
DICOM Conformance Statement

Cirrus HD-OCT 4000 Instrument and Review Software

Version 4.5

and

Cirrus HD-OCT 400 Instrument Software

Version 4.6

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1 Conformance Statement Overview

This document is structured as suggested in the DICOM Standard (PS 3.2, 2008).

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Transfer		
Encapsulated PDF Storage	Yes	No
Workflow Management		
Modality Worklist IM - FIND	Yes	No

Cirrus HD-OCT does not support Media Interchange.

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3 Introduction

3.1 Revision History

Document Version	Author	Date
A	Alex Brandao	2008-03-26
B	Sonia Yu	2009-01-15
C	Paolo Pochendorfer	2009-07-28

3.2 Audience

This document is intended for hospital staff, health system integrators, software designers or implementers. The reader should have a basic understanding of DICOM.

3.3 Remarks

If another device matches this conformance statement based on the comparison with its own conformance statement, there is a chance, but no guarantee, that they interoperate. DICOM deals only with communication; it does not specify what is needed for certain applications to run on a device.

3.4 Definitions and Terms

Informal definitions are provided for the following terms used in this Conformance Statement.

The DICOM Standard is the authoritative source for formal definitions of these terms.

Abstract Syntax

the information agreed to be exchanged between applications, generally equivalent to a Service/Object Pair (SOP) Class.

Examples: Verification SOP Class, Modality Worklist Information Model Find SOP Class, and Computed Radiography Image Storage SOP Class.

Application Entity (AE)

an end point of a DICOM information exchange, including the DICOM network or media interface software; i.e., the software that sends or receives DICOM information objects or messages. A single device may have multiple Application Entities.

Application Entity Title

the externally known name of an Application Entity, used to identify a DICOM application to other DICOM applications on the network.

Application Context

the specification of the type of communication used between Application Entities.

Example: DICOM network protocol.

Association

A network communication channel set up between Application Entities.

Attribute

a unit of information in an object definition; a data element identified by a tag. The information may be a complex data structure (Sequence) composed of lower level data elements.

Examples: Patient ID (0010,0020), Accession Number (0008,0050), Photometric Interpretation (0028,0004) and Procedure Code Sequence (0008,1032).

Information Object Definition (IOD)

the specified set of Attributes that comprise a type of data object; does not represent a specific instance of the data object, but rather a class of similar data objects that have the same properties. The Attributes may be specified as Mandatory (Type 1), Required but possibly unknown (Type 2), or Optional (Type 3), and there may be conditions associated with the use of an Attribute (Types 1C and 2C).

Examples: MR Image IOD, CT Image IOD, Print Job IOD.

Joint Photographic Experts Group (JPEG)

a set of standardized image compression techniques, available for use by DICOM applications.

Media Application Profile

the specification of DICOM information objects and encoding exchanged on removable media (e.g., CDs)

Module

a set of Attributes within an Information Object Definition that are logically related to each other.
Example: Patient Module includes Patient Name, Patient ID, Patient Birth Date, and Patient Sex.

Negotiation

first phase of Association establishment that allows Application Entities to agree on the types of data to be exchanged and how that data will be encoded.

Presentation Context

the set of DICOM network services used over an Association, as negotiated between Application Entities; includes Abstract Syntaxes and Transfer Syntaxes.

Protocol Data Unit (PDU)

a packet (piece) of a DICOM message sent across the network. Devices must specify the maximum size packet they can receive for DICOM messages.

Query Key

an input value for a query process. Query Keys denote the set of DICOM tags that are sent from the SCU to SCP and thus control the query result.

Security Profile

a set of mechanisms, such as encryption, user authentication, or digital signatures, used by an Application Entity to ensure confidentiality, integrity, and/or availability of exchanged DICOM data

Service Class Provider (SCP)

role of an Application Entity that provides a DICOM network service; typically, a server that performs operations requested by another Application Entity (Service Class User).

Examples: Picture Archiving and Communication System (image storage SCP, and image query/retrieve SCP), Radiology Information System (modality worklist SCP).

Service Class User (SCU)

role of an Application Entity that uses a DICOM network service; typically, a client.

Examples: imaging modality (image storage SCU, and modality worklist SCU), imaging workstation (image query/retrieve SCU)

Service/Object Pair (SOP) Class

the specification of the network or media transfer (service) of a particular type of data (object); the fundamental unit of DICOM interoperability specification.

Examples: Ultrasound Image Storage Service, Basic Grayscale Print Management.

Service/Object Pair (SOP) Instance

an information object; a specific occurrence of information exchanged in a SOP Class.

Examples: a specific x-ray image.

Tag

a 32-bit identifier for a data element, represented as a pair of four digit hexadecimal numbers, the "group" and the "element". If the "group" number is odd, the tag is for a private (manufacturer-specific) data element.

Examples: (0010,0020) [Patient ID], (07FE,0010) [Pixel Data], (0019,0210) [private data element]

Transfer Syntax

the encoding used for exchange of DICOM information objects and messages.

Examples: JPEG compressed (images), little endian explicit value representation.

Unique Identifier (UID)

a globally unique "dotted decimal" string that identifies a specific object or a class of objects; an ISO-8824 Object Identifier.

Examples: Study Instance UID, SOP Class UID, SOP Instance UID.

Value Representation (VR)

the format type of an individual DICOM data element, such as text, an integer, a person's name, or a code. DICOM information objects can be transmitted with either explicit identification of the type of each data element (Explicit VR), or without explicit identification (Implicit VR); with Implicit VR, the receiving application must use a DICOM data dictionary to look up the format of each data element.

3.5 Abbreviations

Abbreviation	Definition
AE	Application Entity
AET	Application Entity Title

DICOM	Digital Imaging and Communications in Medicine
ILE	Implicit Little Endian
ELE	Explicit Little Endian
IOD	Information Object Definition
JPG-1	JPEG Coding Process 1 transfer syntax; JPEG Baseline; ISO 10918-1
J2K	JPEG 2000 Image Compression
J2K-LO	JPEG 2000 Image Compression (Lossless Only)
MWL	Modality Work List
MPG2	Motion Picture Expert Group 2; Abbreviation and synonym for video encoding and compression transfer syntax.
SCP	Service Class Provider
SCU	Service Class User
SOP	Service Object Pair, union of a specific DICOM service and related IOD.
TCP/IP	Transmission Control Protocol / Internet Protocol
UID	Unique Identifier
IM	Information Model

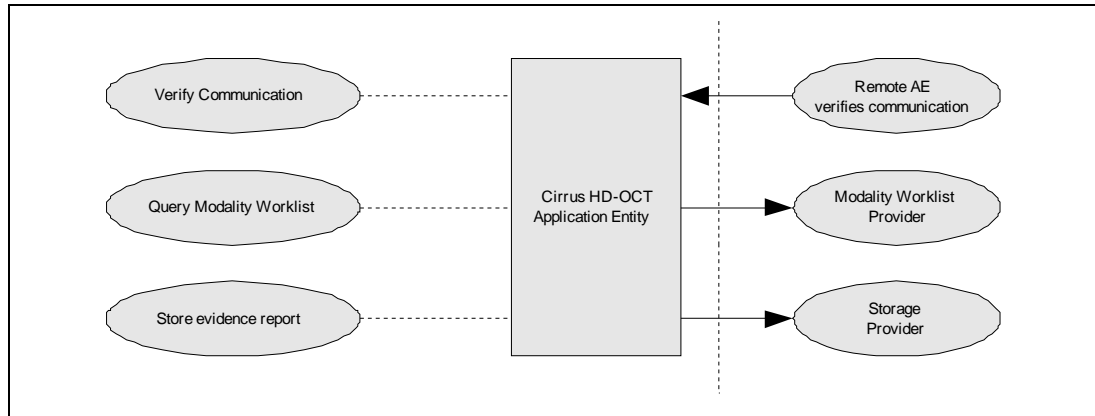
3.6 References

Digital Imaging and Communications in Medicine (DICOM), NEMA PS 3.1-3.18, 2008

4 Networking

4.1 Implementation Model

4.1.1 Application Data Flow



4.1.2 Functional Definition of AEs

4.1.2.1 Functional Definition of Cirrus HD-OCT AE

The Cirrus HD-OCT is an image acquisition modality and review application. The Cirrus HD-OCT employs spectral domain optical coherence tomography (OCT) to acquire 2-dimensional and 3-dimensional tomographic and biomicroscopic images of the posterior ocular structures of the eye.

The Cirrus HD-OCT software allows to:

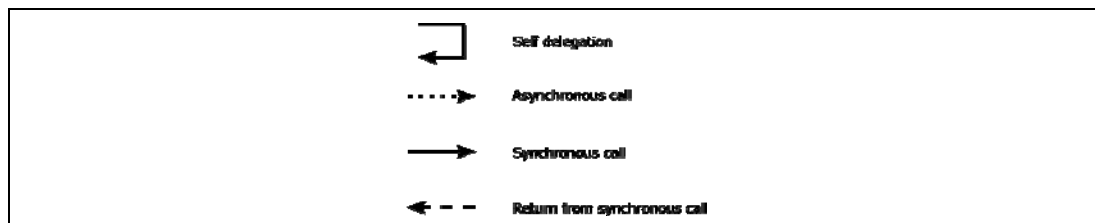
- Verify communication
- Query modality worklist
- Export evidence reports

Cirrus HD-OCT AE runs several DICOM Services, as Service Class User and as Service Class Provider for Verification. All DICOM related activities are manually triggered by the operator.

The Cirrus HD-OCT Software allows performing a verification of the configured AEs. The result of this verification contains information about the supported SOP Classes and Transfer Syntaxes.

4.1.3 Sequencing of Real-World Activities

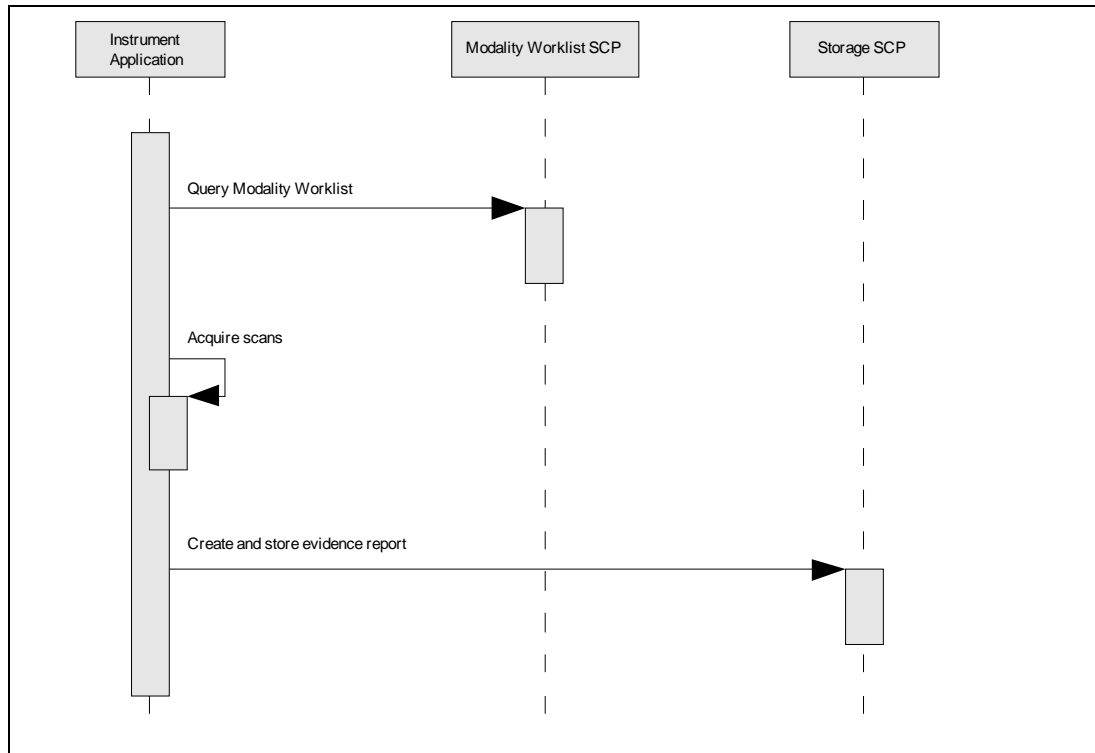
To realize the real world activities, the different entities work together. The sequence diagrams shall depict the intended workflow.



The diagrams uses slightly modified UML symbols. The asynchronous call is not depicted as suggested in UML. Some objects do have more than one dashed line. It symbolizes more than one thread.

4.1.3.1 Scheduled case

The normal case is that the patient arrived at the front desk so that the examination could be scheduled. Or the examination has been scheduled in advance, so that all patient and study related information is available the day the examination shall be taken.



All activities are initiated by the operator.

Query Modality Worklist

When the patient arrives at the Cirrus HD-OCT, then the operator queries the work list. He types in search criteria and gets matches back. Those matches are listed in a table, so the operator can select the correct entry. According to the transferred data Cirrus HD-OCT creates an entry in the local database (Patient, Study, Requested Procedure, Procedure Steps for the current day). Procedure Step related information is kept temporary in the Cirrus HD-OCT application.

The list of imported patients is displayed to the operator in the patient Browser. The operator can now select the patient for data acquisition.

Cirrus HD-OCT only supports one study per day per patient.

Acquire scans

The operator acquires data from patient’s eye using Cirrus HD-OCT.

Create and store evidence reports

The operator can trigger this activity by a click on a button.

4.1.3.2 Unscheduled case

In the unscheduled case the patient arrives immediately at the instrument, so that he or she was not registered and the examination could not be scheduled. This is also the case if the Modality Worklist SCP could not be reached.

4.2 AE Specifications

4.2.1 Cirrus HD-OCT Application Entity Specification

4.2.1.1 SOP Classes

SOP Class Name	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	Yes	Yes
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Yes	No
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Yes	No

4.2.1.2 Associations Policies

4.2.1.2.1 General

The DICOM standard Application Context Name for DICOM 3.0 is always proposed:

Application Context Name	1.2.840.10008.3.1.1.1
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4.2.1.2.2 Number of Associations

The number of simultaneous associations can be two. At a time there may be one outgoing association and one incoming association.

Maximum number of simultaneous associations	2
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4.2.1.2.3 Asynchronous Nature

Cirrus HD-OCT does not support asynchronous communication (multiple outstanding transactions over a single Association).

4.2.1.2.4 Implementation Identifying Information

Implementation Class UID	1.2.276.0.75.2.5.20
Implementation Version Name	NIM-1.0

4.2.1.3 Association Initiation Policy

4.2.1.3.1 Activity – Verify Communication

4.2.1.3.1.1 Description and Sequencing of Activities

This activity is available in the configuration phase. It facilitates the set up of the Instrument Software Application Entity.

A user can test the application level communication between peer DICOM entities. With one test all peer DICOM entities get contacted.

In the association request Cirrus HD-OCT proposes not only Verification SOP Class, but also all other SOP Classes supported by Cirrus HD-OCT.

The association gets established when the peer DICOM entity accepts the Verification related presentation context. In a sub-subsequent step a C-ECHO message is exchanged.

The results of the "Verify Communication" activity are shown to the user as success or failure. For example, a Storage Provider not only the Verification information is evaluated, but also the response regarding the proposed Storage SOP Classes.

Supported DICOM peers are:

- Modality Worklist Provider
- Storage Provider

4.2.1.3.1.2 Proposed Presentation Contexts

Following presentation contexts are offered for each initiated association. In fact the Instrument Application uses only

- "Verification" with Transfer Syntax ILE

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID 1.2.840.10008. ...	Name List	UID List 1.2.840.10008. ...		
Study Root Q/R IM - FIND	5.1.4.1.2.2.1	ILE	1.2	SCU	Yes
Study Root Q/R IM - MOVE	5.1.4.1.2.2.2	ILE	1.2	SCU	No
Verification	1.1	ILE	1.2	SCU	No
Storage Commitment Push Model	1.20.1	ILE	1.2	SCU	No
Encapsulated PDF Storage	5.1.4.1.1.104.1	ILE	1.2	SCU	No

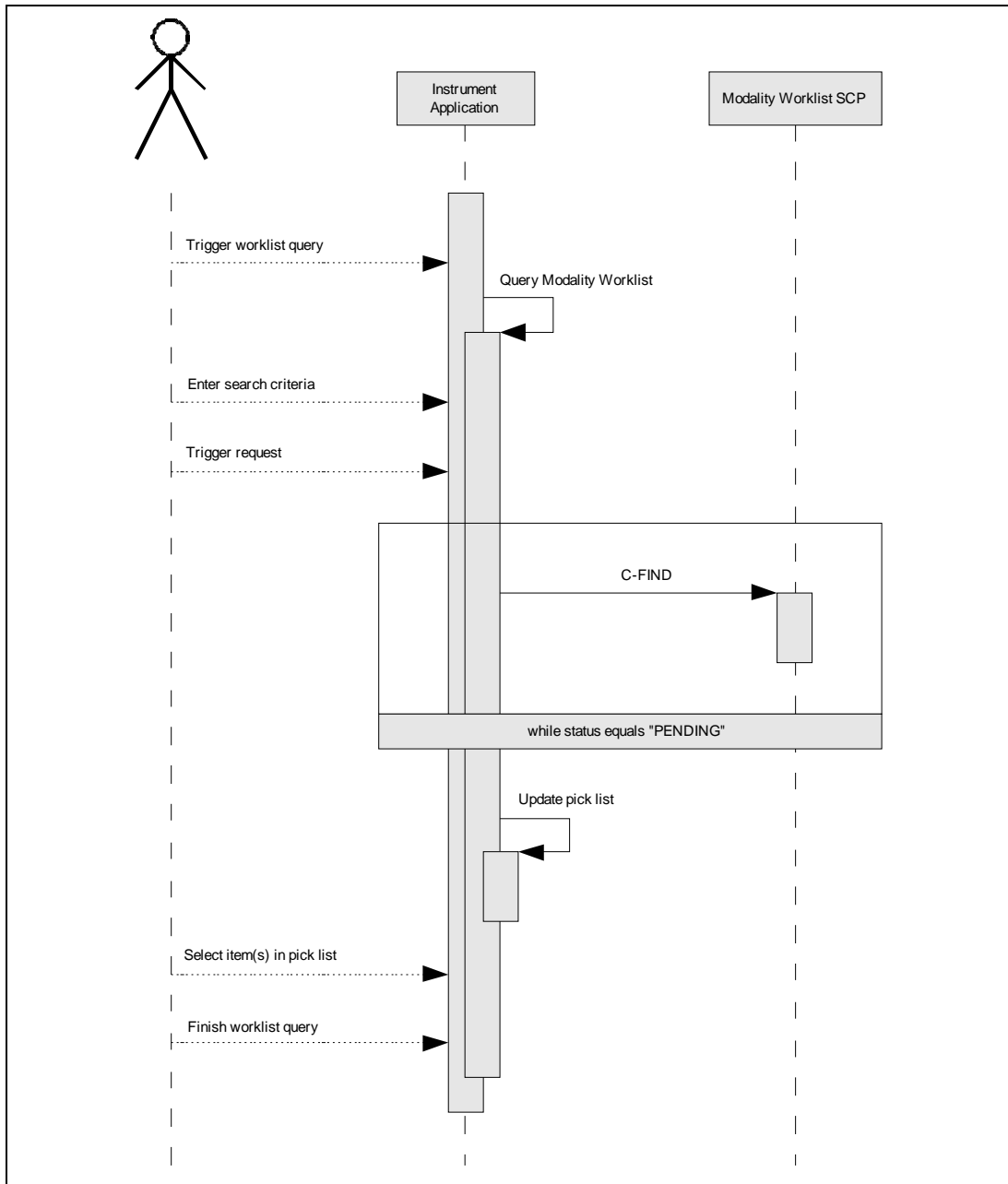
Raw Data Storage	5.1.4.1.1.66	ILE	1.2	SCU	No
OP 8 Bit Image Storage	5.1.4.1.1.77.1.5.1	JPG-1	1.2.4.50	SCU	No
		MPEG2	1.2.4.100	SCU	No
		J2K	1.2.4.91	SCU	No
		J2K-LO	1.2.4.90	SCU	No
OPT Image Storage	5.1.4.1.1.77.1.5.4	J2K	1.2.4.91	SCU	No
		J2K-LO	1.2.4.90	SCU	No
Modality Worklist IM - FIND	5.1.4.31	ILE	1.2	SCU	No

4.2.1.3.1.3 SOP Specific Conformance for Verification SOP Class

The Instrument Application AE provides standard conformance.

4.2.1.3.2 Activity – Query Modality Worklist

4.2.1.3.2.1 Description and Sequencing of Activities



The operator can trigger the “Query Modality Worklist” activity at any time. It is meaningful to perform the query when the patient arrives at the modality, then the work list usually contains latest information.

The operator has two options for the modality worklist query.

The first option is the non-interactive query. The query uses predefined query keys and imports all matching worklist items. The operator cannot select worklist items to be imported. Instead all matching items get imported. Please see 4.2.1.3.2.3 for the set of applied query keys.

The second option is the interactive query and offers a GUI. The GUI again offers two sets of query keys. One set belongs to the “Patient Based Query”; the other set belongs to the “Broad Query”. Please see below for more information.

The operator can change or fill in search criteria in the shown dialog. For instance, the incomplete patient name or the patient ID can be used. The operator triggers the search after he or she filled in search criteria. The Instrument Software sends a DICOM request, containing the search criteria. The Instrument Software waits for the response from the partner Application Entity. After receiving the response, the pick-list gets updated. The

pick-list shows directly the most important information for a quick overview (see 4.2.1.3.2.3 SOP Specific Conformance for Modality Worklist SOP Class for the supported set of tags).

The process can be performed more than one time and the operator may change query keys until he or she finds the adequate worklist item. The operator can select worklist items in the pick-list. Those are imported in the Instrument Software. The operator finally finishes the worklist query by confirming the selected worklist items.

The Instrument Software takes over the selected items. It prepares data according to the selected items. For patients who relate to existing data sets of the local database, the Instrument Software asks the operator to update or to keep the information. For patients who do not relate to existing data sets, the Instrument Software creates new data sets. The Instrument Software handles data on Study level adequately. Two studies for the same day and same patient cannot be imported. Only the first study is taken over. After that, the operator can start examination and acquire data for those Studies.

4.2.1.3.2.2 Proposed Presentation Contexts

Following presentation contexts are offered for each initiated association. In fact the Instrument Application sends

- "Modality Worklist IM - FIND" with Transfer Syntax ILE

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID 1.2.840.10008. ...	Name List	UID List 1.2.840.10008. ...		
Study Root Q/R IM - FIND	5.1.4.1.2.2.1	ILE	1.2	SCU	Yes
Study Root Q/R IM - MOVE	5.1.4.1.2.2.2	ILE	1.2	SCU	No
Verification	1.1	ILE	1.2	SCU	No
Storage Commitment Push Model	1.20.1	ILE	1.2	SCU	No
Encapsulated PDF Storage	5.1.4.1.1.104.1	ILE	1.2	SCU	No
		ELE	1.2.1	SCU	No
Raw Data Storage	5.1.4.1.1.66	ILE	1.2	SCU	No
OP 8 Bit Image Storage	5.1.4.1.1.77.1.5.1	JPG-1	1.2.4.50	SCU	No
		MPEG2	1.2.4.100	SCU	No
		J2K	1.2.4.91	SCU	No
		J2K-LO	1.2.4.90	SCU	No
OPT Image Storage	5.1.4.1.1.77.1.5.4	J2K	1.2.4.91	SCU	No
		J2K-LO	1.2.4.90	SCU	No
Modality Worklist IM - FIND	5.1.4.31	ILE	1.2	SCU	No

4.2.1.3.2.3 SOP Specific Conformance for Modality Worklist SOP Class

Service Status	Further Meaning	Error Code	Behavior
Success	Matching is complete	0000	The Instrument Application finishes receiving worklist items. It updates finally the pick list.
Pending	Matches are continuing	FF00, FF01	Cirrus HD-OCT puts received worklist items into the buffer of the pick-list.
*	*	Any other status code	The user gets an error message.

Non-interactive query

Tags	Tag Name	Description
(0040,0100)	Scheduled Procedure Step Sequence	
>(0040,0001)	Scheduled Station Application Entity Title	Uses the value as configured for the Application Entity.
>(0040,0002)	Scheduled Procedure Step Start Date	Uses today's date
>(0008,0060)	Modality	Uses always "OPT".

Interactive query

If the number of received items oversteps a configurable limit then the SCU closes the association and the operator gets a request to specify query keys more accurate.

Tags	Tag Name	Query Key	Imported	Displayed	Modifiable	IOD
Scheduled Procedure Step (SPS)						
(0040,0100)	Scheduled Procedure Step Sequence					
>(0040,0001)	Scheduled Station Application Entity Title	BRQ, DEF		PLD		
>(0040,0003)	Scheduled Procedure Step Start Time			PLD		
>(0040,0002)	Scheduled Procedure Step Start Date	BRQ, DEF		PL, PLD		
>(0008,0060)	Modality	BRQ, DEF		PLD		
>(0040,0006)	Scheduled Performing Physicians Name					
>(0040,0007)	Scheduled Procedure Step Description			PL, PLD		
>(0040,0010)	Scheduled Station Name					
>(0040,0011)	Scheduled Procedure Step Location					
>(0040,0008)	Scheduled Protocol Code Sequence					
>>	Code Value					
>>	Coding Scheme Designator					
>>	Coding Scheme Version					
>>	Code Meaning					
>(0040,0012)	Pre-Medication					
>(0040,0009)	Scheduled Procedure Step ID					
>(0032,1070)	Requested Contrast Agent					
Requested Procedure						
(0040,1001)	Requested Procedure ID	PBQ	X	PL, PLD		X
(0032,1060)	Requested Procedure Description		X	PLD		X
(0032,1064)	Requested Procedure Code Sequence					
>	Code Value					
>	Coding Scheme Designator					
>	Coding Scheme Version					
>	Code Meaning					
(0020,000D)	Study Instance UID		X			X
(0008,1110)	Referenced Study Sequence					
>(0008,1150)	Referenced SOP Class UID					
>(0008,1155)	Referenced SOP Instance UID					
(0040,1003)	Requested Procedure Priority					
(0040,1004)	Patient Transport Arrangements					
Imaging Service Request						
(0008,0050)	Accession Number	PBQ	X	PL, PLD		X

Tags	Tag Name	Query Key	Imported	Displayed	Modifiable	IOD
(0032,1032)	Requesting Physician					
(0008,0090)	Referring Physicians Name		X	PLD		X
Visit Identification						
(0038,0010)	Admission ID					
Visit Status						
(0038,0300)	Current Patient Location					
Visit Relationship						
(0008,1120)	Referenced Patient Sequence					
>(0008,1150)	Referenced SOP Class UID					
>(0008,1155)	Referenced SOP Instance UID					
Patient Identification						
(0010,0010)	Patients Name	PBQ	X	PL, PLD	X	X
(0010,0020)	Patients ID	PBQ	X	PL, PLD	X	X
(0010,0021)	Issuer of Patient ID		X			X
(0010,1000)	Other Patient IDs					
Patient Demographic						
(0010,0030)	Patients Birth Date		X	PLD	X	X
(0010,0040)	Patients Sex		X	PLD	X	X
(0010,1030)	Patients Weight					
(0040,3001)	Confidentiality Constraint on Patient Data Description					
(0010,4000)	Patients Comments					
Patient Medical						
(0038,0500)	Patient State					
(0010,21C0)	Pregnancy Status					
(0010,2000)	Medical Alerts					
(0038,0050)	Special Needs					

Values for column Query Key:

- PBQ – Patient Based Query**
 A tag that is marked with PBQ is used as query key in the Patient Based Query mode of the interactive Modality Worklist Query Dialog.
- BRQ – Broad Query**
 A tag that is marked with BRQ is used as query key in the Broad Query mode of the interactive Modality Worklist Query Dialog.
- DEF – Default Value**
 A tag that is marked with DEF has a value assigned when the interactive Modality Worklist Query Dialog is shown the first time or when the Reset button is pushed.
 Default values can get modified. Those modifications will be remembered until the Modality Worklist Query Dialog is shown again.
- X**
 The value gets imported in the application. Thus this value may have influence in Information Objects, which will be created as a result of the performed examination.

Values for column Displayed:

- PL – Pick-list**
 Values of this tag are instantly visible in the pick list.
- PLD – Pick-list details**
 Values of this tag are visible in the details dialog of the current selected pick list item.
- APP – Application**
 Values of this tag are visible in the application.

Values for column Modifiable:

- **X**
A value, which has been imported to the application, might be modified inside the application.
Important note: Don't change Patient Demographic information if not absolutely necessary! Patient Demographic information shall always be modified at the Patient Management System Level and changes propagated to the instrument.

Values for column IOD:

- **X**
Values of marked tags will be stored in created IODs. See also table "mapping of attributes" in 8.1.3 Attribute Mapping.

Following set of tags can be used as query key in the "Patient Based Query". The Patient Based Query is a working mode of the Modality Worklist Query Dialog.

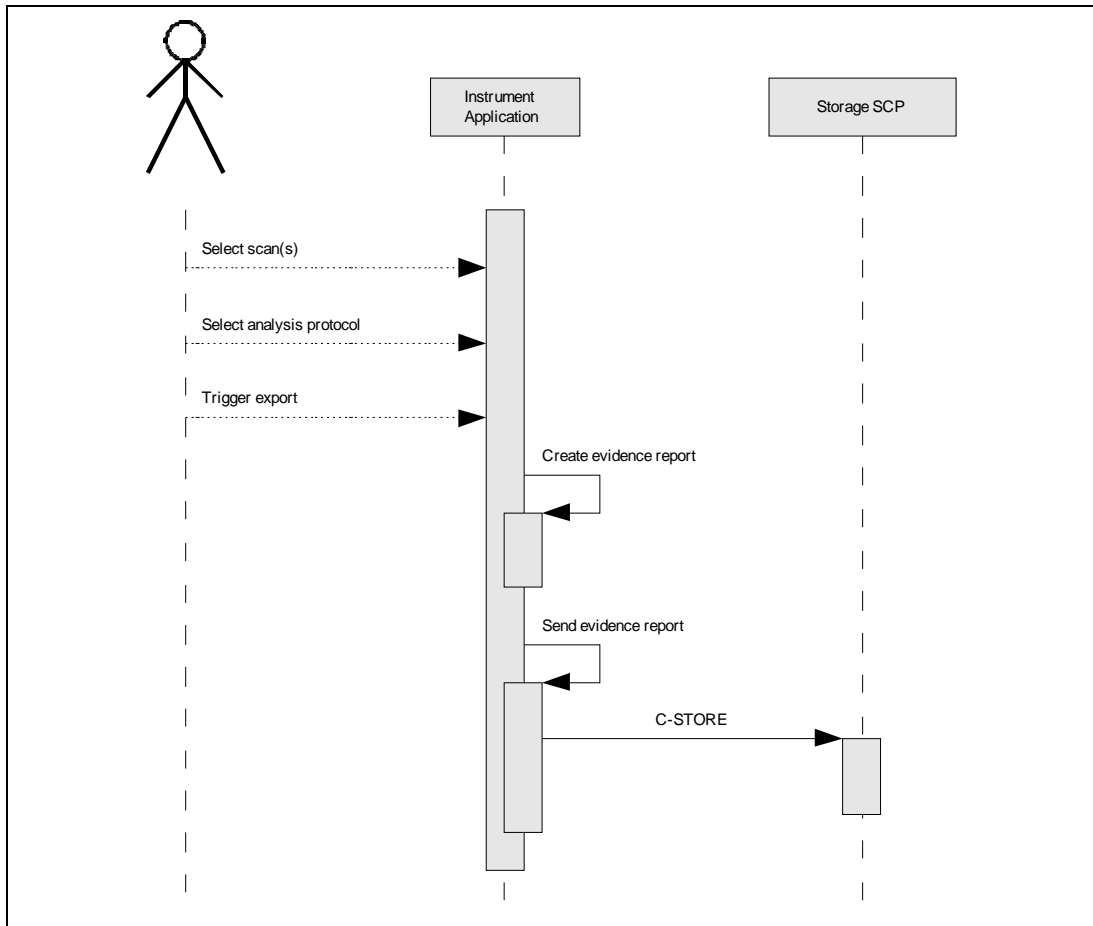
Tag	Tag Name	Description
(0010,0010)	Patients Name	The Cirrus HD-OCT supports family name and given name only as query key. The operator can use '*' or '?' as wild cards.
(0010,0020)	Patient ID	The operator can enter a string, which conforms, to the Value Representation LO.
(0008,0050)	Accession Number	The operator can enter a string which conforms to the Value Representation SH.
(0040,1001)	Requested Procedure ID	The operator can enter a string which conforms to the Value Representation SH.

Following set of tags can be used as query key in the "Broad Query". The Broad Query is a working mode of the Modality Worklist Query Dialog.

Tag	Tag Name	Description
(0040,0100)	Scheduled Procedure Step Sequence	This attribute is the container for the tags as listed below. The sequence contains one item.
>(0040,0002)	Scheduled Procedure Step Start Date	The default value is today's date. The operator can change the value and can even enter date ranges. It is also possible to search for all dates if the operator does not define a specific date range.
>(0008,0060)	Modality	The default value is "OPT". The operator can change the value and select one value of a predefined set of values including an empty string. Possible values are "OP", "OPM", "OPT", "OPV", "OT" and empty string
>(0040,0001)	Scheduled Station AE Title	The default value is derived from the configuration values. The operator can enter the AE Title of another device or leave the field empty.

4.2.1.3.3 Activity – Create and store evidence reports

4.2.1.3.3.1 Description and Sequencing of Activities



The operator can initiate sending evidence reports at any time. The Instrument Application sends created evidence reports then to the configured Storage SCP Application Entity.

The evidence reports gets created but not stored or archived on the instrument itself.

The created evidence report contains the information that was presented on screen when the operator triggered the export. The layout of the created report is portrait. Usually the evidence report contains one to three pages.

4.2.1.3.3.2 Proposed Presentation Contexts

Following presentation contexts are offered for each initiated association. In fact the Instrument Application sends

- Encapsulated PDF with Transfer Syntax ELE
- Encapsulated PDF with Transfer Syntax ILE as fallback

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID 1.2.840.10008. ...	Name List	UID List 1.2.840.10008. ...		
Study Root Q/R IM - FIND	5.1.4.1.2.2.1	ILE	1.2	SCU	Yes
Study Root Q/R IM - MOVE	5.1.4.1.2.2.2	ILE	1.2	SCU	No
Verification	1.1	ILE	1.2	SCU	No
Storage Commitment Push Model	1.20.1	ILE	1.2	SCU	No
Encapsulated PDF Storage	5.1.4.1.1.104.1	ILE	1.2	SCU	No

		ELE	1.2.1	SCU	No
Raw Data Storage	5.1.4.1.1.66	ILE	1.2	SCU	No
OP 8 Bit Image Storage	5.1.4.1.1.77.1.5.1	JPG-1	1.2.4.50	SCU	No
		MPEG2	1.2.4.100	SCU	No
		J2K	1.2.4.91	SCU	No
		J2K-LO	1.2.4.90	SCU	No
OPT Image Storage	5.1.4.1.1.77.1.5.4	J2K	1.2.4.91	SCU	No
		J2K-LO	1.2.4.90	SCU	No
Modality Worklist IM - FIND	5.1.4.31	ILE	1.2	SCU	No

4.2.1.3.3.3 SOP Specific Conformance for Encapsulated PDF Storage SOP Class as SCU

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	No special behaviour.
*	*	Any other status code	The operator gets an error message.

4.2.1.4 Association Acceptance Policy

4.2.1.4.1 Activity – Verify Communication

The activity can be performed at any time. The service is up as soon as the Instrument Software has been started.

4.2.1.4.1.1 Description and Sequencing of Activities

The Instrument Software AE responds to verification requests made by remote AEs.

4.2.1.4.1.2 Accepted Presentation Contexts

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID 1.2.840.10008. ...	Name List	UID List 1.2.840.10008. ...		
Verification	... 1.1	ILE	... 1.2	SCP	No

4.2.1.4.1.3 SOP Specific Conformance for SOP Class Verification

The Instrument Software AE provides standard conformance.

4.3 Network Interfaces

4.3.1 Physical Network Interface

The physical network interface is not visible for the instrument application. The instrument application uses the communication stack as offered by the Operating System.

4.3.2 Additional Protocols

No additional protocols are supported.

4.4 Configuration

Local application entity and remote application entity information can be configured with the Configuration Tool. It is also possible to configure timeout, institution, and worklist item limit parameters via instrument software, configuration tool, and configuration file.

4.4.1 AE Title/Presentation Address Mapping

The mapping from AE Title to TCP/IP addresses and ports is configurable and set at the time of installation by Installation Personnel.

4.4.1.1 Local AE Titles

The IP is not configurable by the Configuration Tool. The IP is administrated by the Operating System. The Application Entity Title as well as the port number is configurable. The default port number is 11112.

4.4.1.2 Remote AE Titles

The mapping of external AE Titles to TCP/IP addresses and ports is configurable. The Cirrus HD-OCT allows setting up a remote AE for each service (Modality Worklist, Storage). For all AE Titles, the host name or IP, the Port and the Application Entity Title must be known.

4.4.2 Parameters

4.4.2.1 General Parameters

The general parameters are shared for associations to any of the configured AE.

The socket timeout (Network Timeout) is configurable. Default is 10 seconds. It affects association opening and closing.

The service timeout (DIMSE RSP Timeout) is configurable. Default is 50 seconds. It defines for how long the Instrument AE waits for a service response from remote AE after it sent a service request.

4.4.2.2 Verification SCU Parameters

No specific configuration is required.

4.4.2.3 Modality Worklist SCU Parameters

There is a limit configurable for the number of matching Worklist Items (Maximum Query Responses). Default limit is set to 100 matching items.

4.4.2.4 Storage SCU Parameters

No specific configuration is required.

4.4.2.5 Verification SCP Parameters

No specific configuration is required. The configuration of port number and Application Entity Title are part of the Local Application Entity setup (see 4.4.1.1 Local AE Titles).

5 Media Interchange

Media Interchange is not scope of this document since it is not supported by Cirrus HD-OCT software.

6 Support Of Character Sets

Supported Specific Character Set	
Character Set Description	Defined Term
Unicode	ISO_IR 192

7 Security

The DICOM capabilities of the Cirrus HD-OCT Application do not support any specific security measures.

It is assumed that Cirrus HD-OCT Application is used within a secured environment. It is assumed that a secured environment includes at a minimum:

- Firewall or router protections to ensure that only approved external hosts have network access to Cirrus HD-OCT Application.
- Firewall or router protections to ensure that Cirrus HD-OCT Application only has network access to approved external hosts and services.
- Any communication with external hosts and services outside the locally secured environment use appropriate secure network channels (e.g. such as a Virtual Private Network (VPN))

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.

8 Annexes

8.1 IOD Contents

8.1.1 Created SOP Instance(s)

Abbreviations used for presence of values:

VNAP Value Not Always Present (attribute sent zero length if no value is present) – Applicable for Type 2, 2C.

ANAP Attribute Not Always Present – Applicable for Type 3

ALWAYS Always Present with a value – Applicable for Type 1

EMPTY Attribute is sent without a value – Applicable for Type 2

Abbreviations used for sources of data:

USER the attribute value source is from User input

AUTO the attribute value is generated automatically

MWL, MPPS, etc. the attribute value is the same as the value received using a DICOM service such as Modality Worklist, Modality Performed Procedure Step, etc.

CONFIG the attribute value source is a configurable parameter

8.1.1.1 Encapsulated PDF IOD

IE	Module	Usage
Patient		
	Patient	MANDATORY
	Specimen Identification	OPTIONAL – Never used
	Clinical Trial Subject	OPTIONAL – Never used
Study		
	General Study	MANDATORY
	Patient Study	OPTIONAL
	Clinical Trial Study	OPTIONAL – Never used
Series		
	Encapsulated Document Series	MANDATORY
	Clinical Trial Series	OPTIONAL – Never used
Equipment		
	General Equipment	MANDATORY
	SC Equipment	MANDATORY
Encapsulated Document		
	Encapsulated Document	MANDATORY
	SOP Common	MANDATORY

Patient				
Tag	Type	VR	Name	Description
(0010,0010)	2	PN	Patient's Name	Patient's full name. MWL and USER
(0010,0020)	2	LO	Patient ID	Primary hospital identification number or code for the patient. MWL and USER

(0010,0021)	3	LO	Issuer of Patient ID	Identifier of the Assigning Authority that issued the Patient ID. MWL and AUTO. AUTO only in unscheduled case.
(0010,0030)	2	DA	Patient's Birth Date	Birth date of the patient. MWL and USER
(0010,0040)	2	CS	Patient's Sex	Sex of the named patient. Enumerated Values: M = male F = female O = other MWL and USER
General Study				
Tag	Type	VR	Name	Description
(0020,000D)	1	UI	Study Instance UID	Unique identifier for the Study. MWL or AUTO depending on whether MWL has been queried. "1.2.826.0.1.3680043.2.139.3.6" as constant prefix in version 4.0 if the value has been generated by the application. "1.2.276.0.75.2.2.40" as constant prefix in version 4.5 if the value has been generated by the application. "1.2.276.0.75.2.2.41" as constant prefix in version 4.6 if the value has been generated by the application.
(0008,0020)	2	DA	Study Date	Date the Study started. AUTO
(0008,0030)	2	TM	Study Time	Time the Study started. AUTO
(0008,0090)	2	PN	Referring Physician's Name	Name of the patient's referring physician MWL or EMPTY
(0020,0010)	2	SH	Study ID	User or equipment generated Study identifier. AUTO
(0008,0050)	2	SH	Accession Number	A RIS generated number that identifies the order for the Study. MWL or EMPTY.
Encapsulated Document Series				
Tag	Type	VR	Name	Description
(0008,0060)	1	CS	Modality	The modality appropriate for the encapsulated document. This Type definition shall override the definition in the SC Equipment Module. See section C.7.3.1.1.1 for Defined Terms. Note: SR may be an appropriate value for an Encapsulated CDA document with a structured XML Body. "OPT" ALWAYS
(0020,000E)	1	UI	Series Instance UID	Unique identifier of the Series. "1.2.826.0.1.3680043.2.139.3.6" as constant prefix of the generated value in version 4.0. "1.2.276.0.75.2.2.40" as constant prefix of the generated value in version 4.5. "1.2.276.0.75.2.2.41" as constant prefix of the generated value in version 4.6.
(0020,0011)	1	IS	Series Number	A number that identifies the Series. AUTO
(0008,103E)	3	LO	Series Description	User provided description of the Series AUTO
(0040,0275)	3	SQ	Request Attributes Sequence	Sequence that contains attributes from the Imaging Service Request. The sequence may have one or more Items. VNAP – Sequence item(s) exist if the examination was a result of a queried Modality Worklist scheduled item. Sequence item(s) are empty in unscheduled case.
>(0040,1001)	1C	SH	Requested Procedure ID	Identifier that identifies the Requested Procedure in the Imaging Service Request. Required if procedure was scheduled. May be present otherwise. Note: The condition is to allow the contents of this macro to be present (e.g., to

				convey the reason for the procedure, such as whether a mammogram is for screening or diagnostic purposes) even when the procedure was not formally scheduled and a value for this identifier is unknown, rather than making up a dummy value. MWL – The user can't create or modify this value.
>(0032,1060)	3	LO	Requested Procedure Description	Institution-generated administrative description or classification of Requested Procedure. MWL – The user can't create or modify this value.
General Equipment				
Tag	Type	VR	Name	Description
(0008,0070)	2	LO	Manufacturer	Manufacturer of the equipment that produced the composite instances. "Carl Zeiss Meditec" ALWAYS
(0008,0080)	3	LO	Institution Name	Institution where the equipment that produced the composite instances is located. CONFIG
(0008,1010)	3	SH	Station Name	User defined name identifying the machine that produced the composite instances.
(0008,1090)	3	LO	Manufacturer's Model Name	Manufacturer's model name of the equipment that produced the composite instances. "CIRRUS HD-OCT 4000" for version 4.0 and 4.5 ALWAYS "CIRRUS HD-OCT 400" for version 4.6 ALWAYS
(0018,1000)	3	LO	Device Serial Number	Manufacturer's serial number of the equipment that produced the composite instances. Note: This identifier corresponds to the device that actually created the images, such as a CR plate reader or a CT console, and may not be sufficient to identify all of the equipment in the imaging chain, such as the generator or gantry or plate. AUTO
(0018,1020)	3	LO	Software Version(s)	Manufacturer's designation of software version of the equipment that produced the composite instances. "4.5.x" for version 4.5 ALWAYS "4.6.x" for version 4.6 ALWAYS
SC Equipment				
Tag	Type	VR	Name	Description
(0008,0064)	1	CS	Conversion Type	Describes the kind of image conversion. Defined Terms : DV = Digitized Video DI = Digital Interface DF = Digitized Film WSD = Workstation SD = Scanned Document SI = Scanned Image DRW = Drawing SYN = Synthetic Image "SYN" always
Encapsulated Document				
Tag	Type	VR	Name	Description
(0020,0013)	1	IS	Instance Number	A number that identifies this SOP Instance. The value shall be unique within a series. AUTO
(0008,0023)	2	DA	Content Date	The date the document content creation was started. AUTO
(0008,0033)	2	TM	Content Time	The time the document content creation was started. AUTO
(0008,002A)	2	DT	Acquisition Date time	The date and time that the original generation of the data in the document started. AUTO
(0028,0301)	1	CS	Burned In Annotation	Indicates whether or not the encapsulated document contains sufficient burned in annotation to identify the patient and date the data was acquired. Enumerated Values: YES NO Identification of

				patient and date as text in an encapsulated document (e.g., in an XML attribute or element) is equivalent to “burned in annotation”. A de-identified document may use the value NO. “YES” always because the generated evidence report contains always Patient Demographics.
(0042,0010)	2	ST	Document Title	The title of the document. Note: In the case of a PDF encapsulated document, this may be the value of the “Title” entry in the “Document Information Directory” as encoded in the PDF data. This attribute contains information about the Laterality and the Analysis Type.
(0040,A043)	2	SQ	Concept Name Code Sequence	A coded representation of the document title. Zero or one item may be present. EMPTY
(0042,0012)	1	LO	MIME Type of Encapsulated Document	The type of the encapsulated document stream described using the MIME Media Type (see RFC 2046). “application/pdf” always as a constant value.
(0042,0011)	1	OB	Encapsulated Document	Encapsulated Document stream, containing a document encoded according to the MIME Type.
SOP Common				
Tag	Type	VR	Name	Description
(0008,0016)	1	UI	SOP Class UID	Uniquely identifies the SOP Class. See C.12.1.1.1 for further explanation. See also PS 3.4. AUTO “1.2.840.10008.5.1.4.1.1.104.1” ALWAYS
(0008,0018)	1	UI	SOP Instance UID	Uniquely identifies the SOP Instance. See C.12.1.1.1 for further explanation. See also PS 3.4. AUTO “1.2.826.0.1.3680043.2.139.3.6” as constant prefix for generated UIDs in version 4.0 “1.2.276.0.75.2.2.40” as constant prefix for generated UIDs in version 4.5 “1.2.276.0.75.2.2.41” as constant prefix for generated UIDs in version 4.6
(0008,0005)	1C	CS	Specific Character Set	Character Set that expands or replaces the Basic Graphic Set. Required if an expanded or replacement character set is used. See C.12.1.1.2 for Defined Terms. “ISO_IR 192” ALWAYS; Unicode encoding

8.1.2 Usage Of Attributes From Received IODs

The usage of attributes of Modality Worklist IODs is described in chapter 4.2.1.3.2 Activity – Query Modality Worklist.

8.1.3 Attribute Mapping

The following attributes are mapped from Modality Worklist IOD to EPDF IOD.

Modality Worklist	Instance IOD
Study Instance UID	Study Instance UID
Accession Number	Accession Number
Requested Procedure ID	Request Attributes Sequence > Requested Procedure ID
Requested Procedure Description	Request Attributes Sequence > Requested Procedure Description
Issuer of Patient ID	Issuer of Patient ID

Referring Physicians Name	Referring Physicians Name
Patients Name	Patients Name
Patient ID	Patient ID
Patients Birth Date	Patients Birth Date
Patients Sex	Patients Sex ¹

8.1.4 Coerced/Modified Files

Those tags are listed in chapter 4.2.1.3.2 Activity – Query Modality Worklist. Other attributes get lost and are not available in the Cirrus HD-OCT Application.

8.2 Data Dictionary of Private Attributes

The Instrument Software AE does not define Private Attributes of interest.

8.3 Coded Terminology And Templates

The Instrument Software AE does not specify a custom coded terminology nor uses codes that are available via the Modality Worklist provider.

8.4 Greyscale Image Consistency

Not applicable.

8.5 Standard Extended / Specialized/ Private SOP Classes

Neither Specialized nor Private SOP Classes are supported.

8.6 Private Transfer Syntaxes

No Private Transfer Syntaxes are supported.

¹ An empty value for Patients Sex in a MWL item is changed to 'O' in resulting IOD instances