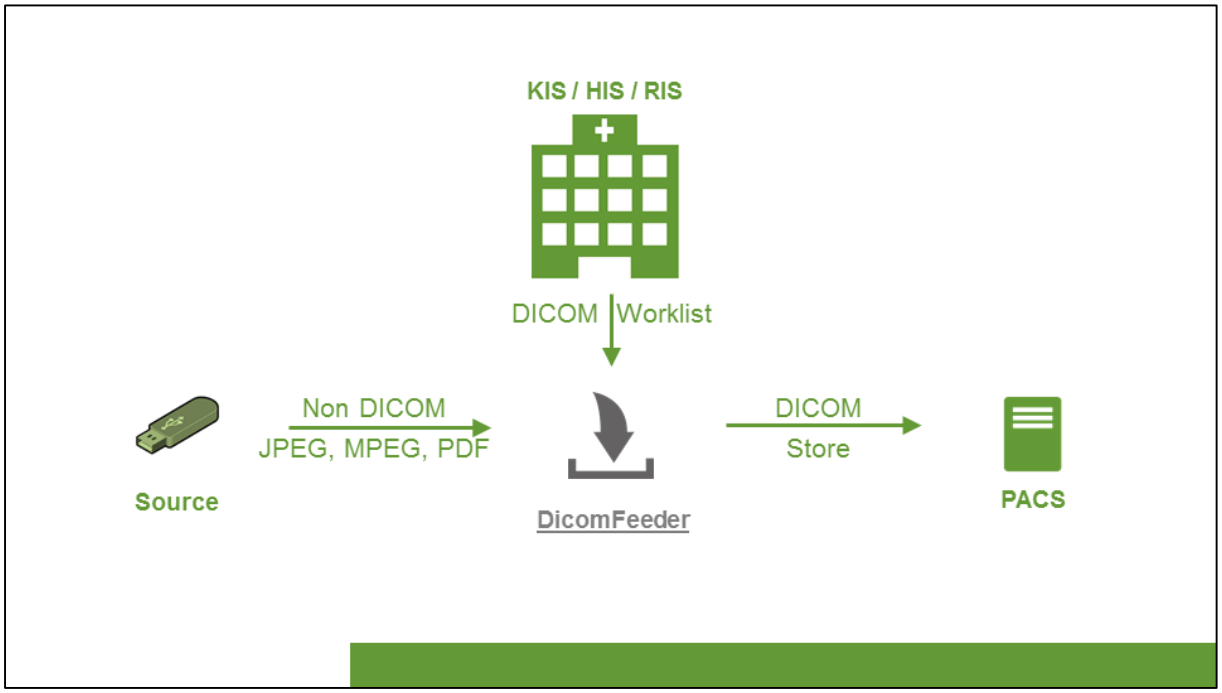
DICOM Conformance Statement

DicomFeeder

Release 4.5.1

20.01.2019

Status: approved



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1 Conformance Statement Overview

DicomFeeder is a software product running on Windows OS to collect Media Files from the local or network storage, convert them into a DICOM compliant format and store the converted instances to a PACS. It provides the following DICOM features:

- Query information systems (Department System Scheduler) for a Modality Worklist.
- Query PACS Systems for Studies.
- Save acquired images to Image Archive(s) (PACS).

Table 1 presents an overview of the DICOM network services supported by DicomFeeder.

Table 1: Network Services

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Transfer		
Secondary Capture Image Storage	Yes	No
Multi-frame True Color Secondary Capture Image Storage	Yes	No
Visible Light Endoscopic Image Storage	Yes	No
Video Endoscopic Image Storage	Yes	No
Visible Light Microscopic Image Storage	Yes	No
Video Microscopic Image Storage	Yes	No
Visible Light Photographic Image Storage	Yes	No
Video Photographic Image Storage	Yes	No
Ultrasound Image Storage	Yes	No
Ultrasound Multi-Frame Image Storage	Yes	No
Encapsulated PDF Storage	Yes	No
Workflow Management		
Modality Worklist Information Model – FIND	Yes	No
Study Root QR Information Model – FIND	Yes	No

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3 Introduction

3.1 Revision History

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

Version	Date	Autor	Chapter	Remarks
1	24.01.2017	Edgar Lenz	All	Initial version for DicomFeeder

3.2 Audience

This Conformance Statement is intended for:

- (potential) customers,
- marketing staff interested in system and data exchange functionality,
- support engineers and system integrators of medical equipment,
- software designers and implementers of DICOM interfaces.
- It is assumed that the reader is familiar with the DICOM standard.

3.3 Remarks

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

Interoperability

Integration of (networked) systems may require application functions that are not specified within the scope of DICOM.

It is the user's (or a user's agent) responsibility to analyze the application requirements and to specify a solution that integrates different vendor's equipment.

Validation

If the comparison of Conformance Statements indicate that the required information exchange should be possible, additional validation tests will be necessary.

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.

3.4 Contents and structure

The DICOM Conformance Statement is contained in chapter 2 through 7 and follows the contents and structuring requirements of DICOM PS 3.2-2013.

3.5 Used definitions and terms

For a description of these, see NEMA PS 3.3-2013 and PS 3.4-2013.

3.6 Abbreviations

The following acronyms and abbreviations are used in the document.

ACR	American College of Radiology
AE	Application Entity
ANSI	American National Standard Institute
AVI	Audio Video Interleaved
BMP	Bitmap
DICOM	Digital Imaging and Communication in Medicine
GDT	Gerätedatenträger-Schnittstelle
GUI	Graphical User Interface
HIS	Hospital Information System
IOD	Image Object Definition
JPEG	Joint Photographic Experts Group
MPEG	Moving Picture Experts Group
MWL	Modality Worklist Query/Retrieve
N.A.	Not applicable
NEMA	National Electric Manufacturers Association
OS	Operating System
PACS	Picture Archiving and Communication System
PDF	Portable Document Format
PDU	Protocol Data Unit
PNG	Portable Network Graphics
RIS	Radiology Information System
RWA	Real World Activity
SC	Secondary Capture/Service Class
SCP	Service Class Provider
SCU	Service Class User
SOP	Service Object Pair
TCP/IP	Transmission Control Protocol/Internet protocol
UID	Unique Identifier
VR	Value Representation
WMV	Windows Media Video

3.7 References

[DICOM] The Digital Imaging and Communications in Medicine (DICOM) standard:
NEMA PS 3.X.
National Electrical Manufacturers Association (NEMA) Publication Sales
1300 N. 17th Street, Suite 1847
Rosslyn, Va. 22209, United States of America

[DicomNet] DEKOM ENGINEERING DicomNet Systems Product Line

DEKOM ENGINEERING GmbH (see address at page ii)

4 Networking

4.1 Implementation Model

DicomFeeder is a Media to DICOM converter unit. It is part of the DicomNet product line of DEKOM ENGINEERING, which provides storage, exchange and viewing network functionality on Windows based systems.

The DicomFeeder DICOM connectivity feature is to gather Patient / Study data from Department System Scheduler(s) using DICOM MWL or from PACS System(s) using C-FIND operations, collect Media files from the local or network storage (e.g. JPG, BMP, PNG, AVI, WMV, PDF files) and store those Images to Image Archive(s) using DICOM C-STORE operation.

The above DICOM functionality is described in this document.

4.1.1 Application Data Flow

Three Application Entities (AE), Worklist AE, Query AE and Store AE can represent the DicomFeeder system.
The related implementation model for the AEs is shown in the next figure.

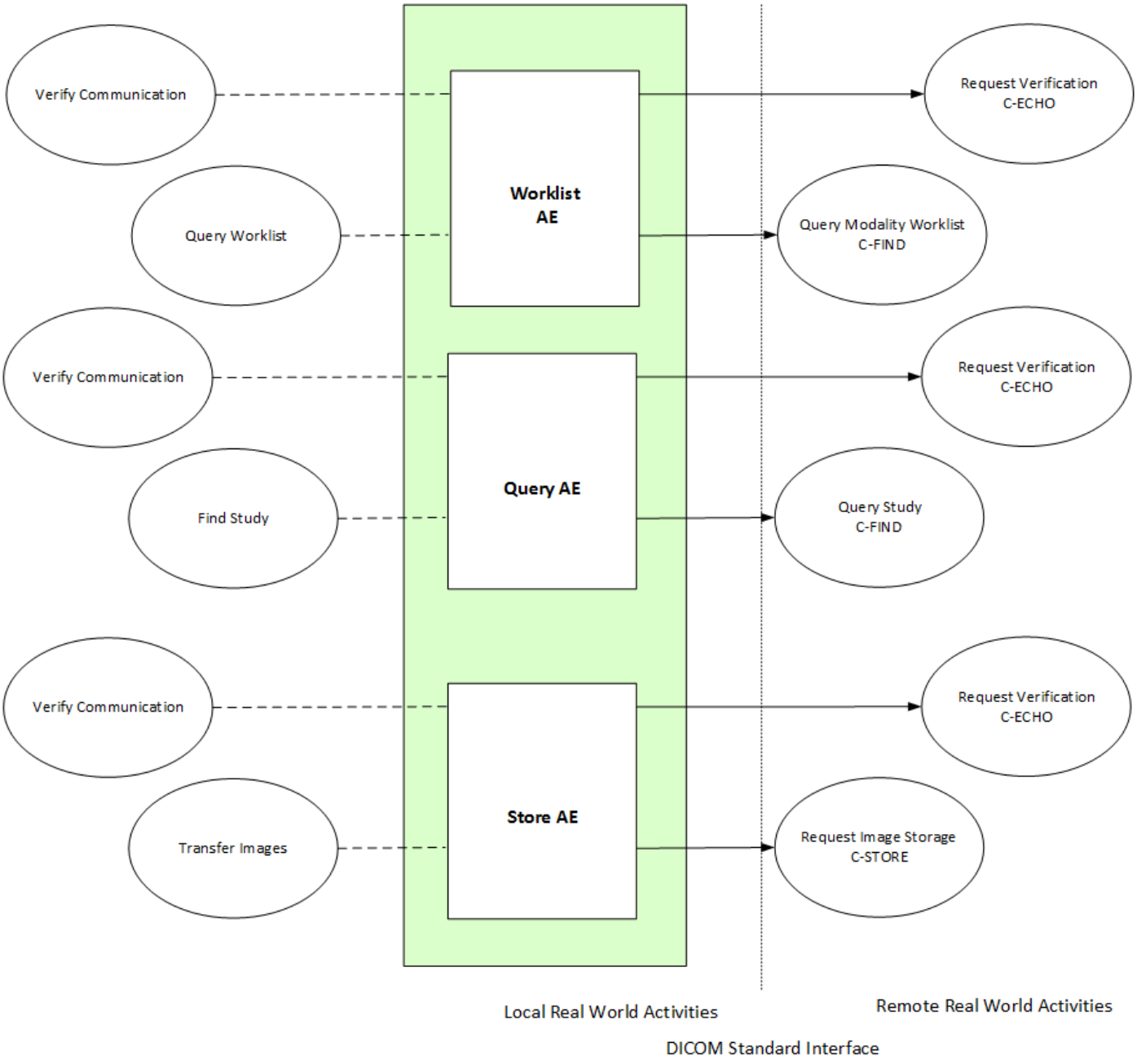


Figure 1:The DICOMFeeder Application Data Flow Diagram

4.1.2 Functional definition of Application Entities

This section describes in general terms the functions performed by Worklist AE, Query AE and Store AE.

4.1.2.1 Functional Definition of Worklist AE

4.1.2.1.1 Basic Worklist Management Service Class

The Worklist AE acts as a SCU of the Basic Worklist Management Service Class. The local RWA “Query Worklist” initiates a request for a list of scheduled examinations from the configured Department System Scheduler(s) and presents the result to the user by the GUI.

4.1.2.1.2 Verification Service Class

The Worklist AE can perform the Verification Service as SCU to the configured Department System Scheduler(s). This is triggered by the operator in the service mode.

4.1.2.2 Functional Definition of Query AE

4.1.2.2.1 Study Root QR Information Model Service Class

The Query AE acts as a SCU of the Study Root QR Information Model Service Class. The local RWA “Query Study” initiates a request for a list of studies from the configured PACS System(s) and presents the result to the user by the GUI.

4.1.2.2.2 Verification Service Class

The Query AE can perform the Verification Service as SCU to the configured PACS System(s). This is triggered by the operator in the service mode.

4.1.2.3 Functional Definition of Store AE

4.1.2.3.1 Storage Service Class

The Store AE acts as a SCU of the Storage Service Class. When the export is initiated through the local RWA “Transfer Images” the Store AE will open an association to the configured remote system and convert the collected media files to a DICOM message to be sent to the remote system. The local RWA “Transfer Images” is triggered by user interaction.

4.1.2.3.2 Verification Service Class

The Store AE can perform the Verification Service as SCU to the configured PACS system. This is triggered by the operator in the service mode.

4.1.3 Sequencing of Real World Activities

The following sequence of Real World Activities are supported by DicomFeeder.

- The user starts collecting media files from the computers local storage or network.
- Depending on the users' preference and System configuration (see 4.4) the user may now apply patient and study demographics using one of the following methods, the attribute mapping is described in chapter 8.1.3:
  - Using the RWA Query Worklist the Worklist AE queries the Department System Scheduler for the Modality Worklist which is presented in the GUI. By selecting an entry, the Worklist data will be used to create the DICOM instances.
  - Using the RWA Find Study the Query AE will query the PACS for related studies. The query result is presented by the GUI. By selecting an entry, the retrieved study data will be used to create the DICOM instances.
  - Using the (non DICOM) RWA Select from non DICOM a list of patient-study-data is presented in the GUI which originated from non DICOM sources (e.g. GDT, HL7, data base views or other proprietary sources). By selecting an entry, the retrieved study data will be used to create the DICOM instances.
  - Enter patient and study demographics manually using the GUI.
- When patient- study-data is selected, the user can make use of the RWA Transfer Images, as a result the selected media files are converted to DICOM IODs and the Store AE is triggered to send the C-STORE-RQ messages containing the image information to one of the configured image archives.

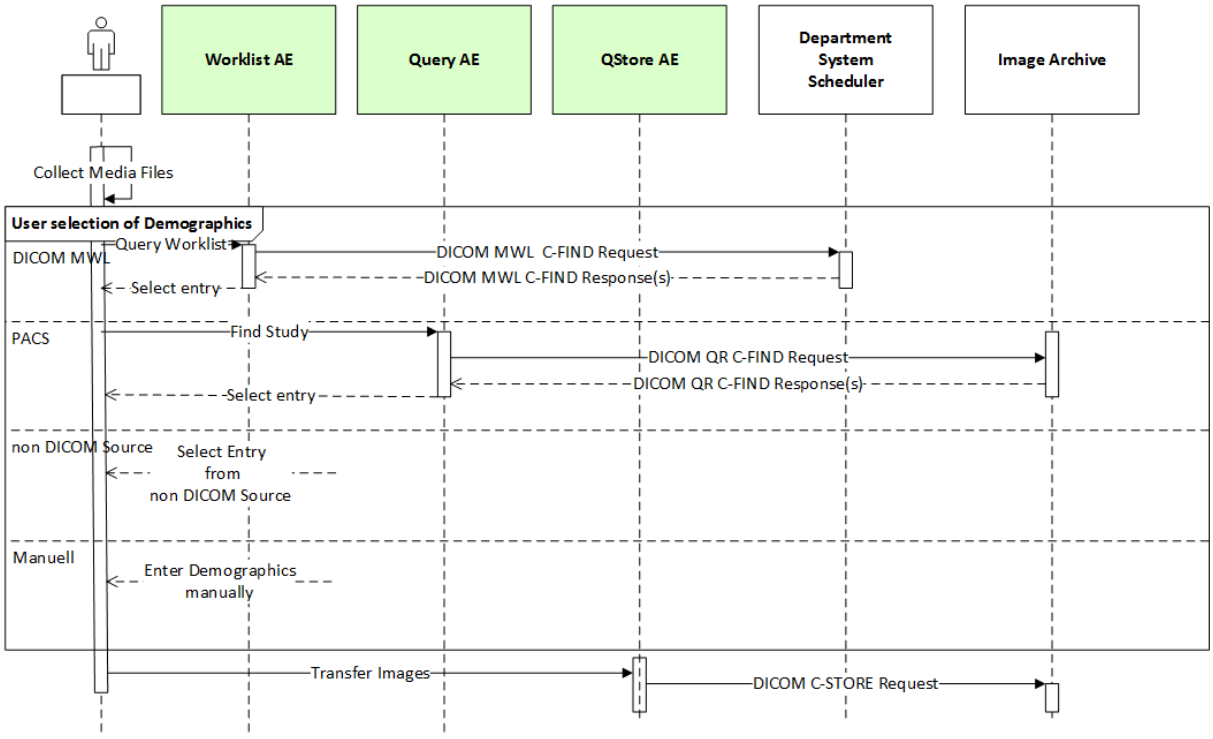


Figure 2:The DicomFeeder Sequence of Real World Activities

4.2 AE Specifications

4.2.1 Worklist AE

4.2.1.1 SOP Classes

The DicomFeeder Worklist AE provides Standard Conformance to the following DICOM V 3.0 SOP classes as an SCU.

Table 2: Supported SOP Classes for Worklist AE

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

The DicomFeeder Worklist AE does not support DICOM V 3.0 SOP Classes as an SCP.

4.2.1.2 Association Policies

4.2.1.2.1 General

The DICOM standard application context name for DICOM 2.0 is always proposed as presented in

Table 3. The PDU size is configurable from a minimum of 4096 bytes.

Table 3: DICOM Application Context

Application Context Name	1.2.840.10008.3.1.1.1

4.2.1.2.2 Number of Associations

Worklist AE will establish a maximum of two associations at a time. Based on local activities, one association may perform Application Level Communication Verification, another association may be used C-FIND operations.

Table 4: Number of Associations as an Association Initiator for Worklist AE

Maximum number of simultaneous associations	2

Worklist AE will not handle incoming associations.

Table 5: Number of Associations as an Association Acceptor for Worklist AE

Maximum number of simultaneous associations	N.A.

4.2.1.2.3 Asynchronous Nature

Worklist AE does not support asynchronous operations and will not perform asynchronous window negotiation.

Table 6: Asynchronous Nature as an Association Initiator for Worklist AE

Maximum number of outstanding asynchronous transactions	N.A.

4.2.1.2.4 Implementation Identifying Information

The implementation information for Worklist AE is:

Table 7: DICOM Implementation Class and Version for Worklist AE

Implementation Class UID	2.16.840.1.113669.632.16
Implementation Version Name	QDICNET_3X *

* X identifies the version number of the DICOM module.

4.2.1.3 Association Initiation Policy

The Worklist AE initiates associations as a result of the following events:

- The user requests a worklist manually (see 4.2.1.3.1).
- In the service mode, the operator verifies application level communication (see 4.2.1.3.2).

4.2.1.3.1 Query Worklist

4.2.1.3.1.1 Description and Sequencing of Activities

For each Broad Worklist Request, the Worklist AE opens an association to the Basic Worklist SCP and sends a C-FIND request. After retrieval of all responses the association is closed. The GUI is populated with the returned worklist items and presented to the user.

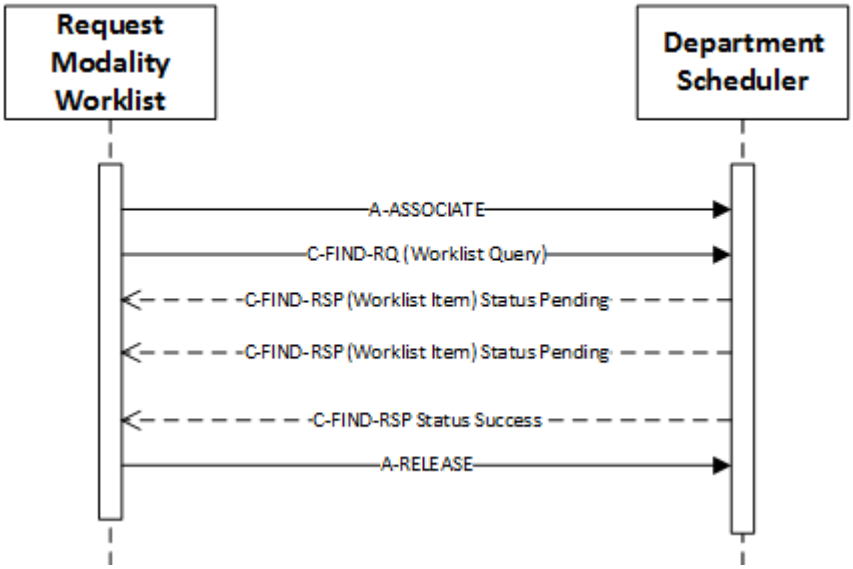


Figure 3:Sequencing of RWA Query Worklist

4.2.1.3.1.2 Proposed Presentation Contexts

The presentation context proposed by Worklist AE Update Worklist is defined in Table 8.
The implementation will choose ELE transfer syntax in the case multiple transfer syntaxes are accepted by the SCP.

Table 8: Proposed Presentation Contexts for Worklist AE Update Worklist

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	ILE ELE	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None

4.2.1.3.1.3 SOP Specific Conformance for Update Worklist

Note:
Worklist attributes, their usage as search key, their display in the GUI and mapping to IOD values is highly configurable. The following tables reflects the default settings after installation.

DicomFeeder's Query Worklist supports Broad Worklist Queries with all required search keys.
Table 9 describes the supported search keys. The Broad Worklist Query shall return all scheduled procedure steps for the own modality or modality AE.

Table 9: Search Key Attributes for Worklist AE Update Worklist

Module Name Attribute Name	Tag	VR	M	Query Value
Scheduled Procedure Step Schedule Procedure Step Sequence	0040,0100	SQ		
>Scheduled Station AE Title	0040,0001	AE	S / W	Configurable, local AET or "*"
>Scheduled Procedure Step Start Date	0040,0002	DA	S / R	Actual Date or Date Range based on the Configuration
>Scheduled Station Name	0040,0010	SH	S / W	Configurable, Station Name or "*"
>Modality	0008,0060	CS	S	Modality

The above table should be read as follows:
Tag: DICOM tag for this attribute.
VR: DICOM VR for this attribute.
M: Matching keys for worklist update, a "S" indicates Single Value Matching, a "R" indicates Range Matching, a "W" indicates Wild Card Matching.

Table 10 below presents the Worklist request identifier of Worklist AE Query Worklist queries and specifies if the attributes presented in the GUI as well as attributed copied to the image IODs. Unexpected attributes in the returned response are ignored, unsupported attributes (by the SCP) are set to have no value.

Table 10: Worklist Request Identifier for Worklist AE Update Worklist

Module Name Attribute Name	Tag	VR	UI	IOD	Notes
SOP Common Module					
Specific Character Set	0008,0005	CS			ISO_IR 100
Patient Identification Module					
Patient's Name	0010,0010	PN	*	*	
Patient ID	0010,0020	LO	*	*	
Patient Demographic Module					
Patient's Birth Date	0010,0030	DA	*	*	
Patients' Sex	0010,0040	CS	*	*	
Patient Medical Module					
Visit Relationship Module					
Visit Status Module					
Scheduled Procedure Step Module					
Scheduled Procedure Step Sequence	0040,0100	SQ			
>Modality	0008,0060	CS	*	*	
>Scheduled Station AE Title	0040,0001	AE			
>Scheduled Procedure Step Start Date	0040,0002	DA	*	*	
>Scheduled Procedure Step Start Time	0040,0003	TM	*	*	
>Scheduled Performing Physician's Name	0040,0006	PN	*	*	
>Scheduled Procedure Step Description	0040,0007	LO	*	*	
>Scheduled Protocol Code Sequences	0040,0008	SQ			
>>Code Value	0008,0100	SH			
>>Coding Scheme Designator	0008,0102	SH			
>>Code Meaning	0008,0104	LO			
>Scheduled Procedure Step ID	0040,0009	SH			
Requested Procedure Module					
Referenced Study Sequence	0008,1110	SQ			
>Referenced SOP Class UID	0008,1150	UI			
>Referenced SOP Instance UID	0008,1155	UI			
Study Instance UID	0020,000D	UI		*	
Requested Procedure Description	0032,1060	LO			
Requested Procedure ID	0040,0101	SH			
Image Service Request Module					

Accession Number	0008,0050	SH	*	*	
Referring Physician's Name	0008,0090	PN		*	

The behavior of the Worklist AE for status codes in a Modality Worklist C-FIND response is presented in Table 11.

Table 11: Response Status Handling Behavior for Worklist AE Update Worklist

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Matching is complete – No final Identifier is supplied	The result is imported to the internal scheduler data base, this is presented to the user and is logged.
Refused	A700	Out of Resources	C-Find Responses are not processed, the reason is logged, a failure status is reported to the user.
Failed	A900	Identifier does not match SOP Class	C-Find Responses are not processed, the reason is logged, a failure status is reported to the user.
	C001	Unable to process	C-Find Responses are not processed, the reason is logged, a failure status is reported to the user.
Cancel	FE00	Matching terminated due to Cancel request	C-Find Responses are not processed, the reason is logged, a failure status is reported to the user.
Pending	FF00	Matches are continuing – Current match is supported in the same manner as supplied and any optional keys were required keys.	Continues with processing the find responses.
	FF01	Matches are continuing – Warning that one or more optional keys were not supported for existence for this identifier.	Continues with processing the find responses.
*	Any other code	*	C-Find Responses are not processed, the reason is logged, a failure status is reported to the user.

The behavior of the Worklist AE during communication failure is presented in Table 12.

Table 12: Communication Failure Behavior for Worklist AE Update Worklist

Exception	Behavior
Timeout	The association is aborted using A-ABORT.

	C-Find Responses are not processed, the reason is logged, a failure status is reported to the user.
Association aborted	The association is aborted using A-ABORT. C-Find Responses are not processed, the reason is logged, a failure status is reported to the user.
Association rejected	C-Find Responses are not processed, the reason is logged, a failure status is reported to the user.

4.2.1.3.2 Verify Application Level Communication

4.2.1.3.2.1 Description and Sequencing of Activities

For each Verify Application Level Communication request Worklist AE initiates and association to the remote system and transmits a C-ECHO request.
After the response is received the association is closed.

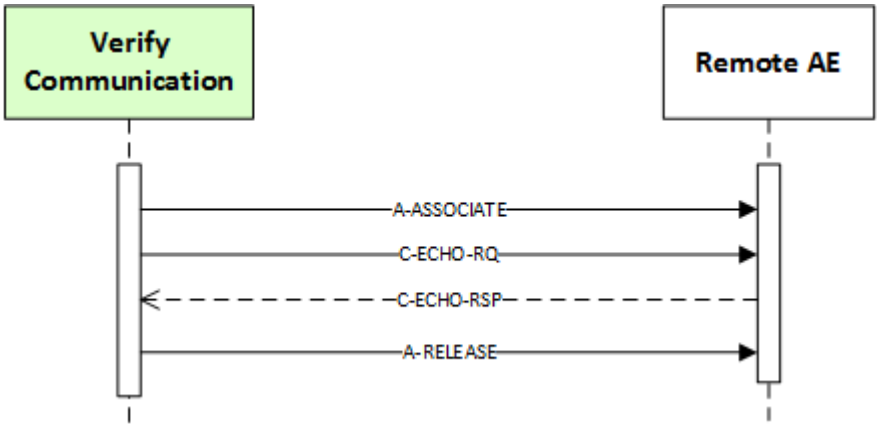


Figure 4:Sequencing of RWA Verify Application Level Communication

4.2.1.3.2.2 Proposed Presentation Contexts

The presentation context proposed by Worklist AE Verify Application Level Communication is defined in Table 13.
The implementation will choose ELE transfer syntax in the case multiple transfer syntaxes are accepted by the SCP.

Table 13: Proposed Presentation Contexts for Worklist AE Verify Application Level Communication

Presentation Context table					
		Transfer Syntax		Role	Extended Negotia-tion
Name	UID	Name List	UID List		

Verification	1.2.840.10008.1.1	ILE ELE	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None

4.2.1.3.2.3 SOP Specific Conformance for SOP Classes

The behavior of the Worklist AE for status codes in a Verification response is presented in Table 14.

Table 14: Response Status Handling Behavior for Worklist AE Verify Application Level Communication

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Successful operation	The success is reported to the user
*	Any other code	*	The failure is reported to the user

The behavior of the Worklist AE during communication failure is presented in Table 15.

Table 15: Communication Failure Behavior for Worklist AE Verify Application Level Communication

Exception	Behavior
Timeout	The reason is logged, a failure status is reported to the user.
Association aborted	The reason is logged, a failure status is reported to the user.
Association rejected	The reason is logged, a failure status is reported to the user.

4.2.1.4 Association Acceptance Policy

DicomFeeders Worklist AE does not accept associations.

4.2.2 Query AE

4.2.2.1 SOP Classes

The DicomFeeder Query AE provides Standard Conformance to the following DICOM V 3.0 SOP classes as an SCU.

Table 16: Supported SOP Classes for Query AE

SOP Class Name	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	Yes	No
Study Root QR Information Model – FIND SOP Class	1.2.840.10008.5.1.4.1.2.2.1	Yes	No

The DicomFeeder Query AE does not support DICOM V 3.0 SOP Classes as an SCP.

4.2.2.2 Association Policies

4.2.2.2.1 General

The DICOM standard application context name for DICOM 2.0 is always proposed as presented in Table 17. The PDU size is configurable from a minimum of 4096 bytes.

Table 17: DICOM Application Context

Application Context Name	1.2.840.10008.3.1.1.1

4.2.2.2.2 Number of Associations

Query AE will establish a maximum of two associations at a time. Based on local activities, one association may perform Application Level Communication Verification, another association may be used C-FIND operations.

Table 18: Number of Associations as an Association Initiator for Query AE

Maximum number of simultaneous associations	2

Query AE will not handle incoming associations.

Table 19: Number of Associations as an Association Acceptor for Query AE

Maximum number of simultaneous associations	N.A.

4.2.2.2.3 Asynchronous Nature

Query AE does not support asynchronous operations and will not perform asynchronous window negotiation.

Table 20: Asynchronous Nature as an Association Initiator for Query AE

Maximum number of outstanding asynchronous transactions	N.A.

4.2.2.2.4 Implementation Identifying Information

The implementation information for Query AE is:

Table 21: DICOM Implementation Class and Version for Query AE

Implementation Class UID	2.16.840.1.113669.632.16
Implementation Version Name	QDICNET_3X *

* X identifies the version number of the DICOM module.

4.2.2.3 Association Initiation Policy

The Query AE initiates associations as a result of the following events:

- The user requests a Query Studies manually (see 4.2.2.3.1).
- In the service mode, the operator verifies application level communication (see 4.2.2.3.2).

4.2.2.3.1 Query Studies

4.2.2.3.1.1 Description and Sequencing of Activities

For each Study Request, the Query AE opens an association to the Query Retrieve SCP and sends a C-FIND request. After retrieval of all responses the association is closed. The GUI is populated with the returned study items and presented to the user.

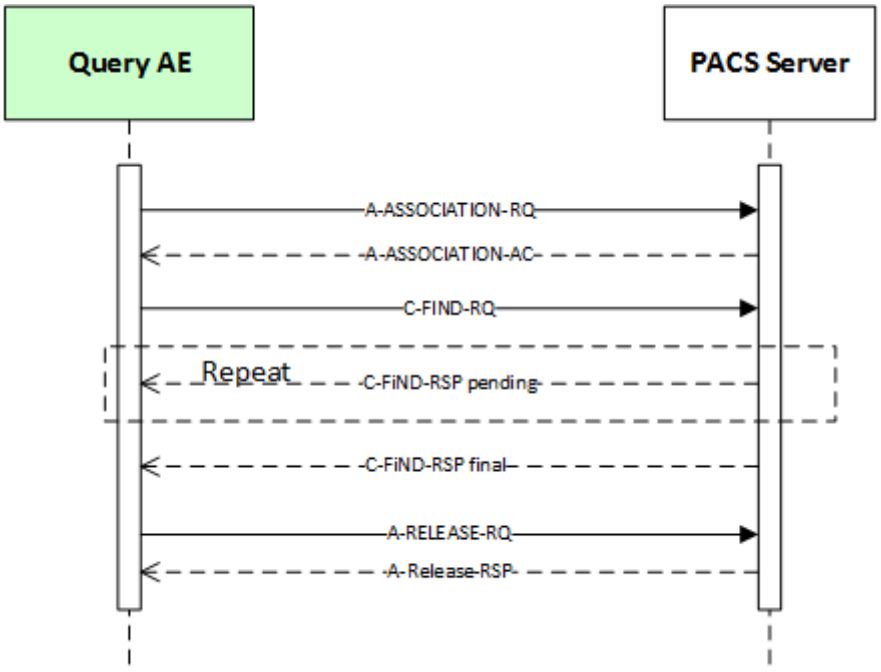


Figure 5:Sequencing of RWA Query Studies

4.2.2.3.1.2 Proposed Presentation Contexts

The presentation context proposed by Query AE Query Studies is defined in Table 22.

The implementation will choose ELE transfer syntax in the case multiple transfer syntaxes are accepted by the SCP.

Table 22: Proposed Presentation Contexts for Query AE Query Studies

Presentation Context table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Study Root QR Information Model – FIND SOP Class	1.2.840.10008.5.1.4.1.2.2.1	ILE ELE	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None

4.2.2.3.1.3 SOP Specific Conformance for Query Studies

Note:
Query attributes, their usage as search key, their display in the GUI and mapping to IOD values is highly configurable. The following tables reflects the default settings after installation.

DicomFeeder's Query Studies supports Study Root Queries with all required search keys.
Table 23 describes the supported required and optional search keys.

Table 23: Search Key Attributes for Query AE Query Studies

Module Name Attribute Name	Tag	VR	M	Query Value
Study Date	0008,0020	DA	S/R	
Study Time	0008,0030	TM	S/R	
Accession Number	0008,0050	SH	S/W	
Patient's Name	0010,0010	PN	S/W	
Patient ID	0010,0020	LO	S	
Patient's Birth Date	0010,0030	DA	S	
Study ID	0020,0010	SH	S/W	

The above table should be read as follows:
Tag: DICOM tag for this attribute.
VR: DICOM VR for this attribute.
M: Matching keys for Query Studies, a "S" indicates Single Value Matching, a "R" indicates Range Matching, a "W" indicates Wild Card Matching.

Table 24 below presents the request identifier of Query AE Query Studies queries and specifies if the attributes presented in the GUI as well as attributed copied to the image IODs. Unexpected attributes in the returned response are ignored, unsupported attributes (by the SCP) are set to have no value.

Table 24: SROOT Study Request Identifier for Query AE Query Study

Module Name Attribute Name	Tag	VR	UI	IOD	Notes
Specific Character Set	0008,0005	CS			ISO_IR 100
Query / Retrieve Level	0008,0052	CS			STUDY
Study Date	0008.0020	DA	*		
Study Time	0008,0030	TM			
Accession Number	0008,0050	SH	*		
Referring Physicians Name	0008,0090	PN	*		
Study Description	0008,1030	LO	*		
Patient's Name	0010,0010	PN	*	*	
Patient ID	0010,0020	LO	*	*	
Patient's Birth Date	0010,0030	DA	*	*	
Patients' Sex	0010,0040	CS	*	*	

Study Instance UID	0020,000D	UI			
StudyID	0020,0010	SH	*		

The behavior of the Query AE for status codes in a SROOT Study Level C-FIND response is presented in Table 25.

Table 25: Response Status Handling Behavior for Query AE Query Studies

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Matching is complete – No final Identifier is supplied	The result is imported to the internal scheduler data base, this is presented to the user and is logged.
Refused	A700	Out of Resources	C-Find Responses are not processed, the reason is logged, a failure status is reported to the user.
Failed	A900	Identifier does not match SOP Class	C-Find Responses are not processed, the reason is logged, a failure status is reported to the user.
	C001	Unable to process	C-Find Responses are not processed, the reason is logged, a failure status is reported to the user.
Cancel	FE00	Matching terminated due to Cancel request	C-Find Responses are not processed, the reason is logged, a failure status is reported to the user.
Pending	FF00	Matches are continuing – Current match is supported in the same manner as supplied and any optional keys were required keys.	Continues with processing the find responses.
	FF01	Matches are continuing – Warning that one or more optional keys were not supported for existence for this identifier.	Continues with processing the find responses.
*	Any other code	*	C-Find Responses are not processed, the reason is logged, a failure status is reported to the user.

The behavior of the Query AE during communication failure is presented in Table 26.

Table 26: Communication Failure Behavior for Query AE Query Studies

Exception	Behavior
Timeout	The association is aborted using A-ABORT. C-Find Responses are not processed, the reason is logged, a failure status is reported to the user.

Association aborted	The association is aborted using A-ABORT. C-Find Responses are not processed, the reason is logged, a failure status is reported to the user.
Association rejected	C-Find Responses are not processed, the reason is logged, a failure status is reported to the user.

4.2.2.3.2 Verify Application Level Communication

4.2.2.3.2.1 Description and Sequencing of Activities

For each Verify Application Level Communication Request Query AE initiates and association to the remote system and transmits a C-ECHO request.
After the response is received the association is closed.

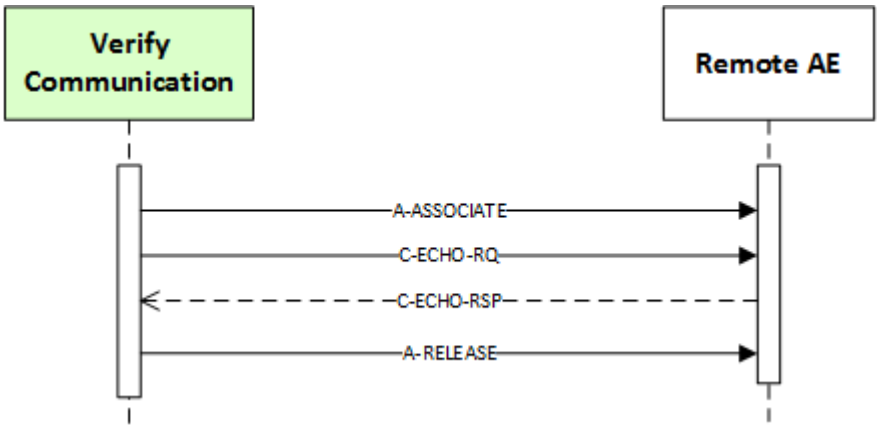


Figure 6:Sequencing of RWA Verify Application Level Communication

4.2.2.3.2.2 Proposed Presentation Contexts

The presentation context proposed by Query AE Verify Application Level Communication is defined in Table 27
The implementation will choose ELE transfer syntax in the case multiple transfer syntaxes are accepted by the SCP.

Table 27: Proposed Presentation Contexts for Query AE Verify Application Level Communication

Presentation Context table					
		Transfer Syntax		Role	Extended Negotia-tion
Name	UID	Name List	UID List		
Verification	1.2.840.10008.1.1	ILE ELE	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None

4.2.2.3.2.3 SOP Specific Conformance for SOP Classes

The behavior of the Query AE for status codes in a Verification response is presented in Table 28.

Table 28: Response Status Handling Behavior for Query AE Verify Application Level Communication

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Successful operation	The success is reported to the user
*	Any other code	*	The failure is reported to the user

The behavior of the Query AE during communication failure is presented in Table 29.

Table 29: Communication Failure Behavior for Query AE Verify Application Level Communication

Exception	Behavior
Timeout	The reason is logged, a failure status is reported to the user.
Association aborted	The reason is logged, a failure status is reported to the user.
Association rejected	The reason is logged, a failure status is reported to the user.

4.2.2.4 Association Acceptance Policy

DicomFeeders Query AE does not accept associations.

4.2.3 STORE AE

4.2.3.1 SOP Classes

The DicomFeeder Store AE provides Standard Conformance to the following DICOM V 3.0 SOP classes as an SCU.

Table 30: Supported SOP Classes for Store AE

SOP Class Name	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	Yes	No
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Yes	No
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Yes	No
Visible Light Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	Yes	No

Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	Yes	No
Visible Light Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	Yes	No
Video Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2.1	Yes	No
Visible Light Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	Yes	No
Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1	Yes	No
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Yes	No
Ultrasound Multi-Frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Yes	No
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Yes	No

DicomFeeder may be configured to use other Image Storage SOP Classes on customer's request.
The conformance statements will be available as addendum when applicable.

The DicomFeeder Store AE does not support DICOM V 3.0 SOP Classes as an SCP.

4.2.3.2 Association Policies

4.2.3.2.1 General

The DICOM standard application context name for DICOM 2.0 is always proposed as presented in Table 31. The PDU size is configurable from a minimum of 4096 bytes.

Table 31: DICOM Application Context

Application Context Name	1.2.840.10008.3.1.1.1

4.2.3.2.2 Number of Associations

Store AE will establish a maximum of two associations at a time. Based on local activities, one association may perform Application Level Communication Verification, another association may be used for image storage.

Table 32: Number of Associations as an Association Initiator for Store AE

Maximum number of simultaneous associations	2

Store AE will not handle incoming associations.

Table 33: Number of Associations as an Association Acceptor for Store AE

Maximum number of simultaneous associations	N.A.

4.2.3.2.3 Asynchronous Nature

Store AE does not support asynchronous operations and will not perform asynchronous window negotiation.

Table 34: Asynchronous Nature as an Association Initiator for Store AE

Maximum number of outstanding asynchronous transactions	N.A.

4.2.3.2.4 Implementation Identifying Information

The implementation information for Store AE is:

Table 35: DICOM Implementation Class and Version for Store AE

Implementation Class UID	2.16.840.1.113669.632.16
Implementation Version Name	QDICNET_3X *

* X identifies the version number.

4.2.3.3 Association Initiation Policy

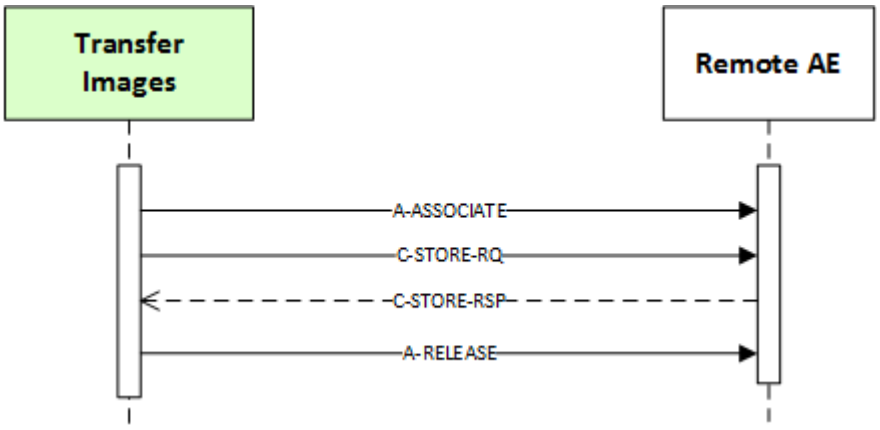
The Store AE initiates associations as a result of the following events:

- The user initiates the image transfer (see 4.2.3.3.1)
- In the service mode, the operator verifies application level communication (see 4.2.3.3.2).

4.2.3.3.1 Transfer Images

4.2.3.3.1.1 Description and Sequencing of Activities

The selected media files will be converted to DICOM instances and sent to the selected destination sent after the user requests “Transfer Instances”.
Store AE initiates one association to the configured SCP and uses it to send the images via C-STORE requests. If the examination contains multiple images, then multiple C-STORE requests will be issued within the same association.
The association will be closed after successful transfer of all images or when an error occurs.
Store AE handles each send request after another.



4.2.3.3.1.2 Proposed Presentation Contexts

Each time an association is initiated Store AE will propose one or two presentation contexts from the list presented in Table 39.

4.2.3.3.1.2.1 Abstract Syntax Selection

The abstract syntax selection criteria are based on the configuration in combination with the modality attribute coming from the corresponding worklist item and if acquired images are single frame or multi-frame images.
The abstract syntax is taken either from the modality attribute of the selected worklist entry or from the modality type the user selects in the GUI.

Table 36: Abstract Syntax based on Modality Type

Modality Type	Abstract Syntax single frame		Abstract Syntax multi frame	
	Name	UID	Name	UID
US	Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Ultrasound Multi-Frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1
ES	Visible Light Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1
GM	Visible Light Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	Video Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2.1
XC	Visible Light Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1
OT	Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4
DOC			Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1

4.2.3.3.1.2.2 Transfer Syntax Selection

The proposed transfer syntax is depending on the source media and user's choice between "uncompressed" and "compressed" in the GUI.

Table 37: Transfer Syntax based on Media Type and User's choice

User Compression Selection Input Media Type	Uncompressed	Lossy Compressed
Uncompressed single frame like BMP	ILE / ELE	JPEG
Compressed single frame like JPEG, PNG	ILE / ELE	JPEG
Multiframe like WMV, AVI, MPG	ILE / ELE*	JPEG/* MPEG-4
PDF	ILE / ELE	-

Note*: The option is offered in the GUI only if the resulting uncompressed or lossy compressed file is estimated to be smaller than 2 GB.

Table 38: Abbreviations used in Table 37

Abbreviation	Name	UID
ILE	Implicit Little Endian	1.2.840.10008.1.2
ELE	Explicit Little Endian	1.2.840.10008.1.2.1
JPEG	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50
MPEG-4	MPEG-4 AVC/H.264 High Profile/Level 4.1	1.2.840.10008.1.2.4.102

Once multi-frame images are compressed they will not be decompressed if the remote AE does not support the related presentation context. There will be no "fall back" to the DICOM default transfer syntax.
Presentation contexts for a SOP Class will only be proposed if the transfer job contains instances of these SOP Classes.

Table 39: Presentation Contexts for Store AE Transfer Images

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		MPEG-4 AVC/H.264 High Profile/Level 4.1 *	1.2.840.10008.1.2.4.102		
Visible Light Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		MPEG-4 AVC/H.264 High Profile/Level 4.1 *	1.2.840.10008.1.2.4.102		
Visible Light Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
Video Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		MPEG-4 AVC/H.264 High Profile/Level 4.1 *	1.2.840.10008.1.2.4.102		
Visible Light Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		MPEG-4 AVC/H.264 High Profile/Level 4.1 *	1.2.840.10008.1.2.4.102		
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
Ultrasound Multi-Frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		MPEG-4 AVC/H.264 High Profile/Level 4.1 *	1.2.840.10008.1.2.4.102		
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

* MPEG-4 Transfer Syntaxes are optional and not supported on all systems.

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4.2.3.3.1.3 SOP Specific Conformance for Image SOP Classes

All image SOP Classes supported by Store AE exhibit the same behavior.
In the case, no presentation context for an abstract syntax can be negotiated, instances of this SOP Class will not be sent and the transfer job is marked as failed. The failure is logged and presented to the user via the GUI.

The behavior of Store AE Transfer Images for status codes in a C-STORE response is summarized in Table 40.

Table 40: Response Status Handling Behavior for Store AE Transfer Images

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Successful operation	If all SOP instances in a transfer job have status success, then the job is marked completed. The result is logged and reported to the user.
Refused	A700-A7FF	Out of Resources	The association is aborted using A-ABORT and the job is marked as failed. The failure is logged and reported to the user.
Error	A900-A9FF	Data Set does not match SOP Class	The association is aborted using A-ABORT and the job is marked as failed. The failure is logged and reported to the user.
	C001-CFFF	Cannot understand	The association is aborted using A-ABORT and the job is marked as failed. The failure is logged and reported to the user.
Warning	B000	Coercion of Data Elements	If all SOP instances in a transfer job have status success, then the job is marked completed. The result is logged.
	B006	Elements discarded	If all SOP instances in a transfer job have status success, then the job is marked completed. The result is logged.
	B007	Data Set does not match SOP Class	If all SOP instances in a transfer job have status success, then the job is marked completed. The result is logged.
*	Any other status code	*	The association is aborted using A-ABORT and the job is marked as failed.

			The failure is logged and reported to the user.

The behavior of the Store AE during communication failure is presented in Table 41.

Table 41: Communication Failure Behavior for Store AE Transfer Images

Exception	Behavior
Timeout	The association is aborted using A-ABORT and the job is marked as failed. The failure is logged and reported to the user.
Association aborted	The association is aborted using A-ABORT and the job is marked as failed. The failure is logged and reported to the user.
Association rejected	The job is marked as failed. The failure is logged and reported to the user.

4.2.3.3.2 Verify Application Level Communication

4.2.3.3.2.1 Description and Sequencing of Activities

For each Verify Application Level Communication Request Store AE initiates and association to the remote system and transmits a C-ECHO request.
After the response is received the association is closed.

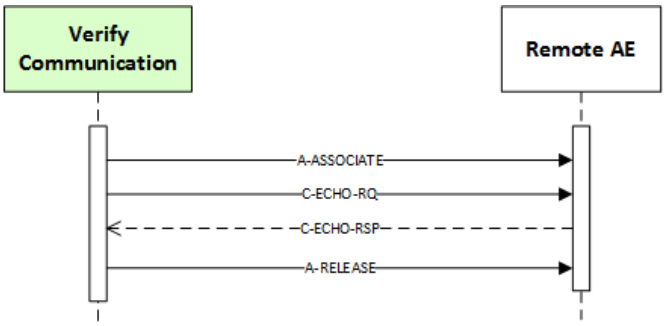

Figure 7:Sequencing of RWA Verify Application Level Communication

4.2.3.3.2.2 Proposed Presentation Contexts

The presentation context proposed by Store AE Verify Application Level Communication is defined in Table 42.
The implementation will choose ELE transfer syntax in the case multiple transfer syntaxes are accepted by the SCP.

Table 42: Proposed Presentation Contexts for Worklist AE Verify Application Level Communication

Presentation Context table			
Abstract Syntax	Transfer Syntax		

Name	UID	Name List	UID List	Role	Extended Negotia-tion
Verification	1.2.840.10008.5.1.4.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

4.2.3.3.2.3 SOP Specific Conformance for Verification SOP Class

The behavior of the Store AE for status codes in a Verification response is presented in Table 43.

Table 43: Response Status Handling Behavior for Store AE Verify Application Level Communication

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Successful operation	The success is reported to the user
*	Any other code	*	The failure is reported to the user

The behavior of the Store AE during communication failure is presented in Table 44.

Table 44: Communication Failure Behavior for Store AE Verify Application Level Communication

Exception	Behavior
Timeout	The reason is logged, a failure status is reported to the user.
Association aborted	The reason is logged, a failure status is reported to the user.
Association rejected	The reason is logged, a failure status is reported to the user.

4.2.3.4 Association Acceptance Policy

DicomFeeders Store AE does not accept associations.

4.3 Network Interfaces

4.3.1 Physical Network Interface

The DicomFeeder provides DICOM V3.0 TCP/IP Network Communication.
The TCP/IP stack is inherited from the Windows operating system.

The DicomFeeder supports a single network interface: Ethernet ISO.8802-3.
Standard AUI, optional twisted pair 100/1000-BaseT.

4.3.2 Additional Protocols

Additional protocols like DHCP, DNS, NTP may be present in the Windows operating system, its usage is transparent for DicomFeeder.

4.4 Configuration

The DicomFeeder Worklist AE, Query AE and Store AE are configured via the Service / Installation Tool. The Service / Installation Tool is intended to be used by DEKOM Service Engineers only. The configuration is stored in configuration repositories.

4.4.1 AE Title/Presentation Address Mapping

4.4.1.1 Local AE Titles

Table 45 shows the defaults for the DicomFeeder local AE Titles.

Table 45: Default AE Titles for DicomFeeder

Application Entity	Default AE Title	Default TCP/IP Port
Worklist AE	DicomFeeder	N.A.
Query AE	DicomFeeder	N.A.
Store AE	DicomFeeder	N.A.

4.4.1.2 Remote AE Titles/Presentation Address Mapping

The AE Title, host names / IP addresses and port numbers of remote applications are configured using the DicomFeeder Service/Installation Tool.

4.4.1.2.1 Worklist AE

The AE Title, host name / IP address and port number of the remote Modality Worklist SCP is configured using the DicomFeeder Service/Installation Tool.
An unlimited number of remote Modality Worklist SCPs can be defined.

4.4.1.2.2 Query AE

The AE Title, host name / IP address and port number of the remote Q/R SCP is configured using the DicomFeeder Service/Installation Tool.
An unlimited number of remote Q/R SCPs can be defined.

4.4.1.2.3 Store AE

The AE Title, host name / IP address and port number of the remote STORE SCP is configured using the DicomFeeder Service/Installation Tool.
An unlimited number of remote STORE SCPs can be defined.

4.4.2 Parameters

A large number of parameters related to image acquisition and general operation can be configured using the DicomFeeder Service/Installation Tool (see the DicomFeeder Service Manual). The following table presents just parameter relevant to the DICOM communication.

Table 46: Configurable Parameters for DicomFeeder

Parameter	Configurable (Yes / No)	Default Value
Worklist AE (local System)		
AE Title	Yes	DicomFeeder
Time-out waiting for an acceptance or rejection to an Association Request(Application Level Timeout)	No	15 s
Time-out waiting for a response to an Association Release Request(Application Level Timeout)	No	15 s
Worklist AE (Remote System(s))		
AE Title	Yes	No Default
IP host name/address	Yes	localhost
Port Number	Yes	104
Modality Worklist SCU time-out waiting for a response to the C-FIND_RQ	Yes	15 s
Supported Transfer Syntaxes for Modality Worklist	No	ILE / ELE
Query Worklist for specific Scheduled Station AE Title	Yes	No Default
Query Worklist for specific Modality Value	Yes	No Default
Query AE (local System)		
AE Title	Yes	DicomFeeder
Time-out waiting for an acceptance or rejection to an Association Request(Application Level Timeout)	No	15 s
Time-out waiting for a response to an Association Release Request(Application Level Timeout)	No	15 s
Query AE (Remote System(s))		
AE Title	Yes	No Default
IP host name/address	Yes	localhost
Port Number	Yes	104
SROOT Query SCU time-out waiting for a response to the C-FIND_RQ	Yes	15 s
Supported Transfer Syntaxes for SROOT Query	No	ILE / ELE
Store AE (local System)		
AE Title	Yes	No Default
Time-out waiting for an acceptance or rejection to an Association Request(Application Level Timeout)	No	15 s
Time-out waiting for a response to an Association Release Request(Application Level Timeout)	No	15 s
Store AE (Remote System(s))		
AE Title	Yes	No Default
IP host name/address	Yes	No Default

Port Number	Yes	No Default
Time-out waiting for a response to a C-STORE-RQ	Yes	15 sec

5 Media Interchange

DicomFeeder does not support DICOM Media Storage.

6 Support of Character Sets

The following character sets are supported by DicomFeeders DICOM applications:

ISO_IR 100 (ISO 8859-1 Latin Alphabet No. 1 supplementary set)

7 Security

The DICOM applications of DicomFeeder do not support any specific security measures.
It is assumed that DicomFeeder is used within a secured environment. It is assumed that a secured environment includes at a minimum:

- Firewall or routers protections to ensure that only approved external hosts have network access to DicomFeeder.
- Firewall or router protections to ensure that DicomFeeder 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 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 Instances

The chapters contain the lists of DICOM attributes provided by DicomFeeders image instances.

The following tables use a number of abbreviations. The abbreviations used in the "Presence of …" column are listed in Table 47:

Table 47: Abbreviations used the column "Presence of …"

Abbreviation	Meaning
VNAP	Value Not Always Present (attribute sent zero length if no value is present)
ANAP	Attribute Not Always Present
ALWAYS	Always Present
NEVER	Never Present
EMPTY	Attribute is sent without a value

The abbreviations used in the "Source" column are listed in Table 48:

Table 48: Abbreviations used the column "Source"

Abbreviation	Meaning
MWL	The attribute value source is Modality Worklist
PACS	The attribute value source is SROOT Query
NDIC	The attribute value source is non DICOM
USER	The attribute value source is from User input
AUTO	The attribute value is generated automatically
CONFIG	The attribute value source is a configurable parameter

Note: The created IODs modules and attributes are based on templates. The templates can be adjusted by DEKOM Service engineers on customer's request. This document describes the defaults.

8.1.1.1 Secondary Capture Image IOD

Table 49: IOD of Created Secondary Capture SOP Instances

IE	Module	Reference	Presence of Module
Patient	Patient	Table 60	ALWAYS
Study	General Study	Table 61	ALWAYS
Series	General Series	Table 62	ALWAYS
Equipment	General Equipment	Table 64	ALWAYS
	SC Equipment	Table 69	ALWAYS
Image	General Image	Table 65	ALWAYS
	Image Pixel	Table 66	ALWAYS
	SC Image	Table 70	ALWAYS
	VOI LUT	Table 67	ALWAYS
	SOP Common	Table 68	ALWAYS

8.1.1.2 Multi-frame True Color Secondary Capture Image IOD

Table 50: IOD of Created Multi-Frame True Color Secondary Capture SOP Instances

IE	Module	Reference	Presence of Module
Patient	Patient	Table 60	ALWAYS
Study	General Study	Table 61	ALWAYS
Series	General Series	Table 62	ALWAYS
Frame Of Reference	Frame of Reference	-	NEVER
Equipment	General Equipment	Table 64	ALWAYS
	SC Equipment	Table 69	ALWAYS
Image	General Image	Table 65	ALWAYS
	Image Pixel	Table 66	ALWAYS
	Cine	Table 73	ALWAYS
	Multi-frame	Table 74	ALWAYS
	SC Image	Table 70	ALWAYS
	SC Multi-frame Image	Table 71	ALWAYS
	SC Multi-frame Vector	Table 72	ALWAYS

	SOP Common	Table 68	ALWAYS

8.1.1.3 Visible Light Endoscopic Image IOD

Table 51: IOD of Created Visible Light Endoscopic SOP Instances

IE	Module	Reference	Presence of Module
Patient	Patient	Table 60	ALWAYS
Study	General Study	Table 61	ALWAYS
Series	General Series	Table 62	ALWAYS
Frame Of Reference	Frame of Reference	-	NEVER
Equipment	General Equipment	Table 63	ALWAYS
Image	General Image	Table 65	ALWAYS
	Image Pixel	Table 66	ALWAYS
	Acquisition Context	Table 75	ALWAYS
	VL Image	Table 76	ALWAYS
	SOP Common	Table 68	ALWAYS

8.1.1.4 Video Endoscopic Image IOD

Table 52: IOD of Created Video Endoscopic SOP Instances

IE	Module	Reference	Presence of Module
Patient	Patient	Table 60	ALWAYS
Study	General Study	Table 61	ALWAYS
Series	General Series	Table 62	ALWAYS
Equipment	General Equipment	Table 63	ALWAYS
Image	General Image	Table 65	ALWAYS
	Cine	Table 73	ALWAYS
	Multi-frame	Table 74	ALWAYS
	Image Pixel	Table 66	ALWAYS
	Acquisition Context	Table 75	ALWAYS
	Specimen	-	NEVER, DicomFeeder is not designed to be used for specimen
	VL Image	Table 76	ALWAYS
	SOP Common	Table 68	ALWAYS
	Frame Extraction	-	NEVER, DicomFeeder does not support Frame-Level retrieve request

8.1.1.5 Visible Light Microscopic Image IOD

Table 53: IOD of Created Visible Light Microscopic SOP Instances

IE	Module	Reference	Presence of Module
Patient	Patient	Table 60	ALWAYS
Study	General Study	Table 61	ALWAYS
Series	General Series	Table 62	ALWAYS
Equipment	General Equipment	Table 63	ALWAYS
Image	General Image	Table 65	ALWAYS
	Image Pixel	Table 66	ALWAYS
	Acquisition Context	Table 75	ALWAYS
	Specimen	-	NEVER, DicomFeeder is not designed to be used for specimen
	VL Image	Table 76	ALWAYS
	SOP Common	Table 68	ALWAYS

8.1.1.6 Video Microscopic Image IOD

Table 54: IOD of Created Video Microscopic SOP Instances

IE	Module	Reference	Presence of Module
Patient	Patient	Table 60	ALWAYS
Study	General Study	Table 61	ALWAYS
Series	General Series	Table 62	ALWAYS
Equipment	General Equipment	Table 63	ALWAYS
Image	General Image	Table 65	ALWAYS
	Cine	Table 73	ALWAYS
	Multi-frame	Table 74	ALWAYS
	Image Pixel	Table 66	ALWAYS
	Acquisition Context	Table 75	ALWAYS
	Specimen	-	NEVER, DicomFeeder is not designed to be used for specimen
	VL Image	Table 76	ALWAYS
	SOP Common	Table 68	ALWAYS

	Frame Extraction	-	NEVER, DicomFeeder does not support Frame-Level retrieve request

8.1.1.7 Visible Light Photographic Image IOD

Table 55: IOD of Created Visible Light Photographic SOP Instances

IE	Module	Reference	Presence of Module
Patient	Patient	Table 60	ALWAYS
Study	General Study	Table 61	ALWAYS
Series	General Series	Table 62	ALWAYS
Equipment	General Equipment	Table 63	ALWAYS
Image	General Image	Table 65	ALWAYS
	Image Pixel	Table 66	ALWAYS
	Acquisition Context	Table 75	ALWAYS
	Specimen	-	NEVER, DicomFeeder is not designed to be used for specimen
	VL Image	Table 76	ALWAYS
	SOP Common	Table 68	ALWAYS

8.1.1.8 Video Photographic Image IOD

Table 56: IOD of Created Video Photographic SOP Instances

IE	Module	Reference	Presence of Module
Patient	Patient	Table 60	ALWAYS
Study	General Study	Table 61	ALWAYS
Series	General Series	Table 62	ALWAYS
Equipment	General Equipment	Table 63	ALWAYS
Image	General Image	Table 65	ALWAYS
	Cine	Table 73	ALWAYS
	Multi-frame	Table 74	ALWAYS
	Image Pixel	Table 66	ALWAYS
	Acquisition Context	Table 75	ALWAYS
	Specimen	-	NEVER, DicomFeeder is not designed to be used for specimen

	VL Image	Table 76	ALWAYS
	SOP Common	Table 68	ALWAYS
	Frame Extraction	-	NEVER, DicomFeeder does not support Frame-Level retrieve request

8.1.1.9 Ultrasound Image IOD

Table 57: IOD of Created Ultrasound Image SOP Instances

IE	Module	Reference	Presence of Module
Patient	Patient	Table 60	ALWAYS
Study	General Study	Table 61	ALWAYS
Series	General Series	Table 62	ALWAYS
Equipment	General Equipment	Table 63	ALWAYS
Image	General Image	Table 65	ALWAYS
	Image Pixel	Table 66	ALWAYS
	Contrast/bolus	-	NEVER
	Palette Color Lookup Table	-	NEVER
	US Image	Table 77	ALWAYS
	SOP Common	Table 68	ALWAYS

8.1.1.10 Ultrasound Multi-Frame Image IOD

Table 58: IOD of Created Ultrasound Multi-Frame SOP Instances

IE	Module	Reference	Presence of Module
Patient	Patient	Table 60	ALWAYS
Study	General Study	Table 61	ALWAYS
Series	General Series	Table 62	ALWAYS
Frame Of Reference	Frame of Reference	-	NEVER
Equipment	General Equipment	Table 63	ALWAYS
Image	General Image	Table 65	ALWAYS
	Image Pixel	Table 66	ALWAYS
	Contrast/bolus	-	NEVER
	Cine	Table 73	ALWAYS
	Multi-frame	Table 74	ALWAYS
	Palette Color Lookup Table	-	NEVER

	US Image	Table 77	ALWAYS
	SOP Common	Table 68	ALWAYS

8.1.1.11 Encapsulated PDF IOD

Table 59: IOD of Created Encapsulated PDF SOP Instances

IE	Module	Reference	Presence of Module
Patient	Patient	Table 60	ALWAYS
Study	General Study	Table 61	ALWAYS
Series	Encapsulated Document Series	Table 78	ALWAYS
Equipment	General Equipment	Table 63	ALWAYS
	SC Equipment	Table 69	ALWAYS
Encapsulated Document	Encapsulated Document	Table 79	ALWAYS
	SOP Common	Table 68	ALWAYS

8.1.1.12 Common Modules

Table 60: Patient Module of created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Patient's Name	0010,0010	PN		ALWAYS	MWL/ PACS/ NDIC/ USER/ AUTO
Patient ID	0010,0020	LO		ALWAYS	MWL/ PACS/ NDIC/ USER/ AUTO
Patient's Birth Date	0010,0030	DA		VNAP	MWL/ PACS/ NDIC/ USER/ AUTO

Patient's Sex	0010,0040	CS		VNAP	MWL/ PACS/ NDIC/ USER/ AUTO

Table 61: General Study Module of created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Study Instance UID	0020,000D	UI	Taken from MWL or auto generated	ALWAYS	MWL/AUTO
Study Date	0008,0020	DA		ALWAYS	AUTO
Study Time	0008,0030	TM		ALWAYS	AUTO
Referring Physician's Name	0008,0090	PN	Taken from MWL or empty	VNAP	MWL
Study ID	0020,0010	SH	Taken from MWL or empty	VNAP	MWL
Accession Number	0010,0020	SH		ALWAYS	MWL/ USER/ AUTO
Study Description	0008,1030	LO	Taken from MWL or empty	VNAP	MWL

Table 62: General Series Module of created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Modality	0008,0060	CS		ALWAYS	MWL/ USER/ AUTO
Series Instance UID	0020,000E	UI		ALWAYS	AUTO
Series Number	0020,0011	IS		ALWAYS	AUTO
Series Date	0008,0021	DA		ALWAYS	AUTO
Series Time	0008,0031	TM	<hhmmss>	ALWAYS	AUTO

Table 63: General Equipment Module (Type 1) of created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Manufacturer	0008,0070	LO	DEKOM - Engineering GmbH	ALWAYS	AUTO
Institution Name	0008,0080	LO		ALWAYS	CONFIG
Institution Address	0008,0081	ST		ALWAYS	CONFIG
Manufacturer's Model Name	0008,1090	LO	DicomFeeder	ALWAYS	AUTO
Device Serial Number	0018,1000	LO		ALWAYS	AUTO

Software Versions	0018,1020	LO		ALWAYS	AUTO

Table 64: General Equipment Module (Type 2) of created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Institution Name	0008,0080	LO		ALWAYS	CONFIG
Institution Address	0008,0081	ST		ALWAYS	CONFIG

Table 65: General Image Module of created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Instance Number	0020,0013	IS		ALWAYS	AUTO
Image Type	0008,0008	CS	Value 1: ORIGINAL Value 2: PRIMARY	ALWAYS	AUTO
Acquisition Date	0008,0022	DA	<yyyymmdd>	ALWAYS	AUTO
Content Date	0008,0023	DA		EMPTY	AUTO
Acquisition Time	0008,0032	TM	<hhmmss>	ALWAYS	AUTO
Content Time	0008,0033	TM		EMPTY	AUTO
Lossy Image Compression	0028,2110	CS	Dependent on the Transfer Syntax used.	ALWAYS	AUTO

Table 66: Image Pixel Module (Color) of created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Samples per Pixel	0028,0002	US	3	ALWAYS	AUTO
Photometric Interpretation	0028,0004	CS	Uncompressed and JPEG compression: RGB MPEG compression: YBR_PARTIAL_420	ALWAYS	AUTO
Rows	0028,0010	US		ALWAYS	AUTO
Columns	0028,0011	US		ALWAYS	AUTO
Bits Allocated	0028,0100	US	8	ALWAYS	AUTO
Bits Stored	0028,0101	US	8	ALWAYS	AUTO
High Bit	0028,0102	US	7	ALWAYS	AUTO
Pixel Representation	0028,0103	US	0	ALWAYS	AUTO
Planar Configuration	0028,0006	US	0	ALWAYS	AUTO
Pixel Data	7FE0,0010	OB		ALWAYS	AUTO

Table 67: VOI LUT Module of created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Window Center	0028,1050	DS	128	ALWAYS	AUTO
Window Width	0028,1051	DS	256	ALWAYS	AUTO

Table 68: SOP Common Module of created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Specific Character Set	0008,0005	CS	ISO_IR 100	ALWAYS	AUTO
SOP Class UID	0008,0016	UI		ALWAYS	AUTO
SOP Instance UID	0008,0018	UI		ALWAYS	AUTO

Table 69: SC Equipment Module of created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Conversion Type	0008,0064	CS	WSD	ALWAYS	AUTO
Secondary Capture Device Manufacturer	0018,1016	LO	DEKOM – Engineering GmbH	ALWAYS	AUTO
Secondary Capture Device Manufacturer's Model Name	0018,1018	LO	DicomFeeder	ALWAYS	AUTO
Secondary Capture Device Software Versions	0018,1019	LO		ALWAYS	AUTO

Table 70: SC Image Module of created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
			No attribute of this module is used	NEVER	

Table 71: SC Multi-Frame Image Module (Color) of created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Burned In Annotation	0028,0301	CS	"NO"	ALWAYS	

Frame Increment Pointer	0028,0009	AT	If No Of Frames > 1 Points to (0018,1063)	ANAP	AUTO

Table 72: SC Multi-Frame Vector Module of created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Frame Time Vector	0018,1065	DS	Frame Increment Pointer never points to (0018,1065) Therefore, this tag is not used.	NEVER	

Table 73: Cine Module of created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Frame Time	0018,1063	DS		ALWAYS	AUTO

Table 74: Multi-Frame Module of created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Number Of Frames	0028,0008	IS		ALWAYS	AUTO
Frame Increment Pointer	0028,0009	AT	0018,1063	ALWAYS	AUTO

Table 75: Acquisition Context Module of created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Acquisition Context Sequence	0040,0555	SQ	Empty Sequence	EMPTY	AUTO

Table 76: VL Image Module of created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Image Type	0008,0008	CS	Value 1: ORIGINAL Value 2: PRIMARY	ALWAYS	AUTO

Photometric Interpretation	0028,0004	CS	RGB	ALWAYS	AUTO
Bits Allocated	0028,0100	US	8	ALWAYS	AUTO
Bits Stored	0028,0101	US	8	ALWAYS	AUTO
High Bit	0028,0102	US	7	ALWAYS	AUTO
Pixel Representation	0028,0103	US	0	ALWAYS	AUTO
Samples per Pixel	0028,0002	US	3	ALWAYS	AUTO
Planar Configuration	0028,0006	US	0	ALWAYS	AUTO
Lossy Image Compression	0028,2110	CS	Dependent on the Transfer Syntax used.	ALWAYS	AUTO
Anatomic Region Sequence	0008,2218	SQ	See note**	ANAP	MWL/USER/ AUTO
>Code Value	0008,0100	SH			
>Coding Scheme Designator	0008,0102	SH			
>Code Meaning	0008,0104	LO			

*NOTE: values given in the VL Image Module Table overrule related entries in the General Image Module, Image Pixel Module and VOI Module.

**Anatomic Region Sequence behavior:

The Anatomic Region Sequence is present in the Video Endoscopic Image IOD only.
If the DICOM Worklist Procedure Code can be mapped to an Anatomic Region as proposed in DICOM part 16, Annex I, the appropriate CID 4040 Code is taken.

When the Procedure Code cannot be mapped AND no user input is present the following Anatomic Region Sequence is taken (because an entry is required):

Code Value	0008,0100	D-0000
Coding Scheme Designator	0008,0102	99DEKOM-VL
Code Meaning	0008,0104	Unknown

Table 77: US Image Module of created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Samples per Pixel	0028,0002	US	3	ALWAYS	AUTO
Photometric Interpretation	0028,0004	CS	RGB	ALWAYS	AUTO
Bits Allocated	0028,0100	US	8	ALWAYS	AUTO
Bits Stored	0028,0101	US	8	ALWAYS	AUTO
High Bit	0028,0102	US	7	ALWAYS	AUTO
Planar Configuration	0028,0006	US	0	ALWAYS	AUTO
Pixel Representation	0028,0103	US	0	ALWAYS	AUTO

Frame Increment Pointer	0028,0009	AT	If Number of Frames set Then 0018,1063	ANAP	AUTO
Image Type	0008,0008	CS	Value 1: ORIGINAL Value 2: PRIMARY	ALWAYS	AUTO
Lossy Image Compression	0028,2110	CS	Dependent on the Transfer Syntax used.	ALWAYS	AUTO

*NOTE: values given in the US Image Module Table overrule related entries in the General Image Module, Image Pixel Module and VOI Module.

Table 78: Encapsulated Document Series of created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Modality	0008,0060	CS	“DOC”	ALWAYS	CONFIG
Series Instance UID	0020,000E	UI		ALWAYS	AUTO
Series Number	0020,0011	IS		ALWAYS	AUTO

Table 79: Encapsulated Document Module of created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Instance Number	0020,0013	IS		ALWAYS	AUTO
Content Date	0008,0023	DA		ALWAYS	AUTO
Content Time	0008,0033	TI		ALWAYS	AUTO
Acquisition Date Time	0008,002A	DT		ALWAYS	AUTO
Burned In Annotation	0028,0301	CS	“NO”	ALWAYS	
Document Title	0042,0010	ST		VNAP	AUTO
Concept Name Code Sequence	0040,A043	SQ	Empty Sequence	EMPTY	
MIME Type of Encapsulated Document	0042,0012	LO	“application/pdf”	ALWAYS	
List of MIME Types	0042,0014	LO		ANAP	AUTO
Encapsulated Document	0042,0011	OB		ALWAYS	AUTO

8.1.2 Used Fields in received IODs

DicomFeeders STORE AE does not receive SOP Instances.
The usage of attributes received by Worklist AE is described in chapter 4.2.1.3.1.3.
The usage of attributes received by Query AE is described in chapter 4.2.2.3.1.3.

8.1.3 Attribute Mapping

NOTE:
The Attribute Mapping can be changed by Service Engineers using the Service Configuration Tool! The following mapping tables define the default mapping only.

The relationships between attributes received by Worklist AE and attributes in the image IOD is described in Table 80.

Table 80: Attribute Mapping between Modality Worklist and Image IOD

Modality Worklist	Image IOD
Patient's Name	Patient's Name
Patient ID	Patient ID
Patient's Birth Date	Patient's Birth Date
Patient's Sex	Patient's Sex
Referring Physician's Name	Referring Physician's Name
Study Instance UID	Study Instance UID
Accession Number	Accession Number
Study ID	Study ID
Scheduled Procedure Step Description	Study Description

The relationships between attributes received by Query AE and attributes in the image IOD is described in Table 81.

Table 81: Attribute Mapping between SROOT Query and Image IOD

Modality Worklist	Image IOD
Patient's Name	Patient's Name
Patient ID	Patient ID
Patient's Birth Date	Patient's Birth Date
Patient's Sex	Patient's Sex

8.1.4 Coerced/Modified Fields

The Worklist AE and Query AE will truncate attribute values received in the response to a modality worklist or Study Root query if the value is longer than the maximum length permitted by the destination attribute's VR.

8.2 Data Dictionary of Private Attributes

No Private Attributes are supported.

8.3 Coded Terminology and Templates

N.A.

8.4 Grayscale Image consistency

N.A.

8.5 Standard Extended / Specialized / Private SOP Classes

No Extended, Specialized or Private SOP Classes are supported.

8.6 Private Transfer Syntaxes

No Private Transfer Syntaxes are supported.