Clarius DICOM Conformance Statement

Clarius Mobile Health Corp.

DICOM Conformance Statement

Clarius App Versions 4.2.2

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1 Conformance Statement Overview

The "Scanner" device developed by Clarius Mobile Health Corp. uses ultrasound technology to scan patients and produce medical images of various formats. DICOM is the standard for the communication and management of medical imaging information and related data [1]. The Clarius implementation provides functionality to transfer saved images or live image data to a DICOM server located anywhere, in several selectable image formats. In addition the app also allows the user to download DICOM Worklists from their DICOM Worklist Servers to automatically fill in patient information.

The following is the table of Supported Networking DICOM Service (SOP) Classes with roles (User/Provider).

Table 1-1: Network Services

SOP Classes	User of Service (SCU)	Provider of Service (SCP)	Category
Ultrasound Image Storage	Yes	No	Transfer
Ultrasound Multi-frame Image Storage	Yes	No	Transfer
Modality Worklist Information Model - FIND	Yes	No	Workflow Management

2 Introduction

2.1 Revision History

Document Version	Date of Issue	Author	Description
1.0	October 21, 2016	Clarius	Version for Final Text
2.0	August 8, 2017	Clarius	Version for Clarius Version 3.1.0
3.0	September 25, 2017	Clarius	Version for Clarius Version 3.1.1 & 3.2.0
4.0	June 5, 2018	Clarius	Version for Clarius Version 4.2.2
4.1	July 4, 2018	Clarius	Version for Clarius Version 4.2.2, Revision 1
4.2	July 6, 2018	Clarius	Version for Clarius Version 4.2.2, Revision 2
4.3	July 17, 2018	Clarius	Version for Clarius Version 4.2.2, Revision 3

2.2 Audience

This document is intended for health-related workers, software engineers, and designers. It is assumed that the reader has a working knowledge of DICOM.

2.3 Remarks

The Clarius DICOM implementation uses a subset of the functionality and features present in the DICOM Standard. The output allows for multiple choices of lossless or near-lossless pixel data compression:

Bitmap (uncompressed) - **Explicit VR Little Endian**

- The *Explicit VR Little Endian Transfer Syntax* is used for uncompressed images and the pixel data is straight RGB triplets per pixel for width x height pixels.

Lossless JPEG (compressed) - **JPEG (Lossless, Process 14)**

- Lossless JPEG refers to the *JPEG Lossless, Nonhierarchical, First-Order Prediction (Process 14 [Selection Value 1]) Transfer Syntax*
- 1993 addition to 1992 JPEG standard algorithm
- https://en.wikipedia.org/wiki/Lossless_JPEG

- standard designation is ISO/IEC 10918-1 : 1993(E)

JPEG-LS Lossless (more compressed) - **JPEG-LS (Lossless)**

- *JPEG-LS (Lossless) Transfer Syntax*
- 1999 addition to 1992 JPEG standard algorithm
- https://en.wikipedia.org/wiki/Lossless_JPEG#JPEG-LS
- standard designation is ISO-14495-1/ITU-T.87

For most images, the Bitmap option is appropriate, but for very large images with large regions of black, white, or grey, a compressed JPEG option may be more appropriate, to save space and transfer time.

2.4 Definitions, Terms, and Abbreviations

The definitions, terms, and abbreviations used in this document are defined in the DICOM standard. Abbreviations and terms are as follows:

Term	Definition
ACSE	Association Control Service Element
AE	Application Entity
AET	Application Entity Title
DIMSE	DICOM Message Service Element
IE	Information Entity
IOD	Information Object Definition
ISO	International Organization for Standardization
PDU	Protocol Data Unit
PDV	Protocol Data Value
SCP	Service Class Provider (DICOM Server)
SCU	Service Class User (DICOM Client)
SOP	Service-Object Pair

2.5 References

NEMA PS3 Digital Imaging and Communications in Medicine (DICOM) Standard, available free at http://medical.nema.org/

DCMTK - DICOM Toolkit (https://dcmtk.org/)

3 Networking

3.1 Implementation Model

3.1.1 Application Data Flow

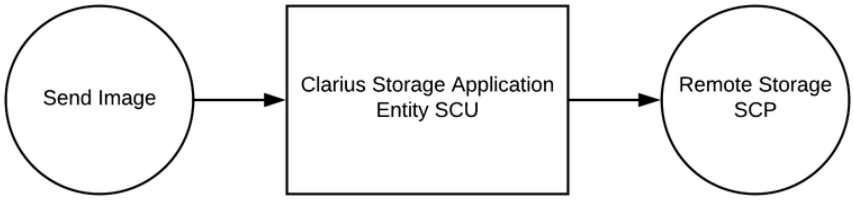

Figure 3.1-1: Application Data Flow Diagram (Storage)

The Storage Application Entity sends images to a Remote Application Entity. Sending images is done for each study completed, and for all images in the study. There is the option of selecting 1 or more Remote Application Entities upon completion of the study, or later in a separate list of completed studies.

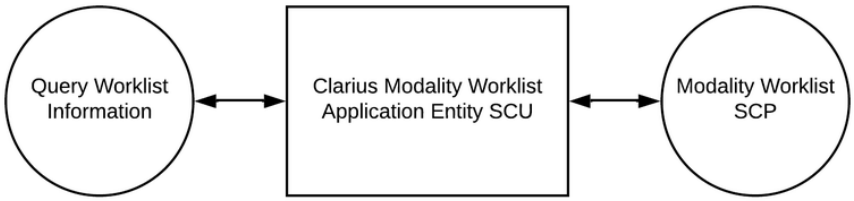

Figure 3.1-2: Application Data Flow Diagram (Worklist)

The Modality Worklist Application Entity downloads worklists from the user's DICOM worklist server specified in Clarius Cloud.

3.1.2 Functional Definition of AE

3.1.2.1 Functional Definition of Storage Application Entity

The selection of Remote Application Entities upon completion of the study, or the selection of a Remote Application Entity in a separate list of completed studies, puts upload entries in a queue to be uploaded one at a time. An association request is sent to the Remote Application Entity described in the activated upload entry, with an Abstract Syntax (Ultrasound Image Storage and Ultrasound Multi-frame Image Storage), and with a list of desired Transfer

Syntaxes, and upon successful negotiation, the image transfer is started using the first accepted Transfer Syntax from the list. If the association cannot be negotiated, the upload entry is set to failed and the user can restart the upload through the interface.

3.1.2.2 Functional Definition of Worklist Application Entity

The Modality Worklist software will attempt to establish an association every one minute interval, when the DICOM Worklist page is refreshed, or when today's exam or modality are toggled.

3.2 AE Specifications

3.2.1 Storage Application Entity Specification

3.2.1.1 SOP Classes

Clarius provides Standard Conformance to the following SOP Classes:

Table 3.2-1: SOP Classes for AE Storage

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

***verification SOP is requested during association negotiation but is not used**

3.2.2 Worklist Application Entity Specification

3.2.2.1 SOP Classes

Table 3.2-2 SOP Classes for AE Worklist

SOP Class Name	SOP Class UID	SCU	SCP
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Yes	No
Verification*	1.2.840.10008.1.1	Yes	No

***verification SOP is requested during association negotiation but is not used**

3.2.3 Association Policies

3.2.3.1 General

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

Table 3.2-3: DICOM Application Context for AE

Application Context Name	1.2.840.10008.3.1.1.1

3.2.3.2 Number of Associations

Clarius initiates one Association at a time for each destination and each request is processed one at a time.

3.2.3.3 Asynchronous Nature

Clarius does not support asynchronous communication (multiple outstanding transactions over a single Association).

3.2.3.4 Implementation Identifying Information

The implementation information for these Application Entities are:

Table 3.2-4: DICOM Implementation Identifying Information

OFFIS DCMTK 3.6.2	1.2.276.0.7230010.3.0.3.6.2

3.2.4 Association Initiation Policy

3.2.4.1 Activity - Send Images (C-STORE)

3.2.4.1.1 Proposed Presentation Contexts

Table 3.2-5: Proposed Presentation Contexts for Storing Single / Multi-frame Images

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name List**	**UID List**		
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14 [Selection Value 1])	1.2.840.10008.1.2.4.70		
		JPEG-LS Lossless	1.2.840.10008.1.2.4.80		
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14 [Selection Value 1])	1.2.840.10008.1.2.4.70		
		JPEG-LS Lossless	1.2.840.10008.1.2.4.80		

3.2.4.1.2 SOP-Specific Conformance for Storage SOP Classes

All SOP Classes supported by the Storage Application Entity exhibit the same behaviour. Those SOP Classes use Explicit VR Little Endian, JPEG Lossless (Process 14, Selection Value 1), and JPEG-LS Lossless as transfer syntaxes.

Table 3.2-6: UID Values

UID Value	**UID Name**
1.2.826.0.1.3680043.9.6514	Clarius Root UID
1.2.826.0.1.3680043.9.6514.0	Clarius Implementation Class UID
1.2.826.0.1.3680043.9.6514.1.2	Clarius Study Root UID

1.2.826.0.1.3680043.9.6514.1.3	Clarius Series Root UID
1.2.826.0.1.3680043.9.6514.1.4	Clarius Instance Root UID

Table 3.2-7: Storage C-STORE Response Status Handling Behaviour

Service Status	Error Code	Behaviour
Success	0	Ignored
Error	Any other status code	Ignored

After all SOP Instances have been attempted to be stored, the Association is released.

3.2.4.2 Activity - Query Worklist Information(C-FIND)

3.2.4.2.1 Proposed Presentation Contexts

Table 3.2-8: Proposed Presentation Contexts for Activity Query Worklist Server

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name List**	**UID List**		
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

3.2.4.2.2 SOP-Specific Conformance for Worklist SOP Class

All SOP Classes supported by the Worklist Application Entity exhibit the same behaviour. Those SOP Classes use Implicit VR Little Endian as transfer syntaxes.

Table 3.2-9: Optional Matching Key Attributes for Basic Modality Worklist SOP Class

Attribute Name	Tag	Handling
Scheduled Procedure Step		
Scheduled Procedure Step Sequence		
> Scheduled Station AE Title	(0040, 0001)	empty
> Scheduled Procedure Step Start Date	(0040, 0002)	empty
> Scheduled Procedure Step Start Time	(0040, 0003)	Current date or empty
> Modality	(0008, 0060)	US or empty
> Scheduled Performing Physician's Name	(0040, 0006)	empty
> Scheduled Procedure Step Description	(0040, 0007)	empty
> Scheduled Station Name	(0040, 0010)	empty
> Scheduled Procedure Step Location	(0040, 0011)	empty
> Pre-Medication	(0040, 0012)	empty
> Scheduled Procedure Step ID	(0040, 0009)	empty
> Requested Contrast Agent	(0032, 1070)	empty
> Scheduled Procedure Step Status	(0040, 0020)	empty
Standard Extended Modality Worklist C-Find Attribute		
>Scheduled Procedure Step Start DateTime	(0040, 4005)	empty
Requested Procedure		
Requested Procedure ID	(0040, 1001)	empty
Requested Procedure Description	(0032, 1060)	empty
Study Instance UID	(0020, 000d)	empty
Study Date	(0008, 0020)	empty
Study Time	(0008, 0030)	empty
Requested Procedure Priority	(0040, 1003)	empty
Patient Transport Arrangements	(0040, 1004)	empty
Imaging Service Request		

Accession Number	(0008, 0050)	empty
Requesting Physician	(0032, 1032)	empty
Visit Identification		
Admission ID	(0038, 0010)	empty
Visit Status		
Current Patient Location	(0038, 0300)	empty
Visit Relationship		
Visit Admission		
Patient Relationship		
Patient Identification		
Patient's Name	(0010, 0010)	empty
Patient ID	(0010, 0020)	empty
Patient Demographic		
Patient's Birth Date	(0010, 0030)	empty
Patient's Sex	(0010, 0040)	empty
Patient's Weight	(0010, 1030)	empty
Patient's Size	(0010, 1020)	empty
Confidentiality Constraint On Patient Data Description	(0040, 3001)	empty
Patient Medical		
Patient State	(0038, 0500)	empty
Pregnancy Status	(0010, 21c0)	empty
Medical Alerts	(0010, 2000)	empty
Allergies	(0010, 2110)	empty
Special Needs	(0038, 0050)	empty
C-Find Identifier		
Specific Character Set	(0008, 0005)	ISO_IR 192
Timezone Offset From UTC	(0008, 0201)	empty

Table 3.2-10: Worklist C-FIND Response Status Handling Behaviour

Service Status	Error Code	Behaviour
Failure	A700	Ignored
	A900	Ignored
	Cxxx	Ignored
Cancel	FE00	Ignored
Success	0000	Matching is finished.
Pending	FF00	Matching keys with optional keys are supplied. The values are stored.
	FF01	Matching keys with some optional keys are supplied. The values are stored.

The Association is released after going through the response list.

4 Media Interchange

The Clarius DICOM implementation does not support media interchange.

5 Support of Character Sets

The Clarius DICOM implementation supports the default repertoire, designated by the ISO registration number ISO-IR 6 and character set ISO_IR 192.

6 Security

The Clarius DICOM implementation does not support any specific security measures.

6.1 Security Profiles

No Security Profiles are supported.

6.2 Association Level Security

The Clarius Storage Application Entity does not accept Association Open Requests.

6.3 Application Level Security

No application-level security measures are supported.

Appendix A IOD Details

A.1 Supported IODs

The Clarius DICOM implementation creates and sends one IOD (Information Object Definition), the Ultrasound Single-Frame or Multi-Frame object, which may be in one of 3 transfer syntaxes, Uncompressed, JPEG, or JPEG-LS.

A value of "Not implemented" in the Module Description column indicates that the Module is NOT used and is therefore ignored by the application.

A.1.1 Ultrasound Image IOD Modules

Table A.1.1-1: Ultrasound Image IOD Modules

IE	Module	Module Description
Patient	Patient	Table A.1.2-1
	Clinical Trial Subject	Not Implemented
Study	General Study	Table A.1.2-2
	Patient Study	Not Implemented
	Clinical Trial Study	Not Implemented
Series	General Series	Table A.1.2-3
	Clinical Trial Series	Not Implemented
Frame of Reference	Frame of Reference	Not Implemented
	Synchronization	Not Implemented
Equipment	General Equipment	Table A.1.2-4
Image	General Image	Table A.1.2-5
	General Reference	Not Implemented
	Image Pixel	Table A.1.2-7
	Contrast/Bolus	Not Implemented
	Palette Color Lookup Table	Not Implemented
	Device	Not Implemented

	Specimen	Not Implemented
	US Region Calibration	Table A.1.2-8
	US Image	Table A.1.2-10
	Overlay Plane	Not Implemented
	VOI LUT	Not Implemented
	ICC Profile	Not Implemented
	SOP Common	Table A.1.2-11
	Common Instance Reference	Not Implemented

Table A.1.1-2 US Multi-frame Image IOD Modules

IE	Module	Module Description
Patient	Patient	Table A.1.2-1
	Clinical Trial Subject	Not Implemented
Study	General Study	Table A.1.2-2
	Patient Study	Not Implemented
	Clinical Trial Study	Not Implemented
Series	General Series	Table A.1.2-3
	Clinical Trial Series	Not Implemented
Frame of Reference	Frame of Reference	Not Implemented
	Synchronization	Not Implemented
Equipment	General Equipment	Table A.1.2-4
Image	General Image	Table A.1.2-5
	General Reference	Not Implemented
	Image Pixel	Table A.1.2-7
	Contrast/Bolus	Not Implemented
	Cine	Table A.1.2-6
	Multi-frame	Table A.1.2-9
	Frame Pointers	Not Implemented

	Palette Color Lookup Table	Not Implemented
	Device	Not Implemented
	Specimen	Not Implemented
	US Region Calibration	Not Implemented
	US Image	Table A.1.2-10
	VOI LUT	Not Implemented
	ICC Profile	Not Implemented
	SOP Common	Table A.1.2-11
	Common Instance Reference	Not Implemented
	Frame Extraction	Not Implemented

A.1.2 Ultrasound Image IOD Attributes

A value of "Not Implemented" in the Handling column indicates that the attribute is not sent to the SCP and that they will be addressed in a future software release.

Table A.1.2-1: Patient Module

Attribute Name	Tag	Type*	Handling
Patient's Name	(0010, 0010)	2	Uses the value from worklist if downloaded otherwise uses the patient's full name (LAST^FIRST^MIDDLE) from first, middle, and last names entered into the Exam form.
Patient ID	(0010, 0020)	2	Uses the value from worklist if downloaded otherwise uses the patient's given ID, entered into the Exam form.
Patient's Birth Date	(0010, 0030)	2	Uses the value from worklist if downloaded otherwise uses the patient's selected Date of Birth, entered into the Exam form.
Patient's Sex	(0010, 0040)	2	Uses the value from worklist if downloaded otherwise uses the patient's selected Gender, entered into the Exam form.
Patient Comments	(0010, 4000)	3	The "Notes Field", entered into the Exam form.
Patient Species Description	(0010, 2201)	1C	Not Implemented
Patient Species Code Sequence	(0010, 2202)	1C	Not Implemented

>Include Table 8.8-1 "Code Sequence Macro Attributes"			Not Implemented
Patient Breed Description	(0010, 2292)	2C	Not Implemented
Patient Breed Code Sequence	(0010, 2293)	2C	Not Implemented
>Include Table 8.8-1 "Code Sequence Macro Attributes"			Not Implemented
Breed Registration Sequence	(0010, 2294)	2C	Not Implemented
>Breed Registration Number	(0010, 2295)	1	Not Implemented
>Breed Registry Code Sequence	(0010, 2296)	1	Not Implemented
>>Include Table 8.8-1 "Code Sequence Macro Attributes"			Not Implemented
Responsible Person	(0010, 2297)	2C	Not Implemented
Responsible Person Role	(0010, 2298)	1C	Not Implemented
Responsible Organization	(0010, 2299)	2C	Not Implemented

Table A.1.2-2: General Study Module

Attribute Name	Tag	Type*	Handling
Study Instance UID	(0020, 000D)	1	Uses the value from worklist if downloaded otherwise uses generated by the Exam (Study) UUID
Study Date	(0008, 0020)	2	The date the first Series was created
Study Time	(0008, 0030)	2	The time the first Series was created
Referring Physician's Name	(0008, 0090)	2	This attribute is present and left empty
Study ID	(0020, 0010)	2	This attribute is present and left empty

Accession Number	(0008, 0050)	2	Uses the value from worklist if downloaded otherwise uses the given Accession Number, entered into the Exam form.

Table A.1.2-3: General Series Module

Attribute Name	Tag	Type*	Handling
Modality	(0008, 0060)	1	US
Series Instance UID	(0020, 000E)	1	Generated by the Session (Series) UUID
Series Number	(0020, 0011)	2	Starts at 1 for the first Session (Series) then increments by 1 for each subsequent Series in the Exam (Study)
Laterality	(0020, 0060)	2C	Not Implemented
Series Date	(0008, 0021)	3	The date of the Series the Capture (Instance) belongs to.
Series Time	(0008, 0031)	3	The time of the Series the Capture (Instance) belongs to.
Operators' Name	(0008, 1070)	3	The name of the current user (LAST^FIRST) or his/her email address
Anatomical Orientation Type	(0010, 2210)	1C	Not Implemented

Table A.1.2-4: General Equipment Module

Attribute Name	Tag	Type*	Handling
Manufacturer	(0008, 0070)	2	Clarius Mobile Health Corporation
Institution Name	(0008, 0080)	3	Not Implemented
Manufacturer's Model Name	(0008,1090)	3	Probe Model
Device Serial Number	(0018,1000)	3	Probe Serial Number
Software Versions	(0018, 1020)	3	Current version of the Clarius software with major number, minor number, revision number, and build

Table A.1.2-5: General Image Module

Attribute Name	Tag	Type*	Handling
Instance Number	(0020, 0013)	2	Starts at 1 for the first still or cine capture (Instance) then increments by 1 for each subsequent Instance in the Session (Series) that contains them
Patient Orientation	(0020, 0020)	2C	This attribute is present and left empty
Content Date	(0008, 0023)	2C	Not Implemented
Content Time	(0008,0033)	2C	Not Implemented
Image Type	(0008, 0008)	3	ORIGINAL\PRIMARY **

****The US Image Module should take precedence over the General Image Module. This will be fixed in future software releases.**

Table A.1.2-6: Cine Module

Attribute Name	Tag	Type*	Handling
Frame Time Vector	(0018, 1065)	1C	Millisecond numbers with 6 decimal places (for nanosecond precision) separated by \ - used when the image capture is a cine and not a single still frame, and the images come from an Exam (Study) instead of a separate list of images

Table A.1.2-7: Image Pixel Module

Attribute Name	Tag	Type*	Handling
Image Pixel Description Macro Attributes			**Table A.1.2-12**

Table A.1.2-8: US Region Calibration Module

Attribute Name	Tag	Type*	Handling
Sequence of Ultrasound Regions	(0018, 6011)	1	There is one sequence attribute created for each region present in the single still frame
>Region Location Min x0	(0018, 6018)	1	The left x value of the region boundary, in the single still frame

>Region Location Min y0	(0018, 601A)	1	The upper y value of the region boundary, in the single still frame
>Region Location Max x1	(0018, 601C)	1	The right x value of the region boundary, in the single still frame (left + width - 1)
>Region Location Max y1	(0018, 601E)	1	The lower y value of the region boundary, in the single still frame (top + height - 1)
>Physical Units X Direction	(0018, 6024)	1	First unit the physical pixel size (in the X direction) can be converted to: cm, sec, cm/sec, cm^2, cm^3, degrees, percent, dB, and hertz; for single still frame
>Physical Units Y Direction	(0018, 6026)	1	First unit the physical pixel size (in the Y direction) can be converted to: cm, sec, cm/sec, cm^2, cm^3, degrees, percent, dB, and hertz; for single still frame
>Physical Delta X	(0018, 602C)	1	A pixel size using the Physical Units X Direction; for single still frame
>Physical Delta Y	(0018, 602E)	1	A pixel size using the Physical Units Y Direction; for single still frame
>Region Spatial Format	(0018, 6012)	1	0001H (2D) for B-type and color images, or 0002H (M-Mode) for M/PW spectrum; for single still frame
>Region Data Type	(0018, 6014)	1	0001H (Tissue); for single still frame
>Region Flags	(0018, 6016)	1	00000001H for Low-Priority Region Pixels, Scaling Protection off, Velocity Doppler Scale Type, and Unspecified Scrolling Region; for single still frame

Table A.1.2-9: Multi-frame Module

Attribute Name	Tag	Type*	Handling
Frame Increment Pointer	(0028, 0009)	1	Set to the Frame Time Vector (0018, 1065)
Number of Frames	(0028, 0008)	1	Number of frames for cine

Table A.1.2-10: US Image Module

Attribute Name	Tag	Type*	Handling
Samples Per Pixel	(0028, 0002)	1	Table A.1.2-12
Photometric Interpretation	(0028, 0004)	1	Table A.1.2-12
Bits Allocated	(0028, 0100)	1	Table A.1.2-12
Bits Stored	(0028, 0101)	1	Table A.1.2-12
High Bit	(0028, 0102)	1	Table A.1.2-12
Planar Configuration	(0028, 0006)	1C	Table A.1.2-12
Pixel Representation	(0028, 0103)	1	Table A.1.2-12
Frame Increment Pointer	(0028, 0009)	1C	Table A.1.2-9
Image Type	(0008, 0008)	2	Table A.1.2-5
Lossy Image Compression	(0028, 2110)	1C	Not Implemented. This is left out because the images have not undergone lossy image compression.
Ultrasound Color Data Present	(0028, 0014)	3	Not Implemented
Transducer Type	(0018, 6031)	3	Not Implemented

Table A.1.2-11: SOP Common Module

Attribute Name	Tag	Type*	Handling
SOP Class UID	(0008, 0016)	1	SOP Class UID for single still frame captures, otherwise the Ultrasound Multi-frame Image Storage SOP Class UID for cine captures
SOP Instance UID	(0008, 0018)	1	Generated by the Capture (Instance) UUID
Specific Character Set	(0008,0005)	1C	ISO_IR 192

Table A.1.2-12: Image Pixel Description Macro Attributes

Attribute Name	Tag	Type*	Handling
Samples Per Pixel	(0028, 0002)	1	3
Photometric Interpretation	(0028, 0004)	1	if not JPEG-LS Transfer Syntax use RGB and YBR_FULL_422 otherwise
Rows	(0028, 0010)	1	Pixel height of the image
Columns	(0028, 0011)	1	Pixel width of the image
Bits Allocated	(0028, 0100)	1	8
Bits Stored	(0028, 0101)	1	8
High Bit	(0028, 0102)	1	7
Pixel Representation	(0028, 0103)	1	0
Pixel Data	(7FE0, 0010)	1C	Contains the RGB triplets or YCbCr groups for single- or multi-frame captures (stills or cines), uncompressed for *Explicit VR Little Endian Transfer Syntax*, or compressed for *JPEG Lossless* or *JPEG-LS Lossless Transfer Syntaxes*
Planar Configuration	(0028, 0006)	1C	0
Pixel Aspect Ratio	(0028, 0034)	1C	1\1

Type **1**: Required to be in the SOP Instance (DICOM file) and shall have a valid value. Type **2**: Required to be in the SOP Instance (DICOM file) but may contain the value of "unknown", or a zero-length value. Type **3**: Optional. May or may not be included and could be zero length. Type **1C**: Conditional. If a condition is met, then it is a Type 1 (required, cannot be zero). If the condition is not met, then the tag is not sent. Type **2C**: Conditional. If a condition is met, then it is a Type 2 (required, zero length OK). If the condition is not met, then the tag is not sent.

A.1.3 Attribute Mapping

Table A.1.2-13 Attribute Map

Modality Worklist	Image IOD	Multi-frame IOD
Study Instance UID	Study Instance UID	Study Instance UID
Accession Number	Accession Number	Accession Number
Patient's Name	Patient's Name	Patient's Name

Patient's ID	Patient's ID	Patient's ID
Patient's Birth Date	Patient's Birth Date	Patient's Birth Date
Patient's Sex	Patient's Sex	Patient's Sex