DICOM Conformance Statement

for

Cerner CAMM

Release 6.2

Revision 6.2.6

Cerner Corporation

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2 Conformance Statement Overview

Cerner CAMM (Care Aware Multimedia) consists of the following application entities using DICOM functionality:

DICOM Server

Rules Engine

HL7 Server

IQD (Image Queue Demon)

CAMM Archive Web User Interface

ProVision Web

ProVision Workstation

UWS/PWS (Universal Workstation Services/Public Workstation Services)

LTA Client (Long Term Archive Client)

2.1 DICOM Server Application Entity

The DICOM Server is a single application entity of Cerner CAMM and is used for archiving diagnostic medical images and other DICOM objects. It conforms to the DICOM standard to allow the sharing of medical information with other digital imaging systems and provides the following features:

it receives DICOM objects sent by remote applications and stores them in a database

it allows a remote system to query the database for DICOM objects and to retrieve them (hierarchical and relational)

it allows a remote system to get a commitment for the safekeeping of DICOM objects it has stored

it receives information about an imaging procedure step which a modality has performed and can forward it to a remote system

The DICOM Server application entity supports the following network services:

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Transfer		
Stored Print Storage	Yes	Yes
Hardcopy Grayscale Image Storage	Yes	Yes
Hardcopy Color Image Storage	Yes	Yes
Computed Radiography Image Storage	Yes	Yes
Digital X-Ray Image Storage – For Presentation	Yes	Yes
Digital X-Ray Image Storage – For Processing	Yes	Yes
Digital Mammography X-Ray Image Storage – For Presentation	Yes	Yes
Digital Mammography X-Ray Image Storage – For Processing	Yes	Yes
Digital Intra-oral X-Ray Image Storage – For Presentation	Yes	Yes
Digital Intra-oral X-Ray Image Storage – For Processing	Yes	Yes
CT Image Storage	Yes	Yes
Enhanced CT Image Storage	Yes	Yes

Ultrasound Multi-frame Image Storage (retired)	Yes	Yes
Ultrasound Multi-frame Image Storage	Yes	Yes
MR Image Storage	Yes	Yes
Enhanced MR Image Storage	Yes	Yes
MR Spectroscopy Storage	Yes	Yes
Nuclear Medicine Image Storage (retired)	Yes	Yes
Ultrasound Image Storage (retired)	Yes	Yes
Ultrasound Image Storage	Yes	Yes
Secondary Capture Image Storage	Yes	Yes
Multi-frame Single Bit Secondary Capture Image Storage	Yes	Yes
Multi-frame Grayscale Byte Secondary Capture Image Storage	Yes	Yes
Multi-frame Grayscale Word Secondary Capture Image Storage	Yes	Yes
Multi-frame True Color Secondary Capture Image Storage	Yes	Yes
Standalone Overlay Storage	Yes	Yes
Standalone Curve Storage	Yes	Yes
12-lead ECG Waveform Storage	Yes	Yes
General ECG Waveform Storage	Yes	Yes
Ambulatory ECG Waveform Storage	Yes	Yes
Hemodynamic Waveform Storage	Yes	Yes
Cardiac Electrophysiology Waveform Storage	Yes	Yes
Basic Voice Audio Waveform Storage	Yes	Yes
Standalone Modality LUT Storage	Yes	Yes
Standalone VOI LUT Storage	Yes	Yes
Grayscale Softcopy Presentation State Storage	Yes	Yes
X-Ray Angiographic Image Storage	Yes	Yes
X-Ray Radiofluoroscopic Image Storage	Yes	Yes
X-Ray Angiographic Bi-Plane Image Storage (retired)	Yes	Yes
Nuclear Medicine Image Storage	Yes	Yes
Raw Data Storage	Yes	Yes
Spatial Registration Storage	Yes	Yes
Spatial Fiducials Storage	Yes	Yes
Real World Value Mapping Storage	Yes	Yes
VL Endoscopic Image Storage	Yes	Yes
Video Endoscopic Image Storage	Yes	Yes
VL Microscopic Image Storage	Yes	Yes
Video Microscopic Image Storage	Yes	Yes
VL Slide-Coordinates Microscopic Image Storage	Yes	Yes
VL Photographic Image Storage	Yes	Yes
Video Photographic Image Storage	Yes	Yes
Ophthalmic Photography 8 Bit Image Storage	Yes	Yes
Ophthalmic Photography 16 Bit Image Storage	Yes	Yes
Stereometric Relationship Storage	Yes	Yes

Basic Text SR Storage	Yes	Yes
Enhanced SR Storage	Yes	Yes
Comprehensive SR Storage	Yes	Yes
Mammography CAD SR Storage	Yes	Yes
Key Object Selection Document Storage	Yes	Yes
Chest CAD SR Storage	Yes	Yes
X-Ray Radiation Dose SR Storage	Yes	Yes
Encapsulated PDF Storage	Yes	Yes
Positron Emission Tomography Image Storage	Yes	Yes
Standalone PET Curve Storage	Yes	Yes
RT Image Storage	Yes	Yes
RT Dose Storage	Yes	Yes
RT Structure Set Storage	Yes	Yes
RT Beams Treatment Record Storage	Yes	Yes
RT Plan Storage	Yes	Yes
RT Brachy Treatment Record Storage	Yes	Yes
RT Treatment Summary Record Storage	Yes	Yes
RT Ion Plan Storage	Yes	Yes
RT Ion Beams Treatment Record Storage	Yes	Yes
Query/Retrieve		
Patient Root Query/Retrieve Information Model – FIND	No	Yes
Patient Root Query/Retrieve Information Model – MOVE	No	Yes
Study Root Query/Retrieve Information Model – FIND	No	Yes
Study Root Query/Retrieve Information Model – MOVE	No	Yes
Workflow Management		
Modality Performed Procedure Step	Yes	Yes
Storage Commitment Push Model	No	Yes

Table 1: Network Services of the Dicom Server Application Entity

2.2 Rules Engine Application Entity

The Rules Engine is a single application entity of the Cerner CAMM Archive and is a means to control the data flow in the PACS. The rules engine reacts on events reported from externally by creating jobs and watching their execution. The assignment of jobs to events is managed by rules which can be defined by the Rules Engine GUI within the CAMM Archive Web User Interface application entity.

The rules engine application entity supports the following SOP Classes:

SOP Classes	**User of Service (SCU)**	**Provider of Service (SCP)**
Query/Retrieve		
Patient Root Query/Retrieve Information Model – MOVE	Yes	No
Study Root Query/Retrieve Information Model – MOVE	Yes	No

Table 2: Network Services of the Rules Engine Application Entity

2.3 HL7 Server Application Entity

The HL7 Server application entity is able to accept HL7 (Health Level 7) compliant messages. It is □onfigureable how to react to these messages. The HL7 Server is able to generate DICOM Structured Reports from incoming HL7 Reports.
The HL7 Server application entity supports the following SOP Classes:

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Transfer		
Basic Text SR Storage	Yes	No

Table 3: Network Services of the HL7 Server Application Entity

2.4 IQD Application Entity

The IQD is a single application entity of the Cerner CAMM Archive and is a means to control the data flow in the PACS. It is able to initiate DICOM transfers.

The IQD application entity supports the following SOP Classes:

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Query/Retrieve		
Patient Root Query/Retrieve Information Model – MOVE	Yes	No
Study Root Query/Retrieve Information Model – MOVE	Yes	No

Table 4: Network Services of the IQD Application Entity

2.5 CAMM Archive Web User Interface Application Entity

The CAMM Archive Web User Interface application entity contains the ProVision Web application entity. It allows a web user to

query remote application entities for DICOM objects and retrieve them

order a remote application entity to send DICOM objects to another remote application entity

store local DICOM files to remote application entities

The CAMM Archive Web User Interface application entity supports the following network services:

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Transfer		
Stored Print Storage	Yes	No
Hardcopy Grayscale Image Storage	Yes	No
Hardcopy Color Image Storage	Yes	No
Computed Radiography Image Storage	Yes	No
Digital X-Ray Image Storage – For Presentation	Yes	No
Digital X-Ray Image Storage – For Processing	Yes	No

Digital Mammography X-Ray Image Storage – For Presentation	Yes	No
Digital Mammography X-Ray Image Storage – For Processing	Yes	No
Digital Intra-oral X-Ray Image Storage – For Presentation	Yes	No
Digital Intra-oral X-Ray Image Storage – For Processing	Yes	No
CT Image Storage	Yes	No
Enhanced CT Image Storage	Yes	No
Ultrasound Multi-frame Image Storage (retired)	Yes	No
Ultrasound Multi-frame Image Storage	Yes	No
MR Image Storage	Yes	No
Enhanced MR Image Storage	Yes	No
MR Spectroscopy Storage	Yes	No
Nuclear Medicine Image Storage (retired)	Yes	No
Ultrasound Image Storage (retired)	Yes	No
Ultrasound Image Storage	Yes	No
Secondary Capture Image Storage	Yes	No
Multi-frame Grayscale Byte Secondary Capture Image Storage	Yes	No
Multi-frame Grayscale Word Secondary Capture Image Storage	Yes	No
Multi-frame True Color Secondary Capture Image Storage	Yes	No
Standalone Overlay Storage	Yes	No
Standalone Curve Storage	Yes	No
12-lead ECG Waveform Storage	Yes	No
General ECG Waveform Storage	Yes	No
Ambulatory ECG Waveform Storage	Yes	No
Hemodynamic Waveform Storage	Yes	No
Cardiac Electrophysiology Waveform Storage	Yes	No
Basic Voice Audio Waveform Storage	Yes	No
Standalone Modality LUT Storage	Yes	No
Standalone VOI LUT Storage	Yes	No
Grayscale Softcopy Presentation State Storage	Yes	No
X-Ray Angiographic Image Storage	Yes	No
X-Ray Radiofluoroscopic Image Storage	Yes	No
X-Ray Angiographic Bi-Plane Image Storage (retired)	Yes	No
Nuclear Medicine Image Storage	Yes	No
Raw Data Storage	Yes	No
Spatial Registration Storage	Yes	No
Spatial Fiducials Storage	Yes	No
Real World Value Mapping Storage	Yes	No
VL Endoscopic Image Storage	Yes	No
Video Endoscopic Image Storage	Yes	No
VL Microscopic Image Storage	Yes	No
Video Microscopic Image Storage	Yes	No
VL Slide-Coordinates Microscopic Image Storage	Yes	No

VL Photographic Image Storage	Yes	No
Video Photographic Image Storage	Yes	No
Ophthalmic Photography 8 Bit Image Storage	Yes	No
Ophthalmic Photography 16 Bit Image Storage	Yes	No
Stereometric Relationship Storage	Yes	No
Basic Text SR Storage	Yes	No
Enhanced SR Storage	Yes	No
Comprehensive SR Storage	Yes	No
Mammography CAD SR Storage	Yes	No
Key Object Selection Document Storage	Yes	No
Chest CAD SR Storage	Yes	No
X-Ray Radiation Dose SR Storage	Yes	No
Encapsulated PDF Storage	Yes	No
Positron Emission Tomography Image Storage	Yes	No
Standalone PET Curve Storage	Yes	No
RT Image Storage	Yes	No
RT Dose Storage	Yes	No
RT Structure Set Storage	Yes	No
RT Beams Treatment Record Storage	Yes	No
RT Plan Storage	Yes	No
RT Brachy Treatment Record Storage	Yes	No
RT Treatment Summary Record Storage	Yes	No
RT Ion Plan Storage	Yes	No
RT Ion Beams Treatment Record Storage	Yes	No
Query/Retrieve		
Patient Root Query/Retrieve Information Model – FIND	Yes	No
Patient Root Query/Retrieve Information Model – MOVE	Yes	No
Study Root Query/Retrieve Information Model – FIND	Yes	No
Study Root Query/Retrieve Information Model – MOVE	Yes	No

Table 5: Network Services of the CAMM Archive Web User Interface Application Entity

2.6 ProVision Web Application Entity

The Cerner ProVision® Web application entity is part of the CAMM Archive Web UI application entity. It can be stored on a medium containing DICOM objects of a patient (see section **Error! Reference source not found.**). It is able to load and view local DICOM objects (i.e. of Cerner CAMM Archive or the medium) of the following SOP Classes:

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Transfer		
Hardcopy Grayscale Image Storage	Viewed	No
Hardcopy Color Image Storage	Viewed	No
Computed Radiography Image Storage	Viewed	No

Digital X-Ray Image Storage – For Presentation	Viewed	No
Digital X-Ray Image Storage – For Processing	Viewed	No
Digital Mammography X-Ray Storage – For Presentation	Viewed	No
Digital Mammography X-Ray Storage – For Processing	Viewed	No
Digital Intra-oral X-Ray Storage – For Presentation	Viewed	No
Digital Intra-oral X-Ray Storage – For Processing	Viewed	No
CT Image Storage	Viewed	No
Enhanced CT Image Storage	Viewed	No
Ultrasound Multi-Frame Image Storage (retired)	Viewed	No
Ultrasound Multi-Frame Image Storage	Viewed	No
MR Image Storage	Viewed	No
Enhanced MR Image Storage	Viewed	No
Nuclear Medicine Image Storage (retired)	Viewed	No
Ultrasound Image Storage (retired)	Viewed	No
Ultrasound Image Storage	Viewed	No
Secondary Capture Image Storage	Viewed	No
Multi-frame Single Bit Secondary Capture Image Storage	Viewed	No
Multi-frame Grayscale Byte Secondary Capture Image Storage	Viewed	No
Multi-frame Grayscale Word Secondary Capture Image Storage	Viewed	No
Multi-frame True Color Secondary Capture Image Storage	Viewed	No
Grayscale Softcopy Presentation State Storage	Viewed	No
X-Ray Angiographic Image Storage	Viewed	No
X-Ray Radiofluoroscopic Image Storage	Viewed	No
X-Ray Angiographic Bi-Plane Image Storage (retired)	Viewed	No
Nuclear Medicine Image Storage	Viewed	No
Visible Light Endoscopic Image Storage	Viewed	No
Video Endoscopic Image Storage	Viewed	No
Visible Light Microscopic Image Storage	Viewed	No
Video Microscopic Image Storage	Viewed	No
Visible Light Slide-Coordinates Microscopic Image Storage	Viewed	No
Visible Light Photographic Image Storage	Viewed	No
Video Photographic Image Storage	Viewed	No
Ophthalmic Photography 8 Bit Image Storage	Viewed	No
Ophthalmic Photography 16 Bit Image Storage	Viewed	No
Basic Text SR Storage	Viewed	No
Enhanced SR Storage	Viewed	No
Comprehensive SR Storage	Viewed	No
Key Object Selection Document Storage	Viewed	No
Positron Emission Tomography Image Storage	Viewed	No
RT Image Storage	Viewed	No

Table 6: Supported SOP Classes of Cerner ProVision® Web Application Entity

2.7 ProVision Workstation Application Entity

The Cerner ProVision® Workstation application entity is able to load and view DICOM objects (i.e. of Cerner CAMM Archive) of the following SOP Classes:

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Transfer		
Computed Radiography Image Storage	Viewed	No
Digital X-Ray Image Storage – For Presentation	Viewed	No
Digital Mammography X-Ray Storage – For Presentation	Viewed	No
CT Image Storage	Viewed	No
Enhanced CT Image Storage	Viewed	No
Ultrasound Multi-Frame Image Storage (retired)	Viewed	No
Ultrasound Multi-Frame Image Storage	Viewed	No
MR Image Storage	Viewed	No
Enhanced MR Image Storage	Viewed	No
Ultrasound Image Storage (retired)	Viewed	No
Ultrasound Image Storage	Viewed	No
Secondary Capture Image Storage	Viewed	No
Multi-frame Single Bit Secondary Capture Image Storage	Viewed	No
Multi-frame Grayscale Byte Secondary Capture Image Storage	Viewed	No
Multi-frame Grayscale Word Secondary Capture Image Storage	Viewed	No
Multi-frame True Color Secondary Capture Image Storage	Viewed	No
Grayscale Softcopy Presentation State Storage	Viewed	No
X-Ray Angiographic Image Storage	Viewed	No
X-Ray Radiofluoroscopic Image Storage	Viewed	No
Nuclear Medicine Image Storage	Viewed	No
Visible Light Endoscopic Image Storage	Viewed	No
Visible Light Microscopic Image Storage	Viewed	No
Visible Light Slide-Coordinates Microscopic Image Storage	Viewed	No
Visible Light Photographic Image Storage	Viewed	No
Mammography CAD SR Storage	Viewed	No
Positron Emission Tomography Image Storage	Viewed	No
RT Image Storage	Viewed	No

Table 7: Supported SOP Classes of Cerner ProVision® Workstation Application Entity

2.8 Cerner SkyVue™ Application Entity

The Cerner SkyVue™ application entity is able to load and view DICOM objects (i.e. of Cerner CAMM Archive) of the following SOP Classes:

SOP Classes	User of Service (SCU)	Provider of Service (SCP)

Transfer		
Computed Radiography Image Storage	Viewed	No
Digital X-Ray Image Storage – For Presentation	Viewed	No
Digital Mammography X-Ray Storage – For Presentation	Viewed	No
CT Image Storage	Viewed	No
Enhanced CT Image Storage	Viewed	No
Ultrasound Multi-Frame Image Storage (retired)	Viewed	No
Ultrasound Multi-Frame Image Storage	Viewed	No
MR Image Storage	Viewed	No
Enhanced MR Image Storage	Viewed	No
Ultrasound Image Storage (retired)	Viewed	No
Ultrasound Image Storage	Viewed	No
Secondary Capture Image Storage	Viewed	No
Multi-frame Single Bit Secondary Capture Image Storage	Viewed	No
Multi-frame Grayscale Byte Secondary Capture Image Storage	Viewed	No
Multi-frame Grayscale Word Secondary Capture Image Storage	Viewed	No
Multi-frame True Color Secondary Capture Image Storage	Viewed	No
Grayscale Softcopy Presentation State Storage	Viewed	No
X-Ray Angiographic Image Storage	Viewed	No
X-Ray Radiofluoroscopic Image Storage	Viewed	No
Nuclear Medicine Image Storage	Viewed	No
Visible Light Endoscopic Image Storage	Viewed	No
Visible Light Microscopic Image Storage	Viewed	No
Visible Light Slide-Coordinates Microscopic Image Storage	Viewed	No
Visible Light Photographic Image Storage	Viewed	No
Mammography CAD SR Storage	Viewed	No
Positron Emission Tomography Image Storage	Viewed	No
RT Image Storage	Viewed	No

Table 8: Supported SOP Classes of Cerner SkyVue™ Application Entity

2.9 UWS StoreDicom Application Entity

The Storage SCU of the UWS StoreDicom AE is able to send DICOM objects to a remote Storage SCP. It supports the following network services:

SOP Classes	**User of Service (SCU)**	**Provider of Service (SCP)**
Transfer		
Stored Print Storage	Yes	No
Hardcopy Grayscale Image Storage	Yes	No
Hardcopy Color Image Storage	Yes	No
Computed Radiography Image Storage	Yes	No

Digital X-Ray Image Storage – For Presentation	Yes	No
Digital X-Ray Image Storage – For Processing	Yes	No
Digital Mammography X-Ray Image Storage – For Presentation	Yes	No
Digital Mammography X-Ray Image Storage – For Processing	Yes	No
Digital Intra-oral X-Ray Image Storage – For Presentation	Yes	No
Digital Intra-oral X-Ray Image Storage – For Processing	Yes	No
CT Image Storage	Yes	No
Enhanced CT Image Storage	Yes	No
Ultrasound Multi-frame Image Storage (retired)	Yes	No
Ultrasound Multi-frame Image Storage	Yes	No
MR Image Storage	Yes	No
Enhanced MR Image Storage	Yes	No
MR Spectroscopy Storage	Yes	No
Nuclear Medicine Image Storage (retired)	Yes	No
Ultrasound Image Storage (retired)	Yes	No
Ultrasound Image Storage	Yes	No
Secondary Capture Image Storage	Yes	No
Multi-frame Grayscale Byte Secondary Capture Image Storage	Yes	No
Multi-frame Grayscale Word Secondary Capture Image Storage	Yes	No
Multi-frame True Color Secondary Capture Image Storage	Yes	No
Standalone Overlay Storage	Yes	No
Standalone Curve Storage	Yes	No
12-lead ECG Waveform Storage	Yes	No
General ECG Waveform Storage	Yes	No
Ambulatory ECG Waveform Storage	Yes	No
Hemodynamic Waveform Storage	Yes	No
Cardiac Electrophysiology Waveform Storage	Yes	No
Basic Voice Audio Waveform Storage	Yes	No
Standalone Modality LUT Storage	Yes	No
Standalone VOI LUT Storage	Yes	No
Grayscale Softcopy Presentation State Storage	Yes	No
X-Ray Angiographic Image Storage	Yes	No
X-Ray Radiofluoroscopic Image Storage	Yes	No
X-Ray Angiographic Bi-Plane Image Storage (retired)	Yes	No
Nuclear Medicine Image Storage	Yes	No
Raw Data Storage	Yes	No
Spatial Registration Storage	Yes	No
Spatial Fiducials Storage	Yes	No
Real World Value Mapping Storage	Yes	No
VL Endoscopic Image Storage	Yes	No
Video Endoscopic Image Storage	Yes	No
VL Microscopic Image Storage	Yes	No

Video Microscopic Image Storage	Yes	No
VL Slide-Coordinates Microscopic Image Storage	Yes	No
VL Photographic Image Storage	Yes	No
Video Photographic Image Storage	Yes	No
Ophthalmic Photography 8 Bit Image Storage	Yes	No
Ophthalmic Photography 16 Bit Image Storage	Yes	No
Stereometric Relationship Storage	Yes	No
Basic Text SR Storage	Yes	No
Enhanced SR Storage	Yes	No
Comprehensive SR Storage	Yes	No
Mammography CAD SR Storage	Yes	No
Key Object Selection Document Storage	Yes	No
Chest CAD SR Storage	Yes	No
X-Ray Radiation Dose SR Storage	Yes	No
Encapsulated PDF Storage	Yes	No
Positron Emission Tomography Image Storage	Yes	No
Standalone PET Curve Storage	Yes	No
RT Image Storage	Yes	No
RT Dose Storage	Yes	No
RT Structure Set Storage	Yes	No
RT Beams Treatment Record Storage	Yes	No
RT Plan Storage	Yes	No
RT Brachy Treatment Record Storage	Yes	No
RT Treatment Summary Record Storage	Yes	No
RT Ion Plan Storage	Yes	No
RT Ion Beams Treatment Record Storage	Yes	No

Table 8: Network Services of the UWS StoreDicom Application Entity

2.10 UWS/PWS StoreDicomEncapuslatedDoc Application Entity

The Storage SCU of the UWS/PWS StoreDicomEncapsulatedDoc AE is able to send generated DICOM Encapsulated Document objects to a remote Storage SCP. It supports the following SOP Classes:

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Transfer		
Encapsulated PDF Storage	Yes	No

Table 9: Network Services of the UWS/PWS StoreDicomEncapsulatedDoc Application Entity

2.11 UWS TransferDicom Application Entity

The Retrieve SCU of the UWS TransferDicom AE is able to initiate DICOM transfers. It supports the following SOP Classes:

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Query/Retrieve		
Patient Root Query/Retrieve Information Model – MOVE	Yes	No
Study Root Query/Retrieve Information Model – MOVE	Yes	No

Table 10: Network Services of the UWS TransferDicom Application Entity

2.12 LTA Client Application Entity

The LTA Client (Long Term Archive Client) AE is used for permanent archiving via the DICOM interface.

It is able to store DICOM objects to a remote system

It is able to request the safekeeping of DICOM objects

It is able to receive information about the safekeeping of DICOM objects

It is able to query remote systems for DICOM objects

It is able to retrieve DICOM objects (hierarchical) from remote systems

It is able to receives DICOM objects sent by remote applications

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Transfer		
Stored Print Storage	Yes	Yes
Hardcopy Grayscale Image Storage	Yes	Yes
Hardcopy Color Image Storage	Yes	Yes
Computed Radiography Image Storage	Yes	Yes
Digital X-Ray Image Storage – For Presentation	Yes	Yes
Digital X-Ray Image Storage – For Processing	Yes	Yes
Digital Mammography X-Ray Image Storage – For Presentation	Yes	Yes
Digital Mammography X-Ray Image Storage – For Processing	Yes	Yes
Digital Intra-oral X-Ray Image Storage – For Presentation	Yes	Yes
Digital Intra-oral X-Ray Image Storage – For Processing	Yes	Yes
CT Image Storage	Yes	Yes
Enhanced CT Image Storage	Yes	Yes
Ultrasound Multi-frame Image Storage (retired)	Yes	Yes
Ultrasound Multi-frame Image Storage	Yes	Yes
MR Image Storage	Yes	Yes
Enhanced MR Image Storage	Yes	Yes
MR Spectroscopy Storage	Yes	Yes
Nuclear Medicine Image Storage (retired)	Yes	Yes
Ultrasound Image Storage (retired)	Yes	Yes
Ultrasound Image Storage	Yes	Yes
Secondary Capture Image Storage	Yes	Yes

Multi-frame Single Bit Secondary Capture Image Storage	Yes	Yes
Multi-frame Grayscale Byte Secondary Capture Image Storage	Yes	Yes
Multi-frame Grayscale Word Secondary Capture Image Storage	Yes	Yes
Multi-frame True Color Secondary Capture Image Storage	Yes	Yes
Standalone Overlay Storage	Yes	Yes
Standalone Curve Storage	Yes	Yes
12-lead ECG Waveform Storage	Yes	Yes
General ECG Waveform Storage	Yes	Yes
Ambulatory ECG Waveform Storage	Yes	Yes
Hemodynamic Waveform Storage	Yes	Yes
Cardiac Electrophysiology Waveform Storage	Yes	Yes
Basic Voice Audio Waveform Storage	Yes	Yes
Standalone Modality LUT Storage	Yes	Yes
Standalone VOI LUT Storage	Yes	Yes
Grayscale Softcopy Presentation State Storage	Yes	Yes
X-Ray Angiographic Image Storage	Yes	Yes
X-Ray Radiofluoroscopic Image Storage	Yes	Yes
X-Ray Angiographic Bi-Plane Image Storage (retired)	Yes	Yes
Nuclear Medicine Image Storage	Yes	Yes
Raw Data Storage	Yes	Yes
Spatial Registration Storage	Yes	Yes
Spatial Fiducials Storage	Yes	Yes
Real World Value Mapping Storage	Yes	Yes
VL Endoscopic Image Storage	Yes	Yes
Video Endoscopic Image Storage	Yes	Yes
VL Microscopic Image Storage	Yes	Yes
Video Microscopic Image Storage	Yes	Yes
VL Slide-Coordinates Microscopic Image Storage	Yes	Yes
VL Photographic Image Storage	Yes	Yes
Video Photographic Image Storage	Yes	Yes
Ophthalmic Photography 8 Bit Image Storage	Yes	Yes
Ophthalmic Photography 16 Bit Image Storage	Yes	Yes
Stereometric Relationship Storage	Yes	Yes
Basic Text SR Storage	Yes	Yes
Enhanced SR Storage	Yes	Yes
Comprehensive SR Storage	Yes	Yes
Mammography CAD SR Storage	Yes	Yes
Key Object Selection Document Storage	Yes	Yes
Chest CAD SR Storage	Yes	Yes
X-Ray Radiation Dose SR Storage	Yes	Yes
Encapsulated PDF Storage	Yes	Yes
Positron Emission Tomography Image Storage	Yes	Yes

Standalone PET Curve Storage	Yes	Yes
RT Image Storage	Yes	Yes
RT Dose Storage	Yes	Yes
RT Structure Set Storage	Yes	Yes
RT Beams Treatment Record Storage	Yes	Yes
RT Plan Storage	Yes	Yes
RT Brachy Treatment Record Storage	Yes	Yes
RT Treatment Summary Record Storage	Yes	Yes
RT Ion Plan Storage	Yes	Yes
RT Ion Beams Treatment Record Storage	Yes	Yes
Query/Retrieve		
Patient Root Query/Retrieve Information Model – FIND	Yes	No
Patient Root Query/Retrieve Information Model – MOVE	Yes	No
Study Root Query/Retrieve Information Model – FIND	Yes	No
Study Root Query/Retrieve Information Model – MOVE	Yes	No
Workflow Management		
Storage Commitment Push Model	Yes	No

3 Introduction

3.1 Purpose of this Document

This document specifies the conformance of Cerner CAMM to the DICOM standard.

3.2 Revision History

Document Version	Date	Description
6.1.0	2009-09-15	New document for Cerner CAMM Release 6.1 created
6.1.1	2009-11-19	C-STORE and C-MOVE response status codes of the DICOM server added; C-STORE and C-MOVE response status code handling of SCUs added; Description added how embedded overlays are detected (images with embedded overlays shall not be compressed); IQD Application Entity added
6.1.2	2010-02-17	Mammography CAD SR Storage Support added for ProVision Workstation
6.2.0	2010-03-25	WADO transfer syntax parameter value “preserve” added to retrieve objects as they are currently stored within the archive; WADO quality parameter value is converted to a ratio 100/requestedQuality (rounded); DICOM server lossy compression ratio is converted to a quality = 100/configured ratio when performing JPEG lossy compression; number of j2k quality layers added when j2k compression is performed in WADO and with the DICOM server
	2010-07-23	LTA-Client added; Storage Commitment Request Status Codes of DICOM server added
6.2.1	2010-10-26	WADO implementation changed; Other Patient IDs (0010,1000) and Other Patient Names (0010,1001) supported in Query/Retrieve SCP
6.2.2	2011-01-20	Support for new SOP Classes added (DICOM server -, Web User Interface -, UWS StoreDicom -, LTA Client Application Entity): RT Ion Plan Storage (1.2.840.10008.5.1.4.1.1.481.8) RT Ion Beams Treatment Record Storage (1.2.840.10008.5.1.4.1.1.481.9) Spatial Registration Storage (1.2.840.10008.5.1.4.1.1.66.1) Spatial Fiducials Storage (1.2.840.10008.5.1.4.1.1.66.2) Real World Value Mapping Storage (1.2.840.10008.5.1.4.1.1.67) X-Ray Radiation Dose SR Storage (1.2.840.10008.5.1.4.1.1.88.67)
6.2.3	2011-04-20	The DICOM Server Application AET rejects images when high bit is not equal to bits stored -1 (C-STORE response failure status: Cannot Understand, C000).
6.2.4	2011-05-04	UWS TransferDicom Application Entity added; Cerner ProVision® Personal Disc Application Entity not supported anymore; ProVision Web Light Application Entity not supported anymore
6.2.5	2011-05-31	Retrieve SCP Application Entity: Patient’s Age (0010,1010) attribute will be contained in any composite SOP Instances exported to a C-MOVE Destination AE WADO: Patient’s Age (0010,1010) attribute will be contained in any composite SOP Instances requested as content type “application/dicom”

6.2.6	2013-02-22	Removed all references to RLE Lossless and Explicit VR Big Endian Transfer Syntax.

Table 11: Revision History

3.3 Audience

This document is intended for hospital staff and health system integrators. It is assumed that the reader has a working understanding of DICOM.

3.4 Remarks

Not applicable.

3.5 Definitions, Terms and Abbreviations

The following definitions, terms and abbreviations are used in this document. They are defined within the different parts of the DICOM standard.

AE	Application Entity
AET	Application Entity Title
CR	Computerized radiography
CT	Computerized tomography
DICOM	Digital Imaging and Communications in Medicine
DIMSE	DICOM Message Service Element
FSC	File Set Creator
IE	Information Entity
IHE	Integrating the Healthcare Enterprise
IOD	Information Object Definition
MR	Magnetic Resonance
NEMA	National Electrical Manufacturers Association
PDU	Protocol Data Unit
PDI	Portable Data for Imaging
MPPS	Modality Performed Procedure Step
SCP	Service Class Provider
SCU	Service Class User
SOP	Service-Object Pair
TCP/IP	Transmission Control Protocol/Internet Protocol
TLS	Transport Layer Security
UID	Unique Identifier
US	Ultrasound
VM	Value Multiplicity
VR	Value Representation

Table 12: Common Definitions, Terms, and Abbreviations

3.6 References

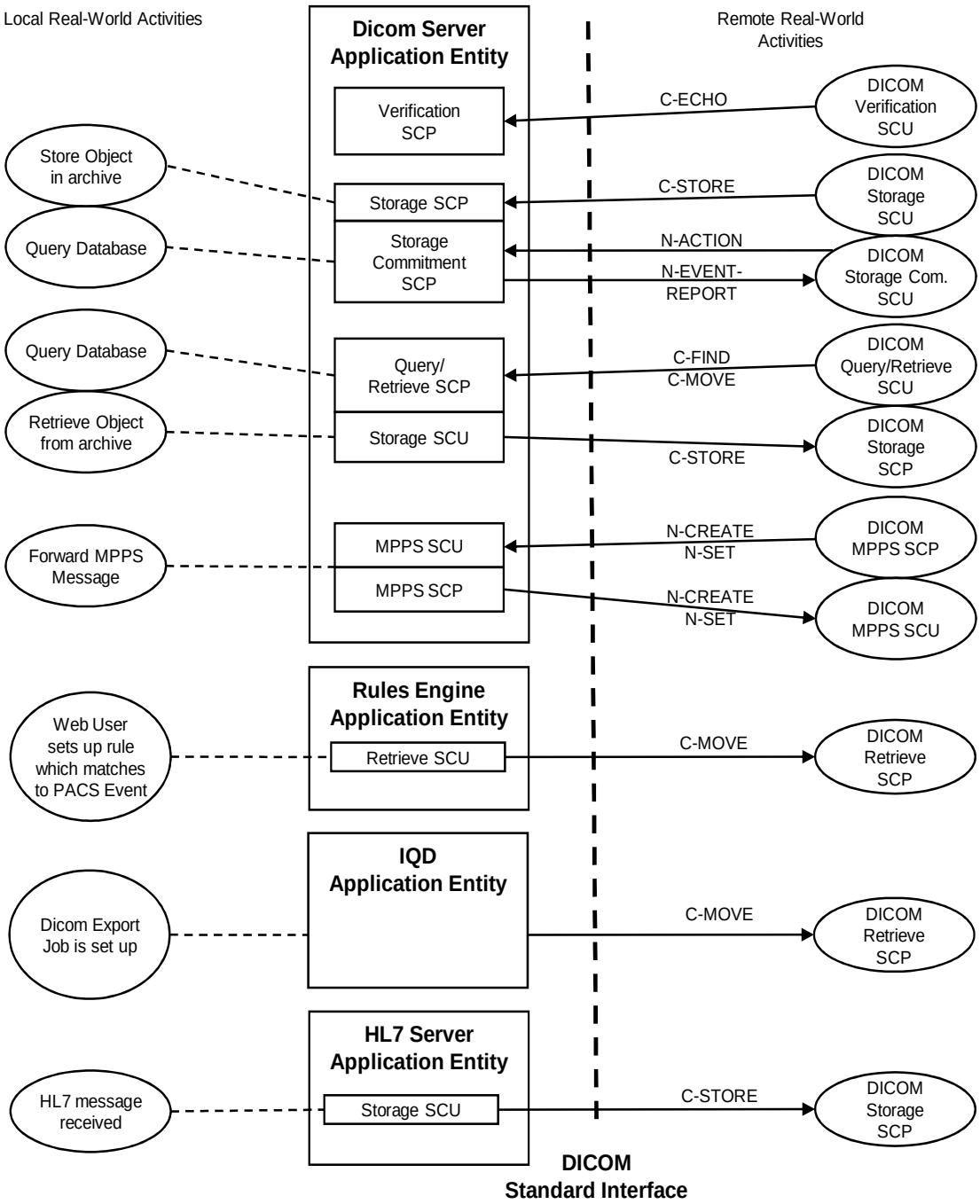
[DICOM] Digital Imaging and Communications in Medicine (DICOM), NEMA PS 3.1 – 3.18, 2004

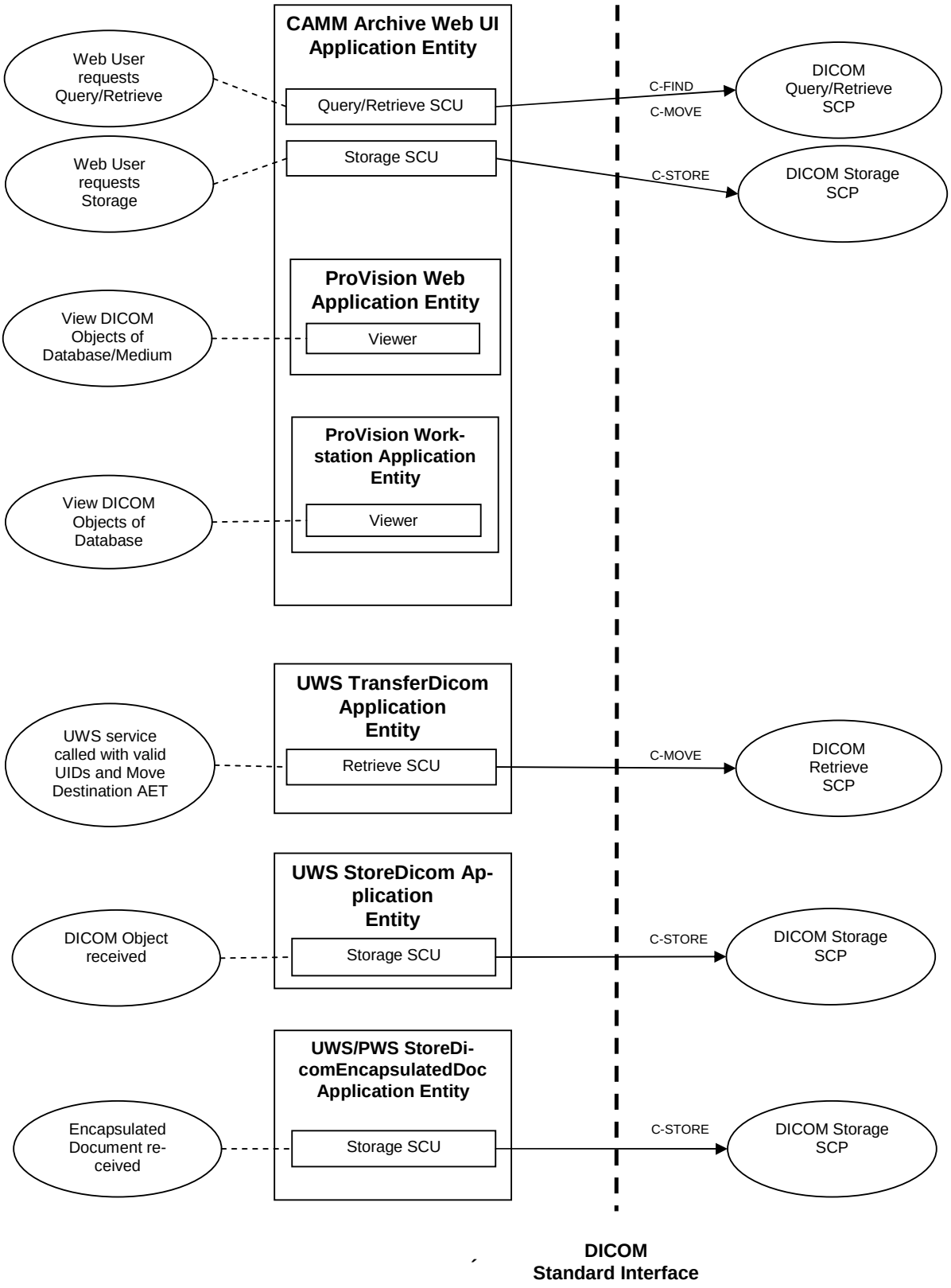
4 Networking

4.1 Implementation Model

4.1.1 Application Data Flow Diagram

Cerner CAMM consists of several application entities. The related application data flow is shown in Figure 1.




CAMM Archive Web UI Application Entity
Query/Retrieve SCU
Storage SCU
Web User requests Query/Retrieve
Web User requests Storage
C-FIND
C-MOVE
C-STORE
DICOM Query/Retrieve SCP
DICOM Storage SCP
ProVision Web Application Entity
Viewer
View DICOM Objects of Database/Medium
ProVision Work-station Application Entity
Viewer
View DICOM Objects of Database
UWS TransferDicom Application Entity
Retrieve SCU
UWS service called with valid UIDs and Move Destination AET
C-MOVE
DICOM Retrieve SCP
UWS StoreDicom Application Entity
Storage SCU
DICOM Object received
C-STORE
DICOM Storage SCP
UWS/PWS StoreDicomEncapsulatedDoc Application Entity
Storage SCU
Encapsulated Document received
C-STORE
DICOM Storage SCP
DICOM Standard Interface

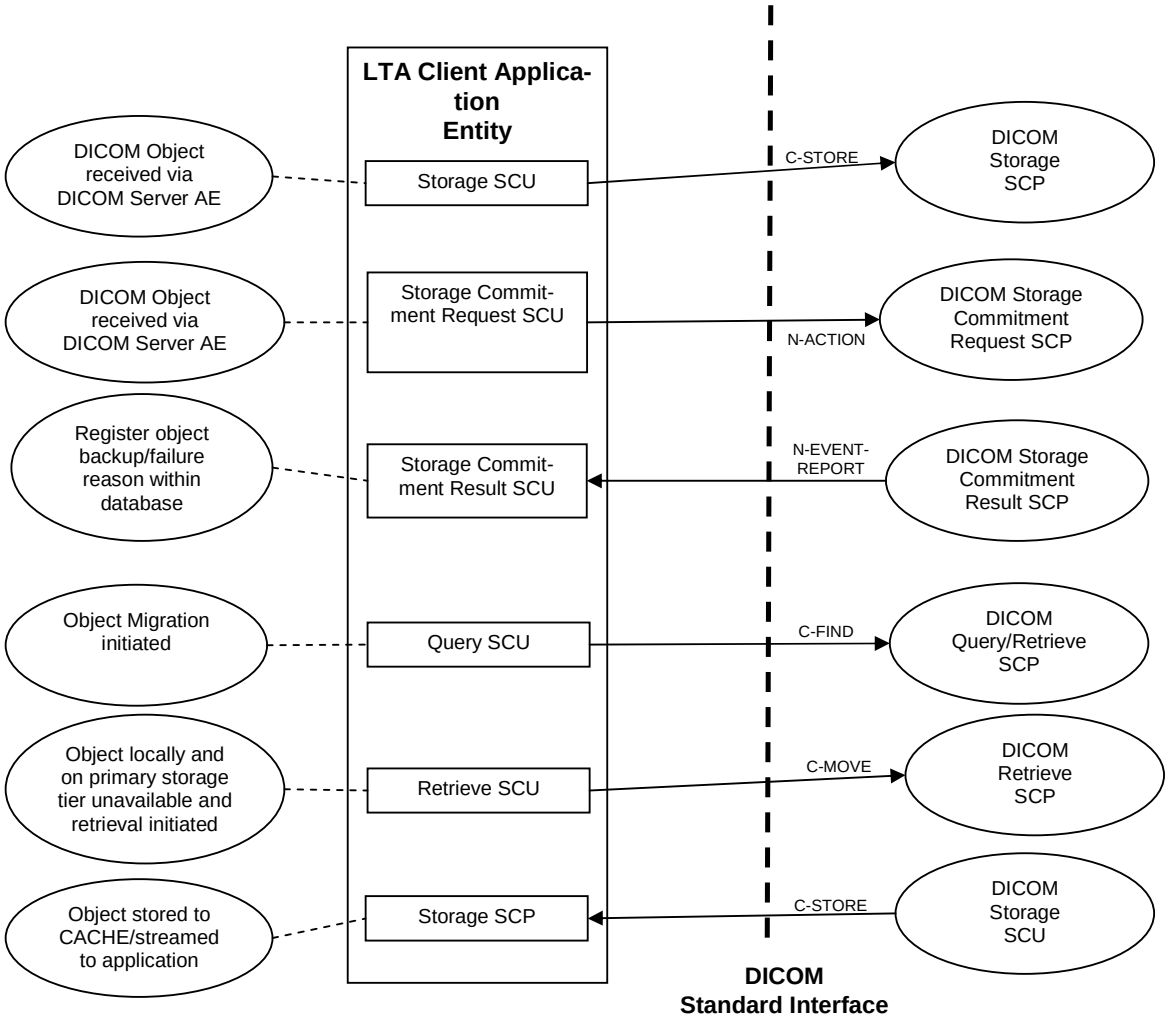


Figure 1: The Cerner CAMM Application Data Flow

The Verification SCP of the DICOM Server AE is able to respond to external Verification requests.

The Storage SCP of the DICOM Server AE is able to receive incoming DICOM objects and to store them in the database.

The Storage Commitment SCP of the DICOM Server AE is able to handle Storage Commitment Push Model requests. A DICOM Storage Commitment SCU is able to get a commitment for the safekeeping of objects the DICOM Server has stored in the database.

The Query/Retrieve SCP of the DICOM Server AE together with the Storage SCU is able to handle incoming query and retrieve requests. They can handle queries for Patient, Study, Series, and Image data. The Query/Retrieve SCP handles object retrieval requests by issuing a command to the Storage SCU to send the requested objects to the destination specified by the remote Query/Retrieve SCU.

The MPPS SCU of the DICOM Server AE is able to receive MPPS messages, which contain information about procedure steps the Modality has performed. The MPPS SCP can forward them to a remote MPPS SCU.

The Retrieve SCU of the Rules Engine AE is able to send move requests to a specified destination.

The Storage SCU of the HL7 Server AE is able to send generated DICOM Structured Report objects to a remote Storage SCP.

The Query/Retrieve SCU of the CAMM Archive Web User Interface is able to query remote Query/Retrieve AEs for lists of patients, studies, series and instances and to retrieve them from remote Query/Retrieve SCPs.

The Storage SCU of the CAMM Archive Web User Interface is able to send local DICOM files to a remote Storage SCP.

The Viewer of the ProVision Web AE is able to load and display local DICOM images, Structured Reports, Presentation States and Key Objects.

The Viewer of the ProVision Workstation AE is able to load and display DICOM images and Presentation States.

The Storage SCU of the UWS StoreDicom AE is able to send DICOM objects to a remote Storage SCP.

The Storage SCU of the UWS/PWS StoreDicomEncapsulatedDoc AE is able to send generated DICOM Encapsulated Document objects to a remote Storage SCP.

The Retrieve SCU of the UWS TransferDicom AE is able to send move requests to a specified destination.

The Storage Commitment Request SCU of the LTA Client AE is able to send Storage Commitment Request requests to remote Storage Commitment Request SCPs.

The Storage Commitment Result SCU of the LTA Client AE is able to receive Storage Commitment Result requests from remote Storage Commitment Result SCPs.

The Storage SCU of the LTA Client AE is able to send DICOM objects to a remote Storage SCP.

The Query SCU of the LTA Client AE is able to query remote Query SCPs for DICOM objects.

The Retrieve SCU of the LTA Client AE is able to send move requests to a specified destination.

The Storage SCP of the LTA Client AE is able to receive DICOM objects sent by remote Storage SCUs.

4.1.2 Functional Definitions of AE's

4.1.2.1 DICOM Server Application Entity

The DICOM Server AE implements the DICOM Verification Service Class as SCP, the DICOM Storage Service Class as SCP and SCU, the DICOM Storage Commitment Service Class as SCP, the DICOM Query/Retrieve Service Class as SCP, and the DICOM Modality Performed Procedure Step Service Class as SCP and as SCU.

The Verification SCP will respond to external Verification requests (C-ECHO) with presentation contexts for SOP Class of the Verification Service Class.

The Storage SCP will accept associations with presentation contexts for Storage SOP classes. Any objects received on such presentation contexts will be stored into the database (C-STORE).

If a Storage Commitment Push Model N-ACTION request is received, the Storage Commitment SCP will immediately check if the referenced Composite SOP instances are in the database and return an N-EVENT-REPORT notification via a new association.

The Query/Retrieve SCP will accept associations with presentation contexts for SOP classes of the DICOM Query/Retrieve Service Class. It will handle query (C-FIND) and retrieve requests (C-MOVE) on these presentation contexts and respond with data objects with values corresponding to the contents of the database. For C-MOVE requests the destination for the objects is determined from the destination AE Title contained in the C-MOVE request. When a retrieval request is received, the Query/Retrieve SCP issues a command to the Storage SCU to send (C-STORE) the specified objects to the C-MOVE destination AE.

The MPPS SCU will accept associations with presentation contexts for Modality Performed Procedure Step Service Classes. If a remote MPPS SCP AE sends an N-CREATE / N-SET request to the DICOM Server, the MPPS SCP can forward these messages to a remote MPPS SCU.

4.1.2.2 Rules Engine Application Entity

The Retrieve SCU is able to send C-MOVE requests to a specified destination with presentation contexts for SOP Class of the Query/Retrieve Service Class. The C-MOVE request depends on the rule the user has set up in the CAMM Archive Web User Interface application entity.

4.1.2.3 HL7 Server Application Entity

The Storage SCU of the HL7 Server AE is able to send C-STORE requests for DICOM Structured Report objects to a remote Storage SCP. The C-STORE request depends on the HL7 message which has been received.

4.1.2.4 IQD Application Entity

The Retrieve SCU is able to send C-MOVE requests to a specified destination with presentation contexts for the Query/Retrieve Service Class.

4.1.2.5 CAMM Archive Web User Interface Application Entity

When a web user fills out a query mask, selects a remote AE (stored in the database) where to send the query and presses the search button, the Query SCU sends a C-FIND request to the remote AE. The User Interface then displays the result of the query.

When a web user has queried an AE as described above, has selected a study or series, has selected a remote AE where to send the retrieve request and has pressed the transfer button, the Retrieve SCU sends a C-MOVE request to the remote AE. The User Interface then displays the result of the transfer.

The Storage SCU of the CAMM Archive Web User Interface is able to send C-STORE requests for local DICOM files to a remote Storage SCP.

4.1.2.6 The ProVision Web Application Entity

The ProVision Web AE is able to load and display local DICOM images, Structured Reports, Presentation States and Key Objects.

4.1.2.7 The ProVision Workstation Application Entity

The ProVision Workstation AE is able to load and display DICOM images and Presentation States.

4.1.2.8 The UWS StoreDicom Application Entity

The Storage SCU of the UWS StoreDicom AE is able to send C-STORE requests to a remote Storage SCP.

4.1.2.9 The UWS/PWS StoreDicomEncapsulatedDoc Application Entity

The Storage SCU of the UWS StoreDicomEncapsulatedDoc AE is able to send C-STORE requests for DICOM Encapsulated Documents to a remote Storage SCP.

4.1.2.10 The UWS TransferDicom Application Entity

The Retrieve SCU is able to send C-MOVE requests to a specified destination with presentation contexts for the Query/Retrieve Service Class.

4.1.2.11 The LTA Client Application Entity

The Storage Commitment Request SCU of the LTA Client AE is able to send N-ACTION requests to remote Storage Commitment Request SCPs with presentation contexts for SOP Class of the Storage Commitment Service Class.

The Storage Commitment Result SCU of the LTA Client AE is able to receive N-EVENT-REPORT requests from remote Storage Commitment Result SCPs with presentation contexts for SOP Class of the Storage Commitment Service Class. Only N-EVENT-REPORTs containing valid Transaction UIDs are processed.

The Storage SCU is able to send C-STORE requests for local DICOM files to a remote Storage SCP with presentation contexts for SOP Class of the Storage Service Class.

The Query SCU is able to send C-FIND requests to a remote Query SCP with presentation contexts for SOP Class of the Query/Retrieve Service Class.

The Retrieve SCU is able to send C-MOVE requests to a specified destination with presentation contexts for SOP Class of the Query/Retrieve Service Class.

The Storage SCP will accept associations with presentation contexts for Storage SOP classes (C-STORE). Only objects requested via the LTA Client AE's Storage Commitment Request SCU received on such presentation contexts will be stored to the local cache and streamed to the requesting application.

4.1.3 Sequencing of Real-World Activities

The Verification, Storage and Query/Retrieve SCP activities of the DICOM Server AE are performed asynchronously in the background and not dependent on any sequencing.

The Query/Retrieve SCU and Storage SCU of the CAMM Archive Web UI activities are sequentially initiated in the user interface, and another activity may not be initiated until the prior activity has completed.

The other SCP and SCU activities are described in more detail (see below).

4.1.4 File Meta Information for Implementation Class and Version

File Meta Information Version	00, 01
implementation class UID	2.16.840.1.113669.632.2.2.5
implementation version name	PVP-7.4-dcm4che

Table 13: File Meta Information of Cerner CAMM Archive

4.2 Application Entity Specification

4.2.1 Association Policies

4.2.1.1 General

Each application entity of the Cerner CAMM Archive accepts and proposes the DICOM standard application context name for DICOM:

Application Context Name	1.2.840.10008.3.1.1.1

Table 14: Dicom Application Context

4.2.1.2 Implementation identifying Information

Each application entity of the Cerner CAMM Archive provides the following implementation class UID and implementation version name:

implementation class UID	2.16.840.1.113669.632.2.2.5
implementation version name	PVP-7.4-dcm4che

Table 15: Implementation Class UID and Version Name for Cerner CAMM Archive AEs

4.2.2 Dicom Server Application Entity

4.2.2.1 Association Policies

4.2.2.1.1 General

The DICOM standard application context name for DICOM is always accepted and proposed (see Table 14).

The DICOM Server AE can both accept and propose Association Requests. It will accept Association Requests for Verification, Storage, Storage Commitment Push Model, Query/Retrieve and MPPS Services. The DICOM Server AE will propose Association Requests for Storage Commitment Push Model, Storage and MPPS Services.

The DICOM Server AE will issue a status and the appropriate error code as defined in Part 7 of the DICOM Standard. It will issue a result and the appropriate reason as defined in Part 8 of the DICOM Standard, if an Association has been rejected.

4.2.2.1.2 Number of Associations

The DICOM Server will spawn a new thread for each association request that it receives. The number of simultaneous associations, which will be accepted by the DICOM Server, can be configured and is limited by the kernel parameters of the underlying operating system.

Maximum number of simultaneous Associations	50 (Configurable)

Table 16: Number of Associations accepted for the DICOM Server

4.2.2.1.3 Asynchronous Nature

Not applicable.

4.2.2.1.4 Implementation identifying Information

The DICOM Server AE provides the implementation class UID and implementation version name listed in Table 15.

4.2.2.2 Verification SCP

4.2.2.2.1 SOP Classes

The Verification SCP of the DICOM Server AE provides Standard Conformance to the DICOM Verification Service Class as a SCP:

SOP Class Name	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	No	Yes

Table 17: Supported SOP Class for Verification SCP

4.2.2.2.2 Association Initiation Policy

The Verification SCP does not initiate Associations.

4.2.2.2.3 Association Acceptance Policy

4.2.2.2.3.1 Activity – Verification Request from External Peer AE

4.2.2.2.3.1.1 Description and Sequencing of Activity

The Verification SCP will accept Association Requests for the Verification Service (C-ECHO).

4.2.2.2.3.1.2 Accepted Presentation Contexts

The Verification SCP will accept Presentation Contexts as shown in the following table:

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax Name	Transfer Syntax UID	Role	Extended Negotiation
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

Table 18: Accepted Presentation Contexts for Verification SCP

4.2.2.2.3.1.3 SOP Specific Conformance for Verification SOP Class

Standard conformance is provided to the DICOM Verification Service Class as a SCP. The Verification Service as a SCP is actually only supported as a diagnostic service tool for network communication issues.

4.2.2.3 Storage SCP

4.2.2.3.1 SOP Classes

The Storage SCP of the DICOM Server application entity provides Standard Conformance to the following DICOM Storage SOP Classes as SCP:

SOP Class Name	SOP Class UID	SCU	SCP
Stored Print Storage	1.2.840.10008.5.1.1.27	No	Yes
Hardcopy Grayscale Image Storage	1.2.840.10008.5.1.1.29	No	Yes
Hardcopy Color Image Storage	1.2.840.10008.5.1.1.30	No	Yes
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	No	Yes
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	No	Yes
Digital X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	No	Yes
Digital Mammography X-Ray Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.2	No	Yes
Digital Mammography X-Ray Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	No	Yes
Digital Intra-oral X-Ray Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.3	No	Yes
Digital Intra-oral X-Ray Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.3.1	No	Yes
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	No	Yes
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	No	Yes
Ultrasound Multi-Frame Image Storage (retired)	1.2.840.10008.5.1.4.1.1.3	No	Yes
Ultrasound Multi-Frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	No	Yes
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	No	Yes
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	No	Yes

MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2	No	Yes
Nuclear Medicine Image Storage (retired)	1.2.840.10008.5.1.4.1.1.5	No	Yes
Ultrasound Image Storage (retired)	1.2.840.10008.5.1.4.1.1.6	No	Yes
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	No	Yes
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	No	Yes
Multi-frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	No	Yes
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	No	Yes
Multi-frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	No	Yes
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	No	Yes
Standalone Overlay Storage	1.2.840.10008.5.1.4.1.1.8	No	Yes
Standalone Curve Storage	1.2.840.10008.5.1.4.1.1.9	No	Yes
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	No	Yes
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	No	Yes
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	No	Yes
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1	No	Yes
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1	No	Yes
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1	No	Yes
Standalone Modality LUT Storage	1.2.840.10008.5.1.4.1.1.10	No	Yes
Standalone VOI LUT Storage	1.2.840.10008.5.1.4.1.1.11	No	Yes
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	No	Yes
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	No	Yes
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	No	Yes
X-Ray Angiographic Bi-Plane Image Storage (retired)	1.2.840.10008.5.1.4.1.1.12.3	No	Yes
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	No	Yes
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66	No	Yes
Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.1	No	Yes
Spatial Fiducials Storage	1.2.840.10008.5.1.4.1.1.66.2	No	Yes
Real World Value Mapping Storage	1.2.840.10008.5.1.4.1.1.67	No	Yes
Visible Light Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	No	Yes
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	No	Yes
Visible Light Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	No	Yes
Video Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2.1	No	Yes
Visible Light Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3	No	Yes
Visible Light Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	No	Yes
Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1	No	Yes
Ophthalmic Photography 8 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	No	Yes
Ophthalmic Photography 16 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.2	No	Yes
Stereometric Relationship Storage	1.2.840.10008.5.1.4.1.1.77.1.5.3	No	Yes
Basic Text SR Storage	1.2.840.10008.5.1.4.1.1.88.11	No	Yes

Enhanced SR Storage	1.2.840.10008.5.1.4.1.1.88.22	No	Yes
Comprehensive SR Storage	1.2.840.10008.5.1.4.1.1.88.33	No	Yes
Mammography CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.50	No	Yes
Key Object Selection Document Storage	1.2.840.10008.5.1.4.1.1.88.59	No	Yes
Chest CAD SR	1.2.840.10008.5.1.4.1.1.88.65	No	Yes
X-Ray Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.67	No	Yes
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	No	Yes
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	No	Yes
Standalone PET Curve Storage	1.2.840.10008.5.1.4.1.1.129	No	Yes
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	No	Yes
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	No	Yes
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	No	Yes
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4	No	Yes
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	No	Yes
RT Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6	No	Yes
RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7	No	Yes
RT Ion Plan Storage	1.2.840.10008.5.1.4.1.1.481.8	No	Yes
RT Ion Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.9	No	Yes

Table 19: Supported SOP Classes for Storage SCP

4.2.2.3.2 Association Initiation Policy

The Storage SCP does not initiate Associations.

4.2.2.3.3 Association Acceptance Policy

4.2.2.3.3.1 Activity – Storage Request from External Peer AE

4.2.2.3.3.1.1 Description and Sequencing of Activity

The DICOM Server accepts associations from nodes that wish to store DICOM objects in the database using the C-STORE command.

The DICOM Server can be configured to compress DICOM images to the formats JPEG Baseline Process 1/ JPEG Extended Process 2 & 4, JPEG Lossless Proc. 14, Value 1, JPEG 2000 Lossless or JPEG 2000 Lossless or Lossy. Images with pixel data containing embedded overlays and palette color images[1] will not be compressed. Embedded overlays are assumed to exist if one of the following conditions is true:

1. that Overlay Bit Position (60xx,0102) is present and not zero
2. that Overlay Data (60xx,3000) is absent but Overlay Bit Allocated (60xx,0100) is present and not zero.

The associated real-world activity is the storage of the DICOM object on the storage medium. The data set of the C-STORE command is stored with no loss of information, if the containing pixel data is not lossy compressed.

4.2.2.3.3.1.2 Accepted Presentation Contexts

The DICOM Server will accept any number of storage SOP classes that are listed in Table 19 above. It defines no limit for the number of presentation contexts accepted.

[1] Images with Photometric Interpretation (0028,0004) having value „PALETTE COLOR“

The DICOM Server supports the Implicit/Explicit VR Little Endian Transfer Syntax for Non-Image Storage as specified in Table 21. For Image Storage it supports the Implicit/Explicit VR Little Endian, JPEG Baseline Process 1, the JPEG Extended Process 2 & 4, the JPEG Lossless Process 14 (Selection Value 1), the JPEG 2000 Lossless and the JPEG 2000 Lossless or Lossy Transfer Syntax as specified in the Table 22.

The DICOM Server can be configured to accept JPEG Lossless, Non-Hierarchical (Process 14), JPEG-LS Lossless Image Compression and JPEG-LS Lossy (Near-Lossless) Image Compression for Image Storage.

The following Presentation Contexts are accepted, if a remote Storage SCU wants to store DICOM objects:

Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Stored Print Storage	1.2.840.10008.5.1.1.27	Transfer Syntaxes for Non-Image Storage Services		SCP	None
Hardcopy Grayscale Image Storage	1.2.840.10008.5.1.1.29	Transfer Syntaxes for Image Storage Services		SCP	None
Hardcopy Color Image Storage	1.2.840.10008.5.1.1.30	Transfer Syntaxes for Image Storage Services		SCP	None
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Transfer Syntaxes for Image Storage Services		SCP	None
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Transfer Syntaxes for Image Storage Services		SCP	None
Digital X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Transfer Syntaxes for Image Storage Services		SCP	None
Digital Mammography X-Ray Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.2	Transfer Syntaxes for Image Storage Services		SCP	None
Digital Mammography X-Ray Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	Transfer Syntaxes for Image Storage Services		SCP	None
Digital Intra-oral X-Ray Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.3	Transfer Syntaxes for Image Storage Services		SCP	None
Digital Intra-oral X-Ray Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.3.1	Transfer Syntaxes for Image Storage Services		SCP	None
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Transfer Syntaxes for Image Storage Services		SCP	None
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	Transfer Syntaxes for Image Storage Services		SCP	None
Ultrasound Multi-Frame Image Storage (retired)	1.2.840.10008.5.1.4.1.1.3	Transfer Syntaxes for Video Storage Services		SCP	None
Ultrasound Multi-Frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Transfer Syntaxes for Video Storage Services		SCP	None
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Transfer Syntaxes for Image Storage Services		SCP	None

Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	Transfer Syntaxes for Image Storage Services	SCP	None
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2	Transfer Syntaxes for Non-Image Storage Services	SCP	None
Nuclear Medicine Image Storage (retired)	1.2.840.10008.5.1.4.1.1.5	Transfer Syntaxes for Image Storage Services	SCP	None
Ultrasound Image Storage (retired)	1.2.840.10008.5.1.4.1.1.6	Transfer Syntaxes for Image Storage Services	SCP	None
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Transfer Syntaxes for Image Storage Services	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Transfer Syntaxes for Image Storage Services	SCP	None
Multi-frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	Transfer Syntaxes for Video Storage Services	SCP	None
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	Transfer Syntaxes for Video Storage Services	SCP	None
Multi-frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	Transfer Syntaxes for Video Storage Services	SCP	None
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Transfer Syntaxes for Video Storage Services	SCP	None
Standalone Overlay Storage	1.2.840.10008.5.1.4.1.1.8	Transfer Syntaxes for Non-Image Storage Services	SCP	None
Standalone Curve Storage	1.2.840.10008.5.1.4.1.1.9	Transfer Syntaxes for Non-Image Storage Services	SCP	None
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	Transfer Syntaxes for Non-Image Storage Services	SCP	None
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	Transfer Syntaxes for Non-Image Storage Services	SCP	None
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	Transfer Syntaxes for Non-Image Storage Services	SCP	None
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1	Transfer Syntaxes for Non-Image Storage Services	SCP	None
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1	Transfer Syntaxes for Non-Image Storage Services	SCP	None
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1	Transfer Syntaxes for Non-Image Storage Services	SCP	None
Standalone Modality LUT Storage	1.2.840.10008.5.1.4.1.1.10	Transfer Syntaxes for Non-Image Storage Services	SCP	None

Standalone VOI LUT Storage	1.2.840.10008.5.1.4.1.1.11	Transfer Syntaxes for Non-Image Storage Services	SCP	None
Grayscale Soft-copy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	Transfer Syntaxes for Non-Image Storage Services	SCP	None
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Transfer Syntaxes for Image Storage Services	SCP	None
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	Transfer Syntaxes for Image Storage Services	SCP	None
X-Ray Angiographic Bi-Plane Image Storage (retired)	1.2.840.10008.5.1.4.1.1.12.3	Transfer Syntaxes for Image Storage Services	SCP	None
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	Transfer Syntaxes for Image Storage Services	SCP	None
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66	Transfer Syntaxes for Non-Image Storage Services	SCP	None
Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.1	Transfer Syntaxes for Non-Image Storage Services	SCP	None
Spatial Fiducials Storage	1.2.840.10008.5.1.4.1.1.66.2	Transfer Syntaxes for Non-Image Storage Services	SCP	None
Real World Value Mapping Storage	1.2.840.10008.5.1.4.1.1.67	Transfer Syntaxes for Non-Image Storage Services	SCP	None
Visible Light Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	Transfer Syntaxes for Image Storage Services	SCP	None
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	Transfer Syntaxes for Video Storage Services	SCP	None
Visible Light Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	Transfer Syntaxes for Image Storage Services	SCP	None
Video Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2.1	Transfer Syntaxes for Video Storage Services	SCP	None
Visible Light Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3	Transfer Syntaxes for Image Storage Services	SCP	None
Visible Light Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	Transfer Syntaxes for Image Storage Services	SCP	None
Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1	Transfer Syntaxes for Video Storage Services	SCP	None
Ophthalmic Photography 8 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	Transfer Syntaxes for Image Storage Services	SCP	None
Ophthalmic Photography 16 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.2	Transfer Syntaxes for Image Storage Services	SCP	None

Stereometric Relationship Storage	1.2.840.10008.5.1.4.1.1.77.1.5.3	Transfer Syntaxes for Non-Image Storage Services	SCP	None
Basic Text SR Storage	1.2.840.10008.5.1.4.1.1.88.11	Transfer Syntaxes for Non-Image Storage Services	SCP	None
Enhanced SR Storage	1.2.840.10008.5.1.4.1.1.88.22	Transfer Syntaxes for Non-Image Storage Services	SCP	None
Comprehensive SR Storage	1.2.840.10008.5.1.4.1.1.88.33	Transfer Syntaxes for Non-Image Storage Services	SCP	None
Mammography CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.50	Transfer Syntaxes for Non-Image Storage Services	SCP	None
Key Object Selection Document Storage	1.2.840.10008.5.1.4.1.1.88.59	Transfer Syntaxes for Non-Image Storage Services	SCP	None
Chest CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.65	Transfer Syntaxes for Non-Image Storage Services	SCP	None
X-Ray Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.67	Transfer Syntaxes for Non-Image Storage Services	SCP	None
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Transfer Syntaxes for Non-Image Storage Services	SCP	None
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	Transfer Syntaxes for Image Storage Services	SCP	None
Standalone PET Curve Storage	1.2.840.10008.5.1.4.1.1.129	Transfer Syntaxes for Non-Image Storage Services	SCP	None
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	Transfer Syntaxes for Image Storage Services	SCP	None
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	Transfer Syntaxes for Non-Image Storage Services	SCP	None
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	Transfer Syntaxes for Non-Image Storage Services	SCP	None
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4	Transfer Syntaxes for Non-Image Storage Services	SCP	None
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	Transfer Syntaxes for Non-Image Storage Services	SCP	None
RT Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6	Transfer Syntaxes for Non-Image Storage Services	SCP	None
RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7	Transfer Syntaxes for Non-Image Storage Services	SCP	None
RT Ion Plan Storage	1.2.840.10008.5.1.4.1.1.481.8	Transfer Syntaxes for Non-Image Storage Services	SCP	None
RT Ion Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.9	Transfer Syntaxes for Non-Image Storage Services	SCP	None

Table 20: Accepted Presentation Contexts for Storage SCP

Name	**UID**

Implicit VR Little Endian	1.2.840.10008.1.2
Explicit VR Little Endian	1.2.840.10008.1.2.1

Table 21: Accepted Transfer Syntaxes for Non-Image Storage Services

Name	UID
Implicit VR Little Endian	1.2.840.10008.1.2
Explicit VR Little Endian	1.2.840.10008.1.2.1
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
JPEG Lossless, Non-Hierarchical (Process 14)**Error! Bookmark not defined.**	1.2.840.10008.1.2.4.57
JPEG Lossless Proc. 14, Value 1	1.2.840.10008.1.2.4.70
JPEG-LS Lossless Image Compression**Error! Bookmark not defined.**	1.2.840.10008.1.2.4.80
JPEG-LS Lossy (Near-Lossless) Image Compression**Error! Bookmark not defined.**	1.2.840.10008.1.2.4.81
JPEG 2000 Lossless	1.2.840.10008.1.2.4.90
JPEG 2000 Lossless or Lossy	1.2.840.10008.1.2.4.91

Table 22: Accepted Transfer Syntaxes for Image Storage Services

Name	UID
Implicit VR Little Endian	1.2.840.10008.1.2
Explicit VR Little Endian	1.2.840.10008.1.2.1
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
JPEG Lossless, Non-Hierarchical (Process 14)**Error! Bookmark not defined.**	1.2.840.10008.1.2.4.57
JPEG Lossless Proc. 14, Value 1	1.2.840.10008.1.2.4.70
JPEG-LS Lossless Image Compression**Error! Bookmark not defined.**	1.2.840.10008.1.2.4.80
JPEG-LS Lossy (Near-Lossless) Image Compression**Error! Bookmark not defined.**	1.2.840.10008.1.2.4.81
JPEG 2000 Lossless	1.2.840.10008.1.2.4.90
JPEG 2000 Lossless or Lossy	1.2.840.10008.1.2.4.91
MPEG2 Main Profile @ Main Level	1.2.840.10008.1.2.4.100

Table 23: Accepted Transfer Syntaxes for Video Storage Services

4.2.2.3.3.1.3 SOP Specific Conformance for Storage SOP Classes

The DICOM Server supports Level 2 (Full) conformance for the Storage SOP Classes.

The DICOM Server will issue a failure status if it is unable to store the DICOM object on the storage medium or unable to announce it to the database.
The DICOM Server rejects images when the high bit (0028,0102) is not equal to bits stored (0028,0101) - 1 and returns C-STORE response failure status “Cannot Understand” (Status Code: C000).The following C-STORE response status codes may be returned by the DICOM server:

Service Status	Further Meaning	Status Code	Behavior
Success	Success	0000	The DICOM server has successfully stored the

			SOP instance. Success indication message is output to the Service Logs.
			The DICOM server has detected that the SOP instance already exists in the database. The Object is not stored again. A “duplicate instance” indication message is output to the Service Logs.
Refused	Out of Resources	A700	The DICOM server has not successfully stored the SOP instance. An error comment is sent to the requesting SCU. Error indication message is output to the Service Logs.
Error	Cannot Understand	C000	The DICOM server has not successfully stored the SOP instance. An error comment is sent to the requesting SCU. Error indication message is output to the Service Logs.

Table 24: C-STORE Response Status Codes of Storage SCP

The duration of storage of DICOM objects is dependent on the installation type and the configuration of the PACS. The PACS can be installed as a permanent or temporary archive. DICOM object deletion is possible as follows:

1. Permanent Archive:
   a. the operator can configure the duration of storage within Cerner CAMM Archive Web UI (Storage Lifetime Management)
   b. manual DICOM object deletion is possible even after a storage commitment within Cerner CAMM Archive Web UI
2. Temporary Archive:
   a. Default: Automatic object deletion even after storage commitment.
   b. Study Overwrite Mode:
      As in default, but a complete study will be replaced by new incoming study data after a configurable period of time there was no storage for that study. External Dicom applications are responsible for re-sending the complete study in this case to avoid a loss of data. The use of this mode is not recommended for typical workflows. Please contact Cerner for more detailed information.
   c. manual DICOM object deletion is possible even after a storage commitment within Cerner CAMM Archive Web UI

When the DICOM server is configured to compress JPEG2000 lossless, images are compressed with 6 JPEG2000 quality layers (layer ratios: 50, 40, 30, 20, 10, 0).

When the DICOM server is configured to compress JPEG2000 lossy, a ratio can be defined between 2 and 10. Then images are compressed with 5 JPEG2000 quality layers (layer ratios: 50, 40, 30, 20, configured ratio).

In the case of lossy image compression the following values are put into the DICOM object:

Name	Tag	Value
Derivation Description	0008,2111	*Configured lossy compression ratio*
Lossy image Compression	0028,2110	“01”
Lossy Image Compression Ratio	0028,2112	*Configured lossy compression ratio*
Lossy Image Compression Method	0028,2114	“ISO_10918_1” *for JPEG Lossy Compression* “ISO_15444_1” *for JPEG 2000 Irreversible Compression*

Table 25: Modified DICOM Elements in Case of Lossy Image Compression

When JPEG Lossy Compression is done the configured ratio is converted to the JPEG quality = 100/configuredRatio (not rounded).

The DICOM Standard defines some criteria for grouping composite instances into a specific series (cp. PS 3.3 – Series IE). The DICOM server verifies the following conditions before an object is stored:

1. Object has the same modality as the according series in the database
2. Object has the same station name as the according series in the database
3. Only images respectively non-images are stored in one series.

In the case that one of the above conditions is not met, the DICOM server rejects the object. The verification can be configured to be turned off.

4.2.2.4 Storage Commitment Request SCP

4.2.2.4.1 SOP Classes

The DICOM Server provides Standard Conformance to the DICOM Storage Commitment Push Model SOP Class as Request SCP:

SOP Class Name	SOP Class UID	SCU	SCP
Storage Commitment Push Model	1.2.840.10008.1.20.1	No	Yes

Table 26: Supported SOP Class for Storage Commitment Request SCP

4.2.2.4.2 Association Initiation Policy

4.2.2.4.2.1 Activity – Send Storage Commitment Notification over new Association

4.2.2.4.2.1.1 Description and Sequencing of Activity

The DICOM Server provides commitment for the safekeeping of DICOM objects which previously have been stored in the database.

If an application successfully establishes an association with the DICOM Server and makes a valid N-ACTION request to initiate the Storage Commitment Push Model service class, the Storage Commitment Request SCP will look up at the database to check if the requested objects exist. The Storage Commitment Request SCP will immediately attempt to initialize a second association to the remote Storage Commitment Request SCU and send the appropriate notification using the N-EVENT-REPORT request.

If a Referenced SOP Instance UID of the N-ACTION request cannot be found within the database, the N-EVENT-REPORT contains a Failed SOP Sequence (0008,1198) with the Failure Reason (0008,1197) 0x0112 (No Such Object Instance).

If the SOP Class UID of a Referenced SOP Instance UID does not correspond to the SOP Class UID stored within the database for this instance, the N-EVENT-REPORT contains a Failed SOP Sequence with the Failure Reason 0x0119 (Class Instance Conflict).

4.2.2.4.2.1.2 Proposed Presentation Contexts

The DICOM Server will propose an association over Storage Commitment Push Model Service Class and Implicit/Explicit VR Little Endian Transfer Syntax:

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax Name	Transfer Syntax UID	Role	Extended Negotiation
Storage Commitment Push Model	1.2.840.10008.1.20.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

Table 27: Proposed Presentation Context of Storage Commitment Request SCP

4.2.2.4.3 Association Acceptance Policy

4.2.2.4.3.1 Activity – Receive Storage Commitment Request

The DICOM Server accepts associations from nodes which wish to get a commitment for the safekeeping of DICOM objects it has stored.

4.2.2.4.3.1.1 Description and Sequencing of Activities

The application entity which wishes to get a storage commitment sends an N-ACTION request to the DICOM Server. The N-ACTION request for the Storage Commitment Push Model specifies a list of objects which have been previously stored on the system supporting the DICOM Server. The DICOM Server sends the N-ACTION response message with the status value set to SUCCESS, checks all objects it was told about and immediately sends an N-EVENT-REPORT request to the remote peer application entity.

The N-EVENT-REPORT request specifies a list all objects the peer application entity is asking for and which can be retrieved from the node supporting the DICOM Server.

4.2.2.4.3.1.2 Accepted Presentation Contexts

The DICOM Server defines no limit for the number of presentation contexts accepted. It supports the Implicit/Explicit VR Little Endian transfer syntax:

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax Name	Transfer Syntax UID	Role	Extended Negotiation
Storage Commitment Push Model	1.2.840.10008.1.20.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

Table 28: Accepted Presentation Contexts for Storage Commitment Request SCP

4.2.2.4.3.1.3 SOP specific Conformance

The storage duration of DICOM objects can be limited. It depends on the installation type and the configuration of the PACS as described in section 4.2.2.3.3.1.3.

The following N-ACTION response status codes may be returned by the DICOM server:

Service Status	Further Meaning	Status Code	Behavior
Success	Success	0000	No errors occurred. The Dicom Server has successfully received the N-ACTION request. The server will immediately send an N-EVENT-REPORT back to the requesting AET. Success indication message is output to the Service Logs.
Failure	Processing failure	0110	Reason: one of the following errors occurred: Storage Commitment destination unknown Internal Database error Dataset is missing in request Value Multiplicity of Transaction UID is not 1 Value Representation of Referenced SOP Sequence is not SQ The Dicom Server will NOT send an N-EVENT-REPORT. An error comment is sent to the requesting AET. Error indication message is output to the Service Logs.

Failure	No Such Object Instance	0112	Reason: Requested SOP Instance of the command set is not Storage Commitment Push Model SOP Instance (1.2.840.10008.1.20.1.1). The Dicom Server will NOT send an N-EVENT-REPORT. An error comment is sent to the requesting AET. Error indication message is output to the Service Logs.
Failure	No Such SOP Class	0118	Reason: Requested SOP Class of the command set is not Storage Commitment Push Model SOP Class (1.2.840.10008.1.20.1). The Dicom Server will NOT send an N-EVENT-REPORT. An error comment is sent to the requesting AET. Error indication message is output to the Service Logs.
Failure	Missing Attribute	0120	Reason: N-ACTION Request cannot be processed because one of the following required attribute is missing from the N-ACTION Request Data Set: Transaction UID (0008,1195) Referenced SOP Sequence (0008,1199) Referenced SOP Instance UID (0008,1155) Referenced SOP Class UID (0008,1150) The Dicom Server will NOT send an N-EVENT-REPORT. An error comment is sent to the requesting AET. Error indication message is output to the Service Logs.
Failure	Missing Attribute Value	0121	Reason: N-ACTION Request cannot be processed because a Type 1 attribute in the N-ACTION Request Data Set has no value for one of the following attributes: Transaction UID (0008,1195) Referenced SOP Sequence (0008,1199) Referenced SOP Instance UID (0008,1155) Referenced SOP Class UID (0008,1150) The Dicom Server will NOT send an N-EVENT-REPORT. An error comment is sent to the requesting AET. Error indication message is output to the Service Logs.
Failure	No Such Action Type	0123	Reason: Action Type ID of the command set is not 1. The Dicom Server will NOT send an N-EVENT-REPORT. An error comment is sent to the requesting AET. Error indication message is output to the Service Logs.

Table 29: Storage Commitment Request Status Codes of Storage Commitment Request SCP

4.2.2.5 Query/Retrieve SCP

4.2.2.5.1 SOP Classes

The Query/Retrieve SCP provides Standard Conformance to the following DICOM SOP Query/Retrieve Classes:

SOP Class Name	SOP Class UID	SCU	SCP
Patient Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	No	Yes
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	No	Yes
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	No	Yes
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	No	Yes

Table 30: SOP Classes for Query/Retrieve SCP

4.2.2.5.2 Association Initiation Policy

The Query/Retrieve SCP does not initiate Associations.

4.2.2.5.3 Association Acceptance Policy

The DICOM Server will accept any number of queried SOP Classes that are listed in Table 30 above and defines no limit for the number of presentation contexts accepted.

The Query/Retrieve SCP accepts C-FIND and C-MOVE Association Requests from external DICOM AEs.

4.2.2.5.3.1 Activity – Handling Query and Retrieval Requests

4.2.2.5.3.1.1 Description and Sequencing of Activities

The DICOM Server provides to perform query/retrieve operations on the DICOM objects, which previously have been stored in the database.

The real-world activity associated with C-FIND and C-MOVE requests are the query and retrieval operations initiated by another application. An application queries the DICOM Server for patient/study/series/image information that has been previously stored in the database and can request to send DICOM objects to a third application.

The Query/Retrieve SCP accepts Associations only if they have valid Presentation Contexts. If none of the requested Presentation Contexts are accepted then the Association Request itself is rejected. It can be configured to only accept Associations with certain AE Titles.

4.2.2.5.3.1.2 Accepted Presentation Contexts

The DICOM Server supports the Implicit/Explicit VR Little Endian transfer syntax.

Table 31 shows the presentation contexts that may be accepted by the DICOM Server for query operations.

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax Name	Transfer Syntax UID	Role	Extended Negotiation
Patient Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
Study Root Query/Retrieve	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

Information Model – FIND		Explicit VR Little Endian	1.2.840.10008.1.2.1		
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

Table 31: Accepted Presentation Contexts for Query/Retrieve SCP

4.2.2.5.3.1.3 SOP Specific Conformance for Query/Retrieve SOP Classes

The DICOM Server supports hierarchical and relational query/retrievals.

Exported SOP Instances are always updated with the latest values in the database prior to export. Thus, a change in Patient demographic information will be contained in both the C-FIND Responses and any composite SOP Instances exported to a C-MOVE Destination AE.
The following DICOM attributes are updated in the DICOM header during export by the information known to the CAMM archive database which is typically controlled by the RIS or an administrator:

Patient ID (0010,0020)
Patient Name (0010,0010)
Patient Birth Date (0010,0030)
Patient Birth Time (0010,0032)
Patient Sex (0010,0040)
Other Patient ID list (0010,1000)
Other Patient Name list (0010,1001)
Patient Age (at time of study) (0010,1010)
Study Instance UID (0020,000D)
Study Description (0008,1030)
Study Date (0008,0020)
Study Time (0008,0030)
Accession Number (0008,0050)
Study ID (0020,0010)
Referring Physician Name (0008,0090)

The Patient's Age (0010,1010) attribute value is calculated by subtracting the Patient's Birth Date database value from the Study Date database value. If either no Patient's Birthdate or Study Date is available within the database or the calculated value is not in the specified range (000D - 999Y), the Patient's Age is empty, i.e. a zero length field is added to the composite. If the Patient's Age DICOM Header field does not exist in the original DICOM header it is added. If the patient age exists in the original object its content will be overwritten by the calculated value.

The value of the Patient's Age value is formatted as follows:

1. Newborn - 000D: (patient is 0 hours to 24 hours)
2. Pediatrics - 001D - 061D (patient is 24 hours to 2 months)
3. Toddler - 002M - 023M (patient is 2 months to 24 months)
4. Child and Older - 002Y - 999Y (patient is 2 years or older)

The following C-MOVE response status codes may be returned by the DICOM server:

Service Status	Further Meaning	Status Codes	Behavior
Failure	Refused: Out of Resources – Unable to calculate number of matches	A701	Number of matches cannot be determined due to no objects found (for all requested UIDs). Error message is output to the Service Log.
	Refused: Out of Resources – Unable to perform sub-operations	A702	C-STORE sub-operations cannot be performed due to a database failure. Error message is output to the Service Log.

	Refused: Move Destination unknown	A801	The Destination Application Entity named in the C-MOVE Request is unknown to the DICOM server. Error message is output to the Service Log.
	Unable to Process	C000	All the Composite SOP Instances have not been successfully sent to the C-MOVE Destination AE. I.e. all C-STORE response status codes are of service status failure (i.e. not 0000, 0111, B000, B006, B007, D000). Error message is output to the Service Log.
Cancel	Sub-operations terminated due to Cancel Indication	FE00	The C-MOVE SCU sent a Cancel Request. This has been acknowledged and the export of Composite SOP Instances to the C-MOVE Destination AE has been halted.
Warning	Sub-operations Complete – One or more Failures	B000	At least on Composite SOP Instance has been successfully sent to the C-MOVE Destination AE, but with a C-STORE response status code of warning (i.e. 0000, 0111, B000, B006, B007, D000). Warning message is output to the Service Log.
Success	Sub-operations Complete – No Failures	0000	All the Composite SOP Instances have been successfully sent to the C-MOVE Destination AE.
Pending	Sub-operations are continuing	FF00	A Response with this Status Code is sent every time a Composite SOP Instance has been successfully sent to the C-MOVE Destination AE.

Table 32: C-MOVE Response Status Codes of Query/Retrieve SCP

The Query/Retrieve SCP supports lists of UIDs in the C-MOVE Request at the Study, Series, and Image Levels. The list of UIDs must be at the Level of the C-MOVE Request however.

An initial C-MOVE Response is always sent after confirming that the C-MOVE Request itself can be processed. After this, the Query/Retrieve SCP will return a response to the C-MOVE SCU after the Storage SCU has attempted to send each image. This response reports the number of remaining SOP Instances to transfer and the number of transferred instances having a successful, failed or warning status.

The DICOM Server supports the C-CANCEL Request during a query/retrieve operation.

Table 33 and Table 34 below indicate which keys are supported by the DICOM Server for the Patient Root Query/Retrieve Information Model and Study Root Query/Retrieve Information Model. Time attributes can only be queried for in conjunction with date attributes.

The DICOM Server provides the FIND and MOVE SOP classes listed in Table 30 above. It supports single value matching (S), List of UID matching (L), universal matching (U), wild card matching (*), and range matching (R). “NONE” indicates that no matching is supported, but that values for this Element in the database can be returned.

Name	Tag	Types of Matching
PATIENT Level		
Patient Name	0010,0010	S,*,U

Patient ID	0010,0020	S,*,U,L
Patient's Birth Date	0010,0030	S,*,U, R
Patient's Birth Time	0010,0032	S,*,U, R
Patient's Sex	0010,0040	S,*,U
Other Patient IDs	0010,1000	S,*,U
Other Patient Names	0010,1001	NONE
STUDY Level		
Study Date	0008,0020	S,*,U,R
Study Time	0008,0030	S,*,U,R
Accession Number	0008,0050	S,*,U
Modalities in Study	0008,0061	S,*,U,R
Referring Physician Name	0008,0090	S,*,U
Study Description	0008,1030	S,*,U
Study Instance UID	0020,000D	UNIQUE,L
Study ID	0020,0010	S,*,U
Number of Study Related Series	0020,1206	NONE
Number of Study Related Instances	0020,1208	NONE
SERIES Level		
Series Date	0008,0021	S,*,U,R
Series Time	0008,0031	S,*,U,R
Retrieve AE Title	0008,0054	NONE
Modality	0008,0060	S,*,U,L
Manufacturer	0008,0070	NONE
Station Name	0008,1010	NONE
Series Description	0008,103E	S,*,U
Body Part Examined	0018,0015	S,*,U
Patient Position	0018,5100	S,*,U
View Position	0018,5101	S,*,U
Series Instance UID	0020,000E	UNIQUE,L
Series Number	0020,0011	S,*,U
Laterality	0020,0016	S,*,U
Number of Series Related Instances	0020,1209	NONE
IMAGE Level		
SOP Class UID	0008,0016	S,*,U,L
SOP Instance UID	0008,0018	UNIQUE,L
Content Date	0008,0023	NONE
Content Time	0008,0033	NONE
Instance Availability	0008,0056	NONE
Code value	0008,0100	NONE
Coding Scheme Designator	0008,0102	NONE
Coding Scheme Version	0008,0103	NONE
Code Meaning	0008,0104	NONE

Referenced Series Sequence	0008,1115	NONE
> Series Instance UID	> 0020,000E	NONE
> Referenced Image Sequence	> 0008,1140	NONE
>> Referenced SOP Instance UID	>> 00081155	NONE
Instance Number	0020,0013	S,*,U
Photometric Interpretation	0028,0004	NONE
Number of Frames	0028,0008	S,*,U
Rows	0028,0010	S,*,U
Columns	0028,0011	S,*,U
Bits Allocated	0028,0100	S,*,U
Bits Stored	0028,0101	S,*,U
Observation DateTime	0040,A032	NONE
Completion Flag	0040,A491	NONE
Completion Flag Description	0040,A492	NONE
Verification Flag	0040,A493	NONE
Content Label	0070,0080	NONE
Content Description	0070,0081	NONE
Presentation Creation Date	0070,0082	NONE
Presentation Creation Time	0070,0083	NONE
Content Creator's Name	0070,0084	NONE

Table 33: Patient Root Supported Elements

Name	Tag	Types of Matching
STUDY Level		
Study Date	0008,0020	S,*,U,R
Study Time	0008,0030	S,*,U,R
Accession Number	0008,0050	S,*,U
Modalities in Study	0008,0061	S,*,U,R
Referring Physician Name	0008,0090	S,*,U
Study Description	0008,1030	S,*,U
Patient Name	0010,0010	S,*,U
Patient ID	0010,0020	S,*,U,L
Study Instance UID	0020,000D	UNIQUE,L
Study ID	0020,0010	S,*,U
Number of Study Related Series	0020,1206	NONE
Number of Study Related Instances	0020,1208	NONE
SERIES Level		
Series Date	0008,0021	S,*,U,R
Series Time	0008,0031	S,*,U,R
Retrieve AE Title	0008,0054	NONE
Modality	0008,0060	S,*,U,L
Manufacturer	0008,0070	NONE

Station Name	0008,1010	NONE
Series Description	0008,103E	S,*,U
Body Part Examined	0018,0015	S,*,U
Patient Position	0018,5100	S,*,U
View Position	0018,5101	S,*,U
Series Instance UID	0020,000E	UNIQUE,L
Series Number	0020,0011	S,*,U
Laterality	0020,0016	S,*,U
Number of Series Related Instances	0020,1209	S,*,U
IMAGE Level		
SOP Class UID	0008,0016	S,*,U,L
SOP Instance UID	0008,0018	UNIQUE,L
Content Date	0008,0023	NONE
Content Time	0008,0033	NONE
Instance Availability	0008,0056	NONE
Code value	0008,0100	NONE
Coding Scheme Designator	0008,0102	NONE
Coding Scheme Version	0008,0103	NONE
Code Meaning	0008,0104	NONE
Referenced Series Sequence	0008,1115	NONE
> Series Instance UID	> 0020,000E	NONE
> Referenced Image Sequence	> 0008,1140	NONE
>> Referenced SOP Instance UID	>> 0008,1155	NONE
Instance Number	0020,0013	S,*,U
Photometric Interpretation	0028,0004	NONE
Number of Frames	0028,0008	S,*,U
Rows	0028,0010	S,*,U
Columns	0028,0011	S,*,U
Bits Allocated	0028,0100	S,*,U
Bits Stored	0028,0101	S,*,U
Observation DateTime	0040,A032	NONE
Completion Flag	0040,A491	NONE
Completion Flag Description	0040,A492	NONE
Verification Flag	0040,A493	NONE
Content Label	0070,0080	NONE
Content Description	0070,0081	NONE
Presentation Creation Date	0070,0082	NONE
Presentation Creation Time	0070,0083	NONE
Content Creator's Name	0070,0084	NONE

Table 34: Study Root Supported Elements

4.2.2.6 Storage SCU

4.2.2.6.1 SOP Classes

The Storage SCU provides standard conformance to the following DICOM Storage SOP Classes:

SOP Class Name	SOP Class UID	SCU	SCP
Stored Print Storage	1.2.840.10008.5.1.1.27	Yes	No
Hardcopy Grayscale Image Storage	1.2.840.10008.5.1.1.29	Yes	No
Hardcopy Color Image Storage	1.2.840.10008.5.1.1.30	Yes	No
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Yes	No
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Yes	No
Digital X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Yes	No
Digital Mammography X-Ray Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.2	Yes	No
Digital Mammography X-Ray Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	Yes	No
Digital Intra-oral X-Ray Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.3	Yes	No
Digital Intra-oral X-Ray Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.3.1	Yes	No
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Yes	No
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	Yes	No
Ultrasound Multi-Frame Image Storage (retired)	1.2.840.10008.5.1.4.1.1.3	Yes	No
Ultrasound Multi-Frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Yes	No
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Yes	No
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	Yes	No
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2	Yes	No
Nuclear Medicine Image Storage (retired)	1.2.840.10008.5.1.4.1.1.5	Yes	No
Ultrasound Image Storage (retired)	1.2.840.10008.5.1.4.1.1.6	Yes	No
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Yes	No
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Yes	No
Multi-frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	Yes	No
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	Yes	No
Multi-frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	Yes	No
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Yes	No
Standalone Overlay Storage	1.2.840.10008.5.1.4.1.1.8	Yes	No
Standalone Curve Storage	1.2.840.10008.5.1.4.1.1.9	Yes	No
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	Yes	No
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	Yes	No
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	No	Yes
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1	Yes	No
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1	Yes	No
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1	Yes	No
Standalone Modality LUT Storage	1.2.840.10008.5.1.4.1.1.10	Yes	No

Standalone VOI LUT Storage	1.2.840.10008.5.1.4.1.1.11	Yes	No
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	Yes	No
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Yes	No
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	Yes	No
X-Ray Angiographic Bi-Plane Image Storage (retired)	1.2.840.10008.5.1.4.1.1.12.3	Yes	No
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	Yes	No
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66	Yes	No
Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.1	Yes	No
Spatial Fiducials Storage	1.2.840.10008.5.1.4.1.1.66.2	Yes	No
Real World Value Mapping Storage	1.2.840.10008.5.1.4.1.1.67	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 Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3	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
Ophthalmic Photography 8 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	Yes	No
Ophthalmic Photography 16 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.2	Yes	No
Stereometric Relationship Storage	1.2.840.10008.5.1.4.1.1.77.1.5.3	Yes	No
Basic Text SR Storage	1.2.840.10008.5.1.4.1.1.88.11	Yes	No
Enhanced SR Storage	1.2.840.10008.5.1.4.1.1.88.22	Yes	No
Comprehensive SR Storage	1.2.840.10008.5.1.4.1.1.88.33	Yes	No
Mammography CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.50	Yes	No
Key Object Selection Document Storage	1.2.840.10008.5.1.4.1.1.88.59	Yes	No
Chest CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.65	Yes	No
X-Ray Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.67	Yes	No
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Yes	No
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	Yes	No
Standalone PET Curve Storage	1.2.840.10008.5.1.4.1.1.129	Yes	No
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	Yes	No
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	Yes	No
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	Yes	No
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4	Yes	No
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	Yes	No
RT Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6	Yes	No
RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7	Yes	No
RT Ion Plan Storage	1.2.840.10008.5.1.4.1.1.481.8	Yes	No
RT Ion Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.9	Yes	No

Table 35: Supported SOP Classes by the DICOM Server for Storage SCU

4.2.2.6.2 Association Initiation Policy

In the case of a C-MOVE request, the Query/Retrieve SCP will issue a command to the Storage SCU to initiate an Association with the Destination DICOM AE to send objects as specified by the originator of the C-MOVE Request.

4.2.2.6.2.1 Activity – Send Images Requested by an External Peer AE

4.2.2.6.2.1.1 Description and Sequencing of Activity

If a remote DICOM Query/Retrieve SCU AE successfully establishes an association with the Query/Retrieve SCP of the DICOM Server and makes a valid C-MOVE request that identifies one or more DICOM objects known to its database, the Storage SCU will send an association request to the C-MOVE destination and upon successful negotiation of the required Presentation Context the object transfer is started.

The DICOM Server can be configured to decompress DICOM images of the formats JPEG Baseline Process 1/ JPEG Extended Process 2 & 4, JPEG Lossless Proc. 14, Value 1, JPEG 2000 Lossless and JPEG 2000 Lossless or Lossy. The resulting Transfer Syntax of the uncompressed DICOM image depends on the negotiated transfer syntax (Implicit or Explicit VR Little Endian).

4.2.2.6.2.1.2 Proposed Presentation Contexts

In response to a C-MOVE request, the DICOM Server builds a list of DICOM objects to be moved. The DICOM Server proposes the presentation context as needed. The presentation context includes an abstract syntax that corresponds to the SOP Class UID and the transfer syntax of the object to be transferred.

Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Stored Print Storage	1.2.840.10008.5.1.1.27	Transfer Syntaxes for Non-Image Storage Services		SCU	None
Hardcopy Grayscale Image Storage	1.2.840.10008.5.1.1.29	Transfer Syntaxes for Image Storage Services		SCU	None
Hardcopy Color Image Storage	1.2.840.10008.5.1.1.30	Transfer Syntaxes for Image Storage Services		SCU	None
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Transfer Syntaxes for Image Storage Services		SCU	None
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Transfer Syntaxes for Image Storage Services		SCU	None
Digital X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Transfer Syntaxes for Image Storage Services		SCU	None
Digital Mammography X-Ray Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.2	Transfer Syntaxes for Image Storage Services		SCU	None
Digital Mammography X-Ray Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	Transfer Syntaxes for Image Storage Services		SCU	None
Digital Intra-oral X-Ray Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.3	Transfer Syntaxes for Image Storage Services		SCU	None

Digital Intra-oral X-Ray Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.3.1	Transfer Syntaxes for Image Storage Services	SCU	None
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Transfer Syntaxes for Image Storage Services	SCU	None
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	Transfer Syntaxes for Image Storage Services	SCU	None
Ultrasound Multi-Frame Image Storage (retired)	1.2.840.10008.5.1.4.1.1.3	Transfer Syntaxes for Video Storage Services	SCU	None
Ultrasound Multi-Frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Transfer Syntaxes for Video Storage Services	SCU	None
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Transfer Syntaxes for Image Storage Services	SCU	None
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	Transfer Syntaxes for Image Storage Services	SCU	None
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2	Transfer Syntaxes for Non-Image Storage Services	SCU	None
Nuclear Medicine Image Storage (retired)	1.2.840.10008.5.1.4.1.1.5	Transfer Syntaxes for Image Storage Services	SCU	None
Ultrasound Image Storage (retired)	1.2.840.10008.5.1.4.1.1.6	Transfer Syntaxes for Image Storage Services	SCU	None
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Transfer Syntaxes for Image Storage Services	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Transfer Syntaxes for Image Storage Services	SCU	None
Multi-frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	Transfer Syntaxes for Video Storage Services	SCU	None
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	Transfer Syntaxes for Video Storage Services	SCU	None
Multi-frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	Transfer Syntaxes for Video Storage Services	SCU	None
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Transfer Syntaxes for Video Storage Services	SCU	None
Standalone Overlay Storage	1.2.840.10008.5.1.4.1.1.8	Transfer Syntaxes for Non-Image Storage Services	SCU	None
Standalone Curve Storage	1.2.840.10008.5.1.4.1.1.9	Transfer Syntaxes for Non-Image Storage Services	SCU	None
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	Transfer Syntaxes for Non-Image Storage Services	SCU	None
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	Transfer Syntaxes for Non-Image Storage Services	SCU	None

Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	Transfer Syntaxes for Non-Image Storage Services	SCU	None
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1	Transfer Syntaxes for Non-Image Storage Services	SCU	None
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1	Transfer Syntaxes for Non-Image Storage Services	SCU	None
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1	Transfer Syntaxes for Non-Image Storage Services	SCU	None
Standalone Modality LUT Storage	1.2.840.10008.5.1.4.1.1.10	Transfer Syntaxes for Non-Image Storage Services	SCU	None
Standalone VOI LUT Storage	1.2.840.10008.5.1.4.1.1.11	Transfer Syntaxes for Non-Image Storage Services	SCU	None
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	Transfer Syntaxes for Non-Image Storage Services	SCU	None
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Transfer Syntaxes for Image Storage Services	SCU	None
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	Transfer Syntaxes for Image Storage Services	SCU	None
X-Ray Angiographic Bi-Plane Image Storage (retired)	1.2.840.10008.5.1.4.1.1.12.3	Transfer Syntaxes for Image Storage Services	SCU	None
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	Transfer Syntaxes for Image Storage Services	SCU	None
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66	Transfer Syntaxes for Non-Image Storage Services	SCU	None
RT Ion Plan Storage	1.2.840.10008.5.1.4.1.1.481.8	Transfer Syntaxes for Non-Image Storage Services	SCU	None
RT Ion Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.9	Transfer Syntaxes for Non-Image Storage Services	SCU	None
RT Ion Plan Storage	1.2.840.10008.5.1.4.1.1.481.8	Transfer Syntaxes for Non-Image Storage Services	SCU	None
Visible Light Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	Transfer Syntaxes for Image Storage Services	SCU	None
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	Transfer Syntaxes for Video Storage Services	SCU	None
Visible Light Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	Transfer Syntaxes for Image Storage Services	SCU	None
Video Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2.1	Transfer Syntaxes for Video Storage Services	SCU	None

Visible Light Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3	Transfer Syntaxes for Image Storage Services	SCU	None
Visible Light Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	Transfer Syntaxes for Image Storage Services	SCU	None
Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1	Transfer Syntaxes for Video Storage Services	SCU	None
Ophthalmic Photography 8 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	Transfer Syntaxes for Image Storage Services	SCU	None
Ophthalmic Photography 16 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.2	Transfer Syntaxes for Image Storage Services	SCU	None
Stereometric Relationship Storage	1.2.840.10008.5.1.4.1.1.77.1.5.3	Transfer Syntaxes for Image Storage Services	SCU	None
Basic Text SR Storage	1.2.840.10008.5.1.4.1.1.88.11	Transfer Syntaxes for Non-Image Storage Services	SCU	None
Enhanced SR Storage	1.2.840.10008.5.1.4.1.1.88.22	Transfer Syntaxes for Non-Image Storage Services	SCU	None
Comprehensive SR Storage	1.2.840.10008.5.1.4.1.1.88.33	Transfer Syntaxes for Non-Image Storage Services	SCU	None
Mammography CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.50	Transfer Syntaxes for Non-Image Storage Services	SCU	None
Key Object Selection Document Storage	1.2.840.10008.5.1.4.1.1.88.59	Transfer Syntaxes for Non-Image Storage Services	SCU	None
Chest CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.65	Transfer Syntaxes for Non-Image Storage Services	SCU	None
X-Ray Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.67	Transfer Syntaxes for Non-Image Storage Services	SCU	None
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	Transfer Syntaxes for Image Storage Services	SCU	None
Standalone PET Curve Storage	1.2.840.10008.5.1.4.1.1.129	Transfer Syntaxes for Non-Image Storage Services	SCU	None
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	Transfer Syntaxes for Image Storage Services	SCU	None
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	Transfer Syntaxes for Non-Image Storage Services	SCU	None
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	Transfer Syntaxes for Non-Image Storage Services	SCU	None
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4	Transfer Syntaxes for Non-Image Storage Services	SCU	None
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	Transfer Syntaxes for Non-Image Storage Services	SCU	None
RT Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6	Transfer Syntaxes for Non-Image Storage Services	SCU	None

RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7	Transfer Syntaxes for Non-Image Storage Services	SCU	None
RT Ion Plan Storage	1.2.840.10008.5.1.4.1.1.481.8	Transfer Syntaxes for Non-Image Storage Services	SCU	None
RT Ion Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.9	Transfer Syntaxes for Non-Image Storage Services	SCU	None

Table 36: Proposed Presentation Contexts by the DICOM Server Storage SCU

Name	UID
Implicit VR Little Endian	1.2.840.10008.1.2
Explicit VR Little Endian	1.2.840.10008.1.2.1

Table 37: Proposed Transfer Syntaxes for Non-Image Storage Services

Name	UID
Implicit VR Little Endian	1.2.840.10008.1.2
Explicit VR Little Endian	1.2.840.10008.1.2.1
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
JPEG Lossless, Non-Hierarchical (Process 14)**Error! Bookmark not defined.**	1.2.840.10008.1.2.4.57
JPEG Lossless Proc. 14, Value 1	1.2.840.10008.1.2.4.70
JPEG-LS Lossless Image Compression**Error! Bookmark not defined.**	1.2.840.10008.1.2.4.80
JPEG-LS Lossy (Near-Lossless) Image Compression**Error! Bookmark not defined.**	1.2.840.10008.1.2.4.81
JPEG 2000 Lossless	1.2.840.10008.1.2.4.90
JPEG 2000 Lossless or Lossy	1.2.840.10008.1.2.4.91

Table 38: Proposed Transfer Syntaxes for Image Storage Services

Name	UID
Implicit VR Little Endian	1.2.840.10008.1.2
Explicit VR Little Endian	1.2.840.10008.1.2.1
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
JPEG Lossless, Non-Hierarchical (Process 14)**Error! Bookmark not defined.**	1.2.840.10008.1.2.4.57
JPEG Lossless Proc. 14, Value 1	1.2.840.10008.1.2.4.70
JPEG-LS Lossless Image Compression**Error! Bookmark not defined.**	1.2.840.10008.1.2.4.80
JPEG-LS Lossy (Near-Lossless) Image Compression**Error! Bookmark not defined.**	1.2.840.10008.1.2.4.81
JPEG 2000 Lossless	1.2.840.10008.1.2.4.90

JPEG 2000 Lossless or Lossy	1.2.840.10008.1.2.4.91
MPEG2 Main Profile @ Main Level	1.2.840.10008.1.2.4.100

Table 39: Proposed Transfer Syntaxes for Video Storage Services

4.2.2.7 MPPS SCU

4.2.2.7.1 SOP Classes

The MPPS SCU provides standard conformance to the following DICOM MPPS SOP Class as SCU:

SOP Class Name	SOP Class UID	SCU	SCP
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Yes	No

Table 40: Supported SOP Class of MPPS SCU

4.2.2.7.2 Association Initiation Policy

The MPPS SCU does not initiate Associations.

4.2.2.7.3 Association Acceptance Policy

4.2.2.7.3.1 Activity – MPPS N-CREATE / N-SET Request from External Peer AE

4.2.2.7.3.1.1 Description and Sequencing of Activities

The remote AE acting as SCP of the MPPS Service Class sends an N-CREATE / N-SET request to the DICOM Server working as SCU of the MPPS Service Class. The MPPS SCP of the DICOM Server can forward this request to a remote MPPS SCU.

4.2.2.7.3.1.2 Accepted Presentation Contexts

Table 41 shows the presentation contexts that are accepted by the DICOM Server for Modality Performed Procedure Step Service Class Operations.

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

Table 41: Accepted Presentation Contexts for MPPS Service Class

4.2.2.8 MPPS SCP

4.2.2.8.1 SOP Classes

SOP Class Name	SOP Class UID	SCU	SCP
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	No	Yes

Table 42: MPPS SOP Class for MPPS SCP

4.2.2.8.2 Association Initiation Policy

4.2.2.8.2.1 Activity – Send MPPS N-CREATE / N-SET to remote Peer AE

4.2.2.8.2.1.1 Description and Sequencing of Activity

If the MPPS SCU receives an N-CREATE/N-SET, the MPPS SCP can forward it to a remote MPPS SCU.

4.2.2.8.2.1.2 Proposed Presentation Contexts

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax Name	Transfer Syntax UID	Role	Extended Negotiation
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

Table 43: Proposed Presentation Context for MPPS SCP

4.2.3 Rules Engine Application Entity

4.2.3.1 Retrieve SCU

4.2.3.1.1 SOP Classes

The Retrieve SCU provides Standard Conformance to the following DICOM SOP Query/Retrieve Classes:

SOP Class Name	SOP Class UID	SCU	SCP
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	Yes	No
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Yes	No

Table 44: SOP Classes supported by Rules Engine Retrieve SCU

4.2.3.1.2 Association Initiation Policy

The Retrieve SCU initiates but never accepts associations.

4.2.3.1.2.1 Activity – Retrieve from Remote AE

4.2.3.1.2.1.1 Description and Sequencing of Activities

Within CAMM Archive Web UI AE a web user is able to set up rules. Certain PACS events lead to jobs within the rules engine which can activate the Retrieve SCU. The Retrieve SCU is activated, if the user has set up a rule with a “Send Dicom” or a “Prefetch from 3rd Party PACS” action.

With the Retrieve SCU DICOM objects can be

sent to remote AEs (via C-MOVE request to the DICOM Server)

retrieved from remote AEs to the DICOM Server (via C-MOVE request to the remote Retrieve SCP)

4.2.3.1.2.1.2 Proposed Presentation Contexts

Table 55 shows the presentation contexts that may be proposed by the Retrieve SCU for retrieval requests.

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax Name	Transfer Syntax UID	Role	Extended Negotiation
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
Study Root Query/Retrieve Information	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR	1.2.840.10008.1.2.1		

Model – MOVE		Little Endian			

Table 45: Proposed Presentation Contexts for the Rules Engine Retrieve SCU

Retrieve SCU proposes two presentation contexts, one for each of the supported abstract syntaxes. If both abstract syntaxes are supported by the remote Query SCP, Study Root Query/Retrieve Information Model abstract syntax is preferred.

4.2.3.1.2.1.3 SOP Specific Conformance for Retrieve SOP Classes

A Rules Engine job results in an error if at least one according C-STORE failed. This is indicated by the number of failed sub-operations within the final C-MOVE response.

The behavior of the Retrieve SCU when encountering status codes in a C-MOVE response is summarized in the table below:

Service Status	**Further Meaning**	**Status Codes**	**Number of failed Sub-Operations**	**Behavior**
* (except PENDING, see below)	*	Any status code.	>0	Any status code is considered as a failure if the number of failed sub-operations within the C-MOVE response is greater than 0. Error indication message is output to the Service Log.
Failure	Refused: Out of Resources – Unable to calculate number of matches	A701	0	Rules Engine job is considered as failed. Error message is output to the Service Log.
	Refused: Out of Resources – Unable to perform sub-operations	A702	0	Rules Engine job is considered as failed. Error message is output to the Service Log.
	Refused: Move Destination unknown	A801	0	Rules Engine job is considered as failed. Error message is output to the Service Log.
	Unable to Process	C000	0	Rules Engine job is considered as failed. Error message is output to the Service Log.
Warning	Sub-operations Complete – One or more Failures	B000	0	A Rules Engine job is considered as success. Success message is output to the Service Log.
Success	Sub-operations Complete – No Failures	0000	0	A Rules Engine job is considered as success. Success message is output to the Service Log.
Pending	Sub-operations are continuing	FF00	*	A Rules Engine job is considered as not yet finished. Pending message is output to the Service Log.

Table 46: C-MOVE Response Status Handling Behavior of Rules Engine Retrieve SCU

4.2.4 HL7 Server Application Entity

4.2.4.1 Storage SCU

The HL7 Server is able to generate DICOM Structured Reports from incoming HL7 Reports and send them to a remote Storage SCP.

4.2.4.1.1 SOP Classes

The Storage SCU provides Standard Conformance to the following DICOM SOP Classes:

SOP Class Name	SOP Class UID	SCU	SCP
Basic Text SR Storage	1.2.840.10008.5.1.4.1.1.88.11	Yes	No

Table 47: SOP Classes supported by HL7 Server Storage SCU

4.2.4.1.2 Association Initiation Policy

4.2.4.1.2.1 Activity – Send Images to Remote AE

4.2.4.1.2.1.1 Description and Sequencing of Activity

4.2.4.1.2.1.2 Proposed Presentation Contexts

Table 48 shows the presentation contexts that are proposed by the Storage SCU for store requests.

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax Name	Transfer Syntax UID	Role	Extended Negotiation
Basic Text SR Storage	1.2.840.10008.5.1.4.1.1.88.11	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

Table 48: Proposed Presentation Contexts for the HL7 Server Storage SCU

4.2.5 IQD Application Entity

4.2.5.1 Retrieve SCU

4.2.5.1.1 SOP Classes

The Retrieve SCU provides Standard Conformance to the following DICOM SOP Query/Retrieve Classes:

SOP Class Name	SOP Class UID	SCU	SCP
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	Yes	No
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Yes	No

Table 49: SOP Classes supported by IQD Retrieve SCU

4.2.5.1.2 Association Initiation Policy

The Retrieve SCU initiates but never accepts associations.

4.2.5.1.2.1 Activity – Retrieve from Remote AE

4.2.5.1.2.1.1 Description and Sequencing of Activities

The CAMM Archive can be configured to activate the Retrieve SCU. The Retrieve SCU is activated, if the DICOM Export job was set up.

With the Retrieve SCU DICOM objects can be

sent to remote AEs (via C-MOVE request to the DICOM Server)

4.2.5.1.2.1.2 Proposed Presentation Contexts

Table 55 shows the presentation contexts that may be proposed by the Retrieve SCU for retrieval requests.

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax Name	Transfer Syntax UID	Role	Extended Negotiation
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

Table 50: Proposed Presentation Contexts for the IQD Retrieve SCU

Retrieve SCU proposes two presentation contexts, one for each of the supported abstract syntaxes. If both abstract syntaxes are supported by the remote Query SCP, Study Root Query/Retrieve Information Model abstract syntax is preferred.

4.2.5.1.2.1.3 SOP Specific Conformance for Retrieve SOP Classes

The IQD DICOM Export job results in an error if at least one according C-STORE failed. This is indicated by the number of failed sub-operations within the C-MOVE response.

The behavior of the Retrieve SCU when encountering status codes in a C-MOVE response is summarized in the table below:

Service Status	Further Meaning	Status Codes	Number of failed Sub-Operations	Behavior
* (except PENDING)	*	Any status code.	>0	Any status code is considered as a failure if the number of failed sub-operations within the C-MOVE response is greater than 0. Error indication message is output to the Service Log.
Failure	Refused: Out of Resources – Unable to calculate number of matches	A701	0	IQD job is considered as failed. Error message is output to the Service Log.
	Refused: Out of Resources – Unable to perform sub-operations	A702	0	IQD job is considered as failed. Error message is output to the Service Log.

	Refused: Move Destination unknown	A801	0	IQD job is considered as failed. Error message is output to the Service Log.
	Unable to Process	C000	0	IQD job is considered as failed. Error message is output to the Service Log.
Warning	Sub-operations Complete – One or more Failures	B000	0	IQD job is considered as success. Success message is output to the Service Log.
Success	Sub-operations Complete – No Failures	0000	0	IQD job is considered as success. Success message is output to the Service Log.
Pending	Sub-operations are continuing	FF00	*	IQD job is considered as not yet finished. Pending message is output to the Service Log.

Table 51: C-MOVE Response Status Handling Behavior of IQD Retrieve SCU

4.2.6 CAMM Archive Web User Interface Application Entity

4.2.6.1 Query SCU

4.2.6.1.1 SOP Classes

The Query SCU provides Standard Conformance to the following DICOM SOP Query/Retrieve Classes:

SOP Class Name	SOP Class UID	SCU	SCP
Patient Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	Yes	No
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Yes	No

Table 52: SOP Classes for Query SCU

4.2.6.1.2 Association Initiation Policy

The Query SCU initiates Associations.

4.2.6.1.2.1 Activity – Query Remote AE

4.2.6.1.2.1.1 Description and Sequencing of Activities

Within the CAMM Archive Web UI the user is able to search local/remote Query SCPs for DICOM objects. After the user has filled out a query mask and pressed the search button, the Query SCU sends a C-FIND request to the selected AE. The C-FIND is then evaluated and displayed within the UI.

4.2.6.1.2.1.2 Proposed Presentation Contexts

Table 53 shows the presentation contexts that may be proposed by the Query SCU for query requests.

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax Name	Transfer Syntax UID	Role	Extended Negotiation
Patient Root Query/Retrieve	1.2.840.10008.5.1.4.1.2.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

Information Model – FIND		Explicit VR Little Endian	1.2.840.10008.1.2.1		
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

Table 53: Proposed Presentation Contexts for Query SCU

Query SCU proposes two presentation contexts, one for each of the supported abstract syntaxes. If both abstract syntaxes are supported by the remote Query SCP, Study Root Query/Retrieve Information Model abstract syntax is preferred.

4.2.6.2 Retrieve SCU

4.2.6.2.1 SOP Classes

The Retrieve SCU provides Standard Conformance to the following DICOM SOP Query/Retrieve Classes:

SOP Class Name	SOP Class UID	SCU	SCP
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	Yes	No
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Yes	No

Table 54: SOP Classes supported by Retrieve SCU

4.2.6.2.2 Association Initiation Policy

The Retrieve SCU initiates but never accepts associations.

4.2.6.2.2.1 Activity – Retrieve from Remote AE

4.2.6.2.2.1.1 Description and Sequencing of Activities

If the web user has searched for DICOM objects at local/remote Query SCPs and at least one object has been found (cp. section 4.2.6.1), he can transfer the selected objects to a remote Storage SCP. I.e. a C-MOVE request will be send to the DICOM Retrieve AET(s) of the selected objects and the objects will be send (C-STORE) to the selected destination (specified as DICOM Move Destination in the C-MOVE request).

4.2.6.2.2.1.2 Proposed Presentation Contexts

Table 55 shows the presentation contexts that may be proposed by the Retrieve SCU for retrieval requests.

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax Name	Transfer Syntax UID	Role	Extended Negotiation
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

Table 55: Proposed Presentation Contexts for Retrieve SCU

Retrieve SCU proposes two presentation contexts, one for each of the supported abstract syntaxes. If both abstract syntaxes are supported by the remote Query SCP, Study Root Query/Retrieve Information Model abstract syntax is preferred.

4.2.6.2.2.1.3 SOP Specific Conformance for Retrieve SOP Classes

The behavior of the Retrieve SCU when encountering status codes in a C-MOVE response is summarized in the table below:

Service Status	Further Meaning	Status Codes	Behavior
Warning	Sub-operations Complete – One or more Failures	B000	Web Transfer is considered as success. Warning message is output to the User Interface and Service Log. Number of failed (if exist) or warning Sub-Operations is output to the User Interface.
Success	Sub-operations Complete – No Failures	0000	Web Transfer is considered as success. Success message is output to the User Interface and Service Log. Number of completed Sub-Operations is output to the User Interface.
*	*	Any other status code.	Any other status code is considered as a failure. Error indication message is output to the User Interface and Service Logs. Number of failed Sub-Operations is output to the User Interface.

Table 56: C-MOVE Response Status Handling Behavior of Web Transfer Retrieve SCU

4.2.6.3 Storage SCU

4.2.6.3.1 SOP Classes

The Storage SCU provides standard conformance to the DICOM Storage SOP Classes listed in Table 35.

4.2.6.3.2 Association Initiation Policy

4.2.6.3.2.1 Activity – Send Images to Remote AE

4.2.6.3.2.1.1 Description and Sequencing of Activity

The Storage SCU of the CAMM Archive Web User Interface is able to send C-STORE requests for local DICOM files to a remote Storage SCP. I.e. that the web user is able to upload DICOM files to the DICOM Server or a third party PACS.

4.2.6.3.2.1.2 Proposed Presentation Contexts

The proposed Presentation Contexts are the same as the DICOM Server AE proposes (see Table 36).

4.2.6.3.2.1.3 SOP Specific Conformance for Retrieve SOP Classes

The behavior of the Storage SCU when encountering status codes in a C-STORE response is summarized in the table below:

Service Status	Further Meaning	Status Code	Behavior

Success	Success	0000	Storage is considered as success. Success indication message is output to the Service Logs.
Warning	Duplicate SOP Instance	0111	Storage is considered as success, but with a warning. Warning indication message is output to the Service Logs.
Warning	Coercion of Data Elements	B000	Storage is considered as success, but with a warning. Warning indication message is output to the Service Logs.
Warning	Elements Discarded	B006	Storage is considered as success, but with a warning. Warning indication message is output to the Service Logs.
Warning	Data Set does not match SOP Class	B007	Storage is considered as success, but with a warning. Warning indication message is output to the Service Logs.
Warning	Same Image Instance UID	D000	Storage is considered as success, but with a warning. Warning indication message is output to the Service Logs.
*	*	Any other status code.	Error indication message is output to the User Interface and Service Logs.

Table 57: C-STORE Response Status Handling Behavior of Storage SCU

4.2.7 Cerner ProVision® Web Application Entity

The Cerner ProVision® Web application entity is able to display DICOM objects of the following SOP Classes. No other DICOM activities are performed.

SOP Class Name	SOP Class UID	SCU	SCP
Hardcopy Grayscale Image Storage	1.2.840.10008.5.1.1.29	Viewed	No
Hardcopy Color Image Storage	1.2.840.10008.5.1.1.30	Viewed	No
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Viewed	No
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Viewed	No
Digital X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Viewed	No
Digital Mammography X-Ray Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.2	Viewed	No
Digital Mammography X-Ray Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	Viewed	No
Digital Intra-oral X-Ray Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.3	Viewed	No
Digital Intra-oral X-Ray Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.3.1	Viewed	No
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Viewed	No
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	Viewed	No
Ultrasound Multi-Frame Image Storage (retired)	1.2.840.10008.5.1.4.1.1.3	Viewed	No
Ultrasound Multi-Frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Viewed	No
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Viewed	No
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	Viewed	No

Nuclear Medicine Image Storage (retired)	1.2.840.10008.5.1.4.1.1.5	Viewed	No
Ultrasound Image Storage (retired)	1.2.840.10008.5.1.4.1.1.6	Viewed	No
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Viewed	No
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Viewed	No
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	Viewed	No
Multi-frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	Viewed	No
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Viewed	No
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	Viewed	No
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	Viewed	No
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	Viewed	No
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Viewed	No
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	Viewed	No
X-Ray Angiographic Bi-Plane Image Storage (retired)	1.2.840.10008.5.1.4.1.1.12.3	Viewed	No
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	Viewed	No
Visible Light Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	Viewed	No
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	Viewed	No
Visible Light Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	Viewed	No
Video Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2.1	Viewed	No
Visible Light Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3	Viewed	No
Visible Light Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	Viewed	No
Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1	Viewed	No
Ophthalmic Photography 8 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	Viewed	No
Ophthalmic Photography 16 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.2	Viewed	No
Basic Text SR Storage	1.2.840.10008.5.1.4.1.1.88.11	Viewed	No
Enhanced SR Storage	1.2.840.10008.5.1.4.1.1.88.22	Viewed	No
Comprehensive SR Storage	1.2.840.10008.5.1.4.1.1.88.33	Viewed	No
Key Object Selection Document Storage	1.2.840.10008.5.1.4.1.1.88.59	Viewed	No
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	Viewed	No
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	Viewed	No

Table 58: Supported SOP Classes for Cerner ProVision® Web

The Cerner ProVision® Web application entity is able to display DICOM images of the following Photometric Interpretations (0028,004):.

MONOCHROME1

MONOCHROME2

RGB

PALETTE COLOR

YBR FULL

YBR FULL 422

YBR PARTIAL 422

4.2.8 Cerner ProVision® Workstation Application Entity

The Cerner ProVision® Workstation application entity is able to display DICOM objects of the following SOP Classes. No other DICOM activities are performed.

SOP Class Name	SOP Class UID	SCU	SCP
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Viewed	No
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Viewed	No
Digital Mammography X-Ray Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.2	Viewed	No
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Viewed	No
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	Viewed	No
Ultrasound Multi-Frame Image Storage (retired)	1.2.840.10008.5.1.4.1.1.3	Viewed	No
Ultrasound Multi-Frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Viewed	No
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Viewed	No
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	Viewed	No
Ultrasound Image Storage (retired)	1.2.840.10008.5.1.4.1.1.6	Viewed	No
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Viewed	No
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Viewed	No
Multi-frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	Viewed	No
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	Viewed	No
Multi-frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	Viewed	No
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Viewed	No
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	Viewed	No
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Viewed	No
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	Viewed	No
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	Viewed	No
Visible Light Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	Viewed	No
Visible Light Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	Viewed	No
Visible Light Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3	Viewed	No
Visible Light Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	Viewed	No
Mammography CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.50	Viewed	No
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	Viewed	No
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	Viewed	No

Table 59: Supported SOP Classes for Cerner ProVision® Workstation

The Cerner ProVision® Workstation application entity is able to display DICOM images of the following Photometric Interpretations (0028,004):.

MONOCHROME1

MONOCHROME2

RGB

PALETTE COLOR

YBR FULL

YBR FULL 422

YBR PARTIAL 422

YBR_ICT

YBR_RCT

4.2.9 UWS StoreDicom Application Entity

4.2.9.1 Storage SCU

The Storage SCU is able to send C-STORE requests for DICOM objects to a remote Storage SCP.

4.2.9.1.1 SOP Classes

The Storage SCU provides standard conformance to the DICOM Storage SOP Classes listed in Table 35.

4.2.9.1.2 Association Initiation Policy

4.2.9.1.2.1 Activity – Send Images to Remote AE

4.2.9.1.2.1.1 Description and Sequencing of Activity

4.2.9.1.2.1.2 Proposed Presentation Contexts

The proposed Presentation Contexts are the same as listed in Table 36.

4.2.9.1.2.1.3 SOP Specific Conformance for Retrieve SOP Classes

The behavior of the Storage SCU when encountering status codes in a C-STORE response is summarized in the table below:

Service Status	Further Meaning	Status Code	Behavior
Success	Success	0000	Storage is considered as success. Success indication message is contained in the reply.
Warning	Duplicate SOP Instance	0111	Storage is considered as success, but with a warning. Warning indication message is contained in the reply.
Warning	Coercion of Data Elements	B000	Storage is considered as success, but with a warning. Warning indication message is contained in the reply.
Warning	Elements Discarded	B006	Storage is considered as success, but with a warning. Warning indication message is contained in the reply.
Warning	Data Set does not match SOP Class	B007	Storage is considered as success, but with a warning. Warning indication message is contained in the reply.
Warning	Same Image Instance UID	D000	Storage is considered as success, but with a warning.

			Warning indication message is contained in the reply.
*	*	Any other status code.	Error indication message is contained in the reply.

Table 60: C-STORE Response Status Handling Behavior of UWS StoreDicom Storage SCU

4.2.10 UWS/PWS StoreDicomEncapsulatedDoc Application Entity

4.2.10.1 Storage SCU

The UWS/PWS StoreDicomEncapsulatedDoc is able to generate DICOM Encapsulated Document objects and send them to a remote Storage SCP.

4.2.10.1.1 SOP Classes

The Storage SCU provides Standard Conformance to the following DICOM SOP Classes:

SOP Class Name	SOP Class UID	SCU	SCP
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Yes	No

Table 61: SOP Classes supported by UWS/PWS StoreDicomEncapsulatedDoc Storage SCU

4.2.10.1.2 Association Initiation Policy

4.2.10.1.2.1 Activity – Send Images to Remote AE

4.2.10.1.2.1.1 Description and Sequencing of Activity

4.2.10.1.2.1.2 Proposed Presentation Contexts

Table 62 shows the presentation contexts that are proposed by the Storage SCU for store requests.

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax Name	Transfer Syntax UID	Role	Extended Negotiation
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		

Table 62: Proposed Presentation Contexts for the UWS/PWS StoreDicomEncapsulatedDoc Storage SCU

4.2.10.1.2.1.3 SOP Specific Conformance for Retrieve SOP Classes

The behavior of the Storage SCU when encountering status codes in a C-STORE response is summarized in the table below:

Service Status	Further Meaning	Status Code	Behavior
Success	Success	0000	Storage is considered as success. Success indication message is contained in the reply.
Warning	Duplicate SOP Instance	0111	Storage is considered as success, but with a warning. Warning indication message is contained in the reply.

Warning	Coercion of Data Elements	B000	Storage is considered as success, but with a warning. Warning indication message is contained in the reply.
Warning	Elements Discarded	B006	Storage is considered as success, but with a warning. Warning indication message is contained in the reply.
Warning	Data Set does not match SOP Class	B007	Storage is considered as success, but with a warning. Warning indication message is contained in the reply.
Warning	Same Image Instance UID	D000	Storage is considered as success, but with a warning. Warning indication message is contained in the reply.
*	*	Any other status code.	Error indication message is contained in the reply.

Table 63: C-STORE Response Status Handling Behavior of UWS/PWS StoreDicomEncapsulatedDoc Storage SCU

4.2.11 UWS TransferDicom Application Entity

4.2.11.1 Retrieve SCU

4.2.11.1.1 SOP Classes

The Retrieve SCU provides Standard Conformance to the following DICOM SOP Query/Retrieve Classes:

SOP Class Name	SOP Class UID	SCU	SCP
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	Yes	No
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Yes	No

Table 64: SOP Classes supported by UWS TransferDicom Retrieve SCU

4.2.11.1.2 Association Initiation Policy

The Retrieve SCU initiates but never accepts associations.

4.2.11.1.2.1 Activity – Retrieve from Remote AE

4.2.11.1.2.1.1 Description and Sequencing of Activities

With the Retrieve SCU DICOM objects can be

sent to remote AEs (via C-MOVE request to the DICOM Server)

4.2.11.1.2.1.2 Proposed Presentation Contexts

Table 55 shows the presentation contexts that may be proposed by the Retrieve SCU for retrieval requests.

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax Name	Transfer Syntax UID	Role	Extended Negotiation
Patient Root Query/Retrieve	1.2.840.10008.5.1.4.1.2.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

Information Model – MOVE		Explicit VR Little Endian	1.2.840.10008.1.2.1		
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

Table 65: Proposed Presentation Contexts for the UWS TransferDicom Retrieve SCU

Retrieve SCU proposes two presentation contexts, one for each of the supported abstract syntaxes. If both abstract syntaxes are supported by the remote Query SCP, Study Root Query/Retrieve Information Model abstract syntax is preferred.

4.2.11.1.2.1.3 SOP Specific Conformance for Retrieve SOP Classes

Failed C-STORE requests are indicated by the number of failed sub-operations within the C-MOVE response.

The behavior of the Retrieve SCU when encountering status codes in a C-MOVE response is summarized in the table below:

Service Status	**Further Meaning**	**Status Codes**	**Number of failed Sub-Operations**	**Behavior**
* (except PENDING)	*	Any status code.	>0	Any status code is considered as a failure if the number of failed sub-operations within the C-MOVE response is greater than 0. Error indication message is output to the Service Log.
Failure	Refused: Out of Resources – Unable to calculate number of matches	A701	0	C-MOVE request is considered as failed. Error message is output to the Service Log.
	Refused: Out of Resources – Unable to perform sub-operations	A702	0	C-MOVE request is considered as failed. Error message is output to the Service Log.
	Refused: Move Destination unknown	A801	0	C-MOVE request is considered as failed. Error message is output to the Service Log.
	Unable to Process	C000	0	C-MOVE request is considered as failed. Error message is output to the Service Log.
Warning	Sub-operations Complete – One or more Failures	B000	0	C-MOVE request is considered as success. Success message is output to the Service Log.
Success	Sub-operations Complete –	0000	0	C-MOVE request is considered as success. Success message is output to the Service Log.

	No Failures			
Pending	Sub-operations are continuing	FF00	*	C-MOVE request is considered as not yet finished. Pending message is output to the Service Log.

Table 66: C-MOVE Response Status Handling Behavior of UWS TransferDicom Retrieve SCU

4.2.12 LTA Client

4.2.12.1 Storage Commitment Request Request SCU

4.2.12.1.1 SOP Classes

The LTA Client provides Standard Conformance to the DICOM Storage Commitment Push Model SOP Class as Request SCU:

SOP Class Name	SOP Class UID	SCU	SCP
Storage Commitment Push Model	1.2.840.10008.1.20.1	Yes	No

Table 67: Supported SOP Class for LTA Clients Storage Commitment Request SCU

4.2.12.1.2 Association Initiation Policy

4.2.12.1.2.1 Activity – Send Storage Commitment Request Request

4.2.12.1.2.1.1 Description and Sequencing of Activity

The Storage Commitment Request request SCU is able to send an N-ACTION request.
Due to uniquely identify Storage Commitment transactions, UIDs are generated for Transaction UIDs (0008,1195). These UIDs begin with 2.16.840.1.113669.632.2.41.1 and are extended with arbitrary combination of digits.

4.2.12.1.2.1.2 Proposed Presentation Contexts

The LTA Client proposes an association over Storage Commitment Push Model Service Class and Implicit/Explicit VR Little Endian Transfer Syntax:

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax Name	Transfer Syntax UID	Role	Extended Negotiation
Storage Commitment Push Model	1.2.840.10008.1.20.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

Table 68: Proposed Presentation Context of LTA Clients Storage Commitment Request Request SCU

4.2.12.1.2.1.3 SOP specific Conformance

The behavior of the Storage Commitment Request SCU when encountering status codes in an N-ACTION response is summarized in the table below:

Service Status	Further Meaning	Status Code	Behavior
Success	Success	0000	Request for Storage Commitment is considered as success. Success indication message is contained in the reply.
*	*	Any other	Error indication message is contained in the reply.

		status code.	

Table 69: Storage Commitment N-ACTION Response Status Handling Behavior of Storage Commitment Request Request SCU

4.2.12.1.3 Association Acceptance Policy

4.2.12.2 Storage Commitment Result SCU

4.2.12.2.1 SOP Classes

The LTA Client provides Standard Conformance to the DICOM Storage Commitment Push Model SOP Class as Result SCU:

SOP Class Name	SOP Class UID	SCU	SCP
Storage Commitment Push Model	1.2.840.10008.1.20.1	Yes	No

Table 70: Supported SOP Class for LTA Clients Storage Commitment Result SCU

4.2.12.2.2 Association Acceptance Policy

4.2.12.2.2.1 Activity – Receive Storage Commitment Result Request

4.2.12.2.2.1.1 Description and Sequencing of Activity

The Storage Commitment Result Request SCU is able to receive an N-EVENT-REPORT requests.

4.2.12.2.2.1.2 Accepted Presentation Contexts

The LTA Client proposes an association over Storage Commitment Push Model Service Class and Implicit/Explicit VR Little Endian Transfer Syntax:

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax Name	Transfer Syntax UID	Role	Extended Negotiation
Storage Commitment Push Model	1.2.840.10008.1.20.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

Table 71: Accepted Presentation Context of LTA Clients Storage Commitment Result Request SCU

4.2.12.2.2.1.3 SOP specific Conformance

The behavior of Storage Commitment Result SCU when receiving Event Types within the N-EVENT-REPORT is summarized in the table below.

Event Type Name	Event Type ID	Behavior
Storage Commitment Request Successful	1	The Referenced SOP Instances (0008,1155) in Referenced SOP Sequence (0008,1199) are marked as successfully stored within the database. Success indication message is output to the service logs. If the Retrieve AET (0008,0054) is not equals the remote AET of the Dicom storage system a warning message is logged.
Storage Commitment Request Complete – Failures Exist	2	The Referenced SOP Instances under Referenced SOP Sequence (0008,1199) are treated in the same way as in the success case (Event Type 1). The Referenced SOP Instances within Failed SOP Sequence (0008,1198) are marked as not successfully

		stored within the database (Failure Reasons (0008,1197) is stored). Error indication message is output to the service logs. A job that failed storage commitment will not be automatically re-tried but needs to be restarted by manual user interaction.
*	Any other event type ID	The N-EVENT report is disregarded.

Table 72: Storage Commitment N-EVENT-REPORT Behavior of Storage Commitment Result SCU

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

Service Status	Further Meaning	Status Code	Reasons
Success	Success	0000	The storage commitment result has been successfully received.
Failure	Processing Failure	0110	One of the following error occurred during processing of the N-EVENTREPORT: Internal Database error Illegal request: Dataset is missing in request Value Multiplicity of Transaction UID is not 1 Value Representation of Referenced/Failed SOP Sequence is not SQ Failed SOP Sequence in Dataset but Event Type ID is 1 A short description of the error will be returned in Error Comment (0000,0902).
Failure	No Such Object Instance	0112	Requested SOP Instance of the command set is not Storage Commitment Push Model SOP Instance (1.2.840.10008.1.20.1.1). A short description of the error will be returned in Error Comment (0000,0902).
Failure	No Such Event Type	0113	An invalid Event Type ID (not 1 or 2) was supplied in the N-EVENT-REPORT request. A short description of the error will be returned in Error Comment (0000,0902).
Failure	Invalid Argument Value	0115	One or more SOP Instance UIDs within the Referenced SOP Sequence (0008,1199) or Failed SOP Sequence (0008,1198) were not included in the Storage Commitment Request (N-ACTION) associated with this Transaction UID. A short description of the error will be returned in Error Comment (0000,0902).
Failure	Missing Attribute	0120	One of the following required attribute is missing in the N-EVENT-REPORT Request Data Set: Transaction UID (0008,1195) Referenced SOP Sequence (0008,1199) when Event Type ID is 1 Failed SOP Sequence (0008,1198) when Event Type ID is 2 Referenced SOP Instance UID (0008,1155) A short description of the error will be returned in Error Comment (0000,0902).
Failure	Missing Attribute Value	0121	N-EVENT-REPORT Request cannot be processed because a Type 1 attribute in the N-EVENT-REPORT Request Data Set has no

			value for one of the following attributes: Transaction UID (0008,1195) Referenced SOP Sequence (0008,1199) when Event Type ID is 1 Failed SOP Sequence (0008,1198) when Event Type ID is 2 Referenced SOP Instance UID (0008,1155) Referenced SOP Class UID (0008,1150) A short description of the error will be returned in Error Comment (0000,0902).
Failure	Unrecognized Operation	0211	The Transaction UID (0008,1195) in the N-EVENT-REPORT request is not recognized: was never issued within an N-ACTION request of the LTA Client AE's Storage Commitment Request request SCU) has been expired when referenced objects have been deleted from the archive database meanwhile A short description of the error will be returned in Error Comment (0000,0902).

Table 73: Storage Commitment N-EVENT-REPORT Response Status Reasons of Storage Commitment Result SCU

The Transaction UID (0008,1195) generated by the LTA Client AE's Storage Commitment Request request SCU does expire when referenced objects are deleted from the archive database.
Storage Commitment Result requests with invalid Transaction UIDs are rejected.

4.2.12.3 Storage SCU

4.2.12.3.1 SOP Classes

The Storage SCU provides standard conformance to the DICOM Storage SOP Classes listed in Table 35.

4.2.12.3.2 Association Initiation Policy

4.2.12.3.2.1 Activity – Send Images to Remote AE

4.2.12.3.2.1.1 Description and Sequencing of Activity

The Storage SCU of the LTA Client AE is able to send C-STORE requests for local DICOM files to a remote Storage SCP.

4.2.12.3.2.1.2 Proposed Presentation Contexts

The proposed Presentation Contexts are the same as the DICOM Server AE proposes (see Table 36).

4.2.12.3.2.1.3 SOP Specific Conformance for Retrieve SOP Classes

The behavior of the Storage SCU when encountering status codes in a C-STORE response is summarized in Table 57.

4.2.12.4 Query SCU

4.2.12.4.1 SOP Classes

The Query SCU provides Standard Conformance to the following DICOM SOP Query/Retrieve Classes:

SOP Class Name	SOP Class UID	SCU	SCP

Patient Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	Yes	No
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Yes	No

Table 74: SOP Classes for Query SCU

4.2.12.4.2 Association Initiation Policy

The Query SCU initiates Associations.

4.2.12.4.2.1 Activity – Query Remote AE

4.2.12.4.2.1.1 Description and Sequencing of Activities

To check storage consistency the system sends a hierarchical C-FIND request to the DICOM Storage node. The C-FIND response is then evaluated.

4.2.12.4.2.1.2 Proposed Presentation Contexts

Table 53 shows the presentation contexts that may be proposed by the Query SCU for query requests.

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax Name	Transfer Syntax UID	Role	Extended Negotiation
Patient Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

Table 75: Proposed Presentation Contexts for Query SCU

Query SCU proposes two presentation contexts, one for each of the supported abstract syntaxes. If both abstract syntaxes are supported by the remote Query SCP, Study Root Query/Retrieve Information Model abstract syntax is preferred.

4.2.12.5 Retrieve SCU

4.2.12.5.1 SOP Classes

The Retrieve SCU provides Standard Conformance to the following DICOM SOP Query/Retrieve Classes:

SOP Class Name	SOP Class UID	SCU	SCP
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	Yes	No
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Yes	No

Table 76: SOP Classes supported by LTA Client Retrieve SCU

4.2.12.5.2 Association Initiation Policy

The Retrieve SCU initiates but never accepts associations.

4.2.12.5.2.1 Activity – Retrieve from Remote AE

4.2.12.5.2.1.1 Description and Sequencing of Activities

When a DICOM object is not locally available but stored at a DICOM Storage node, it will be retrieved with a hierarchical C-MOVE Request.

4.2.12.5.2.1.2 Proposed Presentation Contexts

Presentation contexts as described in Table 45 may be proposed by the Retrieve SCU for retrieval requests.

4.2.12.5.2.1.3 SOP Specific Conformance for Retrieve SOP Classes

The behavior of the Retrieve SCU when encountering status codes in a C-MOVE response is summarized in Table 51.

4.2.12.6 Storage SCP

4.2.12.6.1 SOP Classes

The Storage SCP of the LTA Client application entity provides Standard Conformance to the same DICOM Storage SOP Classes as the DICOM server (cp. section 4.2.2.3.1).

4.2.12.6.2 Association Initiation Policy

The Storage SCP does not initiate Associations.

4.2.12.6.3 Association Acceptance Policy

4.2.12.6.3.1 Activity – Storage Request from External Peer AE

4.2.12.6.3.1.1 Description and Sequencing of Activity

The Storage SCP of the LTA Client accepts associations from DICOM Storage nodes acting as LTA (Long Term Archives). To retrieve objects that are not locally available but stored at the LTA, the Retrieve SCU of the LTA Client initiates C-MOVE requests (cp. section 4.2.12.5) and waits for objects sent via C-STORE.

The associated real-world activity is the storage of the DICOM object on the storage medium (CACHE). The data set of the C-STORE command is stored with no loss of information.

4.2.12.6.3.1.2 Accepted Presentation Contexts

The Storage SCP will accept any number of storage SOP classes that are listed in Table 19 above. It defines no limit for the number of presentation contexts accepted.

The Storage SCP supports the same Presentation Contexts as the DICOM server (see Table 20).

4.2.12.6.3.1.3 SOP Specific Conformance for Storage SOP Classes

The Storage SCP supports Level 2 (Full) conformance for the Storage SOP Classes.

The Storage SCP will issue a failure status if it is unable to store the DICOM object on the storage medium (CACHE).

DICOM objects not being requested via the LTA Client AE's Retrieve SCU are rejected.

The following C-STORE response status codes may be returned by the Storage SCP:

Service Status	Further Meaning	Status Code	Behavior
Success	Success	0000	The Storage SCP has successfully stored the SOP instance. Success indication message is output to the Service Logs.
Refused	Out of Resources	A700	The Storage SCP has not successfully stored the

			SOP instance. An error comment is sent to the requesting SCU. Error indication message is output to the Service Logs.
Error	Cannot Understand	C000	The Storage SCP has not successfully stored the SOP instance. An error comment is sent to the requesting SCU. Error indication message is output to the Service Logs.

Table 77: C-STORE Response Status Codes of the Storage SCP of the LTA-Client AE

4.3 Network Interfaces

4.3.1 Supported Communication Stacks

The DICOM Server provides DICOM TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard.

4.3.2 TCP/IP Stack

4.3.2.1 TCP/IP API

The DICOM Server inherits its TCP/IP stack from the installed operating system upon which it is executed.

4.3.3 Physical Network Interface

The DICOM Server is indifferent to the physical medium over which TCP/IP executes.

4.4 Configuration

By default the DICOM Server uses a configuration file, which by default sets the values described in the following sections.

This chapter contains some DICOM specific aspects of the configuration process of the DICOM Server.

4.4.1 AE Title/Presentation Address Mapping

4.4.1.1 Local AE Titles

The local AE Titles and corresponding TCP ports can be configured.

Application Entity	Default AE Title	Default TCP/IP Port
Dicom server	OWN_AET	4444

Table 78: AE Title Configuration

4.4.1.2 Remote AE Titles

Remote AE Titles, TCP/IP Addresses and ports are configurable through the configuration file. Leave this entry empty to load the trusted nodes from the database.

4.4.2 Parameters

The following parameters relevant to DICOM communication may be configured for the DICOM Server:

Parameter	Configurable (Yes/No)	Default Value
Dicom Server		
Listening Port	Yes	4444
Maximum number of simultaneous Associations (Max-clients)	Yes	50
Request timeout	Yes	5000
DIMSE timeout	Yes	86400000
So close delay	Yes	500
Maximum PDU size the AE can receive	Yes	16352
Maximum op invoked	Yes	0
Accepted Called AETs	Yes	OWN_AET
Accepted Calling AETs	Yes	*loaded from database*
Audit		
host	Yes	localhost
port	Yes	5151
facility	Yes	local5

Table 79: Configuration Parameters

5 Support of extended Character Sets

Cerner CAMM Archive supports the Latin alphabet No. 1 character set (“ISO_IR 100”), which is a supplementary set of ISO 8859. The PACS can be configured to support further single-byte character sets without code extensions. The character set to be used has to be indicated as a single valued element (Specific Character Set: 0008,0005).

6 Security

6.1 Security Profiles

The DICOM Server supports secure DICOM communication in conformance with the Basic TLS Secure Transport Connection Profile. The default configuration looks as follows (TLS is deactivated by default):

Parameter	Configurable (Yes/No)	Default Value
protocol	Yes	dicom
tls-key	Yes	Identity.p12
tls-key-passwd	Yes	****
tls-cacerts	Yes	cacerts.jks
tls-cacerts-passwd	Yes	****

Table 80: TLS Configuration Table

6.2 Association Level Security

The DICOM Server can be configured to accept Association Requests from only a limited list of Calling AE Titles.

7 Annexes

7.1 IOD Contents

7.1.1 Created SOP Instances

Cerner CAMM creates instances of the following SOP classes:
Basic Text SR Storage (1.2.840.10008.5.1.4.1.1.88.11)
Encapsulated PDF Storage (1.2.840.10008.5.1.4.1.1.104.1)

The following tables describe the attributes contained created SOP instances. The tables use a number of abbreviations. The abbreviations of the "Presence of …" column mean:

VNAP	Value Not Always Present (attribute with zero length if no value is present)
ANAP	Attribute Not Always Present
ALWAYS	Always Present

The abbreviations of the "Source" column mean:

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
OBJECT	the attribute value is taken from DICOM object (default values are filled in, if an attribute is not present or empty in an object, but is specified as mandatory, e.g. in the DICOMDIR definition – see **Error! Reference source not found.**)
HL7MSG	the attribute value is taken from HL7 Message
DB	the attribute value is taken from the database

7.1.1.1 Basic Text SR Information Object Modules

The HL7 Server uses the ORU^R01 message to convert HL7 Reports to DICOM Structured Reports. A Basic Text SR object is generated and sent to the configured DICOM server.

IE	Module	Reference	Presence of Module
Patient	Patient	Table 82	ALWAYS
Study	General Study	Table 83	ALWAYS
Series	SR Document Series	Table 87	ALWAYS
Equipment	General Equipment	Table 84	ALWAYS
Document	SR Document General	Table 85	ALWAYS
	SR Document Content	Table 88	ALWAYS
	SOP Common	Table 86	ALWAYS

Table 81: IOD of Created Basic Text SR Document Instances

7.1.1.1.1 Common Modules

Attribute Name	Tag	VR	Value	Presence of Value	Source
Patient's Name	(0010,0010)	PN	From HL7 PID: Patient Name (00108)	ALWAYS	HL7MSG

Patient ID	(0010,0020)	LO	From HL7 PID: Patient Identifier List [0] (00106)	ALWAYS	HL7MSG
Patient's Birth Date	(0010,0030)	DA	From database or from HL7 PID: Date/Time of Birth (00110)	ANAP	HL7MSG/DB
Patient's Sex	(0010,0040)	CS	From database or from HL7 PID: Patient Sex (00111)	ANAP	HL7MSG/DB

Table 82: Patient Module of Created Basic Text Document Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Study Date	(0008,0020)	DA	<current date> if automatically generated	VNAP	DB/AUTO
Study Time	(0008,0030)	TM	<current time> if automatically generated	VNAP	DB/AUTO
Physician(s) of Record	(0008,1048)	PN		VNAP	
Name of Physician(s) Reading Study	(0008,1060)	PN		VNAP	
Study In-stance UID	(0020,000D)	UI	From HL7 ZDS segment or beginning with 2.16.840.1.113669.632.2.31.1. if automatically generated	ALWAYS	HL7MSG /CONFIG/AUTO
Accession Number	(0008,0050)	SH	From HL7 OBR: Placer Order Number (00216)	ANAP	HL7MSG /DB

Table 83: General Study Module of Created Basic Text Document Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Manufacturer	(0008,0070)	LO	"Image Devices" configured by default; "Image Devices GmbH" if automatically generated	ALWAYS	CONFIG/AUTO
Station Name	(0008,1010)	SH	<hostnameOfHL7Server>	ALWAYS	CONFIG/AUTO
Manufacturer's Model Name	(0008,1090)	LO	"ID.Store"	ALWAYS	CONFIG/AUTO

Table 84: General Equipment Module of Created Basic Text Document Instances

Each OBX segment of the ORU^R01 message initiates the HL7 server to add an item to the Content sequence of the generated DICOM SR.

Attribute Name	Tag	VR	Value	Presence of Value	Source

Instance Number	(0020,00163	CS	“1”	ALWAYS	AUTO
Completion Flag	(0040,A491)	CS	“COMPLETE”	ALWAYS	AUTO
Verification Flag	(0040,A493)	CS	“UNVERIFIED”	ALWAYS	AUTO
Content Date	(0008,0023)	DA	<current time> if automatically generated or From HL7 OBR: Observation Date/Time (00241)	ALWAYS	HL7MSG/AUTO
Content Time	(0008,0033)	TM	<current time> if automatically generated or From HL7 OBR: Observation Date/Time (00241)	ALWAYS	HL7MSG/AUTO
Value Type	(0040,A040)	CS	“CONTAINER”	ALWAYS	AUTO
Content Sequence	(0040,A730)	SQ		ALWAYS	AUTO
> Relationship Type	(0040,A010)	CS	“CONTAINS”	ALWAYS	AUTO
> Value Type	(0040,A040)	CS	“TEXT”	ALWAYS	AUTO
> Concept Name Code Sequence	(0040,A043)	SQ		ALWAYS	AUTO
>> Code Value	(0008,0100)	SH	“IMDEV_SR.”+<x>, whereas x is serially numbered (beginning with 0)	ALWAYS	AUTO
>> Coding Scheme Designator	(0008,0102)	SH	“99007”	ALWAYS	AUTO
>> Code Meaning	(0008,0104)	LO	From HL7 OBX: Observation Identifier (00769)	VNAP	HL7MSG
> Text Value	(0040,A0160)	UT	From HL7 OBX: Observation Value (00561)	VNAP	HL7MSG

Table 85: SR Document General Module of Created Basic Text Document Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Specific Character Set	(0008,0005)	CS	“ISO_IR 100”	ALWAYS	CONFIG/AUTO
Instance Creation Date	(0008,0012)	DA	<Current date>	ALWAYS	AUTO
Instance Creation Time	(0008,0013)	TM	<Current time>	ALWAYS	AUTO

SOP Class UID	(0008,0016)	UI	1.2.840.10008.5.1.4.1.1.88.11	ALWAYS	AUTO
SOP Instance UID	(0008,0018)	UI	Beginning with 2.16.840.1.113669.632.2.31.1. if automatically generated	ALWAYS	CONFIG/AUTO

Table 86: SOP Common Module of Created Basic Text Document Instances

7.1.1.1.2 Other Modules

Attribute Name	Tag	VR	Value	Presence of Value	Source
Modality	(0008,0060)	CS	"SR"	ALWAYS	AUTO
Series Instance UID	(0020,000E)	UI	Beginning with 2.16.840.1.113669.632.2.31.1. if automatically generated	ALWAYS	CONFIG/AUTO
Series Number	(0020,0011)	IS	"1"	ALWAYS	AUTO

Table 87: SR Document Series Module of Created Basic Text Document Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Concept Name Code Sequence	(0040,A043)	SQ		ALWAYS	AUTO
> Code Value	(0008,0100)	SH	"IMDEV_SR.01"	ALWAYS	AUTO
> Coding Scheme Designator	(0008,0102)	SH	"99007"	ALWAYS	AUTO
> Code Meaning	(0008,0104)	LO	"HI7 Report"	ALWAYS	AUTO

Table 88: SR Document Content of Created Basic Text Document Instances

7.1.1.2 Encapsulated PDF Information Object Modules

The StoreDicomEncapsulatedDoc service of the Universal Workstation Services (UWS) and Public Web Services (PWS) accepts a PDF file and DICOM attributes as parameters. The PDF file and the specified values of the parameters are put into a newly generated DICOM Encapsulated PDF Document object. The object is sent to the configured DICOM server. Default values for DICOM attributes can be configured.

IE	Module	Reference	Presence of Module
Patient	Patient	Table 90	ALWAYS
	Specimen Identification		ANAP
	Clinical Trial Subject		ANAP
Study	General Study	Table 91	ALWAYS
	Patient Study		ANAP
	Clinical Trial Study		ANAP

Series	Encapsulated Document Series	Table 94	ALWAYS
	Clinical Trial Series		ANAP
Equipment	General Equipment	Table 92	ALWAYS
	SC Equipment	Table 95	ALWAYS
Encapsulated Document	Encapsulated Document	Table 96	ALWAYS
	SOP Common	Table 93	ALWAYS
<Other IE>	<Other Module>	Table 97	ANAP/VNAP

Table 89: IOD of Created Encapsulated PDF Document Instances

7.1.1.2.1 Common Modules

Attribute Name	Tag	VR	Value	Presence of Value	Source
Patient's Name	(0010,0010)	PN		ALWAYS	USER
Patient ID	(0010,0020)	LO		VNAP	USER
Patient's Birth Date	(0010,0030)	DA		VNAP	USER/CONFIG
Patient's Sex	(0010,0040)	CS		VNAP	USER/CONFIG
<Other Attributes>				ANAP/VNAP	USER/CONFIG

Table 90: Patient Module of Created Encapsulated PDF Document Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Study Date	(0008,0020)	DA		VNAP	USER/CONFIG
Study Time	(0008,0030)	TM		VNAP	USER/CONFIG
Referring Physician's Name	(0008,0090)	PN		VNAP	USER/CONFIG
Study Instance UID	(0020,000D)	UI	Beginning with 2.16.840.1.113669.632.2.37.1. if automatically generated	ALWAYS	USER/AUTO/CONFIG
Study ID	(0020,010)	SH		VNAP	USER/CONFIG
Accession Number	(0008,0050)	SH		VNAP	USER/CONFIG
<Other Attributes>				ANAP/VNAP	USER/CONFIG

Table 91: General Study Module of Created Encapsulated PDF Document Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Manufacturer	(0008,0070)	LO	Cerner	VNAP	USER/CONFIG
Manufacturer's Model Name	(0008,1090)	LO	Cerner CAMM Archive		USER/CONFIG

Software Versions	(0018,1020)		If automatically generated: dependant on software version		USER/CONFIG/AUTO
<Other Attributes>				ANAP/VNAP	USER/CONFIG

Table 92: General Equipment Module of Created Encapsulated PDF Document Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
SOP Class UID	(0008,0016)	UI	1.2.840.10008.5.1.4.1.1.104.1	ALWAYS	USER/CONFIG/AUTO
SOP Instance UID	(0008,0018)	UI	Beginning with 2.16.840.1.113669.632.2.37.1. if automatically generated	ALWYS	USER/CONFIG/AUTO
<Other Attributes>				ANAP/VNAP	USER/CONFIG

Table 93: SOP Common Module of Created Encapsulated PDF Document Instances

7.1.1.2.2 Other Modules

Attribute Name	Tag	VR	Value	Presence of Value	Source
Modality	(0008,0060)	CS	OT if automatically generated	ALWAYS	USER/CONFIG/AUTO
Series Instance UID	(0020,000E)	UI	Beginning with 2.16.840.1.113669.632.2.37.1. if automatically generated	ALWAYS	USER/CONFIG/AUTO
Series Number	(0020,0011)	IS	1 if automatically generated	ALWAYS	USER/CONFIG/AUTO
<Other Attributes>				ANAP/VNAP	USER/CONFIG

Table 94: Encapsulated Document Series Module of Created Encapsulated PDF Document Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Conversion Type	(0008,0064)	CS	SD if automatically generated	VNAP	USER/CONFIG/AUTO
<Other Attributes>				ANAP/VNAP	USER/CONFIG

Table 95: SC Equipment Module of Created Encapsulated PDF Document Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Content Date	(0008,0023)	CS		VNAP	USER/CONFIG
Content Time	(0008,0033)	CS		VNAP	USER/CONFIG

Acquisition Datetime	(0008,002A)	CS		VNAP	USER/CONFIG
Instance Number	(0020,0013)	CS	1 if automatically generated	ALWAYS	USER/CONFIG/AUTO
Burned In Annotation	(0028,0301)	CS	YES if automatically generated	ALWAYS	USER/CONFIG/AUTO
Concept Name Code Sequence	(0040,A043)	CS		VNAP	USER/CONFIG
Document Title	(0042,0010)	CS		VNAP	USER/CONFIG
Encapsulated Document	(0042,0011)	CS		ALWAYS	USER
MIME Type Of Encapsulated Document	(0042,0012)	CS	application/pdf	ALWAYS	USER/CONFIG/AUTO
<Other Attributes>				ANAP/VNAP	USER/CONFIG

Table 96: Encapsulated Document Module of Created Encapsulated PDF Document Instances

Arbitrary DICOM attributes can be put into the generated Encapsulated PDF Document object:

Attribute Name	Tag	VR	Value	Presence of Value	Source
<Other Attributes>				ANAP/VNAP	USER/CONFIG

Table 97: Other Modules of Created Encapsulated PDF Document Instances

7.1.2 Usage of Attributes from received IOD's

Not applicable.

7.1.3 Attribute Mapping

Not applicable.

7.1.4 Coerced/Modified fields

Not applicable.

7.2 Data Dictionary of Private Attributes

Not applicable.

7.3 Coded Terminology and Templates

Not applicable.

7.4 Grayscale Image Consistency

Not applicable.

7.5 Standard Extended/Specialized/Private SOP Classes

Not applicable.

7.6 Private Transfer Syntaxes

Not applicable.

7.7 Web Access to DICOM Persistent Objects (WADO)

Cerner CAMM Archive supports the following parts of WADO - Web Access to DICOM Persistent Objects (see DICOM Standard PS 3.18-2007):

JPEG, PNG, GIF and JP2 Retrieval of DICOM images and DICOM ECGs with
- Presentation State applied
- Annotation on the image
- Image resolution
- Region of Interest
- Zoom
- Window Level applied

DICOM object Retrieval with additional Conversion[2]
PDF Retrieval for Encapsulated PDF Documents
MPEG2 Retrieval for DICOM Objects with MPEG2 Transfer Syntax

The base URL of the WADO service is “http://<server_name>/wado/Wado”.
The service supports the following parameters. The returned object is dependent on the “contentType” parameter.

1. *requestType*: required parameter which specifies the request type to perform. The parameter value shall be “WADO”.
2. *studyUID*: required parameter which specifies the study instance UID. The parameter value may be empty. If the value is not empty, the service checks the UID with the according DICOM object (determined by the “objectUID” parameter). If the specified UID differs from the Study Instance UID within the DICOM object (0020, 000D), the service returns an error.
3. *seriesUID*: required parameter which specifies the series instance UID. The parameter value may be empty. If the value is not empty, the service checks the UID with the according DICOM object (determined by the “objectUID” parameter). If the specified UID differs from the Series Instance UID within the DICOM object (0020, 000E), the service returns an error.
4. *objectUID*: required parameter which specifies the SOP instance UID. The parameter value must not be empty.

[2] A change in Patient demographic information will be contained in any composite SOP Instances requested as content type “application/dicom”; Patient’s Age (0010,1010) attribute is calculated as described in section 4.2.2.5.3.1.3.

5. *presentationUID*: optional parameter of the presentation state storage object to be applied to the image (default: no presentation state applied).
6. *presentationSeriesUID*: required, if presentationUID is present; It specifies the Series Instance UID of the series containing the presentation state storage object to be applied on an image (if content type is image/*). The parameter value may be empty. If the value is not empty, the service checks the UID with the according DICOM object (determined by the “presentationUID” parameter). If the specified UID differs from the Series Instance UID within the DICOM object (0020, 000E), the service returns an error.
7. *contentType*: optional parameter which specifies the MIME type of the response. The following content types are supported
   application/dicom
   image/jpeg
   image/png
   image/gif
   image/jp2
   application/pdf (only for Encapsulated PDF Documents)
   video/mpeg (only when Transfer Syntax is MPEG2).
   If no content type is specified, the service does not return any object.
8. *annotation*: optional parameter which specifies the annotation applied to an image (if content type is image/*). It shall not be present if contentType is a non-image MIME type. When it is not present for an image object, no annotation will be burnt in.
   Its value is a non-empty list of one or more of the following items separated by a "," character:
   "patient”: for displaying patient information on the image (e.g. patient name, birth date,…)
   "technique", for displaying technique information of the image (e.g. image number, study date, image position,…).
9. *rows*: optional parameter which specifies the image height to be returned (if content type is image/*). It shall not be present if contentType is not image/*. The value shall be expressed as an integer string (IS), as specified in PS 3.5. If both “rows” and “columns” are specified, then each shall be interpreted as a maximum, and a size will be chosen for the image within these constraints, maintaining the correct aspect ratio. If the number of rows is absent and the number of columns is present, the number of rows shall be chosen in order to maintain the correct aspect ratio. If both are absent, the image is sent in its original size, resulting as one pixel of screen image for each value in the image data matrix (i.e. default: original rows).
10. *columns*: optional parameter which specifies the image width to be returned (if content type is image/*). It shall not be present if contentType is not image/*. The value shall be expressed as an integer string (IS), as specified in PS 3.5. If both “rows” and “columns” are specified, then each shall be interpreted as a maximum, and a size will be chosen for the image within these constraints, maintaining the correct aspect ratio. If the number of columns is absent and the number of rows is present, the number of columns shall be chosen in order to maintain the correct aspect ratio. If both are absent, the image is sent in its original size, resulting as one pixel of screen image for each value in the image data matrix (i.e. default: original columns).
11. *frameNumber*: optional parameter which specifies the frame to be returned of a multi frame image (if content type is image/*). It shall not be present if contentType is application/dicom. The value shall be encoded as an integer string (IS), as specified in PS 3.5.
12. *region*: optional parameter, which allows the selection of a rectangular region of an image matrix to be retrieved (if content type is image/*). The purpose of this parameter is to allow a user to view a selected area of the image matrix, for example at higher magnification. It shall not be present if contentType is not image/*. The value shall be expressed as a list of four positive decimal strings, separated by the ',' character, representing the region of the source image to be returned. These decimal values shall be values in a normalized coordinate system relative to the size of the original image matrix measured in rows and columns, with values ranging from 0.0 to 1.0, and representing in the following order:
    the x position of the top left hand corner of the region to be retrieved, 0.0 corresponding to the first column of the image matrix.
    the y position of the top left hand corner of the region to be retrieved, 0.0 corresponding to the top row of the image matrix.
    the x position of the bottom right hand extent of the region, 1.0 corresponding to the last column of the image matrix, 0.0 being forbidden.
    the y position of the bottom right hand extent of the region, 1.0 corresponding to the last row of the image matrix, 0.0 being forbidden.
13. *imageQuality*: optional parameter which specifies the lossy compression ratio. It shall not be present if contentType is application/dicom, except if the transferSyntax parameter is present and corre-

sponds to a lossy compression. If the requested MIME type is for a lossy compressed image (e.g. image/jpeg), this parameter indicates the required quality of the image to be returned within the range 1 to 100, 100 being the best quality (default: 95). The value shall be encoded as an integer string (IS), as specified in PS 3.5.

The quality parameter value is converted to a ratio 100/requestedQuality (rounded) when requesting images with the j2k lossy transfer syntax (see 14).

14. *transferSyntax*: The Transfer Syntax to be used within the DICOM image object, as specified in PS 3.6. This parameter is OPTIONAL. It shall not be present if contentType is other than application/dicom. By default the DICOM object(s) returned shall be encoded in Explicit VR Little Endian. The response shall be the Transfer Syntax requested if possible. If it is not possible for the response to be sent using the requested transfer syntax then the Explicit VR Little Endian Uncompressed Transfer Syntax shall be used.

    The value shall be encoded as a unique identifier (UID) string, as specified in PS 3.5, except that it shall not be padded to an even length with a NULL character.

    The following Transfer Syntax UIDs are supported:

    1.2.840.10008.1.2.1 (Explicit VR Little Endian)

    1.2.840.10008.1.2.4.90 (JPEG 2000 Image Compression (Lossless Only))

    1.2.840.10008.1.2.4.91 (JPEG 2000 Image Compression)

    Additional a proprietary value “preserve” is supported to retrieve objects as they are currently stored within the archive (without conversion)

    If j2k lossless or lossy images are requested as j2k lossy, the returned images can only have the existing ratios defined by the quality layers within the stored image. The next best layer according to the requested image quality is returned. The DICOM server compresses images j2k lossless with 6 quality layers and j2k lossy with 5 quality layers (cp. section 4.2.2.3.3.1.3).