DICOM Conformance Statement

Ultrasound Lumify R5.1

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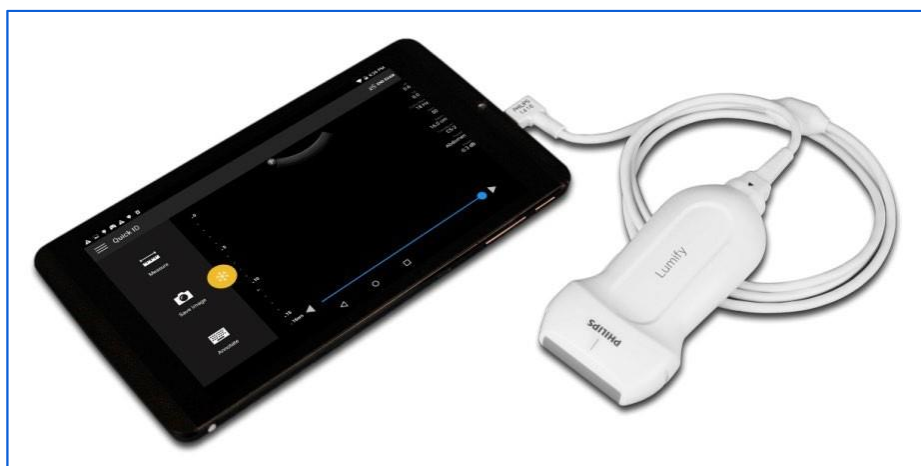
1. DICOM Conformance Statement Overview

The Philips Lumify R5.1 Ultrasound systems implement the necessary DICOM® services to download worklists from an information system, save acquired US Images to a network storage device and inform the information system about the work actually done.

Table below provides an overview of the supported network services.

Table 1: Network Services

SOP Class		User of Service (SCU)	Provider of Service (SCP)	Display
Name	**UID**			
Other				
Verification SOP Class	1.2.840.10008.1.1	Yes	Yes	N/A
Transfer				
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Yes	No	Yes
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Yes	No	Yes
Secondary Capture Image Storage*	1.2.840.10008.5.1.4.1.1.7	Yes	No	Yes
Workflow Management				
Modality Worklist Information Model - FIND SOP Class	1.2.840.10008.5.1.4.31	Yes	No	N/A
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3	Yes	No	N/A
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	Yes	No	N/A

*Secondary Capture is only used for images acquired of B-Line analysis and OB/GYN calcs results pages. It is not configurable

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2. Contents

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3. Introduction

The introduction specifies product and relevant disclaimers as well as any general information that the vendor feels is appropriate.

3.1. Revision History

The revision history provides dates and differences of the different releases.

Table 2: Revision History

Document Version	Date of Issue	Description of change
01	10-Jun-2025	Initial Version of Ultrasound Lumify R5.1

3.2. Audience

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

DICOM, by itself, does not guarantee interoperability. However, the Conformance Statement facilitates a first- level validation for interoperability between different applications supporting the same DICOM functionality.

This Conformance Statement is not intended to replace validation with other DICOM equipment to ensure proper exchange of information intended.

The scope of this Conformance Statement is to facilitate communication between the Philips Healthcare Lumify R5.1 ultrasound systems and other vendors' Medical equipment. The Conformance Statement should be read and understood in conjunction with the DICOM Standard [DICOM]. However, by itself it is not guaranteed to ensure the desired interoperability and successful interconnectivity.

The user should be aware of the following important issues:

- The comparison of different conformance statements is the first step towards assessing interconnectivity between Philips Healthcare and non - Philips Healthcare equipment.
- Test procedures should be defined to validate the desired level of connectivity.
- The DICOM standard will evolve to meet the users' future requirements. Philips Healthcare is actively involved in developing the standard further and therefore reserves the right to make changes to its products or to discontinue its delivery.

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

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information provided by this Conformance Statement does not guarantee interoperability of Philips equipment with non-Philips equipment.

It is the user's responsibility to analyze 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 ensure 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: Definitions, Terms and Abbreviations

Abbreviation/Term	Explanation
AE	Application Entity
AET	Application Entity Title
DICOM	Digital Imaging and Communications in Medicine
ISO	International Standard Organization
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
PDE	Patient Data Entry
FSU	File-set Updater
GUI	Graphic User Interface
HIS	Hospital Information System
HL7	Health Level Seven
SCP	DICOM Service Class Provider (DICOM server)
SCU	DICOM Service Class User (DICOM client) SOP
IOD	Information Object Definition
U	Unique Key Attribute for Modality Worklist Query Matching, or Optional Attribute US Ultrasound
R	Required Key Attribute for Modality Worklist Query

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Abbreviation/Term	Explanation
MWL	Modality Worklist
Matching O	Optional Key Attribute for Modality Worklist Query
Matching PDU	DICOM Protocol Data Unit
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
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 - 22 (NEMA PS 3.1- PS 3.22),
National Electrical Manufacturers Association
1300 North 17th Street
Suite 900
Arlington, Virginia 22209
Internet: https://www.dicomstandard.org/current

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4. Networking

This section contains the networking related services (vs. the media related ones).

4.1. Implementation model

The implementation model consists of three sections:
- The application data flow diagram, specifying the relationship between the Application Entities and the "external world" or Real-World Activities,
- A functional description of each Application Entity, and
- The sequencing constraints among them.

4.1.1. Application Data Flow
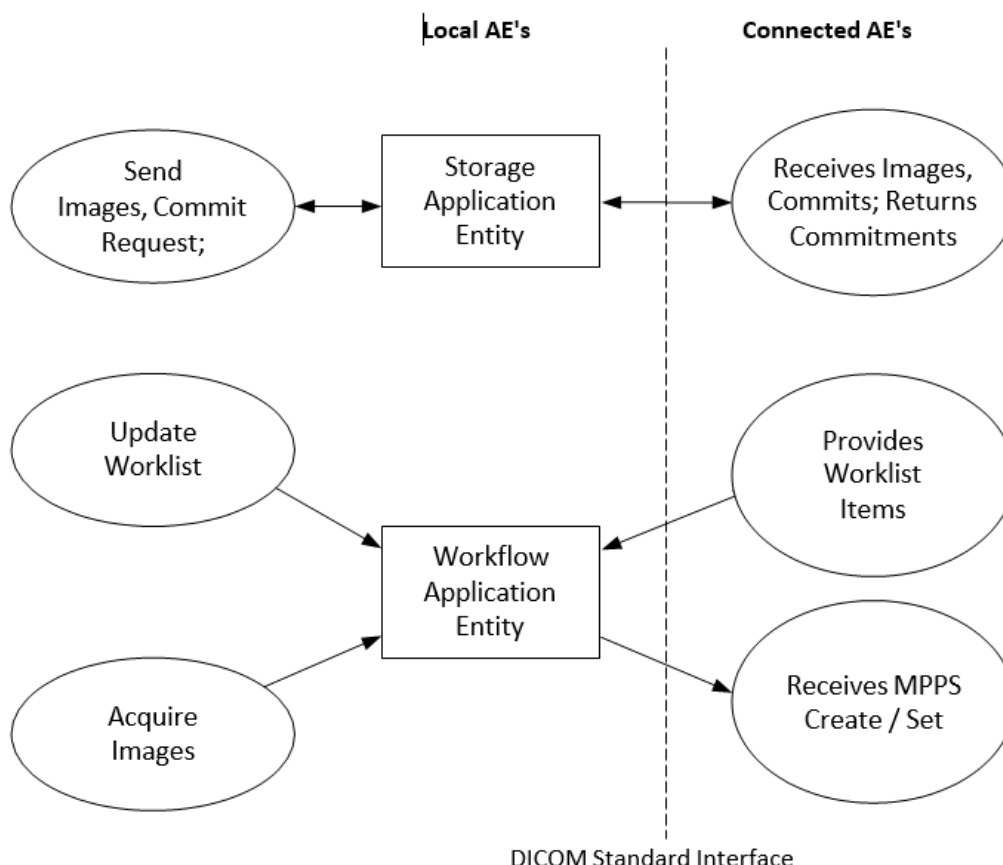
Figure 1: Application Data Flow

The **Storage Application Entity** sends Images to a single remote AE. Acquisition of images is associated with the local real-world activity "Save Image" for single frame and "Save Loop" for loops or clips. Sending of images may occur automatically when configured to do so, either "as images are acquired" or "upon exam completion." The system can also be configured to automatically end and send an exam after a specified exam duration. In addition, exam data may be sent manually upon request of the user. If configured to send "as images are acquired", images are transferred immediately after acquisition and reports are transferred at the end of the exam. If configured for send "upon exam completion", images are transferred when the exam is ended.

The **Workflow Application Entity** receives Modality Worklist (MWL) information from and sends Modality Performed Procedure Step (MPPS) information to remote AEs. It is associated with the local real-world activities "Query Worklist" and "Acquire Images". When the "Update Worklist" local real-world activity is

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performed, the Workflow Application Entity queries a remote AE for worklist items and provides the set of worklist items matching the query request. "Update Worklist" is performed as a result of an operator request. "Patient Search" is manually initiated.

4.1.2. Functional Definition of AE's

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

4.1.2.1. Functional Definition of storage Application Entity

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 "Stopped" as displayed in the Export Queue. The user may select "Retry Job" to attempt re-send. After the automatic retries have failed, the job is set to "Aborted." 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 directory.

4.1.2.2. Functional Definition of Workflow Application Entity

"Query MWL" attempts to download a Modality Worklist from a Modality Worklist server with studies matching the search criteria by sending a C-Find Request containing user-definable Query parameters. Query parameters are stored in the "Setup MWL Server" Dialog.

Note: Either Broad Worklist Query or Patient Based Query can be configured at a time.

Settings that may be customized are:
- Start Date (Today, within 1 day, within 7 days, within 30 days)
- AE Title (This system, Any or Another specific)
- Modality (Ultrasound or All Modalities)
- Perform Patient Based Queries (Allows user to enter Patient Name, Patient ID (MRN), Accession Number and/or Requested Procedure ID to be queried.

When the Workflow AE establishes an association to a remote AE, a MWL C-Find-Rq message is sent to the MWL server. The server will transfer all matching worklist items via the open association. The results of a successful Worklist Update will overwrite the data in the Worklist display.

There is no queue management for Modality Worklist; Modality Worklist queries only occur on demand.

Modality Performed Procedure Steps are created and updated with the following real-world events:
- MPPS N-Create, Status = IN PROGRESS:
  - Acquisition of images will result in automated creation of an MPPS Instance managed by a remote AE.
- MPPS N-Set, Status = COMPLETE
  - Completion of the MPPS is performed as the result of an operator action of ending the exam.
- MPPS N-Set, Status = DISCONTINUED
  - "Cancel Exam" causes the "Discontinued" status to be sent.

4.1.3. Sequencing of Real-World Activities

The following sequence diagrams illustrate the order of network operations during a number of imaging scenarios. If Modality Worklist is not being used, the user enters patient identification manually at the start of exam. Figures 2 and 3 illustrate exam acquisition with send "as images are acquired" or "upon exam completion." Respectively.

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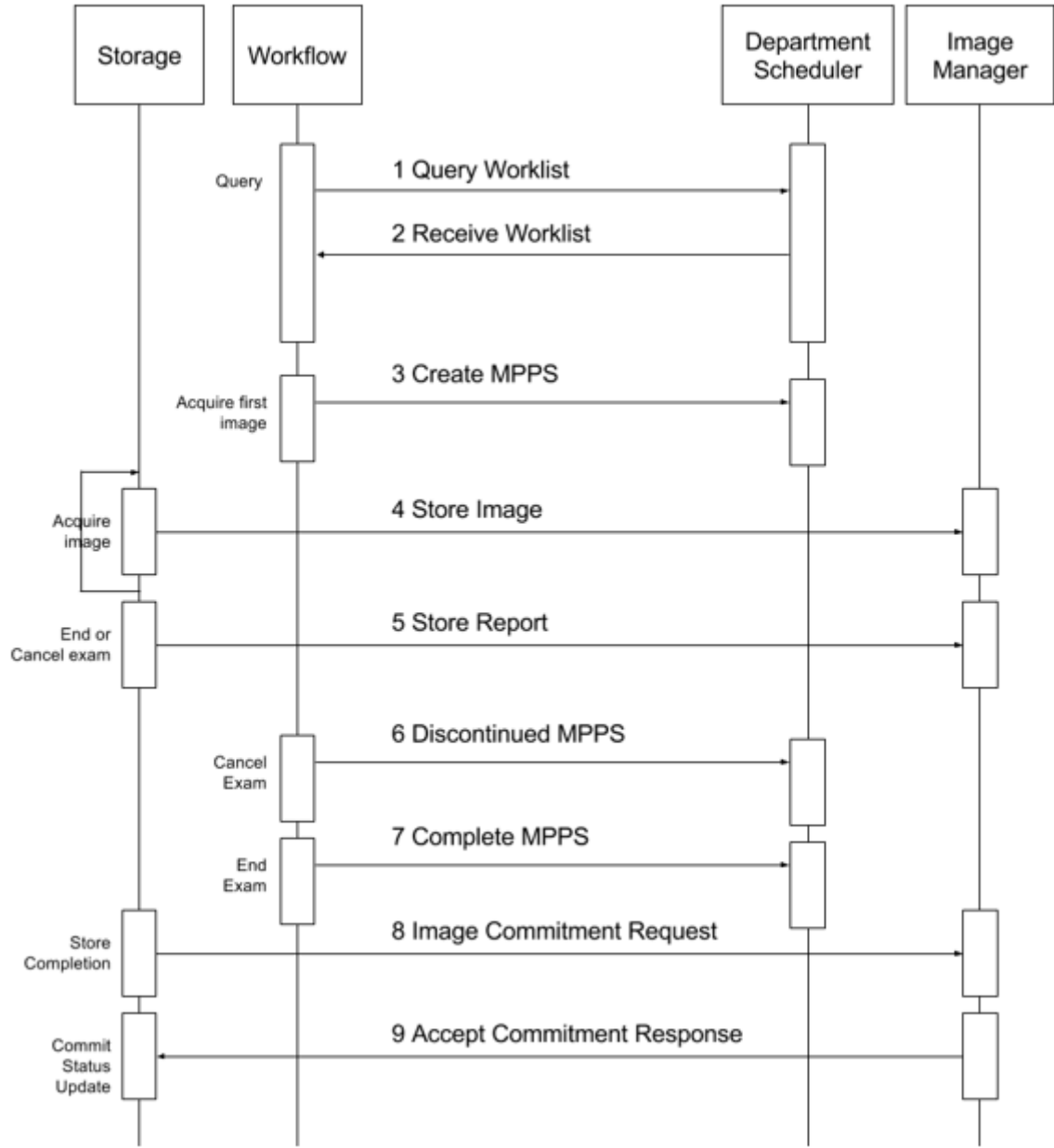
Figure 2: Sequencing Constraints – Configured to Send as Images are Acquired

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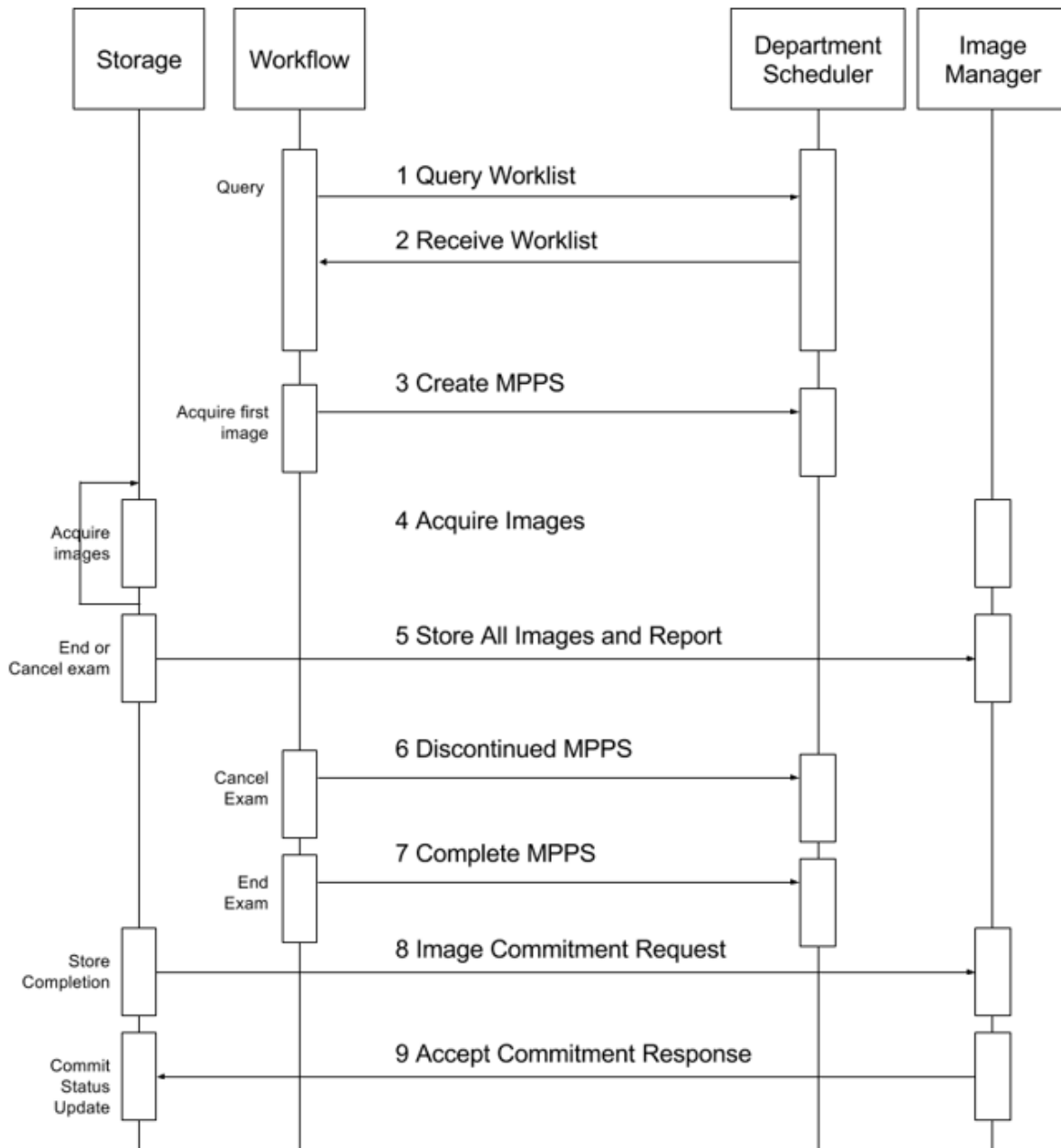
Figure 3: Sequencing Constraints – Configured to Send upon exam completion

Note: Lumify exports images if "Cancel Exam" (resulting in step 6 "Discontinued MPPS") is selected and "Store at End of Exam" is configured. Images acquired during a cancelled exam are stored in the database and are manually exported.

4.2. AE Specifications

This section in the DICOM Conformance Statement is a set of Application Entity specifications. There are as many of these subsections as there are different AE's in the implementation.

4.2.1. Lumify Application Entity

Detail of this specific Application Entity is specified in this section.

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4.2.1.1. SOP Classes

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

Table 4: SOP Classes for Storage AE

SOP Class Name	SOP Class UID	SCU	SCP
Verification SOP Class	1.2.840.10008.1.1	Yes	Yes
Modality Worklist Information Model - FIND SOP Class	1.2.840.10008.5.1.4.31	Yes	No
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3	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
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Yes	No
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	Yes	No

Note: Any SOP specific behavior is documented later in the conformance statement in the applicable SOP specific conformance section.

4.2.1.2. Association Policies

Each AE specification contains a description of the general association establishment and acceptance policies of the AE.

4.2.1.2.1 General

The DICOM standard application context is specified below.

Table 5: DICOM Application Context

Description	Value
Application Context Name	1.2.840.10008.3.1.1.1

4.2.1.2.2 Number of Associations

The number of simultaneous associations that an Application Entity may support as an Initiator or Acceptor is specified here.

Table 6: Number of associations as an Initiator

Description	Value
Maximum number of simultaneous associations	1

4.2.1.2.3 Asynchronous Nature

The implementation supports negotiation of multiple outstanding transactions, along with the maximum number of outstanding transactions supported.

Table 7: Asynchronous nature as an Association Initiator for Storage AE

Description	Value
Maximum number of outstanding asynchronous transactions	1

4.2.1.2.4 Implementation Identifying Information

The value supplied for Implementation Class UID and version name are documented here.

Table 8: DICOM Implementation Class and Version for iOS Device

Implementation Class UID	1.3.46.670589.14.8101.510

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Implementation Version Name	LUMIFY_5.1

Table 9: DICOM Implementation Class and Version for Android Device

Implementation Class UID	1.3.46.670589.14.8100.510
Implementation Version Name	LUMIFY_5.1

4.2.1.2.5 Communication Failure Handling

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

Table 10: Communication Failure Behavior

Exception	Behavior
Timeout	The Association is aborted using A-ABORT and the transfer fails. The status is logged.
Association aborted by the SCP or network layers	The Association is aborted using A-ABORT and the transfer fails. The status is logged.

4.2.1.3. Association Initiation Policy

4.2.1.3.1 (Real Word) Activity – Verification as SCU

4.2.1.3.1.1 Description and Sequencing of Activities

The user can verify the existence of a DICOM server on the hospitals network, through a "Test" button on the DICOM Node's Setup Dialog. When the user presses this button, Lumify R5.1 will initiate the association.

Only one association is established for each verification attempt.

Note: There is no enforced limit on the number of incoming associations. However, only associations from the configured Storage Commitment AE will be accepted, effectively reducing the maximum number of incoming associations to one.
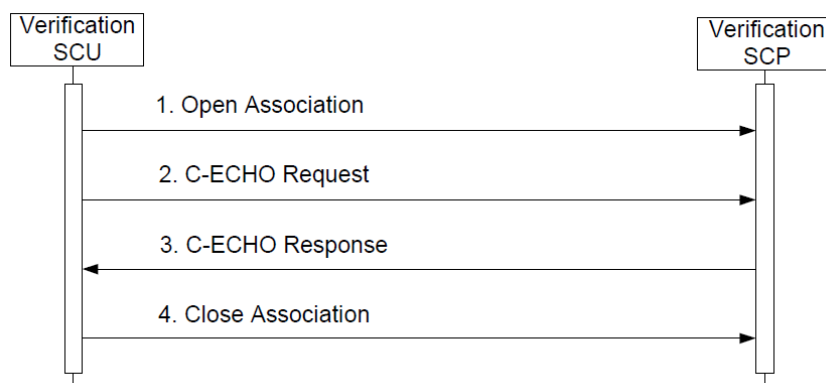
Figure 4: Sequencing of Verify

The Network AE accepts associations to verify application level communication using the C-ECHO command.

4.2.1.3.1.2 Proposed Presentation Contexts

Lumify R5.1 is capable of proposing the Presentation Contexts shown in the following table:

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Table 11: Proposed Presentation Contexts for (Real-World) Activity – Verification as SCU

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

4.2.1.3.1.3 SOP Specific Conformance for Verification SOP Class

This section and sub-section include the manufacturer SOP and Dataset specific information as well the status codes and their corresponding behavior.

4.2.1.3.1.3.1 Dataset Specific Conformance for Verification C-ECHO SCU

The following table summarizes the behavior of Lumify R5.1 when receiving status codes in a C-ECHO response. A message will appear on the user interface if Lumify R5.1 receives any other SCP response status than "Success."

Table 12: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Success	Device Status is set to: Test Passed/Verified
*	Any other status code	*	Device Status is set to: Failed to connect/Not Verified.

4.2.1.3.2 (Real Word) Activity – Modality Worklist as SCU

4.2.1.3.2.1 Description and Sequencing of Activities

Worklist queries for Modality (US) or All Modalities may be initiated by the user.

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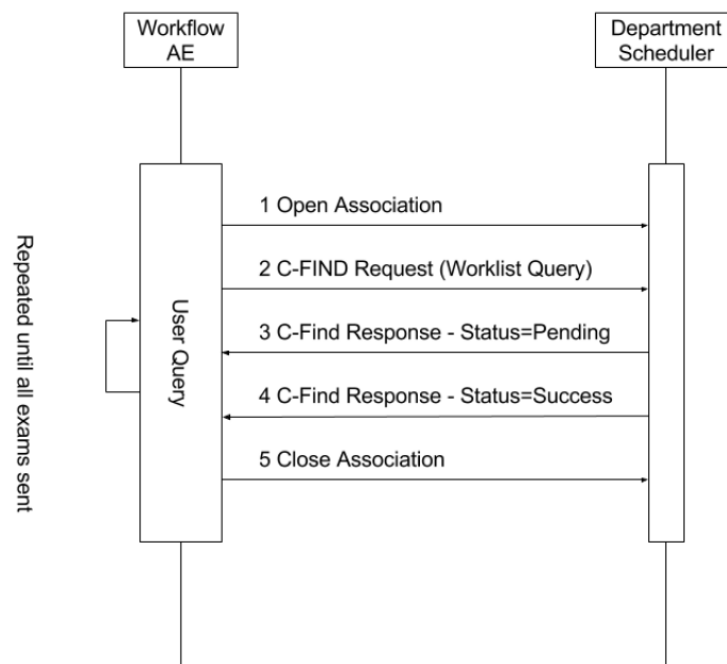
Figure 5: Sequencing of Modality Worklist

A possible sequence of interactions between the Workflow AE and a Departmental Scheduler (e.g. a device such as a RIS or HIS which supports the MWL SOP Class as an SCP) is illustrated in above Figure.

4.2.1.3.2.2 Proposed Presentation Contexts

Lumify R5.1 is capable of proposing the Presentation Contexts shown in the following table:

Table 13: Proposed Presentation Contexts for (Real-World) Activity – Verification as SCU

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Modality Worklist Information Model – FIND SOP Class	1.2.840.10008.5.1.4.31	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

4.2.1.3.2.3 SOP Specific Conformance for Modality Worklist SOP Class

This section and sub-section include the manufacturer SOP and Dataset specific information as well the status codes and their corresponding behavior.

4.2.1.3.2.3.1 Dataset Specific Conformance for Modality Worklist Information Model - FIND SOP Class C-FIND-SCU

Table below describes the Lumify R5.1 Worklist Matching Keys and requested attributes. Unexpected attributes returned in a C-FIND response are ignored.

Non-matching responses returned by the SCP due to unsupported optional matching keys are ignored.

Table below should be read as follows:

Attribute Name:	Attributes supported to build a Modality Worklist Request Identifier.
Tag:	DICOM tag for this attribute.
VR:	DICOM VR for this attribute.
M:	Matching Keys for (automatic) Worklist Update.
R:	Return Keys. An "x" indicates that Lumify R5.1 supplies this attribute as a Return Key with zero length for Universal Matching.
Q:	Interactive Query Key. An "X" indicates that this attribute as matching key can be used.
D:	Displayed Keys. An "x" indicates that this worklist attribute is displayed to the user in the Patient Data Entry screen or Worklist Directory.
IOD:	An "x" indicates that this Worklist attribute's data is included into applicable Image Object Instances created during performance of the related Procedure Step.
Type of matching:	The following types of matching exists:

Single Value Matching
List of UID Matching
Wild Card Matching
Range Matching
Sequence Matching
Universal Matching

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Table 14: Worklist Request Identifier

Attribute Name	Tag	VR	M	R	Q	D	IOD	Type of Matching	Comment
Patient Identification Module									
Other Patient IDs	0010,1000	LO		X			X	-	-
Patient's Name	0010,0010	PN	X ,*	X	X	X	X	Single value, WildCard	-
Patient ID	0010,0020	LO	X ,*	X	X	X	X	Single value, WildCard	-
Patient Demographic Module									
Ethnic Group	0010,2160	SH		X			X	-	-
Patient Comments	0010,4000	LT		X			X	-	-
Patient's Birth Date	0010,0030	DA		X		X	X	-	-
Patient's Sex	0010,0040	CS		X		X	X	-	-
Patient's Weight	0010,1030	DS		X			X	-	-
Patient's Size	0010,1020	DS		X			X	-	-
Patient Medical Module									
Additional Patient History	0010,21B0	LT		X			X	-	-
Medical Alerts	0010,2000	LO		X			X	-	-
Pregnancy Status	0010,21C0	US		X			X		-
Scheduled Procedure Step Module									
Scheduled Procedure Step Sequence	0040,0100	SQ		X				-	-
>Modality	0008,0060	CS	X	X	X	X	X	Single Value	-
>Scheduled Performing Physician's Name[1]	0040,0006	PN		X		X		-	-
>Scheduled Procedure Step Description[2]	0040,0007	LO		X		X	X	-	-
>Scheduled Procedure Step ID	0040,0009	SH		X			X	-	-
>Scheduled Procedure Step Start Date	0040,0002	DA	X	X	X	X		Single Value, Range	-
>Scheduled Procedure Step Start Time	0040,0003	TM		X		X		-	-
>Scheduled Station AE Title	0040,0001	AE	X	X	X			Single Value	-
>Scheduled Protocol Code Sequence[3]	0040,0008	SQ		X			X	-	-
>>Code Meaning	0008,0104	LO		X			X		
>>Coding Scheme Designator	0008,0102	SH		X			X		
>>Coding Scheme Version	0008,0103	SH		X			X		
>>Code Meaning	0008,0104	LO		X			X		
Requested Procedure Module									
Referenced Study Sequence	0008,1110	SQ		X			X		

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Attribute Name	Tag	VR	M	R	Q	D	IOD	Type of Matching	Comment
>Referenced SOP Class UID	0008,1150	UI		X			X		
>Referenced SOP Instance UID	0008,1155	UI		X			X		
Study Instance UID	0020,000D	UI		X			X		
Names of Intended Recipients of Results	0040,1010	PN		X		X		-	-
Requested Procedure Description[4]	0032,1060	LO		X		X	X	-	-
Reason for the Requested Procedure[5]	0040,1002	LO		X		X		-	-
Requested Procedure ID	0040,1001	SH	X	X	X	X	X	Single value	-
Study Instance UID	0020,000D	UI		X			X	-	-
Referenced Study Sequence	0008,1110	SQ		X			X	-	-
Requested Procedure Code Sequence	0032,1064	SQ		X				-	-
>Code Value	0008,0100	SH		X					
>Coding Scheme Designator	0008,0102	SH		X					
>Coding Scheme Version	0008,0103	SH		X					
>Code Meaning	0008,0104	LO		X					
Imaging Service Request Module									
Accession Number	0008,0050	SH	X	X	X	X	X	Single value	-
Referring Physician's Name[6]	0008,0090	PN		X		X	X	-	-
Requesting Physician	0032,1032	PN		X				-	-
Reason for the Imaging Service Request[7]	0032,1033	LO		X		X		-	-
Admitting Diagnoses Description	0008,1080	LO		X					

Notes:
1. Scheduled Performing Physician's Name sets the "Performed by" field in Patient Data Entry Screen.
2. Scheduled Procedure Step Description may be used to set "Study Description" field in the Patient Selection screen and is mapped to "Study Description" in images. It is the 2nd option for "Study Description" in Patient Data Entry Screen and images.
3. Scheduled Protocol Code Sequence: Code Meaning may be used to set "Study Description" field in the Patient Selection screen and is mapped to "Study Description" in images. It is the 3rd option for "Study Description" in Patient Data Entry Screen and images.
4. Requested Procedure Description may be used to set "Study Description" field in the Patient Selection screen and is mapped to "Study Description" in images. It is the 1st option for "Study Description" in Patient Data Entry Screen and images.
5. Reason for the Requested Procedure may be used to set "Study Description" field in the Patient Selection screen and is mapped to "Study Description" in images. It is the 4th option for "Study

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Description" in Patient Data Entry Screen and images. It is also the 1st option for "Indication" in the Patient Data Entry Screen.

6. Sets the "Referring Physician" in Patient Data Entry screens.
7. Reason for the Imaging Service Request may be used to set "Study Description" field in the Patient Selection screen and is mapped to "Study Description" in images. It is the 5th option for "Study Description" in Patient Data Entry Screen and images. It is also the 2nd option for "Indication" in the Patient Data Entry Screen.
8. Patient Last name is considered mandatory field for worklist query.

The possible Status Responses during a Worklist query are shown in table below.
A message "query failed" will appear on the user interface if Lumify R5.1 receives any other SCP response status than "Success" or "Pending."

Table 15: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Matching is complete	The system replaced the worklist from the response.
Failed	A900	Identifier does not match SOP	The Association is aborted using A-ABORT. The worklist is not replaced.
	C000 – CFFF	Unable to process	
Refused	A700	Out of resources	The Association is aborted using A-ABORT. The worklist is not replaced.
Pending	FF00	Matches are continuing	Continue.
	FF01	Matches are continuing – Warning that one or more optional keys were not supported	
Cancel	FE00	Matching terminated due to Cancel request	The user is notified that a partial list was retrieved. The retrieved items can be displayed by user request.
Refused	0122	SOP Class Not Supported	The Association is aborted using A-ABORT. The worklist is not replaced.

The possible Communication Failures during a Worklist query are shown in below table.

Table 16: DICOM Command Communication Failure Behavior.

Exception	Behavior
Time-out	The Association is aborted using A-ABORT. The worklist is not replaced.
Association aborted by the SCP or network layers	The Association is aborted using A-ABORT. The worklist is not replaced.

4.2.1.3.3 (Real Word) Activity – Modality Performed Procedure Step as SCU

4.2.1.3.3.1 Description and Sequencing of Activities

An Association to the configured MPPS SCP system is established immediately after the first image is acquired to send the MPPS N-CREATE message with status of "IN PROGRESS".

The "End Exam" button causes a "COMPLETED" status in the N-SET message. An exam for which an MPPS Instance is sent with a status of "COMPLETED" can no longer be updated.

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The "Cancel Exam" button causes a "DISCONTINUED" message. An exam for which an MPPS Instance is sent with a state of "DISCONTINUED" can also no longer be updated.

The system supports creation of "unscheduled cases" by allowing MPPS Instances to be communicated for locally registered Patients. The system performs a single Performed Procedure Step at a time per Scheduled Procedure Step.

Lumify will initiate an Association to issue:
- N-CREATE request according to the Create Modality Performed Procedure Step SOP Instance operation
- N-SET request to finalize the contents and state of the MPPS according to the Set Modality Performed Procedure Step Information operation.
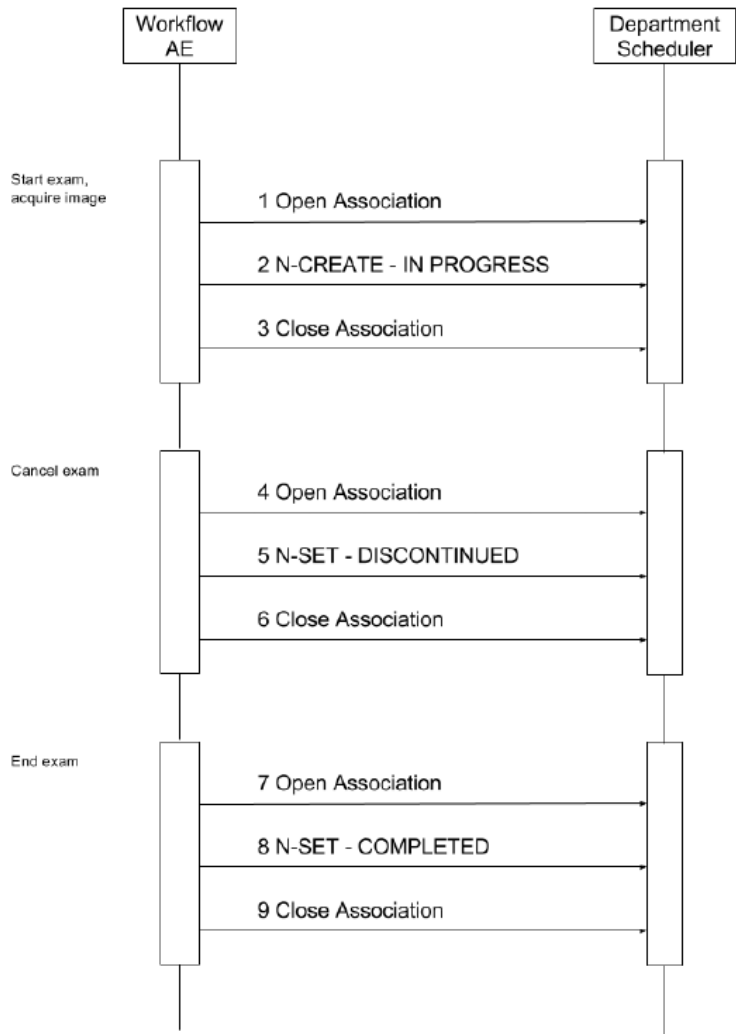
Figure 6: Sequencing of MPPS

A possible sequence of interactions between the Workflow AE and a Departmental Scheduler (e.g. a device such as a RIS or HIS which supports the MPPS SOP Class as an SCP) is illustrated in Figure above.

Note: The Cancel and End Exam commands are mutually exclusive. They are both represented here for illustration purposes only. Actual workflow uses one or the other for a given exam.

4.2.1.3.3.2 Proposed Presentation Contexts

Lumify R5.1 is capable of proposing the Presentation Contexts shown in the following table:

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Table 17: Proposed Presentation Contexts for (Real-World) Activity – Image Export

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

*Note: If the worklist server accepts Explicit VR Little Endian and Implicit VR Little Endian then Lumify R5.1 will use Explicit VR Little Endian Transfer Syntax.

4.2.1.3.3.3 SOP Specific Conformance for Modality Performed Procedure Step SOP Class

This section and sub-section include the manufacturer SOP and Dataset specific information as well the status codes and their corresponding behavior.

4.2.1.3.3.3.1 Dataset Specific Conformance for Modality Performed Procedure Step SOP Class N-CREATE-SCU

Table below provides a description of the MPPS N-CREATE request identifiers.

Table 18: MPPS Request Identifiers for N-CREATE-RQ

Attribute Name	Tag	VR	Value	Comment
Patient ID	0010,0020	LO	-	As received from MWL or entered in PDE
Patient's Birth Date	0010,0030	DA	-	As received from MWL or entered in PDE
Patient's Name	0010,0010	PN	-	As received from MWL or entered in PDE
Patient's Sex	0010,0040	CS	-	As received from MWL or entered in PDE
Modality	0008,0060	CS	US	-
Referenced Patient Sequence	0008,1120	SQ	-	Zero Length
Study ID	0020,0010	SH	-	System Generated, starting at 1 for each patient and incrementing for each subsequent study
Requesting Physician	0032,1032	PN		Same value as in MWL attribute if present or Zero Length
Performed Station AE Title	0040,0241	AE	-	AE Title from configuration
Performed Station Name	0040,0242	SH	-	AE Title from configuration
Performed Location	0040,0243	SH	-	AE Title from configuration
Performed Procedure Step Start Date	0040,0244	DA	-	Actual Start Date (on close of PDE Screen)
Performed Procedure Step Start Time	0040,0245	TM	-	Actual Start Time (on close of PDE Screen)
Procedure Code Sequence	0008,1032	SQ	-	Mapped from Requested Procedure Code Sequence (0032,1064) from MWL, Zero Length for unscheduled study
>Code Value	0008,0100	SH	-	As received from MWL
>Coding Scheme Designator	0008,0102	SH	-	As received from MWL
>Coding Scheme Version	0008,0103	SH	-	As received from MWL
>Code Meaning	0008,0104	LO	-	As received from MWL
Performed Procedure Step End Date	0040,0250	DA	-	Zero Length

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Attribute Name	Tag	VR	Value	Comment
Performed Procedure Step End Time	0040,0251	TM	-	Zero Length
Performed Procedure Step Status	0040,0252	CS	IN PROGRESS	-
Performed Procedure Step ID	0040,0253	SH	-	Auto generated in the format, <YYYYMMDDHHMMSS>
Performed Procedure Step Description	0040,0254	LO	-	Set from "Study Description" field in PDE, else mapped from Requested Procedure Description in MWL.
Performed Procedure Type Description	0040,0255	LO	-	Zero Length
Performed Protocol Code Sequence	0040,0260	SQ	-	Zero length, or mapped from MWL Scheduled Protocol Code Sequence (0040,0008)
>Code Value	0008,0100	SH	-	As received from MWL
>Coding Scheme Designator	0008,0102	SH	-	As received from MWL
>Coding Scheme Version	0008,0103	SH	-	As received from MWL
>Code Meaning	0008,0104	LO	-	As received from MWL
Scheduled Step Attributes Sequence	0040,0270	SQ	-	-
>Accession Number	0008,0050	SH	-	From MWL or user PDE input. MWL value may be edited.
>Referenced Study Sequence	0008,1110	SQ	-	One item per item in the MWL Reference Study Sequence. Absent if unscheduled.
>>Referenced SOP Class UID	0008,1150	UI	-	Same value as in of the Reference Study Sequence in the MWL
>>Referenced SOP Instance UID	0008,1155	UI	-	Same value as in of the Reference Study Sequence in the MWL
>Study Instance UID	0020,000D	UI	-	Same value as in MWL attribute or auto generated
>Requested Procedure Description	0032,1060	LO	-	Same value as in MWL attribute if present or Zero Length
>Requested Procedure ID	0040,1001	SH	-	Same value as in MWL attribute if present or Zero Length
>Scheduled Procedure Step Description	0040,0007	LO	-	Same value as in MWL attribute if present or Zero Length
>Scheduled Procedure Step ID	0040,0009	SH	-	Same value as in MWL attribute if present or Zero Length
>Scheduled Protocol Code Sequence	0040,0008	SQ	-	Same value as in MWL attribute if present or Zero Length
>Code Value	0008,0100	SH	-	As received from MWL
>Coding Scheme Designator	0008,0102	SH	-	As received from MWL
>Coding Scheme Version	0008,0103	SH	-	As received from MWL
>Code Meaning	0008,0104	LO	-	As received from MWL
Performed Series Sequence	0040,0340	SQ	-	-
>Retrieve AE Title	0008,0054	AE	-	Zero Length
>Series Description	0008,103E	LO	-	Zero Length

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Attribute Name	Tag	VR	Value	Comment
>Performing Physician's Name	0008,1050	PN	-	From the "Performed by" field in PDE
>Operator's Name	0008,1070	PN	-	From the "Performed by" field in PDE
>Referenced Image Sequence	0008,1140	SQ	-	Zero Length
>Protocol Name	0008,1030	LO	"Free Form"	-
>Series Instance UID	0020,000E	UI	-	Auto Generated
>Referenced Non-Image Composite SOP Instance Sequence	0040,0220	SQ	-	Zero Length
Reason for the Requested Procedure	0040,1002	LO	-	As received from MWL or entered in PDE

The following table summarizes the behavior of Lumify R5.1 when encountering status codes in An MPPS N-CREATE response.

Table 19: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Success	The SCP has completed the operation successfully.
Failure	0110	Processing Failure – Performed Procedure Step Object may no longer be updated	The Association is aborted.
Failure	0105	No Such Attribute	The Association is aborted.
Failure	0106	Invalid Attribute Value	The Association is aborted.
Failure	0107	Attribute List Error	The Association is aborted.
Failure	0110	Processing Failure	The Association is aborted.
Failure	0111	Duplicate SOP Instance	The Association is aborted.
Failure	0116	Attribute Value Out Of Range	The Association is aborted.
Failure	0117	Invalid Object Instance	The Association is aborted.
Failure	0118	No Such SOP Class	The Association is aborted.
Failure	0120	Missing Attribute	The Association is aborted.
Failure	0121	Missing Attribute Value	The Association is aborted.
Failure	0124	Refused: Not Authorized	The Association is aborted.
Failure	0210	Duplicate Invocation	The Association is aborted.
Failure	0211	Unrecognized Operation	The Association is aborted.
Failure	0212	Mistyped Argument	The Association is aborted.
Failure	0213	Resource Limitation	The Association is aborted.
*	Any other status code	*	The Association is aborted.

The possible Communication Failures during a MPPS N-CREATE are shown in below table.

Table 20: DICOM Command Communication Failure Behavior.

Exception	Behavior
Time-out	The Association is aborted using A-ABORT.
Association aborted by the SCP or network layers	The Association is aborted using A-ABORT.

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4.2.1.3.3.3.2 Dataset Specific Conformance for Modality Performed Procedure Step SOP Class N-SET-SCU

Table below provides a description of the MPPS N-SET request identifiers.

Table 21: MPPS Request Identifiers for N-SET-RQ

Attribute Name	Tag	VR	Value	Comment
Procedure Code Sequence	0008,1032	SQ	-	Mapped from Requested Procedure Code Sequence (0032,1064) from MWL, Zero Length for unscheduled study
>Code Value	0008,0100	SH	-	As received from MWL
>Coding Scheme Designator	0008,0102	SH	-	As received from MWL
>Coding Scheme Version	0008,0103	SH	-	As received from MWL
>Code Meaning	0008,0104	LO	-	As received from MWL
Requesting Physician	0032,1032	PN		Same value as in MWL attribute if present or Zero Length
Performed Procedure Step End Date	0040,0250	DA	-	Actual end date
Performed Procedure Step End Time	0040,0251	TM	-	Actual end time
Performed Procedure Step Status	0040,0252	CS	COMPLETED or DISCONTINUED	-
Performed Procedure Step Description	0040,0254	LO	-	Set from "Study Description" field in PDE, else mapped from Requested Procedure Description in MWL.
Performed Protocol Code Sequence	0040,0260	SQ	-	Zero length or mapped from MWL Scheduled Protocol Code Sequence (0040,0008)
>Code Value	0008,0100	SH	-	As received from MWL
>Coding Scheme Designator	0008,0102	SH	-	As received from MWL
>Coding Scheme Version	0008,0103	SH	-	As received from MWL
>Code Meaning	0008,0104	LO	-	As received from MWL
Performed Series Sequence	0040,0340	SQ	-	-
>Retrieve AE Title	0008,0054	AE	-	Zero Length
>Series Description	0008,103E	LO	-	Zero Length
>Performing Physician's Name	0008,1050	PN	-	From the "Performed by" field in PDE
>Operator's Name	0008,1070	PN	-	From the "Performed by" field in PDE
>Referenced Image Sequence	0008,1140	SQ	-	One item per referenced image instance
>>Referenced SOP Class UID	0008,1150	UI	-	SOP Class UID of acquired instance
>>Referenced SOP Instance UID	0008,1155	UI	-	SOP Class UID of acquired instance
>Protocol Name	0008,1030	LO	"Free Form"	-

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Attribute Name	Tag	VR	Value	Comment
>Series Instance UID	0020,000E	UI	-	Auto Generated
>Referenced Non-Image Composite SOP Instance Sequence	0040,0220	SQ	-	Zero Length or One item per referenced non-image instance
>>Referenced SOP Class UID	0008,1150	UI	-	SOP Class UID of acquired instance
>>Referenced SOP Instance UID	0008,1155	UI	-	SOP Class UID of acquired instance

The following table summarizes the behavior of Lumify R5.1 when encountering status codes in an MPPS N-SET response.

Table 22: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Success	The SCP has completed the operation successfully.
Failure	0110	Processing Failure – Performed Procedure Step Object may no longer be updated	The Association is aborted.
Failure	0105	No Such Attribute	The Association is aborted.
Failure	0106	Invalid Attribute Value	The Association is aborted.
Failure	0107	Attribute List Error	The Association is aborted.
Failure	0110	Processing Failure	The Association is aborted.
Failure	0111	Duplicate SOP Instance	The Association is aborted.
Failure	0116	Attribute Value Out Of Range	The Association is aborted.
Failure	0117	Invalid Object Instance	The Association is aborted.
Failure	0118	No Such SOP Class	The Association is aborted.
Failure	0120	Missing Attribute	The Association is aborted.
Failure	0121	Missing Attribute Value	The Association is aborted.
Failure	0124	Refused: Not Authorized	The Association is aborted.
Failure	0210	Duplicate Invocation	The Association is aborted.
Failure	0211	Unrecognized Operation	The Association is aborted.
Failure	0212	Mistyped Argument	The Association is aborted.
Failure	0213	Resource Limitation	The Association is aborted.
*	Any other status code	*	The Association is aborted.

The possible Communication Failures during a MPPS N-SET are shown in below table.

Table 23: DICOM Command Communication Failure Behavior.

Exception	Behavior
Time-out	The Association is aborted using A-ABORT.
Association aborted by the SCP or network layers	The Association is aborted using A-ABORT.

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4.2.1.3.4 (Real Word) Activity – Image Export

4.2.1.3.4.1 Description and Sequencing of Activities

Images may be sent from the selected studies from the Review directory. Each image is sent in its own association that is opened and closed. Additional images acquired during the exam will be sent using subsequent associations.

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.

If a device is configured for Storage Commitment service, the Storage AE will transmit a single Storage Commitment N-ACTION request for images and, if present, the report images. The Storage AE can only receive an N- EVENT-REPORT request in a separate subsequent association initiated by the SCP. It cannot receive N-EVENT-REPORT request messages on the same association as the N-ACTION request. Further details are described in Section 4.2.1.3.5 (Real Word) Activity – Storage Commitment Push Model as SCU.

The sequence of interactions between the Storage AE and an Image Manager is illustrated in below figure for the "Store" configuration option "After Each Print/Acquire". If the "At End Exam" configuration option is selected, no C-STORE is sent at the Acquire Image event and instead all image C-STOREs are sent after end exam.
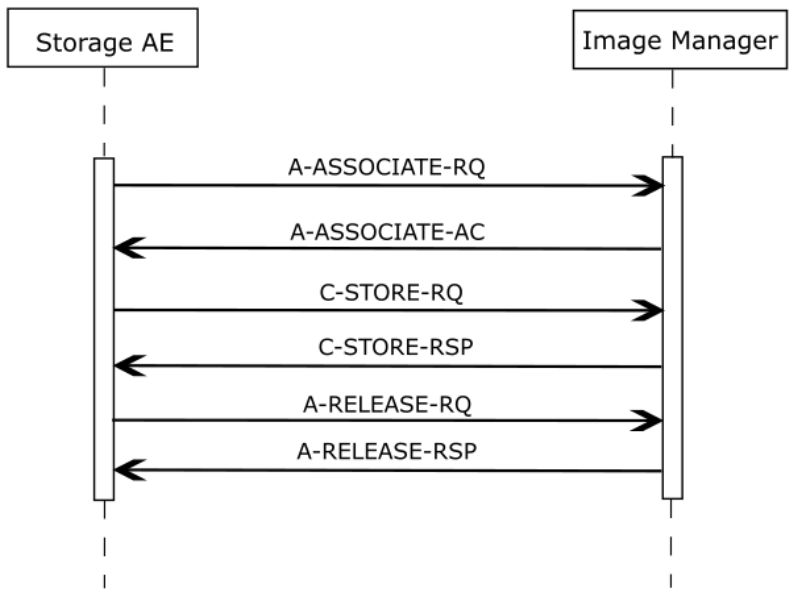
Figure 7: (Real Word) Activity - Export Images

4.2.1.3.4.2 Proposed Presentation Contexts

Lumify R5.1 is capable of proposing the Presentation Contexts shown in the following table:

Table 24: Proposed Presentation Contexts for (Real-World) Activity – Image Export

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
US Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.6.1	JPEG Lossy Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCU	None
		RLE Lossless	1.2.840.10008.1.2.5		

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Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
US Multiframe Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.3.1	JPEG Lossy Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCU	None
		RLE Lossless	1.2.840.10008.1.2.5		
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7	JPEG Lossy Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCU	None
		RLE Lossless	1.2.840.10008.1.2.5		

4.2.1.3.4.3 SOP Specific Conformance for Image SOP Class

This section and sub-section include the manufacturer SOP and Dataset specific information as well the status codes and their corresponding behavior.

4.2.1.3.4.3.1 Dataset Specific Conformance for C-STORE-RQ

All SOP Classes supported by the Storage AE exhibit the same behavior, except where stated, and are described together in this section.

Detail regarding the Dataset Specific response behavior will be reported in this section.
This includes the dataset specific behavior, i.e. error codes, error and exception handling, time-outs, etc.

Table 25: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Successful stored	The SCP successfully stored the SOP Instance. If all SOP Instances succeed, the job is marked as complete.
Failure	A901	Dataset does not match SOP Class	Storage operation is failed. Failure reason is logged in application logs and association is released.
	A701	Out of Resources	
	C000	Cannot understand	
	0210	Duplicate Invocation	
	0117	Invalid Object Instance	
	0212	Mistyped Argument	
	0107	Attribute List Error	
Warning	B000	Coercion of Data Elements	The SCP successfully stored the SOP Instance. Warning reason is logged in application logs and association is released.
	B 007	Dataset does not match SOP Class	
	B006	Elements Discarded	

The possible Communication Failures during a C-STORE-RQ are shown in below table.

Table 26: DICOM Command Communication Failure Behavior.

Exception	Behavior
Time-out	The store job fails. The reason is logged and reported to the user..
Association aborted by the SCP or network layers	The store job fails. The reason is logged and reported to the user..

The contents of US Image, US Multi-frame and Secondary Capture Storage SOP Instances conform to the DICOM IOD definitions are described in Section 8.1.

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4.2.1.3.5 (Real Word) Activity – Storage Commitment Push Model as SCU

4.2.1.3.5.1 Description and Sequencing of Activities

The Network AE supports asynchronous storage commitment. The Figure below shows the sequence diagram for the storage and asynchronous storage commitment of an Examination containing one Series of images.
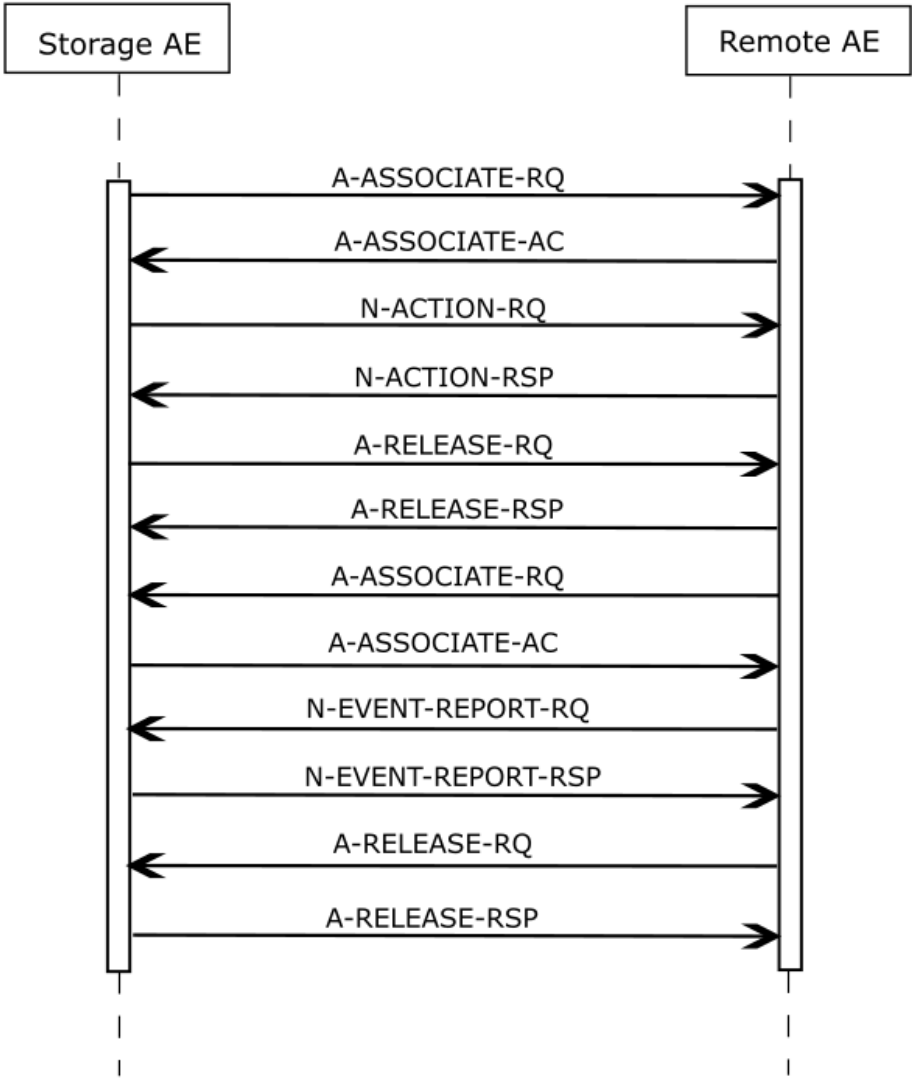
Figure 8: Sequencing of Storage Export with Asynchronous Storage Commitment

4.2.1.3.5.2 Proposed Presentation Contexts

Lumify R5.1 is capable of proposing the Presentation Contexts shown in the following table:

Table 27: Proposed Presentation Contexts for (Real-World) Activity – Storage Commitment Push Model as SCU

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2		

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4.2.1.3.5.3 SOP Specific Conformance for Storage Commitment Push Model SOP Class

4.2.1.3.5.3.1 Dataset Specific Conformance for Storage Commitment Push Model SOP Class N-ACTION-SCU

The Storage AE will request storage commitment for the configured device. If "Send images as they are acquired" is selected, Storage Commitment is requested automatically by the system immediately after the instance is stored.

The Storage AE will request storage commitment using the attributes described in the following table:

Table 28: Storage Commitment N-ACTION REQUEST Message Contents

Storage Commitment Module					
Action Type Name	Action Type ID	Attribute Name	Tag	Requirement Type SCU	Comment
Request Storage Commitment	1	Transaction UID	0008,1195	1	-
		Referenced SOP Sequence	0008,1199	1	-
		>Referenced SOP Class UID	0008,1150	1	-
		>Referenced SOP Instance UID	0008,1155	1	-

The N-ACTION request is retried if the N-ACTION has completed successfully but no N-EVENT-RESPONSE received within 96 hours. Further, the NACTION request is retried if N-EVENT-RESPONSE is received with one or more instances that fail commit; in that case, C-STORE requests are also resent for all instances that failed to commit.

Table 29: Status Response for N-ACTION-RQ.

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Success	The SCP successfully stored the SOP Instance. If all SOP Instances succeed, the job is marked as complete.
Failure	0119	Class-Instance Conflict	Storage Commitment is failed. Reason for the failure is logged in application logs and association is released.
	0219	Duplicate Invocation	
	0114	No Such Argument	
	0118	No Such SOP Class	
	0112	No Such SOP Instance	
	0110	Processing Failure	
	0213	Resource Limitation	
	0211	Unrecognized Operation	
	0124	Not Authorized	
	0115	Invalid Argument Value	
	0117	Invalid Object Instance	
	0212	Mistyped Argument	
	0123	No Such Action	

The possible communication failures are shown in below table:

Table 30: DICOM Command Communication Failure Behavior N-ACTION.

Exception	Behavior
Time-out	The Association is aborted using A-ABORT and the transfer fails. The status is logged.

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Exception	Behavior
Association aborted by the SCP or network layers	The Association is aborted using A-ABORT and the transfer fails. The status is logged.

4.2.1.3.5.3.2 Dataset Specific Conformance for Storage Commitment Push Model SOP Class N-EVENT-REPORT-SCP

The Storage AE accepts associations for pending responses to a Storage Commitment Request only using SCP/SCU Role Negotiation of "SCP" explicitly stating that the association is initiated by the SCP to the SCU.

The Storage AE can receive an N-EVENT-REPORT notification received from the SCP via an association requested by the SCP with reverse-role negotiation. Table below summarizes the behavior of Storage AE when receiving Event Types within the N-EVENT-REPORT.

Table 31: Storage Commitment N-EVENR-REPORT Behavior

Event Type Name	Event Type ID	Behavior
Storage Commitment Request Successful	1	The commit status is set to complete for each object.
Storage Commitment Request Complete – Failures Exist	2	The commit status remains incomplete. The commit comment for each object is logged.

Table below Lists the attributes that are supported within the N-EVENT-REPORT.

Table 32: Storage Commitment N-EVENR-REPORT Message Contents

Storage Commitment Module					
Event Type Name	Event Type ID	Attribute Name	Tag	Requirement Type SCU	Comment
Storage Commitment Request Successful	1	Transaction UID	0008,1195	None	-
		Referenced SOP Sequence	0008,1199	None	-
		>Referenced SOP Class UID	0008,1150	None	-
		>Referenced SOP Instance UID	0008,1155	None	-
Storage Commitment Request Successful	1	Transaction UID	0008,1195	None	-
		Referenced SOP Sequence	0008,1199	None	-
		>Referenced SOP Class UID	0008,1150	None	-
		>Referenced SOP Instance UID	0008,1155	None	-
		Failed SOP Sequence	0008,1198	None	-
		>Referenced SOP Class UID	0008,1150	None	-
		>Referenced SOP Instance UID	0008,1155	None	-

The reasons for returning specific status codes in an N-EVENT-REPORT response are summarized in Table below.

Table 33: Status Response for N-EVENT-REPORT.

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Success	The storage commitment result has been successfully received
*	Any Other Status Code	*	Storage Commitment is failed and association is released.

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4.2.1.4. Association Acceptance Policy

4.2.1.4.1 (Real Word) Activity – Verification as SCP

4.2.1.4.1.1 Description and Sequencing of Activities

The system listens on the port configured in the Connectivity Profile for Verification requests initiated by other remote devices. The calling device AE must already be configured as the remote Storage Commitment device in the Connectivity Profile or the association is rejected.
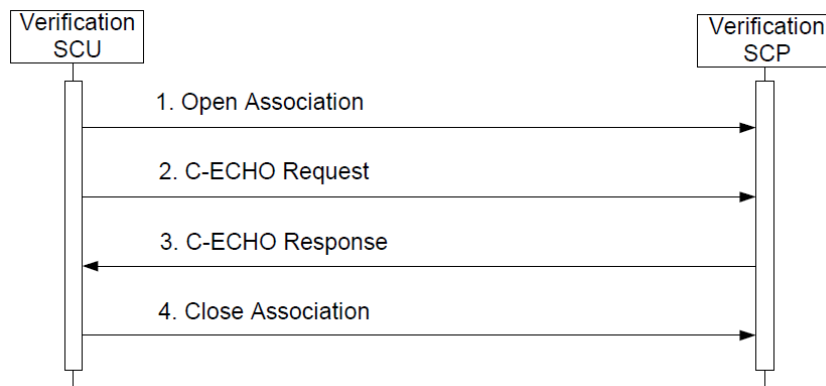
Figure 9: (Real Word) Activity – Verification as SCP

4.2.1.4.1.2 Accepted Presentation Contexts

Lumify R5.1 is capable of accepting the Presentation Contexts shown in the following table:

Table 34: Accepted Presentation Contexts for (Real-World) Activity – Verification as SCP

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

4.2.1.4.1.3 SOP Specific Conformance for Verification SOP Class

This section and sub-section include the manufacturer SOP and Dataset specific information as well the status codes and their corresponding behavior.

4.2.1.4.1.3.1 Dataset Specific Conformance for Verification C-ECHO RSP

This section describes the dataset specific response behavior for Verification C-ECHO-RSP.

This part of the section includes the dataset specific behavior, i.e. error codes, error and exception handling, time-outs, etc.

Table 35: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Success	Device Status is set to: Test Passed/Verified

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4.3. Network Interfaces

4.3.1. Supported Communication stacks

4.3.1.1. TCP/IP stack

The System provides only DICOM V3.0 TCP/IP Network Communication Support as defined in PS 3.8 of the standard. The TCP/IP Stack, as supported by the underlying Operating System, 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.

4.3.2. Physical Network Interface

The Lumify R5.1 DICOM Conformance Statement system supports one network interface at a time. The available network.

4.3.3. Additional Protocols

Not Applicable. Additional Protocols are not implemented by Lumify System.

4.3.4. IPv4 and IPv6 support

IPv4 and IPv6 addresses are 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.

Lumify uses a concept of "Configuration Profiles" that may be used to group sets of configured devices together. Each profile may contain at least one of a Primary Storage Server, a Storage Commitment Server, a Modality Worklist Server and a Modality Performed Procedure Step server. Other settings are configurable as well, including strategies for automatic export of exam images, and automatic deletion of exams.

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 36: AE Title configuration table

Application Entity	AE Title	Default TCP/IP Port
Storage	<User Specified>	11112
Storage Commitment*	<User Specified>	11112
Worklist	<User Specified>	11112
Modality Performed Procedure Step	<User Specified>	11112

Note:

- For Storage Commitment N-Event-Report messages to return to the system, the Android operating system list the range of available listening ports for Lumify to be above 1023. "104" cannot be assigned to the Lumify.
- The default TCP/IP listen port number for AE is 1112. If needed this listen port number can be changed.

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4.4.1.2. Remote AE Title/Presentation Address Mapping

The configuration of the remote application is specified here.

Table 37: AE Title Configuration Table

Application Entity	AE Title	Default TCP/IP Port
Storage	<User Specified>	11112
Storage Commitment*	<User Specified>	11112
Worklist	<User Specified>	11112
Modality Performed Procedure Step	<User Specified>	11112

4.4.1.2.1 Workflow

Setup is used to set the AE Title, Port number and IP Address the remote MWL SCP. Multiple MWL SCPs may be defined, but only a single remote MWL SCP can be used at a time.

"AE Title" may be selected as the system's.

The Start Date defaults to "Today" but may be modified to be "All Dates", or a Date Range that may be 1, 7, or 30 days.

4.4.2. Configurable Parameters

This section describes all the parameters that can be configured on the MR system via the service application tool.

Table 38: Configuration Parameters Table

Parameter	Configurable	Default Value
Local node Parameters		
AE title	Yes	-
Port Number	Yes	11112
Maximum PDU Length	Yes	16384
Network Timeout (seconds)	Yes	30 sec
Support SOP classes	No	Ultrasound Image Storage Ultrasound Multiframe Image Storage SOP Class Secondary Capture Image Storage SOP Class
Institution Name	Yes	-
Remote node Parameters		
AE title	Yes	-
Port Number	Yes	104
Storage Commit Mode	Yes	Asynchronous

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5. Media Interchange

Lumify R5.1 does not support Media Storage.

Lumify R5.1 does support saving of images to DICOM file formats, but does not necessarily comply with the DICOM Media Storage model in PS 3.10.

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6. Support of Character Sets

Any support for character sets in Network and Media services is described here.

Table 39: Supported DICOM Character Sets

Character Set Description	Defined Term	ESC Sequence	ISO Registration Number	Code Element	Character Set
Latin alphabet No. 1	ISO_IR 100	-	ISO-IR 6	G0	ISO 646
		-	ISO-IR 100	G1	Supplementary set of ISO 8859

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7. Security

7.1. Security Profiles

The Lumify system supports security measures that will be used for secure authentication of a node.

7.1.1. Security use Profiles

Not Applicable. Lumify system has not implemented Security Use Profiles.

7.1.2. Security Transport Connection Profiles

The TLS Component is a "mode of operation" of Lumify system and will be used for nodes that can authenticate each other before they communicate over sockets. Lumify system conforms to the TLS protocol v1.2 of Secure Transport Connection Profile. Node authentication and encryption are only possible when the node has:

- a "private and public key";
- a self-signed certificate or certificate signed by a Certificate Authority; and
- a list of certificates with which the system wants to communicate.

Furthermore, the TLS component may communicate using the following Cipher Suites:

- TLS_AES_256_GCM_SHA384
- TLS_CHACHA20_POLY1305_SHA256
- TLS_AES_128_GCM_SHA256
- TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256
- TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384

In case no encryption is used the data is signed and hashed: integrity is present and confidentiality is not present.

Certificates

If two systems communicate with each other, one system will be listening on a port (server node) while the other system sets up a connection (client node). The certificate this server node will send to the other client node is the server certificate. The client node initiates the communication and the certificate that the client node is sending to the server is the client certificate. The following TLS Certification checks will be done (TLS Handshake). The machine (either server or client) that will send its certificate will choose the certificate according to Common Name (CN) value in the Subject-field. This name is case-sensitive. All present certificates should have unique CN names.

The server verifies:

- that the client certificate is a valid X.509 certificate;
- that the client certificate is either signed by a CA or is self-signed;
- that the client certificate is in the list of trusted certificates;
- that the client certificate is valid (present time is between "Valid from" and "Valid to" fields of the X.509 certificate);
- that the client certificate has the correct purpose (at least the Client Authenticate purpose).

The client verifies:

- that the server certificate is a valid X.509 certificate;
- that the server certificate either is signed by a CA or is self-signed;
- that the server certificate is in the list of trusted certificates;
- that the server certificate is valid (present time is between "Valid from" and "Valid to" fields of the X.509 certificate);
- that the server certificate has the correct purpose (at least Server Authenticate purpose).

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The System is responsible for:
- revocation of certificates;
- limiting the connection to a limited set of IP-addresses.

Additional information: The value in the Subject-field is determined in the certificate request. The CA will sign the request in case it accepts the values that are present in the request. The CN value can be: IP-address, hostname or hostname. Domain. The value in the CN-field must be equal to the value that is used in making a connection to the server. In case the name is specified as hostname. Domain that same value should be specified during connect. In the ideal situation the name-IP-number translation will be dealt with by the DNS in the hospital. This check is case-insensitive.

Figure below presents the message flow of TLS handshake supported by Lumify.
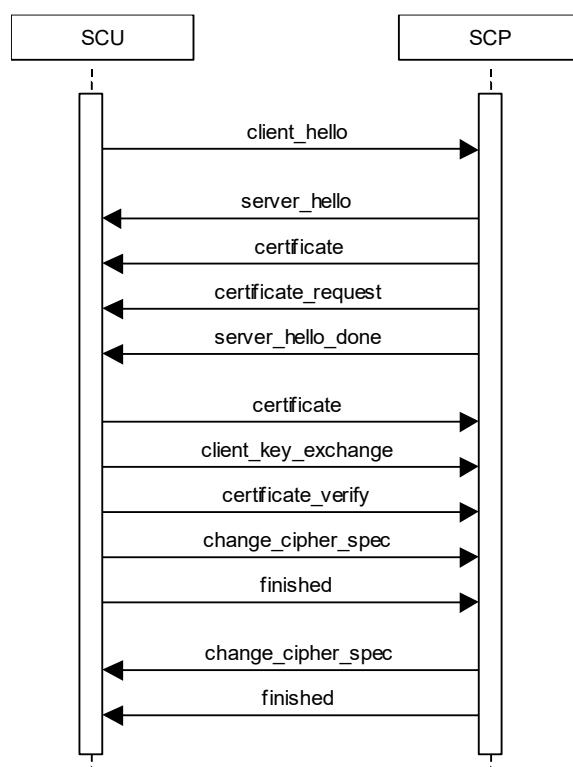
Figure 10: Message flow of TLS handshake

7.1.3. Digital Signature Profiles

Not Applicable. Lumify system has not implemented Digital Signature Profiles.

7.1.4. Media Storage Security Profiles

Not applicable. Lumify system has not implemented Media Storage Security Profiles.

7.1.5. Attribute Confidentiality Profiles

Not applicable. Lumify system has not implemented Attribute Confidentiality Profiles.

7.1.6. Network Address Management Profiles

Not applicable. Lumify system has not implemented Network Address Management Profiles.

7.1.7. Time Synchronization Profiles

Not applicable. Lumify system has not implemented Time Synchronization Profiles.

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7.1.8. Application Configuration Management Profiles

Not applicable. Lumify system has not implemented Application Configuration Management Profiles.

7.1.9. Audit Trail Profiles

Not applicable. Lumify system has not implemented Audit Trail Profiles.

7.2. Association Level Security

Not applicable. Lumify system has not implemented Association Level Security Profiles.

7.3. Application Level Security

Lumify does not support any specific application level security measures.
- The Application which gives access to Patient records and DICOM communication requires Login with Username and Password.
- The system is used within a secured environment. It is assumed that a secured environment includes at a minimum.
  o The OS is solidified by white-listing applications and files. Not white-listed executable files, libraries, drivers, Java apps, ActiveX controls, scripts, and other code are blocked.
  o Firewall or router protections to ensure that only approved external hosts have network access to Lumify System.
  o Firewall or router protections to ensure that Lumify System only has network access to approved external hosts and services.
  o Any communication with external hosts outside the locally secured environment can be configured to use secure network channels.

Other network security procedures such as automated intrusion detection may be appropriate in some environments.

Additional security features may be established by the local security policy and are beyond the scope of this conformance statement.

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8. Annexes of Application "Lumify R5.1"

8.1. IOD Contents

8.1.1. Created SOP Instance

This section specifies each IOD created by this application.

This section specifies each IOD created (including private IOD's). It should specify the attribute name, tag, VR, and value. The value should specify the range and source (e.g. user input, Modality Worklist, automatically generated, etc.). For content items in templates, the range and source of the concept name and concept values should be specified. Whether the value is always present or not shall be specified.

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
MPPS   The attribute value is the same as that use for Modality Performed Procedure Step
MWL   The attribute value source is a Modality Worklist
                  Unless otherwise noted, values returned from worklist may be overridden by User input
USER   The attribute value source is explicit user input

8.1.1.1. List of created SOP Classes

Table 40: List of created SOP Classes

SOP Class Name	SOP Class UID
Ultrasound Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.6.1
Ultrasound Multiframe Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.3.1
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7

8.1.1.1.1 Ultrasound Image Storage SOP Class

Table 41: IOD of Created Ultrasound Image Storage SOP Class Instances

Information Entity	Module	Presence
Patient	Patient Module	ALWAYS
Study	General Study Module	ALWAYS
	Patient Study Module	ALWAYS
Series	General Series Module	ALWAYS
Equipment	General Equipment Module	ALWAYS
Acquisition	General Acquisition Module	ALWAYS

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Information Entity	Module	Presence
Image	General Image Module	ALWAYS
	Image Pixel Module	ALWAYS
	US Region Calibration Module	CONDITIONAL
	US Image Module	ALWAYS
	SOP Common Module	ALWAYS

Table 42: Patient Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Patient's Name	0010,0010	PN	-	ALWAYS	AUTO, USER, MWL	Same attribute of MWL or PDE input
Patient ID	0010,0020	LO	-	ALWAYS	AUTO, USER, MWL	From MWL, user input or system generated.
Patient's Birth Date	0010,0030	DA	-	VNAP	USER, MWL	Same attribute of MWL or PDE input
Patient's Sex	0010,0040	CS	-	VNAP	USER, MWL	Same attribute of MWL
Other Patient Ids	0010,1000	LO	-	ANAP	MWL	Same attribute of MWL

Table 43: General Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Study Date	0008,0020	DA	-	ALWAYS	AUTO	Study's Start Date (0040,0244).
Study Time	0008,0030	TM	-	ALWAYS	AUTO	Study's Start Time (0040,0245).
Accession Number	0008,0050	SH	-	VNAP	USER, MWL	Same attribute of MWL or user PDE input.
Referring Physician's Name	0008,0090	PN	-	VNAP	USER, MWL	User Input from Patient ID screen. From MWL, sent as "Last, Prefix First Middle Suffix" in the Last name field.
Study Instance UID	0020,000D	UI	-	ALWAYS	AUTO, MWL	Same value as in MWL or auto generated
Study ID	0020,0010	SH	-	ALWAYS	AUTO	MWL Requested Procedure ID (0040,1000) or Auto-generated starting at 1
Study Description	0008,1030	LO	-	ANAP	USER, MWL	'Study Description' in PDE or, can be obtained from the MWL Server. The string used will be the first non-empty string from the following list: Requested Procedure description tag (0032,1060), Scheduled Procedure Step description tag (0040,0007) Scheduled Procedure Step, "Code Meaning" tag (0008,0104)

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Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
						Reason for the requested procedure tag (0040,1002) Reason for imaging service request tag (0040,2001)
Physician(s) of Record	0008,1048	PN	-	VNAP	MWL, USER	Mapped from Names of Intended Recipients of Results (0040,1010) from MWL or user PDE input.
Referenced Study Sequence	0008,1110	SQ	-	ANAP	MWL	One item per item in the MWL Referenced Study Sequence
>Referenced SOP Class UID	0008,1150	UI	-	ALWAYS	AUTO	Same value as in of the Referenced Study Sequence in the MWL
>Referenced SOP Instance UID	0008,1155	UI	-	ALWAYS	AUTO	Same value as in of the Referenced Study Sequence in the MWL
Procedure Code Sequence	0008,1032	SQ	-	ANAP	MWL	MWL Requested Procedure Code Sequence (0032,1064) Absent if unscheduled.
>Code Value	0008,0100	SH	-	VNAP	MWL	Same value as MWL attribute
>Coding Scheme Designator	0008,0102	SH	-	VNAP	MWL	Same value as MWL attribute
>Coding Scheme Version	0008,0103	SH	-	VNAP	MWL	Same value as MWL attribute
>Code Meaning	0008,0104	LO	-	ALWAYS	MWL	Same value as MWL attribute

Table 44: Patient Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Patient's Size	0010,1020	DS	-	ANAP	MWL	Same value as MWL attribute.
Patient's Weight	0010,1030	DS	-	ANAP	MWL	Same value as MWL attribute.
Admitting Diagnosis Description	0008,1080	LO	-	ANAP	MWL	Same value as MWL attribute.
Additional Patient's History	0010,21B0	LT	-	ANAP	MWL	Same value as MWL attribute.
Medical Alerts	0010,2000	LO	-	ANAP	MWL	Same value as MWL attribute.
Pregnancy Status	0010,21C0	US	-	ANAP	MWL	Same value as MWL attribute.

*Note: Medical Alerts and Pregnancy Status attributes extend the standard US Image IOD

Table 45: General Series Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Modality	0008,0060	CS	US	ALWAYS	AUTO	-
Performing Physicians' Name	0008,1050	PN	-	ANAP	USER, MWL	MWL Scheduled Performing Physician's Name (0040,0006) or PDE input, 'Performed by'.

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Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Operators' Name	0008,1070	PN	-	ANAP	USER, MWL	MWL Scheduled Performing Physician's Name (0040,0006) or PDE input, 'Performed by'.
Series Instance UID	0020,000E	UI	-	ALWAYS	AUTO	Auto generated.
Series Number	0020,0011	IS	-	ALWAYS	AUTO	A number unique within the Study
Series Date	0008,0021	DA	-	ALWAYS	AUTO	Date of first image in series.
Series Time	0008,0031	TM	-	ANAP	AUTO	-
Series Description	0008,103E	LO	-	ANAP	USER, MWL	User entry in the 'Study Description' field of the Patient ID screen. If the user does not enter a value, this tag is not sent.
Referenced Performed Procedure Step Sequence	0008,1111	SQ	-	ANAP	AUTO	-
>Referenced SOP Class UID	0008,1150	UI	-	ALWAYS	AUTO	-
>Referenced SOP Instance UID	0008,1155	UI	-	ALWAYS	AUTO	-
Protocol Name	0018,1030	LO	-	ANAP	AUTO	-
Request Attributes Sequence	0040,0275	SQ	-	ANAP	MWL	This sequence will be present only for scheduled study. In case of unscheduled study, this sequence will not be present.
>Requested Procedure Description	0032,1060	LO	-	ANAP	MWL	Value from MWL.
>Requested Procedure ID	0040,1001	SH	-	ANAP	AUTO, MWL	Value from MWL.
>Scheduled Procedure Step ID	0040,0009	SH	-	ANAP	AUTO, MWL	Auto-generated = Study ID or value from MWL. One item.
>Scheduled Procedure Step Description	0040,0007	LO	-	ANAP	MWL	Same value as MWL attribute.
>Scheduled Protocol Code Sequence	0040,0008	SQ	-	ANAP	MWL	Same value as MWL attribute.
>>Code Value	0008,0100	SH	-	ANAP	AUTO	-
>>Coding Scheme Designator	0008,0102	SH	-	ANAP	AUTO	-
>>Coding Scheme Version	0008,0103	SH	-	ANAP	AUTO	-
>>Code Meaning	0008,0104	LO	-	ALWAYS	AUTO	-
Performed Procedure Step ID	0040,0253	SH	-	ANAP	AUTO	Set as current date and time in the format yyyymmddhhmmss.
Performed Procedure Step Start Date	0040,0244	DA	-	ANAP	AUTO	Date on which the Performed Procedure Step started on close of Patient Data Entry Screen
Performed Procedure Step Start Time	0040,0245	TM	-	ANAP	AUTO	Time on which the Performed Procedure Step started on

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Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
						close of Patient Data Entry Screen
Performed Procedure Step Description	0040,0254	LO	-	ANAP	USER, MWL	Set with the value entered or selected in 'Study Description' field of Patient ID screen.
Performed Protocol Code Sequence	0040,0260	SQ	-	ANAP	MWL	Zero length, or mapped from MWL Scheduled Protocol Code Sq (0040,0008)
>Code Value	0008,0100	SH	-	ANAP	AUTO	-
>Coding Scheme Designator	0008,0102	SH	-	ANAP	AUTO	-
>Coding Scheme Version	0008,0103	SH	-	ANAP	AUTO	-
>Code Meaning	0008,0104	LO	-	ALWAYS	AUTO	-

Table 46: General Equipment Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Manufacturer	0008,0070	LO	Philips	ALWAYS	AUTO, FIXED	-
Station Name	0008,1010	SH	-	VNAP	CONFIG	The AE Title of Lumify system on which the image is acquired. The user can configure the AE Title of the system through 'Setup'.
Institution Name	0008,0080	LO	-	ANAP	CONFIG	-
Manufacturer's Model Name	0008,1090	LO	Lumify	ALWAYS	FIXED	-
Software Version(s)	0018,1020	LO	5.1	ALWAYS	AUTO	

Table 47: General Acquisition Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Acquisition Date	0008,0022	DA		ALWAYS	AUTO	The system uses the same value as the Content Date, tag (0008,0023).
Acquisition DateTime	0008,002A	DT	-	ALWAYS	AUTO	The system generates this as a combination of Acquisition Date and Acquisition Time. The format is yyyymmddhhmmss.ffffff
Acquisition Time	0008,0032	TM	-	ALWAYS	AUTO	The system uses the same value as the Content time, tag (0008,0033).

Table 48: General Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Content Date	0008,0023	DA	-	ALWAYS	AUTO	<yyyymmdd>
Content Time	0008,0033	TM	-	ALWAYS	AUTO	<hhmmss.ffffff>

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Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Patient Orientation	0020,0020	CS	-	VNAP	AUTO	The system sends the tag empty
Image Type	0008,0008	CS	-	ALWAYS	CONFIG	Value is DERIVED\PRIMARY for lossy, and ORIGINAL\PRIMARY for lossless
Instance Number	0020,0013	IS	-	ALWAYS	AUTO	Generated by device, increments from "1" in each series. Gaps in values may exist if images are deleted on the system prior to export.
Lossy Image Compression	0028,2110	CS	-	ALWAYS	AUTO	"01" if image is lossy compressed, "00" if not.
Lossy Image Compression Ratio	0028,2112	DS	-	ANAP	AUTO	-
Lossy Image Compression Method	0028,2114	CS	-	ANAP	AUTO	-

Table 49: Image Pixel Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Rows	0028,0010	US	768	ALWAYS	CONFIG	-
Columns	0028,0011	US	1024	ALWAYS	CONFIG	-
Bits Allocated	0028,0100	US	8 bits	ALWAYS	AUTO	-
Bits Stored	0028,0101	US	-	ALWAYS	AUTO	Always the same numbers as Bits Allocated
High Bit	0028,0102	US	-	ALWAYS	AUTO	The High Bit is always (Bits Allocated -1).
Pixel Representation	0028,0103	US	-	ALWAYS	AUTO	"0" pixels are Unsigned integers
Pixel Data	7FE0,0010	OB	-	ANAP	AUTO	-
Samples per Pixel	0028,0002	US	-	ALWAYS	CONFIG	3 for RGB 3 for YBR_FULL_422
Photometric Interpretation	0028,0004	CS	-	ALWAYS	CONFIG	RGB YBR_FULL_422
Planar Configuration	0028,0006	US	0	ANAP	AUTO	-

Table 50: US Region Calibration Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Sequence of Ultrasound Regions	0018,6011	SQ	-	ANAP	AUTO	A sequence is present for each region on the system display
>Region Spatial Format	0018,6012	US	-	ANAP	AUTO	Enumerated Value. 2D (tissue or flow) = 0001H MMode (tissue or flow) = 0002H Spectral (PW Doppler) = 0003H
>Region Data Type	0018,6014	US	-	ANAP	AUTO	Enumerated Value.

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Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
						Tissue = 0001H PW Spectral Doppler = 0003H
>Region Flags	0018,6016	UL	3	ANAP	AUTO	Always set to 3.
>Region Location Min x0	0018,6018	UL	-	ANAP	AUTO	Top Left position of region.
>Region Location Min y0	0018,601A	UL	-	ANAP	AUTO	Top Left position of region
>Region Location Max X1	0018,601C	UL	-	ANAP	AUTO	Bottom Right position of region
>Region Location Max Y1	0018,601E	UL	-	ANAP	AUTO	Bottom Right position of region
>Reference Pixel X0	0018,6020	SL	-	ANAP	AUTO	The X pixel value of baseline
>Reference Pixel y0	0018,6022	SL	-	ANAP	AUTO	The Y pixel value of baseline
>Physical Units X Direction	0018,6024	US	-	ANAP	AUTO	Enumerated Value. 2D Image = 0003H = CM MMode/Doppler = 0004H = SEC
>Physical Units Y Direction	0018,6026	US	-	ANAP	AUTO	Enumerated Value. ECG Region = 0000H = None 2D Image = 0003H = CM MMode = 0003H = CM Doppler = 0007H = CM / SEC
>Reference Pixel Physical Value X	0018,6028	FD	-	ANAP	AUTO	For each region, the X coordinate of the reference point for measurements within that region.
> Reference Pixel Physical Value Y	0018,602A	FD	-	ANAP	AUTO	For each region, the Y coordinate of the reference point for measurements within that region.
>Physical Delta X	0018,602C	FD	-	ANAP	AUTO	The physical value per pixel increment
>Physical Delta Y	0018,602E	FD	-	ANAP	AUTO	The physical value per pixel increment

Table 51: US Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Image Type	0008,0008	CS	-	ALWAYS	CONFIG	Value is DERIVED\PRIMARY for lossy, and ORIGINAL\PRIMARY for lossless
Acquisition DateTime	0008,002A	DT	-	ALWAYS	AUTO	The date and time that the acquisition of data that resulted in this image started.
Transducer Data	0018,5010	LO	-	ALWAYS	AUTO	Transducer name. VM = 3, the last two fields are written as "UNUSED".
Processing Function	0018,5020	LO	-	ALWAYS	AUTO	The factory-defined exam/preset that was active when the image was

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Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
						acquired even if a user-defined preset.
Transducer Type	0018,6031	CS	-	ANAP	AUTO	SECTOR_PHASED, LINEAR, CURVED LINEAR Only used for 2D images; not used for Doppler-only images (i.e. pencil probes)
Samples Per Pixel	0028,0002	US	-	ALWAYS	AUTO	3 for RGB 3 for YBR_FULL_422
Photometric Interpretation	0028,0004	CS	-	ALWAYS	CONFIG	RGB YBR_FULL_422
Bits Allocated	0028,0100	US	8 bits	ALWAYS	AUTO	-
Bits Stored	0028,0101	US	-	ALWAYS	AUTO	Always the same numbers as Bits Allocated
High Bit	0028,0102	US	-	ALWAYS	AUTO	The High Bit is always (Bits Allocated -1).
Pixel Representation	0028,0103	US	-	ALWAYS	AUTO	"0" Pixels are Unsigned integers
Lossy Image Compression	0028,2110	CS	-	ALWAYS	AUTO	"01" if image is lossy compressed, "00" if not.
Planar Configuration	0028,0006	US	0	ANAP	AUTO	-
Frame Increment Pointer	0028,0009	AT	-	ANAP	AUTO	(0018,1065) (Frame Time Vector).
Ultrasound Color Data Present	0028,0014	US	0 or 1	ALWAYS	AUTO	-

Table 52: SOP Common Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Specific Character Set	0008,0005	CS	ISO_IR 100	ALWAYS	AUTO	-
SOP Class UID	0008,0016	UI	1.2.840.10008.5.1.4.1.1.6.1	ALWAYS	AUTO	-
SOP Instance UID	0008,0018	UI	-	ALWAYS	AUTO	Auto Generated
Instance Number	0020,0013	IS	-	ANAP	AUTO	-

8.1.1.1.2 Ultrasound Multi-Frame Image Storage SOP Class

Table 53: IOD of Created Ultrasound Multi-Frame Image Storage SOP Class Instances

Information Entity	Module	Presence
Patient	Patient Module	ALWAYS
Study	General Study Module	ALWAYS
	Patient Study Module	ALWAYS
Series	General Series Module	ALWAYS
Equipment	General Equipment Module	ALWAYS
Acquisition	General Acquisition Module	ALWAYS
Image	General Image Module	ALWAYS
	Image Pixel Module	ALWAYS
	Cine Module	ALWAYS
	Multi-frame Module	ALWAYS

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Information Entity	Module	Presence
	US Region Calibration Module	CONDITIONAL
	US Image Module	ALWAYS
	SOP Common Module	ALWAYS

Note: The US Region Calibration module is not present in US Multiframe images where a calibration change occurs, i.e. the loop contained a depth or zoom change.

Table 54: Patient Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Patient's Name	0010,0010	PN	-	ALWAYS	AUTO, USER, MWL	Same attribute of MWL or PDE input
Patient ID	0010,0020	LO	-	ALWAYS	AUTO, USER, MWL	From MWL, user input or system generated.
Patient's Birth Date	0010,0030	DA	-	VNAP	USER, MWL	Same attribute of MWL or PDE input
Patient's Sex	0010,0040	CS	-	VNAP	USER, MWL	Same attribute of MWL
Other Patient Ids	0010,1000	LO	-	ANAP	MWL	Same attribute of MWL

Table 55: General Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Study Date	0008,0020	DA	-	ALWAYS	AUTO	Study's Start Date (0040,0244).
Study Time	0008,0030	TM	-	ALWAYS	AUTO	Study's Start Time (0040,0245).
Accession Number	0008,0050	SH	-	VNAP	USER, MWL	Same attribute of MWL or user PDE input.
Referring Physician's Name	0008,0090	PN	-	VNAP	USER, MWL	User Input from Patient ID screen. From MWL, sent as "Last, Prefix First Middle Suffix" in the Last name field.
Study Instance UID	0020,000D	UI	-	ALWAYS	AUTO, MWL	Same value as in MWL or auto generated
Study ID	0020,0010	SH	-	ALWAYS	AUTO	MWL Requested Procedure ID (0040,1000) or Auto-generated starting at 1
Study Description	0008,1030	LO	-	ANAP	USER, MWL	'Study Description' in PDE or,can be obtained from the MWL Server. The string used will be the first non-empty string from the following list: Requested Procedure description tag (0032,1060), Scheduled Procedure Step description tag (0040,0007) Scheduled Procedure Step, "Code Meaning" tag (0008,0104)

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Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
						Reason for the requested procedure tag (0040,1002) Reason for imaging service request tag (0040,2001)
Physician(s) of Record	0008,1048	PN	-	VNAP	MWL, USER	Mapped from Names of Intended Recipients of Results (0040,1010) from MWL or user PDE input.
Referenced Study Sequence	0008,1110	SQ	-	ANAP	MWL	One item per item in the MWL Referenced Study Sequence
>Referenced SOP Class UID	0008,1150	UI	-	ALWAYS	AUTO	Same value as in of the Referenced Study Sequence in the MWL
>Referenced SOP Instance UID	0008,1155	UI	-	ALWAYS	AUTO	Same value as in of the Referenced Study Sequence in the MWL
Procedure Code Sequence	0008,1032	SQ	-	ANAP	MWL	MWL Requested Procedure Code Sequence (0032,1064) Absent if unscheduled.
>Code Value	0008,0100	SH	-	VNAP	MWL	Same value as MWL attribute
>Coding Scheme Designator	0008,0102	SH	-	VNAP	MWL	Same value as MWL attribute
>Coding Scheme Version	0008,0103	SH	-	VNAP	MWL	Same value as MWL attribute
>Code Meaning	0008,0104	LO	-	ALWAYS	MWL	Same value as MWL attribute

Table 56: Patient Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Patient's Size	0010,1020	DS	-	ANAP	MWL	Same value as MWL attribute.
Patient's Weight	0010,1030	DS	-	ANAP	MWL	Same value as MWL attribute.
Admitting Diagnosis Description	0008,1080	LO	-	ANAP	MWL	Same value as MWL attribute.
Additional Patient's History	0010,21B0	LT	-	ANAP	MWL	Same value as MWL attribute.
Medical Alerts	0010,2000	LO	-	ANAP	MWL	Same value as MWL attribute.
Pregnancy Status	0010,21C0	US	-	ANAP	MWL	Same value as MWL attribute.

*Note: Medical Alerts and Pregnancy Status attributes extend the standard US Image IOD.

Table 57: General Series Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Modality	0008,0060	CS	US	ALWAYS	AUTO	-
Performing Physicians' Name	0008,1050	PN	-	ANAP	USER, MWL	MWL Scheduled Performing Physician's Name (0040,0006) or PDE input, 'Performed by'.

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Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Operators' Name	0008,1070	PN	-	ANAP	USER, MWL	MWL Scheduled Performing Physician's Name (0040,0006) or PDE input, 'Performed by'.
Series Instance UID	0020,000E	UI	-	ALWAYS	AUTO	Auto generated.
Series Number	0020,0011	IS	-	ALWAYS	AUTO	A number unique within the Study
Series Date	0008,0021	DA	-	ALWAYS	AUTO	Date of first image in series.
Series Time	0008,0031	TM	-	ANAP	AUTO	-
Series Description	0008,103E	LO	-	ANAP	USER, MWL	User entry in the 'Study Description' field of the Patient ID screen. If the user does not enter a value, this tag is not sent.
Referenced Performed Procedure Step Sequence	0008,1111	SQ	-	ANAP	AUTO	-
>Referenced SOP Class UID	0008,1150	UI	-	ALWAYS	AUTO	-
>Referenced SOP Instance UID	0008,1155	UI	-	ALWAYS	AUTO	-
Protocol Name	0018,1030	LO	-	ANAP	AUTO	-
Request Attributes Sequence	0040,0275	SQ	-	ANAP	MWL	This sequence will be present only for scheduled study. In case of unscheduled study, this sequence will not be present.
>Requested Procedure Description	0032,1060	LO	-	ANAP	MWL	Value from MWL.
>Requested Procedure ID	0040,1001	SH	-	ANAP	AUTO, MWL	Value from MWL.
>Scheduled Procedure Step ID	0040,0009	SH	-	ANAP	AUTO, MWL	Auto-generated = Study ID or value from MWL. One item.
>Scheduled Procedure Step Description	0040,0007	LO	-	ANAP	MWL	Same value as MWL attribute.
>Scheduled Protocol Code Sequence	0040,0008	SQ	-	ANAP	MWL	Same value as MWL attribute.
>>Code Value	0008,0100	SH	-	ANAP	AUTO	-
>>Coding Scheme Designator	0008,0102	SH	-	ANAP	AUTO	-
>>Coding Scheme Version	0008,0103	SH	-	ANAP	AUTO	-
>>Code Meaning	0008,0104	LO	-	ALWAYS	AUTO	-
Performed Procedure Step ID	0040,0253	SH	-	ANAP	AUTO	Set as current date and time in the format yyyymmddhhmmss.
Performed Procedure Step Start Date	0040,0244	DA	-	ANAP	AUTO	Date on which the Performed Procedure Step started on close of Patient Data Entry Screen
Performed Procedure Step Start Time	0040,0245	TM	-	ANAP	AUTO	Time on which the Performed Procedure Step started on

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Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
						close of Patient Data Entry Screen
Performed Procedure Step Description	0040,0254	LO	-	ANAP	USER, MWL	Set with the value entered or selected in 'Study Description' field of Patient ID screen.
Performed Protocol Code Sequence	0040,0260	SQ	-	ANAP	MWL	Zero length, or mapped from MWL Scheduled Protocol Code Sq (0040,0008)
>Code Value	0008,0100	SH	-	ANAP	AUTO	-
>Coding Scheme Designator	0008,0102	SH	-	ANAP	AUTO	-
>Coding Scheme Version	0008,0103	SH	-	ANAP	AUTO	-
>Code Meaning	0008,0104	LO	-	ALWAYS	AUTO	-

Table 58: General Equipment Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Manufacturer	0008,0070	LO	Philips	ALWAYS	AUTO, FIXED	-
Station Name	0008,1010	SH	-	VNAP	CONFIG	The AE Title of Lumify system on which the image is acquired. The user can configure the AE Title of the system through 'Setup'.
Institution Name	0008,0080	LO	-	ANAP	CONFIG	-
Manufacturer's Model Name	0008,1090	LO	Lumify	ALWAYS	FIXED	-
Software Version(s)	0018,1020	LO	5.1	ALWAYS	AUTO	

Table 59: General Acquisition Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Acquisition Date	0008,0022	DA	-	ALWAYS	AUTO	The system uses the same value as the Content Date, tag (0008,0023).
Acquisition DateTime	0008,002A	DT	-	ALWAYS	AUTO	The system generates this as a combination of Acquisition Date and Acquisition Time. The format is yyyymmddhhmmss.ffffff
Acquisition Time	0008,0032	TM	-	ALWAYS	AUTO	The system uses the same value as the Content time, tag (0008,0033).

Table 60: General Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Content Date	0008,0023	DA	-	ALWAYS	AUTO	<yyyymmdd>
Content Time	0008,0033	TM	-	ALWAYS	AUTO	<hhmmss.ffffff>

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Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Patient Orientation	0020,0020	CS	-	VNAP	AUTO	The system sends the tag empty
Image Type	0008,0008	CS	-	ALWAYS	CONFIG	Value is DERIVED\PRIMARY for lossy, and ORIGINAL\PRIMARY for lossless
Instance Number	0020,0013	IS	-	ALWAYS	AUTO	Generated by device, increments from "1" in each series. Gaps in values may exist if images are deleted on the system prior to export.
Lossy Image Compression	0028,2110	CS	-	ALWAYS	AUTO	"01" if image is lossy compressed, "00" if not.
Lossy Image Compression Method	0028,2114	CS	-	ANAP	AUTO	-

Table 61: Image Pixel Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Rows	0028,0010	US	768	ALWAYS	CONFIG	-
Columns	0028,0011	US	1024	ALWAYS	CONFIG	-
Bits Allocated	0028,0100	US	8 bits	ALWAYS	AUTO	-
Bits Stored	0028,0101	US	-	ALWAYS	AUTO	Always the same numbers as Bits Allocated
High Bit	0028,0102	US	-	ALWAYS	AUTO	The High Bit is always (Bits Allocated -1).
Pixel Representation	0028,0103	US	-	ALWAYS	AUTO	"0" pixels are Unsigned integers
Pixel Data	7FE0,0010	OB	-	ANAP	AUTO	-
Samples per Pixel	0028,0002	US	-	ALWAY	CONFIG	3 for RGB 3 for YBR_FULL_422
Photometric Interpretation	0028,0004	CS	-	ALWAY	CONFIG	RGB YBR_FULL_422
Planar Configuration	0028,0006	US	0	ANAP	AUTO	-

Table 62: Cine Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Recommended Display Frame Rate	0008,2144	IS	-	ALWAYS	AUTO	Used for Multiframe
Cine Rate	0018,0040	IS	-	ALWAYS	AUTO	Used for Multiframe
Effective Duration	0018,0072	DS	-	ALWAYS	AUTO	Used for Multiframe
Frame Time Vector	0018,1065	DS	-	ALWAYS	AUTO	An array that contains the real time increments (in msec) between frames for a Multi-frame image. Present if Frame Increment Pointer (0028,0009) points to Frame Time Vector.

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Table 63: Multi-Frame Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Number of Frames	0028,0008	IS	-	ALWAYS	CONFIG	# of frames in object
Frame Increment Pointer	0028,0009	AT	-	ALWAYS	CONFIG	(0018,1065) (Frame Time Vector).

Table 64: US Region Calibration Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Sequence of Ultrasound Regions	0018,6011	SQ	-	ANAP	AUTO	A sequence is present for each region on the system display
>Region Spatial Format	0018,6012	US	-	ANAP	AUTO	Enumerated Value. 2D (tissue or flow) = 0001H MMode (tissue or flow) = 0002H Spectral (PW Doppler) = 0003H
>Region Data Type	0018,6014	US	-	ANAP	AUTO	Enumerated Value. Tissue = 0001H PW Spectral Doppler = 0003H
>Region Flags	0018,6016	UL	3	ANAP	AUTO	Always set to 3.
>Region Location Min x0	0018,6018	UL	-	ANAP	AUTO	Top Left position of region.
>Region Location Min y0	0018,601A	UL	-	ANAP	AUTO	Top Left position of region
>Region Location Max X1	0018,601C	UL	-	ANAP	AUTO	Bottom Right position of region
>Region Location Max Y1	0018,601E	UL	-	ANAP	AUTO	Bottom Right position of region
>Reference Pixel X0	0018,6020	SL	-	ANAP	AUTO	The X pixel value of baseline
>Reference Pixel y0	0018,6022	SL	-	ANAP	AUTO	The Y pixel value of baseline
>Physical Units X Direction	0018,6024	US	-	ANAP	AUTO	Enumerated Value. 2D Image = 0003H = CM MMode/Doppler = 0004H = SEC
>Physical Units Y Direction	0018,6026	US	-	ANAP	AUTO	Enumerated Value. ECG Region = 0000H = None 2D Image = 0003H = CM MMode = 0003H = CM Doppler = 0007H = CM / SEC
>Reference Pixel Physical Value X	0018,6028	FD	-	ANAP	AUTO	For each region, the X coordinate of the reference point for measurements within that region.
> Reference Pixel Physical Value Y	0018,602A	FD	-	ANAP	AUTO	For each region, the Y coordinate of the reference point for measurements within that region.
>Physical Delta X	0018,602C	FD	-	ANAP	AUTO	The physical value per pixel increment

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Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
>Physical Delta Y	0018,602E	FD	-	ANAP	AUTO	The physical value per pixel increment

Table 65: US Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Image Type	0008,0008	CS	-	ALWAYS	CONFIG	Value is DERIVED\PRIMARY for lossy, and ORIGINAL\PRIMARY for lossless
Acquisition DateTime	0008,002A	DT	-	ALWAYS	AUTO	The date and time that the acquisition of data that resulted in this image started.
Transducer Data	0018,5010	LO	-	ALWAYS	AUTO	Transducer name. VM = 3, the last two fields are written as "UNUSED".
Processing Function	0018,5020	LO	-	ALWAYS	AUTO	The factory-defined exam/preset that was active when the image was acquired even if a user-defined preset.
Transducer Type	0018,6031	CS	-	ANAP	AUTO	SECTOR_PHASED, LINEAR, CURVED LINEAR Only used for 2D images; not used for Doppler-only images (i.e. pencil probes)
Samples Per Pixel	0028,0002	US	-	ALWAYS	AUTO	3 for RGB 3 for YBR_FULL_422
Photometric Interpretation	0028,0004	CS	-	ALWAYS	CONFIG	RGB YBR_FULL_422
Bits Allocated	0028,0100	US	8 bits	ALWAYS	AUTO	-
Bits Stored	0028,0101	US	-	ALWAYS	AUTO	Always the same numbers as Bits Allocated
High Bit	0028,0102	US	-	ALWAYS	AUTO	The High Bit is always (Bits Allocated -1).
Pixel Representation	0028,0103	US	-	ALWAYS	AUTO	"0" Pixels are Unsigned integers
Lossy Image Compression	0028,2110	CS	-	ALWAYS	AUTO	"01" if image is lossy compressed, "00" if not.
Planar Configuration	0028,0006	US	0	ANAP	AUTO	-
Frame Increment Pointer	0028,0009	AT	-	ANAP	AUTO	(0018,1065) (Frame Time Vector).
Ultrasound Color Data Present	0028,0014	US	0 or 1	ALWAYS	AUTO	-

Table 66: SOP Common Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Specific Character Set	0008,0005	CS	ISO_IR 100	ALWAYS	AUTO	-

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Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
SOP Class UID	0008,0016	UI	1.2.840.10008.5.1.4.1.1.3.1	ALWAYS	AUTO	-
SOP Instance UID	0008,0018	UI	-	ALWAYS	AUTO	Auto Generated
Instance Number	0020,0013	IS	-	ANAP	AUTO	-

8.1.1.1.3 Secondary Capture Image Storage SOP Class

Table 67: IOD of Created Secondary Capture Image Storage SOP Class Instances

Information Entity	Module	Presence
Patient	Patient Module	ALWAYS
Study	General Study Module	ALWAYS
	Patient Study Module	ALWAYS
Series	General Series Module	ALWAYS
Equipment	General Equipment Module	ALWAYS
	SC Equipment Module	ALWAYS
Acquisition	General Acquisition Module	ALWAYS
Image	General Image Module	ALWAYS
	Image Pixel Module	ALWAYS
	SOP Common Module	ALWAYS

Table 68: Patient Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Patient's Name	0010,0010	PN	-	ALWAYS	AUTO, USER, MWL	Same attribute of MWL or PDE input
Patient ID	0010,0020	LO	-	ALWAYS	AUTO, USER, MWL	From MWL, user input or system generated.
Patient's Birth Date	0010,0030	DA	-	VNAP	USER, MWL	Same attribute of MWL or PDE input
Patient's Sex	0010,0040	CS	-	AVNAP	USER, MWL	Same attribute of MWL
Other Patient Ids	0010,1000	LO	-	ANAP	MWL	Same attribute of MWL

Table 69: General Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Study Date	0008,0020	DA	-	ALWAYS	AUTO	Study's Start Date (0040,0244).
Study Time	0008,0030	TM	-	ALWAYS	AUTO	Study's Start Time (0040,0245).
Accession Number	0008,0050	SH	-	VNAP	USER, MWL	Same attribute of MWL or user PDE input.
Referring Physician's Name	0008,0090	PN	-	VNAP	USER, MWL	User Input from Patient ID screen. From MWL, sent as "Last, Prefix First Middle Suffix" in the Last name field.
Study Instance UID	0020,000D	UI	-	ALWAYS	AUTO, MWL	Same value as in MWL or auto generated

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Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Study ID	0020,0010	SH	-	ALWAYS	AUTO	MWL Requested Procedure ID (0040,1000) or Auto-generated starting at 1
Study Description	0008,1030	LO	-	ANAP	USER, MWL	'Study Description' in PDE or, can be obtained from the MWL Server. The string used will be the first non-empty string from the following list: Requested Procedure description tag (0032,1060), Scheduled Procedure Step description tag (0040,0007) Scheduled Procedure Step, "Code Meaning" tag (0008,0104) Reason for the requested procedure tag (0040,1002) Reason for imaging service request tag (0040,2001)
Physician(s) of Record	0008,1048	PN	-	VNAP	MWL, USER	Mapped from Names of Intended Recipients of Results (0040,1010) from MWL or user PDE input.
Referenced Study Sequence	0008,1110	SQ	-	ANAP	MWL	One item per item in the MWL Referenced Study Sequence
>Referenced SOP Class UID	0008,1150	UI	-	ALWAYS	MAUTO	Same value as in of the Referenced Study Sequence in the MWL
>Referenced SOP Instance UID	0008,1155	UI	-	ALWAYS	MAUTO	Same value as in of the Referenced Study Sequence in the MWL
Procedure Code Sequence	0008,1032	SQ	-	ANAP	MWL	MWL Requested Procedure Code Sequence (0032,1064) Absent if unscheduled.
>Code Value	0008,0100	SH	-	VNAP	MWL	Same value as MWL attribute
>Coding Scheme Designator	0008,0102	SH	-	VNAP	MWL	Same value as MWL attribute
>Coding Scheme Version	0008,0103	SH	-	VNAP	MWL	Same value as MWL attribute
>Code Meaning	0008,0104	LO	-	ALWAYS	MWL	Same value as MWL attribute

Table 70: Patient Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Patient's Size	0010,1020	DS	-	ANAP	MWL	Same value as MWL attribute.
Patient's Weight	0010,1030	DS	-	ANAP	MWL	Same value as MWL attribute.
Admitting Diagnosis Description	0008,1080	LO	-	ANAP	MWL	Same value as MWL attribute.

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Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Additional Patient's History	0010,21B0	LT	-	ANAP	MWL	Same value as MWL attribute.
Medical Alerts	0010,2000	LO	-	ANAP	MWL	Same value as MWL attribute.
Pregnancy Status	0010,21C0	US	-	ANAP	MWL	Same value as MWL attribute.

Table 71: General Series Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Modality	0008,0060	CS	US	ALWAYS	AUTO	-
Performing Physicians' Name	0008,1050	PN	-	ANAP	USER, MWL	MWL Scheduled Performing Physician's Name (0040,0006) or PDE input, 'Performed by'.
Operators' Name	0008,1070	PN	-	ANAP	USER, MWL	MWL Scheduled Performing Physician's Name (0040,0006) or PDE input, 'Performed by'.
Series Instance UID	0020,000E	UI	-	ALWAYS	AUTO	Auto generated.
Series Number	0020,0011	IS	-	ALWAYS	AUTO	A number unique within the Study
Series Date	0008,0021	DA	-	ALWAYS	AUTO	Date of first image in series.
Series Time	0008,0031	TM	-	ANAP	AUTO	-
Series Description	0008,103E	LO	-	ANAP	USER, MWL	User entry in the 'Study Description' field of the Patient ID screen. If the user does not enter a value, this tag is not sent.
Referenced Performed Procedure Step Sequence	0008,1111	SQ	-	ANAP	AUTO	-
>Referenced SOP Class UID	0008,1150	UI	-	ALWAYS	AUTO	-
>Referenced SOP Instance UID	0008,1155	UI	-	ALWAYS	AUTO	-
Protocol Name	0018,1030	LO	-	ANAP	AUTO	-
Request Attributes Sequence	0040,0275	SQ	-	ANAP	MWL	This sequence will be present only for scheduled study. In case of unscheduled study, this sequence will not be present.
>Requested Procedure Description	0032,1060	LO	-	ANAP	MWL	Value from MWL.
>Requested Procedure ID	0040,1001	SH	-	ANAP	AUTO, MWL	Value from MWL.
>Scheduled Procedure Step ID	0040,0009	SH	-	ANAP	AUTO, MWL	Auto-generated = Study ID or value from MWL. One item.
>Scheduled Procedure Step Description	0040,0007	LO	-	ANAP	MWL	Same value as MWL attribute.
>Scheduled Protocol Code Sequence	0040,0008	SQ	-	ANAP	MWL	Same value as MWL attribute.
>>Code Value	0008,0100	SH	-	ANAP	AUTO	-

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Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
>>Coding Scheme Designator	0008,0102	SH	-	ANAP	AUTO	-
>>Coding Scheme Version	0008,0103	SH	-	ANAP	AUTO	-
>>Code Meaning	0008,0104	LO	-	ALWAYS	AUTO	-
Performed Procedure Step ID	0040,0253	SH	-	ANAP	AUTO	Set as current date and time in the format yyyymmddhhmmss.
Performed Procedure Step Start Date	0040,0244	DA	-	ANAP	AUTO	Date on which the Performed Procedure Step started on close of Patient Data Entry Screen
Performed Procedure Step Start Time	0040,0245	TM	-	ANAP	AUTO	Time on which the Performed Procedure Step started on close of Patient Data Entry Screen
Performed Procedure Step Description	0040,0254	LO	-	ANAP	USER, MWL	Set with the value entered or selected in 'Study Description' field of Patient ID screen.
Performed Protocol Code Sequence	0040,0260	SQ	-	ANAP	MWL	Zero length, or mapped from MWL Scheduled Protocol Code Sq (0040,0008)
>Code Value	0008,0100	SH	-	ANAP	AUTO	-
>Coding Scheme Designator	0008,0102	SH	-	ANAP	AUTO	-
>Coding Scheme Version	0008,0103	SH	-	ANAP	AUTO	-
>Code Meaning	0008,0104	LO	-	ALWAYS	AUTO	-

Table 72: General Equipment Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Manufacturer	0008,0070	LO	Philips	ALWAYS	AUTO, FIXED	-
Station Name	0008,1010	SH	-	VNAP	CONFIG	The AE Title of Lumify system on which the image is acquired. The user can configure the AE Title of the system through 'Setup'.
Institution Name	0008,0080	LO	-	ANAP	CONFIG	-
Manufacturer's Model Name	0008,1090	LO	Lumify	ALWAYS	FIXED	-
Software Version(s)	0018,1020	LO	5.1	ALWAYS	AUTO	

Table 73: SC Equipment Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Conversion Type	0008,0064	CS		ALWAYS	AUTO	SYN = Synthetic
Modality	0008,0060	CS	US	ALWAYS	AUTO	-

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Table 74: General Acquisition Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Acquisition Date	0008,0022	DA	-	ALWAYS	AUTO	The system uses the same value as the Content Date, tag (0008,0023).
Acquisition DateTime	0008,002A	DT	-	ALWAYS	AUTO	The system generates this as a combination of Acquisition Date and Acquisition Time. The format is yyyymmddhhmmss.ffffff
Acquisition Time	0008,0032	TM	-	ALWAYS	AUTO	The system uses the same value as the Content time, tag (0008,0033).

Table 75: General Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Content Date	0008,0023	DA	-	ALWAYS	AUTO	<yyyymmdd>
Content Time	0008,0033	TM	-	ALWAYS	AUTO	<hhmmss.ffffff>
Patient Orientation	0020,0020	CS	-	VNAP	AUTO	The system sends the tag empty
Image Type	0008,0008	CS	-	ALWAYS	CONFIG	Value is DERIVED\PRIMARY for lossy, and ORIGINAL\PRIMARY for lossless
Instance Number	0020,0013	IS	-	ALWAYS	AUTO	Generated by device, increments from "1" in each series. Gaps in values may exist if images are deleted on the system prior to export.
Lossy Image Compression	0028,2110	CS	-	ALWAYS	AUTO	"01" if image is lossy compressed, "00" if not.
Lossy Image Compression Ratio	0028,2112	DS		ANAP	AUTO	
Lossy Image Compression Method	0028,2114	CS		ANAP	AUTO	

Table 76: Image Pixel Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Rows	0028,0010	US	-	ALWAYS	CONFIG	OB Summary Report:768 B-Line:2560
Columns	0028,0011	US	1024	ALWAYS	CONFIG	OB Summary Report:1024 B-Line: 1440
Bits Allocated	0028,0100	US	8 bits	ALWAYS	AUTO	RGB Mode: 2D B&W,: 8 bits 2D Color: 8 bits YBR_FULL_422 Mode: 2D B&W: 8 bits 2D Color: 8 bits

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Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Bits Stored	0028,0101	US	-	ALWAYS	AUTO	Always the same numbers as Bits Allocated.
High Bit	0028,0102	US	-	ALWAYS	AUTO	The High Bit is always (Bits Allocated -1).
Pixel Representation	0028,0103	US	-	ALWAYS	AUTO	"0" pixels are Unsigned integers
Pixel Data	7FE0,0010	OB	-	ANAP	AUTO	-
Samples per Pixel	0028,0002	US	-	ALWAYS	CONFIG	3 for RGB 3 for YBR_FULL_422
Photometric Interpretation	0028,0004	CS	-	ALWAYS	CONFIG	RGB YBR_FULL_422
Planar Configuration	0028,0006	US	0	ANAP	AUTO	Zero (color-by-pixel)

Table 77: SOP Common Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Specific Character Set	0008,0005	CS	ISO_IR 100	ALWAYS	AUTO	-
SOP Class UID	0008,0016	UI	1.2.840.10008.5.1.4.1.1.7	ALWAYS	AUTO	-
SOP Instance UID	0008,0018	UI	-	ALWAYS	AUTO	Auto Generated
Instance Number	0020,0013	IS	-	ANAP	AUTO	-

8.1.2. Usage of Attributes from Received IOD

Not Applicable. Lumify System does not support image import.

8.1.3. Attribute Mapping

Table below summarizes the relationships between attributes received via MWL, stored in acquired images and communicated via MPPS. The format and conventions used in table below are the same as the corresponding table in DICOM Part 4, Annex M.6.

Table 78: Attribute Mapping Between Modality Worklist, Image and MPPS

Attribute Name	MWL Tag	MPPS Tag	Store Tag
Patient's Name	0010,0010	0010,0010	0010,0010
Patient ID	0010,0020	0010,0020	0010,0020
Patient's Birth Date	0010,0030	0010,0030	0010,0030
Patient's Sex	0010,0040	0010,0040	0010,0040
Patient's Weight	0010,1030	-	0010,1030
Referring Physician's Name	0008,0090	-	0008,0090
Scheduled Step Attributes Sequence	-	0040,0270	-
> Study Instance UID	0020,000D	0020,000D	0020,000D
> Referenced Study Sequence	0008,1110	0008,1110	0008,1110
>Accession Number	0008,0050	0008,0050	0008,0050
Request Attributes Sequence	-	-	0040,0275
>Requested Procedure ID	0040,1001	0040,1001	0040,1001
>Requested ProcedureDescription	0032,1060	0032,1060	0032,1060
>Scheduled Procedure Step ID	0040,0009	0040,0009	0040,0009
>Scheduled Procedure step Description	0040,0007	0040,0007	0040,0007
>Scheduled Protocol Code Sequence	0040,0008	0040,0008	0040,0008

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Attribute Name	MWL Tag	MPPS Tag	Store Tag
Performed Protocol Code Sequence	-	0040,0008	0040,0008
Study ID – Requested ProcedureID from MWL, else generated	-	0020,0010	0020,0010
Performed Procedure Step ID	-	0040,0253	0040,0253
Performed Procedure Step Start Date	-	0040,0244	0040,0244
Performed Procedure Step Start Time	-	0040,0245	0040,0245
Performed Procedure Step Description	-	0040,0254	0040,0254
Procedure Code Sequence	0032,1064	0008,1032	0008,1032
Referenced Performed Procedure Step Sequence	-	-	0008,1111
>Referenced SOP Class UID	-	0008,0016	0008,1150
>Referenced SOP Instance UID	-	0008,0018	0008,1155

8.1.4. Coerced/Modified fields

The contents of Requested Procedure Code Sequence (0032,1064) and Scheduled Protocol Code Sequence (0040,0008) supplied in Worklist Items will be mapped to Image IOD attributes as described in section 8.1.3.

8.2. Data Dictionary of Private Attributes

Not Applicable. Private attributes are not implemented by Lumify System.

8.3. Coded Terminology and Templates

Not Applicable. Coded Templates are not implemented by Lumify System.

8.3.1. Context Groups

Not Applicable. Context Groups are not implemented by Lumify System.

8.3.2. Template Specifications

Not Applicable. Templates are not implemented by Lumify System.

8.3.3. Private code definitions

Not Applicable. Private Code Definitions are not implemented by Lumify System.

8.4. Grayscale Image consistency

Not Applicable. Grayscale Images are not supported by Lumify System.

8.5. Standard Extended/Specialized/Private SOPs

Table 79: List of created SOP Classes

SOP Class Name	SOP Class UID
Ultrasound Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.6.1
Ultrasound Multiframe Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.3.1

8.5.1. Standard Extended/Specialized/Private SOP Instance

The Storage SOP classes are extended to create a standard extended SOP class by addition of standard and private attributes to the created SOP Instances.

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8.5.1.1. Ultrasound Image Storage SOP Class

Table 80: Addition of standard and private attributes for Ultrasound Image Storage SOP Class

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Imager Pixel Spacing	0018,1164	DS		ANAP	AUTO	Implemented only on Android Platform
Pixel Spacing	0028,0030	DS		ANAP	AUTO	Implemented only on Android Platform

8.5.1.1. Ultrasound Multiframe Image Storage SOP Class

Table 81: Addition of standard and private attributes for Ultrasound Multiframe Image Storage SOP Class

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Imager Pixel Spacing	0018,1164	DS		ANAP	AUTO	Implemented only on Android Platform
Pixel Spacing	0028,0030	DS		ANAP	AUTO	Implemented only on Android Platform

8.6. Private Transfer Syntaxes

Not applicable. Private Transfer Syntaxes are not implemented by Lumify System.

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