer the data is removed. Once any communication issues have been resolved, “Retry Job” may be selected or if the jobs were deleted, they may be queued again from the Review/Local patient directory.

### 4.1.3 Sequencing of Real World Activities

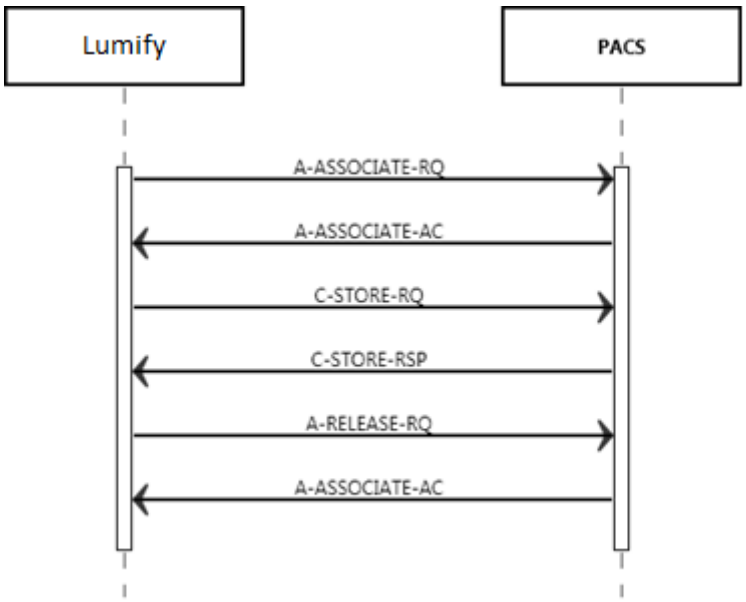


**Figure 2 Sequencing of Real World Activity - Store**

## 4.2 AE Specifications

### 4.2.1 AE Specification of Storage AE

#### 4.2.1.1 *SOP Classes*

This Application Entity provides Standard Conformance to the following SOP Classes.

**Table 4 SOP Classes for Application Entity Storage AE**

| SOP Class Name | SOP Class UID | SCU | SCP |
|---|---|---|---|
| Verification SOP Class | 1.2.840.10008.1.1 | Yes | No |
| Ultrasound Multi-frame Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.3.1 | Yes | No |
| Ultrasound Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.6.1 | Yes | No |

#### 4.2.1.2 *Association Policies*

##### 4.2.1.2.1 General

The DICOM standard application context name for DICOM 3.0 is always proposed:

**Table 5 DICOM Application Context**

| Property | Value |
|---|---|
| Application Context Name | 1.2.840.10008.3.1.1.1 |

##### 4.2.1.2.2 Number of Associations

The maximum number of simultaneous associations that this Application Entity supports as an initiator or acceptor is specified below.

**Table 6 Maximum number of simultaneous associations**

| Property | Value |
|---|---|
| Maximum number of simultaneous associations | 1 |

#### 4.2.1.2.3 Asynchronous Nature

This application entity supports negotiation of multiple outstanding transactions, along with the maximum number of outstanding transactions supported.

**Table 7 Asynchronous Nature**

| Property | Value |
|---|---|
| Maximum number of asynchronous outstanding transactions | 1 |

#### 4.2.1.2.4 Implementation Identifying Information

**Table 8 Implementation Identifying Information**

| Property | Value |
|---|---|
| Implementation Class UID | 1.3.46.670589.14.8100.100 |
| Implementation Version Name | LUMIFY_1.0 |

#### 4.2.1.2.5 Communication Failure Handling

The behaviour of this application entity during communication failure is summarized in the table below.

**Table 9 Communication Failure Behavior**

| Exception | Behaviour |
|---|---|
| Timeout | The association is aborted using A-ABORT and the command is marked failed. The reason is logged and reported to the user. |
| Association aborted | An A-ABORT is send and the association is closed. |
| Failed to connect | The failure to connect reason is logged and reported to the user, the activity is retried in the job viewer. |

### 4.2.1.3 *Association Initiation Policy*

Images shall be sent from the selected studies from the Review/local patient directory. The studies can be manually selected and sent to the default PACS. If the C-STORE response from the remote application contains a status other than Success or Warning, the association is retried until switched to a failed state. The application entity will respond to a received association rejection as shown in the next table.

**Table 10 Association Rejection Handling Behavior**

| Result | Source | Reason/Diagnosis | Behaviour |
|---|---|---|---|
| 1-rejected-permanent | 1-DICOM UL service-user | 1-no-reason-given | Association is released. |
| | | 2-application-context-name-not-supported | Association is released. |
| | | 3-calling-AE-title-not-recognized | Association is released. |
| | | 7-called- AE-title-not-recognized | Association is released. |
| | 2-DICOM UL service-provider (ACSE related function) | 1-no-reason-given | Association is released. |
| | | 2-no-reason-given | Association is released. |
| | 3-DICOM UL service-provider (Presentation related function) | 1-temporary-congestion | Association is released. |
| | | 2-local-limit-exceeded | Association is released. |
| 2-rejected-transient | 1-DICOM UL service-user | 1-no-reason-given | Association is released. |
| | | 2-application-context-name-not-supported | Association is released. |
| | | 3-calling-AE-title-not-recognized | Association is released. |
| | | 7-called- AE-title-not-recognized | Association is released. |
| | 2-DICOM UL service-provider (ACSE related function) | 1-no-reason-given | Association is released. |
| | | 2-no-reason-given | Association is released. |
| | 3-DICOM UL service-provider (Presentation related function) | 1-temporary-congestion | Association is released. |
| | | 2-local-limit-exceeded | Association is released. |

#### 4.2.1.3.1 (Real-World) Activity - Image Export

##### *4.2.1.3.1.1 Description and Sequencing of Activities*

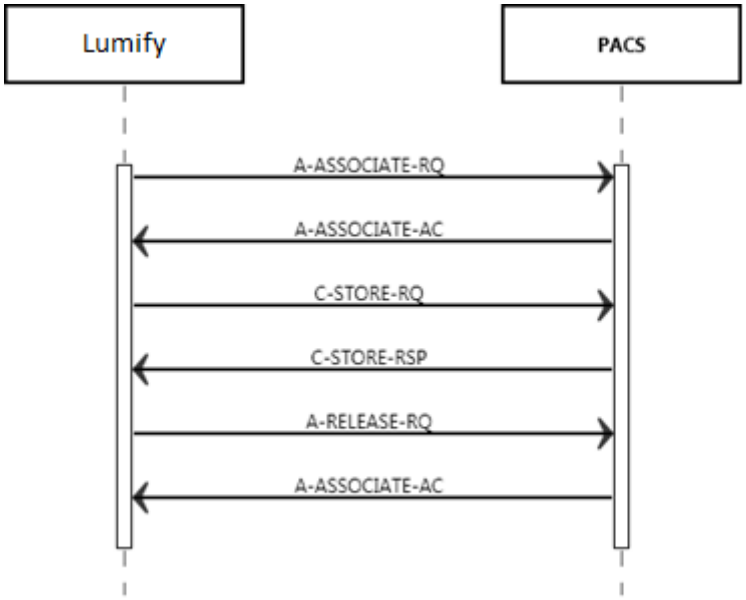


**Figure 3 Image Export**

The Storage Application Entity sends Images to one or many remote AE. Only one AE can be configured to auto export. Acquisition of images is associated with the local real-world activity “Freeze” then “Save Image” for single frame and “Save Loop” for loops or clips. Sending or exporting of images can be performed manually.

##### *4.2.1.3.1.2 Proposed Presentation Contexts*

**Table 11 Proposed Presentation Contexts for (Real-World) Activity Image Export**

| Presentation Context Table | | | | | |
|---|---|---|---|---|---|
| Abstract Syntax | | Transfer Syntax | | Role | Ext. Neg. |
| Name | UID | Name | UID | | |
| Ultrasound Multi-frame Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.3.1 | JPEG Lossy Baseline<br>RLE Lossless | 1.2.840.10008.1.2.4.50<br>1.2.840.10008.1.2.5 | SCU | None |
| Ultrasound Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.6.1 | JPEG Lossy Baseline<br>RLE Lossless | 1.2.840.10008.1.2.4.50<br>1.2.840.10008.1.2.5 | SCU | None |

#### *4.2.1.3.1.3 SOP Specific Conformance for SOP Classes*

### 4.2.1.3.2 (Real-World) Activity - Verification as SCU

#### *4.2.1.3.2.1 Description and Sequencing of Activities*

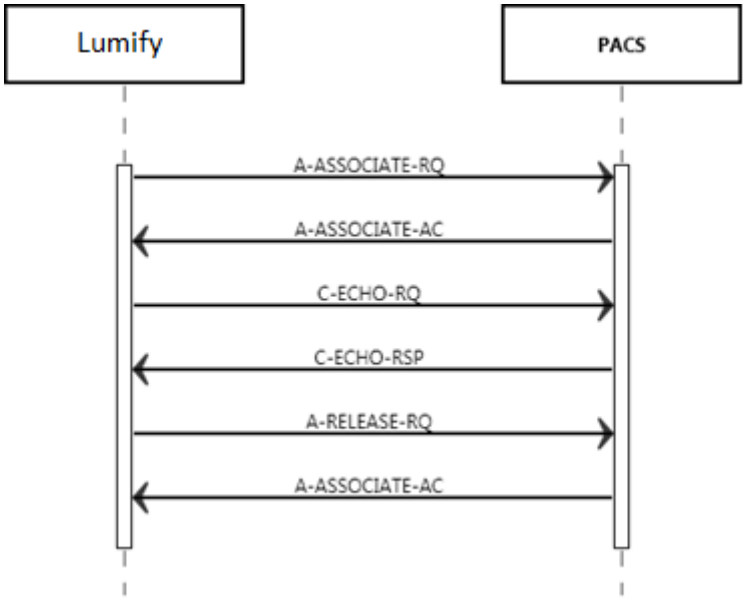


**Figure 4 Verification as SCU**

#### *4.2.1.3.2.2 Proposed Presentation Contexts*

**Table 12 Proposed Presentation Contexts for (Real-World) Activity Verification as SCU**

| Presentation Context Table | | | | | |
|---|---|---|---|---|---|
| Abstract Syntax | | Transfer Syntax | | Role | Ext. Neg. |
| Name | UID | Name | UID | | |
| Verification SOP Class | 1.2.840.10008.1.1 | Implicit VR Little Endian: Default Transfer Syntax for DICOM<br>Explicit VR Little Endian<br>Explicit VR Big Endian<br>JPEG Lossy Baseline<br>RLE Lossless | 1.2.840.10008.1.2<br><br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2<br>1.2.840.10008.1.2.4.50<br>1.2.840.10008.1.2.5 | SCU | None |

#### *4.2.1.3.2.3 SOP Specific Conformance for SOP Classes*

Not Applicable

#### *4.2.1.3.2.3.1 SOP Specific Conformance for Verification SOP Class*
Not Applicable

#### 4.2.1.3.2.3.1.1 Dataset Specific Conformance for Verification SOP Class C-ECHO-SCU
Not Applicable

#### 4.2.1.4 *Association Acceptance Policy*
The details regarding the response behaviour to status codes are provided in next table.

**Table 13 Status Response**

| Service Status | Error Code | Further Meaning | Behaviour |
|---|---|---|---|
| Success | 0000 | Confirmation | The SCP has successfully responded to the verification request. |
| Refused | A700 | Out of Resources | Device Status is set to: Not Verified |
| Failed | C000 – CFFF | Unable to Process | Same as “Refused” above |

## 4.3 Network Interfaces

### 4.3.1 Physical and Wireless Network Interfaces
The System provides only DICOM V3.0 TCP/IP Network Communication Support as defined in PS 3.8 of the standard.

TCP/IP is the only protocol stack supported.

The system supports Wireless network interface that is available by the device. The system does not control or configure the network interfaces.

The TCP/IP Stack as supported by the underlying Operating System.

### 4.3.2 Additional Protocols
Not Applicable

### 4.3.3 IPv4 and IPv6 Support
Only IPv4 is supported.

## 4.4 Configuration
Any implementation's DICOM conformance may be dependent upon configuration, which takes place at the time of installation. Issues concerning configuration are addressed in this section.

### 4.4.1 AE Title/Presentation Address Mapping
An important installation issue is the translation from AE title to presentation address. How this is to be performed is described here.

#### 4.4.1.1 *Local AE Titles*
The local AE title mapping and configuration are specified as:

**Table 14 AE Title Configuration**

| Application Entity | AE Title |
|---|---|
| Storage | <User Specified> |

#### 4.4.1.2 *Remote AE Title/Presentation Address Mapping*

| Application Entity | AE Title |
|---|---|
| Storage | <User Specified> |

#### 4.4.1.2.1 Storage AE

### 4.4.2 Parameters
The specification of important operational parameters, their default value and range (if configurable) are specified here.

## Table 15 Configuration Parameters

| Parameter | Configurable | Default Value |
|---|---|---|
| **General** | | |
| Time-out waiting for acceptance or rejection Response to an Association Open Request (Application Level timeout) | Yes | 5 min |
| General DIMSE level time-out values (Verification, Storage) | Yes | 30sec |
| Time-out for response to TCP/IP connect request. (Low-level timeout) | Yes | 5 min |
| **AE Specific Parameters** | | |
| System AE title | Yes | |
| Size constraint in maximum object size | No | - |
| Maximum PDU size the AE can send | | 16384 |
| Association time-out SCU | No | 5 min |
| Number of simultaneous associations by service and/or SOP class | No | 1 |
| SOP Class support | No | |
| Transfer Syntax support | Yes | 1.2.840.10008.1.2.5 (RLE Lossless) |

# 5 Support of Character Sets

**Table 16 Supported DICOM Character Sets**

| Character Set Description | Defined Term | ESC Sequence | ISO Registration Number | Code Element | Character Set |
|---|---|---|---|---|---|
| Unicode as UTF-8 | ISO_IR 192 | - | ISO-IR 192 | N/A | ISO 10646-1, 10646-2, and their associated supplements and extensions |
| | | - | ISO-IR 6 | G0 | ISO 646 |

# 6 Security

## 6.1 Security Profiles

Not applicable.

# 7 Lumify

## 7.1 IOD Contents

### 7.1.1 Created SOP Instances

This section specifies each IOD created by this application and specifies the content for each IOD created (including private IODs).

For each attribute in the IOD the following information is supplied:

- Attribute name
- Tag
- VR – Value representation
- Value - specifies possible values
- Presence of value - specifies if attribute is always present or only under specific conditions
- Source of value - specifies the source of the value
- Comment - gives additional information on the attribute

Abbreviations used in the IOD tables for the column "Presence of Module" are:

| | |
|---|---|
| ALWAYS | The module is always present. |
| CONDITIONAL | The module is used under specified condition. |

Abbreviations used in the Module table for the column "Presence of Value" are:

| | |
|---|---|
| ALWAYS | The attribute is always present with a value. |
| EMPTY | The attribute is always present without any value. (attribute sent zero length) |
| VNAP | The attribute is always present and its Value is Not Always Present. (attribute sent zero length if no value is present) |
| ANAP | The attribute is present under specified condition – if present then it will always have a value. |

The abbreviations used in the Module table for the column "Source" are:

| | |
|---|---|
| AUTO | The attribute value is generated automatically. |
| CONFIG | The attribute value source is a configurable parameter. |
| COPY | The attribute value source is another SOP instance. |
| FIXED | The attribute value is hard-coded in the application. |
| IMPLICIT | The attribute value source is a user-implicit setting. |
| MPPS | The attribute value is the same as that use for Modality Performed Procedure Step. |
| MWL | The attribute value source is a Modality Worklist. |
| USER | The attribute value source is explicit user input. |

#### 7.1.1.1 *List of Created SOP Classes*

**Table 17 List of Created SOP Classes**

| SOP Class Name | SOP Class UID |
|---|---|
| Ultrasound Multi-frame Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.3.1 |
| Ultrasound Image Storage SOP Class | 1.2.840.10008.5.1.4.1.1.6.1 |

#### 7.1.1.2 *Ultrasound Multi-frame Image Storage SOP Class*

### Table 18 SOP Class Modules

| Information Entity | Module | Presence |
|---|---|---|
| Patient | Patient Module | Always |
| Study | General Study Module | Always |
| Series | General Series Module | Always |
| Equipment | General Equipment Module | Always |
| Image | General Image Module | Always |
| | Image Pixel Module | Always |
| | Cine Module | Always |
| | Multi-Frame Module | Always |
| | US Region Calibration Module | Always |
| | US Image Module | Always |
| | SOP Common Module | Always |

### Table 19 Patient Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Patient's Name | 0010,0010 | PN | | VNAP | AUTO, USER | |
| Patient ID | 0010,0020 | LO | | VNAP | AUTO, USER | |
| Patient's Birth Date | 0010,0030 | DA | | VNAP | USER | |
| Patient's Sex | 0010,0040 | CS | | EMPTY | AUTO | |

### Table 20 General Study Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Study Date | 0008,0020 | DA | | VNAP | AUTO | |
| Study Time | 0008,0030 | TM | | VNAP | AUTO | |
| Accession Number | 0008,0050 | SH | | EMPTY | AUTO | |
| Referring Physician's Name | 0008,0090 | PN | | EMPTY | AUTO | |
| Study Description | 0008,1030 | LO | "Study" followed by Study ID | ALWAYS | AUTO | |
| Study Instance UID | 0020,000D | UI | | ALWAYS | AUTO | |
| Study ID | 0020,0010 | SH | | ALWAYS | AUTO | |

### Table 21 General Series Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Series Date | 0008,0021 | DA | | ALWAYS | AUTO | |
| Modality | 0008,0060 | CS | | ALWAYS | AUTO | |
| Series Description | 0008,103E | LO | Series 1 | ALWAYS | FIXED | |
| Performing Physicians' Name | 0008,1050 | PN | | VNAP | USER | |
| Operators' Name | 0008,1070 | PN | | VNAP | USER | |
| Series Instance UID | 0020,000E | UI | | ALWAYS | AUTO | |
| Series Number | 0020,0011 | IS | | ALWAYS | AUTO | |

### Table 22 General Equipment Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Manufacturer | 0008,0070 | LO | Philips Medical Systems | ALWAYS | FIXED | |
| Station Name | 0008,1010 | SH | | ALWAYS | USER | Same as AE title |
| Manufacturer's Model Name | 0008,1090 | LO | Lumify | ALWAYS | AUTO, FIXED | |
| Software Version(s) | 0018,1020 | LO | | ALWAYS | AUTO | |

### Table 23 General Image Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Image Type | 0008,0008 | CS | Value is DERIVED\PRIMARY for lossy, and ORIGINAL\PRIMARY for lossless | ALWAYS | AUTO | |
| Acquisition Date | 0008,0022 | DA | | ALWAYS | AUTO | |
| Content Date | 0008,0023 | DA | | ALWAYS | AUTO | |
| Acquisition DateTime | 0008,002A | DT | | ALWAYS | AUTO | |
| Acquisition Time | 0008,0032 | TM | | ALWAYS | AUTO | |
| Content Time | 0008,0033 | TM | | ALWAYS | AUTO | |
| Instance Number | 0020,0013 | IS | | ALWAYS | AUTO | |
| Patient Orientation | 0020,0020 | CS | | EMPTY | AUTO | |
| Lossy Image Compression | 0028,2110 | CS | “01” if image is lossy, “00” if not. | ALWAYS | AUTO, CONFIG | |

### Table 24 Image Pixel Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Samples per Pixel | 0028,0002 | US | | ALWAYS | CONFIG | |
| Photometric Interpretation | 0028,0004 | CS | | ALWAYS | CONFIG | |
| Planar configuration | 0028,0006 | US | | ALWAYS | AUTO | |
| Rows | 0028,0010 | US | 768 | ALWAYS | FIXED | |
| Columns | 0028,0011 | US | 1024 | ALWAYS | FIXED | |
| Bits Allocated | 0028,0100 | US | | ALWAYS | AUTO | |
| Bits Stored | 0028,0101 | US | | ALWAYS | AUTO | |
| High Bit | 0028,0102 | US | | ALWAYS | AUTO | |
| Pixel Representation | 0028,0103 | US | | ALWAYS | AUTO | |
| Pixel Data | 7FE0,0010 | OB | | ANAP | AUTO | |

### Table 25 Cine Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Recommended Display Frame Rate | 0008,2144 | IS | | ALWAYS | AUTO | |
| Cine Rate | 0018,0040 | IS | | ALWAYS | AUTO | |
| Effective Duration | 0018,0072 | DS | | ALWAYS | AUTO | |
| Frame Time Vector | 0018,1065 | DS | | ALWAYS | AUTO | |

### Table 26 Multi-Frame Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Number of Frames | 0028,0008 | IS | | ALWAYS | AUTO | |
| Frame Increment Pointer | 0028,0009 | AT | | ALWAYS | AUTO | |

### Table 27 US Region Calibration Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Sequence of Ultrasound Regions | 0018,6011 | SQ | | ALWAYS | AUTO | |
| >Region Spatial Format | 0018,6012 | US | | ALWAYS | AUTO | |
| >Region Data Type | 0018,6014 | US | | ALWAYS | AUTO | |
| >Region Flags | 0018,6016 | UL | | ALWAYS | AUTO | |
| >Region Location Min x0 | 0018,6018 | UL | | ALWAYS | AUTO | |
| >Region Location Min y0 | 0018,601A | UL | | ALWAYS | AUTO | |
| >Region Location Max x1 | 0018,601C | UL | | ALWAYS | AUTO | |
| >Region Location Max y1 | 0018,601E | UL | | ALWAYS | AUTO | |
| >Reference Pixel x0 | 0018,6020 | SL | | ALWAYS | AUTO | |
| >Reference Pixel y0 | 0018,6022 | SL | | ALWAYS | AUTO | |
| >Physical Units X Direction | 0018,6024 | US | | ALWAYS | AUTO | |
| >Physical Units Y Direction | 0018,6026 | US | | ALWAYS | AUTO | |
| >Ref. Pixel Physical Value X | 0018,6028 | FD | | ALWAYS | AUTO | |
| >Ref. Pixel Physical Value Y | 0018,602A | FD | | ALWAYS | AUTO | |
| >Physical Delta X | 0018,602C | FD | | ALWAYS | AUTO | |
| >Physical Delta Y | 0018,602E | FD | | ALWAYS | AUTO | |

### Table 28 US Image Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Image Type | 0008,0008 | CS | Value is DERIVED\PRIMARY for lossy, and ORIGINAL\PRIMARY for lossless | ALWAYS | AUTO | |
| Acquisition DateTime | 0008,002A | DT | | ALWAYS | AUTO | |
| Transducer Data | 0018,5010 | LO | | ALWAYS | AUTO | |
| Processing Function | 0018,5020 | LO | | ALWAYS | AUTO | |
| Transducer Type | 0018,6031 | CS | | ALWAYS | AUTO | |
| Samples Per Pixel | 0028,0002 | US | | ALWAYS | AUTO | |
| Photometric Interpretation | 0028,0004 | CS | | ALWAYS | AUTO | |
| Planar Configuration | 0028,0006 | US | | ALWAYS | AUTO | |
| Frame Increment Pointer | 0028,0009 | AT | | ANAP | AUTO | |
| Ultrasound Color Data Present | 0028,0014 | US | 0 for no color data and 1 for color data | ALWAYS | AUTO | |
| Bits Allocated | 0028,0100 | US | | ALWAYS | AUTO | |
| Bits Stored | 0028,0101 | US | | ALWAYS | AUTO | |
| High Bit | 0028,0102 | US | | ALWAYS | AUTO | |
| Pixel Representation | 0028,0103 | US | | ALWAYS | AUTO | |
| Lossy Image Compression | 0028,2110 | CS | “01” if image is lossy, “00” if not. | ALWAYS | AUTO, CONFIG | |

### Table 29 SOP Common Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Specific Character Set | 0008,0005 | CS | ISO_IR 192 | ALWAYS | FIXED | |
| SOP Class UID | 0008,0016 | UI | | ALWAYS | AUTO | |
| SOP Instance UID | 0008,0018 | UI | | ALWAYS | AUTO | |
| Instance Number | 0020,0013 | IS | | ALWAYS | AUTO | |

#### 7.1.1.3 *Ultrasound Image Storage SOP Class*

### Table 30 SOP Class Modules

| Information Entity | Module | Presence |
|---|---|---|
| Patient | Patient Module | Always |
| Study | General Study Module | Always |
| Series | General Series Module | Always |
| Equipment | General Equipment Module | Always |
| Image | General Image Module | Always |
| | Image Pixel Module | Always |
| | US Region Calibration Module | Always |
| | US Image Module | Always |
| | SOP Common Module | Always |

### Table 31 Patient Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Patient's Name | 0010,0010 | PN | | VNAP | AUTO, USER | |
| Patient ID | 0010,0020 | LO | | VNAP | AUTO, USER | |
| Patient's Birth Date | 0010,0030 | DA | | VNAP | USER | |
| Patient’s Sex | 0010,0040 | CS | | EMPTY | AUTO | |

### Table 32 General Study Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Study Date | 0008,0020 | DA | | ALWAYS | AUTO | |
| Study Time | 0008,0030 | TM | | ALWAYS | AUTO | |
| Accession Number | 0008,0050 | SH | | EMPTY | AUTO | |
| Referring Physician’s Name | 0008,0090 | PN | | EMPTY | AUTO | |
| Study Description | 0008,1030 | LO | “Study” followed by Study ID | ALWAYS | AUTO | |
| Study Instance UID | 0020,000D | UI | | ALWAYS | AUTO | |
| Study ID | 0020,0010 | SH | | ALWAYS | AUTO | |

### Table 33 General Series Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Series Date | 0008,0021 | DA | | ALWAYS | AUTO | |
| Modality | 0008,0060 | CS | | ALWAYS | AUTO | |
| Series Description | 0008,103E | LO | Series 1 | ALWAYS | FIXED | |
| Performing Physicians' Name | 0008,1050 | PN | | ANAP | USER | |
| Operators' Name | 0008,1070 | PN | | ANAP | USER | |
| Series Instance UID | 0020,000E | UI | | ALWAYS | AUTO | |
| Series Number | 0020,0011 | IS | | ALWAYS | AUTO | |

### Table 34 General Equipment Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Manufacturer | 0008,0070 | LO | Philips Medical Systems | ALWAYS | AUTO, FIXED | |
| Station Name | 0008,1010 | SH | | ALWAYS | USER | Contains our AE title |
| Manufacturer's Model Name | 0008,1090 | LO | Lumify | ALWAYS | FIXED | |
| Software Version(s) | 0018,1020 | LO | | ALWAYS | AUTO | |

### Table 35 General Image Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Image Type | 0008,0008 | CS | Value is DERIVED\PRIMARY for lossy, and ORIGINAL\PRIMARY for lossless | ALWAYS | AUTO | |
| Acquisition Date | 0008,0022 | DA | | ALWAYS | AUTO | |
| Content Date | 0008,0023 | DA | | ALWAYS | AUTO | |
| Acquisition DateTime | 0008,002A | DT | | ALWAYS | AUTO | |
| Acquisition Time | 0008,0032 | TM | | ALWAYS | AUTO | |
| Content Time | 0008,0033 | TM | | ALWAYS | AUTO | |
| Instance Number | 0020,0013 | IS | | ALWAYS | AUTO | |
| Patient Orientation | 0020,0020 | CS | | EMPTY | AUTO | |
| Lossy Image Compression | 0028,2110 | CS | “01” if image is lossy, “00” if not. | ALWAYS | AUTO, CONFIG | |
| Lossy Image Compression Ratio | 0028,2112 | DS | | ANAP | AUTO, CONFIG | If user chooses JPEG, they can also choose a compression ratio. The system automatically generates the corresponding value for this tag. |
| Lossy Image Compression Method | 0028,2114 | CS | ISO_10918_1 | ANAP | FIXED | |

### Table 36 Image Pixel Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Rows | 0028,0010 | US | | ALWAYS | AUTO | |
| Columns | 0028,0011 | US | | ALWAYS | AUTO | |
| Pixel Data | 7FE0,0010 | OB | | ANAP | AUTO | |

### Table 37 US Region Calibration Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Sequence of Ultrasound Regions | 0018,6011 | SQ | | ALWAYS | AUTO | |
| >Region Spatial Format | 0018,6012 | US | | ALWAYS | AUTO | |
| >Region Data Type | 0018,6014 | US | | ALWAYS | AUTO | |
| >Region Flags | 0018,6016 | UL | | ALWAYS | AUTO | |
| >Region Location Min X0 | 0018,6018 | UL | | ALWAYS | AUTO | |
| >Region Location Min Y0 | 0018,601A | UL | | ALWAYS | AUTO | |
| >Region Location Max X1 | 0018,601C | UL | | ALWAYS | AUTO | |
| >Region Location Max Y1 | 0018,601E | UL | | ALWAYS | AUTO | |
| >Reference Pixel X0 | 0018,6020 | SL | | ALWAYS | AUTO | |
| >Reference Pixel Y0 | 0018,6022 | SL | | ALWAYS | AUTO | |
| >Physical Units X Direction | 0018,6024 | US | | ALWAYS | AUTO | |
| >Physical Units Y Direction | 0018,6026 | US | | ALWAYS | AUTO | |
| >Ref. Pixel Physical Value X | 0018,6028 | FD | | ALWAYS | AUTO | |
| >Ref. Pixel Physical Value Y | 0018,602A | FD | | ALWAYS | AUTO | |
| >Physical Delta X | 0018,602C | FD | | ALWAYS | AUTO | |
| >Physical Delta Y | 0018,602E | FD | | ALWAYS | AUTO | |

### Table 38 US Image Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Image Type | 0008,0008 | CS | Value is DERIVED\PRIMARY for lossy, and ORIGINAL\PRIMARY for lossless | ALWAYS | FIXED | |
| Acquisition DateTime | 0008,002A | DT | | ALWAYS | AUTO | |
| Transducer Data | 0018,5010 | LO | | ALWAYS | AUTO | |
| Processing Function | 0018,5020 | LO | | ALWAYS | AUTO | |
| Transducer Type | 0018,6031 | CS | | ALWAYS | AUTO | |
| Samples Per Pixel | 0028,0002 | US | | ALWAYS | AUTO | |
| Photometric Interpretation | 0028,0004 | CS | | ALWAYS | AUTO | |
| Planar Configuration | 0028,0006 | US | | ALWAYS | AUTO | |
| Ultrasound Color Data Present | 0028,0014 | US | 0 for no color data and 1 for color data | ALWAYS | AUTO | |
| Bits Allocated | 0028,0100 | US | | ALWAYS | AUTO | |
| Bits Stored | 0028,0101 | US | | ALWAYS | AUTO | |
| High Bit | 0028,0102 | US | | ALWAYS | AUTO | |
| Pixel Representation | 0028,0103 | US | | ALWAYS | AUTO | |
| Lossy Image Compression | 0028,2110 | CS | “01” if image is lossy compressed,<br>“00” if not. | ALWAYS | AUTO, CONFIG | User can choose between lossy and lossless compression |

### Table 39 SOP Common Module

| Attribute Name | Tag | VR | Value | Presence of Value | Source | Comment |
|---|---|---|---|---|---|---|
| Specific Character Set | 0008,0005 | CS | ISO_IR 192 | ALWAYS | AUTO | |
| SOP Class UID | 0008,0016 | UI | | ALWAYS | AUTO | |
| SOP Instance UID | 0008,0018 | UI | | ALWAYS | AUTO | |
| Instance Number | 0020,0013 | IS | | ALWAYS | AUTO | |

#### 7.1.2 Usage of Attributes from Received IODs

Not applicable.

#### 7.1.3 Attribute Mapping

Not applicable.

#### 7.1.4 Coerced/Modified Fields
Not applicable.

## 7.2 Data Dictionary of Private Attributes
Not applicable.

## 7.3 Coded Terminology and Templates

#### 7.3.1 Context Group
Not applicable.

#### 7.3.2 Template Specifications
Not applicable.

#### 7.3.3 Private Code Definitions
Not applicable.

## 7.4 Grayscale Image Consistency
Not applicable.

## 7.5 Standard/Extended/Specialized/Private SOP Classes
Not applicable.