

FORCARE

EMPOWERING YOUR FLOW



DICOM CONFORMANCE STATEMENT PRODUCT SUITE 2020-2

Status: Issued
Date: 27-May-2020
Author: Software Development Team

Copyright © Forcare All rights reserved

Overview

Forcare’s XDS Suite is a set of applications that implement the IHE XDS and XDS-I profiles. Part of this implementation is the ability to route DICOM objects between different source and consumer systems. If these systems are located in the same LAN, DICOM network connectivity is used for communication.

Table 1 lists the supported SOP classes of the DICOM interface.

SOP Class	Role
All storage classes	SCU/SCP
Study Root Query/Retrieve Model - MOVE	SCU
Study Root Query/Retrieve Model - FIND	SCU
Verification Service	SCP
Modality Worklist Information Model - FIND	SCU

Table 1 - Supported SOP Classes overview

Contents

Overview	2
1 Networking	4
1.1 Implementation Model	4
1.1.1 Application Data Flow	4
1.1.2 Functional Definition of DCM 2 XDS Application Entity (Verification SCP)	6
1.1.3 Functional Definition of DCM 2 XDS Application Entity	6
1.1.4 Functional Definition of XDS 2 DCM Application Entity	7
1.1.5 Functional Definition of WADO Server Application Entity	7
1.1.6 Functional Definition of C-FIND/C-STORE prefetch functionality	7
1.2 AE Specifications	7
1.2.1 DCM 2 XDS Application Entity	7
1.2.2 XDS 2 DCM Application Entity	15
1.2.3 WADO Server Application Entity	19
1.3 Network Interfaces	21
1.3.1 DICOM Upper Layer Protocol for TCP/IP	21
1.3.2 IPv4 and IPv6 Support	21
1.4 Configuration	21
1.4.1 AE Title/Presentation Address Configuration	21
1.4.2 Configurable Parameters	21
2 Media Interchange	22
2.1 Implementation Model	22
2.1.1 Application Data Flow	22
2.1.2 Functional Definition of AE’s	22
2.1.3 Sequencing of Real-World Activities	22
2.1.4 File Meta Information Options	22
2.2 AE Specifications	22

2.2.1	Offline-Media Application Entity Specification	22
2.3	Augmented and Private Application Profiles	23
2.4	Media Configuration	23
3	Support of Character Sets.....	24
4	Security.....	25
4.1	Security Profiles.....	25
4.2	Association Level Security	25
4.3	Application Level Security	25
5	WADO (Web Access to DICOM Objects)	26
5.1	WADO Server Application Entity	26
5.1.1	The WADO Endpoint	26
5.1.2	The IHE RAD69 Endpoint.....	27
5.1.3	The WADO WS Endpoint.....	27
6	Annexes	29
6.1	DATA DICTIONARY OF PRIVATE ATTRIBUTES	29
6.2	Private IODs.....	29
6.3	DICOM Tag Morphing.....	29

1 Networking

1.1 Implementation Model

1.1.1 Application Data Flow

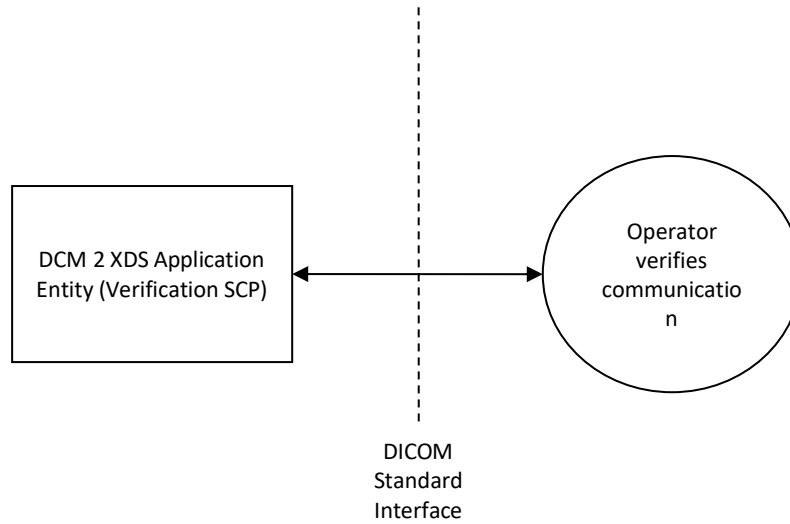


Figure 1-1 – Verify communication

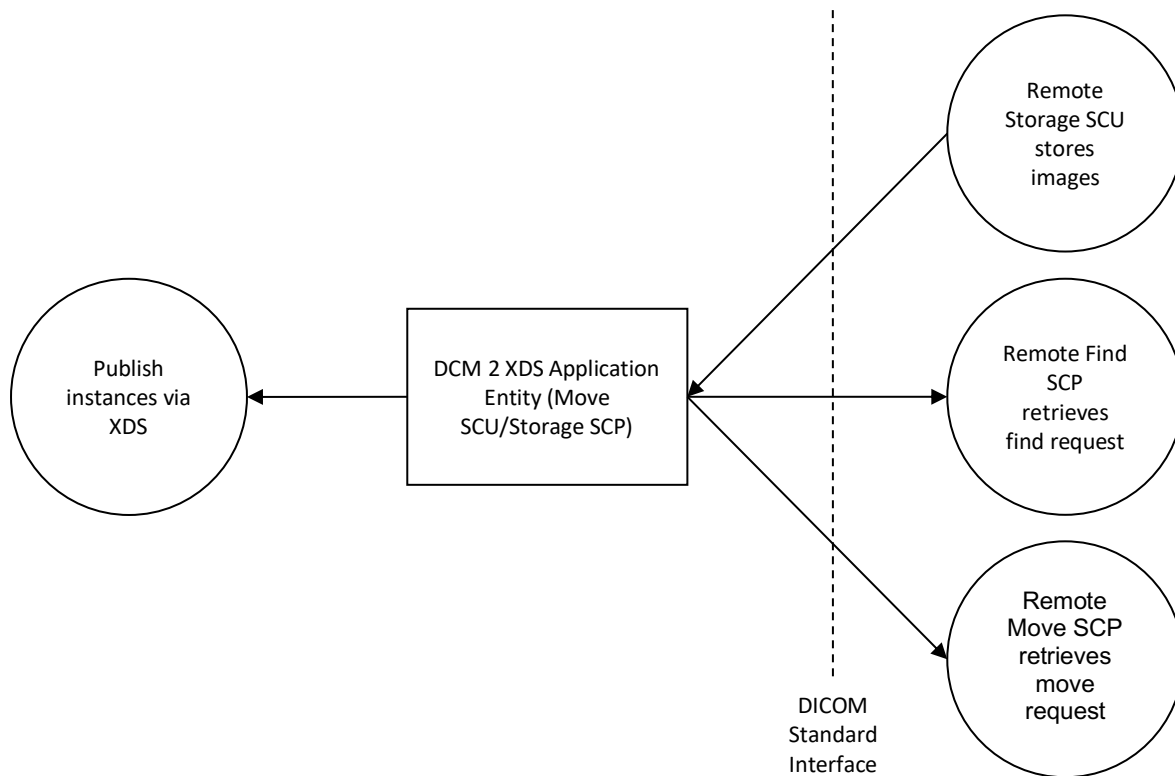


Figure 1-2 – Process received instances

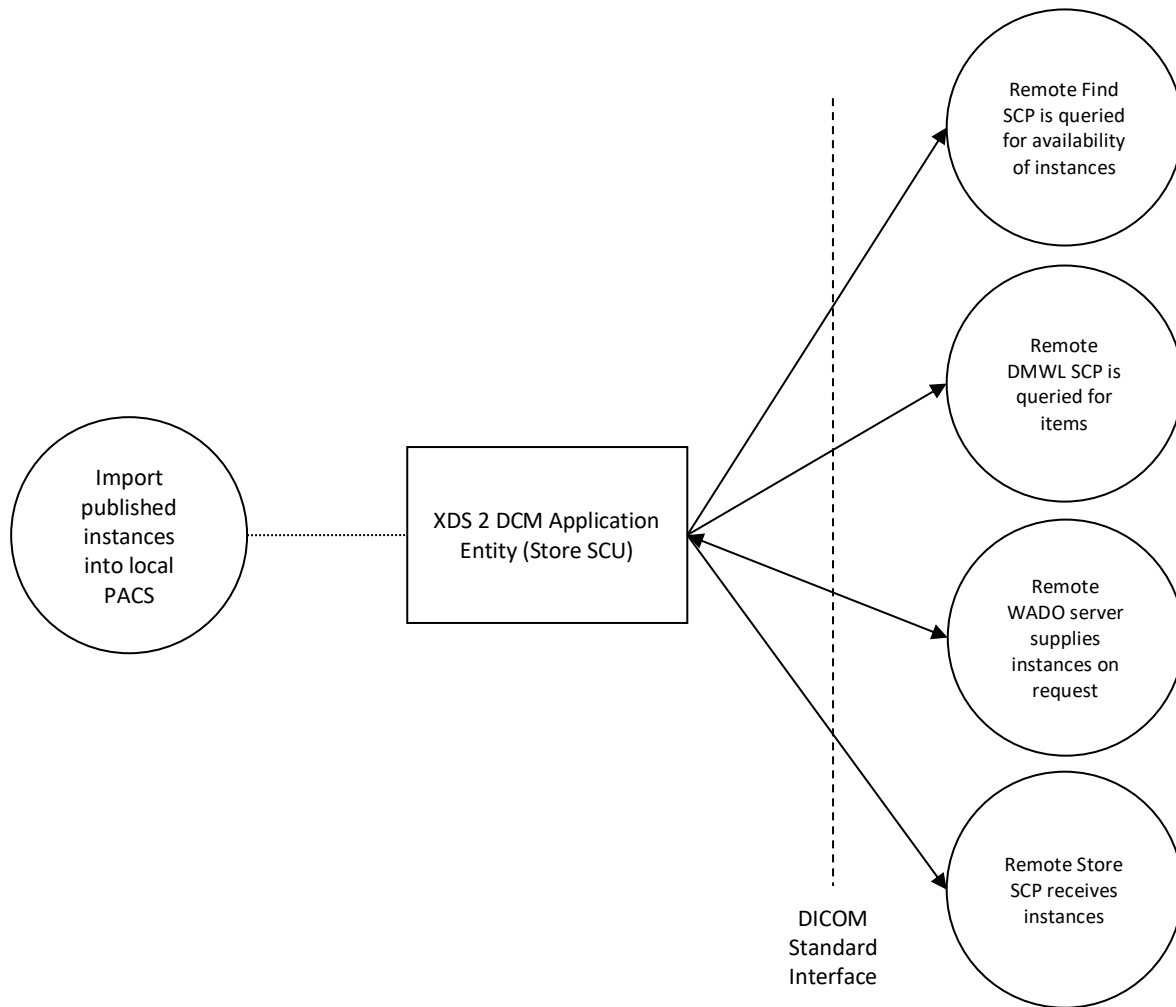


Figure 1-3 – Export published instances into local PACS

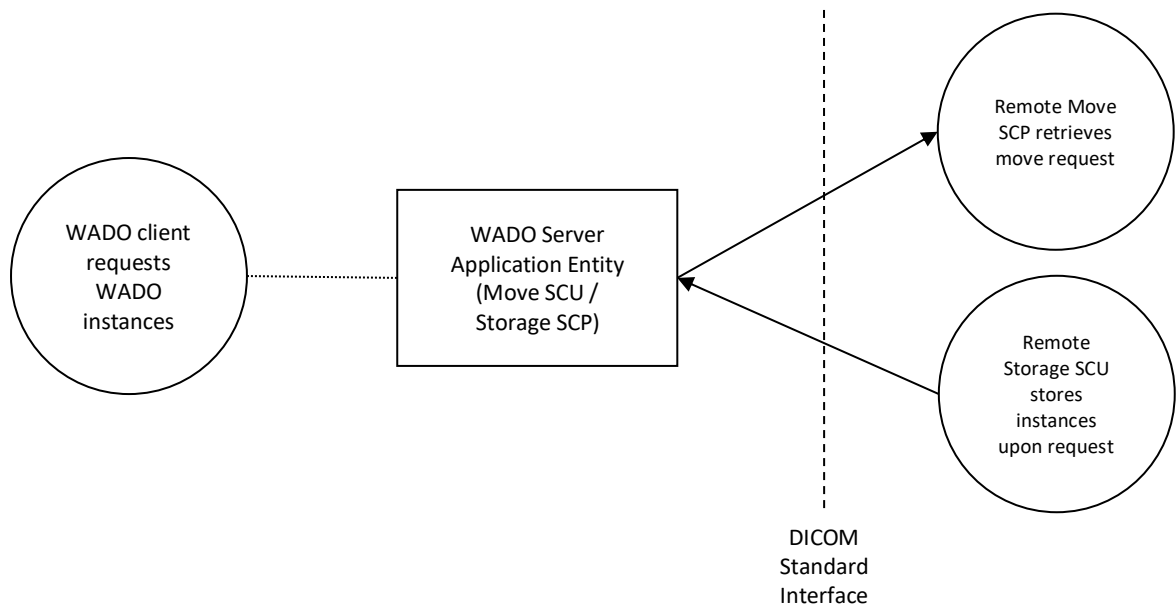


Figure 1-4 – Retrieve instances via WADO

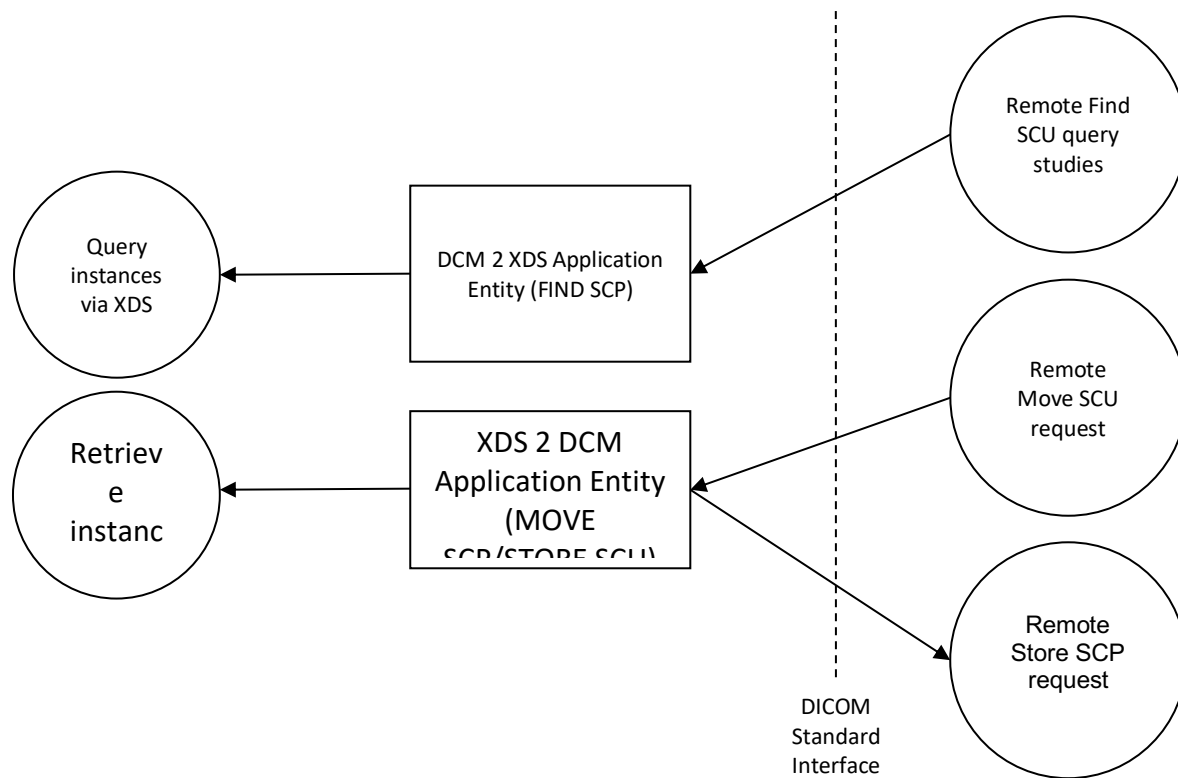


Figure 1-5 C-FIND/C-MOVE dicom instances

1.1.2 Functional Definition of DCM 2 XDS Application Entity (Verification SCP)

The DCM 2 XDS Application Entity waits for a Verification SCU to connect to its configured presentation address. The Verification SCP AE will accept associations and give success response only for configured AE entities.

1.1.3 Functional Definition of DCM 2 XDS Application Entity

The DCM 2 XDS Application Entity waits for a Remote Storage SCU to connect to its configured presentation address. The Storage SCP AE will accept associations with Presentation Contexts for SOP Classes of the Storage Service Classes.

DICOM Instances received in a Storage Request can be handled in different ways. First, they can be recorded in a Key Object Selection document, which is subsequently published to a configured IHE XDS Repository. The instances must remain available at a configured Storage SCP AE for later retrieval. DICOM instances with SOP Class Key Object Selection Document can also be published directly to a configured IHE XDS Repository. In the latter case the instances referred to in the Key Object Selection document have to be available at a configured Storage SCP AE for later retrieval.

Another option is that the DICOM instances are only used as a trigger for a subsequent C-FIND request. Which option is used depends on configuration. For all options, it is possible that the instances are stored in the local cache.

The DCM 2 XDS Application Entity initiates an association to a Remote Move SCP or to a Remote Find SCP when a publication request is made (e.g. through an HL7 ORM message). As a Find SCU it will request information about instances related to a study on several query levels. As Move SCU, it will request instances to be moved to its local Storage SCP, using the *Study Root Query/Retrieve Model – MOVE* SOP Class.

1.1.4 Functional Definition of XDS 2 DCM Application Entity

The XDS 2 DCM Application Entity is triggered by an import action on one of its non-DICOM interfaces. Upon this event a DICOM Key Object Selection instance is retrieved via HTTP GET, as specified in the IHE XDS-I Integration Profile. This KOS instance is processed for image references, which need to be imported.

Before storing the DICOM instance, the XDS 2 DCM AE can query a DICOM Modality Work List and update the patient and procedure information in the transferred instance.

Optionally, the AE can initiate an association to a remote Find SCP, grouped with a remote Store SCP. A query is performed, using the *Study Root Query/Retrieve Model – FIND* SOP Class, to check for the availability of the referenced images on the target AE.

Then the AE initiates an association to the grouped remote Store SCP. Each of the not-yet-available images are then retrieved from a WADO server and streamed over the open association to the remote Store SCP.

1.1.5 Functional Definition of WADO Server Application Entity

The WADO Server Application Entity initiates an association to a Remote Move SCP when a WADO import request is made on its WADO interface. As Move SCU, it will request instances to be moved to its local Storage SCP, using the *Study Root Query/Retrieve Model – MOVE* SOP Class.

The retrieved DICOM instances will be transferred to the WADO interface user (either without conversion or after conversion into the JPEG image format).

1.1.6 Functional Definition of C-FIND/C-STORE prefetch functionality

The DCM 2 XDS and XDS 2 DCM application entities are combined when using the DICOM prefetch functionality. This allows a DICOM entity to query and retrieve images by using a Study-Level C-FIND to query for the images and a Study-Level C-MOVE to retrieve the images. The C-FIND will trigger an XDS query and retrieve of the KOS objects. The C-MOVE will use the retrieved KOS objects and do a WADO or RAD-69 call to retrieve the referenced instances. Then the instances are stored using the C-STORE operation to the STORE SCP destination.

1.2 AE Specifications

1.2.1 DCM 2 XDS Application Entity

1.2.1.1 SOP Classes

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

SOP Class Name	SOP Class UID	Role
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	SCP
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	SCP
Arterial Pulse Waveform Storage	1.2.840.10008.5.1.4.1.1.9.5.1	SCP
Audio SR Storage Trial Retired	1.2.840.10008.5.1.4.1.1.88.2	SCP
Autorefracton Measurements Storage	1.2.840.10008.5.1.4.1.1.78.2	SCP
Basic Structured Display Storage	1.2.840.10008.5.1.4.1.1.131	SCP
Basic Text SR	1.2.840.10008.5.1.4.1.1.88.11	SCP

SOP Class Name	SOP Class UID	Role
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1	SCP
Blending Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.4	SCP
Breast Tomosynthesis Image Storage	1.2.840.10008.5.1.4.1.1.13.1.3	SCP
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1	SCP
Chest CAD SR	1.2.840.10008.5.1.4.1.1.88.65	SCP
Colon CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.69	SCP
Color Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.2	SCP
Comprehensive SR	1.2.840.10008.5.1.4.1.1.88.33	SCP
Comprehensive SR Storage Trial Retired	1.2.840.10008.5.1.4.1.1.88.4	SCP
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	SCP
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	SCP
Deformable Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.3	SCP
Detail SR Storage Trial Retired	1.2.840.10008.5.1.4.1.1.88.3	SCP
Digital Intra-oral X-Ray Image Storage (Presentation)	1.2.840.10008.5.1.4.1.1.1.3	SCP
Digital Intra-oral X-Ray Image Storage (Processing)	1.2.840.10008.5.1.4.1.1.1.3.1	SCP
Digital Mammography X-Ray Image Storage (Presentation)	1.2.840.10008.5.1.4.1.1.1.2	SCP
Digital Mammography X-Ray Image Storage (Processing)	1.2.840.10008.5.1.4.1.1.1.2.1	SCP
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	SCP
Digital X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	SCP
Encapsulated CDA Storage	1.2.840.10008.5.1.4.1.1.104.2	SCP
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	SCP
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	SCP
Enhanced MR Color Image Storage	1.2.840.10008.5.1.4.1.1.4.3	SCP
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	SCP
Enhanced PET Image Storage	1.2.840.10008.5.1.4.1.1.130	SCP
Enhanced SR	1.2.840.10008.5.1.4.1.1.88.22	SCP
Enhanced US Volume Storage	1.2.840.10008.5.1.4.1.1.6.2	SCP
Enhanced XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1.1	SCP
Enhanced XRF Image Storage	1.2.840.10008.5.1.4.1.1.12.2.1	SCP
General Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.2	SCP
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	SCP
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	SCP
Hanging Protocol Storage	1.2.840.10008.5.1.4.38.1	SCP
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1	SCP
Keratometry Measurements Storage	1.2.840.10008.5.1.4.1.1.78.3	SCP

SOP Class Name	SOP Class UID	Role
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59	SCP
Lensometry Measurements Storage	1.2.840.10008.5.1.4.1.1.78.1	SCP
Macular Grid Thickness and Volume Report Storage	1.2.840.10008.5.1.4.1.1.79.1	SCP
Mammography CAD SR	1.2.840.10008.5.1.4.1.1.88.50	SCP
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	SCP
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2	SCP
Multi-frame True Color SC Image Storage	1.2.840.10008.5.1.4.1.1.7.4	SCP
Multi-frame Grayscale Byte SC Image Storage	1.2.840.10008.5.1.4.1.1.7.2	SCP
Multi-frame Grayscale Word SC Image Storage	1.2.840.10008.5.1.4.1.1.7.3	SCP
Multiframe Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	SCP
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	SCP
Nuclear Medicine Image Storage Retired	1.2.840.10008.5.1.4.1.1.5	SCP
Ophthalmic Photography 16 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5 .2	SCP
Ophthalmic Photography 8 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5 .1	SCP
Ophthalmic Tomography Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5 .4	SCP
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	SCP
Procedure Log Storage	1.2.840.10008.5.1.4.1.1.88.40	SCP
Pseudo Color Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.3	SCP
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66	SCP
Real World Value Mapping Storage	1.2.840.10008.5.1.4.1.1.67	SCP
Respiratory Waveform Storage	1.2.840.10008.5.1.4.1.1.9.6.1	SCP
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4	SCP
RT Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6	SCP
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	SCP
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	SCP
RT Ion Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.9	SCP
RT Ion Plan Storage	1.2.840.10008.5.1.4.1.1.481.8	SCP
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	SCP
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	SCP
RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7	SCP
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	SCP
Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.4	SCP
Spatial Fiducials Storage	1.2.840.10008.5.1.4.1.1.66.2	SCP
Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.1	SCP

SOP Class Name	SOP Class UID	Role
Spectacle Prescription Reports Storage	1.2.840.10008.5.1.4.1.1.78.6	SCP
Standalone Curve Storage Retired	1.2.840.10008.5.1.4.1.1.9	SCP
Standalone Modality LUT Storage Retired	1.2.840.10008.5.1.4.1.1.10	SCP
Standalone Overlay Storage Retired	1.2.840.10008.5.1.4.1.1.8	SCP
Standalone PET Curve Storage Retired	1.2.840.10008.5.1.4.1.1.129	SCP
Standalone VOI LUT Storage Retired	1.2.840.10008.5.1.4.1.1.11	SCP
Stereometric Relationship Storage	1.2.840.10008.5.1.4.1.1.77.1.5 .3	SCP
Subjective Refraction Measurements Storage	1.2.840.10008.5.1.4.1.1.78.4	SCP
Surface Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.5	SCP
Text SR Storage Trial Retired	1.2.840.10008.5.1.4.1.1.88.1	SCP
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	SCP
Ultrasound Image Storage Retired	1.2.840.10008.5.1.4.1.1.6	SCP
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	SCP
Ultrasound Multiframe Image Storage Retired	1.2.840.10008.5.1.4.1.1.3	SCP
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1 .1	SCP
Video Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2 .1	SCP
Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4 .1	SCP
Visual Acuity Measurements	1.2.840.10008.5.1.4.1.1.78.5	SCP
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	SCP
VL Image Storage Retired	1.2.840.10008.5.1.4.1.1.77.1	SCP
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	SCP
VL Multiframe Image Storage Retired	1.2.840.10008.5.1.4.1.1.77.2	SCP
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	SCP
VL Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3	SCP
Waveform Storage Trial Retired	1.2.840.10008.5.1.4.1.1.9.1	SCP
XA XRF Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.5	SCP
XRay 3D Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.13.1.1	SCP
XRay 3D Craniofacial Image Storage	1.2.840.10008.5.1.4.1.1.13.1.2	SCP
X-Ray Angiographic Bi Plane Image Storage Retired	1.2.840.10008.5.1.4.1.1.12.3	SCP
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	SCP
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67	SCP
X-Ray Radio Fluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	SCP

Table 2 - Supported Storage SOP Classes

SOP Class Name	SOP Class UID	Role
Study Root Q/R Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1	SCU
Study Root Q/R Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2	SCU
Patient Root Q/R Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1	SCP
Study Root Q/R Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1	SCP

Table 3 - Additional SOP Classes

1.2.1.2 Association Policies

1.2.1.2.1 General

The Application Context Name supported by this AE is conformant with DICOM 3.0, and has the value 1.2.840.10008.3.1.1.1.

1.2.1.2.2 Number of Associations

The DCM 2 XDS AE supports multiple associations as a Find SCU and as a Move SCU. A single association will be initiated to the remote SCP, which will not be reused for different requests. If an error occurs the association will be rebuilt. As SCP (Storage or Find) it will accept multiple connections. The number of associations can be limited.

1.2.1.2.3 Asynchronous Nature

The DCM 2 XDS AE does not support asynchronous transactions.

1.2.1.2.4 Implementation Identifying Information

The DCM 2 XDS AE uses the Dcm4Che implementation. The following identifying information is communicated:

Implementation Class UID	1.2.40.0.13.1.1
Implementation Version Name	dcm4che-2.0

Table 4 - DICOM Implementation Class and Version for DCM 2 XDS AE

1.2.1.3 Association Initiation Policy

1.2.1.3.1 Activity – Remote Find SCP retrieves find request

1.2.1.3.1.1 Description and Sequencing of Activities

Upon a publication request (e.g. an HL7 ORM message), the DCM 2 XDS AE will initiate an association for subsequent C-FIND requests. It will request from the remote Find SCP to return information related to one or more studies. One study level query will be performed, which will be followed by a series level query for each returned study, and by an instance level query for each returned series.

1.2.1.3.1.2 Proposed Presentation Contexts

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		

Abstract Syntax		Transfer Syntax	Role	Extended
Study Root Q/R Information Model – FIND	1.2.840.10008.5.1.4.1.2.2 .1	Supported Transfer Syntaxes are described in Table 9	SCU	None

Table 5 - Presentation Contexts for Remote Find SCP retrieves find request

1.2.1.3.1.3 SOP Specific Conformance Statement

Standard conformance is provided.

1.2.1.3.2 Activity – Remote Move SCP retrieves move request

1.2.1.3.2.1 Description and Sequencing of Activities

Upon a publication request (e.g. an HL7 ORM message), the DCM 2 XDS AE will initiate an association for a subsequent C-MOVE request. It will request from the remote Move SCP to store an instance to the local Storage SCP on the DCM 2 XDS AE. The specific instance to be retrieved will be specified by the publication request.

1.2.1.3.2.2 Proposed Presentation Contexts

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID	Name	UID	
Study Root Q/R Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2 .2	Supported Transfer Syntaxes are described in Table 9	SCU	None

Table 6 - Presentation Contexts for Remote Move SCP retrieves move request

1.2.1.3.2.3 SOP Specific Conformance Statement

Standard conformance is provided.

1.2.1.4 Association Acceptance Policy

1.2.1.4.1 Activity – Operator verifies communication

1.2.1.4.1.1 Description and Sequencing of Activities

A remote operator can choose to verify connectivity from a Verification SCU to the DCM 2 XDS SCP.

1.2.1.4.1.2 Proposed Presentation Contexts

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID	Name	UID	
Verification	1.2.840.10008.1.1	Supported Transfer Syntaxes are described in Table 9	SCP	None

Table 7 - Presentation Contexts for C-ECHO

1.2.1.4.2 Activity – Process received instances

1.2.1.4.2.1 Description and sequencing of activities

A Remote Application Entity sends instances to DCM 2 XDS to be processed. Processing can be configured to be several activities. For example, the images can be published as described in the IHE XDS-I Integration Profile, or the images can be used as a trigger for subsequent C-FIND or C-MOVE requests.

1.2.1.4.2.2 Accepted Presentation Contexts

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Supported SOP Classes as SCP are described in Table 2		Supported Transfer Syntaxes are described in Table 10		SCP	None

Table 8 – Accepted Presentation Contexts for C-STORE

Transfer Syntax Name	UID
Implicit VR Little Endian	1.2.840.10008.1.2
Explicit VR Little Endian	1.2.840.10008.1.2.1
Explicit VR Big Endian	1.2.840.10008.1.2.2

Table 9 – Accepted Base Transfer Syntaxes

Transfer Syntax Name	UID
Implicit VR Little Endian	1.2.840.10008.1.2
Explicit VR Little Endian	1.2.840.10008.1.2.1
Explicit VR Big Endian	1.2.840.10008.1.2.2
JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70
JPEG LS Lossless Image Compression	1.2.840.10008.1.2.4.80
JPEG Lossless, Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57
JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50
JPEG Extended (Process 2 & 4)	1.2.840.10008.1.2.4.51
MPEG2 Main Profile @ Main Level	1.2.840.10008.1.2.4.100
MPEG2 Main Profile @ High Level	1.2.840.10008.1.2.4.101
MPEG-4 AVC/H.264 High Profile / Level 4.1	1.2.840.10008.1.2.4.102
MPEG-4 AVC/H.264 BD-compatible High Profile / Level 4.1	1.2.840.10008.1.2.4.103

Table 10 – Accepted Transfer Syntaxes for Image Storage

1.2.1.4.2.3 SOP Specific Conformance for SOP Classes

The DCM 2 XDS AE captures a number of element values (such as UIDs) such that it is possible to retrieve the instances at a later time via the IHE XDS-I Integration Profile. The DCM 2 XDS AE has cache functionality which can store instances to improve performance. The cache has a configurable size limit and instances are not guaranteed to be stored in the cache. The DCM 2 XDS AE is a Level 0 (Local) conformant Storage SCP.

The AE may return the following C-STORE responses situations:

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0x0000	The Composite SOP Instance was successfully received, verified and processed.
Error	Processing Failure	0x0110	The instance could not be processed due to an application error. Amongst other the instance may not have been published successfully.

Table 11 – C-STORE Responses

1.2.1.4.3 Activity – Find SCP for querying instances

1.2.1.4.3.1 Description and sequencing of activities

A remote application can trigger a study level C-FIND request to the DCM 2 XDS application entity and retrieve the available studies for the given patient. This will populate the cache with the KOS objects which can be referenced by subsequent C-MOVE operations.

1.2.1.4.3.2 Accepted Presentation Contexts

Name	Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
	UID		Name	UID		
Patient Root Q/R Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.		Supported Transfer Syntaxes are described in Table 9		SCP	None
Study Root Q/R Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.		Supported Transfer Syntaxes are described in Table 9		SCP	None

Table 12 - Accepted Presentation Contexts for C-FIND

The AE may return the following C-FIND responses situations:

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0x0000	The Composite SOP Instance was successfully received, verified and processed.
Error	Processing Failure	0x0110	The instance could not be processed due to an application error. Amongst other the instance may not have been published successfully.

1.2.2 XDS 2 DCM Application Entity

1.2.2.1 SOP Classes

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

SOP Class Name	SOP Class UID	Role
All Storage SOP Classes as SCU	Refer to Table 2	SCU
Study Root Q/R Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	SCU
Patient Root Q/R Information Model – C-MOVE	1.2.840.10008.5.1.4.1.2.1.2	SCP
Study Root Q/R Information Model – C-MOVE	1.2.840.10008.5.1.4.1.2.2.2	SCP

Table 13 – Supported SOP Classes

1.2.2.2 Association Policies

1.2.2.2.1 General

Same as the DCM 2 XDS AE; refer to section 1.2.1.2.1.

1.2.2.2.2 Number of Associations

The XDS 2 DCM AE supports multiple associations as an SCU. One find association and one store association will be initiated per user import action. The AE will not accept incoming associations, since it's not an SCP.

1.2.2.2.3 Asynchronous Nature

The XDS 2 DCM AE does not support asynchronous transactions.

1.2.2.2.4 Implementation Identifying Information

Same as the DCM 2 XDS AE; refer to section 1.2.1.2.4.

1.2.2.3 Association Initiation Policy

1.2.2.3.1 Activity – Determine relevant work list items for procedure matching

1.2.2.3.1.1 Description and Sequencing of Activities

Before the user import action, the DICOM Modality Work List is queried for procedure information relevant to the requested instance. The user is allowed to pick an item from the query results that matches the local information for the import procedure. Attributes from the selected work list item will be placed in the transferred DICOM instances. This activity is followed by either 'Activity – Determine availability of instances in local PACS' or 'Activity – Import not-yet-available instances into local PACS'.

1.2.2.3.1.2 Proposed Presentation Contexts

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		

Abstract Syntax		Transfer Syntax	Role	Extended
Modality	1.2.840.10008.5.1.4.3	Supported Transfer	SCU	None
Worklist Information Model – FIND	1	Syntaxes are described in Table 7		

Table 14 – Presentation Contexts for Determine availability of instances in local PACS activity

1.2.2.3.1.3 SOP Specific Conformance Statement

Standard conformance is provided.

1.2.2.3.2 Activity – Determine availability of instances in local PACS

1.2.2.3.2.1 Description and Sequencing of Activities

Upon a user import action, the XDS 2 DCM AE will retrieve a DICOM Key Object Selection instance via HTTP GET, as specified in the IHE XDS-I Integration Profile. This KOS instance will be processed for instance references with accompanying “Retrieve AE Title” elements (0008, 0054). An association will be established as a C-FIND SCU with the configured import destination AE (acting as the C-FIND SCP). A single query will be performed to determine the availability of each of the referenced images on the import destination. The association will be closed upon completion of the query. This activity is always followed by ‘Activity – Import not-yet-available instances into local PACS’.

1.2.2.3.2.2 Proposed Presentation Contexts

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Study Root Q/R Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Supported Transfer		SCU	None
		Syntaxes are described in Table 7			

Table 15 – Presentation Contexts for Determine availability of instances in local PACS activity

1.2.2.3.2.3 SOP Specific Conformance Statement

Standard conformance is provided.

1.2.2.3.3 Activity – Import not-yet-available instances into local PACS

1.2.2.3.3.1 Description and Sequencing of Activities

This action is optionally preceded by ‘Activity – Determine relevant work list items for procedure matching’.

After the availability of instances in the local PACS has been determined, an association will be established as a C-STORE SCU with the import destination AE (acting as the C-STORE SCP). For each of the not-yet-available images a WADO request will be performed based on the

“Retrieve AE Title” and the response will be streamed as a C-STORE request over the open association. Upon completion of the import, the association will be closed.

1.2.2.3.3.2 Proposed Presentation Contexts

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Supported SOP Classes are described in Table 2		Supported Transfer Syntaxes are described in Table 9		SCU	None

Table 16 – Presentation Contexts for Import not-yet-available instances into local PACS activity

1.2.2.3.3.3 SOP Specific Conformance Statement

Standard conformance is provided.

1.2.2.4 Association Acceptance Policy

1.2.2.4.1 Activity – C-MOVE to send instances

1.2.2.4.1.1 Description and Sequencing of Activities

The C-MOVE will trigger a C-STORE for the referenced KOS. The specified move-AETitle will map to the configured destination where the instances will be sent.

1.2.2.4.1.2 Accepted Presentation Context

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Patient Root Q/R Information Model – C-MOVE	1.2.840.10008.5.1.4.1.2.1.2	Supported Transfer Syntaxes are described in Table 9		SCP	None
Study Root Q/R Information Model – C-MOVE	1.2.840.10008.5.1.4.1.2.2.2	Supported Transfer Syntaxes are described in Table 9		SCP	None

Table 17 - Presentation Context for C-MOVE

The AE may return the following C-MOVE responses situations:

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0x0000	The Composite SOP Instance was successfully moved.
Error	Processing Failure	0x0110	The instance could not be processed due to an application error. Amongst other the instance may not have been found or stored properly.

1.2.3 WADO Server Application Entity

1.2.3.1 SOP Classes

This Application Entity provides Standard Conformance for the following SOP Classes:

SOP Class Name	SOP Class UID	Role
All Storage SOP Classes	Refer to Table 2	SCP
Study Root Q/R Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	SCU
Study Root Q/R Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	SCU

Table 18 – Supported SOP Classes

1.2.3.2 Association Policies

1.2.3.2.1 General

Same as the DCM 2 XDS AE; refer to section 1.2.1.2.1.

1.2.3.2.2 Number of Associations

The WADO Server AE supports multiple associations as a Move SCU. An optional single association may be initiated before a retrieve to determine the available instances to be retrieved. A single association will be initiated to the remote Move SCP, which will be reused for different move requests. If an error occurs the association will be rebuilt. As Storage SCP it will accept multiple connections.

1.2.3.2.3 Asynchronous Nature

The WADO Server AE does not support asynchronous transactions.

1.2.3.2.4 Implementation Identifying Information

Same as the DCM 2 XDS AE; refer to section 1.2.1.2.4.

1.2.3.3 Association Initiation Policy

1.2.3.3.1 Activity – Request Instances for Transfer via WADO

1.2.3.3.1.1 Description and Sequencing of Activities

Upon a WADO client request, the WADO Server AE will initiate an association for a subsequent C-MOVE request. It will request from the remote Move SCP to store an instance or the associated series or study (based on configuration) to the local Storage SCP on the WADO Server. The specific instance to be retrieved will be specified by the WADO client request. This has typically been obtained from a KOS instance stored in an XDS repository, as specified by the IHE XDS-I Integration Profile. For XDS-I.b RAD-69 requests, the C-MOVE request may be preceded by a C-FIND request to determine the available instances to be retrieved.

1.2.3.3.1.2 Proposed Presentation Contexts

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Study Root Q/R Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Supported Transfer Syntaxes are described in Table 9		SCU	None
Study Root Q/R Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Supported Transfer Syntaxes are described in Table 9		SCU	None

Table 19 – Presentation Contexts for Request Instances for Transfer via WADO

1.2.3.3.1.3 SOP Specific Conformance Statement

Standard conformance is provided.

1.2.3.4 Association Acceptance Policy

1.2.3.4.1 Activity – Receive Instances for Transfer via WADO

1.2.3.4.1.1 Description and Sequencing of Activities

The Storage SCP of the WADO Server AE will accept associations from remote Storage SCUs for which its local Move SCU has previously made a request. The instances will be matched to a WADO client request and transferred to the WADO client.

1.2.3.4.1.2 Accepted Presentation Contexts

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Supported SOP Classes are described in Table 2		Supported Transfer Syntaxes are described in Table 8		SCP	None

Table 20 – Accepted Presentation Contexts for Receive Instances for Transfer via WADO

1.1.1.1.1.1.1 SOP Specific Conformance for SOP Classes

The WADO Server AE also has the ability to store instances in the cache, similar to the XDS 2 DCM Application Entity. The WADO retrieve for DICOM instances will transfer the unmodified DICOM instance as retrieved from the DICOM source. The WADO retrieve for JPEG will convert the DICOM instance to JPEG image(s) which may not preserve the instance attributes.

The AE may return the following C-STORE responses situations:

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0x0000	The Composite SOP Instance was successfully received, verified and processed.

Service Status	Further Meaning	Error Code	Behavior
Error	Processing Failure	0x0110	The instance could not be processed due to an application error. Amongst other the instance may not have been published successfully.

Table 21 – C-STORE Responses

1.3 Network Interfaces

1.3.1 DICOM Upper Layer Protocol for TCP/IP

All AEs implement the DICOM Upper Layer Protocol for TCP/IP, as defined in DICOM PS 3.8. Most, if not all, physical network interfaces are supported by virtue of using the Java Runtime Environment (JRE) for TCP/IP communication. Any physical network interface supported by the JRE or its underlying operating system is supported.

1.3.2 IPv4 and IPv6 Support

The AEs have only been tested with the IPv4 protocol.

1.4 Configuration

1.4.1 AE Title/Presentation Address Configuration

1.4.1.1 Local AE Network Configuration

The different AEs support configuration of their AE titles, along with their TCP/IP ports. Table 22 lists the default configuration for the different AEs.

Application Entity	Default AE Title	Default TCP/IP port
DCM 2 XDS	FC_D2X	8104
XDS 2 DCM	FC_X2D	N/A
WADO Server	FC_WADO	8104

Table 22 – Default AE Network Configuration

1.4.1.2 Remote AE Network Configuration

Any remote AEs that communication is established with needs to be configured in the respective application.

At least the following attributes are required:

- TCP/IP hostname or IP address
- TCP/IP port number
- AE title

1.4.2 Configurable Parameters

Currently no parameters besides the network configuration are available.

2 Media Interchange

2.1 Implementation Model

2.1.1 Application Data Flow



Figure 6 - Application Data Flow Diagram for Media Storage

The Offline-Media Application Entity exports images and Presentation States to a ZIP-file that can be extracted to USB or any other storage. It is associated with the local real-world activity “Download ZIP-file”. “Download ZIP-file” is performed upon user request for all images referenced in a DICOM KOS object.

2.1.2 Functional Definition of AE’s

2.1.2.1 Functional Definition of Offline-Media Application Entity

Activation of the “Download ZIP-file” icon will pass the corresponding DICOM KOS Object to the Offline-Media Application Entity. The SOP Instances referenced in the DICOM KOS Object will be retrieved –if needed – and offered in a ZIP-file.

2.1.3 Sequencing of Real-World Activities

The Offline-Media Application Entity can be invoked if a DICOM KOS object for a patient is present. The ZIP-file can be downloaded and extracted to any storage device, like a USB device.

2.1.4 File Meta Information Options

The implementation information written to the File Meta Header in each file is as described in *Table 4 - DICOM Implementation Class and Version for DCM 2 XDS AE*.

2.2 AE Specifications

2.2.1 Offline-Media Application Entity Specification

The Offline-Media Application Entity provides standard conformance to the Media Storage Service Class.

The Application Profiles and roles are listed below:

Application Profiles Supported	Real World Activity	Role
STD-GEN-USB-JPEG	Download ZIP-file	FSC

Table 23 – Application Profiles, Activities and Roles for Offline-Media

2.2.1.1 File Meta Information for the Application Entity

The Source Application Entity Title is not included in the File Meta Header.

2.2.1.2 Real-World Activities

2.2.1.2.1 Activity – Download ZIP-file

The Offline-Media Application Entity acts as an FSC when requested to download SOP Instances in a ZIP-file. A dialog will be presented allowing the user to choose where to store the ZIP-file.

The instances will be retrieved as described in 1.1.5 Functional Definition of WADO Server Application Entity.

The SOP Instances referenced in the DICOM KOS Object will be written in the ZIP-file together with a corresponding DICOMDIR. The user can cancel the download. The way to cancel the download is browser specific. Once the ZIP-file is downloaded the user can extract it to a storage device such as a USB device.

2.2.1.2.1.1 Media Storage Application Profiles

The Offline-Media Application Entity supports the STD-GEN-USB-JPEG Application Profile.

2.2.1.2.1.1.1 Options

The Offline-Media Application Entity supports the SOP Classes and Transfer Syntaxes as listed in *Table 2 - Supported Storage SOP Classes*.

If the remote Application Entity provides the SOP Instances uncompressed the Offline-Media Application Entity will use the Transfer Syntax Explicit VR Little Endian (1.2.840.10008.1.2.1) for writing the SOP Instances to the ZIP-file.

If the remote Application Entity provides the SOP Instances in one of the JPEG formats (see Table 10 – Accepted Transfer Syntaxes for Image Storage) the Offline-Media Application Entity will use that Transfer Syntax for writing the SOP Instances to the ZIP-file.

Additionally the DICOMDIR is written as specified in the Table below:

Information Object Definition	SOP Class UID	Transfer Syntax	Transfer Syntax UID
Media Storage	1.2.840.10008.1.3.	Explicit VR Little Endian	1.2.840.10008.1.2
Directory Storage	10	Endian	.1

Table 24 – IODS, SOP Classes and Transfer Syntaxes for Offline media

2.3 Augmented and Private Application Profiles

The Forcare XDS Suite does not support any augmented and private application profiles.

2.4 Media Configuration

The application entity has no configuration related to downloading ZIP files.

3 Support of Character Sets

The DCM 2 XDS Application Entity reads data from the sent instances to construct XDS metadata and a DICOM KOS object. It supports the Character Sets listed in Table 25 below.

DICOM Character Set Name	IANA/Java Character Set Name
	US-ASCII
GB18030	GB18030
ISO 2022 IR 100	ISO-8859-1
ISO 2022 IR 101	ISO-8859-2
ISO 2022 IR 109	ISO-8859-3
ISO 2022 IR 110	ISO-8859-4
ISO 2022 IR 126	ISO-8859-7
ISO 2022 IR 127	ISO-8859-6
ISO 2022 IR 13	JIS_X0201
ISO 2022 IR 138	ISO-8859-8
ISO 2022 IR 144	ISO-8859-5
ISO 2022 IR 148	ISO-8859-9
ISO 2022 IR 149	cp949
ISO 2022 IR 159	JIS0212
ISO 2022 IR 166	TIS-620
ISO 2022 IR 6	US-ASCII
ISO 2022 IR 87	JIS0208
ISO_IR 100	ISO-8859-1
ISO_IR 101	ISO-8859-2
ISO_IR 109	ISO-8859-3
ISO_IR 110	ISO-8859-4
ISO_IR 126	ISO-8859-7
ISO_IR 127	ISO-8859-6
ISO_IR 13	JIS_X0201
ISO_IR 138	ISO-8859-8
ISO_IR 144	ISO-8859-5
ISO_IR 148	ISO-8859-9
ISO_IR 166	TIS-620
ISO_IR 192	UTF-8

Table 25 Supported Character Sets

For creation of DICOM KOS objects, the character set is configurable from the table above. Alternatively, one can use the character set specified in the source DICOM data.

4 Security

The Forcare XDS Suite is expected to run in a controlled security environment.

4.1 Security Profiles

The applications in the Forcare XDS Suite can be configured to use the Basic TLS Secure Transport Connection Profile. For use of that profile, security certificates are required to be configured.

The Forcare XDS Suite does not currently conform to the Digital Signatures Security Profile.

4.2 Association Level Security

The applications in the Forcare XDS Suite accept/initiate associations from/with any Remote AEs. TCP/IP address validation is not performed and is expected to be controlled by either the Basic TLS Secure Transport Connection Profile or by other network means.

This means the applications must run in a controlled network environment. Network access, and thus application interface access is expected to be controlled outside of the applications.

4.3 Application Level Security

All DICOM communication is triggered by network interface events. As such, application level security is provided by the remote applications. Security of the administration/configuration at the application level should be provided by the underlying operating system.

5 WADO (Web Access to DICOM Objects)

5.1 WADO Server Application Entity

5.1.1 The WADO Endpoint

The WADO Endpoint supports the parameters listed in Table 26 – WADO Parameters. All other parameters will be ignored.

Name	S/ E*	Comments
requestType	S	Shall be set to WADO.
studyUID	S	The requested Study Instance UID of the object to be retrieved.
seriesUID	S	The requested Series Instance UID of the object to be retrieved.
objectUID	S	The requested SOP Instance UID of the object to be retrieved.
presentationUID	S	Contrast and luminosity as indicated in the Grayscale Softcopy Presentation State (GSPS) of the requested UID will be applied to the image. Annotations, viewports, shutters, masks, overlays or spatial transformations will not be rendered onto the image.
presentationSeriesUID	S	The Series Instance UID of the GSPS to be retrieved.
patientID	E	The IHE Patient ID for auditing purposes.
contentType	S	Can be set to application/dicom for full-fidelity DICOM; for image display, set to image/jpeg for JPEG rendering or set to video/mpeg to retrieve MPEG-2 or MPEG-4 videos.
rows	S	The maximum number of target rows; only valid for image retrieves. When specified together with columns, the actual number of rows returned depends on the aspect ratio of the image rendered.
columns	S	The maximum number of target columns; only valid for image retrieves. When specified together with rows, the actual number of rows returned depends on the aspect ratio of the image rendered.
frameNumber	S	For images: the frame number of the DICOM multi-frame to convert to JPEG.
region	S	For images: the region of the image to convert to JPEG. Videos always use the entire frame.
transferSyntax	S	Accepted but ignored, since the only transfer syntax supported is Explicit Little Endian.
windowCenter	S	Set the luminosity of the image. Is required when windowWidth is set

Name	S/ E*	Comments
windowWidth	S	Set the contrast of the image
imageQuality	S	Only applies for JPEG retrieve, this parameter indicates the quality of the compressed image from 1 to 100.
timeout	E	The maximum amount of time to wait for the remote image source system to respond to the C-MOVE request. A value in milliseconds.

Table 26 – WADO Parameters

S/E*: Standard (specified in DICOM PS 3.18) or Vendor Extension.

5.1.2 The IHE RAD69 Endpoint

The IHE RAD69 Web Service Endpoint supports the xml parameter structure listed in Table 27. All other parameters will be ignored.

Name	S/E*	Comments
StudyRequest	S	Element containing the DICOM study request.
>SeriesRequest	S	One or more xml elements containing the series request.
>>DocumentRequest	S	The document request.
>>>RepositoryUniqueld	S	Required. Repository unique ID.
>>>DocumentUniqueld	S	The unique ID of the document.
>>>HomeCommunityId	S	Optional. Home community ID.
TransferSyntaxUIDList	S	Contains list of one or more TransferSyntaxUID elements.
>TransferSyntaxUID	S	One of the transfer syntax encodings that the Imaging Document Consumer is capable of processing.

Table 27 – IHE RAD69 Web Service parameters

S/E*: Standard (specified in DICOM PS 3.18) or Vendor Extension.

5.1.3 The WADO WS Endpoint

The WADO WS (WADO over Web Services) supports the xml parameters listed in Table 28. All other parameters will be ignored.

Name	S/E*	Comments
StudyRequest	S	Element containing the DICOM study request.
>SeriesRequest	S	One or more xml elements containing the series request.
>>DocumentRequest	S	The document request.
>>>RepositoryUniqueld	S	Required. Repository unique ID.
>>>DocumentUniqueld	S	The unique ID of the document.
>>>HomeCommunityId	S	Optional. Home community ID.

Name	S/E*	Comments
>>>Annotation	S	Ignored.
>>>Rows / Columns	S	The maximum number of target rows/columns; only valid for image retrieves. When specified together, the actual number of rows/columns returned depends on the aspect ratio of the image rendered.
>>>Region	S	For images: the region of the image to convert to JPEG. Videos always use the entire frame.
>>>>Xmin	S	the x position of the top left hand corner of the region to be retrieved.
>>>>Ymin	S	the y position of the top left hand corner of the region to be retrieved.
>>>>Xmax	S	the x position of the bottom right hand extent of the region
>>>>Ymax	S	the y position of the bottom right hand extent of the region.
>>>>WindowCenter	S	Set the luminosity of the image. Is required when windowWidth is set.
>>>WindowWidth	S	Set the contrast of the image.
>>>ImageQuality	S	This parameter indicates the quality of the compressed image from 1 to 100.
>>>PresentationUID	S	Contrast and luminosity as indicated in the Grayscale Softcopy Presentation State (GSPS) of the requested UID will be applied to the image. Annotations, viewports, shutters, masks, overlays or spatial transformations will not be rendered onto the image.
>>>PresentationSeriesUID	S	The Series Instance UID of the GSPS to be retrieved.
>>>FrameNumber	S	For images: the frame number of convert to JPEG.
>>>Anonymize	S	Ignored.
>>>ContentTypeList	S	A list of ContentType elements.
>>>>ContentType	S	Can be set to application/dicom for full-fidelity DICOM; for image display, set to image/jpeg for JPEG rendering or video/mpeg for MPEG-2 or MPEG-2 video.
>>>CharsetList	S	Ignored.
>>>>Charset	S	Ignored.
>>>Timeout	E	The maximum amount of time to wait for the remote image source system to respond to the C-MOVE request. A value in milliseconds.
>>>PatientID	E	The IHE Patient ID for auditing purposes.

Table 28 – WADO WS parameters

S/E*: Standard (specified in DICOM PS 3.18) or Vendor Extension.

6 Annexes

6.1 DATA DICTIONARY OF PRIVATE ATTRIBUTES

Forcare defines private attributes with Block Descriptor (0067, 00xx) = "Forcare B.V."

Attribute Name	Tag	VR	VM	Attribute Description
AdditionalSeriesInfo	(0067,xx01)	SQ	1	Additional Series Information. The element is added in a KOS to each Referenced Series Sequence (0008,1115) in a Current Requested Procedure Evidence Sequence (0040,A375). It contains a copy of a configurable set of elements on series level.

Table 29 Private Forcare Attributes

6.2 Private IODs

No private / vendor-specific IODs are used.

6.3 DICOM Tag Morphing

This chapter provides an overview of the DICOM tag morphing that is performed by the Forcare products.

In XDS and DICOM infrastructures Patient IDs can be issued by multiple Assigning Authorities. When DICOM data crosses domain boundaries the patient identification information may change from the source domain to the target domain. The [DICOM PS3.3-C.2.2 Patient Identification Module](#) describes the identification of a patient.

The following DICOM tags are adjusted when the patient identification is changed.

Attribute Name	Tag	Attribute Description
Patient ID	(0010,0020)	Primary hospital identification number or code for the patient. <i>This uniquely identifies a patient within the namespace of an Assigning Authority.</i>
Issuer of Patient ID	(0010,0021)	Identifier of the Assigning Authority (system, organization, agency, or department) that issued the Patient ID. <i>This matches the Patient ID and is thus typically adjusted in combination with the Patient ID. In case the Assigning Authority represents a Universal ID then the value of this tag will be the Universal Entity ID as a plain OID otherwise the value will be the Namespace ID (Equivalent to HL7 v2 CX component 4 subcomponent 1).</i>
Issuer of Patient ID Qualifiers Sequence	(0010,0024)	Attributes specifying or qualifying the identity of the issuer of the Patient ID, or scoping the Patient ID. Only a single Item is permitted in this sequence. <i>When the 'Issuer of Patient ID' is adjusted to a</i>

		<i>Universal ID then this sequence is filled to align the (0010,0021) value, otherwise this sequence removed/cleared from the DICOM header.</i>
>Universal Entity ID	(0040,0032)	Universal or unique identifier for the Patient ID Assigning Authority. <i>The authority identified by this attribute shall be the same as that of Issuer of Patient ID (0010,0021), if present. Equivalent to HL7 v2 CX component 4 subcomponent 2 (Universal ID). Typically this will be the OID of the Assigning Authority.</i>
>Universal Entity ID Type	(0040,0033)	Standard defining the format of the Universal Entity ID (0040,0032). <i>Required if Universal Entity ID (0040,0032) is present. Equivalent to HL7 v2 CX component 4 subcomponent 3 (Universal ID Type). Typically this will be the value 'ISO'.</i>
Other Patient IDs Sequence	(0010,1002)	A sequence of identification numbers or codes used to identify the patient, which may or may not be human readable, and may or may not have been obtained from an implanted or attached device such as an RFID or barcode. <i>Every time the 'Patient ID' and/or 'Issuer of Patient ID' is adjusted this sequence is extended with the combination of values of those tags. No items will be added that already occur. This implementation is in line with the Recommendation for use of the Dutch National Patient ID (BSN) & DICOM Objects</i>
>Patient ID	(0010,0020)	An identification number or code used to identify the patient
>Issuer of Patient ID	(0010,0021)	Identifier of the Assigning Authority (system, organization, agency, or department) that issued the Patient ID