McKesson Radiology 12.3

DICOM Conformance Statement

Document Description	
Document Title	McKesson Radiology 12.3 DICOM Conformance Statement
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Copyright notice

Trademarks

Revision History

Date	Revision	Description	Author
Nov 29, 2016	1.1	Based on 12.2.1 and added multiple GSPS and CSPS support	Wayne Tran
Jan 26, 2017	1.2	Added Type of Patient ID (0010,0022)	Wayne Tran
Jan 27, 2017	2.0	Submit for Final Approval	Wayne Tran
Feb 9, 2017	3.0	Removed Reviewers Section since the reviewers are listed in WPR. Updated Copyright date to 2017.	Wayne Tran
Mar 1, 2017	4.0	Removed BI-RADS trademark from the document.	Wayne Tran

1   CONFORMANCE STATEMENT OVERVIEW

McKesson Radiology™ 12.3 is a self-contained, networked computer system used for receiving, archiving, and displaying diagnostic medical images. It is also capable of creating derived images using Multi-Planar Reconstruction (MPR). It can create DICOM Secondary Capture Image objects from documents scanned directly into McKesson Radiology™ 12.3. The MPR and Secondary Capture Image objects can both be exported via the Query/Retrieve or Storage Services. It can display DICOM Standard GSPS Text and graphic annotations and Presentation State information (i.e. Shutter, Display Area, VOILUT etc.) created by other DICOM compliant devices. It can export internal (proprietary format) Text and graphic annotations and Presentation State information (i.e. Shutter, Display Area, VOILUT etc.) that are created by the McKesson Radiology™ 12.3 System using standard DICOM GSPS SOP Instances (See 7.1.9). It can support multiple GSPS objects for a given study when the Presentation State information varies for each image or a group of images. The details describing how annotations in multiple GSPS objects should be applied when they are assigned to the same image (e.g. apply annotations cumulatively to the same image) or how the GSPS attributes: Presentation Label, Presentation Creation Date, and Presentation Creation Time are used for grouping multiple GSPS objects to form a presentation state is not described in this document. It can also display DICOM Standard Color Softcopy Presentation State (CSPS) text and graphic annotations and Presentation State information (i.e. Shutter, Display Area etc.). McKesson Radiology™ 12.3 does not support CSPS device-independent color space capabilities. Please consult with a McKesson Representative to learn more about McKesson support for multiple GSPS objects and CSPS objects in the McKesson Radiology™ 12.3 system.

For Shared Image Management (SIM) customers who want to DICOM archive their non-DICOM Cardiology files to a separate DICOM archive, McKesson Radiology™ 12.3 can create DICOM SOP instances for these non-DICOM files so they can be DICOM archive. DICOM Raw Data instances will be used to wrap file types (See 7.1.10) that are non pdf format. Encapsulated PDF instances will be used to wrap .pdf data file type. This allows these files to be sent and query/retrieved back from a separate DICOM archive.

McKesson Radiology™ 12.3 supports displaying information about CAD findings encoded in R2 and iCAD DICOM Mammography SR objects (See 7.1.12)

McKesson Radiology™ 12.3 includes the ability to import, send, query and retrieve, perform media import/export, and display Digital Breast Tomosynthesis (DBT) images and synthesized 2D MG images. Display of DBT images is only for 64-bit McKesson Radiology Station™ 12.3. A few of the functions include: scroll, power scroll, window/level, zoom, pan, annotate, creation of display protocols that support hanging of both 2D and DBT images and view DBT image data at different slice thicknesses to visualize anatomical regions of interest and calcifications in greater detail (slab DBT images - Single Plane Reconstruction (SPR) presentation of DBT volumes). Please consult with a McKesson Representative for a complete list of features that McKesson Radiology™ 12.3 supports for DBT images.

McKesson Radiology™ 12.3 needs to handle imaging data where the patient and study identifiers can be from multiple assigning authorities. With the addition of the IHE MIMA Multiple Identity Resolution option feature, McKesson Radiology™ 12.3 will be capable of exchanging the patient and study identifiers associated with the assigning authorities in a standard manner.

McKesson Radiology™ 12.3 handles the synchronization of Imaging Instances based on the IHE Imaging Object Change Management (IOCM) Integration Profile. IOCM specifies how one actor communicates local changes applied on existing imaging objects to other actors that manage copies of the modified imaging objects in their own local systems. The supported changes include (1) object rejection due to

quality or patient safety reasons, (2) correction of incorrect modality worklist entry selection, and (3) expiration of objects due to data retention requirements. McKesson Radiology™ 12.3 follows the IHE IOCM approach of using DICOM KOS instances for change communication. However, certain implementation details deviate from the Profile to better fit the McKesson Radiology™ 12.3 existing architecture and practice.

McKesson Radiology™ 12.3 supports Query based on ID for DICOM Objects by Representational State Transfer Services (QIDO-RS) to allow web based queries for studies, series and instances.

McKesson Radiology™ 12.3 supports Web Access to DICOM Persistent Objects by RESTful Services (WADO-RS) to allow web based retrieve for studies, series and instances.

The system conforms to the DICOM 3.0 standard[1] to allow the sharing of medical information with other digital imaging systems.

Table 1 provides an overview of the network services supported by McKesson Radiology™ 12.3.

Table 1: Network Services

DICOM SOP Class Name	SOP Class UID	User of Service (SCU)	Provider of Service (SCP)
Verification			
Verification	1.2.840.10008.1.1	Yes	Yes
Transfer			
12-lead ECG Waveform	1.2.840.10008.5.1.4.1.1.9.1.1	Yes	Yes
Ambulatory ECG Waveform	1.2.840.10008.5.1.4.1.1.9.1.3	Yes	Yes
Basic Voice Audio Waveform	1.2.840.10008.5.1.4.1.1.9.4.1	Yes	Yes
Cardiac Electrophysiology Waveform	1.2.840.10008.5.1.4.1.1.9.3.1	Yes	Yes
General Audio Waveform	1.2.840.10008.5.1.4.1.1.9.4.2	Yes	Yes
Arterial Pulse Waveform	1.2.840.10008.5.1.4.1.1.9.5.1	Yes	Yes
Respiratory Waveform	1.2.840.10008.5.1.4.1.1.9.6.1	Yes	Yes
Basic Text Structured Report	1.2.840.10008.5.1.4.1.1.88.11	Yes	Yes
Comprehensive Structured Report	1.2.840.10008.5.1.4.1.1.88.33	Yes	Yes
Enhanced Structured Report	1.2.840.10008.5.1.4.1.1.88.22	Yes	Yes
Mammography CAD Structured Report	1.2.840.10008.5.1.4.1.1.88.50	Yes	Yes
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59	Yes	Yes
Chest CAD SR	1.2.840.10008.5.1.4.1.1.88.65	Yes	Yes
Colon CAD SR Document	1.2.840.10008.5.1.4.1.1.88.69	Yes	Yes
Implantation Plan SR Document	1.2.840.10008.5.1.4.1.1.88.70	Yes	Yes
Encapsulated PDF	1.2.840.10008.5.1.4.1.1.104.1	Yes	Yes

[1] NEMA PS 3.1 - 3.20 (2014a)

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DICOM SOP Class Name	SOP Class UID	User of Service (SCU)	Provider of Service (SCP)
Encapsulated CDA IOD	1.2.840.10008.5.1.4.1.1.104.2	Yes	Yes
Computed Radiography Image	1.2.840.10008.5.1.4.1.1.1	Yes	Yes
CT Image	1.2.840.10008.5.1.4.1.1.2	Yes	Yes
Digital X-Ray Image (Presentation)	1.2.840.10008.5.1.4.1.1.1.1	Yes	Yes
Digital X-Ray Image (Processing)	1.2.840.10008.5.1.4.1.1.1.1.1	Yes	Yes
Digital Mammography Image (Presentation)	1.2.840.10008.5.1.4.1.1.1.2	Yes	Yes
Digital Mammography Image (Processing)	1.2.840.10008.5.1.4.1.1.1.2.1	Yes	Yes
Breast Tomosynthesis Image	1.2.840.10008.5.1.4.1.1.13.1.3	Yes	Yes
Digital Intra-oral X-Ray Image (Presentation)	1.2.840.10008.5.1.4.1.1.1.3	Yes	Yes
Digital Intra-oral X-Ray Image (Processing)	1.2.840.10008.5.1.4.1.1.1.3.1	Yes	Yes
General ECG Waveform	1.2.840.10008.5.1.4.1.1.9.1.2	Yes	Yes
Grayscale Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.1	Yes	Yes
Color Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.2	Yes	Yes
Pseudo-Color Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.3	Yes	Yes
Blending Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.4	Yes	Yes
XA/XRF Grayscale Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.5	Yes	Yes
Hardcopy Color Image	1.2.840.10008.5.1.1.30	Yes	Yes
Hardcopy Grayscale Image	1.2.840.10008.5.1.1.29	Yes	Yes
Hemodynamic Waveform	1.2.840.10008.5.1.4.1.1.9.2.1	Yes	Yes
Multi-frame Single Bit Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7.1	Yes	Yes
Multi-frame Grayscale Byte Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7.2	Yes	Yes
Multi-frame Grayscale Word Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7.3	Yes	Yes
Multi-frame True Color Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7.4	Yes	Yes
MR Image	1.2.840.10008.5.1.4.1.1.4	Yes	Yes
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2	Yes	Yes
Nuclear Medicine Image	1.2.840.10008.5.1.4.1.1.20	Yes	Yes
Nuclear Medicine Image (Retired)	1.2.840.10008.5.1.4.1.1.5	Yes	Yes
Positron Emission Tomography Image	1.2.840.10008.5.1.4.1.1.128	Yes	Yes
Raw Data	1.2.840.10008.5.1.4.1.1.66	Yes	Yes
Spatial Registration	1.2.840.10008.5.1.4.1.1.66.1	Yes	Yes
Spatial Fiducials	1.2.840.10008.5.1.4.1.1.66.2	Yes	Yes
Deformable Spatial Registration	1.2.840.10008.5.1.4.1.1.66.3	Yes	Yes

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DICOM SOP Class Name	SOP Class UID	User of Service (SCU)	Provider of Service (SCP)
Segmentation	1.2.840.10008.5.1.4.1.1.66.4	Yes	Yes
Surface Segmentation	1.2.840.10008.5.1.4.1.1.66.5	Yes	Yes
Real World Value Mapping	1.2.840.10008.5.1.4.1.1.67	Yes	Yes
RT Beams Treatment Record	1.2.840.10008.5.1.4.1.1.481.4	Yes	Yes
RT Brachy Treatment Record	1.2.840.10008.5.1.4.1.1.481.6	Yes	Yes
RT Dose	1.2.840.10008.5.1.4.1.1.481.2	Yes	Yes
RT Image	1.2.840.10008.5.1.4.1.1.481.1	Yes	Yes
RT Plan	1.2.840.10008.5.1.4.1.1.481.5	Yes	Yes
RT Structure Set	1.2.840.10008.5.1.4.1.1.481.3	Yes	Yes
RT Treatment Summary Record	1.2.840.10008.5.1.4.1.1.481.7	Yes	Yes
RT Ion Plan Storage	1.2.840.10008.5.1.4.1.1.481.8	Yes	Yes
RT Ion Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.9	Yes	Yes
RT Beams Delivery Instruction	1.2.840.10008.5.1.4.34.7	Yes	Yes
Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7	Yes	Yes
Stand-alone Curve	1.2.840.10008.5.1.4.1.1.9	Yes	Yes
Stand-alone Modality LUT	1.2.840.10008.5.1.4.1.1.10	Yes	Yes
Stand-alone Overlay	1.2.840.10008.5.1.4.1.1.8	Yes	Yes
Stand-alone VOI LUT	1.2.840.10008.5.1.4.1.1.11	Yes	Yes
Standalone PET Curve	1.2.840.10008.5.1.4.1.1.129	Yes	Yes
Stored Print	1.2.840.10008.5.1.1.27	Yes	Yes
Ultrasound Image	1.2.840.10008.5.1.4.1.1.6.1	Yes	Yes
Ultrasound Image (Retired)	1.2.840.10008.5.1.4.1.1.6	Yes	Yes
Ultrasound Multi-frame Image	1.2.840.10008.5.1.4.1.1.3.1	Yes	Yes
Ultrasound Multi-frame Image (Retired)	1.2.840.10008.5.1.4.1.1.3	Yes	Yes
VL Endoscopic Image	1.2.840.10008.5.1.4.1.1.77.1.1	Yes	Yes
VL Microscopic Image	1.2.840.10008.5.1.4.1.1.77.1.2	Yes	Yes
VL Slide-Coordinates Microscopic Image	1.2.840.10008.5.1.4.1.1.77.1.3	Yes	Yes
VL Photographic Image	1.2.840.10008.5.1.4.1.1.77.1.4	Yes	Yes
VL Image (Retired)	1.2.840.10008.5.1.4.1.1.77.1	Yes	Yes
VL Multi-frame Image (Retired)	1.2.840.10008.5.1.4.1.1.77.2	Yes	Yes
Video Endoscopic Image	1.2.840.10008.5.1.4.1.1.77.1.1.1	Yes	Yes
Video Microscopic Image	1.2.840.10008.5.1.4.1.1.77.1.2.1	Yes	Yes
Video Photographic Image	1.2.840.10008.5.1.4.1.1.77.1.4.1	Yes	Yes
Ophthalmic Photography 8 Bit Image	1.2.840.10008.5.1.4.1.1.77.1.5.1	Yes	Yes

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DICOM SOP Class Name	SOP Class UID	User of Service (SCU)	Provider of Service (SCP)
Ophthalmic Photography 16 Bit Image	1.2.840.10008.5.1.4.1.1.77.1.5.2	Yes	Yes
Stereometric Relationship	1.2.840.10008.5.1.4.1.1.77.1.5.3	Yes	Yes
X-Ray Angiographic Bi-Plane Image (retired)	1.2.840.10008.5.1.4.1.1.12.3	Yes	Yes
X-Ray Angiographic Image	1.2.840.10008.5.1.4.1.1.12.1	Yes	Yes
X-Ray Radiofluoroscopic Image	1.2.840.10008.5.1.4.1.1.12.2	Yes	Yes
X-Ray Radiation Dose Structured Report	1.2.840.10008.5.1.4.1.1.88.67	Yes	Yes
Lensometry Measurements	1.2.840.10008.5.1.4.1.1.78.1	Yes	Yes
Autorefraction Measurements	1.2.840.10008.5.1.4.1.1.78.2	Yes	Yes
Keratometry Measurements	1.2.840.10008.5.1.4.1.1.78.3	Yes	Yes
Subjective Refraction Measurements	1.2.840.10008.5.1.4.1.1.78.4	Yes	Yes
Visual Acuity Measurements	1.2.840.10008.5.1.4.1.1.78.5	Yes	Yes
Spectacle Prescription Report	1.2.840.10008.5.1.4.1.1.78.6	Yes	Yes
Ophthalmic Axial Measurements	1.2.840.10008.5.1.4.1.1.78.7	Yes	Yes
Intraocular Lens Calculations	1.2.840.10008.5.1.4.1.1.78.8	Yes	Yes
Macular Grid Thickness and Volume Report	1.2.840.10008.5.1.4.1.1.79.1	Yes	Yes
Ophthalmic Visual Field Static Perimetry Measurements	1.2.840.10008.5.1.4.1.1.80.1	Yes	Yes
Basic Structured Display IOD	1.2.840.10008.5.1.4.1.1.131	Yes	Yes
Generic Implant Template	1.2.840.10008.5.1.4.43.1	Yes	Yes
Implant Assembly Template	1.2.840.10008.5.1.4.44.1	Yes	Yes
Implant Template Group	1.2.840.10008.5.1.4.45.1	Yes	Yes
Surface Scan Mesh Storage	1.2.840.10008.5.1.4.1.1.68.1	Yes	Yes
Surface Scan Point Cloud Storage	1.2.840.10008.5.1.4.1.1.68.2	Yes	Yes
Comprehensive 3D SR	1.2.840.10008.5.1.4.1.1.88.34	Yes	Yes
Procedure Log	1.2.840.10008.5.1.4.1.1.88.40	Yes	Yes
Radiopharmaceutical Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.68	Yes	Yes
Query/Retrieve			
Patient Root Q/R – FIND	1.2.840.10008.5.1.4.1.2.1.1	Yes	Yes
Patient Root Q/R – MOVE	1.2.840.10008.5.1.4.1.2.1.2	Yes	Yes
Study Root Q/R – FIND	1.2.840.10008.5.1.4.1.2.2.1	Yes	Yes
Study Root Q/R – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Yes	Yes
Patient Study Only – FIND	1.2.840.10008.5.1.4.1.2.3.1	Yes	Yes
Patient Study Only – MOVE	1.2.840.10008.5.1.4.1.2.3.2	Yes	Yes

DICOM SOP Class Name	SOP Class UID	User of Service (SCU)	Provider of Service (SCP)
Workflow Management			
Storage Commitment Push Model	1.2.840.10008.1.20.1	Yes	Yes
Modality Worklist	1.2.840.10008.5.1.4.31	Yes	Yes
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Yes	Yes
Print Management			
Basic Grayscale Print Management	1.2.840.10008.5.1.1.9	Yes	No
Basic Color Print Management	1.2.840.10008.5.1.1.18	Yes	No

NOTE1:   Relational Queries are not supported either as an SCU or SCP.

Table 2 provides an overview of the Media Storage Application Profiles supported by McKesson Radiology™ 12.3.

Table 2: Media Storage Application Profiles

Media Storage Application Profile	Write Files (FSC or FSU)	Read Files (FSR)
Compact Disk – Recordable		
General Purpose CD-R	Yes	Yes
Ultrasound Image Display Single Frame	Yes	Yes
Ultrasound Spatial Calibration Single Frame	Yes	Yes
Ultrasound Combined Calibration Single Frame	Yes	Yes
Ultrasound Image Display Single and Multi-Frame	Yes	Yes
Ultrasound Spatial Calibration Single and Multi-Frame	Yes	Yes
Ultrasound Combined Calibration Single and Multi-Frame	Yes	Yes

NOTE1:   For the system to act as an FSC or FSU of the STD-GEN-CD Application Profile it must be equipped with the necessary hardware option for writing to CD media. This is not a standard feature of all McKesson Radiology™ 12.3 systems. McKesson Radiology™ 12.3 systems can also support these Ultrasound Application Profiles for MOD media if equipped with the necessary hardware.

Table 3: QIDO-RS and WADO-RS Network Services

Network Service	User of Service (Client)	Provider of Service (Server)
Query by ID for DICOM Objects (QIDO)		
QIDO-RS – Search for Studies	No	Yes
QIDO-RS – Search for Series	No	Yes
QIDO-RS – Search for Instances	No	Yes
Web Access to DICOM Objects (WADO)		
WADO – RS – Retrieve Study	No	Yes

Network Service	User of Service (Client)	Provider of Service (Server)
WADO – RS – Retrieve Series	No	Yes
WADO – RS – Retrieve Instance	No	Yes
WADO – RS – Retrieve Frames	No	Yes
WADO – RS – Retrieve BulkData	No	Yes
WADO – RS – Retrieve Metadata	No	Yes

1.1   DICOM SOP Classes supported for Display

McKesson Radiology Station™ 12.3 as a multi-modality diagnostic medical workstation shall support the display of DICOM SOP Classes that are conforming to the DICOM 3.0 standard. However, McKesson Radiology Station™ 12.3 cannot actually support the display of all of the Composite SOP Classes listed in Table 1. Please refer to Table 186: "Supported Composite Image SOP Classes for Display" and Table 187: "Unsupported Composite SOP Classes for Display" for the SOP Classes in the two sets.

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Table of Contents

2   Introduction

2.1   Audience

This document is the DICOM 3.0 Conformance Statement for McKesson Radiology™ 12.3. It is intended for hospital staff, health system integrators, and software designers or implementers. It is assumed that the reader has a working understanding of DICOM.

2.2   Remarks

McKesson Radiology™ 12.3 is a self-contained, networked computer system used for receiving, archiving, and displaying diagnostic medical images. The system conforms to the DICOM 3.0 standard to allow the sharing of medical information with other digital imaging systems.

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

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

The scope of this Conformance Statement is to facilitate communication between McKesson Radiology™ 12.3 and other DICOM systems. The Conformance Statement should be read and understood in conjunction with the DICOM Standard [DICOM]. However, by itself it is not guaranteed to ensure the desired interoperability and a successful interconnectivity.

The user should be aware of the following important issues:

- The comparison of different Conformance Statements is the first step towards assessing interconnectivity between McKesson Radiology™ 12.3 and other DICOM conformant equipment.

- Test procedures should be defined to validate the desired level of connectivity.

2.3   Definitions, Terms and Abbreviations

VR   Value Representation - The value type of the DICOM attribute

SIM   Shared Image Management - With SIM, customers will have one PACS system to learn and maintain instead of having a separate PACS system for both Radiology and Cardiology Studies.

PCS-Value Profile Connection Space Value is a device independent color value that is created by the application of the transformation specified in an ICC profile.

3   Networking

3.1   Implementation Model

3.1.1   Application Data Flow Diagram

Figure 1: McKesson Radiology™ 12.3 DICOM Network Data Flow Diagram

Figure 1-1 Send Instances to External System
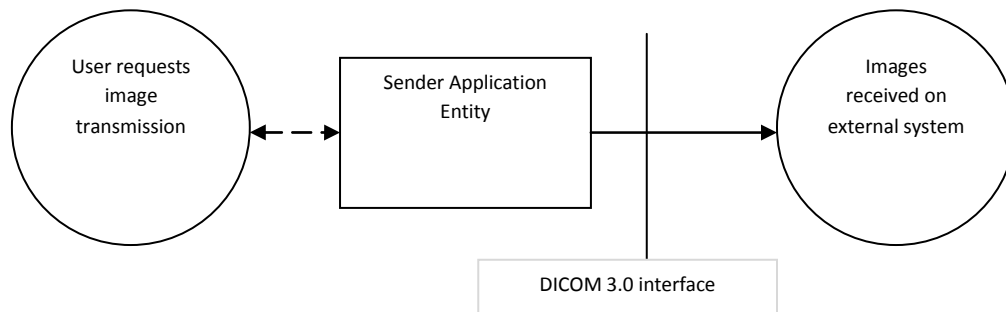
Figure 1-2 Receive Instances from External System
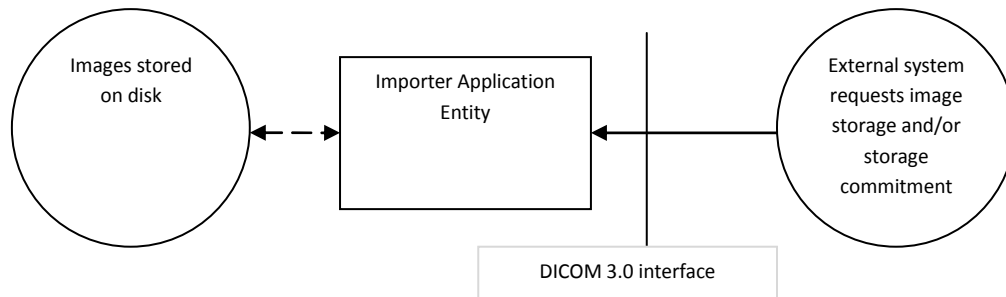
Figure 1-3 Issue Query/Retrieve Request
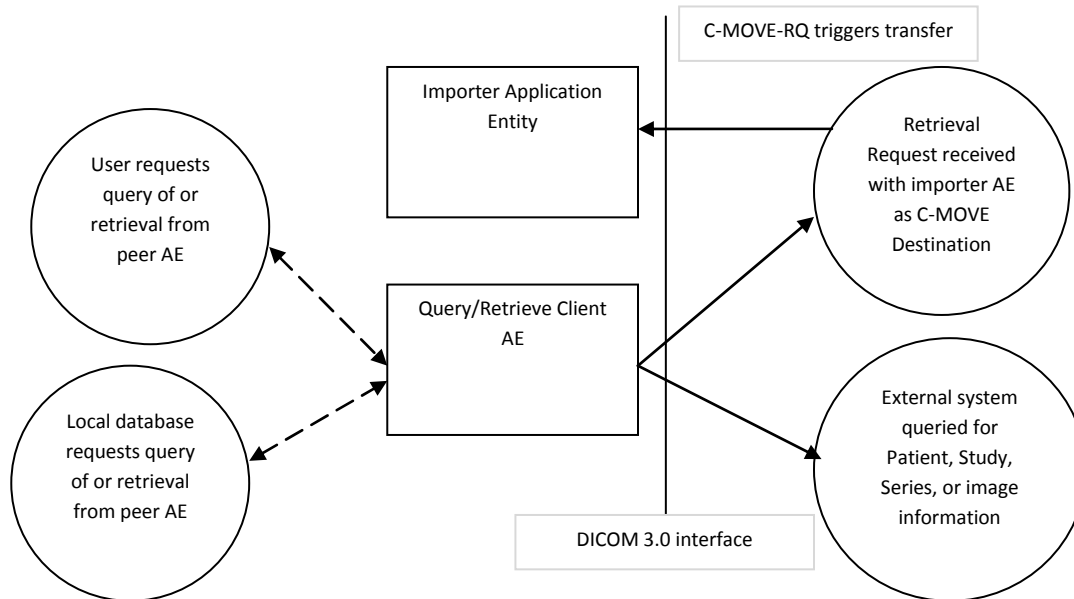
Figure 1-4 Issue Modality Worklist Request
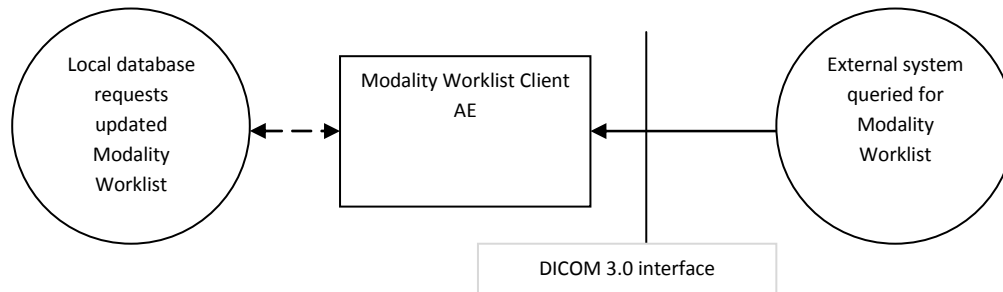
Figure 1-5 Receive Query/Retrieve and MWL requests
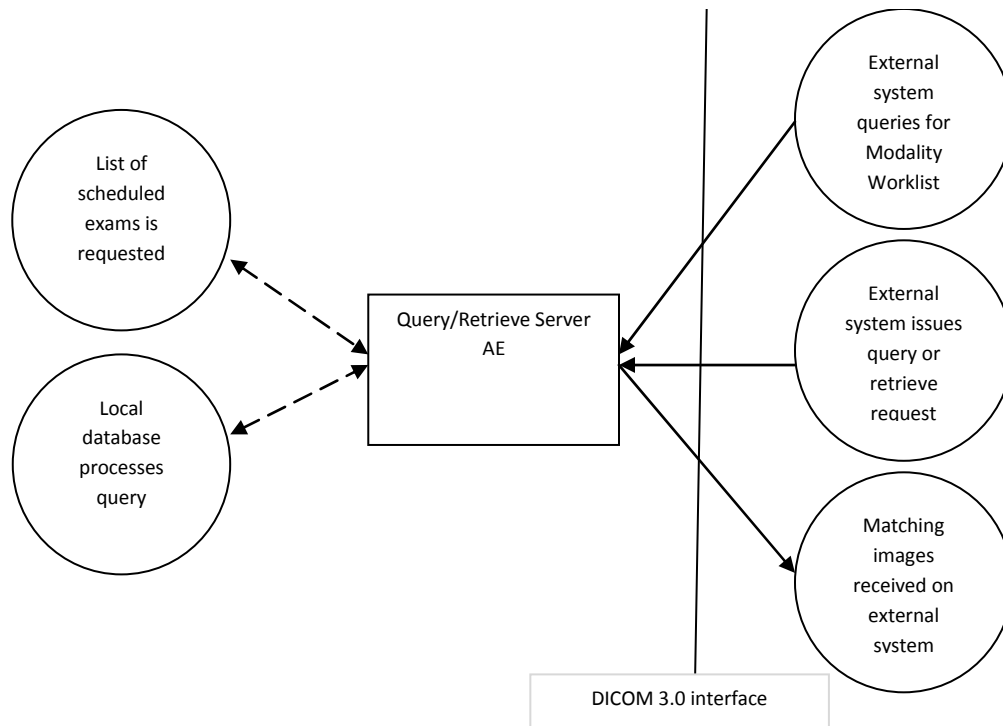
Figure 1-6 Send Notification Message
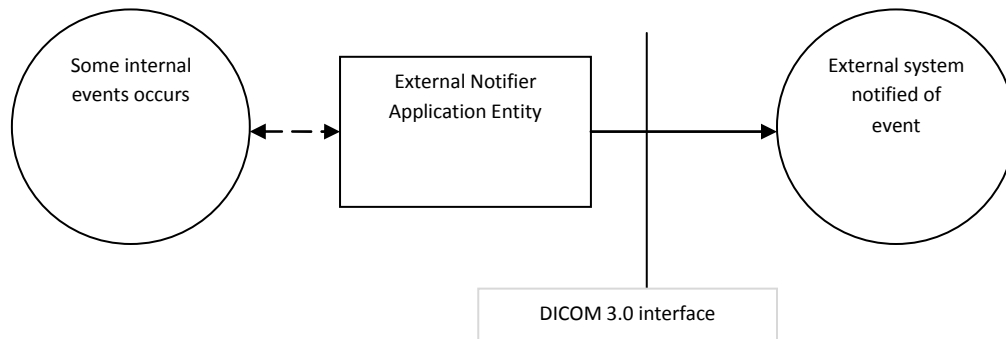
Figure 1-7 Issue Storage Commitment request and Receive Event
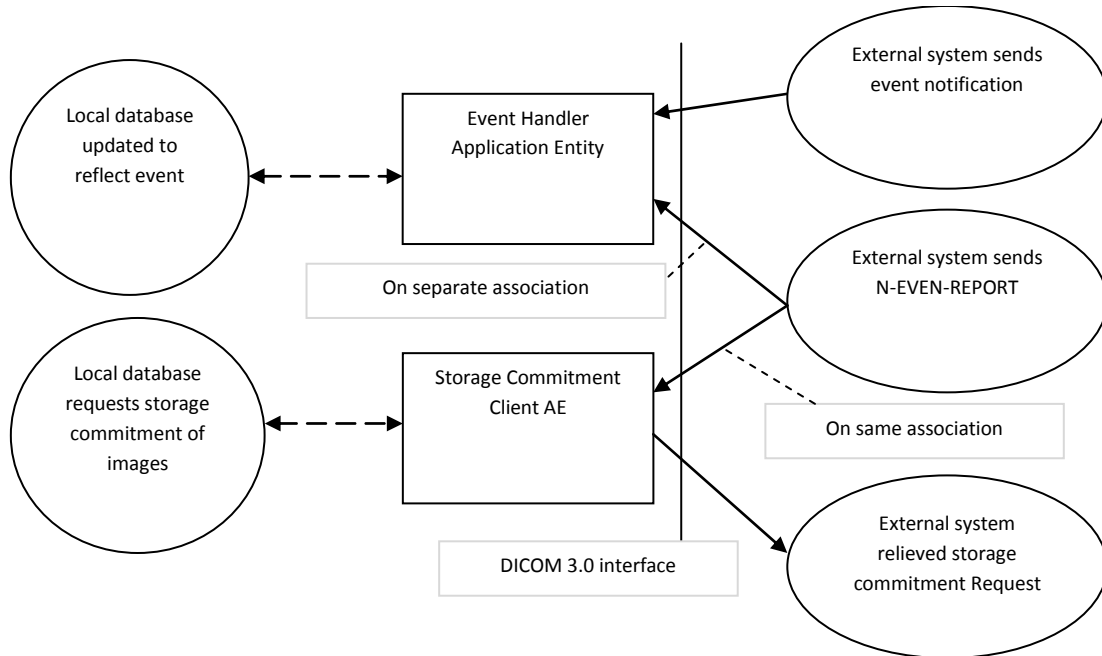
Figure 1-8 Issue Printing Request
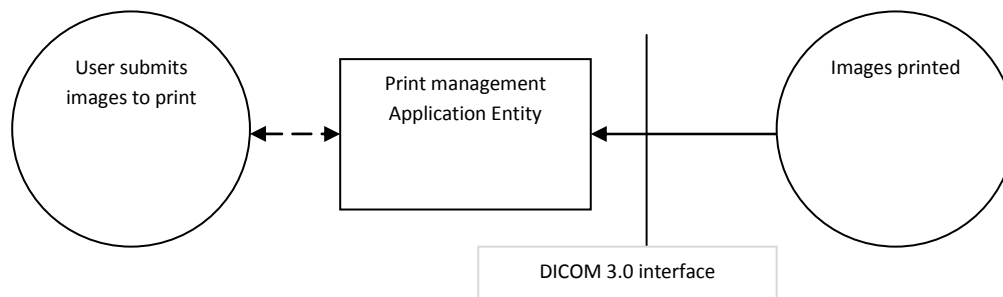
Figure 1-9 Receive QID-RS Request
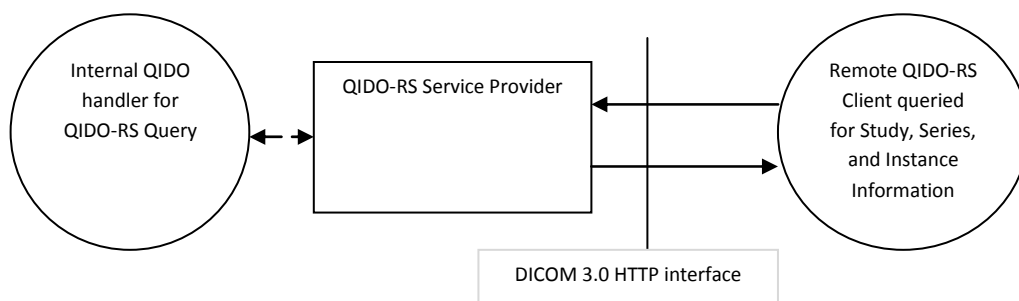
Figure 1-10 Receive WADO-RS Request
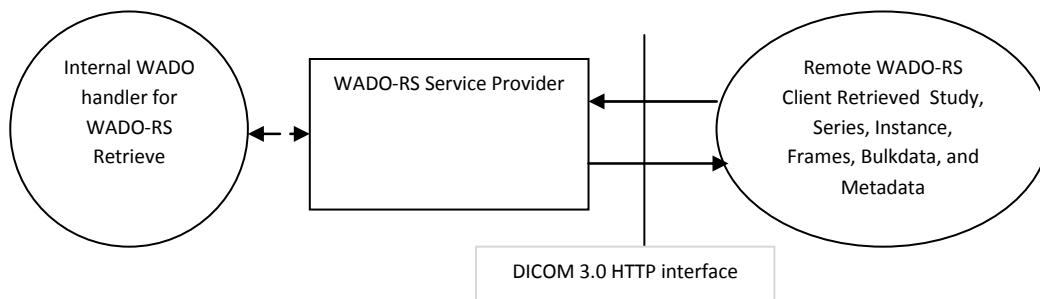
The Sender AE can send Storage Image objects as a C-STORE SCU. It receives requests from a McKesson Radiology™ 12.3 user to transmit a list of images to a specific DICOM destination.

The Importer AE can receive Storage Image objects as a C-STORE SCP. As an SCP it can respond to external Storage Requests which are either unsolicited or a result of DICOM C-MOVE requests. It can also receive Storage Commitment Push Model N-ACTION Requests from the SCU. The Importer can send all N-EVENT Reports over this same Association or open a new Association to the SCU and send the N-EVENT report over the new Association.

The Query/Retrieve Server AE allows external systems to query McKesson Radiology™ 12.3 for Modality Worklist, patient, study and series demographic queries as a C-FIND SCP. Also, image retrievals will be processed by this AE as a C-MOVE SCP.

The Query/Retrieve Client AE acts as an Association Requestor for sending queries or retrieval requests to a remote AE acting as an SCP for the C-FIND query or C-MOVE retrieval SOP Classes. The Query/Retrieve Client AE can either be triggered directly through the user interface, or when the McKesson Radiology™ 12.3 system is aware that it must retrieve SOP Instances from a remote AE (i.e. The McKesson Radiology™ 12.3 database indicates that the data was sent to the remote AE earlier, such as when the remote AE is serving as the primary archive).

The Modality Worklist Client AE acts as an Association Requestor for sending queries to a remote AE acting as an SCP for the Modality Worklist SOP Class. If the Modality Worklist Client AE is enabled then it will automatically query a remote AE repeatedly for the latest Modality Worklist. The time period between queries is configurable.

The Print Management AE enables users to initiate an Association with a DICOM-compliant printer to print a list of selected images.

The External Notifier AE will forward any Modality Performed Procedure Step request received by the Event Handler AE.

The Event Handler AE receives notifications of events from external systems. This AE can receive Modality Performed Procedure Step requests.

The Storage Commitment Client AE implements the Storage Commitment Service Class as an SCU. When acting as an SCU, it issues a Storage Commitment Push Model N-ACTION Request to a Remote Storage Commitment SCP AE to explicitly request the remote Storage Commitment SCP AE to make the commitment for the safekeeping of the SOP Instances archived by the Sender AE.

The Removable Media AE can be used to create and read DICOM removable media. The user can choose to access the image files for individual studies on DICOM removable media. They can also choose to export individual studies that exist in the system's database to removable media.

The QIDO-RS Service Provider receives QIDO requests from a remote QIDO-RS Client. These requests are HTTP/1.1 GET requests. It uses the request to select matching Studies, Series or Instances. It then returns a set of matching Studies, Series or Instances or a response code indicating warning or failure back to the requesting QIDO-RS Client.

The WADO-RS Service Provider receives WADO-RS requests from a remote WADO-RS Client. These requests are HTTP/1.1 GET requests. It converts these requests into internal lookup functions to find the matching SOP Instances. It then obtains these matching SOP Instances and composes a response back to the requesting WADO-RS Client.

3.1.2   Functional Definitions of Application Entities

McKesson Radiology™ 12.3 contains, conceptually, eleven local Application Entities (AE's) and Service Providers: Sender, Importer, Query/Retrieve Server, Query/Retrieve Client, Modality Worklist Client, Print Management, External Notifier,Event Handler, Storage Commitment Client, QIDO-RS Service Provider, and WADO-RS Service Provider. The Application Entities and Service Providers run as background Windows tasks or Restful Web Services.

3.1.2.1   Sender AE

The Sender AE acts as an SCU and implements the Storage Service Class operation. It can transmit images that have been received from prior external DICOM transmissions.

3.1.2.2   Importer AE

The Importer AE acts as an SCP and implements the Storage Service Class operation. It can receive unsolicited image storage requests from external DICOM storage SCUs. It also acts as an SCP for the Storage Commitment Push Model SOP Class.

3.1.2.3   Query/Retrieve Server AE

The Query/Retrieve Server AE implements the Query/Retrieve Service Class as an SCP. The Query/Retrieve Server AE can handle requests from external devices to query the database for worklists, patient, study and series demographics, and image level information. It can also handle C-MOVE Requests from remote AEs for the retrieval of Composite SOP Instances. The Query/Retrieve Server AE can act as an SCU of the Storage Service to transfer the requested Composite SOP Instances.

3.1.2.4   Query/Retrieve Client AE

The Query/Retrieve Client AE implements the Query/Retrieve Service Class as an SCU. It can act as an SCU to query remote AEs for patient, study and series information. It can also request the retrieval of Composite SOP Instances from remote AEs using C-MOVE Requests. When doing so, it always specifies the Importer AE running on the same McKesson Radiology™ 12.3 system as the C-MOVE Destination AE.

3.1.2.5   Modality Worklist Client AE

The Modality Worklist Client AE implements the Modality Worklist SOP Class as an SCU. It cannot be triggered through the user interface. Instead it will repeatedly query for the latest Modality Worklist, with a configurable delay period between each query.

3.1.2.6   Print Management AE

The Print Management AE implements the Print Management Service Class as an SCU. It supports both the Basic Grayscale Print Management and Basic Color Print Management Classes.

3.1.2.7   External Notifier AE

The External Notifier AE implements the Modality Performed Procedure Step Service Class. It can send Modality Performed Procedure Step messages whenever a configurable set of system events occurs.

3.1.2.8   Event Handler AE

The Event Handler AE implements full support of the Modality Performed Procedure Step Service Class.

3.1.2.9   Storage Commitment Client AE

The Storage Commitment Client AE implements the Storage Commitment Service Class as an SCU. When acting as an SCU, it issues a Storage Commitment Push Model N-ACTION Request to a Remote Storage Commitment SCP AE to explicitly request the remote Storage Commitment SCP AE to make the commitment for the safekeeping of the SOP Instances archived by the Sender AE. Depending on the configuration value, the Storage Commitment Client AE can receive Storage Commitment Confirmation for Composite SOP Instances from the Storage Commitment SCP AE on the same association or on a separate association. The Event Handler AE will handle Storage Commitment Confirmation if sent on a different association.

3.1.2.10 QIDO-RS Service Provider

The QIDO-RS Service Provider implements the Query based on ID for DICOM Objects (QIDO) by Representational State Transfer (REST) Services.   Upon receiving a QIDO-RS HTTP/1.1 GET request for DICOM studies, series, or instances, from a Remote QIDO-RS Client, the QIDO-RS Service Provider performs the search based on the URL of the request. The search is similar to the DICOM C-FIND for the "Study Root" hierarchical Information Model for Query and Retrieve. The Study is the highest, or root level, containing study information such as patient ID and Accession Number. Below that is Series, followed by the Instance level (Study→ Series→Instance). The response returned to the Remote QIDO-RS Client is a status code indicating the success, warning, or failure of the search along with any matching results stored in the McKesson Radiology™ 12.3 system.

3.1.2.11 WADO-RS Service Provider

The WADO-RS Service Provider implements the Web Access to DICOM Persistent Objects by RESTful Services for access to DICOM SOP Instances that are stored in the McKesson Radiology™ 12.3 system. The DICOM WADO-RS Services defines several action types (RetrieveStudy, RetrieveSeries, RetrieveInstance, RetrieveFrames, RetrieveBulkdata, and RetrieveMetadata) that the Remote WADO-RS Client can use for accessing the SOP Instances. Upon receiving a WADO-RS HTTP/1.1 GET request for one of the action types from a Remote WADO-RS Client, the WADO-RS Service Provider retrieves the indicated SOP Instance(s) based on the URL of the request. The response returned to the Remote WADO-RS Client is a status code indicating the success, warning, or failure of the request along with resulting data retrieved.

3.1.3   Sequencing of Real-World Activities

The only sequencing constraint that exists across all the McKesson Radiology™ 12.3 Application Entities is the fact that a Composite SOP Instance must be received by the Importer AE before Storage Commitment Push Model or Query-Retrieve Requests related to this SOP Instance can be successfully handled.

Figure 2: McKesson Radiology™ 12.3 Sequencing Constraints
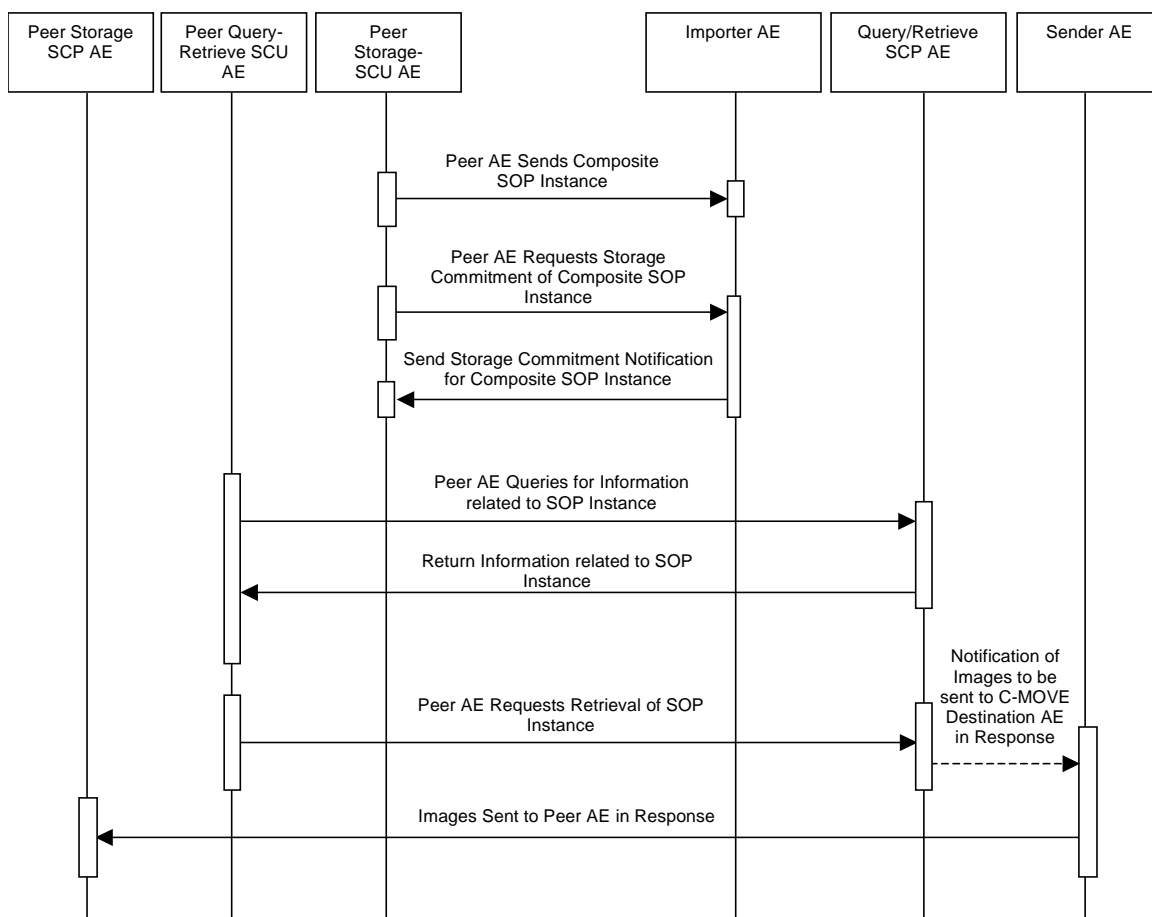
NOTE1:   The only constraint is for the Composite SOP Instance to be received prior to the other events. For example, it is not necessary for the Storage Commitment Push Model Request to be received prior to receiving Query or Retrieval Requests related to the SOP Instance.

3.2   AE Specifications

3.2.1   Sender AE Specification

3.2.1.1   SOP Classes

The Sender AE provides Standard Conformance to the following DICOM V3.0 SOP Classes:

Table 4: SOP Class Conformance of Sender AE

DICOM SOP Class Name	SOP Class UID	SCU	SCP
Verification			
Verification	1.2.840.10008.1.1	Yes	No
Transfer			
12-lead ECG Waveform	1.2.840.10008.5.1.4.1.1.9.1.1	Yes	No
Ambulatory ECG Waveform	1.2.840.10008.5.1.4.1.1.9.1.3	Yes	No
Basic Voice Audio Waveform	1.2.840.10008.5.1.4.1.1.9.4.1	Yes	No
Cardiac Electrophysiology Waveform	1.2.840.10008.5.1.4.1.1.9.3.1	Yes	No
General Audio Waveform	1.2.840.10008.5.1.4.1.1.9.4.2	Yes	No
Arterial Pulse Waveform	1.2.840.10008.5.1.4.1.1.9.5.1	Yes	No
Respiratory Waveform	1.2.840.10008.5.1.4.1.1.9.6.1	Yes	No
Basic Text Structured Report	1.2.840.10008.5.1.4.1.1.88.11	Yes	No
Comprehensive Structured Report	1.2.840.10008.5.1.4.1.1.88.33	Yes	No
Enhanced Structured Report	1.2.840.10008.5.1.4.1.1.88.22	Yes	No
Mammography CAD Structured Report	1.2.840.10008.5.1.4.1.1.88.50	Yes	No
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59	Yes	No
Chest CAD SR	1.2.840.10008.5.1.4.1.1.88.65	Yes	No
Colon CAD SR Document	1.2.840.10008.5.1.4.1.1.88.69	Yes	No
Implantation Plan SR Document	1.2.840.10008.5.1.4.1.1.88.70	Yes	No
Encapsulated PDF	1.2.840.10008.5.1.4.1.1.104.1	Yes	No
Encapsulated CDA IOD	1.2.840.10008.5.1.4.1.1.104.2	Yes	No
Computed Radiography Image	1.2.840.10008.5.1.4.1.1.1	Yes	No
CT Image	1.2.840.10008.5.1.4.1.1.2	Yes	No
Digital X-Ray Image (Presentation)	1.2.840.10008.5.1.4.1.1.1.1	Yes	No
Digital X-Ray Image (Processing)	1.2.840.10008.5.1.4.1.1.1.1.1	Yes	No
Digital Mammography Image (Presentation)	1.2.840.10008.5.1.4.1.1.1.2	Yes	No

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DICOM SOP Class Name	SOP Class UID	SCU	SCP
Digital Mammography Image (Processing)	1.2.840.10008.5.1.4.1.1.1.2.1	Yes	No
Breast Tomosynthesis Image	1.2.840.10008.5.1.4.1.1.13.1.3	Yes	No
Digital Intra-oral X-Ray Image (Presentation)	1.2.840.10008.5.1.4.1.1.1.3	Yes	No
Digital Intra-oral X-Ray Image (Processing)	1.2.840.10008.5.1.4.1.1.1.3.1	Yes	No
General ECG Waveform	1.2.840.10008.5.1.4.1.1.9.1.2	Yes	No
Grayscale Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.1	Yes	No
Color Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.2	Yes	No
Pseudo-Color Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.3	Yes	No
Blending Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.4	Yes	No
XA/XRF Grayscale Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.5	Yes	No
Hardcopy Color Image	1.2.840.10008.5.1.1.30	Yes	No
Hardcopy Grayscale Image	1.2.840.10008.5.1.1.29	Yes	No
Hemodynamic Waveform	1.2.840.10008.5.1.4.1.1.9.2.1	Yes	No
Multi-frame Single Bit Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7.1	Yes	No
Multi-frame Grayscale Byte Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7.2	Yes	No
Multi-frame Grayscale Word Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7.3	Yes	No
Multi-frame True Color Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7.4	Yes	No
MR Image	1.2.840.10008.5.1.4.1.1.4	Yes	No
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2	Yes	No
Nuclear Medicine Image	1.2.840.10008.5.1.4.1.1.20	Yes	No
Nuclear Medicine Image (Retired)	1.2.840.10008.5.1.4.1.1.5	Yes	No
Positron Emission Tomography Image	1.2.840.10008.5.1.4.1.1.128	Yes	No
Raw Data	1.2.840.10008.5.1.4.1.1.66	Yes	No
Spatial Registration	1.2.840.10008.5.1.4.1.1.66.1	Yes	No
Spatial Fiducials	1.2.840.10008.5.1.4.1.1.66.2	Yes	No
Deformable Spatial Registration	1.2.840.10008.5.1.4.1.1.66.3	Yes	No
Segmentation	1.2.840.10008.5.1.4.1.1.66.4	Yes	No
Surface Segmentation	1.2.840.10008.5.1.4.1.1.66.5	Yes	No
Real World Value Mapping	1.2.840.10008.5.1.4.1.1.67	Yes	No
RT Beams Treatment Record	1.2.840.10008.5.1.4.1.1.481.4	Yes	No
RT Brachy Treatment Record	1.2.840.10008.5.1.4.1.1.481.6	Yes	No
RT Dose	1.2.840.10008.5.1.4.1.1.481.2	Yes	No
RT Image	1.2.840.10008.5.1.4.1.1.481.1	Yes	No
RT Plan	1.2.840.10008.5.1.4.1.1.481.5	Yes	No
RT Structure Set	1.2.840.10008.5.1.4.1.1.481.3	Yes	No

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DICOM SOP Class Name	SOP Class UID	SCU	SCP
RT Treatment Summary Record	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
RT Beams Delivery Instruction	1.2.840.10008.5.1.4.34.7	Yes	No
Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7	Yes	No
Stand-alone Curve	1.2.840.10008.5.1.4.1.1.9	Yes	No
Stand-alone Modality LUT	1.2.840.10008.5.1.4.1.1.10	Yes	No
Stand-alone Overlay	1.2.840.10008.5.1.4.1.1.8	Yes	No
Stand-alone VOI LUT	1.2.840.10008.5.1.4.1.1.11	Yes	No
Standalone PET Curve	1.2.840.10008.5.1.4.1.1.129	Yes	No
Stored Print	1.2.840.10008.5.1.1.27	Yes	No
Ultrasound Image	1.2.840.10008.5.1.4.1.1.6.1	Yes	No
Ultrasound Image (Retired)	1.2.840.10008.5.1.4.1.1.6	Yes	No
Ultrasound Multi-frame Image	1.2.840.10008.5.1.4.1.1.3.1	Yes	No
Ultrasound Multi-frame Image (Retired)	1.2.840.10008.5.1.4.1.1.3	Yes	No
VL Endoscopic Image	1.2.840.10008.5.1.4.1.1.77.1.1	Yes	No
VL Microscopic Image	1.2.840.10008.5.1.4.1.1.77.1.2	Yes	No
VL Slide-Coordinates Microscopic Image	1.2.840.10008.5.1.4.1.1.77.1.3	Yes	No
VL Photographic Image	1.2.840.10008.5.1.4.1.1.77.1.4	Yes	No
VL Image (Retired)	1.2.840.10008.5.1.4.1.1.77.1	Yes	No
VL Multi-frame Image (Retired)	1.2.840.10008.5.1.4.1.1.77.2	Yes	No
Video Endoscopic Image	1.2.840.10008.5.1.4.1.1.77.1.1.1	Yes	No
Video Microscopic Image	1.2.840.10008.5.1.4.1.1.77.1.2.1	Yes	No
Video Photographic Image	1.2.840.10008.5.1.4.1.1.77.1.4.1	Yes	No
Ophthalmic Photography 8 Bit Image	1.2.840.10008.5.1.4.1.1.77.1.5.1	Yes	No
Ophthalmic Photography 16 Bit Image	1.2.840.10008.5.1.4.1.1.77.1.5.2	Yes	No
Stereometric Relationship	1.2.840.10008.5.1.4.1.1.77.1.5.3	Yes	No
X-Ray Angiographic Bi-Plane Image (retired)	1.2.840.10008.5.1.4.1.1.12.3	Yes	No
X-Ray Angiographic Image	1.2.840.10008.5.1.4.1.1.12.1	Yes	No
X-Ray Radiofluoroscopic Image	1.2.840.10008.5.1.4.1.1.12.2	Yes	No
X-Ray Radiation Dose Structured Report	1.2.840.10008.5.1.4.1.1.88.67	Yes	Yes
Lensometry Measurements	1.2.840.10008.5.1.4.1.1.78.1	Yes	No
Autorefraction Measurements	1.2.840.10008.5.1.4.1.1.78.2	Yes	No
Keratometry Measurements	1.2.840.10008.5.1.4.1.1.78.3	Yes	No
Subjective Refraction Measurements	1.2.840.10008.5.1.4.1.1.78.4	Yes	No

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DICOM SOP Class Name	SOP Class UID	SCU	SCP
Visual Acuity Measurements	1.2.840.10008.5.1.4.1.1.78.5	Yes	No
Spectacle Prescription Report	1.2.840.10008.5.1.4.1.1.78.6	Yes	No
Ophthalmic Axial Measurements	1.2.840.10008.5.1.4.1.1.78.7	Yes	No
Intraocular Lens Calculations	1.2.840.10008.5.1.4.1.1.78.8	Yes	No
Macular Grid Thickness and Volume Report	1.2.840.10008.5.1.4.1.1.79.1	Yes	No
Ophthalmic Visual Field Static Perimetry Measurements	1.2.840.10008.5.1.4.1.1.80.1	Yes	No
Basic Structured Display IOD	1.2.840.10008.5.1.4.1.1.131	Yes	No
Generic Implant Template	1.2.840.10008.5.1.4.43.1	Yes	No
Implant Assembly Template	1.2.840.10008.5.1.4.44.1	Yes	No
Implant Template Group	1.2.840.10008.5.1.4.45.1	Yes	No
Surface Scan Mesh Storage	1.2.840.10008.5.1.4.1.1.68.1	Yes	No
Surface Scan Point Cloud Storage	1.2.840.10008.5.1.4.1.1.68.2	Yes	No
Comprehensive 3D SR	1.2.840.10008.5.1.4.1.1.88.34	Yes	No
Procedure Log	1.2.840.10008.5.1.4.1.1.88.40	Yes	No
Radiopharmaceutical Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.68	Yes	No

The Sender AE will attempt to send stored DICOM images in the abstract syntax in which they were received. If a negotiated Association to a remote C-STORE SCP does not support the required abstract syntax, the Sender AE will attempt to transform the image object into an abstract syntax that is supported on that Association. The transformations that the Sender AE will attempt depend on the initial abstract syntax of the image.

To send images objects in either the single or multi-frame retired Ultrasound SOP classes across Associations not supporting these classes, the Sender AE first attempts to send the images by transforming them into the matching (single or multi-frame) Ultrasound new SOP classes. Likewise, for Associations not supporting the new Ultrasound classes, the Sender AE will transform the images into the corresponding retired class.

The Sender AE will attempt to send stored DICOM images in the Transfer Syntax in which they were received. If, however, that Transfer Syntax is not supported on an Association, the Sender AE will transform the Transfer Syntax of the image to the default DICOM Implicit VR Little Endian and send it in that syntax.

The Sender AE represents a single task on a Windows NT machine, with multiple instances of the Sender AE possible on a single host. Each Sender AE is configured to send to a single remote DICOM C-STORE SCP destination. Multiple C-STORE SCP destinations can be implemented by configuring more than one Sender AE. In this case each separate Sender AE acts independently of any others (are implemented as separate processes). In addition, multiple instances of the Sender AE can be configured to send to a single Remote AE.

3.2.1.2   Association Establishment Policies

3.2.1.2.1   General

The Sender AE will initiate a new Association when the user requests the transmission of a set of images (either a complete study or series, or part thereof). Also, McKesson Radiology™ 12.3 can be configured to automatically send (i.e. forward) any images that are sent to it (received via the Import AE). An attempt will be made to transmit all the images in the study in a single Association. The Association will be released when all the images have been sent. If the Association is broken or some other Association related error is detected, the Association will be aborted and an attempt will be made to transmit the unsent images in a new Association.

The DICOM Standard Application Context Name is always proposed:

Table 5: DICOM Application Context for Sender AE

Application Context Name	1.2.840.10008.3.1.1.1

The maximum PDU size that will be offered is configurable, and by default is 16,384 bytes.

3.2.1.2.2   Number of Associations

Each Sender AE process will only attempt to open one Association at a time to the destination it is configured to send to. By default, each instance of the Sender AE application will send to a different Remote AE, although it is possible to configure multiple Sender AE instances to send to the same Remote AE. However, as multiple destinations can be configured, each with their own Sender AE process, multiple Sender AE connections can be open at one time. Thus, there is no limit on the number of simultaneous Associations that Sender AE can attempt.

Table 6: Number of Simultaneous Associations as an SCU for Sender AE

Maximum number of simultaneous Associations	Unlimited

3.2.1.2.3   Asynchronous Nature

The Sender AE does not provide asynchronous communication (multiple outstanding transactions over a single Association). All Association requests must be completed and acknowledged before a new operation can be initiated.

Table 7: Asynchronous Nature as an SCU for Sender AE

Maximum number of outstanding asynchronous transactions	1 (Not Configurable)

3.2.1.2.4   Implementation Identifying Information

Table 8: DICOM Implementation Class and Version for Sender AE

Implementation Class UID	1.2.840.113711.1
Implementation Version Name	V1.0

3.2.1.3   Association Initiation Policy

3.2.1.3.1   Activity – User Requests Transmission of Images

3.2.1.3.1.1   *Description and Sequencing of Activity*

The Sender AE attempts to open a new Association for each set of images within a single study it attempts to transfer (i.e. images belonging to separate studies will not be sent over the same Association). This occurs when a user of McKesson Radiology™ 12.3 requests the transmission of Images. There is no sequencing of this activity.

3.2.1.3.1.2   Proposed Presentation Contexts

The Sender AE may propose any one or more of the following Transfer Syntaxes for each of the abstract syntaxes listed in Table 4. Each proposed Presentation Context contains a single Transfer Syntax. Multiple Transfer Syntaxes per abstract syntax would be proposed with multiple Presentation Contexts.

Table 9: Sender AE Proposed Transfer Syntaxes

Transfer Syntax		Role	Extended Negotiation
Name	**UID**		
DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
DICOM JPEG Baseline Process 1	1.2.840.10008.1.2.4.50	SCU	None
DICOM JPEG Extended Process 2 & 4	1.2.840.10008.1.2.4.51	SCU	None
DICOM JPEG Lossless Proc 14	1.2.840.10008.1.2.4.57	SCU	None
DICOM JPEG Lossless First Order Prediction	1.2.840.10008.1.2.4.70	SCU	None
DICOM JPEG 2000 (Lossless Only)	1.2.840.10008.1.2.4.90	SCU	None
DICOM JPEG 2000	1.2.840.10008.1.2.4.91	SCU	None
DICOM RLE.	1.2.840.10008.1.2.5	SCU	None
ALI Wavelet (Private)	1.2.840.113711.1.2.100.1	SCU	None

NOTE1:   The Transfer Syntaxes and supported SOP Classes the Sender AE proposes, as listed above, represent the default behavior. The Sender AE can be configured to propose a subset of these.

NOTE2:   The ALI Wavelet private Transfer Syntax is implemented using the Pegasus Imaging Corporation's medical image toolkit.

3.2.1.3.1.3   SOP Specific Conformance as an Association Requestor

3.2.1.3.1.3.1   SOP Specific Conformance – Storage

In the case of a successful C-STORE response from the SCP, the Sender AE will continue to send any unsent images belonging to the same study. The Association will be properly released after all relevant images have been sent.

When an image is sent to the McKesson Radiology™ 12.3 Importer AE, the entire set of tags received with the image will be saved in McKesson Radiology™ 12.3. When the object is selected for transmission from McKesson Radiology™ 12.3, the content of these objects will be as they were originally received unless patient demographic information and/or study-related information are altered. In such cases the latest values in the database will replace the original information in the DICOM image. Thus, the set of optional tags contained in DICOM objects going out from McKesson Radiology™ 12.3 depends on the information that was received. For the list of patient, study, and series attributes that can

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be updated by the Sender AE when a SOP Instance is exported please refer to 7.1.5: Sender AE and Query/Retrieve Server AE Element Modification.

McKesson Radiology™ 12.3 can support the display of overlays included in the original DICOM image (either embedded or separate). It can also be configured to automatically create overlays of its own by specifying that certain DICOM header values should be displayed as strings at certain locations on the displayed image. Additional annotations can be added to images using the 'Mark and Measure' tool of McKesson Radiology™ 12.3 Station. The Sender AE can be configured to convert such annotations to a single bit per pixel overlay that is added as a DICOM Overlay to the exported images. The overlay bitmap is added as an Overlay Data (60xx,3000) Element with the overlay characteristics added to the required Group (60xx) Elements (see DICOM Part 3, Table C.9-2).

The Sender AE can be configured to automatically try resending the SOP Instances if some failure occurs. In addition, the Sender AE can be configured to demote the priority of an export task if export fails a certain number of times. Refer to 3.4.2: Configurable Parameters, for the default values for these settings.

The Sender AE creates files called Service Logs that can be used to monitor its status and diagnose any problems that may arise. If any error occurs during DICOM communication then appropriate messages are always output to these Service Logs. In addition, error messages may be output as alerts to the User Interface in certain cases.

The Sender AE will exhibit the following Behavior according to the Status Code value returned in a C-STORE Response from a destination C-STORE SCP:

Table 10: Sender AE C-STORE Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The SCP has successfully stored the exported SOP Instance. Success indication message is output to the Service Logs. A success indication is posted to the User Interface.
Refused	Out of Resources	A700 – A7FF	This is treated as a failure[2]. An error indication is output to the Service Logs. An error indication is also posted to the User Interface.
Error	Data Set does not match SOP Class	A900 – A9FF	This is treated as a failure[2]. An error indication is output to the Service Logs. An error indication is also posted to the User Interface.
Error	Cannot Understand	C000 – CFFF	This is treated as a failure[2]. An error indication is output to the Service Logs. An error indication is also posted to the User Interface.
Warning	Coercion of Data Elements	B000	SOP Instance transmission is considered successful. A warning indication is output to the Service Logs so that there is a record of the SCP returning a Warning Status. A success indication is also posted to the User Interface.

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[2] Sender AE can be configured to treat all failures as either permanent or transient. The default behavior is to consider all failures to be transient and to attempt to resend the SOP Instances up to 20 times.

Service Status	Further Meaning	Error Code	Behavior
Warning	Element Discarded	B006	SOP Instance transmission is considered successful. A warning indication is output to the Service Logs so that there is a record of the SCP returning a Warning Status. A success indication is also posted to the User Interface.
Warning	Data Set does not match SOP Class	B007	SOP Instance transmission is considered successful. A warning indication is output to the Service Logs so that there is a record of the SCP returning a Warning Status. A success indication is also posted to the User Interface.
Warning	Attribute List Error	0107	SOP Instance transmission is considered successful. A warning indication is output to the Service Logs so that there is a record of the SCP returning a Warning Status. A success indication is also posted to the User Interface.
Warning	Attribute Value Out of Range	0116	SOP Instance transmission is considered successful. A warning indication is output to the Service Logs so that there is a record of the SCP returning a Warning Status. A success indication is also posted to the User Interface.
*	*	Any other status code	This is treated as a failure[2]. An error indication is output to the Service Logs. An error indication is also posted to the User Interface.

3.2.1.3.1.3.2 Association Requestor Communication Failure Behavior

The Behavior of the Sender AE during communication failure is summarized in the following table:

Table 11: Sender AE Communication Failure Behavior

Exception	Behavior
Timeout expiry for an expected DICOM Message Response (DIMSE level timeout).	The Association is aborted using a DICOM A-ABORT. This is treated as a failure[2]. An error indication is output to the Service Logs. An error indication is also posted to the User Interface.
Timeout expiry for an expected DICOM PDU or TCP/IP packet (Low-level timeout).	The Association is aborted using a DICOM A-ABORT. This is treated as a failure[2]. An error indication is output to the Service Logs. An error indication is also posted to the User Interface.
Association A-P-ABORTed by the SCP or the network layers indicate communication loss (i.e. low-level TCP/IP socket closure)	This is treated as a failure[2]. An error indication is output to the Service Logs. An error indication is also posted to the User Interface.

3.2.1.3.2   Activity – Send Synchronization KOS Request

3.2.1.3.2.1   Description and Sequencing of Activity

McKesson Radiology™ 12.3 can export IOCM KOS objects to a Central Archive or an external Image Manager as a result of an internal "Delete Image" event. Note that the exported IOCM KOS objects will always specify the DICOM Secondary Capture Image SOP Class UID in the Referenced SOP Sequence, which thus can differ from the actual SOP Class of a deleted object.

If McKesson Radiology™ 12.3 has the Data Retention Management feature enabled then it can also broadcast IOCM KOS objects to external Image Managers as a result of an internal "Delete Study for retention" event. When a study is deleted (as a result of either Move/Merge Study or Retention Manager), the SOP Instance UIDs for DICOM objects in the study are not included in the Current Requested Procedure Evidence Sequence (0040,A375) or Content Sequence (0040,A730) of the KOS object.

3.2.1.3.2.1.1   Delete Images

Deleting the images on McKesson Radiology™ 12.3 triggers the creation of an Outbound Delete Instances KOS.
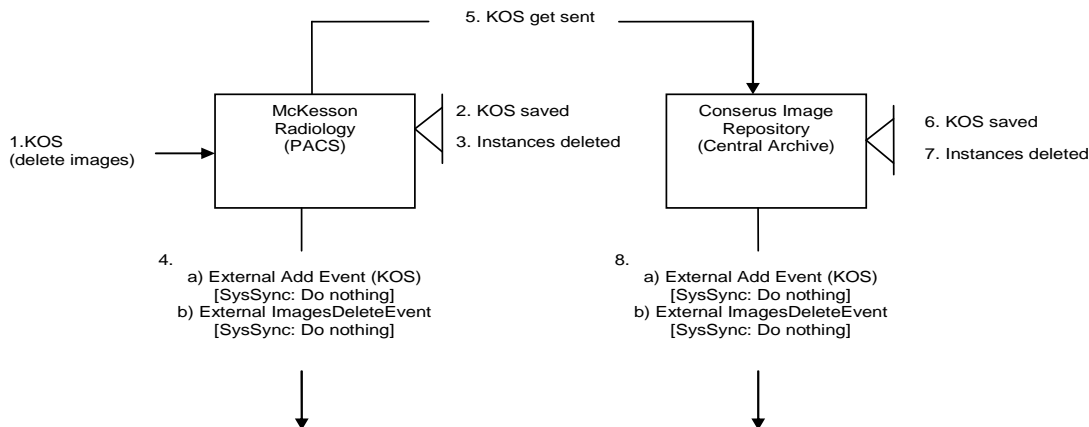
3.2.1.3.2.1.2   Delete Study

Deleting the study on McKesson Radiology™ 12.3 triggers the creation of an Outbound Delete Study KOS indicated by the presence of the (3711,xx40) private tag.

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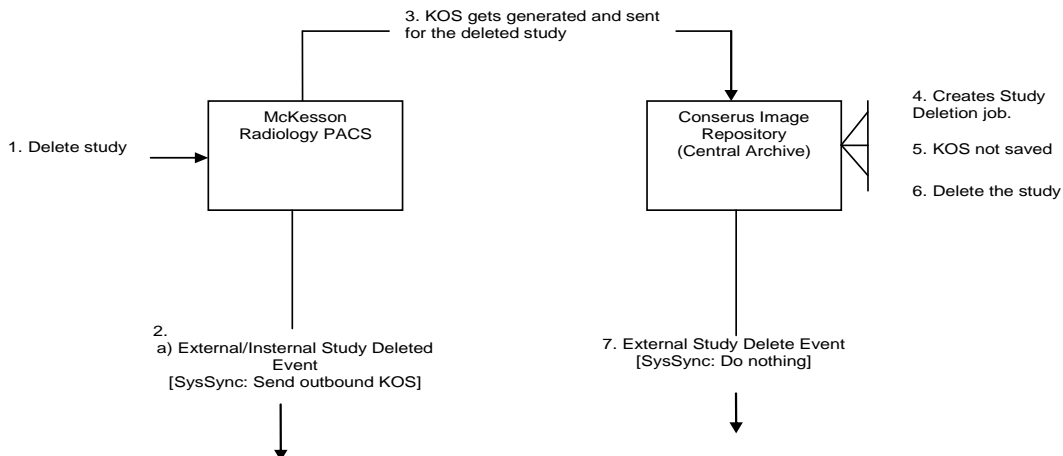
3.2.1.3.2.1.3   Merge Studies

Source study will get archived to a Central Archive/external Image Manager with the target study's study UID. Since the SOP Instance UIDs do not get updated, the external system may reject the archived instances because of duplicate instance UIDs in their system (e.g., copies of images from the source study still exist in their system). In such case McKesson Radiology™ 12.3 shall keep trying until archive succeeds (or until the source study is deleted from the external system).
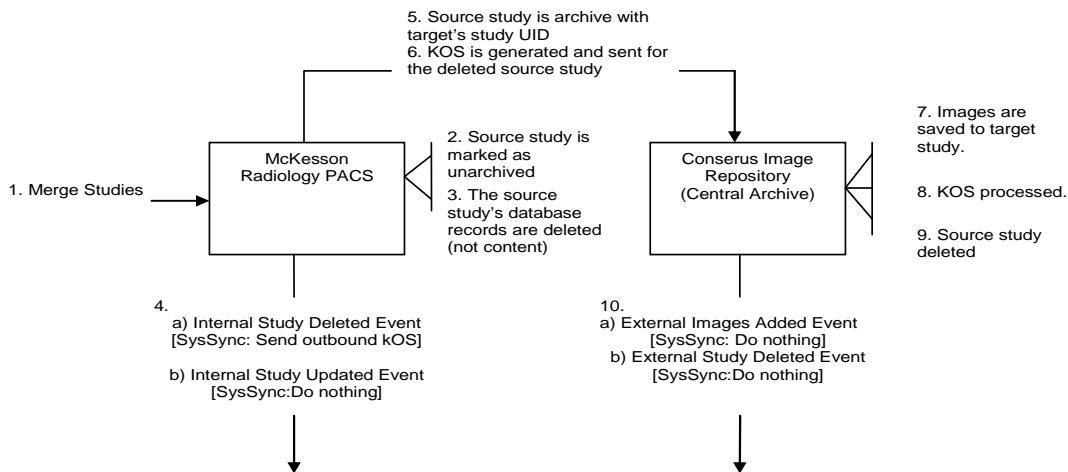
3.2.1.3.2.1.4   Move Study

After moving a study from patient A to patient B, McKesson Radiology™ 12.3 shall:

- Generate a new study UID for the study and update the study UID in the database

- trigger re-archive

- Outbound Synchronization KOS is sent to delete the original study.
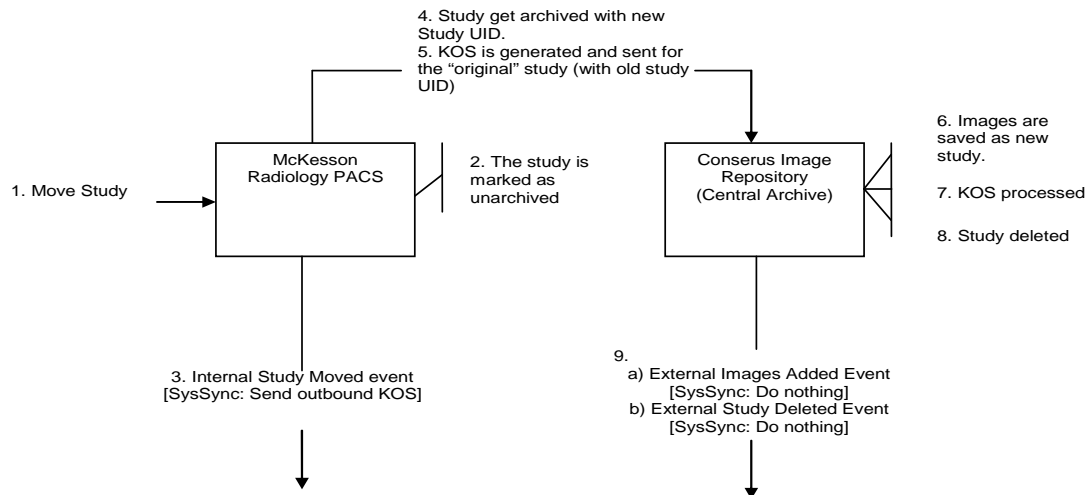
3.2.1.3.2.2   Proposed Presentation Contexts

The Sender AE may propose any one or more of the following Transfer Syntaxes for each of the abstract syntaxes listed in Table 12. Each proposed Presentation Context contains a single Transfer Syntax. Multiple Transfer Syntaxes per abstract syntax would be proposed with multiple Presentation Contexts.

Table 12: SOP Class Conformance of Sender AE for IOCM KOS

DICOM SOP Class Name	SOP Class UID	SCU	SCP
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59	Yes	No

Table 13: Sender AE Proposed Transfer Syntaxes for IOCM KOS

Transfer Syntax		Role	Extended Negotiation
Name	UID		
DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

3.2.1.3.2.3   SOP Specific Conformance as an Association Requestor

3.2.1.3.2.3.1   SOP Specific Conformance – KOS Storage

The status codes in a C-STORE Response returns by the Sender AE for IOCM KOS is same as described in Table 10: Sender AE C-STORE Response Status Handling Behavior.

The Behavior of the Sender AE during communication failure is summarized as described in Table 11: Sender AE Communication Failure Behavior.

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3.2.1.4 Association Acceptance Policy

The Sender AE does not accept Associations.

3.2.2   Importer AE Specification

3.2.2.1 SOP Classes

The Importer AE provides Standard Conformance to the following DICOM V3.0 SOP Classes:

Table 14: SOP Class Conformance of Importer AE

DICOM SOP Class Name	SOP Class UID	SCU	SCP
Verification			
Verification	1.2.840.10008.1.1	No	Yes
Transfer			
12-lead ECG Waveform	1.2.840.10008.5.1.4.1.1.9.1.1	No	Yes
Ambulatory ECG Waveform	1.2.840.10008.5.1.4.1.1.9.1.3	No	Yes
Basic Voice Audio Waveform	1.2.840.10008.5.1.4.1.1.9.4.1	No	Yes
Cardiac Electrophysiology Waveform	1.2.840.10008.5.1.4.1.1.9.3.1	No	Yes
General Audio Waveform	1.2.840.10008.5.1.4.1.1.9.4.2	No	Yes
Arterial Pulse Waveform	1.2.840.10008.5.1.4.1.1.9.5.1	No	Yes
Respiratory Waveform	1.2.840.10008.5.1.4.1.1.9.6.1	No	Yes
Basic Text Structured Report	1.2.840.10008.5.1.4.1.1.88.11	No	Yes
Comprehensive Structured Report	1.2.840.10008.5.1.4.1.1.88.33	No	Yes
Enhanced Structured Report	1.2.840.10008.5.1.4.1.1.88.22	No	Yes
Mammography CAD Structured Report	1.2.840.10008.5.1.4.1.1.88.50	No	Yes
Key Object Selection Document	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
Colon CAD SR Document	1.2.840.10008.5.1.4.1.1.88.69	No	Yes
Implantation Plan SR Document	1.2.840.10008.5.1.4.1.1.88.70	No	Yes
Encapsulated PDF	1.2.840.10008.5.1.4.1.1.104.1	No	Yes
Encapsulated CDA IOD	1.2.840.10008.5.1.4.1.1.104.2	No	Yes
Computed Radiography Image	1.2.840.10008.5.1.4.1.1.1	No	Yes
CT Image	1.2.840.10008.5.1.4.1.1.2	No	Yes
Digital X-Ray Image (Presentation)	1.2.840.10008.5.1.4.1.1.1.1	No	Yes
Digital X-Ray Image (Processing)	1.2.840.10008.5.1.4.1.1.1.1.1	No	Yes
Digital Mammography Image (Presentation)	1.2.840.10008.5.1.4.1.1.1.2	No	Yes
Digital Mammography Image (Processing)	1.2.840.10008.5.1.4.1.1.1.2.1	No	Yes
Breast Tomosynthesis Image	1.2.840.10008.5.1.4.1.1.13.1.3	No	Yes

DICOM SOP Class Name	SOP Class UID	SCU	SCP
Digital Intra-oral X-Ray Image (Presentation)	1.2.840.10008.5.1.4.1.1.1.3	No	Yes
Digital Intra-oral X-Ray Image (Processing)	1.2.840.10008.5.1.4.1.1.1.3.1	No	Yes
General ECG Waveform	1.2.840.10008.5.1.4.1.1.9.1.2	No	Yes
Grayscale Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.1	No	Yes
Color Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.2	No	Yes
Pseudo-Color Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.3	No	Yes
Blending Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.4	No	Yes
XA/XRF Grayscale Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.5	No	Yes
Hardcopy Color Image	1.2.840.10008.5.1.1.30	No	Yes
Hardcopy Grayscale Image	1.2.840.10008.5.1.1.29	No	Yes
Hemodynamic Waveform	1.2.840.10008.5.1.4.1.1.9.2.1	No	Yes
Multi-frame Single Bit Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7.1	No	Yes
Multi-frame Grayscale Byte Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7.2	No	Yes
Multi-frame Grayscale Word Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7.3	No	Yes
Multi-frame True Color Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7.4	No	Yes
MR Image	1.2.840.10008.5.1.4.1.1.4	No	Yes
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2	No	Yes
Nuclear Medicine Image	1.2.840.10008.5.1.4.1.1.20	No	Yes
Nuclear Medicine Image (Retired)	1.2.840.10008.5.1.4.1.1.5	No	Yes
Positron Emission Tomography Image	1.2.840.10008.5.1.4.1.1.128	No	Yes
Raw Data	1.2.840.10008.5.1.4.1.1.66	No	Yes
Spatial Registration	1.2.840.10008.5.1.4.1.1.66.1	No	Yes
Spatial Fiducials	1.2.840.10008.5.1.4.1.1.66.2	No	Yes
Deformable Spatial Registration	1.2.840.10008.5.1.4.1.1.66.3	No	Yes
Segmentation	1.2.840.10008.5.1.4.1.1.66.4	No	Yes
Surface Segmentation	1.2.840.10008.5.1.4.1.1.66.5	No	Yes
Real World Value Mapping	1.2.840.10008.5.1.4.1.1.67	No	Yes
RT Beams Treatment Record	1.2.840.10008.5.1.4.1.1.481.4	No	Yes
RT Brachy Treatment Record	1.2.840.10008.5.1.4.1.1.481.6	No	Yes
RT Dose	1.2.840.10008.5.1.4.1.1.481.2	No	Yes
RT Image	1.2.840.10008.5.1.4.1.1.481.1	No	Yes
RT Plan	1.2.840.10008.5.1.4.1.1.481.5	No	Yes
RT Structure Set	1.2.840.10008.5.1.4.1.1.481.3	No	Yes
RT Treatment Summary Record	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

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DICOM SOP Class Name	SOP Class UID	SCU	SCP
RT Ion Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.9	No	Yes
RT Beams Delivery Instruction	1.2.840.10008.5.1.4.34.7	No	Yes
Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7	No	Yes
Stand-alone Curve	1.2.840.10008.5.1.4.1.1.9	No	Yes
Stand-alone Modality LUT	1.2.840.10008.5.1.4.1.1.10	No	Yes
Stand-alone Overlay	1.2.840.10008.5.1.4.1.1.8	No	Yes
Stand-alone VOI LUT	1.2.840.10008.5.1.4.1.1.11	No	Yes
Standalone PET Curve	1.2.840.10008.5.1.4.1.1.129	No	Yes
Stored Print	1.2.840.10008.5.1.1.27	No	Yes
Ultrasound Image	1.2.840.10008.5.1.4.1.1.6.1	No	Yes
Ultrasound Image (Retired)	1.2.840.10008.5.1.4.1.1.6	No	Yes
Ultrasound Multi-frame Image	1.2.840.10008.5.1.4.1.1.3.1	No	Yes
Ultrasound Multi-frame Image (Retired)	1.2.840.10008.5.1.4.1.1.3	No	Yes
VL Endoscopic Image	1.2.840.10008.5.1.4.1.1.77.1.1	No	Yes
VL Microscopic Image	1.2.840.10008.5.1.4.1.1.77.1.2	No	Yes
VL Slide-Coordinates Microscopic Image	1.2.840.10008.5.1.4.1.1.77.1.3	No	Yes
VL Photographic Image	1.2.840.10008.5.1.4.1.1.77.1.4	No	Yes
VL Image (Retired)	1.2.840.10008.5.1.4.1.1.77.1	No	Yes
VL Multi-frame Image (Retired)	1.2.840.10008.5.1.4.1.1.77.2	No	Yes
Video Endoscopic Image	1.2.840.10008.5.1.4.1.1.77.1.1.1	No	Yes
Video Microscopic Image	1.2.840.10008.5.1.4.1.1.77.1.2.1	No	Yes
Video Photographic Image	1.2.840.10008.5.1.4.1.1.77.1.4.1	No	Yes
Ophthalmic Photography 8 Bit Image	1.2.840.10008.5.1.4.1.1.77.1.5.1	No	Yes
Ophthalmic Photography 16 Bit Image	1.2.840.10008.5.1.4.1.1.77.1.5.2	No	Yes
Stereometric Relationship	1.2.840.10008.5.1.4.1.1.77.1.5.3	No	Yes
X-Ray Angiographic Bi-Plane Image (retired)	1.2.840.10008.5.1.4.1.1.12.3	No	Yes
X-Ray Angiographic Image	1.2.840.10008.5.1.4.1.1.12.1	No	Yes
X-Ray Radiofluoroscopic Image	1.2.840.10008.5.1.4.1.1.12.2	No	Yes
X-Ray Radiation Dose Structured Report	1.2.840.10008.5.1.4.1.1.88.67	No	Yes
Lensometry Measurements	1.2.840.10008.5.1.4.1.1.78.1	No	Yes
Autorefraction Measurements	1.2.840.10008.5.1.4.1.1.78.2	No	Yes
Keratometry Measurements	1.2.840.10008.5.1.4.1.1.78.3	No	Yes
Subjective Refraction Measurements	1.2.840.10008.5.1.4.1.1.78.4	No	Yes
Visual Acuity Measurements	1.2.840.10008.5.1.4.1.1.78.5	No	Yes
Spectacle Prescription Report	1.2.840.10008.5.1.4.1.1.78.6	No	Yes

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DICOM SOP Class Name	SOP Class UID	SCU	SCP
Ophthalmic Axial Measurements	1.2.840.10008.5.1.4.1.1.78.7	No	Yes
Intraocular Lens Calculations	1.2.840.10008.5.1.4.1.1.78.8	No	Yes
Macular Grid Thickness and Volume Report	1.2.840.10008.5.1.4.1.1.79.1	No	Yes
Ophthalmic Visual Field Static Perimetry Measurements	1.2.840.10008.5.1.4.1.1.80.1	No	Yes
Basic Structured Display IOD	1.2.840.10008.5.1.4.1.1.131	No	Yes
Generic Implant Template	1.2.840.10008.5.1.4.43.1	No	Yes
Implant Assembly Template	1.2.840.10008.5.1.4.44.1	No	Yes
Implant Template Group	1.2.840.10008.5.1.4.45.1	No	Yes
Surface Scan Mesh Storage	1.2.840.10008.5.1.4.1.1.68.1	Yes	No
Surface Scan Point Cloud Storage	1.2.840.10008.5.1.4.1.1.68.2	Yes	No
Comprehensive 3D SR	1.2.840.10008.5.1.4.1.1.88.34	Yes	No
Procedure Log	1.2.840.10008.5.1.4.1.1.88.40	Yes	No
Radiopharmaceutical Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.68	Yes	No
Workflow Management			
Storage Commitment Push Model	1.2.840.10008.1.20.1	No	Yes

These are the default SOP Classes supported. By altering the configuration it is possible to support fewer or more SOP Classes.

The Importer AE will store the DICOM Composite SOP Instances as DICOM Part 10 compliant files using the Transfer Syntax with which they were received.

The Importer AE will fork a child process to handle each Association requested by a remote AE for the Storage of Composite SOP Instances and/or to send a Storage Commitment Push Model N-ACTION Request.

McKesson Radiology™ 12.3 Station is capable of creating new Derived images by performing Multi-Planar Reconstruction on CT and MR image sets received by the Importer. For the characteristics of these MPR images, refer to 7.1.7: Derived MPR Image Creation.

3.2.2.2   Association Establishment Policies

3.2.2.2.1   General

The Importer AE accepts Associations from external DICOM C-STORE SCUs to provide storage on the McKesson Radiology™ 12.3 system of DICOM Composite SOP Instances. The Importer AE can send a request for establishing an Association to an SCU if an SCU sends a Storage Commitment request and then drops the Association before the Storage Commitment N-EVENT-REPORT Request can be sent.

The DICOM Standard Application Context Name is always proposed:

Table 15: DICOM Application Context for Importer AE

Application Context Name	1.2.840.10008.3.1.1.1

3.2.2.2.2   Number of Associations

The Importer AE places configurable limitations on the number of simultaneous connections it will support. Once the Importer AE accepts an Association, a spawned child task will receive any images transmitted on that Association and store them on the hard drive. The default maximum number of Associations is 10 per connecting host. It is possible to restrict the number of hosts that can connect with the Importer AE so the combination of these settings can restrict the maximum number of Associations.

Table 16: Number of Simultaneous Associations as an Acceptor for Importer AE

Maximum number of simultaneous Associations	Unlimited[3]

The Importer AE can also request new Associations in order to send Storage Commitment N-EVENT-REPORT Requests. The Importer AE cannot request simultaneous Associations with the same remote AE, so the maximum number of simultaneous Associations depends upon the number of remote AEs that the Importer AE will need to open Associations with in order to send the Storage Commitment N-EVENT-REPORT Requests.

Table 17: Number of Simultaneous Associations as a Requestor for Importer AE

Maximum number of simultaneous Associations	Unlimited

3.2.2.2.3   Asynchronous Nature

The Importer AE does not provide asynchronous communication (multiple outstanding transactions over a single Association). All Association requests must be completed and acknowledged before a new operation can be initiated.

Table 18: Asynchronous Nature as an SCP for Importer AE

Maximum number of outstanding asynchronous transactions	1 (Not Configurable)

3.2.2.2.4   Implementation Identifying Information

Table 19: DICOM Implementation Class and Version for Importer AE

Implementation Class UID	1.2.840.113711.9
Implementation Version Name	V1.0

3.2.2.3   Association Initiation Policies

3.2.2.3.1   Activity – Require New Association for Storage Commitment

3.2.2.3.1.1   Description and Sequencing of Activity

The Importer AE can act as an Association Requestor in the case where the SCU issues a Storage Commitment N-ACTION and then immediately drops the Association. The Importer AE can then send a request for establishing an Association to the SCU in order to send the corresponding Storage Commitment N-EVENT-REPORT. The Importer AE can also be configured to always request a new

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[3] Default maximum is 10 per host permitted to connect to the Importer AE.

Association to send the Storage Commitment N-EVENT-REPORT rather than trying to send it over the original Association requested by the SCU.

In order to successfully handle Storage Commitment N-ACTION Requests, the Importer AE must have already received the referenced SOP Instances. That is, the Importer AE cannot properly handle a Storage Commitment N-ACTION Request that is sent to it before the SOP Instances it references are sent to the Importer.

Figure 3: Sequencing of Activity – Require New Association for Storage Commitment
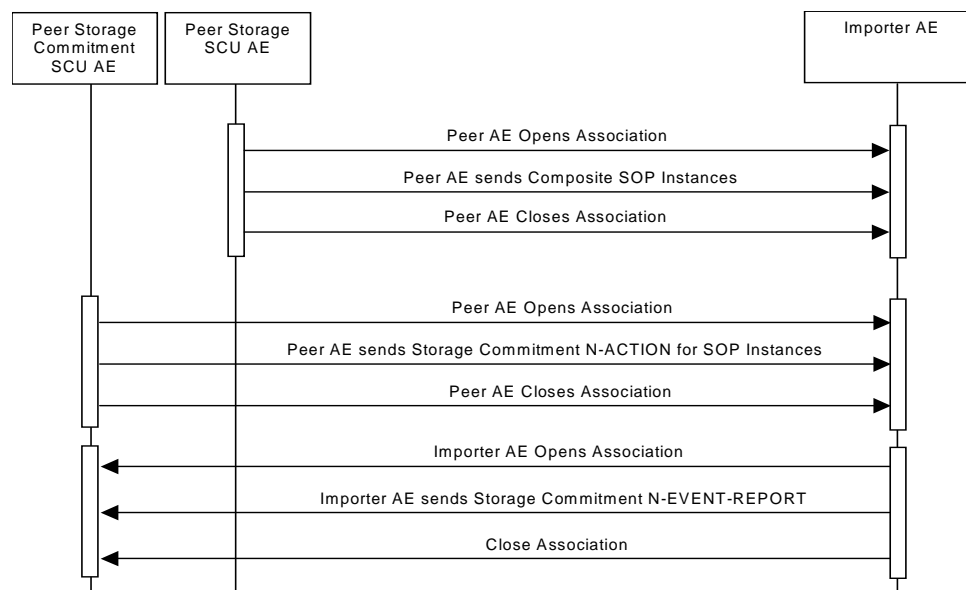
Note that the remote Storage Commitment SCU AE and Storage SCU AE could be a single AE, in which case the remote AE could send both the Composite SOP Instances and the Storage Commitment N-ACTION over the same Association. However, the Importer AE would still require that the Composite SOP Instances be sent before the Storage Commitment N-ACTION referencing them is sent.

The following sequencing constraints illustrated in Figure 3 apply to the Importer AE for handling Storage Commitment Push Model Requests using a new Association:

1. Remote AE opens an Association with the Importer AE.

2. Remote AE requests Storage Commitment of Composite SOP Instance(s) (remote sends N-ACTION-RQ and Importer AE responds with N-ACTION-RSP to indicate that it received the request).

3. Remote AE closes the Association before the Importer AE can successfully send the Storage Commitment Push Model Notification (N-EVENT-REPORT-RQ).

4. Importer AE opens a new Association with the remote AE.

5. Importer AE sends Storage Commitment Push Model Notification (N-EVENT-REPORT). More than one can be sent over a single Association if multiple Notifications are outstanding.

6. Importer AE closes the Association with the remote AE.

3.2.2.3.1.2   *Proposed Presentation Contexts*

The Importer AE will propose Presentation Contexts as shown in the following table:

Table 20: Importer AE Proposed Presentation Contexts

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name**	**UID**		
Storage Commitment Push Model	1.2.840.10008.1.20.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

3.2.2.3.1.3   *SOP Specific Conformance as an Association Requestor*

3.2.2.3.1.3.1   SOP Specific Conformance - Storage Commitment

Standard conformance is provided to the DICOM Storage Commitment Push Model SOP Class as an SCP.

The associated activity with the Storage Commitment Push Model Service is the communication by the Importer AE to remote AEs that it has committed to permanently store Composite SOP Instances that have been sent to it. It thus allows remote AEs to determine whether the McKesson Radiology™ 12.3 system has taken responsibility for the archiving of specific SOP Instances so that they can be flushed from the remote AE system.

By default, the Importer AE will initiate a new Association to a remote AE that sent a Storage Commitment Push Model request only if the original Association over which this was sent is no longer open. Otherwise it will send the N-EVENT-REPORT Request over the original Association requested by the SCU. However, the Importer AE can be configured to always request a new Association to send the N-EVENT-REPORT Request.

The Importer AE creates files called Service Logs that can be used to monitor its status and diagnose any problems that may arise. If any error occurs during DICOM communication then appropriate messages are always output to these Service Logs. In addition, error messages may be output as alerts to the User Interface in certain cases.

If the request by the Importer AE to establish an Association fails for any reason (i.e. fail to connect with remote AE's TCP/IP port, Association Request is Rejected by remote AE, etc.) then the Importer AE will not try again later to send the N-EVENT-REPORT Request. If such a failure occurs then the remote AE will have to resend the Storage Commitment Push Model N-ACTION Request.

The Importer AE will exhibit the following Behavior according to the Status Code value returned in a Storage Commitment Push Model N-EVENT-REPORT Response from a destination SCU:

Table 21: Importer AE N-EVENT-REPORT Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The SCU has successfully received the Storage Commitment report. Success indication message is output to the Service Logs. No indication is posted to the User Interface.
Refused	Out of	A700 –	This is treated as a failure. Importer AE does not attempt to resend the N-

Service Status	Further Meaning	Error Code	Behavior
	Resources	A7FF	EVENT-REPORT Request. An error indication is output to the Service Logs. No indication is posted to the User Interface.
Error	Data Set does not match SOP Class	A900 – A9FF	This is treated as a failure. Importer AE does not attempt to resend the N-EVENT-REPORT Request. An error indication is output to the Service Logs. No indication is posted to the User Interface.
Error	Cannot Understand	C000 – CFFF	This is treated as a failure. Importer AE does not attempt to resend the N-EVENT-REPORT Request. An error indication is output to the Service Logs. No indication is posted to the User Interface.
Warning	Attribute List Error	0107	Storage Commitment report transmission is considered successful. A warning indication is output to the Service Logs. No indication is posted to the User Interface.
Warning	Attribute Value Out of Range	0116	Storage Commitment report transmission is considered successful. A warning indication is output to the Service Logs. No indication is posted to the User Interface.
*	*	Any other status code	This is treated as a failure. Importer AE does not attempt to resend the N-EVENT-REPORT Request. An error indication is output to the Service Logs. No indication is posted to the User Interface.

3.2.2.3.1.3.2   Association Requestor Communication Failure Behavior

The Behavior of the Importer AE during communication failure when it is acting as an Association Requestor is summarized in the following table:

Table 22: Importer AE Communication Failure Behavior as an Association Requestor

Exception	Behavior
Timeout expiry for an expected DICOM Message Response (DIMSE level timeout).	The Association is aborted using a DICOM A-ABORT. This is treated as a failure. Importer AE does not attempt to resend the N-EVENT-REPORT Request. An error indication is output to the Service Logs. No indication is posted to the User Interface.
Timeout expiry for an expected DICOM PDU or TCP/IP packet (Low-level timeout).	The Association is aborted using a DICOM A-ABORT. This is treated as a failure. Importer AE does not attempt to resend the N-EVENT-REPORT Request. An error indication is output to the Service Logs. No indication is posted to the User Interface.
Association A-P-ABORTed by the SCU or the network layers indicate communication loss (i.e. low-level TCP/IP socket closure)	This is treated as a failure. Importer AE does not attempt to resend the N-EVENT-REPORT Request. An error indication is output to the Service Logs. No indication is posted to the User Interface.

3.2.2.4   Association Acceptance Policy

3.2.2.4.1   Activity – Receive Images and Storage Commitment Requests

3.2.2.4.1.1   Description and Sequencing of Activity

The Importer AE accepts Association Requests only if they propose one or more Presentation Contexts that the Importer AE actually supports. If none of the requested Presentation Contexts are accepted, then the Association Request itself is rejected. The Importer AE can be configured to only accept Associations requested by certain hosts (using TCP/IP address).

The default behavior of the Importer AE is to always attempt to send a Storage Commitment Push Model Notification (N-EVENT-REPORT) over the same Association opened by the remote AE to send the request (N-ACTION). If the Importer AE receives a request to close the Association either before sending the Notification or before receiving the corresponding N-EVENT-REPORT-RSP, then it will open a new Association to send the Notification. Refer to section 3.2.2.3 for the details.

In order to successfully handle Storage Commitment N-ACTION Requests, the Importer AE must have already received the referenced SOP Instances. That is, the Importer AE cannot properly handle a Storage Commitment N-ACTION Request that is sent to it before the SOP Instances it references are sent to the Importer.

Figure 4:Sequencing of Activity – Single Association for Storage and Storage Commitment
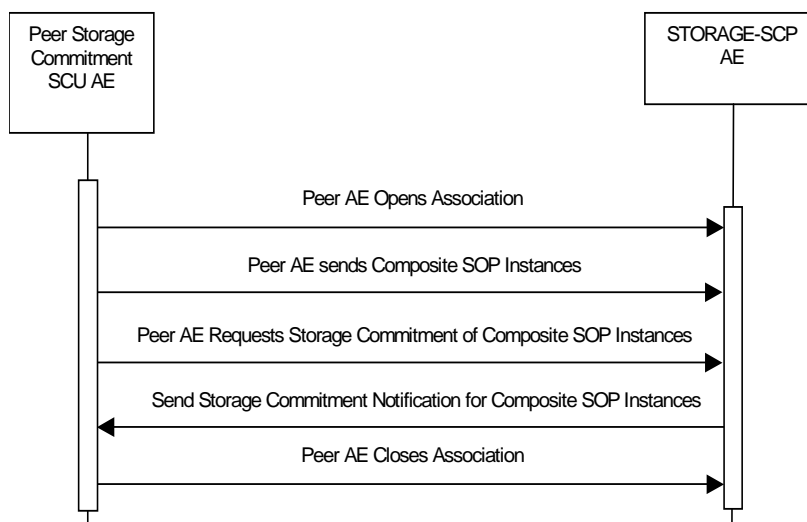
The following sequencing constraints illustrated in Figure 4 apply to the Importer AE for handling Storage Commitment Push Model Requests over the original Association:

1.   .Remote AE opens an Association with the Importer AE.

2.   Remote AE sends zero or more Composite SOP Instances.

3.   Remote AE requests Storage Commitment of Composite SOP Instance(s) (remote sends N-ACTION-RQ and Importer AE responds with N-ACTION-RSP to indicate that it received the request).

4. STORAGE-SCP AE sends Storage Commitment Push Model Notification request (N-EVENT-REPORT-RQ) and successfully receives Notification response (N-EVENT-REPORT-RSP) from remote AE.

5. Remote AE closes the Association.

If the Importer AE receives a request to close the Association from the remote AE before sending the Notification request (N-EVENT-REPORT-RQ) or when expecting to receive a Notification response (N-EVENT-REPORT-RSP), then it will open a new Association to send (or resend) the Notification. Refer to 3.2.2.2 for the details.

The Importer AE has a configurable timeout value for the maximum amount of time that it will wait on an open Association for a new request from a remote AE. A remote AE can reset this timer by sending a Verification request (C-ECHO-RQ). This can act as a useful mechanism for a remote AE to maintain an active Association if the length of time between sending Storage or Storage Commitment requests is long (such as when using a single Association to send images as they are acquired during an exam).

The Importer AE may reject Association attempts as shown in the Table below. The Result, Source and Reason/Diag columns represent the values returned in the corresponding fields of an ASSOCIATE-RJ PDU (see PS 3.8, Section 9.3.4). The following abbreviations are used in the Source column:

a) 1 – DICOM UL service-user

b) 2 – DICOM UL service-provider (ASCE related function)

c) 3 – DICOM UL service-provider (Presentation related function)

Table 23: Importer AE Association Rejection Reasons

Result	Source	Reason/Diag	Explanation
2 – rejected-transient	c	2 – local-limit-exceeded	The (configurable) maximum number of simultaneous Associations has been reached. An Association request with the same parameters may succeed at a later time.
1 – rejected-permanent	a	2 – application-context-name-not-supported	The Association request contained an unsupported Application Context Name. An association request with the same parameters will not succeed at a later time.
1 – rejected-permanent	b	1 – no-reason-given	The Association request could not be parsed. An Association request with the same format will not succeed at a later time. Usually this is only returned if the Importer AE has not been configured to allow the remote AE host to connect.

3.2.2.4.1.2   Accepted Presentation Contexts

The Importer AE will accept any Presentation Context containing:

1. An abstract syntax selected from Table 14

2. One or more Transfer Syntaxes selected from Table 24

Table 24: Importer AE Accepted Transfer Syntaxes

Transfer Syntax		Role	Extended Negotiation
Name	**UID**		
DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
DICOM JPEG Baseline Process 1	1.2.840.10008.1.2.4.50	SCP	None
DICOM JPEG Extended Process 2 & 4	1.2.840.10008.1.2.4.51	SCP	None
DICOM JPEG Lossless Proc 14	1.2.840.10008.1.2.4.57	SCP	None
DICOM JPEG Lossless 1st Order Prediction	1.2.840.10008.1.2.4.70	SCP	None
DICOM JPEG 2000 (Lossless Only)	1.2.840.10008.1.2.4.90	SCP	None
DICOM JPEG 2000	1.2.840.10008.1.2.4.91	SCP	None
DICOM RLE	1.2.840.10008.1.2.5	SCP	None
Wavelet (Private)	1.2.840.113711.1.2.100.1	SCP	None

NOTE1:   The Wavelet Transfer Syntax is implemented using the Pegasus Imaging Corporation's Medical Image Toolkit.

3.2.2.4.1.3   *SOP Specific Conformance as an Association Acceptor*

3.2.2.4.1.3.1   SOP Specific Conformance – Verification

The Importer AE provides standard conformance to the Verification SOP Class as an SCP.

3.2.2.4.1.3.2   SOP Specific Conformance – Storage

The Importer AE does not have any dependencies on the number of Associations used to send images to it. Images belonging to more than one study or series can be sent over a single or multiple Associations. Images belonging to a single study or series can also be sent over different Associations. There is no limit on either the number of SOP Instances or the maximum amount of total SOP Instance data that can be transferred over a single Association.

The Importer AE provides Level 2 DICOM conformance to the Importing SOP Class. It is configured to retain the original DICOM data in DICOM Part 10 compliant file format. In addition, all Private and SOP Class Extended Elements are maintained in the DICOM format files.

In addition to saving all Elements in files, a subset of the Elements are stored in the McKesson Radiology™ 12.3 database to support query and retrieval requests and also allow updating of patient, study, and series information by user input, or demographic and study-related messages. Refer to Table 188: Significant Elements in Received Images in the Annex for the list of Elements that are checked and/or processed upon receiving a Composite SOP Instance.

The associated Real-World Activity with the C-STORE service is the storage of medical imaging data on a designated hard disk. The Importer AE will return a failure status if it is unable to store the Composite SOP Instances onto the hard disk. After sending the C-STORE-RSP for a failure status, Importer AE will abort the association.

When receiving a compressed image from a C-STORE SCU, the Importer AE will not decompress and recompress an image to another compression format. Also, Importer AE shall not lossy compress an image that has already been subjected to lossy compresion. How Importer AE performs this lossy compression check is by inspecting the value of the DICOM element (0028,2110) Lossy image processing in the DICOM image header. A value of 01 means the Image has been subjected to lossy compression and a value of 00 means the Image has NOT been subjected to lossy compression.

For the purposes of display, refer to Table 186: Supported Composite Image SOP Classes for Display in the Annex. In addition, information regarding the support for certain image-related characteristics can be found in Table 188.

It is preferred that optimal Window Center and Width values be specified in the DICOM Image Objects if they have greater than 8 bits of image data stored per sample. If optimal Window Center and Width values cannot be provided, then it is preferred that none are included, as McKesson Radiology™ 12.3 is capable of estimating values using histogram analysis.

The Importer AE provides support for Storage Commitment Push Model. The Importer AE expects the SCU to open an Association, send one or more images, and then send the Storage Commitment Request for those images. The Importer will then send the N-EVENT Report over this same Association. If it cannot do so, then it will open a new Association with the SCU and send the N-EVENT-REPORT over the new Association.

The Importer AE returns one of the following status codes in a C-STORE Response:

Table 25: Importer AE Returned C-STORE-RSP Status Codes

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The Importer AE has successfully received, parsed, and saved to file the received C-STORE-RQ Composite SOP Instance. Success indication message is output to the Service Logs. No indication is posted to the User Interface.
Refused	Out of Resources	A700	The Importer AE does not have enough disk space to store the C-STORE-RQ Composite SOP Instance. The SOP Instance will not be saved. An error indication is output to the Service Logs. No indication is posted to the User Interface.
Error	Data Set does not match SOP Class	A900	The Importer AE has determined that the C-STORE-RQ Composite SOP Instance is missing mandatory Elements specified for the SOP Class. This will only occur if the missing Elements or values prevent the Importer AE from successfully adding the Composite SOP Instance to the system database. An error indication is output to the Service Logs. No indication is posted to the User Interface.
Error	Cannot Understand	C000	Indicates that the Importer AE cannot parse the C-STORE-RQ Data Set. The SOP Instance will not be saved. An error indication is output to the Service Logs. No indication is posted to the User Interface.
Warning	Coercion of Data Elements	B000	Indicates that the Importer AE coerced one or more Element values of the C-STORE-RQ Composite SOP Instance. Refer to Table 188: Significant Elements in Received Images of the Annex for descriptions of those Elements that can be coerced. Note that return of this status is normally disabled as some SCUs treat it as an Error code rather than a Warning. A warning indication is output to the Service Logs. No indication is posted to the User Interface.

The Importer will never delete any received images that can be successfully parsed and contain all the necessary information to add the image to the database (see the table of significant DICOM elements defined earlier). The images will always be archived to media of some sort (WORM, DLT etc.). Images are only flushed from the hard disk storage if they have been successfully archived to the media.

3.2.2.4.1.3.3   SOP Specific Conformance – Storage Commitment

The associated Activity with the Storage Commitment Push Model service is the communication by the Importer AE to remote AEs that it has committed to permanently store Composite SOP Instances that have been sent to it. It thus allows remote AEs to determine whether the McKesson Radiology™ 12.3 system has taken responsibility for the archiving of specific SOP Instances so that they can be flushed from the remote AE system.

The Importer AE takes the list of Composite SOP Instance UIDs specified in a Storage Commitment Push Model N-ACTION Request and checks if they are present in the McKesson Radiology™ 12.3 database. As long as the Composite SOP Instance UIDs are present in the database, the Importer AE will consider those Composite SOP Instance UIDs to be successfully archived. The Importer AE does not require the Composite SOP Instances to actually be successfully written to archive media in order to commit to responsibility for maintaining these SOP Instances.

Once the Importer AE has checked for the existence of the specified Composite SOP Instances, it will then attempt to send the Notification request (N-EVENT-REPORT-RQ). The default behavior is to attempt to send this Notification over the same Association that was used by the remote AE to send the original N-ACTION Request. If the Association has already been released or Message transfer fails for some reason, then the Importer AE will attempt to send the N-EVENT-REPORT-RQ over a new Association. The Importer AE can be configured to always open a new Association in order to send the Notification request. Refer to 3.2.2.3.1.3 for SOP Specific Conformance when the Importer AE acts as an Association Requestor.

The Importer AE will not cache Storage Commitment Push Model N-ACTION Requests that specify Composite SOP Instances that have not yet been transferred to the Importer AE. If a remote AE sends a Storage Commitment Push Model N-ACTION Request before the specified Composite SOP Instances are later sent, the Importer AE will not commit to responsibility for such SOP Instances.

The Importer AE does not support the optional Storage Media File-Set ID & UID attributes in the N-ACTION Request.

The McKesson Radiology™ 12.3 system never automatically deletes Composite SOP Instances from the archive. The absolute persistence of SOP Instances and the maximum archiving capacity for such SOP Instances is dependent on the archiving media and capacity used by the McKesson Radiology™ 12.3 system and is dependent on the actual specifications of the purchased system. It is necessary to check the actual system specifications to determine these characteristics.

The Importer AE will support Storage Commitment Push Model requests for Composite SOP Instances of any of the Storage SOP Classes that are also supported by the Importer AE as an SCP. For a complete listing refer to Table 14: SOP Class Conformance of Importer AE.

The Importer AE returns one of the following status codes in an N-ACTION Response:

Table 26: Importer AE Returned N-ACTION-RSP Status Codes

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The Importer AE has successfully received the Storage Commitment Push Model N-ACTION Request and can process the commitment request for the indicated SOP Instances.
			Success indication message is output to the Service Logs.
			No indication is posted to the User Interface.
Error	Processing Failure	0110	Indicates that the Storage Commitment Push Model N-ACTION Request cannot be parsed by the Importer AE or it cannot be fully processed due to a database or system failure.
			An error indication is output to the Service Logs.
			No indication is posted to the User Interface.
Error	Missing Attribute	0120	Indicates that the Storage Commitment Push Model N-ACTION Request cannot be processed by the Importer AE because a required attribute is missing from the N-ACTION Request Data Set.
			An error indication is output to the Service Logs.
			No indication is posted to the User Interface.
Error	Missing Attribute Value	0121	Indicates that the Storage Commitment Push Model N-ACTION Request cannot be processed because a Type 1 attribute in the N-ACTION Request Data Set does not specify a value.
			An error indication is output to the Service Logs.
			No indication is posted to the User Interface.

Refer to Table 21: Importer AE N-EVENT-REPORT Response Status Handling Behavior, for the behavior that the Importer AE will exhibit according to the Status Code value returned in a Storage Commitment Push Model N-EVENT-REPORT Response from a destination SCU.

3.2.2.4.1.3.4   Association Acceptor Communication Failure Behavior

If a communication failure occurs while the Importer AE is trying to handle a Verification Service or Storage Service task or just waiting for the next Request Message on an open Association, then the Importer AE will exhibit the following behavior:

Table 27: Importer AE Communication Failure Behavior as an Association Acceptor while handling a Verification or Storage Task

Exception	Behavior
Timeout expiry for an expected DICOM Message Request (DIMSE level timeout). The default timeout for waiting on an open Association to receive the next DICOM Message is 60 minutes.	The Association is aborted using a DICOM A-P-ABORT.
	This is treated as a failure.
	An error indication is output to the Service Logs.
	No indication is posted to the User Interface.
	If any Composite SOP Instances have been successfully received and parsed prior to the failure, then they will still be archived rather than discarded.

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Exception	Behavior
Timeout expiry for an expected DICOM PDU or TCP/IP packet (Low-level timeout). The default timeout when trying to read from or write to an open socket is 3 minutes.	The Association is aborted using a DICOM A-P-ABORT. This is treated as a failure. An error indication is output to the Service Logs. No indication is posted to the User Interface. If any Composite SOP Instances have been successfully received and parsed prior to the failure, then they will still be archived rather than discarded.
Association A-ABORTed by the SCU or the network layers indicate communication loss (i.e. low-level TCP/IP socket closure)	This is treated as a failure. An error indication is output to the Service Logs. No indication is posted to the User Interface. If any Composite SOP Instances have been successfully received and parsed prior to the failure, then they will still be archived rather than discarded.

If a communication failure occurs while the Importer AE is trying to handle a Storage Commitment Push Model task (any point after a Storage Commitment N-ACTION-RQ has been received), then the Importer AE will exhibit the following behavior:

Table 28: Importer AE Communication Failure Behavior as an Association Acceptor while handling a Storage Commitment Push Model Task

Exception	Behavior
Timeout expiry for an expected DICOM Message Request (DIMSE level timeout). The default timeout for waiting on an open Association to receive the next DICOM Message is 60 minutes.	The Association is aborted using a DICOM A-P-ABORT. This is treated as a failure. An error indication is output to the Service Logs. No indication is posted to the User Interface. If a Storage Commitment N-ACTION-RQ has already been received, then the Importer AE will no longer try to process it, regardless of whether it has already sent the corresponding N-ACTION-RSP or N-EVENT-REPORT-RQ. The remote AE will have to resend the N-ACTION-RQ.
Timeout expiry for an expected DICOM PDU or TCP/IP packet (Low-level timeout). The default timeout when trying to read from or write to an open socket is 3 minutes.	The Association is aborted using a DICOM A-P-ABORT. This is treated as a failure. An error indication is output to the Service Logs. No indication is posted to the User Interface. If a Storage Commitment N-ACTION-RQ has already been received, then the Importer AE will no longer try to process it, regardless of whether it has already sent the corresponding N-ACTION-RSP or N-EVENT-REPORT-RQ. The remote AE will have to resend the N-ACTION-RQ.
Association A-ABORTed by the SCU or the network layers indicate communication loss (i.e. low-level TCP/IP socket closure)	This is treated as a failure. An error indication is output to the Service Logs. No indication is posted to the User Interface. If a Storage Commitment N-ACTION-RQ has already been received, then the Importer AE will no longer try to process it, regardless of whether it has already sent the corresponding N-ACTION-RSP or N-EVENT-REPORT-RQ. The remote AE will have to resend the N-ACTION-RQ.

3.2.2.4.1.3.5   Presentation Context Acceptance Criterion

The Importer AE will only accept a Presentation Contexts specified by a SOP Class from Table 14 and having at least one Proposed Transfer Syntax from Table 24. More than one proposed Presentation Context will be accepted for the same Abstract Syntax if the Transfer Syntax is supported, whether or not it is the same as another Accepted Presentation Context.

The Importer AE can be configured to reject valid Presentation Contexts if the host for the remote AE is not listed in a local configuration file. In addition, a valid Presentation Context can be rejected if the maximum limit on the number of simultaneous processes has been reached.

The Importer AE does not check for and will accept duplicate Presentation Contexts.

3.2.2.4.1.3.6   Transfer Syntax Selection Policies

The default behavior of the Importer AE supports the Implicit VR Little Endian and Explicit VR Little Endian Transfer Syntaxes for all Associations. In addition, some explicit JPEG Lossy and JPEG Lossless compression Transfer Syntaxes are supported, as defined in Table 24.

The JPEG 2000 Lossy, JPEG 2000 Lossless, RLE, and Wavelet (Private) Transfer Syntaxes can also be enabled via configuration; however, these are not enabled by default. The Importer AE can be configured to accept a subset of any of these syntaxes, with the inclusion of Implicit VR Little Endian being mandatory. It can also be configured to compress images once they are received using these various compression options.

The default preferred acceptance order for Transfer Syntaxes for the Importer AE (from highest preference to lowest) is: Little Endian Explicit, Little Endian Implicit, JPEG Lossy, and JPEG Lossless (if all these contexts are proposed). This order of preference is configurable.

3.2.2.4.2   Activity – Receive Synchronization KOS Request

3.2.2.4.2.1   *Description and Sequencing of Activity*

The IHE IOCM Profile specifies the use of DICOM KOS objects to achieve synchronization between different Image Manager/Archive systems.

A KOS contains one of the Document Title codes to specify the reason for deletion:

- Rejected for Quality Reasons

- Rejected for Patient Safety Reasons

- Incorrect Modality Worklist Entry

- Data Retention Policy Expired.

McKesson Radiology™ 12.3 adopted the following implementation:

1. Rejection of Deleted Instances

    For IOCM, the Image Manager/Archive shall "not accept subsequent occurrence of instances that have been hidden".

Table 29 summarizes the expected action of the McKesson Radiology™ 12.3 according to the IHE IOCM Profile when receiving instances that have been previously deleted.

Table 29: Rejection of Deleted Instance

KOS Document Title/Reason	Comments
Rejection Note Stored (for Quality Reasons)	Not specified explicitly by the IHE IOCM Profile what the Image Manager / Archive should do if receiving the same previously rejected instances.
	For rejected instances for Image Quality Reason, McKesson Radiology™ 12.3 does not provide the functionality of hiding. McKesson Radiology™ 12.3 will delete the instances right away. When performing DICOM query against the McKesson Radiology™ 12.3 , the deleted instances due to Image Quality reason will NOT be returned.
Rejection Note Stored (for Patient Safety Reasons)	The Image Manager / Archive shall not accept subsequent occurrence of instances that have been hidden.
	McKesson Radiology™ 12.3 keeps track of whether a DICOM instance was deleted due to synchronization KOS and not accept the same previously rejected instance again.
Rejection Note Stored (for Incorrect Modality Worklist)	The Image Manager / Archive shall not accept subsequent occurrence of instances that have been hidden.
	McKesson Radiology™ 12.3 keeps track of whether a DICOM instance was deleted due to synchronization KOS and not accept the same previously rejected instance again.
Rejection Note Stored (for Data Retention Expiry)	If the Image Manager / Archive later receives the same expired instances that have been previously hidden due to the expiry of data retention period and not other reasons, then it shall receive the instances as defined in one of the corresponding instance stored transactions (RAD-8, RAD-9, RAD-18, RAD-19, RAD-29, RAD-43, RAD-61).
	When McKesson Radiology™ 12.3 receives the Data Retention Expiry KOS, the entire study is deleted. As a result, if the same expired instances from the deleted study are received again, McKesson Radiology™ 12.3 will be happy to accept those instances.

2. Acceptance of Synchronization KOS

    By default, Importer AE does not accept synchronization KOS from any external systems. Only KOS objects from trusted sources are allowed. If Importer AE receives a synchronization KOS from a source it does not trust, it shall fail the DICOM association and subsequent Storage Commitment requests (e.g. Importer AE returns a C-STORE-RSP failure status code C000 to the SCU).

    Furthermore, if a KOS comes from a trusted source but references a study where the ownership is invalid (e.g., the KOS is from a different facility other than the referenced study facility), the KOS object will be dropped internally and not processed. The DICOM C-STORE association and storage commit requests from the sender, in this case, shall still succeed since the source is deemed valid.

    If the KOS comes from a trusted source but references a study that does not yet exist in McKesson Radiology™ 12.3, the KOS will be saved (unless it is a study level message requesting for study deletion) since it is possible that McKesson Radiology™ 12.3 can receive the KOS along with its referenced images in the same association.

3. Instance Availability Notification

According to the IHE IOCM Profile, the Image Manager / Archive receives the Key Image Note with the Key Object Selection Document Title valued (113001, DCM, "Rejected for Quality Reasons"), (113037, DCM, "Rejected for Patient Safety Reasons"), (XXXXXX11, 99IHEIOCM, "Incorrect Modality Worklist Entry) or (XXXXXX22, 99IHEIOCM, "Data Retention Period Expired"), shall send one of the following availability status values for all the rejected instances according to the received KOS:

- "UNAVAILABLE" when it is configured to hide rejected instances.

- "ONLINE", "NEARLINE" or "OFFLINE" when regular use of rejected instances is configured, depending on the actual availability of the individual instances.

- It shall also send one of the following availability status values for all remaining instances in the same notification:

- "ONLINE", "NEARLINE" or "OFFLINE".

McKesson Radiology™ 12.3 implementation does not support sending Instance Availability Notification to the DSS/OF to confirm all the instances that remain available and those that are deleted.

However, for McKesson Radiology™ 12.3, the study status will be reverted back to scheduled if the KOS type is Incorrect Modality Worklist and all instances in the study are deleted. Similarly, the study status shall become performed if the KOS type is Incorrect Modality Worklist and there are still images left in the study.

4. Study Level Deletion

   IHE IOCM Profile focuses on communication of changes at the Instance Level. Study Level internal change events such as Move Study, Merge Studies, and Delete Study are not explicitly supported by IOCM.

   McKesson Radiology™ 12.3 added the capability of Study Level deletion to delete an entire study without verifying each referenced SOP instance using a private DICOM tag (3711,xx40) in the KOS. The presence of the private tag (3711,xx40) in the KOS object means the entire study shall be deleted.

   Customization work is expected for synchronization between McKesson and Non McKesson Image Manager / Archive. The other vendor is expected to understand how McKesson Image Manager / Archive communicate its local changes, especially on our usage of the private Delete Study tag.

5. GSPS and KIN References

   To avoid an overly complex design, existing references in GSPS or KIN objects will not get updated in system synchronization. The GSPS or KIN, as a result, may end up referencing instances that have been deleted.

6. Data Retention Expiry KOS

   Synchronization KOS for Data Retention reason requires special care because almost all studies to be deleted are offline. Retrieving each study from archive is not a viable option since the batch of studies to be deleted for Data Retention Expiry can be thousands of studies at one time.

   To avoid retrieval, McKesson Radiology™ 12.3 will delete the study without verifying the referenced instances against the actual study content. McKesson Radiology™ 12.3 will treat the

IOCM KOS for retention expiry as study-level deletion. Since this behavior deviates from the IHE IOCM Profile Standard, the client must be warned of this implementation.

7. Handling Locked / Offline Case

   Importer AE cannot delete the referenced instances during import due to one of the following reasons: [1] Referenced instances cannot be deleted because the study is locked [2] Referenced instances cannot be deleted because the study is offline.

   If Importer AE cannot process the KOS during import, a TaskProcessing job will be created in the database for KOS processing at a later time. If the job fails after a configured number of retries, a System Issue will be created so the user becomes aware of the failure.

8. IOCM Storage Commitment SCP

   The IHE IOCM Profile requires the Image Manager/Archive to act as the Storage Commitment SCP for incoming KOS. Importer AE can already respond to Storage Commitment requests as a SCP. To ensure successful response to Storage Commitment requests, inbound KOS accepted by Importer AE needs to have its SOP Instance UID added to the IMAGE_UID table.

Figure 5: Sequencing of Activity – Receive Synchronization KOS

Use Case: Data Retention Expiration
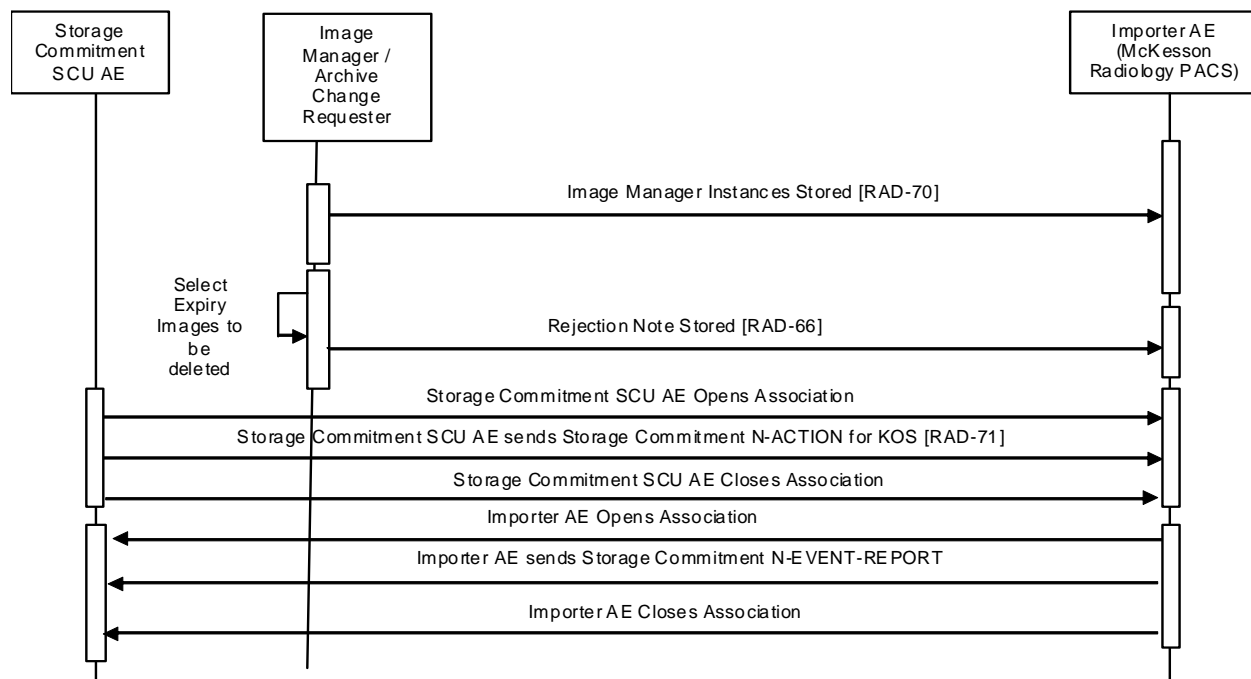
NOTE1: McKesson Radiology™ 12.3 receiving a KOS for Data Retention Expiration will delete the study and KOS.

Use Case: Image Rejection for Quality Reasons
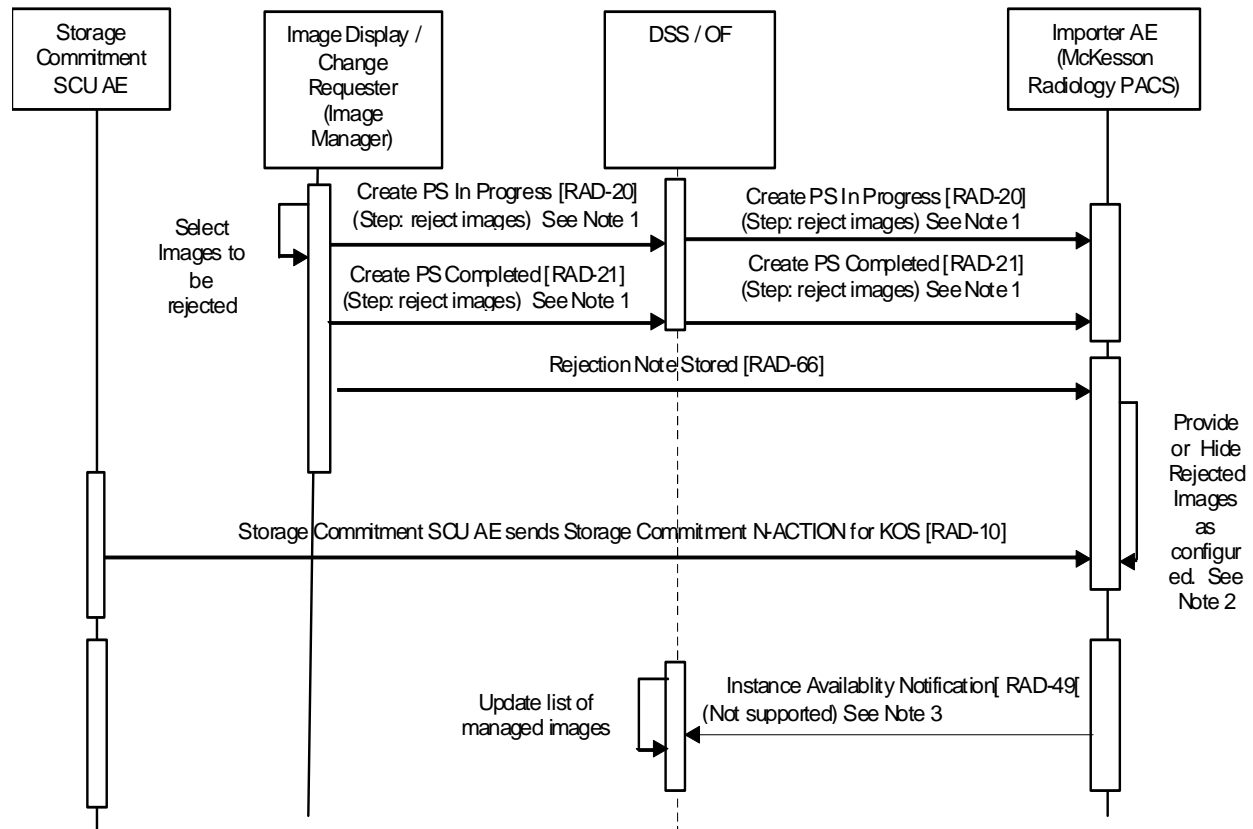
NOTE1: The Image Manager acting as the Change Requester does not have to create an MPPS referencing the Rejection Note or an MPPS referencing the corrected images.

NOTE2: The Image Manager / Archive shall support the two behaviors for Rejection for Quality Reasons:

d) Regular use: For the Key Object Selection instance and all instances referenced therein, the Image Manager / Archive shall return SOP Instance UIDs in Query Responses and the instances in Patient, Study, Series, or Instance level retrievals.

e) Hide rejected instances: For the rejected instances referenced in the Key Object Selection, the Image Manager / Archive shall neither return SOP Instance UIDs in Query Responses nor return the instances in Patient, Study, Series, or Instance level retrievals.

McKesson Radiology™ 12.3 implementation does not hide rejected images. The rejected images are deleted by the Importer AE upon receiving a Rejection Note Stored [RAD-66].   Therefore, for the use case (a) "Regular use" above, McKesson Radiology™ 12.3 will not return the deleted referenced instances in the Query Responses.

NOTE3:   McKesson Radiology™ 12.3 does not support sending an Instance Available Notification (RAD-49) to the DSS/OF to confirm all the instances that remain available and those that are deleted.

NOTE4:   All internally generated KOS will have either "Retention Expiry" or "Patient Safety" as reasons for deletion. McKesson Radiology™ 12.3 does not use "Quality" reason for internally generated KOS.

Use Case: Image Correction for Patient Safety Reasons
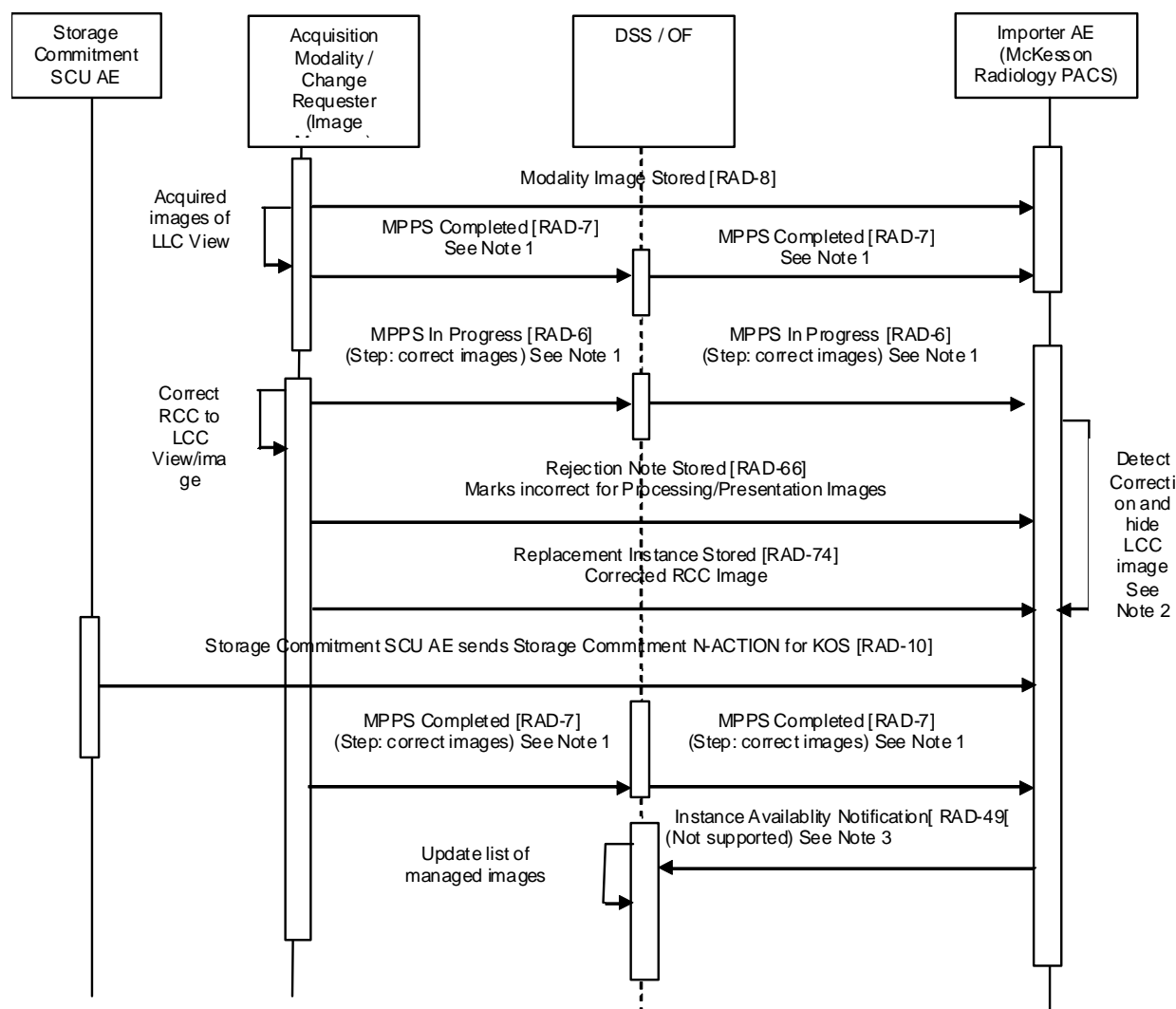
NOTE1:   The Image Manager acting as the Change Requester does not have to create an MPPS referencing the Rejection Note or an MPPS referencing the corrected images.

NOTE2:   McKesson Radiology™ 12.3 implementation does not hide rejected images. The rejected images are deleted by the Importer AE upon receiving a Rejection Note Stored [RAD-66]

NOTE3:   McKesson Radiology™ 12.3 does not support sending an Instance Available Notification (RAD-49) to the DSS/OF to confirm all the instances that remain available and those that are deleted.

NOTE4:   McKesson Radiology™ 12.3 will not provide the incorrect instances referenced in this KOS in responses to an image query/ retrieve transaction (RAD-14, RAD-16) or presentation state query/retrieve transaction (RAD-15, RAD-17).

Use Case: Object Correction due to Modality Worklist Selection Error
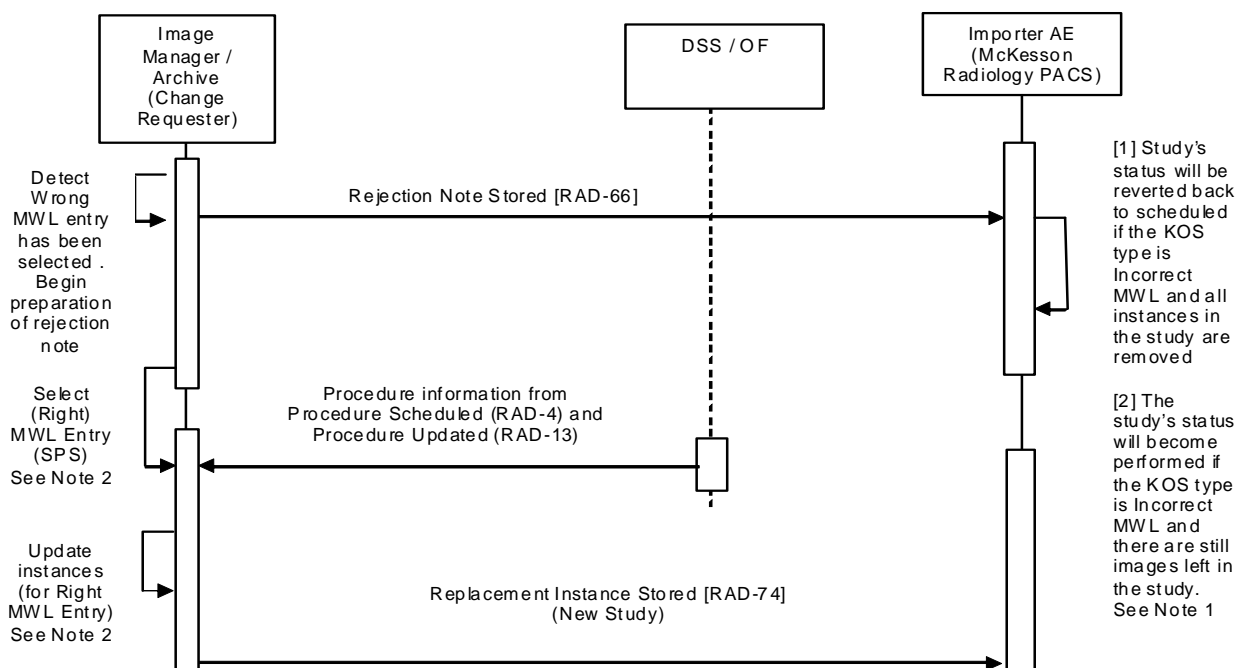
NOTE1:   This gives an alternative approach to the use of MPPS/IAN (as discussed in the IOCM standard) for resetting the study's status.

NOTE2:   If an Image Manager is the Change Requester, the Image Manager uses the received procedure information from Procedure Scheduled (RAD-4) and Procedure Updated (RAD-13) to choose the correct modality worklist, updates the images and creates a new set. The Image Manager does not have to create an MPPS referencing the Rejection Note or an MPPS referencing the corrected images.

NOTE3:   McKesson Radiology™ 12.3 will not provide the incorrect instances referenced in this KOS in responses to an image query/ retrieve transaction (RAD-14, RAD-16) or presentation state query/retrieve transaction (RAD-15, RAD-17).

3.2.2.4.2.1.1   Acceptance of Synchronization Events

When an external Image Manager acting as the Change Requester adds or deletes DICOM objects and communicates the changes to McKesson Radiology™ 12.3, McKesson Radiology™ 12.3 will process the synchronization KOS it receives.

The following diagrams show the flow of events from an External Image Manager to McKesson Radiology™ 12.3 for different local changes to DICOM objects / Studies.

3.2.2.4.2.1.1.1   Add Images

New DICOM instances coming into McKesson Radiology™ 12.3 are saved.
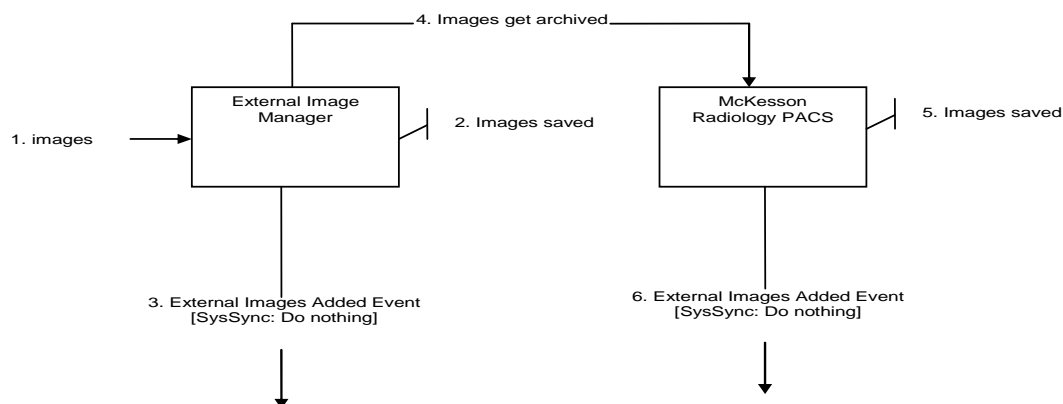
3.2.2.4.2.1.1.2   Delete Images

McKesson Radiology™ 12.3 will process the synchronization KOS and delete the referenced items.
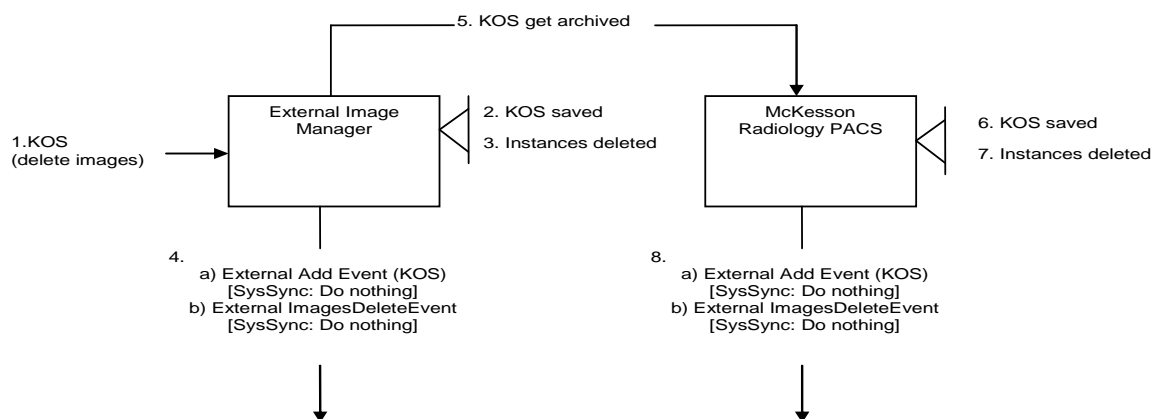
3.2.2.4.2.1.1.3   Move Images

Move Images is equivalent to Delete Images from the source study plus Add Images to the destination study. A moved image shall have the target study's study UID, new series UID, and new SOP instance UID.

5. The images get archivef to study B with new SOP instance UIDS.

6. KOS is generated and sent for images deleted in Study A

External Image Manager

McKesson Radiology PACS

1. Move images

2. Images delete from study A

3. Images added to study B

7. "New" images saved to study B.

8. KOS saved

9. Instances deleted

4.
a) Internal Images Deleted Event [SysSync: Send outbound kOS]

b) Internal Images Added Event [SysSync:Do nothing]

10.
a) Internal Images Added Event [SysSync: Do nothing]
b) External Added Event (KOS) [SysSync: do nothing]
c) Internal Images Deleted Event [SysSync:Do nothing]

3.2.2.4.2.1.1.4   Delete Study

When McKesson Radiology™ 12.3 receives a synchronization KOS containing the private tag (3711,xx40), the whole study will be deleted.

3. KOS gets generated and sent for the deleted study

External Image Manager

McKesson Radiology PACS

1. Delete study

4. Creates Study Deletion job.

5. KOS not saved

6. Delete the study

2.
a) External/Insternal Study Deleted Event [SysSync: Send outbound KOS]

7. External Study Delete Event [SysSync: Do nothing]

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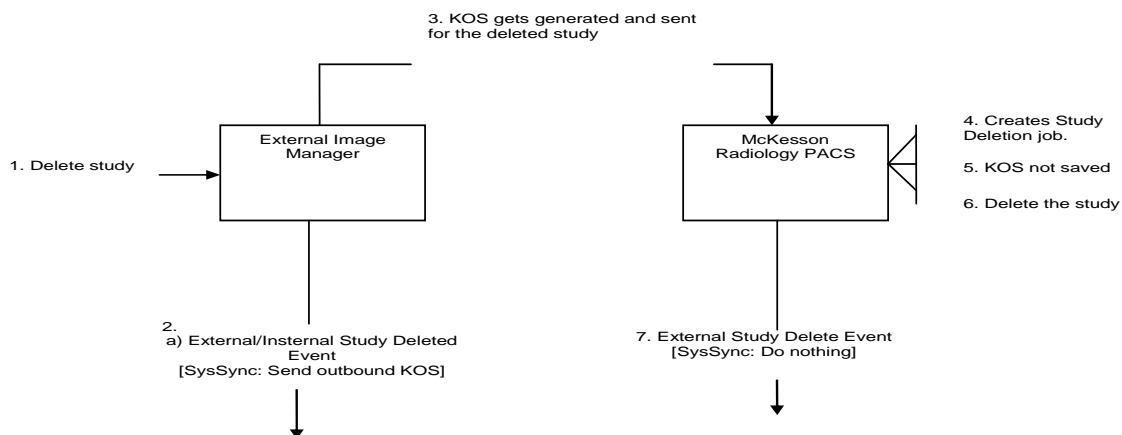
3.2.2.4.2.1.1.5   Merge Studies

Source study will get archived to McKesson Radiology™ 12.3 with the target study's study UID.
McKesson Radiology™ 12.3 will delete the source study after receiving the KOS for delete source study.
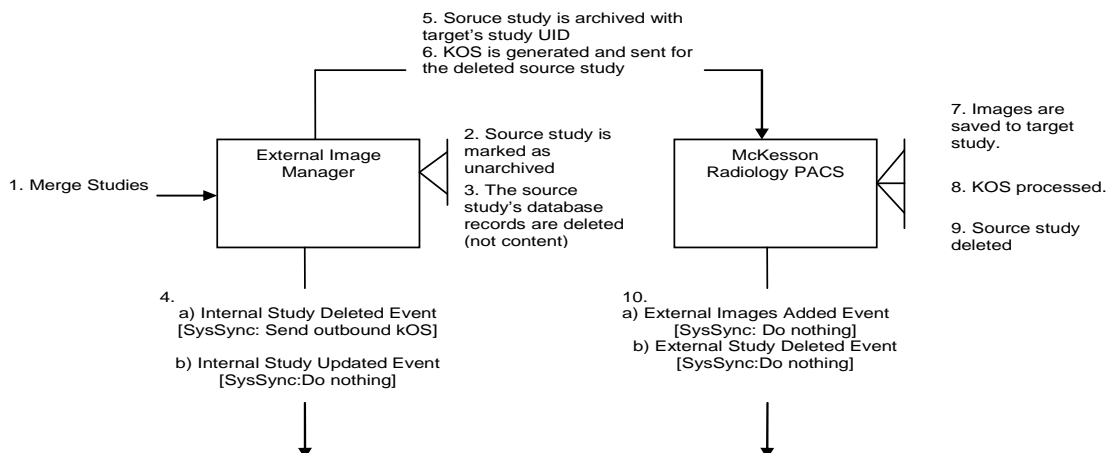
3.2.2.4.2.1.1.6   Move Study

After moving a study from patient A to patient B, the external Image Manager shall:

- Generate a new study UID for the study and update the study UID in the database

- trigger re-archive

- Outbound Synchronization KOS is sent to delete the original study.
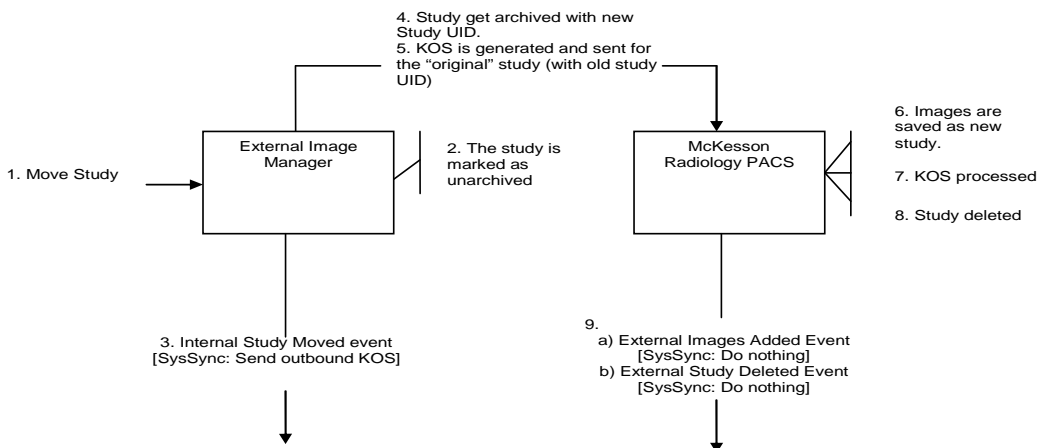
3.2.2.4.2.2   Accepted Presentation Contexts

The Importer AE will accept Presentation Context below:

Table 30: SOP Class Conformance of Importer AE for IOCM KOS

DICOM SOP Class Name	SOP Class UID	SCU	SCP
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59	No	Yes

9. An abstract syntax selected from Table 30

10. One or more Transfer Syntaxes selected from Table 31

Table 31: Importer AE Accepted Transfer Syntaxes for IOCM KOS

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

3.2.2.4.2.3   SOP Specific Conformance as an Association Acceptor

3.2.2.4.2.3.1   SOP Specific Conformance – KOS Storage

The Importer AE provides Level 2 DICOM conformance to the Importing IOCM KOS SOP Class. It is configured to retain the original DICOM data in DICOM Part 10 compliant file format. In addition, all Private and SOP Class Extended Elements are maintained in the DICOM format files. The use of IOCM KOS is described in 3.2.2.4.2 Activity – Receive Synchronization KOS Request.

The Importer AE provides support for Storage Commitment Push Model. The Importer AE expects the SCU to open an Association, send one or more IOCM KOS, and then send the Storage Commitment Request for those objects. The Importer will then send the N-EVENT Report over this same Association. If it cannot do so, then it will open a new Association with the SCU and send the N-EVENT-REPORT over the new Association.

The status codes in a C-STORE Response returns by the Importer AE for IOCM KOS is same as described in Table 25: Importer AE Returned C-STORE-RSP Status Codes

The Importer will never delete any received KOS that can be successfully parsed and contain all the necessary information for system synchronization.

3.2.2.4.2.3.2   SOP Specific Conformance – KOS Storage Commitment

The associated Activity with the Storage Commitment Push Model service for IOCM KOS is the same as described in 3.2.2.4.1.3.3 SOP Specific Conformance – Storage Commitment.

3.2.3   Query/Retrieve Server AE Specification

3.2.3.1   SOP Classes

The Query/Retrieve Server AE provides Standard Conformance to the following DICOM V3.0 SOP Classes:

Table 32: SOP Class Conformance of Query/Retrieve Server AE

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DICOM SOP Class Name	SOP Class UID	SCU	SCP
Verification			
Verification	1.2.840.10008.1.1	No	Yes
Query/Retrieve			
Patient Root Q/R Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1	No	Yes
Patient Root Q/R Information Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2	No	Yes
Study Root Q/R Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1	No	Yes
Study Root Q/R Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2	No	Yes
Patient Study Only Information Model - FIND	1.2.840.10008.5.1.4.1.2.3.1	No	Yes
Patient Study Only Information Model - MOVE	1.2.840.10008.5.1.4.1.2.3.2	No	Yes
Workflow Management			
Modality Worklist Information Model	1.2.840.10008.5.1.4.31	No	Yes
Transfer			
12-lead ECG Waveform	1.2.840.10008.5.1.4.1.1.9.1.1	Yes	No
Ambulatory ECG Waveform	1.2.840.10008.5.1.4.1.1.9.1.3	Yes	No
Basic Voice Audio Waveform	1.2.840.10008.5.1.4.1.1.9.4.1	Yes	No
Cardiac Electrophysiology Waveform	1.2.840.10008.5.1.4.1.1.9.3.1	Yes	No
General Audio Waveform	1.2.840.10008.5.1.4.1.1.9.4.2	Yes	No
Arterial Pulse Waveform	1.2.840.10008.5.1.4.1.1.9.5.1	Yes	No
Respiratory Waveform	1.2.840.10008.5.1.4.1.1.9.6.1	Yes	No
Basic Text Structured Report	1.2.840.10008.5.1.4.1.1.88.11	Yes	No
Comprehensive Structured Report	1.2.840.10008.5.1.4.1.1.88.33	Yes	No
Enhanced Structured Report	1.2.840.10008.5.1.4.1.1.88.22	Yes	No
Mammography CAD Structured Report	1.2.840.10008.5.1.4.1.1.88.50	Yes	No
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59	Yes	No
Chest CAD SR	1.2.840.10008.5.1.4.1.1.88.65	Yes	No
Colon CAD SR Document	1.2.840.10008.5.1.4.1.1.88.69	Yes	No
Implantation Plan SR Document	1.2.840.10008.5.1.4.1.1.88.70	Yes	No
Encapsulated PDF	1.2.840.10008.5.1.4.1.1.104.1	Yes	No
Encapsulated CDA IOD	1.2.840.10008.5.1.4.1.1.104.2	Yes	No
Computed Radiography Image	1.2.840.10008.5.1.4.1.1.1	Yes	No
CT Image	1.2.840.10008.5.1.4.1.1.2	Yes	No
Digital X-Ray Image (Presentation)	1.2.840.10008.5.1.4.1.1.1.1	Yes	No
Digital X-Ray Image (Processing)	1.2.840.10008.5.1.4.1.1.1.1.1	Yes	No
Digital Mammography Image (Presentation)	1.2.840.10008.5.1.4.1.1.1.2	Yes	No

DICOM SOP Class Name	SOP Class UID	SCU	SCP
Digital Mammography Image (Processing)	1.2.840.10008.5.1.4.1.1.1.2.1	Yes	No
Breast Tomosynthesis Image	1.2.840.10008.5.1.4.1.1.13.1.3	Yes	No
Digital Intra-oral X-Ray Image (Presentation)	1.2.840.10008.5.1.4.1.1.1.3	Yes	No
Digital Intra-oral X-Ray Image (Processing)	1.2.840.10008.5.1.4.1.1.1.3.1	Yes	No
General ECG Waveform	1.2.840.10008.5.1.4.1.1.9.1.2	Yes	No
Grayscale Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.1	Yes	No
Color Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.2	Yes	No
Pseudo-Color Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.3	Yes	No
Blending Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.4	Yes	No
XA/XRF Grayscale Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.5	Yes	No
Hardcopy Color Image	1.2.840.10008.5.1.1.30	Yes	No
Hardcopy Grayscale Image	1.2.840.10008.5.1.1.29	Yes	No
Hemodynamic Waveform	1.2.840.10008.5.1.4.1.1.9.2.1	Yes	No
Multi-frame Single Bit Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7.1	Yes	No
Multi-frame Grayscale Byte Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7.2	Yes	No
Multi-frame Grayscale Word Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7.3	Yes	No
Multi-frame True Color Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7.4	Yes	No
MR Image	1.2.840.10008.5.1.4.1.1.4	Yes	No
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2	Yes	No
Nuclear Medicine Image	1.2.840.10008.5.1.4.1.1.20	Yes	No
Nuclear Medicine Image (Retired)	1.2.840.10008.5.1.4.1.1.5	Yes	No
Positron Emission Tomography Image	1.2.840.10008.5.1.4.1.1.128	Yes	No
Raw Data	1.2.840.10008.5.1.4.1.1.66	Yes	No
Spatial Registration	1.2.840.10008.5.1.4.1.1.66.1	Yes	No
Spatial Fiducials	1.2.840.10008.5.1.4.1.1.66.2	Yes	No
Deformable Spatial Registration	1.2.840.10008.5.1.4.1.1.66.3	Yes	No
Segmentation	1.2.840.10008.5.1.4.1.1.66.4	Yes	No
Surface Segmentation	1.2.840.10008.5.1.4.1.1.66.5	Yes	No
Real World Value Mapping	1.2.840.10008.5.1.4.1.1.67	Yes	No
RT Beams Treatment Record	1.2.840.10008.5.1.4.1.1.481.4	Yes	No
RT Brachy Treatment Record	1.2.840.10008.5.1.4.1.1.481.6	Yes	No
RT Dose	1.2.840.10008.5.1.4.1.1.481.2	Yes	No
RT Image	1.2.840.10008.5.1.4.1.1.481.1	Yes	No
RT Plan	1.2.840.10008.5.1.4.1.1.481.5	Yes	No
RT Structure Set	1.2.840.10008.5.1.4.1.1.481.3	Yes	No

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DICOM SOP Class Name	SOP Class UID	SCU	SCP
RT Treatment Summary Record	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
RT Beams Delivery Instruction	1.2.840.10008.5.1.4.34.7	Yes	No
Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7	Yes	No
Stand-alone Curve	1.2.840.10008.5.1.4.1.1.9	Yes	No
Stand-alone Modality LUT	1.2.840.10008.5.1.4.1.1.10	Yes	No
Stand-alone Overlay	1.2.840.10008.5.1.4.1.1.8	Yes	No
Stand-alone VOI LUT	1.2.840.10008.5.1.4.1.1.11	Yes	No
Standalone PET Curve	1.2.840.10008.5.1.4.1.1.129	Yes	No
Stored Print	1.2.840.10008.5.1.1.27	Yes	No
Ultrasound Image	1.2.840.10008.5.1.4.1.1.6.1	Yes	No
Ultrasound Image (Retired)	1.2.840.10008.5.1.4.1.1.6	Yes	No
Ultrasound Multi-frame Image	1.2.840.10008.5.1.4.1.1.3.1	Yes	No
Ultrasound Multi-frame Image (Retired)	1.2.840.10008.5.1.4.1.1.3	Yes	No
VL Endoscopic Image	1.2.840.10008.5.1.4.1.1.77.1.1	Yes	No
VL Microscopic Image	1.2.840.10008.5.1.4.1.1.77.1.2	Yes	No
VL Slide-Coordinates Microscopic Image	1.2.840.10008.5.1.4.1.1.77.1.3	Yes	No
VL Photographic Image	1.2.840.10008.5.1.4.1.1.77.1.4	Yes	No
VL Image (Retired)	1.2.840.10008.5.1.4.1.1.77.1	Yes	No
VL Multi-frame Image (Retired)	1.2.840.10008.5.1.4.1.1.77.2	Yes	No
Video Endoscopic Image	1.2.840.10008.5.1.4.1.1.77.1.1.1	Yes	No
Video Microscopic Image	1.2.840.10008.5.1.4.1.1.77.1.2.1	Yes	No
Video Photographic Image	1.2.840.10008.5.1.4.1.1.77.1.4.1	Yes	No
Ophthalmic Photography 8 Bit Image	1.2.840.10008.5.1.4.1.1.77.1.5.1	Yes	No
Ophthalmic Photography 16 Bit Image	1.2.840.10008.5.1.4.1.1.77.1.5.2	Yes	No
Stereometric Relationship	1.2.840.10008.5.1.4.1.1.77.1.5.3	Yes	No
X-Ray Angiographic Bi-Plane Image (retired)	1.2.840.10008.5.1.4.1.1.12.3	Yes	No
X-Ray Angiographic Image	1.2.840.10008.5.1.4.1.1.12.1	Yes	No
X-Ray Radiofluoroscopic Image	1.2.840.10008.5.1.4.1.1.12.2	Yes	No
X-Ray Radiation Dose Structured Report	1.2.840.10008.5.1.4.1.1.88.67	Yes	Yes
Lensometry Measurements	1.2.840.10008.5.1.4.1.1.78.1	Yes	No
Autorefraction Measurements	1.2.840.10008.5.1.4.1.1.78.2	Yes	No
Keratometry Measurements	1.2.840.10008.5.1.4.1.1.78.3	Yes	No
Subjective Refraction Measurements	1.2.840.10008.5.1.4.1.1.78.4	Yes	No

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DICOM SOP Class Name	SOP Class UID	SCU	SCP
Visual Acuity Measurements	1.2.840.10008.5.1.4.1.1.78.5	Yes	No
Spectacle Prescription Report	1.2.840.10008.5.1.4.1.1.78.6	Yes	No
Ophthalmic Axial Measurements	1.2.840.10008.5.1.4.1.1.78.7	Yes	No
Intraocular Lens Calculations	1.2.840.10008.5.1.4.1.1.78.8	Yes	No
Macular Grid Thickness and Volume Report	1.2.840.10008.5.1.4.1.1.79.1	Yes	No
Ophthalmic Visual Field Static Perimetry Measurements	1.2.840.10008.5.1.4.1.1.80.1	Yes	No
Basic Structured Display IOD	1.2.840.10008.5.1.4.1.1.131	Yes	No
Generic Implant Template	1.2.840.10008.5.1.4.43.1	Yes	No
Implant Assembly Template	1.2.840.10008.5.1.4.44.1	Yes	No
Implant Template Group	1.2.840.10008.5.1.4.45.1	Yes	No
Surface Scan Mesh Storage	1.2.840.10008.5.1.4.1.1.68.1	Yes	No
Surface Scan Point Cloud Storage	1.2.840.10008.5.1.4.1.1.68.2	Yes	No
Comprehensive 3D SR	1.2.840.10008.5.1.4.1.1.88.34	Yes	No
Procedure Log	1.2.840.10008.5.1.4.1.1.88.40	Yes	No
Radiopharmaceutical Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.68	Yes	No

The Query/Retrieve Server AE implements SOP Classes of the Query/Retrieve Service Class as an SCP. It also supports the Modality Worklist SOP Class as an SCP. The Query/Retrieve Server AE can handle requests from external devices to query the McKesson Radiology™ 12.3 database for patient, study and series demographics, and Modality Worklists. It also handles requests for the retrieval of Composite SOP Instances.

The Query/Retrieve Server AE has one main task running on a McKesson Radiology™ 12.3 system. It acts as an Association Acceptor, waiting for remote AEs acting as SCUs to request an Association. When the main task receives a request to open a new Association from a remote AE, it will spawn a child task for handling messages sent by the remote AE. These child tasks will both receive the query or retrieval requests sent by the remote AE and return any necessary responses with the matching information. In addition, a child process will attempt to handle any retrieval request by opening a new Association with the specified C-MOVE Destination AE and send any matching Composite SOP Instances over this Association. Thus, each child task can also act as an Association Requestor in addition to handling Associations requested by a remote AE. After each attempt to send a Composite SOP Instance using a C-STORE Request, a C-MOVE Response is sent to the remote AE that sent the retrieval request (the C-MOVE SCU) indicating whether the transfer was successful or not.

3.2.3.2 Association Establishment Policies

3.2.3.2.1   General

The Query/Retrieve Server AE will accept Associations as an SCP for the Query/Retrieve Service C-FIND, and C-MOVE SOP Classes. It will also accept Associations as an SCP for the Modality Worklist SOP Class.

The Query/Retrieve Server AE will initiate Associations to send Composite SOP Instances in response to a C-MOVE Request. It will attempt to open a new Association with the C-MOVE Destination AE specified in the C-MOVE Request.

The DICOM Standard Application Context Name is always proposed:

Table 33: DICOM Application Context for Query/Retrieve Server AE

Application Context Name	1.2.840.10008.3.1.1.1

3.2.3.2.2   Number of Associations

Each time the Query/Retrieve Server AE accepts an Association Request, a child process will be spawned to process any query or retrieval requests. The maximum number of child processes, and thus the maximum number of simultaneous Associations that can be processed, is set by configuration.

Table 34: Number of Simultaneous Associations for Query/Retrieve Server AE acting as an SCP

Maximum number of simultaneous Associations	Unlimited[4]

If a child process receives a C-MOVE Request, then a new Association will also be requested by the Query/Retrieve Server AE in order to send images to the C-MOVE Destination AE. This means that each child process can also request a new Association and thus the Query/Retrieve Server AE can have multiple simultaneous requested Associations.

Table 35: Number of Simultaneous Associations for Query/Retrieve Server AE acting as an SCU

Maximum number of simultaneous Associations	Unlimited[5]

3.2.3.2.3   Asynchronous Nature

Negotiation of multiple outstanding transactions is not supported.

Table 36: Asynchronous Nature for Query/Retrieve Server AE

Maximum number of outstanding asynchronous transactions	1 (Not Configurable)

3.2.3.2.4   Implementation Identifying Information

Table 37: DICOM Implementation Class and Version for Query/Retrieve Server AE

Implementation Class UID	1.2.840.113711.3
Implementation Version Name	V1.0

3.2.3.3   Association Initiation Policy

3.2.3.3.1   Activity – Remote AE requests the retrieval of images

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[4] Default maximum is 10 per host permitted to connect to the Query/Retrieve Server AE.

[5] Default maximum is 10 per host permitted to connect to the Query/Retrieve Server AE.

3.2.3.4   Description and Sequencing of Activity

When a remote AE submits a C-MOVE request to the McKesson Radiology™ 12.3 system, the Query/Retrieve Server AE looks in its database to find any matches for the submitted request. If there are Composite SOP Instances that match the C-MOVE request, then the Query/Retrieve Server AE will attempt to open an Association and transfer the requested SOP Instances. An Association Request is sent to the specified C-MOVE Destination AE and, upon successful negotiation of the required Presentation Context, the transfer is started. In all cases an attempt will be made to transmit all the indicated SOP Instances in a single Association, but this may not always be possible. The Association will be released when all the SOP Instances have been sent. If an error occurs during transmission over an open Association then the transfer is halted. The Query/Retrieve Server AE will not attempt to independently retry the image export.

The Query/Retrieve Server AE does not support the unsolicited sending of SOP Instances using the DICOM Storage Service Class. It will only send SOP Instances in response to a C-MOVE Request from a remote AE.

3.2.3.4.1.1   Proposed Presentation Contexts

The Query/Retrieve Server AE can propose the same Presentation Contexts as the Sender AE when it attempts to transfer Composite SOP Instances in response to a C-MOVE Request. As such, it can propose any one or more of the Transfer Syntaxes in Table 9: Sender AE Proposed Transfer Syntaxes for each of the abstract syntaxes listed in Table 4: SOP Class Conformance of Sender AE (same as SOP Classes with Role of SCU listed in Table 32: SOP Class Conformance of Query/Retrieve Server AE). Each proposed Presentation Context contains a single Transfer Syntax. Multiple Transfer Syntaxes per abstract syntax would be proposed with multiple Presentation Contexts.

3.2.3.4.1.2   SOP Specific Conformance as an Association Requestor

3.2.3.4.1.2.1   SOP Specific Conformance - Storage

The Query/Retrieve Server AE will attempt to transfer all requested SOP Instances to the C-MOVE Destination AE specified in a C-MOVE Request. For each C-STORE Response received from the C-MOVE Destination AE, the Query/Retrieve Server AE will return a C-MOVE Response to the AE that sent the original C-MOVE Request. Each C-MOVE Response will indicate the appropriate Status Code based on the Status Code of the corresponding C-STORE Response. The Association will be properly released after the Query/Retrieve Server AE has attempted to transfer all requested SOP Instances. The Query/Retrieve Server AE will continue to attempt to transfer any remaining SOP Instances even if a failure Status Code is returned in a particular C-STORE Response.

When a Composite SOP Instance is selected for transmission from McKesson Radiology™ 12.3, the content of the object will be the same as when it was originally received unless patient demographic or study-related information is altered. In such cases, the latest values in the database will replace the original information in the SOP Instance. Thus, the set of optional tags contained in DICOM objects going out from McKesson Radiology™ 12.3 depends on the information that was received. For the list of patient, study, and series attributes that can be updated by the Query/Retrieve Server AE when a SOP Instance is exported please refer to 7.1.5: Sender AE and Query/Retrieve Server AE Element Modification.

The Query/Retrieve Server AE cannot be configured to automatically resend Composite SOP Instances when the Status Code returned in a C-STORE Response is considered to indicate a failure. Failure indications are not output to the User Interface if an error occurs during the handling of a C-MOVE retrieval request.

The Query/Retrieve Server AE will exhibit the following behavior according to the Status Code value returned in a C-STORE Response from the C-STORE SCP (the C-MOVE Destination AE):

Table 38: Query/Retrieve Server AE C-STORE Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The SCP has successfully stored the exported SOP Instance. Success indication message is output to the Service Logs. No indication is posted to the User Interface.
Refused	Out of Resources	A700 – A7FF	This is treated as a failure. The Query/Retrieve Server AE does not attempt to resend the SOP Instance. However, it will continue trying to send any remaining SOP Instances requested by the C-MOVE-RQ. An error indication is output to the Service Logs. No indication is posted to the User Interface.
Error	Data Set does not match SOP Class	A900 – A9FF	This is treated as a failure. The Query/Retrieve Server AE does not attempt to resend the SOP Instance. However, it will continue trying to send any remaining SOP Instances requested by the C-MOVE-RQ. An error indication is output to the Service Logs. No indication is posted to the User Interface.
Error	Cannot Understand	C000 – CFFF	This is treated as a failure. The Query/Retrieve Server AE does not attempt to resend the SOP Instance. However, it will continue trying to send any remaining SOP Instances requested by the C-MOVE-RQ. An error indication is output to the Service Logs. No indication is posted to the User Interface.
Warning	Coercion of Data Elements	B000	SOP Instance transmission is considered successful. A warning indication is output to the Service Logs so that there is a record of the SCP returning a Warning Status. No indication is posted to the User Interface.
Warning	Element Discarded	B006	SOP Instance transmission is considered successful. A warning indication is output to the Service Logs so that there is a record of the SCP returning a Warning Status. No indication is posted to the User Interface.
Warning	Data Set does not match SOP Class	B007	SOP Instance transmission is considered successful. A warning indication is output to the Service Logs so that there is a record of the SCP returning a Warning Status. No indication is posted to the User Interface.
Warning	Attribute List Error	0107	SOP Instance transmission is considered successful. A warning indication is output to the Service Logs so that there is a record of the SCP returning a Warning Status. No indication is posted to the User Interface.
Warning	Attribute Value Out of Range	0116	SOP Instance transmission is considered successful. A warning indication is output to the Service Logs so that there is a record of the SCP returning a Warning Status. No indication is posted to the User Interface.
*	*	Any	This is treated as a failure. The Query/Retrieve Server AE does not attempt to

Service Status	Further Meaning	Error Code	Behavior
		other status code	resend the SOP Instance. However, it will continue trying to send any remaining SOP Instances requested by the C-MOVE-RQ. An error indication is output to the Service Logs. No indication is posted to the User Interface.

3.2.3.4.1.2.2   Association Requestor Communication Failure Behavior

The Behavior of the Query/Retrieve Server AE during communication failure when acting as an Association Requestor is summarized in the following table:

Table 39: Query/Retrieve Server AE Communication Failure Behavior as an Association Requestor

Exception	Behavior
Timeout expiry for an expected DICOM Message Response (DIMSE level timeout).	The Association is aborted using a DICOM A-ABORT. This is treated as a failure. The Query/Retrieve Server AE does not attempt to resend any of the SOP Instances that were not successfully transferred. An error indication is output to the Service Logs. No indication is posted to the User Interface.
Timeout expiry for an expected DICOM PDU or TCP/IP packet (Low-level timeout).	The Association is aborted using a DICOM A-ABORT. This is treated as a failure. The Query/Retrieve Server AE does not attempt to resend any of the SOP Instances that were not successfully transferred. An error indication is output to the Service Logs. No indication is posted to the User Interface.
Association A-P-ABORTed by the SCP or the network layers indicate communication loss (i.e. low-level TCP/IP socket closure)	This is treated as a failure. The Query/Retrieve Server AE does not attempt to resend any of the SOP Instances that were not successfully transferred. An error indication is output to the Service Logs. No indication is posted to the User Interface.

3.2.3.5   Association Acceptance Policy

3.2.3.5.1   Activity – External system queries McKesson Radiology™ 12.3

3.2.3.5.1.1   Description and Sequencing of Activity

The Query/Retrieve Server AE 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 hosts (using TCP/IP address) and/or Application Entity Titles.

If the Query/Retrieve Server AE receives a query (C-FIND) request, then the response(s) will be sent over the same Association used to send the C-FIND-Request.

If the Query/Retrieve Server AE receives a retrieval (C-MOVE) request, then the responses will be sent over the same Association used to send the C-MOVE-Request. The Query/Retrieve Server AE will send the requested Composite SOP Instances to the C-MOVE Destination AE. After each attempt to send a SOP Instance, the Query/Retrieve Server AE sends a C-MOVE Response indicating whether the transfer was successful or not. Once the Query/Retrieve Server AE has finished attempting to transfer all the

requested SOP Instances, it sends a final C-MOVE Response indicating the overall status of the attempted retrieval.

Figure 6: Sequencing of Activity – Handling Query and Retrieval Requests
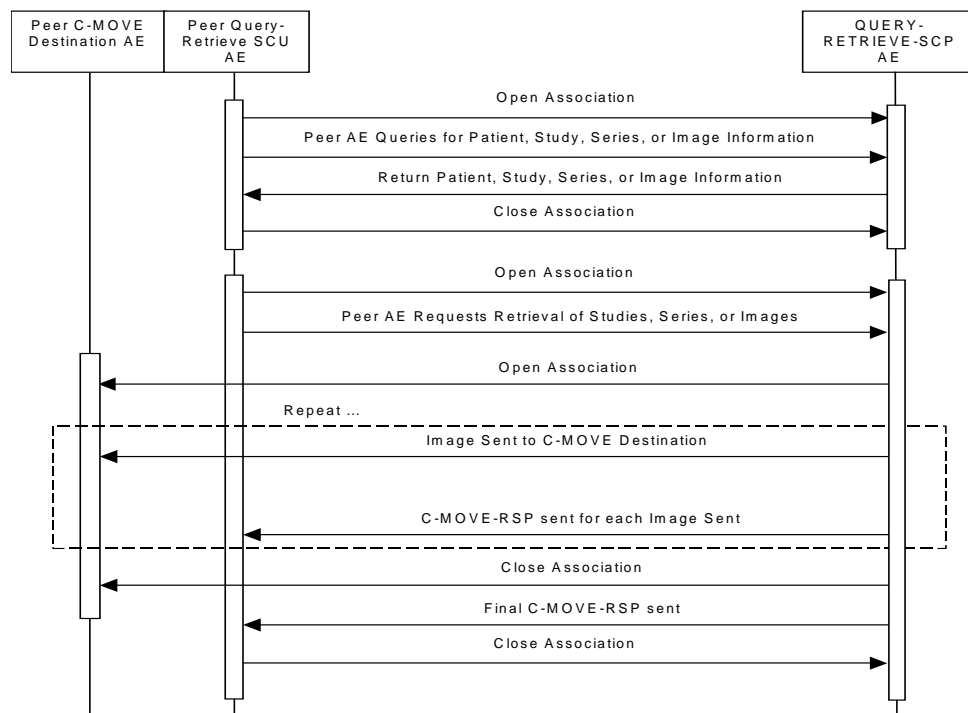
The following sequencing constraints illustrated in Figure 6 apply to the Query/Retrieve Server AE for handling queries (C-FIND-Requests):

1. Remote AE opens an Association with the Query/Retrieve Server AE.

2. Remote AE sends a C-FIND-RQ Message

3. Query/Retrieve Server AE returns a C-FIND-RSP Message to the remote AE with matching information. A C-FIND-RSP is sent for each entity matching the identifier specified in the C-FIND-RQ. A final C-FIND-RSP is sent indicating that the matching is complete.

4. Remote AE closes the Association. Note that the remote AE does not have to close the Association immediately. Further C-FIND or C-MOVE Requests can be sent over the Association before it is closed.

The following sequencing constraints illustrated in Figure 6 apply to the Query/Retrieve Server AE for handling retrievals (C-MOVE-Requests):

1. Remote AE opens an Association with the Query/Retrieve Server AE.

2. Remote AE sends a C-MOVE-RQ Message

3. Query/Retrieve Server AE sends the Composite SOP Instances to the remote C-MOVE Destination AE as indicated in the C-MOVE-RQ.

4. After each attempt to send a SOP Instance, the Query/Retrieve Server AE returns a C-MOVE-RSP indicating this success or failure of the transfer.

5. Once the Query/Retrieve Server AE has completed all attempts to transfer the SOP Instances to the C-MOVE Destination AE, the Query/Retrieve Server AE sends a final C-MOVE-RSP indicating the overall success or failure of the retrieval.

6. Remote AE closes the Association. Note that the remote AE does not have to close the Association immediately. Further C-FIND or C-MOVE Requests can be sent over the Association before it is closed.

The Query/Retrieve Server AE may reject Association attempts as shown in the table below. The Result, Source and Reason/Diag columns represent the values returned in the corresponding fields of an ASSOCIATE-RJ PDU (see PS 3.8, Section 9.3.4). The following abbreviations are used in the Source column:

a) 1 – DICOM UL service-user

b) 2 – DICOM UL service-provider (ASCE related function)

c) 3 – DICOM UL service-provider (Presentation related function)

Table 40: Query/Retrieve Server AE Association Rejection Reasons

Result	Source	Reason/Diag	Explanation
2 – rejected-transient	c	2 – local-limit-exceeded	The (configurable) maximum number of simultaneous Associations for the remote AE host has been reached. An Association request with the same parameters may succeed at a later time.
1 – rejected-permanent	a	2 – application-context-name-not-supported	The Association request contained an unsupported Application Context Name. An association request with the same parameters will not succeed at a later time.
1 – rejected-permanent	b	1 – no-reason-given	The Association request could not be parsed. An Association request with the same format will not succeed at a later time. Usually this is only returned if the Query/Retrieve Server AE has not been configured to allow the remote AE host to connect to it. The Query/Retrieve Server AE can be configured to allow only specific host names to open Associations with it. Note that it cannot currently be configured to only allow specific calling and/or called AE Titles when forming Associations.

3.2.3.5.1.2   Accepted Presentation Contexts

The Query/Retrieve Server AE may accept any one or more of the following Presentation Contexts:

Table 41: Query/Retrieve Server AE Accepted Presentation Contexts

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Verification	1.2.840.10008.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Verification	1.2.840.10008.1.1	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Patient Root Q/R	1.2.840.10008.5.1.4.1.2.1.1	DICOM Implicit	1.2.840.10008.1.2	SCP	None

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Information Model - FIND		VR Little Endian			
Patient Root Q/R Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Patient Root Q/R Information Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Patient Root Q/R Information Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Study Root Q/R Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Study Root Q/R Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Study Root Q/R Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Study Root Q/R Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Patient Study Only Information Model - FIND	1.2.840.10008.5.1.4.1.2.3.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Patient Study Only Information Model - FIND	1.2.840.10008.5.1.4.1.2.3.1	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Patient Study Only Information Model - MOVE	1.2.840.10008.5.1.4.1.2.3.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Patient Study Only Information Model - MOVE	1.2.840.10008.5.1.4.1.2.3.2	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Modality Worklist Information Model	1.2.840.10008.5.1.4.31	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Modality Worklist Information Model	1.2.840.10008.5.1.4.31	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None

3.2.3.5.1.3   SOP Specific Conformance as an Association Acceptor

3.2.3.5.1.3.1   SOP Specific Conformance – Verification

Standard conformance is provided to the DICOM Verification Service Class as an SCP.

3.2.3.5.1.3.2   SOP Specific Conformance – Query (C-FIND)

The Query/Retrieve Server AE supports hierarchical queries and not relational queries. There are no attributes always returned by default. Only those attributes requested in the query identifier are returned. Query responses always return values from the McKesson Radiology™ 12.3 database. 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. If the submitted C-FIND Request generates a large number of matches in the McKesson Radiology™ 12.3 database, QueryServer will return a maximum of 5000 matching C-FIND Responses. This limitation of 5000 matching C-FIND Responses does not apply to instance-level C-FIND Requests. The limitation could have some consequences when the submitted C-FIND Requests are for Patient level queries and Study Root/Study Level queries that do not specify a single patient id (e.g only specifying a patient last name: Jones). This is done by design to

prevent QueryServer from using extremely large amounts of resources (CPU and memory), eventually causing the server to crash.

By default, the Query/Retrieve Server AE is configured to not check for Cancel Requests sent by a remote AE. This is done to improve performance, as it does not have to spend time periodically checking if a remote AE has sent a Cancel Request over the Association. However, if it is known that a remote AE can send Cancel Requests, then the Query/Retrieve Server AE can be configured to handle them properly.

The Query/Retrieve Server AE implements support for the IHE Technical Framework version 5.5 (Year 6). All required attributes are supported at the Patient, Study, Series, Image levels.

Patient Root Information Model

All required search keys on each of the four levels (Patient, Study, Series, and Image) are supported. However, the Patient ID (0010,0020) key must be fully stated if the Patient's Name (0010,0010) is not present in the query (e.g McKesson Radiology™ 12.3 does not support queries for patients having the patient ID of "123*" when this is the only search criterion).

Study Root Information Model

All the required search keys on each of the three levels (Study, Series, and Image) are supported. There is, however, a caveat that applies to the Study Time (0008,0030) — it cannot be used as the only search key on the Study level. If it is used in conjunction with the other supported search keys on the Study level, it can be used in the matching criteria.

Patient/Study Only Information Model

All the required search keys on the Patient and Study levels are supported. The Patient ID (0010,0020) key must be fully stated if the Patient's Name (0010,0010) is not present in the query.

Table 42: Patient Root C-FIND SCP Supported Elements

Description/Module	Tag ID	VR	Types of Matching
Patient Level			
Patient's Name (See NOTE7)	(0010,0010)	PN	S,*,U also DICOM FUZZY LOGIC if MIMA
Patient ID	(0010,0020)	LO	UNIQUE
Issuer of Patient ID (See NOTE3)	(0010,0021)	LO	S,U
Other patient IDs Sequence (See NOTE4)	(0010,1002)	SQ	NONE
> Patient ID	(0010,0020)	LO	NONE
>Issuer of Patient ID	(0010,0021)	LO	NONE
>Type of Patient ID	(0010,0022)	CS	NONE
Patient's Birth Date	(0010,0030)	DA	S,U
Patient's Birth Time	(0010,0032)	TM	S,U
Patient's Sex	(0010,0040)	CS	S,U
Medical Alerts	(0010,2000)	LO	NONE

Contrast Allergies	(0010,2110)	LO	NONE
Pregnancy Status	(0010,21C0)	US	NONE
Study Level			
Study Date	(0008,0020)	DA	S,R,U
Study Time	(0008,0030)	TM	R,U
Accession Number	(0008,0050)	SH	S,U
Issuer of Accession Number Sequence (See NOTE5)	(0008,0051)	SQ	SQ
>Local Namespace Entity ID	(0040,0031)	UT	S,U
>Universal Entity ID	(0040,0032)	UT	S,U
>Universal Entity ID Type	(0040,0033)	CS	S,U
Study ID	(0020,0010)	SH	S,U
Study Instance UID	(0020,000D)	UI	UNIQUE,L
Referring Physician's Name	(0008,0090)	PN	S,*,U
Study Description	(0008,1030)	LO	S,*,U
Modalities in Study	(0008,0061)	CS	S,*,U
Number of Study Related Series	(0020,1206)	IS	NONE
Number of Study Related Instances	(0020,1208)	IS	NONE
Instance Availability (see NOTE2)	(0008,0056)	CS	NA
Series Level			
Modality	(0008,0060)	CS	S,U
Series Number	(0020,0011)	IS	S,U
Series Instance UID	(0020,000E)	UI	UNIQUE,L
Number of Series Related Instances	(0020,1209)	IS	NONE
Performing Physician's Name (see NOTE1)	(0008,1050)	PN	S,*,U
Operator's Name	(0008,1070)	PN	S,*,U
Series Description	(0008,103E)	LO	S,*,U
Request Attribute Sequence	(0040,0275)	SQ	SQ
>Requested Procedure ID	(0040,1001)	SH	S,*,U
>Scheduled Procedure Step ID	(0040,0009)	SH	S,*,U
Performed Procedure Step Start Date	(0040,0244)	DA	S,R,U
Performed Procedure Step Start Time	(0040,0245)	TM	S,R,U
Instance Availability (see NOTE2)	(0008,0056)	CS	NA
Institution Name (See NOTE6)	(0008,0080)	LO	NONE
Institution Code Sequence (See NOTE6)	(0008,0082)	SQ	SQ
>Code Value	(0008,0100)	SH	S,U
>Coding Scheme Designator	(0008,0102)	SH	S,U

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>Coding Scheme Version	(0008,0103)	SH	S,U
>Code Meaning	(0008,0104)	LO	S,U
Image Level			
SOP Instance UID	(0008,0018)	UI	UNIQUE,L
SOP Class UID	(0008,0016)	UI	S,U,L
Content Date	(0008,0023)	DA	NONE
Content Time	(0008,0033)	TM	NONE
Retrieve AE Title (See NOTE8)	(0008,0054)	AE	N/A
Referenced Series Sequence	(0008,1115)	SQ	NONE
>Series Instance UID	(0020,000E)	UI	NONE
>Referenced Image Sequence	(0008,1140)	SQ	NONE
>>Referenced SOP Class UID	(0008,1150)	UI	NONE
>>Referenced SOP Instance UID	(0008,1155)	UI	NONE
Instance Number	(0020,0013)	IS	S,U
Rows	(0028,0010)	US	NONE
Columns	(0028,0011)	US	NONE
Bits Allocated	(0028,0100)	US	NONE
Number of Frames	(0028,0008)	IS	NONE
Observation DateTime	(0040,A032)	DT	NONE
Concept Name Code Sequence	(0040,A043)	SQ	SQ
>Code Value	(0008,0100)	SH	S,*,U
>Coding Scheme Designator	(0008,0102)	SH	S,*,U
>Coding Scheme Version	(0008,0103)	SH	NONE
>Code Meaning	(0008,0104)	LO	NONE
Verifying Observer Sequence	(0040,A073)	SQ	SQ
>Verifying Organization	(0040,A027)	LO	NONE
>Verification DateTime	(0040,A030)	DT	S,R,U
>Verifying Observer Name	(0040,A075)	PN	S,*,U
>Verifying Observer Identification Code Sequence	(0040,A088)	SQ	NONE
>>Code Value	(0008,0100)	SH	NONE
>>Coding Scheme Designator	(0008,0102)	SH	NONE
>>Coding Scheme Version	(0008,0103)	SH	NONE
>>Code Meaning	(0008,0104)	LO	NONE
Referenced Request Sequence	(0040,A370)	SQ	NONE
>Accession Number	(0008,0050)	SH	NONE
>Study Instance UID	(0020,000D)	UI	NONE

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>Requested Procedure Code Sequence	(0032,1064)	SQ	NONE
>>Code Value	(0008,0100)	SH	NONE
>>Coding Scheme Designator	(0008,0102)	SH	NONE
>>Coding Scheme Version	(0008,0103)	SH	NONE
>>Code Meaning	(0008,0104)	LO	NONE
>Requested Procedure ID	(0040,1001)	SH	NONE
Completion Flag	(0040,A491)	CS	S,*,U
Verification Flag	(0040,A493)	CS	S,*,U
Content Template Sequence	(0040,A504)	SQ	NONE
>Template Identifier	(0040,DB00)	CS	NONE
Presentation Label	(0070,0080)	CS	NONE
Presentation Description	(0070,0081)	LO	NONE
Presentation Creation Date	(0070,0082)	DA	NONE
Presentation Creation Time	(0070,0083)	TM	NONE
Presentation Creator's Name	(0070,0084)	PN	NONE
Instance Availability (see NOTE2)	(0008,0056)	CS	NA

Table 43: Study Root C-FIND SCP Supported Elements

Description/Module	Tag ID	VR	Types of Matching
Study Level			
Patient's Name (See NOTE7)	(0010,0010)	PN	S,*,U also DICOM FUZZY LOGIC if MIMA
Patient ID	(0010,0020)	LO	S,U
Issuer of Patient ID (See NOTE3)	(0010,0021)	LO	S,U
Other patient IDs Sequence (See NOTE4)	(0010,1002)	SQ	NONE
> Patient ID	(0010,0020)	LO	NONE
>Issuer of Patient ID	(0010,0021)	LO	NONE
>Type of Patient ID	(0010,0022)	CS	NONE
Patient's Birth Date	(0010,0030)	DA	S,U
Patient's Birth Time	(0010,0032)	TM	S,U
Patient's Sex	(0010,0040)	CS	S,U
Medical Alerts	(0010,2000)	LO	NONE
Contrast Allergies	(0010,2110)	LO	NONE
Pregnancy Status	(0010,21C0)	US	NONE
Study Date	(0008,0020)	DA	S,R,U
Study Time	(0008,0030)	TM	R,U

Accession Number	(0008,0050)	SH	S,U
Issuer of Accession Number Sequence (See NOTE5)	(0008,0051)	SQ	SQ
>Local Namespace Entity ID	(0040,0031)	UT	S,U
>Universal Entity ID	(0040,0032)	UT	S,U
>Universal Entity ID Type	(0040,0033)	CS	S,U
Study ID	(0020,0010)	SH	S,U
Study Instance UID	(0020,000D)	UI	UNIQUE,L
Referring Physician's Name	(0008,0090)	PN	S,*,U
Study Description	(0008,1030)	LO	S,*,U
Modalities in Study	(0008,0061)	CS	S,*,U
Number of Study Related Series	(0020,1206)	IS	NONE
Number of Study Related Instances	(0020,1208)	IS	NONE
Instance Availability (see NOTE2)	(0008,0056)	CS	NA
Series Level			
Modality	(0008,0060)	CS	S,U
Series Number	(0020,0011)	IS	S,*,U
Series Instance UID	(0020,000E)	UI	UNIQUE,L
Number of Series Related Instances	(0020,1209)	IS	NONE
Performing Physician's Name (see NOTE1)	(0008,1050)	PN	S,*,U
Operator's Name	(0008,1070)	PN	S,*,U
Series Description	(0008,103E)	LO	S,*,U
Request Attribute Sequence	(0040,0275)	SQ	NONE
>Requested Procedure ID	(0040,1001)	SH	S,*,U
>Scheduled Procedure Step ID	(0040,0009)	SH	S,*,U
Performed Procedure Step Start Date	(0040,0244)	DA	S,R,U
Performed Procedure Step Start Time	(0040,0245)	TM	S,R,U
Instance Availability (see NOTE2)	(0008,0056)	CS	NA
Institution Name (See NOTE6)	(0008,0080)	LO	NONE
Institution Code Sequence (See NOTE6)	(0008,0082)	SQ	SQ
>Code Value	(0008,0100)	SH	S,U
>Coding Scheme Designator	(0008,0102)	SH	S,U
>Coding Scheme Version	(0008,0103)	SH	S,U
>Code Meaning	(0008,0104)	LO	S,U
Image Level			
SOP Instance UID	(0008,0018)	UI	UNIQUE,L
SOP Class UID	(0008,0016)	UI	S,U,L

Content Date	(0008,0023)	DA	NONE
Content Time	(0008,0033)	TM	NONE
Retrieve AE Title	(0008,0054)	AE	N/A
Referenced Series Sequence	(0008,1115)	SQ	NONE
>Series Instance UID	(0020,000E)	UI	NONE
>Referenced Image Sequence	(0008,1140)	SQ	NONE
>>Referenced SOP Class UID	(0008,1150)	UI	NONE
>>Referenced SOP Instance UID	(0008,1155)	UI	NONE
Instance Number	(0020,0013)	IS	S,U
Rows	(0028,0010)	US	NONE
Columns	(0028,0011)	US	NONE
Bits Allocated	(0028,0100)	US	NONE
Number of Frames	(0028,0008)	IS	NONE
Observation DateTime	(0040,A032)	DT	NONE
Concept Name Code Sequence	(0040,A043)	SQ	SQ
>Code Value	(0008,0100)	SH	S,*,U
>Coding Scheme Designator	(0008,0102)	SH	S,*,U
>Coding Scheme Version	(0008,0103)	SH	NONE
>Code Meaning	(0008,0104)	LO	NONE
Verifying Observer Sequence	(0040,A073)	SQ	SQ
>Verifying Organization	(0040,A027)	LO	NONE
>Verification DateTime	(0040,A030)	DT	S,R,U
>Verifying Observer Name	(0040,A075)	PN	S,*,U
>Verifying Observer Identification Code Sequence	(0040,A088)	SQ	NONE
>>Code Value	(0008,0100)	SH	NONE
>>Coding Scheme Designator	(0008,0102)	SH	NONE
>>Coding Scheme Version	(0008,0103)	SH	NONE
>>Code Meaning	(0008,0104)	LO	NONE
Referenced Request Sequence	(0040,A370)	SQ	NONE
>Accession Number	(0008,0050)	SH	NONE
>Study Instance UID	(0020,000D)	UI	NONE
>Requested Procedure Code Sequence	(0032,1064)	SQ	NONE
>>Code Value	(0008,0100)	SH	NONE
>>Coding Scheme Designator	(0008,0102)	SH	NONE
>>Coding Scheme Version	(0008,0103)	SH	NONE
>>Code Meaning	(0008,0104)	LO	NONE

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>Requested Procedure ID	(0040,1001)	SH	NONE
Completion Flag	(0040,A491)	CS	S,*,U
Verification Flag	(0040,A493)	CS	S,*,U
Content Template Sequence	(0040,A504)	SQ	NONE
>Template Identifier	(0040,DB00)	CS	NONE
Presentation Label	(0070,0080)	CS	NONE
Presentation Description	(0070,0081)	LO	NONE
Presentation Creation Date	(0070,0082)	DA	NONE
Presentation Creation Time	(0070,0083)	TM	NONE
Presentation Creator's Name	(0070,0084)	PN	NONE
Instance Availability (see NOTE2)	(0008,0056)	CS	NA

Table 44: Patient/Study Only Root C-FIND SCP Supported Elements

Description/Module	Tag ID	VR	Types of Matching
Patient Level			
Patient's Name (See NOTE7)	(0010,0010)	PN	S,*,U also DICOM FUZZY LOGIC if MIMA
Patient ID	(0010,0020)	LO	UNIQUE
Issuer of Patient ID (See NOTE3)	(0010,0021)	LO	S,U
Other patient IDs Sequence (See NOTE4)	(0010,1002)	SQ	NONE
> Patient ID	(0010,0020)	LO	NONE
>Issuer of Patient ID	(0010,0021)	LO	NONE
>Type of Patient ID	(0010,0022)	CS	NONE
Patient's Birth Date	(0010,0030)	DA	S,U
Patient's Birth Time	(0010,0032)	TM	S,U
Patient's Sex	(0010,0040)	CS	S,U
Medical Alerts	(0010,2000)	LO	NONE
Contrast Allergies	(0010,2110)	LO	NONE
Pregnancy Status	(0010,21C0)	US	NONE
Study Level			
Study Date	(0008,0020)	DA	S,R,U
Study Time	(0008,0030)	TM	R,U
Accession Number	(0008,0050)	SH	S,U
Issuer of Accession Number Sequence (See NOTE5)	(0008,0051)	SQ	SQ
>Local Namespace Entity ID	(0040,0031)	UT	S,U
>Universal Entity ID	(0040,0032)	UT	S,U

>Universal Entity ID Type	(0040,0033)	CS	S,U
Study ID	(0020,0010)	SH	S,*,U
Study Instance UID	(0020,000D)	UI	UNIQUE,L
Referring Physician's Name	(0008,0090)	PN	S,*,U
Study Description	(0008,1030)	LO	S,*,U
Modalities in Study	(0008,0061)	CS	S,*,U
Number of Study Related Series	(0020,1206)	IS	NONE
Number of Study Related Instances	(0020,1208)	IS	NONE
Performing Physician's Name (see NOTE1)	(0008,1050)	PN	S,*,U
Instance Availability (see NOTE2)	(0008,0056)	CS	NA

The types of Matching supported by the Query/Retrieve Server AE Query (C-FIND) SCP:

S   - indicates Single Value Matching is supported.

R   - indicates Range Matching is supported.

*   - indicates Wildcard Matching is supported.

U   - indicates Universal Matching is supported.

L   - indicates that UID lists Matching are supported.

SQ   - indicates that Sequence Matching is supported.

NONE   - indicates that no matching is supported, but that values for this Element are returned if requested (i.e. universal matching).

UNIQUE   - indicates that this is the Unique Key for that query level, in which case Universal Matching or Single Value Matching is supported depending on the query level.

NA   - indicates that no matching is supported, but the values for this Element will be returned whether it is requested or not.

DICOM   - indicates DICOM Fuzzy Semantic Matching (MIMA) support so that variations in the

FUZZY   spelling of a patient's name in different domains, phonetic matching (e.g. a query for

LOGIC   Swain" might as well return "Swayne"), or patient name components order-insensitivity (e.g. a query for "Smith^Mary" might well return "Mary^Smith") can still be handled. However, McKesson Radiology™ 12.3 shall only support case-insensitivity of patient name matching.

NOTE1: By default, McKesson Radiology™ 12.3 returns Performing Physician's Name (0008,1050) at the Series Level. However, it can be configured to return it at the Study Level.

NOTE2: McKesson Radiology™ 12.3 supports the Instance Availability attribute (0008,0056) which defines how rapidly composite object instance(s) become available for transmission from McKesson Radiology™ 12.3 after a C-MOVE retrieval request.   McKesson Radiology™ 12.3 will return one of three possible values for this attribute:

    - "ONLINE"   if all the SOP Instances are immediately available because they all have a cache location.

-"NEARLINE"   if all SOP Instances can be retrieved from accessible archive locations, even if some do not have a cache location.

-"OFFLINE"   if some of the SOP Instances are archived, but they are not accessible from their archived location(s).

McKesson Radiology™ 12.3 supporting the Multiple Identity Resolution option of the IHE MIMA Profile will support the query match keys as a Query SCP in the above tables. McKesson Radiology™ 12.3 will handle Patient ID and Accession Number Assigning Authorities, and Institution Information in Queries as follows:

NOTE3: Patient ID Assigning Authority in Queries

McKesson Radiology™ 12.3 receiving query requests will establish the Assigning Authority of an included Patient ID value from the Issuer of Patient ID (0010,0021) attribute that is explicitly present in the received query request identifier, or if absent, from the preconfigured Assigning Authority of the Patient ID associated with the querying client.

If there is no Patient ID (0010,0020) value included in the query request then McKesson Radiology™ 12.3 will establish the Patient ID Assigning Authority to be used for all responses from the Issuer of Patient ID (0010,0021) attribute that is explicitly present in the received query request identifier, or if absent, from the preconfigured Assigning Authority of the patient ID associated with the querying client.

The value of a returned Patient ID (0010,0020) will correspond to the Assigning Authority specified in the query, or if absent, the preconfigured Assigning Authority associated with the querying client. McKesson Radiology™ 12.3 will use its knowledge of the cross-referencing of patient identifiers to return the appropriate Patient ID value.

For a Patient Level Query, if there is a matching patient, but there is no matching patient ID for the Assigning Authority associated with the querying client (e.g. The matching patient by Patient Name "John Doe" has a Patient Identifier for "Site A" Assigning Authority, but the Patient Identifier associated with the querying client is for "Site B" Assigning Authority), no matches will be returned for the query request. But if the query request also includes the Issuer of Patient ID (0010,0021) attribute with no value, then the existing Patient ID will be returned with the corresponding Patient ID Assigning Authority (e.g. Site A).

For a Study Level Query, if there is a matching study, but there is no Matching Patient ID for the Assigning Authority associated with the querying client (e.g. The existing Patient Identifier for the matching study is for "Site A", but the Patient Identifier associated with the querying client is for "Site B" Assigning Authority), and the Issuer of Patient ID (0010,0021) attribute is sent with no value in the query identifier, McKesson Radiology™ 12.3 will return the existing Patient ID with the corresponding Patient ID Assigning Authority (e.g. "Site A"). If there is no Matching Patient ID for the requested Assigning Authority for the matching study and the Issuer of Patient ID (0010,0021) attribute is not included as a return key in the query, a zero length Patient ID value will be returned.

NOTE4: Other Patient IDs in Queries

McKesson Radiology™ 12.3 can include all patient identifiers known to it in the Other Patient IDs Sequence (0010,1002) as a list of return key values.

At a minimum McKesson Radiology™ 12.3 will include in the Other Patient IDs Sequence (0010,1002) the destination patient ID value, if it exists.

NOTE5: Accession Number Assigning Authority in Queries

McKesson Radiology™ 12.3 receiving query requests will establish the Assigning Authority of an included Accession Number value from the Issuer of Accession Number Sequence (0008,0051) attribute that is explicitly present in the received query request identifier, or if absent, from the preconfigured Assigning Authority of the Accession Number associated with the querying client.

If there is no Accession Number (0008,0050) value included in the query request then McKesson Radiology™ 12.3 will establish the Accession Number Assigning Authority to be used for all responses from the Accession Number Sequence (0008,0051) attribute that is explicitly present in the received query request identifier, or if absent, from the preconfigured Assigning Authority of the Accession Number associated with the querying client.

The value of a returned Accession Number shall correspond to the Assigning Authority specified in the query, or if absent, the preconfigured Assigning Authority associated with the querying client. If the Accession Number of a matching Study does not correspond to this Assigning Authority then it shall be returned zero length.

In the case where the Issuer of Accession Number Sequence (0010,0021) attribute is sent with no value in the query identifier and the existing Accession Number value (e.g. acc0001) for the matching study is not for the Assigning Authority associated with the querying client (e.g. querying client pre-configured Accession Number Assigning Authority is for "Site B", but the Accession Number Assigning Authority of the study is for "Site A"), McKesson Radiology™ 12.3 will return the existing Accession Number value with the corresponding Accession Number Assigning Authority (e.g. "Site A").

NOTE6: Institution in Queries

McKesson Radiology™ 12.3 receiving query requests shall support Institution Code Sequence (0008,0082) as a Matching Key for Series, or SOP Instances acquired at a certain Institution. The Institution Name (0008,0080) attribute value shall be included in the query response if the attribute is included in the Query identifier.

NOTE7: DICOM Fuzzy Semantic Matching

McKesson Radiology™ 12.3 supporting the Multiple Identity Resolution option shall support the DICOM Fuzzy Semantic Matching of Person Names option. However, McKesson Radiology™ 12.3 shall only support the case-insensitivity of patient name. We do not support the true variations in the spelling of a patient's name.

NOTE8: Retrieve AE Title

The C-FIND SCP is required to support either or both the Retrieve AE Title Data Element or the Storage Media File-Set ID/Storage Media File Set UID Data Elements. An Identifier in a C-FIND response shall contain:

- Retrieve AE Title (0008,0054) which defines a list of DICOM Application Entity Title(s) that identify the location from which the composite object instance(s) may be retrieved on the network.

The Query/Retrieve Server AE returns one of the following status codes in a C-FIND Response:

Table 45: Query/Retrieve Server AE Returned C-FIND-RSP Status Codes

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Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The Query/Retrieve Server AE has successfully finished sending all matches in previous C-FIND-RSPs. Success indication message is output to the Service Logs. No indication is posted to the User Interface.
Failed	Data Set does not match SOP Class	A900	The Query/Retrieve Server AE has determined that the C-FIND-RQ query identifier is missing mandatory Elements for the specified SOP Class and Query Level. This will only occur if the missing Elements or values prevent the Query/Retrieve Server AE from successfully querying the McKesson Radiology™ 12.3 database. An error indication is output to the Service Logs. No indication is posted to the User Interface.
Failed	Unable to Process	C001	The Query/Retrieve Server AE cannot process the C-FIND-RQ because it cannot query the McKesson Radiology™ 12.3 database for some reason. An error indication is output to the Service Logs. No indication is posted to the User Interface.
Cancel	Sub-operations terminated due to Cancel Indication	FE00	Indicates that the Query/Retrieve Server AE received a Cancel Request from the remote AE. Note that this can only occur if the Query/Retrieve Server AE is configured to actually check for and handle Cancel Requests. A warning indication is output to the Service Logs. No indication is posted to the User Interface.
Pending	Matches are continuing – Current Match is supplied	FF00	The Query/Retrieve Server AE is successfully sending a match in the C-FIND-RSP, and will continue to send further C-FIND-RSPs. Note that the Query/Retrieve Server AE does not check the C-FIND-RQ query identifier to see if there are Optional Elements that it does not support, so it never returns FF01 (Pending) - Matches are continuing but one or more Optional Keys were not supported. Success indication message is output to the Service Logs. No indication is posted to the User Interface.

3.2.3.5.1.3.3   SOP Specific Conformance – Retrieve (C-MOVE)

The Query/Retrieve Server AE will try to establish an Association with a DICOM Application Entity named by the external C-MOVE SCU (through a C-MOVE Destination AE Title) to perform C-STORE operations on requested images. One or more of the Image Storage Presentation Contexts listed in Table 9 will be negotiated.

By default, the Query/Retrieve Server AE is configured to not check for Cancel Requests sent by a remote AE. This is done to improve performance as it does not have to spend time periodically checking if a remote AE has sent a Cancel Request over the Association. However, if it is known that a remote AE can send Cancel Requests, then the Query/Retrieve Server AE can be configured to handle them properly.

If the Query/Retrieve Server AE cannot handle the received C-MOVE Request, then a C-MOVE Response will be returned with the appropriate error Status Code. If the Request can be handled, then the Query/Retrieve Server AE will return a C-MOVE Response to the C-MOVE SCU after each C-STORE Response from the SCP has been received. The C-MOVE Response reports the number of remaining SOP Instances to transfer, as well as the number of SOP Instances transferred having a successful, failed, or warning status. The Association will be properly released after the Query/Retrieve Server AE

has attempted to transfer all requested SOP Instances. The Query/Retrieve Server AE will continue to attempt to transfer any remaining SOP Instances even if a failure Status Code is returned in a particular C-STORE response, or the Association with the C-MOVE SCU has been lost.

MIMA specifies different behavior responding to Query SCU that can handle Issuer of Patient ID and Issuer of Accession Number attributes versus Query SCU that cannot handle those attributes where a default value for the unsupported attribute should be configurable for the Query SCU on the Query SCP.

The Query/Retrieve Server AE supporting the Multiple Identity Resolution option of the IHE MIMA Profile will meet the following requirements when handling received C-MOVE Requests:

1. If there is a preconfigured default Patient ID Assigning Authority for the C-MOVE Destination Application Entity then the Query/Retrieve Server AE will specify a Patient ID value from this Assigning Authority in the SOP Instances sent to the C-MOVE Destination Application Entity. If there is no Patient ID value defined for this preconfigured default Assigning Authority then the Patient ID value will be left blank.

2. If there is no preconfigured default Patient ID Assigning Authority for the C-MOVE Destination Application Entity then the Query/Retrieve Server AE can specify a Patient ID value from any Assigning Authority in the SOP Instances. It will assume that the C-MOVE Destination Application Entity is capable of handling the corresponding Patient ID Assigning Authority information conveyed in the SOP Instances.

3. If there is a preconfigured default Accession Number Assigning Authority for the C-MOVE Destination Application Entity then the Query/Retrieve Server AE will only specify an Accession Number value from this Assigning Authority in the SOP Instances sent to the C-MOVE Destination Application Entity. If there is no Accession Number value defined for this preconfigured default Assigning Authority then the Accession Number value will be left blank.

4. If there is no preconfigured default Accession Number Assigning Authority for the C-MOVE Destination Application Entity then the Query/Retrieve Server AE can specify an Accession Number value from any Assigning Authority in the SOP Instances. It will assume that the C-MOVE Destination Application Entity is capable of handling the corresponding Accession Number Assigning Authority information conveyed in the SOP Instances.

For a summary of the MIMA identifiers convey in the SOP Instances for export see Table 192

The Query/Retrieve Server AE supports the following Elements depending on the Information Model used for the C-MOVE Request:

Table 46: Patient Root C-MOVE SCP Supported Elements

Description/Module	Tag ID	VR	Types of Matching
Patient Level			
Patient ID	(0010,0020)	LO	UNIQUE
Study Level			
Study Instance UID	(0020,000D)	UI	UNIQUE, L
Series Level			
Series Instance UID	(0020,000E)	UI	UNIQUE
Image Level			
SOP Instance UID	(0008,0018)	UI	UNIQUE

Table 47: Study Root C-MOVE SCP Supported Elements

Description/Module	Tag ID	VR	Types of Matching
Study Level			
Study Instance UID	(0020,000D)	UI	UNIQUE,L
Series Level			
Series Instance UID	(0020,000E)	UI	UNIQUE
Image Level			
SOP Instance UID	(0008,0018)	UI	UNIQUE

Table 48: Patient/Study Only C-MOVE SCP Supported Elements

Description/Module	Tag ID	VR	Types of Matching
Patient Level			
Patient ID	(0010,0020)	LO	UNIQUE
Study Level			
Study Instance UID	(0020,000D)	UI	UNIQUE, L

The types of Matching requested by the Query/Retrieve Server AE Retrieve (C-MOVE) SCP:

L   - indicates that UID lists can be sent.

UNIQUE   - indicates that a single Unique Key value can be sent.

Query/Retrieve Server AE returns one of the following status codes in a Query/Retrieve C-MOVE Response:

Table 49: Query/Retrieve Server AE Returned C-MOVE-RSP Status Codes

Service Status	Further Meaning	Error Code	Behavior
Success	Sub-operations complete – No failures	0000	The Query/Retrieve Server AE has successfully finished sending all SOP Instances to the C-MOVE Destination AE and will no longer be sending any additional C-MOVE-RSPs. Success indication message is output to the Service Log. No indication is posted to the User Interface.
Warning	Sub-operations complete – One or more failures	B000	The Query/Retrieve Server AE has finished trying to send all SOP Instances to the C-MOVE Destination AE and will no longer be sending any additional C-MOVE-RSPs. However, one or more of the SOP Instances were not successfully sent to the C-MOVE Destination AE. The C-MOVE Response fields indicate the number of SOP Instances transferred having a successful, failed, or warning status. A warning indication is output to the Service Log. No indication is posted to the User Interface.
Refused	Move destination unknown	A801	The Destination Application Entity named in the C-MOVE Request is unknown to Query-Retrieve Server AE. Error message is output to the Service Log. No indication is posted to the User Interface.

Service Status	Further Meaning	Error Code	Behavior
Failed	Identifier does not match SOP Class	A900	The Query/Retrieve Server AE has determined that the C-MOVE-RQ query identifier is missing mandatory Elements for the specified C-MOVE SOP Class and Query Level. This will only occur if the missing Elements or values prevent the Query/Retrieve Server AE from successfully querying the McKesson Radiology™ 12.3 database for matching SOP Instances. An error indication is output to the Service Log. No indication is posted to the User Interface.
Failed	Unable to Process	C000	The Query/Retrieve Server AE cannot process the C-MOVE-RQ because it could not parse the C-MOVE Request identifier or cannot query the McKesson Radiology™ 12.3 database for some reason. An error indication is output to the Service Log.
Cancel	Matching terminated due to Cancel Indication	FE00	Indicates that the Query/Retrieve Server AE received a Cancel Request from the remote AE. Note that this can only occur if the Query/Retrieve Server AE is configured to actually check for and handle Cancel Requests. A warning indication is output to the Service Log. No indication is posted to the User Interface.
Pending	Matches are continuing – Current Match is supplied	FF00	The Query/Retrieve Server AE has attempted to send a SOP Instance to the C-MOVE Destination AE and further C-MOVE Responses will be sent. The C-MOVE Response fields indicates the number of remaining SOP Instances to transfer, as well as the number of SOP Instances transferred having a successful, failed, or warning status. If full tracing is enabled, then the contents of the C-MOVE Response are output to the Service Log. No indication is posted to the User Interface.

3.2.3.5.1.3.4   SOP Specific Conformance – Modality Worklist

Matching on Optional Matching Keys is not supported. Type 3 Return Keys are not supported.

By default, the Query/Retrieve Server AE is configured to not check for Cancel Requests sent by a remote AE. This is done to improve performance, as it does not have to spend time periodically checking if a remote AE has sent a Cancel Request over the Association. However, if it is known that a remote AE can send Cancel Requests, then the Query/Retrieve Server AE can be configured to handle them properly.

The following table lists the Attributes that it can return in a Modality Worklist C-FIND Response. It also specifies the types of matching supported for an Attribute's value, as well as whether a default or actual value is returned for an Attribute. The default values are used only if the scheduling information is entered through the McKesson Radiology™ 12.3 user interface or the Modality Worklist SCP that McKesson Radiology™ 12.3 queried for this scheduling data does not return valid values.

Table 50: Significant Worklist Attributes

Module Name Attribute Name	Tag ID	VR	Types of Matching	Returned Value	Default Value
Scheduled Procedure Step					
Scheduled Procedure Step Sequence	(0040,0100)	SQ	U	V	

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> Scheduled Station AE Title	(0040,0001)	AE	NONE	D	"UNKNOWN"
> Scheduled Procedure Step Start Date	(0040,0002)	DA	R,S,*,U	V	
> Scheduled Procedure Step Start Time	(0040,0003)	TM	NONE	D	6:00 AM
> Scheduled Procedure Step End Date	(0040,0004)	DA	R,S,*,U	V	
> Modality	(0008,0060)	CS	S,*,U NONE	D	""
> Scheduled Performing Physician's Name	(0040,0006)	PN	NONE	D	""
> Scheduled Procedure Step Description	(0040,0007)	LO	NONE	D	"UNASSIGNED"
> Scheduled Station Name	(0040,0010)	SH	NONE	D	""
> Scheduled Procedure Step Location	(0040,0011)	SH	NONE	D	""
> Scheduled Procedure Step ID	(0040,0009)	SH	NONE	V	
Requested Procedure					
Requested Procedure Code Sequence (See Note 1)	(0032,1064)	SQ	U	V	
>Code Value	(0008,0100)	SH	NONE	V	
>Coding Scheme Designator	(0008,0102)	SH	NONE	D	"UNKNOWN"
>Coding Scheme Version	(0008,0103)	SH	NONE	D	"1.0"
>Code Meaning	(0008,0104)	LO	NONE	V	
Requested Procedure ID	(0040,1001)	SH	NONE	V	
Requested Procedure Description	(0032,1060)	LO	NONE	D	"UNASSIGNED"
Study Instance UID	(0020,000D)	UI	NONE	V	
Requested Procedure Priority	(0040,1003)	SH	NONE	D	""
Patient Transport Arrangements	(0040,1004)	LO	NONE	D	""
Reference Study Sequence	(0008,1110)	SQ	NONE	D	Empty Sequence
Imaging Service Request					
Accession Number	(0008,0050)	SH	S,U	V	
Referring Physician's Name	(0008,0090)	PN	NONE	D	""
Visit Identification					
Visit Admission ID	(0038,0010)	LO	NONE	D	""
Visit Status					
Current Patient Location	(0038,0300)	LO	NONE	D	""
Patient Identification					
Patient Name	(0010,0010)	PN	S,*,U	V	
Patient ID	(0010,0020)	LO	S,U	V	
Issuer of Patient ID	(0010,0021)	LO	NONE	V	
Other patient IDs Sequence	(0010,1002)	SQ	NONE	V	
> Patient ID	(0010,0020)	LO	NONE	V	

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>Issuer of Patient ID	(0010,0021)	LO	NONE	V	
>Type of Patient ID	(0010,0022)	CS	NONE	V	"TEXT"
Patient Demographic					
Patient Birth Date	(0010,0030)	DA	S,*,U	V	
Patient Gender	(0010,0040)	CS	NONE	V	
Patient Weight	(0010,1030)	DS	NONE	D	""
Patient Confidentiality	(0040,3001)	LO	NONE	D	""
Referenced Patient Sequence	(0008,1120)	SQ	NONE	D	Empty Sequence
Patient Medical					
Patient State	(0038,0500)	LO	NONE	D	""
Pregnancy Status	(0010,21C0)	US	NONE	D	""
Patient Medical Alerts	(0010,2000)	LO	NONE	D	""
Patient Contrast Allergies	(0010,2110)	LO	NONE	D	""
Patient Special Needs	(0038,0050)	LO	NONE	D	""

NOTE1:   The Modality Worklist query only returns the Requested Procedure Code Sequence (0032,1064) if the McKesson Radiology™ 12.3 is configured for IHE Compliant queries.

The Types of Matching supported by the Query/Retrieve Server AE Modality Worklist SCP:

S   - indicates Single Value Matching is supported.

R   - indicates Range Matching is supported.

*   - indicates Wildcard Matching is supported.

U   - indicates Universal Matching is supported.

NONE   - indicates that no matching is supported, but that values for this Element are returned if requested (i.e. universal matching).

The Returned Value supported by the Query/Retrieve Server AE Modality Worklist SCP:

V   - indicates a valid value is returned.

D   - indicates a default hard-coded value is returned. The default values are used only if the Modality Worklist SCP that McKesson Radiology™ 12.3 queried for this scheduling data does not return valid values.

The Query/Retrieve Server AE returns one of the following status codes in a Modality Worklist C-FIND Response:

Table 51: Query/Retrieve Server AE Returned C-FIND-RSP Status Codes

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The Query/Retrieve Server AE has successfully finished sending all Modality Worklist matches in previous C-FIND-RSPs. Success indication message is output to the Service Logs. No indication is posted to the User Interface.

Service Status	Further Meaning	Error Code	Behavior
Failed	Data Set does not match SOP Class	A900	The Query/Retrieve Server AE has determined that the C-FIND-RQ query identifier is missing mandatory Elements for the Modality Worklist SOP Class. This will only occur if the missing Elements or values prevent the Query/Retrieve Server AE from successfully querying the McKesson Radiology™ 12.3 database. An error indication is output to the Service Logs. No indication is posted to the User Interface.
Failed	Unable to Process	C001	The Query/Retrieve Server AE cannot process the Modality Worklist C-FIND-RQ because it cannot query the McKesson Radiology™ 12.3 database for some reason. An error indication is output to the Service Logs. No indication is posted to the User Interface.
Cancel	Sub-operations terminated due to Cancel Indication	FE00	Indicates that the Query/Retrieve Server AE received a Cancel Request from the remote AE. Note that this can only occur if the Query/Retrieve Server AE is configured to actually check for and handle Cancel Requests. A warning indication is output to the Service Logs. No indication is posted to the User Interface.
Pending	Matches are continuing – Current Match is supplied	FF00	The Query/Retrieve Server AE is successfully sending a match in the C-FIND-RSP, and will continue to send further C-FIND-RSPs. Note that the Query/Retrieve Server AE does not check the C-FIND-RQ query identifier to see if there are Optional Elements that it does not support, so it never returns FF01 (Pending) - Matches are continuing but one or more Optional Keys were not supported. Success indication message is output to the Service Logs. No indication is posted to the User Interface.

3.2.3.5.1.3.5   Association Acceptor Communication Failure Behavior

The Behavior of the Query/Retrieve Server AE during communication failure when it is acting as an Association Acceptor is summarized in the following table:

Table 52: Query/Retrieve Server AE Communication Failure Behavior

Exception	Behavior
Timeout expiry for an expected DICOM Message Request (DIMSE level timeout). The default timeout for waiting on an open Association to receive the next DICOM Message is 60 minutes.	The Association is aborted using a DICOM A-P-ABORT. This is treated as a failure. An error indication is output to the Service Logs. No indication is posted to the User Interface. If Query/Retrieve Server AE is in the process of sending images to a C-MOVE Destination AE, then it will continue to do so even if the Association with the C-MOVE SCU has been lost.
Timeout expiry for an expected DICOM PDU or TCP/IP packet (Low-level timeout). The default timeout when trying to read from or write to an open socket is 3 minutes.	The Association is aborted using a DICOM A-P-ABORT. This is treated as a failure. An error indication is output to the Service Logs. No indication is posted to the User Interface. If Query/Retrieve Server AE is in the process of sending images to a C-MOVE Destination AE, then it will continue to do so even if the Association with the C-MOVE SCU has been lost.

Exception	Behavior
Association A-ABORTed by the SCU or the network layers indicate communication loss (i.e. low-level TCP/IP socket closure)	This is treated as a failure. An error indication is output to the Service Logs. No indication is posted to the User Interface. If Query/Retrieve Server AE is in the process of sending images to a C-MOVE Destination AE, then it will continue to do so even if the Association with the C-MOVE SCU has been lost.

3.2.3.5.1.3.6   Presentation Context Acceptance Criteria

The Query/Retrieve Server AE will only accept the Presentation Contexts specified in Table 41: Query/Retrieve Server AE Accepted Presentation Contexts.

The Query/Retrieve Server AE can be configured to reject valid Presentation Contexts if the external DICOM host is not listed in a local configuration file. In addition, a valid Presentation Context can be rejected if the maximum limit on the number of simultaneous processes has been reached.

The Query/Retrieve Server AE does not check for, and will accept, duplicate Presentation Contexts.

3.2.3.5.1.3.7   Transfer Syntax Selection Policies

The Query/Retrieve Server AE supports only the Implicit VR Little Endian and Explicit VR Little Endian Transfer Syntaxes when acting in the Role of an SCP. If both of these are proposed in a single Presentation Context and the SOP Class is supported, then the default behavior is to accept the Implicit VR Little Endian Transfer Syntax.

3.2.4   Query/Retrieve Client AE Specification

3.2.4.1   SOP Classes

The Query/Retrieve Client AE provides Standard Conformance to the following DICOM V3.0 SOP Classes:

Table 53: SOP Class Conformance of Query/Retrieve Client AE

DICOM SOP Class Name	SOP Class UID	SCU	SCP
Query/Retrieve			
Patient Root Q/R Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1	Yes	No
Patient Root Q/R Information Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2	Yes	No
Study Root Q/R Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1	Yes	No
Study Root Q/R Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2	Yes	No
Patient Study Only Information Model - FIND	1.2.840.10008.5.1.4.1.2.3.1	Yes	No
Patient Study Only Information Model - MOVE	1.2.840.10008.5.1.4.1.2.3.2	Yes	No

The Query/Retrieve Client AE implements the C-FIND Query and C-MOVE Retrieval SOP Classes as an SCU. It can act as a SCU to query for patient, study and series demographic information as well as retrieve all SOP Instances in a study or series. It can act in direct response to input from the user interface, or when triggered to do so by the McKesson Radiology™ 12.3 system.

The Query/Retrieve Client AE has one task running on a McKesson Radiology™ 12.3 system. It acts as an Association Requestor, requesting a new Association when the user of the system requests that a query or retrieval request be sent to a remote AE.

3.2.4.2 Association Establishment Policies

3.2.4.2.1   General

The Query/Retrieve Client AE will initiate a new Association when the user requests that a remote AE be queried for certain patient, study, or series information. It will also initiate a new Association when it is triggered to retrieve all SOP Instances in a study or series from a remote AE.

The DICOM Standard Application Context Name is always proposed:

Table 54: DICOM Application Context for Query/Retrieve Client AE

Application Context Name	1.2.840.10008.3.1.1.1

3.2.4.2.2   Number of Associations

The Query/Retrieve Client AE will only open one Association at a time with a remote AE.

Table 55: Number of Simultaneous Associations for Query/Retrieve Client AE

Maximum number of simultaneous Associations	1

3.2.4.2.3   Asynchronous Nature

Negotiation of multiple outstanding transactions is not supported.

Table 56: Asynchronous Nature for Query/Retrieve Client AE

Maximum number of outstanding asynchronous transactions	1 (Not Configurable)

3.2.4.2.4   Implementation Identifying Information

Table 57: DICOM Implementation Class and Version for Query/Retrieve Client AE

Implementation Class UID	1.2.840.113711.10
Implementation Version Name	V1.0

3.2.4.3 Association Initiation Policy

3.2.4.3.1   Activity – Users Send Query Request to Remote AE

3.2.4.3.1.1   Description and Sequencing of Activity

If the user of a McKesson Radiology™ 12.3 system uses the user interface to specify that a query or retrieval request be sent to a remote AE, then a single attempt will be made. If the query or retrieval request fails, for whatever reason, then no retry will be performed.

In order for the user interface to be used to request the retrieval of SOP Instances from a remote AE, the user must first query the remote AE to get the key values (Patient ID, Study UID, etc.) for the SOP

Instances to be retrieved. Once the key values have been identified, then the user interface can be used to request the retrieval.

In addition to the user directly requesting the retrieval of SOP Instances, the McKesson Radiology™ 12.3 system can do this automatically. This will occur if the user wants to access a certain study and the McKesson Radiology™ 12.3 system knows that the SOP Instances for the study have to first be retrieved from a remote AE before they can be accessed. This can occur if the McKesson Radiology™ 12.3 system is configured to use a remote AE as the archive, and the SOP Instances have been flushed from the McKesson Radiology™ 12.3 system after they were sent to the remote AE.

Before the Query/Retrieve Client AE sends a C-MOVE-RQ to retrieve items, it will first verify that the remote AE really has the SOP Instances to be retrieved. This will occur regardless of whether the retrieval is being triggered directly by the user or automatically by McKesson Radiology™ 12.3 system. In some cases this can result in a duplicate C-FIND query being sent to the remote AE, first in response to a query initiated through the user interface, and then a second query to verify that the SOP Instances can really be retrieved.

Figure 7: Sequencing of Activity – Sending Query and Retrieval Requests
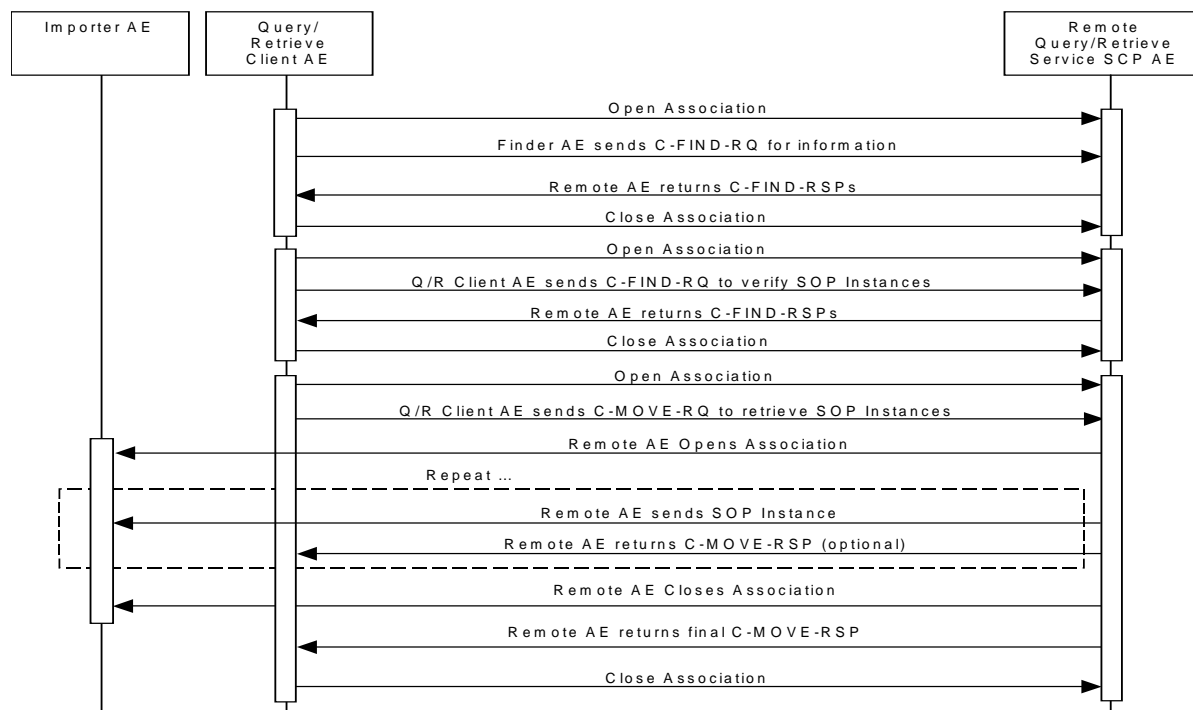
3.2.4.3.1.2   *Proposed Presentation Contexts*

The Query/Retrieve Client AE may propose any one or more of the following Presentation Contexts:

Table 58: Query/Retrieve Client AE Proposed Presentation Contexts

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	**UID**	**Name**	**UID**		
Patient Root Q/R Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Patient Root Q/R Information Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Study Root Q/R Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Study Root Q/R Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Patient Study Only Information Model - FIND	1.2.840.10008.5.1.4.1.2.3.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Patient Study Only Information Model - MOVE	1.2.840.10008.5.1.4.1.2.3.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

3.2.4.3.1.3   SOP Specific Conformance as an Association Requestor

3.2.4.3.1.3.1   SOP Specific Conformance – Query (C-FIND)

The Query/Retrieve Client AE provides standard conformance to the supported C-FIND SOP Classes. The Query/Retrieve Client AE does not support Relational Queries.

All three query information models — Patient Root, Study Root, and Patient/Study Only Root — is supported. If more than one information model is negotiated on an Association, and it is possible to use more than one of the negotiated information models to form a query, the following information model will be used (in order of preference):

1. Study Root Information Model

2. Patient Root Information Model

3. Patient/Study Only Information Model

All queries are initiated at the highest level of the information model (the PATIENT or STUDY level depending on the SOP Class used), and then for each response received, recursively repeated at the next lower levels (the STUDY, and then SERIES, and then IMAGE levels, if using the Patient Root query information model), in order to completely elucidate the "tree" of instances available on the remote AE (from which the user may subsequently request a retrieval at any level).

The Query/Retrieve Client AE has a default setting for the maximum number of matching responses it can receive from a remote AE. If the remote AE is going to exceed this number, then the Query/Retrieve Client AE will issue a Cancel Request to the remote AE to stop it from returning further matches. By default, this maximum number is 500.

Unexpected attributes returned in a C-FIND Response (those not requested) are ignored. Requested optional return attributes that are not returned by the SCP are also ignored. Non-matching responses returned by the SCP due to unsupported (hopefully optional) matching keys are not filtered locally by the Query/Retrieve Client AE and thus will still be presented in the browser. The Query/Retrieve Client AE attempts to filter out duplicate responses, but only for responses have duplicate key values. For example,

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if the Query/Retrieve Client AE issues a Study Root Study Level query, and multiple matching responses have the same Patient ID and Study UID, then the Query/Retrieve Client AE will filter these so that they are presented as a single matching response.

The Query/Retrieve Client AE can be triggered to issue a query either by user input through the user interface or by the McKesson Radiology™ 12.3 itself. The responses to a C-FIND query are presented in the user interface only in the case where the user initiated the query.

The Query/Retrieve Client AE can include the following Elements in a C-FIND Request depending on the Query Root model and the Query level:

Table 59: Patient Root C-FIND SCU Requested Elements

Description/Module	Tag ID	VR	Types of Matching
Patient Level			
Patient's Name	(0010,0010)	PN	S,*,U
Patient ID	(0010,0020)	LO	UNIQUE
Issuer of Patient ID (See NOTE1)	(0010,0021)	LO	S,U (MIMA), NONE otherwise.
Patient's Birth Date	(0010,0030)	DA	S,U
Patient's Sex	(0010,0040)	CS	S,U
Study Level			
Study Date	(0008,0020)	DA	S,R,U
Study Time	(0008,0030)	TM	R,U
Accession Number	(0008,0050)	SH	S,*,U
Issuer of Accession Number Sequence (See NOTE2)	(0008,0051)	SQ	SQ
>Local Namespace Entity ID	(0040,0031)	UT	S,U (MIMA), NONE otherwise
>Universal Entity ID	(0040,0032)	UT	S,U (MIMA), NONE otherwise
>Universal Entity ID Type	(0040,0033)	CS	S,U (MIMA), NONE otherwise
Study ID	(0020,0010)	SH	S,*,U
Study Instance UID	(0020,000D)	UI	UNIQUE,L
Referring Physician's Name	(0008,0090)	PN	S,*,U
Study Description	(0008,1030)	LO	S,*,U
Modalities in Study	(0008,0061)	CS	S,*,U
Series Level			
Modality	(0008,0060)	CS	S,U
Series Number	(0020,0011)	IS	S,*,U
Series Instance UID	(0020,000E)	UI	UNIQUE
Request Attribute Sequence	(0040,0275)	SQ	S,*,U

> Requested Procedure ID	(0040,1001)	SH	S,*,U
> Scheduled Procedure Step ID	(0040,0009)	SH	S,*,U
Performed Procedure Step Start Date	(0040,0244)	DA	S,R,U
Performed Procedure Step Start Time	(0040,0245)	TM	R,U
Image Level			
Instance Number	(0020,0013)	IS	S,*,U
SOP Instance UID	(0008,0018)	UI	UNIQUE

Table 60: Study Root C-FIND SCU Requested Elements

Description/Module	Tag ID	VR	Types of Matching
Study Level			
Patient's Name	(0010,0010)	PN	S,*,U
Patient ID	(0010,0020)	LO	S,U
Issuer of Patient ID (See NOTE1)	(0010,0021)	LO	S,U (MIMA), NONE otherwise.
Patient's Birth Date	(0010,0030)	DA	S,U
Patient's Sex	(0010,0040)	CS	S,U
Study Date	(0008,0020)	DA	S,R,U
Study Time	(0008,0030)	TM	R,U
Accession Number	(0008,0050)	SH	S,*,U
Issuer of Accession Number Sequence (See NOTE2)	(0008,0051)	SQ	SQ
>Local Namespace Entity ID	(0040,0031)	UT	S,U (MIMA), NONE otherwise
>Universal Entity ID	(0040,0032)	UT	S,U (MIMA), NONE otherwise
>Universal Entity ID Type	(0040,0033)	CS	S,U (MIMA), NONE otherwise
Study ID	(0020,0010)	SH	S,*,U
Study Instance UID	(0020,000D)	UI	UNIQUE,L
Referring Physician's Name	(0008,0090)	PN	S,*,U
Study Description	(0008,1030)	LO	S,*,U
Modalities in Study	(0008,0061)	CS	S,*,U
Series Level			
Modality	(0008,0060)	CS	S,U
Series Number	(0020,0011)	IS	S,*,U
Series Instance UID	(0020,000E)	UI	UNIQUE
Request Attribute Sequence	(0040,0275)	SQ	S,*,U
> Requested Procedure ID	(0040,1001)	SH	S,*,U

> Scheduled Procedure Step ID	(0040,0009)	SH	S,*,U
Performed Procedure Step Start Date	(0040,0244)	DA	S,R,U
Performed Procedure Step Start Time	(0040,0245)	TM	R,U
Image Level			
Instance Number	(0020,0013)	IS	S,*,U
SOP Instance UID	(0008,0018)	UI	UNIQUE

Table 61: Patient/Study Only C-FIND SCU Requested Elements

Description/Module	Tag ID	VR	Types of Matching
Patient Level			
Patient's Name	(0010,0010)	PN	S,*,U
Patient ID	(0010,0020)	LO	UNIQUE
Issuer of Patient ID (See NOTE1)	(0010,0021)	LO	S,U (MIMA), NONE otherwise.
Patient's Birth Date	(0010,0030)	DA	S,U
Patient's Sex	(0010,0040)	CS	S,U
Study Level			
Study Date	(0008,0020)	DA	S,R,U
Study Time	(0008,0030)	TM	R,U
Accession Number	(0008,0050)	SH	S,*,U
Issuer of Accession Number Sequence (See NOTE2)	(0008,0051)	SQ	SQ
>Local Namespace Entity ID	(0040,0031)	UT	S,U (MIMA), NONE otherwise
>Universal Entity ID	(0040,0032)	UT	S,U (MIMA), NONE otherwise
>Universal Entity ID Type	(0040,0033)	CS	S,U (MIMA), NONE otherwise
Study ID	(0020,0010)	SH	S,*,U
Study Instance UID	(0020,000D)	UI	UNIQUE,L
Referring Physician's Name	(0008,0090)	PN	S,*,U
Study Description	(0008,1030)	LO	S,*,U
Modalities in Study	(0008,0061)	CS	S,*,U

The types of Matching requested by the Query/Retrieve Client AE Query (C-FIND) SCU:

S   - indicates the identifier attribute can specify Single Value Matching.

R   - indicates Range Matching.

*   - indicates Wildcard Matching.

U   - indicates Universal Matching.

L   - indicates that UID lists can be sent.

NONE   - indicates that no matching can be requested, but that values for this Element are requested to be returned (i.e. universal matching).

UNIQUE - indicates that this is the Unique Key for that query level, in which case Universal Matching or Single Value Matching can be requested depending on the query level.

McKesson Radiology™ 12.3 supports the Multiple Identity Resolution option of the IHE MIMA Profile. As such it can include the Patient ID and Accession Number Assigning Authorities as Matching Keys for DICOM Prefetch Queries. The inclusion of Patient ID and Accession Number Assigning Authorities as Matching Keys for general C-FIND queries is not supported.

NOTE1: Patient ID Assigning Authority in Queries

McKesson Radiology™ 12.3 acting as a Query SCU for DICOM Prefetch can include a value for the Issuer of Patient ID (0010,0021) as a Matching Key in order to unambiguously identify the assigning authority for an included Patient ID value, or indicate which Patient ID assigning authority shall be used in responses if no Patient ID value is included.

NOTE2: Accession Number Assigning Authority in Queries

McKesson Radiology™ 12.3 acting as a Query SCU for DICOM Prefetch can include values for the Issuer of Accession Number Sequence (0008,0051) as Matching Keys in order to unambiguously identify the assigning authority for an included Accession Number value, or indicate which Accession Number assigning authority shall be used in responses if no Accession Number value is included.

The Query/Retrieve Client AE will exhibit the following behavior according to the Status Code value returned in a C-FIND Response from the Remote AE acting as the SCP:

Table 62: Query/Retrieve Client AE C-FIND-RSP Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The remote AE has successfully finished sending all matches in previous C-FIND-RSPs. Success indication message is output to the Service Log. If a user directly initiated the query using the user interface, then resulting matching information is output to the user interface. If the McKesson Radiology™ 12.3 initiated the query, then matching information is not output to the user interface.
Failed	Identifier does not match SOP Class	A900	This is treated as a failure. The Query/Retrieve Client AE does not attempt to resend the C-FIND-RQ. The Association is closed. An error indication is output to the Service Log. An error indication is posted to the User Interface only if the query was initiated through the user interface. Any previously returned matching information is discarded and not output to the user interface.

Service Status	Further Meaning	Error Code	Behavior
Failed	Unable to Process	C001	This is treated as a failure. The Query/Retrieve Client AE does not attempt to resend the C-FIND-RQ. The Association is closed. An error indication is output to the Service Log. An error indication is posted to the User Interface only if the query was initiated through the user interface. Any previously returned matching information is discarded and not output to the user interface.
Cancel	Sub-operations terminated due to Cancel Indication	FE00	Indicates that the remote AE received a Cancel Request sent by the Query/Retrieve Client AE and will no longer return further matches. A warning indication is output to the Service Logs but not to the user interface. If a user directly initiated the query using the user interface, then resulting matching information is output to the user interface. If McKesson Radiology™ 12.3 initiated the query, then matching information is not output to the user interface.
Pending	Matches are continuing – However one or more Optional Keys were not supported.	FF01	Query/Retrieve Client AE continues to wait for further C-FIND-RSPs. The remote AE has successfully returned a match in the C-FIND-RSP, and will continue to send further C-FIND-RSPs. However, the remote AE does not support one or more Optional Keys in the query identifier of the C-FIND-RQ. Warning indication message is output to the Service Logs. No indication is posted to the User Interface. Matching information will not be accessed until final C-FIND-RSP is returned.
Pending	Matches are continuing – Current Match is supplied	FF00	Query/Retrieve Client AE continues to wait for further C-FIND-RSPs. The remote AE has successfully returned a match in the C-FIND-RSP, and will continue to send further C-FIND-RSPs. Success indication message is output to the Service Logs. No indication is posted to the User Interface. Matching information will not be accessed until final C-FIND-RSP is returned.
*	*	Any other status code	This is treated as a failure. The Query/Retrieve Client AE does not attempt to resend the C-FIND-RQ. The Association is closed. An error indication is output to the Service Logs. An error indication is posted to the User Interface only if the query was initiated through the user interface. Any previously returned matching information is discarded and not output to the user interface.

3.2.4.3.1.3.2   SOP Specific Conformance - Retrieval (C-MOVE)

The Query/Retrieve Client AE provides standard conformance to the supported C-MOVE SOP Classes. All three information models — Patient Root, Study Root, and Patient/Study Only Root — are supported.

Retrieval will be performed at the STUDY, SERIES or IMAGE level depending on what level of entity has been selected by the user in the user interface browser, or by the McKesson Radiology™ 12.3 to retrieve SOP Instances that have been archived to a remote AE.

The Query/Retrieve Client AE never issues Cancel Requests while retrieving SOP Instances.

The C-MOVE Request is sent to the AE that was specified in the Retrieve AE attribute returned in the related C-FIND-RSP by the remote AE. The instances are retrieved to the McKesson Radiology™ 12.3 database by specifying the C-MOVE Destination AE as the AE Title of the Importer AE. This implies that the remote C-MOVE SCP must be pre-configured to determine the presentation address corresponding to the Importer AE. The Importer AE will have to be configured to either allow any host to send to it, or to allow the host of the Storage Service SCU that the C-MOVE SCP will use.

The Query/Retrieve Client AE completely ignores whatever activities are taking place in relation to the Importer AE that is receiving the retrieved SOP Instances. There is no attempt by the Query/Retrieve Client AE to confirm that SOP Instances have actually been successfully received or stored.

Whether or not completely or partially successfully retrievals are made available on the McKesson Radiology™ 12.3 to the user is purely dependent on the success or failure of the C-STORE sub-operations, not on any explicit action by the Query/Retrieve Client AE. Whether or not the remote AE attempts to retry any failed C-STORE sub-operations is beyond the control of the Query/Retrieve Client AE.

If the Association on which the C-MOVE-RQ was issued is aborted for any reason, whether or not the C-STORE sub-operations continue is dependent on the remote AE; the Importer AE will continue to accept Associations and Storage operations regardless.

Table 63: Patient Root C-MOVE SCU Requested Elements

Description/Module	Tag ID	VR	Types of Matching
Patient Level			
Patient ID	(0010,0020)	LO	UNIQUE
Study Level			
Study Instance UID	(0020,000D)	UI	UNIQUE
Series Level			
Series Instance UID	(0020,000E)	UI	UNIQUE
Image Level			
SOP Instance UID	(0008,0018)	UI	UNIQUE

Table 64: Study Root C-MOVE SCU Requested Elements

Description/Module	Tag ID	VR	Types of Matching
Study Level			
Study Instance UID	(0020,000D)	UI	UNIQUE
Series Level			
Series Instance UID	(0020,000E)	UI	UNIQUE
Image Level			
SOP Instance UID	(0008,0018)	UI	UNIQUE

Table 65: Patient/Study Only C-MOVE SCU Requested Elements

Description/Module	Tag ID	VR	Types of Matching
Patient Level			
Patient ID	(0010,0020)	LO	UNIQUE
Study Level			
Study Instance UID	(0020,000D)	UI	UNIQUE

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The types of Matching requested by the Query/Retrieve Client AE Retrieve (C-MOVE) SCU:

L   - indicates that UID lists can be sent.

UNIQUE   - indicates that a single Unique Key value can be sent.

The Query/Retrieve Client AE will exhibit the following behavior according to the Status Code value returned in a C-MOVE Response from the Remote AE acting as the SCP:

Table 66: Query/Retrieve Client AE C-MOVE-RSP Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Sub-operations complete – No failures	0000	The remote AE has successfully finished sending all SOP Instances to the C-MOVE Destination AE and will no longer be sending any additional C-MOVE-RSPs
			Success indication message is output to the Service Log.
			If a user directly initiated the retrieval using the user interface, then the retrieved SOP Instances will be displayed in the user interface. If the McKesson Radiology™ system initiated the retrieval, then the retrieved SOP Instances are not automatically displayed in the user interface.
Warning	Sub-operations complete – One or more failures	B000	The remote AE has finished trying to send all SOP Instances to the C-MOVE Destination AE and will no longer be sending any additional C-MOVE-RSPs. However, one or more of the SOP Instances were not successfully sent to the C-MOVE Destination AE. The C-MOVE Response fields indicate the number of SOP Instances transferred having a successful, failed, or warning status.
			A warning indication is output to the Service Log.
			If a user directly initiated the retrieval using the user interface, a warning that some SOP Instances were not successfully retrieved is displayed in the user interface. If the McKesson Radiology™ system initiated the retrieval, then the retrieved SOP Instances are not automatically displayed in the user interface.
			Any successfully retrieved SOP Instances will be discarded and will not be displayed in the user interface whether the user or the McKesson Radiology™ 12.3 system initiated the retrieval.
Refused	Move destination unknown	A801	This is treated as a failure. The Query/Retrieve Client AE does not automatically attempt to resend the C-MOVE-RQ. The Association is closed.
			An error indication is output to the Service Log.
			An error indication is posted to the User Interface only if the retrieval was initiated through the user interface. Any successfully retrieved SOP Instances will be discarded and will not be displayed in the user interface if the user initiated the retrieval.
Failed	Identifier does not match SOP Class	A900	This is treated as a failure. The Query/Retrieve Client AE does not automatically attempt to resend the C-MOVE-RQ. The Association is closed.
			An error indication is output to the Service Log.
			An error indication is posted to the User Interface only if the retrieval was initiated through the user interface. Any successfully retrieved SOP Instances will be discarded and will not be displayed in the user interface if the user initiated the retrieval.
Failed	Unable to Process	C000	This is treated as a failure. The Query/Retrieve Client AE does not automatically attempt to resend the C-MOVE-RQ. The Association is closed.
			An error indication is output to the Service Log.
			An error indication is posted to the User Interface only if the retrieval was initiated through the user interface. Any successfully retrieved SOP Instances will be discarded and will not be displayed in the user interface if the user initiated the

Service Status	Further Meaning	Error Code	Behavior
			retrieval.
Cancel	Matching terminated due to Cancel Indication	FE00	This is treated as a failure because the Query/Retrieve Client AE never issues Cancel Requests for C-MOVE Requests. The Query/Retrieve Client AE does not automatically attempt to resend the C-MOVE-RQ. The Association is closed. An error indication is output to the Service Log. An error indication is posted to the User Interface only if the retrieval was initiated through the user interface. Any successfully retrieved SOP Instances will be discarded and will not be displayed in the user interface if the user initiated the retrieval.
Pending	Matches are continuing – Current Match is supplied	FF00	The Query/Retrieve Client AE continues to wait for further C-MOVE-RSPs. If full tracing is enabled, then the contents of the C-MOVE Response are output to the Service Log. No indication is posted to the User Interface.
*	*	Any other status code	This is treated as a failure. The Query/Retrieve Client AE does not attempt to resend the C-MOVE-RQ. The Association is closed. An error indication is output to the Service Logs. An error indication is posted to the User Interface only if the retrieval was initiated through the user interface. Any successfully retrieved SOP Instances will be discarded and will not be displayed in the user interface if the user initiated the retrieval.

3.2.4.3.1.3.3   Association Requestor Communication Failure Behavior

The Behavior of the Query/Retrieve Client AE during communication failure when acting as an Association Requestor is summarized in the following table:

Table 67: Query/Retrieve Client AE Communication Failure Behavior

Exception	Behavior
Timeout expiry for an expected DICOM Message Response (DIMSE level timeout).	The Association is aborted using a DICOM A-ABORT. This is treated as a failure. The Query/Retrieve Client AE does not automatically attempt to resend the C-FIND-RQ or C-MOVE-RQ. An error indication is output to the Service Logs. An error indication is posted to the User Interface only if the query was initiated through the user interface. If this occurs while waiting for a C-FIND-RSP, then any previously returned matching information is discarded and not output to the user interface. If this occurs while waiting for a C-MOVE-RSP, then any previously retrieved SOP Instances are not discarded.
Timeout expiry for an expected DICOM PDU or TCP/IP packet (Low-level timeout).	The Association is aborted using a DICOM A-ABORT. This is treated as a failure. The Query/Retrieve Client AE does not automatically attempt to resend the C-FIND-RQ or C-MOVE-RQ. An error indication is output to the Service Logs. An error indication is posted to the User Interface only if the query was initiated through the user interface. If this occurs while waiting for a C-FIND-RSP, then any previously returned matching information is discarded and not output to the user interface. If this occurs while waiting for a C-MOVE-RSP, then any previously retrieved SOP Instances are not discarded.

Exception	Behavior
Association A-P-ABORTed by the SCP or the network layers indicate communication loss (i.e. low-level TCP/IP socket closure)	This is treated as a failure. The Query/Retrieve Client AE does not automatically attempt to resend the C-FIND-RQ or C-MOVE-RQ. An error indication is output to the Service Logs. An error indication is posted to the User Interface only if the query was initiated through the user interface. If this occurs while waiting for a C-FIND-RSP, then any previously returned matching information is discarded and not output to the user interface. If this occurs while waiting for a C-MOVE-RSP, then any previously retrieved SOP Instances are not discarded.

3.2.4.3.2   Activity – Users Send Retrieve Request to Remote AE for A Study with IOCM KOS

3.2.4.3.2.1   Description and Sequencing of Activity

McKesson Radiology™ 12.3 currently does not process synchronization KOS received as a part of study retrieval.

3.2.4.4   Association Acceptance Policy

The Query/Retrieve Client AE does not accept Associations.

3.2.5   Modality Worklist Client AE Specification

3.2.5.1   SOP Classes

The Modality Worklist Client AE provides Standard Conformance to the following DICOM V3.0 SOP Classes:

Table 68: SOP Class Conformance of Modality Worklist Client AE

DICOM SOP Class Name	SOP Class UID	SCU	SCP
Workflow Management			
Modality Worklist Information Model	1.2.840.10008.5.1.4.31	Yes	No

The Modality Worklist Client AE implements the Modality Worklist SOP Class as an SCU. The Modality Worklist Client AE can query a remote AE for a Modality Worklist.

The Modality Worklist Client AE is a single task running on a McKesson Radiology™ 12.3. It acts as an Association Requestor, opening a new Association when it is triggered to query a remote AE for the latest Modality Worklist. If enabled, it will be triggered periodically by the McKesson Radiology™ 12.3 to query a remote AE for the Modality Worklist.

3.2.5.2   Association Establishment Policies

3.2.5.2.1   General

The Modality Worklist Client AE will initiate a new Association when it is triggered to query a remote AE for the Modality Worklist.

The DICOM Standard Application Context Name is always proposed:

Table 69: DICOM Application Context for Modality Worklist Client AE

| Application Context Name | 1.2.840.10008.3.1.1.1 |

3.2.5.2.2   Number of Associations

The Modality Worklist Client AE will only open one Association at a time with a remote AE to be queried.

Table 70: Number of Simultaneous Associations for Modality Worklist Client AE

| Maximum number of simultaneous Associations | 1 |

3.2.5.2.3   Asynchronous Nature

Negotiation of multiple outstanding transactions is not supported.

Table 71: Asynchronous Nature for Modality Worklist Client AE

| Maximum number of outstanding asynchronous transactions | 1 (Not Configurable) |

3.2.5.2.4   Implementation Identifying Information

Table 72: DICOM Implementation Class and Version for Modality Worklist Client AE

| Implementation Class UID | 1.2.840.113711.12 |
| Implementation Version Name | V1.0 |

3.2.5.3   Association Initiation Policy

3.2.5.3.1   Activity – Update Modality Worklist

3.2.5.3.2   Description and Sequencing of Activity

The request for an updated Modality Worklist is automatically initiated at specific configurable time intervals. By default, a query to update the Modality Worklist is initiated every 15 minutes.

By default, the Modality Worklist Client AE only queries for the Scheduled Procedure Steps on the day the query is sent. However, it can be configured to also query for those Steps scheduled for future days.

Upon initiation of the request, the Modality Worklist Client AE will build an identifier for the C-FIND Request, initiate an Association to send it, and wait for the Modality Worklist C-FIND Responses. After retrieval of all C-FIND Responses, the Modality Worklist Client AE will access the local McKesson Radiology™ 12.3 database to add or update patient demographic and study data.

To protect the system from overflow, the Modality Worklist Client AE will limit the number of processed Modality Worklist C-FIND Responses to a configurable maximum. The default maximum value is 200. Once this amount has been reached, the Modality Worklist Client AE will send a Cancel Request to the remote AE acting as the Modality Worklist SCP. The results of a Modality Worklist query are never displayed directly to a user of the McKesson Radiology™ 12.3 as the information is only used to update the database and/or to provide this same information if the McKesson Radiology™ 12.3 Query Server AE is configured to act as a Modality Worklist SCP.

3.2.5.3.2.1   *Proposed Presentation Contexts*

The Modality Worklist Client AE may propose the following Presentation Context:

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Table 73: Modality Worklist Client AE Proposed Presentation Contexts

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Modality Worklist Information Model	1.2.840.10008.5.1.4.31	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

3.2.5.3.2.2   *SOP Specific Conformance as an Association Requestor*

3.2.5.3.2.2.1   SOP Specific Conformance - Modality Worklist

The following table lists the Attributes that the Modality Worklist Client AE can include in a Modality Worklist C-FIND Request identifier. It also specifies whether a matching value can be specified and the type of matching. Unexpected Attributes returned in a C-FIND Response are ignored.

Table 74: Modality Worklist Client AE Requested Elements

Module Name Attribute Name	Tag ID	VR	Types of Matching
Scheduled Procedure Step			
Scheduled Procedure Step Sequence	(0040,0100)	SQ	NONE
> Scheduled Station AE Title	(0040,0001)	AE	S,*,U
> Scheduled Procedure Step Start Date	(0040,0002)	DA	R,S,*,U
> Scheduled Procedure Step Start Time	(0040,0003)	TM	NONE
> Scheduled Procedure Step End Date	(0040,0004)	DA	NONE
> Modality	(0008,0060)	CS	S,*,U
> Scheduled Performing Physician's Name	(0040,0006)	PN	S,*,U
> Scheduled Procedure Step Description	(0040,0007)	LO	S,*,U
> Scheduled Station Name	(0040,0010)	SH	S,*,U
> Scheduled Procedure Step Location	(0040,0011)	SH	S,*,U
> Scheduled Procedure Step ID	(0040,0009)	SH	NONE
Requested Procedure			
Requested Procedure Code Sequence	(0032,1064)	SQ	NONE
>Code Value	(0008,0100)	SH	NONE
Requested Procedure ID	(0040,1001)	SH	NONE
Requested Procedure Description	(0032,1060)	LO	NONE
Study Instance UID	(0020,000D)	UI	NONE
Requested Procedure Priority	(0040,1003)	SH	NONE
Patient Transport Arrangements	(0040,1004)	LO	NONE
Reference Study Sequence	(0008,1110)	SQ	NONE

Imaging Service Request			
Accession Number	(0008,0050)	SH	NONE
Referring Physician's Name	(0008,0090)	PN	NONE
Visit Identification			
Visit Admission ID	(0038,0010)	LO	NONE
Visit Status			
Current Patient Location	(0038,0300)	LO	NONE
Patient Identification			
Patient Name	(0010,0010)	PN	NONE
Patient ID	(0010,0020)	LO	NONE
Patient Demographic			
Patient Birth Date	(0010,0030)	DA	NONE
Patient Gender	(0010,0040)	CS	NONE
Patient Weight	(0010,1030)	DS	NONE
Patient Confidentiality	(0040,3001)	LO	NONE
Referenced Patient Sequence	(0008,1120)	SQ	NONE
Patient Medical			
Patient State	(0038,0500)	LO	NONE
Pregnancy Status	(0010,21C0)	US	NONE
Patient Medical Alerts	(0010,2000)	LO	NONE
Patient Contrast Allergies	(0010,2110)	LO	NONE
Patient Special Needs	(0038,0050)	LO	NONE

The types of Modality Worklist Matching that can be requested by the Modality Worklist Client AE:

S   - indicates the identifier attribute can specify Single Value Matching.

R   - indicates Range Matching.

*   - indicates Wildcard Matching.

U   - indicates Universal Matching.

L   - indicates that UID lists can be sent.

NONE   - indicates that no matching can be requested, but that values for this Element are requested to be returned (i.e. universal matching).

The Modality Worklist Client AE will exhibit the following behavior according to the Status Code value returned in a C-FIND Response from the Remote AE acting as the SCP:

Table 75: Modality Worklist Client AE C-FIND-RSP Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The remote AE has successfully finished sending all matches in previous C-FIND-RSPs. Success indication message is output to the Service Log. Resulting matching information is output to the user interface.
Failed	Data Set does not match SOP Class	A900	This is treated as a failure. The Modality Worklist Client AE does not attempt to resend the C-FIND-RQ. The Association is closed. An error indication is output to the Service Log. No indication is posted to the User Interface.
Failed	Unable to Process	C001	This is treated as a failure. The Modality Worklist Client AE does not attempt to resend the C-FIND-RQ. The Association is closed. An error indication is output to the Service Log. No indication is posted to the User Interface.
Cancel	Sub-operations terminated due to Cancel Indication	FE00	Indicates that the remote AE received a Cancel Request sent by the Modality Worklist Client AE and will no longer return further matches. A warning indication is output to the Service Logs. Resulting matching information is output to the user interface.
Pending	Matches are continuing – However one or more Optional Keys were not supported.	FF01	Modality Worklist Client AE continues to wait for further C-FIND-RSPs. The remote AE has successfully returned a match in the C-FIND-RSP, and will continue to send further C-FIND-RSPs. However, the remote AE does not support one or more Optional Keys in the query identifier of the C-FIND-RQ. Warning indication message is output to the Service Logs. No indication is posted to the User Interface.
Pending	Matches are continuing – Current Match is supplied	FF00	Modality Worklist Client AE continues to wait for further C-FIND-RSPs. The remote AE has successfully returned a match in the C-FIND-RSP, and will continue to send further C-FIND-RSPs. Success indication message is output to the Service Logs. No indication is posted to the User Interface.
*	*	Any other status code	This is treated as a failure. The Modality Worklist Client AE does not attempt to resend the C-FIND-RQ. The Association is closed. An error indication is output to the Service Logs. No indication is posted to the User Interface.

3.2.5.3.2.2.2   Association Requestor Communication Failure Behavior

The Behavior of the Modality Worklist Client AE during communication failure when acting as an Association Requestor is summarized in the following table:

Table 76: Modality Worklist Client AE Communication Failure Behavior

Exception	Behavior
Timeout expiry for an expected DICOM Message Response (DIMSE level timeout).	The Association is aborted using a DICOM A-ABORT. This is treated as a failure. The Modality Worklist Client AE does not automatically attempt to resend the C-FIND-RQ. An error indication is output to the Service Logs. No indication is posted to the User Interface.

Exception	Behavior
Timeout expiry for an expected DICOM PDU or TCP/IP packet (Low-level timeout).	The Association is aborted using a DICOM A-ABORT. This is treated as a failure. The Modality Worklist Client AE does not automatically attempt to resend the C-FIND-RQ. An error indication is output to the Service Logs. No indication is posted to the User Interface.
Association A-P-ABORTed by the SCP or the network layers indicate communication loss (i.e. low-level TCP/IP socket closure)	This is treated as a failure. The Modality Worklist Client AE does not automatically attempt to resend the C-FIND-RQ. An error indication is output to the Service Logs. No indication is posted to the User Interface.

3.2.5.4 Association Acceptance Policy

The Modality Worklist Client AE does not accept Associations.

3.2.6 Print Management AE Specification

The Print Management AE provides Standard Conformance to the following DICOM V3.0 Meta SOP Classes:

Table 77: Meta SOP Class Conformance of Print Management AE

DICOM SOP Class Name	SOP Class UID	SCU	SCP
Print Management			
Basic Grayscale Print Management	1.2.840.10008.5.1.1.9	Yes	No
Basic Color Print Management	1.2.840.10008.5.1.1.18	Yes	No

This corresponds to conformance to the following SOP Classes:

Table 78: SOP Class Conformance of Print Management AE

DICOM SOP Class Name	SOP Class UID	SCU	SCP
Print Management			
Basic Film Session	1.2.840.10008.5.1.1.1	Yes	No
Basic Film Box	1.2.840.10008.5.1.1.2	Yes	No
Basic Grayscale Image Box	1.2.840.10008.5.1.1.4	Yes	No
Basic Color Image Box	1.2.840.10008.5.1.1.4.1	Yes	No
Printer SOP Class	1.2.840.10008.5.1.1.16	Yes	No

In addition, the Print Management AE supports the following optional SOP Classes:

Table 79: Optional SOP Class Conformance of Print Management AE

DICOM SOP Class Name	SOP Class UID	SCU	SCP
Print Management			
Basic Annotation Box	1.2.840.10008.5.1.1.15	Yes	No

The Print Management AE will try to use the Basic Color Print Management SOP Class for color images and the Basic Grayscale Print Management SOP Class for grayscale images. However, if the printer only supports one of these SOP Classes, then image data will be converted if necessary so that it can still be sent to the printer. In addition, if both color and grayscale images need to be printed to the same piece of film, then the Print Management AE will try to use the Basic Color Print Management SOP Class and convert the color images to grayscale if this SOP Class is actually supported.

The Print Management AE can be configured to propose the Basic Annotation Box SOP Class. If a printer supports this, then the Print Management AE can specify text annotations to be printed on the film with the image(s).

There can be one Print Management AE per DICOM printer that McKesson Radiology™ 12.3 is configured to use. Thus, the Print Management AE can print simultaneously to multiple printers; However, it cannot simultaneously send multiple print tasks to a single DICOM printer.

3.2.6.1   Association Establishment Policies

3.2.6.1.1   General

The Print Management AE will initiate a new Association when the user requests that certain image(s) be printed. Also, McKesson Radiology™ 12.3 can be configured to automatically print any images that are sent to it (received via the Importer AE). If the Association is broken or some other Association related error is detected, the Association will be aborted. The Print Management AE can be configured to automatically resend images to the printer if such an error occurs.

The DICOM Standard Application Context Name is always proposed:

Table 80: DICOM Application Context for Print Management AE

Application Context Name	1.2.840.10008.3.1.1.1

The maximum PDU size that will be offered is configurable, and by default is 16,384 bytes.

3.2.6.1.2   Number of Associations

There can be one Print Management AE process per DICOM printer on the network. Each Print Management AE process is configured to send only to a single DICOM printer and each process can only attempt to open one Association at a time. Thus, the maximum possible number of simultaneous Associations is limited to the number of DICOM printers that the McKesson Radiology™ 12.3 is configured to use.

Table 81: Number of Simultaneous Associations for Print Management AE

Maximum number of simultaneous Associations	(number of configured DICOM printers)

3.2.6.1.3   Asynchronous Nature

The Print Management AE does not provide asynchronous communication (multiple outstanding transactions over a single Association). All Association requests must be completed and acknowledged before a new operation can be initiated.

Table 82: Asynchronous Nature for Print Management AE

Maximum number of outstanding asynchronous transactions	1 (Not Configurable)

3.2.6.1.4   Implementation Identifying Information

Table 83: DICOM Implementation Class and Version for Print Management AE

Implementation Class UID	1.2.840.113711.2
Implementation Version Name	V1.0

3.2.6.2 Association Initiation Policy

3.2.6.2.1   Activity – Images Sent to Printer

3.2.6.2.1.1   Description and Sequencing of Activity

An Association is initiated with the named DICOM printer either when a McKesson Radiology™ 12.3 user selects images to be printed and submits the list of images to the Print Management AE, or when the McKesson Radiology™ 12.3 is configured to automatically print received images. If the user initiates the printing of images, then they can specify how the image should be processed by using the workstation's image processing tools. In addition, they can select the desired film format and number of copies. If McKesson Radiology™ 12.3 is configured to automatically print the images, then the default configured image processing, film format, and number of copies will be used.

A new Association will be opened for each print job. The following figure

shows the sequencing of the DICOM Messaging involved. The Print Management AE can support N-EVENT-REPORT Requests that are sent by a DICOM Printer at any time over the open Association, even when actually expecting a Response Message of some sort.

Figure 8: Sequencing of Activity – Images Sent to Printer
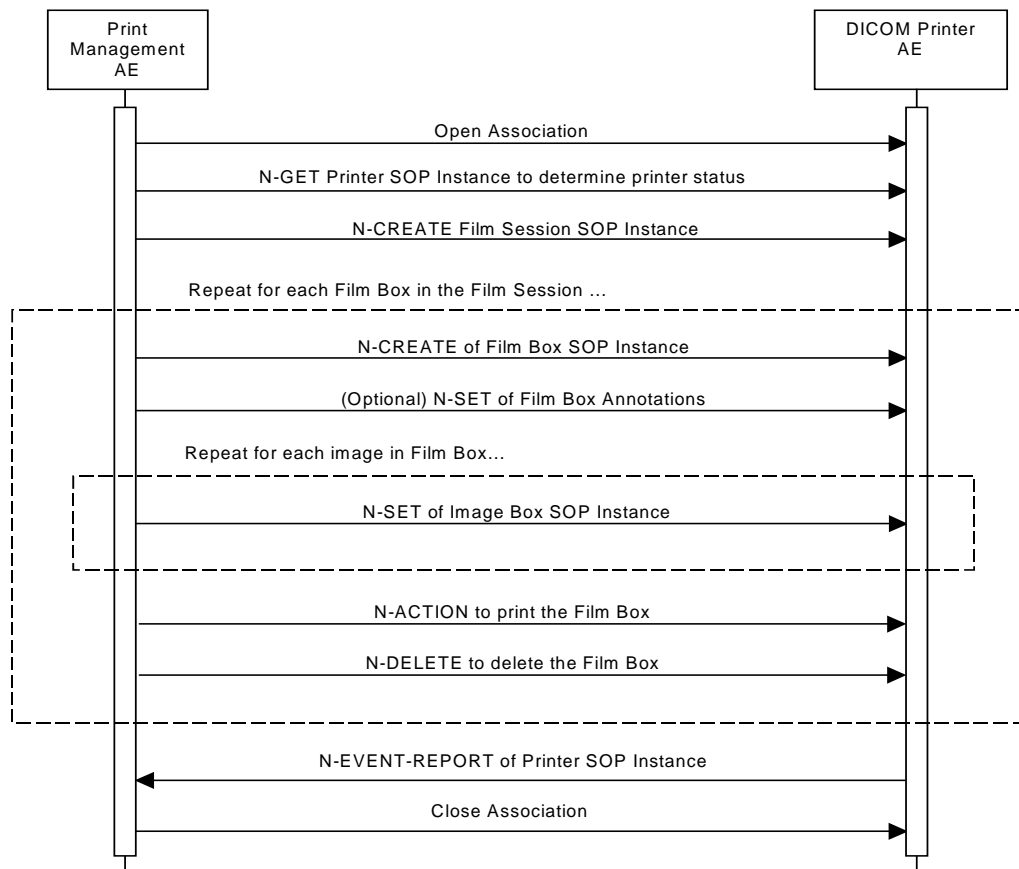
3.2.6.2.1.2   Proposed Presentation Contexts

The Print Management AE may propose the following Presentation Contexts:

Table 84: Proposed Presentation Contexts

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	**UID**	**Name**	**UID**		
Basic Grayscale Print Management	1.2.840.10008.5.1.1.9	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Basic Color Print Management	1.2.840.10008.5.1.1.18	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Basic Annotation Box	1.2.840.10008.5.1.1.15	DICOM Implicit	1.2.840.10008.1.2	SCU	None

		VR Little Endian			

3.2.6.2.1.3   *SOP Specific Conformance as an Association Requestor*

The following sections detail the SOP Specific Conformance of the Print Management AE as an Association Requestor for each of the SOP Classes that make up the Basic Grayscale and Basic Color Print Management Meta SOP Classes. In addition, there is a section explaining the SOP Specific Conformance for the Basic Annotation Box SOP Class.

If an error or warning condition is detected during a print-job, then an error is posted to the Examine Print Jobs status window of the McKesson Radiology™ 12.3 user interface. The Print Management AE can be configured to automatically retry a number of times to complete a print-job if some failure occurs.

The tables in this section can use the following terms for Presence of Value of an Attribute:

    VNAP   - Value Not Always Present (Attribute is present but value can be zero length)

    ANAP   - Attribute Not Always Present

    ALWAYS   - Always present with a value

    EMPTY   - Attribute is sent without a value

The tables in this section can use the following terms for Source of an Attribute's value:

    USER   - Attribute value source is from User input (if user initiates print-job)

    AUTO   - Attribute value is generated automatically

    CONFIG   - Attribute value is Configurable

    PRINTER - Attribute value will be returned by the Printer

3.2.6.2.1.3.1   SOP Specific Conformance - Printer SOP Class

The Print Management AE uses the Printer SOP Class to obtain information about the current printer status by sending an N-GET Request before even attempting to create a Film Session. This way, it can abort the print task and notify the user of any problems if the printer indicates there is a problem of some sort. The attributes obtained via N-GET are listed in the Table below:

Table 85: Print Management AE Printer SOP Class N-GET-RQ Attributes

Attribute Name	Tag ID	VR	Value	Presence of Value[6]	Source
Printer Status	(2110,0010)	CS	To be returned by Printer	EMPTY	PRINTER
Printer Status Info	(2110,0020)	CS	To be returned by Printer	EMPTY	PRINTER
Printer Name	(2110,0030)	LO	To be returned by Printer	EMPTY	PRINTER
Manufacturer	(0008,0070)	LO	To be returned by Printer	EMPTY	PRINTER
Manufacturer Model	(0008,1090)	LO	To be returned by Printer	EMPTY	PRINTER

---

[6] Attributes do not have a value in the N-GET-RQ. It is up to the DICOM printer to return values in the N-GET-RSP.

Device Serial Number	(0018,1000)	LO	To be returned by Printer	EMPTY	PRINTER
Software Version	(0018,1020)	LO	To be returned by Printer	EMPTY	PRINTER
Date of Last Calibration	(0018,1200)	DA	To be returned by Printer	EMPTY	PRINTER
Time of Last Calibration	(0018,1201)	TM	To be returned by Printer	EMPTY	PRINTER

It is mandatory for the SCP to return a value for the Printer Status (2110,0010). The returned value will be handled as follows:

NORMAL - The print-job continues to be printed.

FAILURE - The print-job is aborted. Error message is output to the Service Log. If initiated by the user, then an error indication is posted to the Examine Print Jobs status window.

WARNING - The print-job continues to be printed. Warning is output to the Service Log. The Examine Print Jobs status window does not currently support warning indications.

The Print Management AE will exhibit the following behavior according to the Status Code value returned in an N-GET Response from the Remote AE acting as the Print Management SCP:

Table 86: Print Management AE N-GET-RSP Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The remote AE has successfully returned the printer status information. Success indication message is output to the Service Log. Examine Print Jobs status window shows print-job as being in-progress.
*	*	Any other status code	This is treated as a failure. The print-job is aborted and the Association is Released. An error indication is output to the Service Logs. An error indication is posted to the Examine Print Jobs status window

The Print Management AE is capable of receiving an N-EVENT-REPORT Request from the Print Management SCP at any time over an open Association.

The Print Management AE will exhibit the following behavior according to the Event Type ID value specified in an N-EVENT-REPORT Request from the Remote AE acting as the Print Management SCP:

Table 87: Print Management AE N-EVENT-REPORT-RQ Event Type ID Behavior

Event Type Name	Event Type ID	Behavior
Normal	1	The Print Management AE continues completing the print-job. Success indication message is output to the Service Log. Examine Print Jobs status window shows print-job as being in-progress.
Warning	2	The Print Management AE continues completing the print-job. Warning indication message is output to the Service Log. Examine Print Jobs status window shows print-job as being in-progress.

Event Type Name	Event Type ID	Behavior
Failure	3	This is treated as a failure. The print-job is aborted and the Association is Released. An error indication is output to the Service Logs. An error indication is posted to the Examine Print Jobs status window
*	*	This is treated as a failure. The print-job is aborted and the Association is Released. An error indication is output to the Service Logs. An error indication is posted to the Examine Print Jobs status window

3.2.6.2.1.3.2   SOP Specific Conformance - Film Session SOP Class

The Print Management AE does not use collation, so it does not send N-ACTION or N-DELETE Requests for a Film Session. Thus, it only sends N-CREATE Requests for Film Sessions. The Attributes supplied in an N-CREATE Request for a Film Session are listed below:

Table 88: Print Management AE Film Session SOP Class N-CREATE-RQ Attributes

Attribute Name	Tag ID	VR	Value	Presence of Value[7]	Source
Number of Copies	(2000,0010)	IS	1 to N if User, 1 if Config	ALWAYS	USER, CONFIG
Print Priority	(2000,0020)	CS	HIGH, MED	ALWAYS	USER, CONFIG
Medium Type	(2000,0030)	CS	BLUE FILM, CLEAR FILM, PAPER	ALWAYS	CONFIG
Film Destination	(2000,0040)	CS	MAGAZINE, PROCESSOR	ALWAYS	CONFIG

The Print Management AE will exhibit the following behavior according to the Status Code value returned in a Film Session N-CREATE Response from the Remote AE acting as the Print Management SCP:

Table 89: Print Management AE Film Session N-CREATE-RSP Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The remote AE has successfully created the Film Session. Success indication message is output to the Service Log. Examine Print Jobs status window shows print-job as being in-progress.
Warning	Attribute Value Out of Range	0116	The remote AE has created the Film Session. A warning indication is output to the Service Log. Examine Print Jobs status window shows print-job as being in-progress.
Warning	Attribute List Error	0107	The remote AE has created the Film Session. A warning indication is output to the Service Log. Examine Print Jobs status window shows print-job as being in-progress.

---

[7] Attributes do not have a value in the N-GET-RQ. It is up to the DICOM printer to return values in the N-GET-RSP.

Service Status	Further Meaning	Error Code	Behavior
Warning	Memory allocation not supported	B600	The remote AE has created the Film Session. A warning indication is output to the Service Log. Examine Print Jobs status window shows print-job as being in-progress.
*	*	Any other status code	This is treated as a failure. The print-job is aborted. An error indication is output to the Service Logs. An error indication is posted to the Examine Print Jobs status window

3.2.6.2.1.3.3 SOP Specific Conformance - Film Box SOP Class

The Print Management AE does not use collation, so it must send an N-ACTION Request to print each Film Box and an N-DELETE Request to delete each Film Box. In addition, it must of course send an N-CREATE Request to create each Film Box.

The Attributes supplied in an N-CREATE Request for a Film Box are listed below:

Table 90: Print Management AE Film Box SOP Class N-CREATE-RQ Attributes

Attribute Name	Tag ID	VR	Value	Presence of Value[8]	Source
Image Display Format	(2010,0010)	CS	STANDARD\1,1 STANDARD\2,2 STANDARD\3,3 STANDARD\3,4 …	ALWAYS	USER, CONFIG
Referenced Film Session Sequence	(2010,0500)	SQ		ALWAYS	AUTO
>Referenced SOP Class UID	(0008,1150)	UI	1.2.840.10008.5.1.1.1	ALWAYS	AUTO
>Referenced SOP Instance UID	(0008,1155)	UI	From created Film Session SOP Instance	ALWAYS	AUTO
Film Orientation	(2010,0040)	CS	PORTRAIT, LANDSCAPE	ALWAYS	USER, CONFIG
Film Size ID	(2010,0050)	CS	14INX17IN, 14INX14IN, 11INX14IN, 11INX11IN, 85INX11IN, 8INX10IN	ALWAYS	CONFIG
Magnification Type	(2010,0060)	CS	REPLICATE, BILINEAR, CUBIC, NONE	VNAP	CONFIG
Smoothing Type	(2010,0080)	CS	Supported values are defined in printer's Conformance Statement	VNAP	CONFIG
Border Density	(2010,0100)	CS	BLACK, WHITE, 0 … N (100ths of OD)	VNAP	CONFIG

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[8] Attributes do not have a value in the N-GET-RQ. It is up to the DICOM printer to return values in the N-GET-RSP.

Empty Image Density	(2010,0110)	CS	BLACK, WHITE, 0 … N (100ths of OD)	VNAP	CONFIG
Min Density	(2010,0120)	US	0 … N	VNAP	CONFIG
Max Density	(2010,0130)	US	0 … N	VNAP	CONFIG
Trim	(2010,0140)	CS	YES, NO	VNAP	CONFIG
Configuration Information	(2010,0150)	ST	Supported values are defined in printer's Conformance Statement	VNAP	CONFIG
Illumination	2010, 015E	US	0 … N	VNAP	CONFIG
Reflective Ambient Light	(2010,0160)	US	0 … N	VNAP	CONFIG

The Print Management AE will exhibit the following behavior according to the Status Code value returned in a Film Box N-CREATE Response from the Remote AE acting as the Print Management SCP:

Table 91: Print Management AE Film Box N-CREATE-RSP Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The remote AE has successfully created the Film Box. Success indication message is output to the Service Log. Examine Print Jobs status window shows print-job as being in-progress.
Warning	Attribute Value Out of Range	0116	The remote AE has created the Film Box. A warning indication is output to the Service Log. Examine Print Jobs status window shows print-job as being in-progress.
Warning	Attribute List Error	0107	The remote AE has created the Film Box. A warning indication is output to the Service Log. Examine Print Jobs status window shows print-job as being in-progress.
Warning	Requested Min Density or Max Density outside of printer's operating range	B605	The remote AE has created the Film Box. A warning indication is output to the Service Log. Examine Print Jobs status window shows print-job as being in-progress.
*	*	Any other status code	This is treated as a failure. The print-job is aborted. An error indication is output to the Service Logs. An error indication is posted to the Examine Print Jobs status window

An N-ACTION Request is issued to instruct the Remote AE acting as the Print Management SCP to print the contents of the Film Box. The SOP Instance UID of the Film Box is automatically included in the N-ACTION Request. The Action Reply argument in the N-ACTION Response is not evaluated.

The Print Management AE will exhibit the following behavior according to the Status Code value returned in a Film Box N-ACTION Response from the Remote AE acting as the Print Management SCP:

Table 92: Print Management AE Film Box N-ACTION-RSP Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The remote AE has successfully accepted the film for printing. Success indication message is output to the Service Log. Examine Print Jobs status window shows print-job as being in-progress.
Warning	Attribute Value Out of Range	0116	The remote AE has created the Film Box. A warning indication is output to the Service Log. Examine Print Jobs status window shows print-job as being in-progress.
Warning	Attribute List Error	0107	The remote AE has created the Film Box. A warning indication is output to the Service Log. Examine Print Jobs status window shows print-job as being in-progress.
Warning	Film Box SOP Instance hierarchy does not contain Image Box SOP Instances (empty page)	B603	The remote AE has accepted the film for printing. Warning indication message is output to the Service Log. Examine Print Jobs status window shows print-job as being in-progress.
Warning	Image size is larger than Image Box size. The image has been de-magnified.	B604	The remote AE has accepted the film for printing. Warning indication message is output to the Service Log. Examine Print Jobs status window shows print-job as being in-progress.
Warning	Image size is larger than Image Box size. The image has been cropped to fit.	B609	The remote AE has accepted the film for printing. Warning indication message is output to the Service Log. Examine Print Jobs status window shows print-job as being in-progress.
Warning	Image size or Combined Print Image Size is larger than Image Box size. The image has been decimated to fit.	B60A	The remote AE has accepted the film for printing. Warning indication message is output to the Service Log. Examine Print Jobs status window shows print-job as being in-progress.
Failure	Unable to create Print Job SOP Instance; print queue is full.	C602	This is treated as a failure. The print-job is aborted and the Association is released. An error indication is output to the Service Logs. An error indication is posted to the Examine Print Jobs status window
Failure	Image size is larger than Image Box size.	C603	This is treated as a failure. The print-job is aborted and the Association is released. An error indication is output to the Service Logs. An error indication is posted to the Examine Print Jobs status window
Failure	Combined Print Image Size is larger than Image Box size.	C613	This is treated as a failure. The print-job is aborted and the Association is released. An error indication is output to the Service Logs. An error indication is posted to the Examine Print Jobs status window
*	*	Any other status	This is treated as a failure. The print-job is aborted and the Association is released. An error indication is output to the Service Logs.

Service Status	Further Meaning	Error Code	Behavior
		code	An error indication is posted to the Examine Print Jobs status window

An N-DELETE Request is issued to instruct the Remote AE acting as the Print Management SCP to delete the contents of the Film Box. The SOP Instance UID of the Film Box is automatically included in the N-DELETE Request.

The Print Management AE will exhibit the following behavior according to the Status Code value returned in a Film Box N-ACTION Response from the Remote AE acting as the Print Management SCP:

Table 93: Print Management AE Film Box N-DELETE-RSP Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The remote AE has successfully deleted the Film Box. Success indication message is output to the Service Log. This has no impact on the Examine Print Jobs status window
*	*	Any other status code	This is treated as a failure. The print-job is aborted and the Association is released. An error indication is output to the Service Logs. An error indication is posted to the Examine Print Jobs status window

3.2.6.2.1.3.4   SOP Specific Conformance - Basic Annotation SOP Class

The Print Management AE can send N-SET Requests specifying text labels for a Film Box. In order to do this, the Print Management SCP must support the Basic Annotation Box SOP Class. The DICOM Standard does not specify exactly how a printer must implement support for the Basic Annotation Box, so even if it is supported, the DICOM Conformance Statement for the printer must be reviewed in order to determine what support is offered and how the Print Management AE must be configured to make use of this support.

For each Annotation Box that the SCP can support, the Print Management AE can be configured to send the following values in a text string:

%%   - A '%' character

%x   - Today's date

%N   - Patient's full name (lastname, firstname)

%I   - Patient's medical ID

%e   - Exam date

%t   - Exam type

%P   - Page number

%T   - Total number of pages

The Attributes supplied in an N-CREATE Request for a Basic Annotation Box are listed below:

Table 94: Print Management AE Basic Annotation Box SOP Class N-SET-RQ Attributes

Attribute Name	Tag ID	VR	Value	Presence of Value[9]	Source
Image Display Format	(2010,0010)	CS	STANDARD\1,1 STANDARD\2,2 STANDARD\3,3 STANDARD\3,4 …	ALWAYS	USER, CONFIG
Referenced Film Session Sequence	(2010,0500)	SQ		ALWAYS	AUTO
>Referenced SOP Class UID	(0008,1150)	UI	1.2.840.10008.5.1.1.1	ALWAYS	AUTO
>Referenced SOP Instance UID	(0008,1155)	UI	From created Film Session SOP Instance	ALWAYS	AUTO
Film Orientation	(2010,0040)	CS	PORTRAIT, LANDSCAPE	ALWAYS	USER, CONFIG
Film Size ID	(2010,0050)	CS	14INX17IN, 14INX14IN, 11INX14IN, 11INX11IN, 85INX11IN, 8INX10IN	ALWAYS	CONFIG
Magnification Type	(2010,0060)	CS	REPLICATE, BILINEAR, CUBIC, NONE	VNAP	CONFIG
Smoothing Type	(2010,0080)	CS	Supported values are defined in printer's Conformance Statement	VNAP	CONFIG
Border Density	(2010,0100)	CS	BLACK, WHITE, 0 … N (100ths of OD)	VNAP	CONFIG
Empty Image Density	(2010,0110)	CS	BLACK, WHITE, 0 … N (100ths of OD)	VNAP	CONFIG
Min Density	(2010,0120)	US	0 … N	VNAP	CONFIG
Max Density	(2010,0130)	US	0 … N	VNAP	CONFIG
Trim	(2010,0140)	CS	YES, NO	VNAP	CONFIG
Configuration Information	(2010,0150)	ST	Supported values are defined in printer's Conformance Statement	VNAP	CONFIG
Illumination	2010, 015E	US	0 … N	VNAP	CONFIG

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[9] Attributes do not have a value in the N-GET-RQ. It is up to the DICOM printer to return values in the N-GET-RSP.

| Reflective Ambient Light | (2010,0160) | US | 0 … N | VNAP | CONFIG |

The Print Management AE will exhibit the following behavior according to the Status Code value returned in a Film Box N-CREATE Response from the Remote AE acting as the Print Management SCP:

Table 95: Print Management AE Film Box N-CREATE-RSP Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The remote AE has successfully created the Film Box. Success indication message is output to the Service Log. Examine Print Jobs status window shows print-job as being in-progress.
Warning	Attribute Value Out of Range	0116	The remote AE has created the Film Box. A warning indication is output to the Service Log. Examine Print Jobs status window shows print-job as being in-progress.
Warning	Attribute List Error	0107	The remote AE has created the Film Box. A warning indication is output to the Service Log. Examine Print Jobs status window shows print-job as being in-progress.
Warning	Requested Min Density or Max Density outside of printer's operating range	B605	The remote AE has created the Film Box. A warning indication is output to the Service Log. Examine Print Jobs status window shows print-job as being in-progress.
*	*	Any other status code	This is treated as a failure. The print-job is aborted. An error indication is output to the Service Logs. An error indication is posted to the Examine Print Jobs status window

An N-ACTION Request is issued to instruct the Remote AE acting as the Print Management SCP to print the contents of the Film Box. The SOP Instance UID of the Film Box is automatically included in the N-ACTION Request. The Action Reply argument in the N-ACTION Response is not evaluated.

The Print Management AE will exhibit the following behavior according to the Status Code value returned in a Film Box N-ACTION Response from the Remote AE acting as the Print Management SCP:

Table 96: Print Management AE Film Box N-ACTION-RSP Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The remote AE has successfully accepted the film for printing. Success indication message is output to the Service Log. Examine Print Jobs status window shows print-job as being in-progress.
Warning	Attribute Value Out of Range	0116	The remote AE has created the Film Box. A warning indication is output to the Service Log. Examine Print Jobs status window shows print-job as being in-progress.
Warning	Attribute List Error	0107	The remote AE has created the Film Box. A warning indication is output to the Service Log. Examine Print Jobs status window shows print-job as being in-progress.

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Service Status	Further Meaning	Error Code	Behavior
Warning	Film Box SOP Instance hierarchy Does not contain Image Box SOP Instances (empty page)	B603	The remote AE has accepted the film for printing. Warning indication message is output to the Service Log. Examine Print Jobs status window shows print-job as being in-progress.
Warning	Image size is larger than Image Box size. The image has been de-magnified.	B604	The remote AE has accepted the film for printing. Warning indication message is output to the Service Log. Examine Print Jobs status window shows print-job as being in-progress.
Warning	Image size is larger than Image Box size. The image has been cropped to fit.	B609	The remote AE has accepted the film for printing. Warning indication message is output to the Service Log. Examine Print Jobs status window shows print-job as being in-progress.
Warning	Image size or Combined Print Image Size is larger than Image Box size. The image or combined Print Image has been decimated to fit.	B60A	The remote AE has accepted the film for printing. Warning indication message is output to the Service Log. Examine Print Jobs status window shows print-job as being in-progress.
Failure	Unable to create Print Job SOP Instance; print queue is full.	C602	This is treated as a failure. The print-job is aborted and the Association is released. An error indication is output to the Service Logs. An error indication is posted to the Examine Print Jobs status window
Failure	Image size is larger than Image Box size.	C603	This is treated as a failure. The print-job is aborted and the Association is released. An error indication is output to the Service Logs. An error indication is posted to the Examine Print Jobs status window
Failure	Combined Print Image Size is larger than Image Box size.	C613	This is treated as a failure. The print-job is aborted and the Association is released. An error indication is output to the Service Logs. An error indication is posted to the Examine Print Jobs status window
*	*	Any other status code	This is treated as a failure. The print-job is aborted and the Association is released. An error indication is output to the Service Logs. An error indication is posted to the Examine Print Jobs status window

An N-DELETE Request is issued to instruct the Remote AE acting as the Print Management SCP to delete the contents of the Film Box. The SOP Instance UID of the Film Box is automatically included in the N-DELETE Request.

The Print Management AE will exhibit the following behavior according to the Status Code value returned in a Film Box N-ACTION Response from the Remote AE acting as the Print Management SCP:

Table 97: Print Management AE Film Box N-DELETE-RSP Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The remote AE has successfully deleted the Film Box. Success indication message is output to the Service Log. This has no impact on the Examine Print Jobs status window
*	*	Any other status code	This is treated as a failure. The print-job is aborted and the Association is released. An error indication is output to the Service Logs. An error indication is posted to the Examine Print Jobs status window

3.2.6.2.1.3.5   SOP Specific Conformance - Image Box SOP Classes

The Print Management AE can send N-SET Requests specifying image data for a Basic Grayscale Image Box or a Basic Color Image Box.

The Attributes supplied in an N-SET Request for a Basic Grayscale Image Box are listed below:

Table 98: Print Management AE Basic Grayscale Image Box SOP Class N-SET-RQ Attributes

Attribute Name	Tag ID	VR	Value	Presence of Value[10]	Source
Image Position	(2020,0010)	US	1 to number of images in the Film Box	ALWAYS	AUTO
Basic Grayscale Image Sequence	(2020,0110)	SQ		ALWAYS	AUTO
>Samples Per Pixel	(0028,0002)	US	1	ALWAYS	AUTO
>Photometric Interpretation	(0028,0004)	CS	MONOCHROME2	ALWAYS	AUTO
>Rows	(0028,0010)	US	Rows in original image being printed	ALWAYS	AUTO
>Columns	(0028,0011)	US	Columns in original image being printed	ALWAYS	AUTO
>Bits Allocated	(0028,0100)	US	8	ALWAYS	AUTO
>Bits Stored	(0028,0101)	US	8	ALWAYS	AUTO
>High Bit	(0028,0102)	US	7	ALWAYS	AUTO
>Pixel Representation	(0028,0103)	US	0	ALWAYS	AUTO
>Pixel Data	(7FE0,0010)	OB	Processed image data	ALWAYS	AUTO
Magnification Type	(2010,0060)	CS	REPLICATE, BILINEAR, CUBIC, NONE	VNAP	CONFIG
Smoothing Type	(2010,0080)	CS	Supported values are defined in printer's Conformance Statement	VNAP	CONFIG

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[10] Attributes do not have a value in the N-GET-RQ. It is up to the DICOM printer to return values in the N-GET-RSP.

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Polarity	(2020,0020)	CS	NORMAL, REVERSE	VNAP	CONFIG
Requested Image Size	(2020,0030)	DS	Width in mm of the image to be printed. See comments below for details.	VNAP	AUTO

The image data will be processed if necessary so that it has the characteristics defined in Table 98. If the original image pixel data being printed is not MONOCHROME2 (i.e. is MONOCHROME1, RGB, or …), then it will be converted to have this Photometric Interpretation. The pixel data will also be converted to unsigned values if they are not already.

If a Modality LUT, Slope and Intercept, VOI LUT, and/or Window and Level values are specified in the DICOM header for the image, then these will be applied during processing. If the image to be printed is currently displayed on the McKesson Radiology™ 12.3 workstation, then the same processing parameters used to process the image for display will be used to process the image prior to sending it to the printer. If the original image has greater than 8 Bits Allocated per pixel, then it must be scaled down to 8 Bits Allocated per pixel before sending it to the printer. If no VOI LUT or Window and Level values are specified in the DICOM header or through the user interface, then the Print Management AE will estimate Window and Level values using histogram analysis of the pixel values.

McKesson Radiology™ 12.3 can support the display of overlays included in the original DICOM image (either embedded or separate). McKesson Radiology™ 12.3 can also be configured to automatically create overlays of its own by specifying that certain DICOM header values should be displayed as strings at certain locations on the displayed image. The Print Management AE will automatically 'burn in' all these types of overlays into the processed pixel data before it is sent to the DICOM printer. In addition, if the user adds graphic annotations to a displayed image on the McKesson Radiology™ 12.3 workstation, then these annotations will also be 'burned into' the pixel data sent to the printer if the user chooses to print the image.

A value for the Requested Image Size (2020,0030) is only sent if 'True Size' printing is configured. In order to actually calculate a value for this, the DICOM header for the image being printed must specify the size of each pixel in one of the following Attributes:

(0028,0030)   - Pixel Spacing

(0018,1164)   - Imager Pixel Spacing

(0018,2010)   - Nominal Scanned Pixel Spacing

(3002,0011)   - Image Plane Pixel Spacing

The DICOM Standard does not define exactly what a printer must do if the Requested Image Size (2020,0030) is too large for the Image Box. The Print Management AE can be configured with the Image Box sizes that will be available on a printer for all combinations of Film Size and Image Display Format. It can be configured to not send a value for the Requested Image Size if the image will not fit in the Image Box. This will prevent the printer from taking some unwanted action if the Requested Image Size is too large.

The Print Management AE will exhibit the following behavior according to the Status Code value returned in an Image Box N-SET Response from the Remote AE acting as the Print Management SCP:

Table 99: Print Management AE Image Box N-SET-RSP Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
	Success	0000	The remote AE has successfully set the Image Box. Success indication message is output to the Service Log. Examine Print Jobs status window shows print-job as being in-progress.
Warning	Image size is larger than Image Box size. The image has been de-magnified.	0116	The remote AE has set the Image Box. A warning indication is output to the Service Log. Examine Print Jobs status window shows print-job as being in-progress.
Warning	Requested Min Density or Max Density outside of printer's operating range.	B605	The remote AE has set the Image Box. A warning indication is output to the Service Log. Examine Print Jobs status window shows print-job as being in-progress.
Warning	Image size is larger than Image Box size. The image has been cropped to fit.	B609	The remote AE has set the Image Box. A warning indication is output to the Service Log. Examine Print Jobs status window shows print-job as being in-progress.
Warning	Image size or Combined Print Image Size is larger than Image Box size. The image or combined Print Image has been decimated to fit.	B60A	The remote AE has set the Image Box. A warning indication is output to the Service Log. Examine Print Jobs status window shows print-job as being in-progress.
Failure	Image size is larger than Image Box size.	C603	This is treated as a failure. The print-job is aborted and the Association is released. An error indication is output to the Service Logs. An error indication is posted to the Examine Print Jobs status window
Failure	Insufficient memory in printer to store the image.	C605	This is treated as a failure. The print-job is aborted and the Association is released. An error indication is output to the Service Logs. An error indication is posted to the Examine Print Jobs status window
Failure	Combined Print Image Size is larger than Image Box size.	C613	This is treated as a failure. The print-job is aborted and the Association is released. An error indication is output to the Service Logs. An error indication is posted to the Examine Print Jobs status window
*	*	Any other status code	This is treated as a failure. The print-job is aborted and the Association is released. An error indication is output to the Service Logs. An error indication is posted to the Examine Print Jobs status window

3.2.6.2.1.3.6   Association Requestor Communication Failure Behavior

The Behavior of the Print Management AE during communication failure when acting as an Association Requestor is summarized in the following table:

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Table 100: Print Management AE Communication Failure Behavior

Exception	Behavior
Timeout expiry for an expected DICOM Message Response (DIMSE level timeout).	The Association is aborted using a DICOM A-ABORT. This is treated as a failure. The Print Management AE can be configured to automatically retry a number of times to complete a print-job if some failure occurs. An error indication is output to the Service Logs. No indication is posted to the User Interface.
Timeout expiry for an expected DICOM PDU or TCP/IP packet (Low-level timeout).	The Association is aborted using a DICOM A-ABORT. This is treated as a failure. The Print Management AE can be configured to automatically retry a number of times to complete a print-job if some failure occurs. An error indication is output to the Service Logs. No indication is posted to the User Interface.
Association A-P-ABORTed by the SCP or the network layers indicate communication loss (i.e. low-level TCP/IP socket closure)	This is treated as a failure. The Print Management AE can be configured to automatically retry a number of times to complete a print-job if some failure occurs. An error indication is output to the Service Logs. No indication is posted to the User Interface.

3.2.6.3   Association Acceptance Policy

The Print Management AE does not accept Associations.

3.2.7   External Notifier AE Specifications

The External Notifier AE provides Standard Conformance to the following DICOM V3.0 SOP Classes:

Table 101: SOP Class Conformance of External Notifier AE

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

The External Notifier AE will forward any Modality Performed Procedure Step Requests received by the Event Handler AE.

3.2.7.1   Association Establishment Policies

3.2.7.1.1   General

The External Notifier AE can issue Notifications for any number of configurable events.

For each event that occurs, an Association to a subscribed third party device will be opened, and a Modality Performed Procedure Step SOP Instance will be sent.

Table 102: DICOM Application Context for External Notifier AE

Application Context Name	1.2.840.10008.3.1.1.1

The maximum PDU size that will be offered is configurable, and by default is 16,384 bytes

3.2.7.1.1.1   Number of Associations

One Association is opened for every destination configured to receive notifications.

The External Notifier AE can request one open Association to each Remote AE that it is configured to send notifications to, and keep these Associations open simultaneously.

Table 103: Number of Simultaneous Associations for External Notifier AE

Maximum number of simultaneous Associations	One per Remote AE receiving notifications

3.2.7.1.2   Asynchronous Nature

The External Notifier AE does not provide asynchronous communication (multiple outstanding transactions over a single Association). All Association requests must be completed and acknowledged before a new operation can be initiated.

Table 104: Asynchronous Nature for External Notifier AE

Maximum number of outstanding asynchronous transactions	1 (Not Configurable)

3.2.7.1.3   Implementation Identifying Information

Table 105: DICOM Implementation Class and Version for External Notifier AE

Implementation Class UID	1.2.840.113711.14
Implementation Version Name	V1.0

3.2.7.2   Association Initiation Policy

3.2.7.2.1   Activity – Event Occurs that Requires Notification of a Remote AE

3.2.7.2.2   Description and Sequencing of Activity

An Association is initiated with the external DICOM system when a McKesson Radiology™ 12.3 internal event occurs. There is no sequencing of this activity.

3.2.7.2.2.1   Proposed Presentation Contexts

The External Notifier AE may propose the following Presentation Contexts:

Table 106: External Notifier AE Proposed Presentation Contexts

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

3.2.7.2.2.2   SOP Specific Conformance as an Association Requestor

The External Notifier AE can be configured to notify Remote AE 'C' whenever a Modality Performed Procedure Step is created or set by forwarding the MPPS Messages (acting as an IHE Performed Procedure Step Manager).

Currently, the events listed in the following table are supported:

Table 107: External Notifier AE Supported Events

Event Type	Meaning
MPPSCREATE	A Modality Performed Procedure Step request has been received (N-CREATE)
MPPSSET	A Modality Performed Procedure Step has been updated (N-SET)

3.2.7.2.2.2.1   SOP Specific Conformance - Modality Performed Procedure Step

The External Notifier AE does not independently generate MPPS requests. It simply forwards all requests received by the Event Handler AE as-is to its configured destinations. Therefore, the attributes sent by the External Notifier AE in both the N-CREATE and N-SET messages depend solely on the originating source of the MPPS request. This behavior implements the IHE Technical Framework requirements for the Performed Procedure Step Manager Actor.

As part of the MIMA option support, the system can provide DICOM attributes conveying the Assigning Authorities of the Patient ID and Accession Number in the forwarded Performed Procedure Step N-CREATE messages, and also convey the Institution Name (0008,0080) and Institution Code Sequence (0008,0082) in the forwarded Performed Procedure Step N-CREATE messages so that the institution where the referenced SOP Instances were created is identified. If a destination system cannot handle these attributes, the system can be configured to not include this information in the forwarded message when forwarding to that destination.

The External Notifier AE will exhibit the following behavior according to the Status Code value returned in a MPPS N-CREATE Response from the Remote AE acting as the MPPS SCP:

Table 108: External Notifier AE MPPS N-CREATE-RSP Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The remote AE has successfully created the MPPS. Success indication message is output to the Service Log. No indication is posted to the User Interface.
Warning	Attribute Value Out of Range	0116	The remote AE is considered to have created the MPPS. A warning indication is output to the Service Log. No indication is posted to the User Interface.
Warning	Attribute List Error	0107	The remote AE is considered to have created the MPPS. A warning indication is output to the Service Log. No indication is posted to the User Interface.
Warning	Memory allocation not supported	B600	The remote AE is considered to have created the MPPS. A warning indication is output to the Service Log. No indication is posted to the User Interface.
*	*	Any other	This is treated as a failure. External Notifier AE will re-attempt to create the MPPS SOP Instance a configurable maximum number of times.

Service Status	Further Meaning	Error Code	Behavior
		status code	An error indication is output to the Service Logs. No indication is posted to the User Interface.

The External Notifier AE will exhibit the following behavior according to the Status Code value returned in a MPPS N-SET Response from the Remote AE acting as the MPPS SCP:

Table 109: External Notifier AE MPPS N-SET-RSP Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The remote AE has successfully set the MPPS. Success indication message is output to the Service Log. No indication is posted to the User Interface.
Warning	Attribute Value Out of Range	0116	The remote AE is considered to have set the MPPS. A warning indication is output to the Service Log. No indication is posted to the User Interface.
Warning	Attribute List Error	0107	The remote AE is considered to have set the MPPS. A warning indication is output to the Service Log. No indication is posted to the User Interface.
Warning	Performed Procedure Step Object may no longer be updated.	A710	The remote AE is considered to have set the MPPS. A warning indication is output to the Service Log. No indication is posted to the User Interface.
Warning	Memory allocation not supported	B600	The remote AE is considered to have set the MPPS. A warning indication is output to the Service Log. No indication is posted to the User Interface.
*	*	Any other status code	This is treated as a failure. The MPPS-job is aborted and the Association is released. An error indication is output to the Service Logs. An error indication is posted to the Examine Print Jobs status window

3.2.7.2.2.2.2   Association Requestor Communication Failure Behavior

The Behavior of the External Notifier AE during communication failure is summarized in the following table:

Table 110: External Notifier AE Communication Failure Behavior

Exception	Behavior
Timeout expiry for an expected DICOM Message Response (DIMSE level timeout).	The Association is aborted using a DICOM A-ABORT. This is treated as a failure. Notification task is re-queued so that an attempt will be made to repeat it. There are a configured maximum number of times that a notification task can be re-queued. An error indication is output to the Service Logs. An error indication is also posted to the User Interface.
Timeout expiry for an expected DICOM PDU or TCP/IP packet (Low-level timeout).	The Association is aborted using a DICOM A-ABORT. This is treated as a failure. Notification task is re-queued so that an attempt will be made to repeat it. There are a configured maximum number of times that a notification task can be re-queued. An error indication is output to the Service Logs. An error indication is also posted to the User Interface.
Association A-P-ABORTed by the SCP or the network layers indicate communication loss (i.e. low-level TCP/IP socket closure)	This is treated as a failure. Notification task is re-queued so that an attempt will be made to repeat it. There are a configured maximum number of times that a notification task can be re-queued. An error indication is output to the Service Logs. An error indication is also posted to the User Interface.

3.2.7.3   Association Acceptance Policy

The External Notifier AE does not accept Associations.

3.2.8   Event Handler AE

The Event Handler AE provides Standard Conformance to the following DICOM V3.0 SOP Classes:

Table 111: SOP Class Conformance of Event Handler AE

DICOM SOP Class Name	SOP Class UID	SCU	SCP
Verification			
Verification	1.2.840.10008.1.1	No	Yes
Workflow Management			
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	No	Yes

The Event Handler AE receives notifications of events from external systems. When a MPPS Request is received, it can be forwarded to the External Notifier AE so that it can be relayed to other Remote AEs. In addition, Scheduled Procedure Steps can be removed from the Modality Worklist provided by the Query/Retrieve Server AE if a received MPPS Message indicates that it is in progress.

3.2.8.1 Association Establishment Policies

3.2.8.1.1   General

The Event Handler AE accepts Associations from external DICOM devices to receive event notifications.

The DICOM Standard Application Context Name is always supported:

Table 112: DICOM Application Context for Sender AE

Application Context Name	1.2.840.10008.3.1.1.1

The maximum PDU size that will be offered is configurable, and by default is 16,384 bytes

3.2.8.1.2   Number of Associations

The Event Handler AE places configurable limitations on the number of simultaneous connections it will support. Once the event Handler AE accepts an Association, a spawned child task will receive any messages transmitted on that Association. The default maximum number of Associations is 10 per connecting host. It is possible to restrict the number of hosts that can connect with the Event Handler AE so the combination of these settings can restrict the maximum number of Associations.

Table 113: Number of Simultaneous Associations as an Acceptor for Importer AE

Maximum number of simultaneous Associations	Unlimited[11]

3.2.8.1.3   Asynchronous Nature

The Event Handler AE does not provide asynchronous communication (multiple outstanding transactions over a single Association). All Association requests must be completed and acknowledged before a new operation can be initiated.

Table 114: Asynchronous Nature as an SCP for Importer AE

Maximum number of outstanding asynchronous transactions	1 (Not Configurable)

3.2.8.1.4   Implementation Identifying Information

Table 115: DICOM Implementation Class and Version for Event Handler AE

Implementation Class UID	1.2.840.113711.15
Implementation Version Name	V1.0

3.2.8.2 Association Initiation Policies

The Event Handler AE does not initiate Associations.

3.2.8.3 Association Acceptance Policies

3.2.8.3.1   Activity – External system sends notification of an event

3.2.8.3.1.1   Description and Sequencing of Activity

The Event Handler AE accepts Association Requests only if they propose one or more Presentation Contexts that the Event Handler AE actually supports. If none of the requested Presentation Contexts

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[11] Default maximum is 10 per host permitted to connect to the Event Handler AE.

are accepted, then the Association Request itself is rejected. The Event Handler AE can be configured to only accept Associations requested by certain hosts (using TCP/IP address).

If the Event Handler AE receives an MPPS SOP Class Request Message from a Remote AE, then it can forward this Request to the External Notifier AE. The External Notifier AE can then forward the Request Message to other Remote AEs acting as an SCP for the MPPS SOP Class. In addition, under certain circumstances, any Scheduled Procedure Step corresponding to the MPPS can be removed from the Modality Worklist.

The Event Handler AE has a configurable timeout value for the maximum amount of time that it will wait on an open Association for a new request from a remote AE. A remote AE can reset this timer by sending a Verification request (C-ECHO-RQ). This can act as a useful mechanism for a remote AE to maintain an active Association if the length of time between sending MPPS Requests is long (such as when using a single Association to send the initial Message to create an MPPS and then later Messages to update its status and information).

The Event Handler AE may reject Association attempts as shown in the Table below. The Result, Source and Reason/Diag columns represent the values returned in the corresponding fields of an ASSOCIATE-RJ PDU (see PS 3.8, Section 9.3.4). The following abbreviations are used in the Source column:

  a)   1 – DICOM UL service-user

  b)   2 – DICOM UL service-provider (ASCE related function)

  c)   3 – DICOM UL service-provider (Presentation related function)

Table 116: Event Handler AE Association Rejection Reasons

Result	Source	Reason/Diag	Explanation
2 – rejected-transient	c	2 – local-limit-exceeded	The (configurable) maximum number of simultaneous Associations has been reached. An Association request with the same parameters may succeed at a later time.
1 – rejected-permanent	a	2 – application-context-name-not-supported	The Association request contained an unsupported Application Context Name. An association request with the same parameters will not succeed at a later time.
1 – rejected-permanent	b	1 – no-reason-given	The Association request could not be parsed. An Association request with the same format will not succeed at a later time. Usually this is only returned if the Event Handler AE has not been configured to allow the remote AE host to connect to it. The Event Handler AE can be configured to allow only specific host names to open Associations with it. Note that it cannot currently be configured to only allow specific calling and/or called AE Titles when forming Associations.

3.2.8.3.1.2   Accepted Presentation Contexts

The Event Handler AE may accept any one or more of the following Presentation Contexts:

Table 117: Event Handler AE Accepted Presentation Contexts

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

Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

3.2.8.3.1.3   SOP Specific Conformance as an Association Acceptor

3.2.8.3.1.3.1   SOP Specific Conformance – Modality Performed Procedure Step

If the Event Handler AE receives an MPPS N-CREATE or N-SET Request Message from a Remote AE, then it can forward this to the External Notifier AE. The External Notifier AE can then forward a copy of the Request Message to other Remote AEs acting as an SCP for the MPPS SOP Class. This behavior implements the IHE Technical Framework requirements for the Performed Procedure Step Manager Actor.

In addition, under certain circumstances, any Scheduled Procedure Step corresponding to the MPPS can be removed from the Modality Worklist.

The Event Handler AE can pass all Attributes and values of an MPPS N-CREATE Request to the External Notifier AE; however, it retains only the following Attribute values in the McKesson Radiology™ 12.3 database:

Table 118: MPPS N-CREATE-RQ Attribute Values Retained by Event Handler

Attribute Name	Tag ID	VR
Performed Procedure Step ID	(0040,0253)	SH
Performed Procedure Step UID / Affected SOP Instance UID	(0000,1000)	UI
Performed Procedure Step Start Date	(0040,0244)	DA
Performed Procedure Step Start Time	(0040,0245)	TM
Performed Procedure Step Status	(0040,0252)	CS

Upon receipt of a MPPS N-CREATE "IN PROGRESS" request, the corresponding Scheduled Procedure Step entry, if it exists, will be removed from the Modality Worklist. Future Modality Worklist queries will not return the removed entry.

The Event Handler AE returns one of the following status codes in a MPPS N-CREATE Response:

Table 119: Event Handler AE MPPS N-CREATE-RSP Status Codes

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The Event Handler AE has successfully created the MPPS. Success indication message is output to the Service Log. No indication is posted to the User Interface.
Failure	Processing Failure	0110	The Event Handler AE failed to properly parse or handle the MPPS N-CREATE Request. An error indication is output to the Service Logs. No indication is posted to the User Interface.

The Event Handler AE can pass all Attributes and values of an MPPS N-SET Request to the External Notifier AE; however, it retains only the following Attribute values in the McKesson Radiology™ 12.3 database:

Table 120: MPPS N-SET-RQ Attributes Updated by Event Handler

Attribute Name	Tag ID	VR
Performed Procedure Step Status	(0040,0252)	CS

Attributes may only be modified when the MPPS entry's status is "IN PROGRESS". If the status is "DISCONTINUED" or "COMPLETED", modification via an N-SET Request is not possible.

An MPPS SOP Instance will not be automatically removed from the McKesson Radiology™ 12.3. Removal of MPPS SOP Instances requires human intervention. Once an MPPS SOP Instance has been removed, then any subsequent N-SET Requests for the SOP Instance will be rejected and an Error Status will be returned in the corresponding N-SET Response.

The Event Handler AE returns one of the following status codes in a MPPS N-CREATE Response:

Table 121: Event Handler AE MPPS N-SET-RSP Status Codes

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The remote AE has successfully set the MPPS. Success indication message is output to the Service Log. No indication is posted to the User Interface.
Failure	Processing Failure	0110	The Event Handler AE failed to properly parse or handle the MPPS N-SET Request. An error indication is output to the Service Logs. No indication is posted to the User Interface.

Table 122:   Event Handler AE Communication Failure Behavior as an Association Acceptor

Exception	Behavior
Timeout expiry for an expected DICOM Message Response (DIMSE level timeout).	The Association is aborted using a DICOM A-ABORT. This is treated as a failure. Importer AE does not attempt to resend the N-EVENT-REPORT Request. An error indication is output to the Service Logs. No indication is posted to the User Interface.
Timeout expiry for an expected DICOM PDU or TCP/IP packet (Low-level timeout).	The Association is aborted using a DICOM A-ABORT. This is treated as a failure. Importer AE does not attempt to resend the N-EVENT-REPORT Request. An error indication is output to the Service Logs. No indication is posted to the User Interface.
Association A-P-ABORTed by the SCU or the network layers indicate communication loss (i.e. low-level TCP/IP socket closure)	This is treated as a failure. Importer AE does not attempt to resend the N-EVENT-REPORT Request. An error indication is output to the Service Logs. No indication is posted to the User Interface.

3.2.8.3.1.3.2   Presentation Context Acceptance Criterion

The Event Handler AE will only accept the Presentation Contexts specified in Table 117.

The Event Handler AE does not check for, and will accept, duplicate Presentation Contexts.

3.2.8.3.1.3.3   Transfer Syntax Selection Policies

The Event Handler AE supports only the Implicit VR Little Endian Transfer Syntax.

3.2.9   Storage Commitment Client AE Specification

3.2.9.1   SOP Classes

The Storage Commitment Client AE provides Standard Conformance to the following DICOM V3.0 SOP Classes:

Table 123: SOP Class Conformance of Storage Commitment Client AE

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

3.2.9.2   Association Establishment Policies

3.2.9.2.1   General

The Storage Commitment Client AE can send a request for establishing an Association with a Storage Commitment SCP. When the association is established, an N-ACTION Request is sent to request for Storage Commitment for previously stored Composite SOP Instances. The Storage Commitment Client AE can wait for the Storage Commitment Confirmation (N-EVENT-REPORT) from the Storage Commitment SCP if the Commitment Confirmation is on the same association. The Event Handler AE will handle the Storage Commitment Confirmation (N-EVENT-REPORT) if the Storage Commitment Confirmation is on a separate association.

The DICOM Standard Application Context Name is always proposed:

Table 124: DICOM Application Context for Storage Commitment Client AE

Application Context Name	1.2.840.10008.3.1.1.1

3.2.9.2.2   Number of Associations

The Storage Commitment Client AE queries the database for pending Storage Commitments jobs, dispatches these jobs to Storage Commitment worker processes that perform the Storage Commitment requests, and completes them when the Storage Commitment worker processes return the responses.

It is possible to configure multiple Storage Commitment worker processes for the Storage Commitment SCU Service. But each Storage Commitment Worker process will only attempt to open one Association at a time to the destination Storage Commitment SCP it is configured to send to. There is no limit on the number Storage Commitment worker processes (simultaneous connections) that the Storage Commitment Client AE can support. However, in the real world, this number is small since the user shall only configure one Storage Commitment worker process per DICOM archive destination.

Table 125: Number of Simultaneous Associations as a Requestor for Storage Commitment Client AE

Maximum number of simultaneous Associations	No hard limit[12]

Table 126: Number of Simultaneous Associations as an Acceptor for Storage Commitment Client AE

Maximum number of simultaneous Associations	Unlimited[13]

3.2.9.2.3   Asynchronous Nature

The Storage Commitment Client AE does not provide asynchronous communication (multiple outstanding transactions over a single Association). All Association requests must be completed and acknowledged before a new operation can be initiated.

Table 127: Asynchronous Nature as an SCU for Storage Commitment Client AE

Maximum number of outstanding asynchronous transactions	1 (Not Configurable)

3.2.9.2.4   Implementation Identifying Information

Table 128: DICOM Implementation Class and Version for Storage Commitment Client AE

Implementation Class UID	1.2.840.113711.15
Implementation Version Name	V1.0

3.2.9.3   Association Initiation Policies

3.2.9.3.1   Activity – Send Storage Commitment Request

3.2.9.3.1.1   Description and Sequencing of Activity

The Storage Commitment Client AE will attempt to initiate an association when requested to commit the Composite SOP Instances. When the association is established, an N-ACTION Request is sent to request storage commitment for previously stored Composite SOP Instances. After receiving the N-ACTION response from the Storage Commitment SCP, the Storage Commitment Client AE can wait for the corresponding Storage Commitment Confirmation (N-EVENT-REPORT) on the same association or release the association of the N-ACTION Request. If the Storage Commitment Client AE is configured to not wait for the N-EVENT-REPORT, it will release the association of the N-ACTION Request. The Storage Commitment SCP will be required to open a new association with the Storage Commitment Client AE to send over the N-EVENT-REPORT. The Event Handler AE is responsible for listening for the Storage Commitment Confirmation (N-EVENT-REPORT) on the new association on behalf of the Storage

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[12] There is not hard limit to the number of simultaneous associations initiate by the Storage Commitment Client AE. However, in the real world, this number is small since the user shall only configure one Storage Commitment worker process per DICOM archive destination.

[13] Default maximum is 10 per host permitted to connect to the Event Handler AE.

Commitment Client AE. The Storage Commitment SCP will close the association after sending over the N-EVENT-REPORT.

Figure 9: Sequencing of Activity – Send Storage Commitment Request
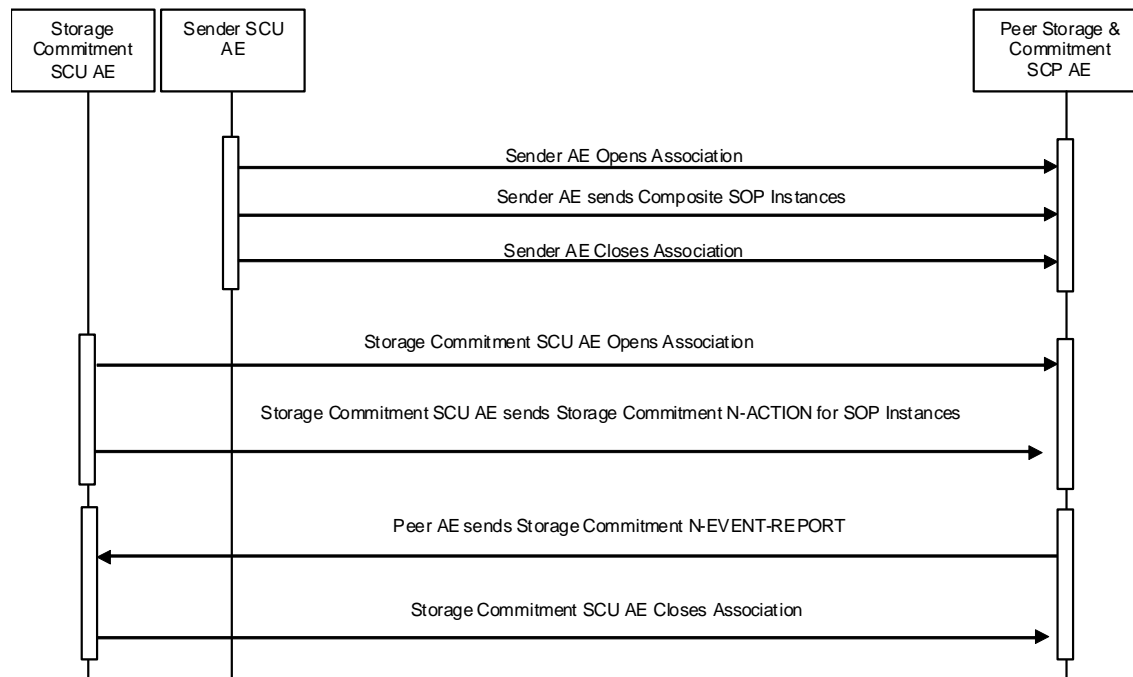
Note that the Storage Commitment SCU Client AE shall only send Storage Commitment N-ACTION requests for previously stored Composite SOP Instances.

The following sequencing constraints illustrated in Figure 9 apply to the Storage Commitment Client AE for making Storage Commitment Push Model Requests and receiving N-EVENT-REPORT using a Single Association:

1. Storage Commitment Client AE opens an Association with Peer Storage Commitment SCP AE.

2. Storage Commitment Client AE requests Storage Commitment of Composite SOP Instance(s) (sends N-ACTION-RQ and Peer Storage Commitment SCP AE responds with N-ACTION-RSP to indicate that it received the request).

3. Peer Storage Commitment SCP AE sends Storage Commitment Push Model Notification (N-EVENT-REPORT).

4. Storage Commitment Client AE closes the Association.

3.2.9.3.1.2   *Proposed Presentation Contexts*

The Storage Commitment Client AE will propose Presentation Contexts as shown in the following table:

Table 129: Storage Commitment Client AE Proposed Presentation Contexts

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
Storage Commitment Push Model	1.2.840.10008.1.20.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

3.2.9.3.1.3   SOP Specific Conformance as an Association Requestor

3.2.9.3.1.3.1   SOP Specific Conformance - Storage Commitment

Standard conformance is provided to the DICOM Storage Commitment Push Model SOP Class as an SCP.

The associated activity with the Storage Commitment Push Model Service enables the Storage Commitment Client AE to request remote AEs to make commitment to permanently store Composite SOP Instances that have been sent to them. It thus allows McKesson Radiology™ 12.3 to safely flush the Composite SOP Instances from its local cache storage.

The Storage Commitment Client AE will send a request for establishing an Association with a remote AE. When the association is established, an N-ACTION Request is sent to request for Storage Commitment for previously stored Composite SOP Instances. The Storage Commitment Client AE can wait for the Storage Commitment Confirmation (N-EVENT-REPORT) from the remote AE if the Commitment Confirmation is on the same association. The Event Handler AE will handle the Storage Commitment Confirmation (N-EVENT-REPORT) if the Storage Commitment Confirmation is on a separate association.

The Storage Commitment Client AE creates files called Service Logs and database records that can be used to monitor its status and diagnose any problems that may arise. If any error occurs during DICOM communication then appropriate messages are always output to the Service Logs and database Storage Commitment Job records.

If the request by the Storage Commitment Client AE to establish an Association fails for any reason (i.e. fail to connect with remote AE's TCP/IP port, Association Request is Rejected by remote AE, etc.) then the Storage Commitment Client AE will try again later to send the N-ACTION Request. The number of retries (default 3) and delay between retries (default 30 min) are configurable.

The Storage Commitment Client AE will exhibit the following Behavior according to the Status Code value returned in a Storage Commitment Push Model N-ACTION Response from a destination SCP:

Table 130: Storage Commitment Client AE N-ACTION-RSP Status Codes Handling

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The Storage Commitment Client AE has successfully Requested the Storage Commitment Push Model N-ACTION Request. Continue to listen for N-EVENT-REPORT on the same association or separate association depending on configuration.
Error	Processing Failure	0110	Indicates that the Storage Commitment Push Model N-ACTION Request cannot be parsed by the Storage Commitment SCP AE.

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Service Status	Further Meaning	Error Code	Behavior
			An error indication is output to the Service Logs. A failure Storage Commitment Request database record is created.
Error	No Such SOP Class	0112	Indicates that the Storage Commitment Push Model N-ACTION Request cannot be processed by the Storage Commitment SCP AE because a The SCP does not accept N-ACTION Request. An error indication is output to the Service Logs. A failure Storage Commitment Request database record is created.

NOTE1:   Any Error codes not 0000 is considered a failure.

The Storage Commitment Client AE will send one of the N-EVENT-REPORT Response codes to the Storage Commitment SCP after processing of the N-EVENT-REPORT Result it receives.

The Storage Commitment Client AE verifies the Transaction UID and Committed SOP Instances with the original request. If the Transaction UID and the Committed SOP Instances failed to verify then the Storage Commitment Client AE will re queue and retry the Storage Commitment Request (with a new Transaction UID). However, the Storage Commitment Client AE only returns an N-EVENT-REPORT Response status code of 0000 (Success) to indicate to that the N-EVENT-REPORT Result has been received. It will not return other status codes such as 0110 or 0119 below.

Table 131: Storage Commitment Client AE N-EVENT-REPORT Response Codes

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The SCU has successfully received the Storage Commitment Report. - Verified the Transaction UID is the same Transaction UID in the N-ACTION Request. - All SOP Instances are committed - All SOP Instances in the Storage Commitment Report are verified with the Referenced SOP Instances. Success indication message is output to the Service Logs. A successful Storage Commitment database record is created. No indication is posted to the User Interface.
Failure	Processing failure	0110	Not Used Failed to parse the N-EVENT-REPORT-RQ from the Storage Commitment SCP An error indication is output to the Service Logs. A failure Storage Commitment Request database record is created. No indication is posted to the User Interface.
Failure	SOP Instance UID does not match	0119	Not Used Some SOP Instances in the Storage Commitment Report do not match the SOP Instances in the Reference SOP Instance. No indication is posted to the User Interface.

3.2.9.3.1.3.2   Association Requestor Communication Failure Behavior

The Behavior of the Storage Client AE during communication failure when it is acting as an Association Requestor is summarized in the following table:

Table 132: Storage Commitment Client AE Communication Failure Behavior as an Association Requestor

Exception	Behavior
Timeout expiry for an expected DICOM Message Response (DIMSE level timeout).	The Association is aborted using a DICOM A-ABORT, A-RELEASE. This is treated as a failure. Storage Commitment Client AE will attempt to resend the Storage Commitment job using the N-ACTION Request after a configurable retry delay (in minutes). An error indication is output to the Service Logs. A failure Storage Commitment Request database record is created. No indication is posted to the User Interface.
Timeout expiry for an expected DICOM PDU or TCP/IP packet (Low-level timeout).	The Association is aborted using a DICOM A-ABORT, A-RELEASE. This is treated as a failure. Storage Commitment Client AE will attempt to resend the Storage Commitment job using the N-ACTION Request after a configurable retry delay (in minutes). An error indication is output to the Service Logs. A failure Storage Commitment Request database record is created. No indication is posted to the User Interface.
Association A-P-ABORTed by the SCP or the network layers indicate communication loss (i.e. low-level TCP/IP socket closure)	The Association is aborted using a DICOM A-ABORT, A-RELEASE. This is treated as a failure. Storage Commitment Client AE will attempt to resend the Storage Commitment job using the N-ACTION Request after a configurable retry delay (in minutes). An error indication is output to the Service Logs. A failure Storage Commitment Request database record is created. No indication is posted to the User Interface.

3.2.9.4   Association Acceptance Policy

3.2.9.4.1   Activity – Receive Storage Commitment Response

3.2.9.4.1.1   Description and Sequencing of Activity

The Storage Commitment Client AE accepts association if configured to receive N-EVENT-REPORT on a separate association.

The Storage Commitment Client AE accepts Association Requests only if the Requestor proposes one or more Presentation Contexts that the Storage Commitment Client AE actually supports. If none of the requested Presentation Contexts are accepted, then the Association Request itself is rejected. The Storage Commitment Client AE can be configured to only accept Associations requested by certain hosts (using TCP/IP address).

Figure 10: Sequencing of Activity – Receive Storage Commitment Response in a Separate Association
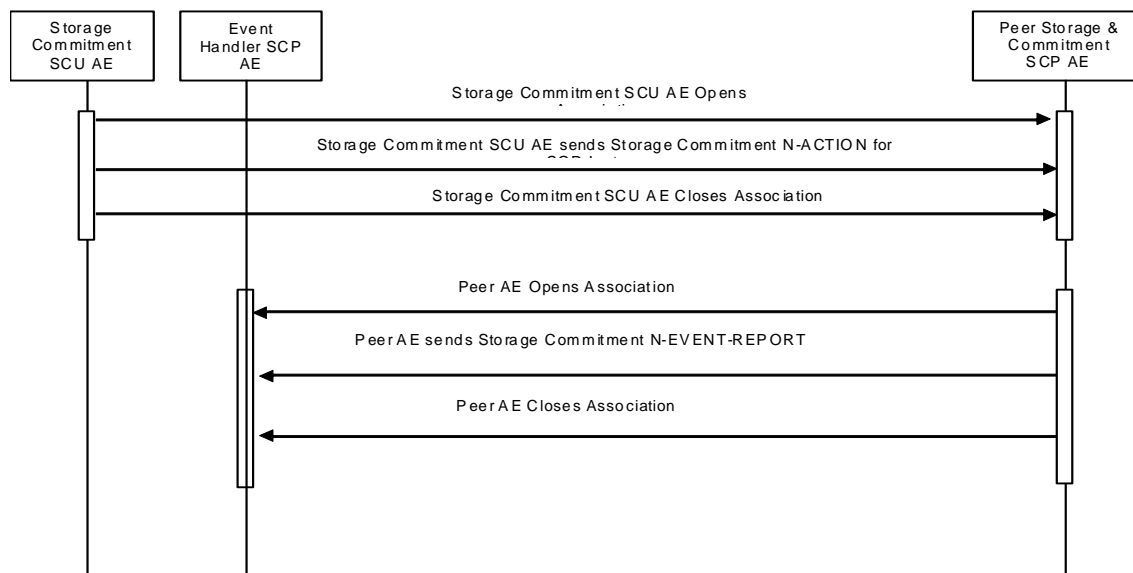
The following sequencing constraints illustrated in Figure 10 apply to the Storage Commitment Client AE for handling Storage Commitment Push Model N-EVENT-REPORT over the separate Association:

1. Storage Commitment Client AE opens an Association with Peer Storage Commitment SCP AE.

2. Storage Commitment Client AE requests Storage Commitment of Composite SOP Instance(s) (sends N-ACTION-RQ and Peer Storage Commitment SCP AE responds with N-ACTION-RSP to indicate that it received the request).

3. Storage Commitment Client AE closes the Association of the N-ACTION Request.

4. Peer Storage Commitment SCP AE opens a new Association.

5. Peer Storage Commitment SCP AE sends Storage Commitment Push Model Notification (N-EVENT-REPORT).

6. Peer Storage Commit SCP AE closes the Association with the Event Handler AE.

The Storage Commitment Client AE has a configurable timeout value for the maximum amount of time that it will wait on an open Association for a new request from a remote AE. A remote AE can reset this timer by sending a Verification request (C-ECHO-RQ). This can act as a useful mechanism for a remote AE to maintain an active Association if the length of time between sending requests is long. The Storage Commitment Client AE also has a configurable wait time value to wait for the N-EVENT-REPORT from the Storage Commitment SCP before failing the Storage Commitment job and resubmitting it.

The Storage Commitment Client AE may reject Association attempts as shown in the Table below. The Result, Source and Reason/Diag columns represent the values returned in the corresponding fields of an ASSOCIATE-RJ PDU (see PS 3.8, Section 9.3.4 and Event Handler AE). The following abbreviations are used in the Source column:

a)   1 – DICOM UL service-user

b)   2 – DICOM UL service-provider (ASCE related function)

c)   3 – DICOM UL service-provider (Presentation related function)

Table 133: Storage Commitment Client AE Association Rejection Reasons

Result	Source	Reason/Diag	Explanation
2 – rejected-transient	c	2 – local-limit-exceeded	The (configurable) maximum number of simultaneous Associations has been reached. An Association request with the same parameters may succeed at a later time.
1 – rejected-permanent	a	2 – application-context-name-not-supported	The Association request contained an unsupported Application Context Name. An association request with the same parameters will not succeed at a later time.
1 – rejected-permanent	b	1 – no-reason-given	The Association request could not be parsed. An Association request with the same format will not succeed at a later time. Usually this is only returned if the Storage Commitment Client AE has not been configured to allow the remote AE host to connect.

3.2.9.4.1.2   Accepted Presentation Contexts

The Importer AE will accept any Presentation Context containing:

1.   An abstract syntax selected from Table 14

2.   One or more Transfer Syntaxes selected from Table 24

The Storage Commitment Client AE will accept Presentation Contexts (For N-EVENT-REPORT) as shown in the following table:

Table 134: Storage Commitment Client AE Accepted Presentation Contexts

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
Storage Commitment Push Model	1.2.840.10008.1.20.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

3.2.9.4.1.3   SOP Specific Conformance as an Association Acceptor

3.2.9.4.1.3.1   SOP Specific Conformance – Verification

The Storage Commitment Client AE provides standard conformance to the Verification SOP Class as an SCP.

3.2.9.4.1.3.2   SOP Specific Conformance – Storage Commitment

The Storage Commitment Client AE accepts association if configured to receive N-EVENT-REPORT on a separate association.

The Storage Commitment Client AE accepts Association Requests only if the Requestor proposes one or more Presentation Contexts that the Storage Commitment Client AE actually supports. If none of the

requested Presentation Contexts are accepted, then the Association Request itself is rejected. The Storage Commitment Client AE can be configured to only accept Associations requested by certain hosts (using TCP/IP address).

The Storage Commitment Client AE will send one of the N-EVENT-REPORT Response codes to the Storage Commitment SCP after processing of the N-EVENT-REPORT Result it receives.

The Storage Commitment Client AE verifies the Transaction UID and Committed SOP Instances with the original request. If the Transaction UID and the Committed SOP Instances failed to verify then the Storage Commitment Client AE will re queue and retry the Storage Commitment Request (with a new Transaction UID). However, the Storage Commitment Client AE only returns an N-EVENT-REPORT Response status code of 0000 (Success) to indicate to that the N-EVENT-REPORT Result has been received. It will not return other status codes such as 0110 or 0119 below.

Table 135: Storage Commitment Client AE N-EVENT-REPORT Response Codes

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The SCU has successfully received the Storage Commitment Report. - Verified the Transaction UID is the same Transaction UID in the N-ACTION Request. - All SOP Instances are committed - All SOP Instances in the Storage Commitment Report are verified with the Referenced SOP Instances. Success indication message is output to the Service Logs. A successful Storage Commitment database record is created. No indication is posted to the User Interface.
Failure	Processing failure	0110	Not Used Failed to parse the N-EVENT-REPORT-RQ from the Storage Commitment SCP An error indication is output to the Service Logs. A failure Storage Commitment Request database record is created. No indication is posted to the User Interface.
Failure	SOP Instance UID does not match	0119	Not Used Some SOP Instances in the Storage Commitment Report do not match the SOP Instances in the Reference SOP Instance. No indication is posted to the User Interface.

3.2.9.4.1.3.3   Association Acceptor Communication Failure Behavior

The Behavior of the Storage Commitment Client AE during communication failure when it is acting as an Association Acceptor is summarized in the following table (See Event Handler AE):

Table 136: Storage Commitment Client AE Communication Failure Behavior as an Association Acceptor

Exception	Behavior
Timeout expiry for an expected DICOM Message Response (DIMSE level timeout).	The Association is aborted using a DICOM A-ABORT, A-RELEASE. This is treated as a failure. Storage Commitment Client AE will attempt to resend the Storage Commitment job using the N-ACTION Request after a configurable retry delay (in minutes). An error indication is output to the Service Logs. A failure Storage Commitment Request database record is created. No indication is posted to the User Interface.
Timeout expiry for an expected DICOM PDU or TCP/IP packet (Low-level timeout).	The Association is aborted using a DICOM A-ABORT, A-RELEASE. This is treated as a failure. Storage Commitment Client AE will attempt to resend the Storage Commitment job using the N-ACTION Request after a configurable retry delay (in minutes). An error indication is output to the Service Logs. A failure Storage Commitment Request database record is created. No indication is posted to the User Interface.
Association A-P-ABORTed by the SCP or the network layers indicate communication loss (i.e. low-level TCP/IP socket closure)	The Association is aborted using a DICOM A-ABORT, A-RELEASE. This is treated as a failure. Storage Commitment Client AE will attempt to resend the Storage Commitment job using the N-ACTION Request after a configurable retry delay (in minutes). An error indication is output to the Service Logs. A failure Storage Commitment Request database record is created. No indication is posted to the User Interface.

3.2.10   QIDO-RS Service Provider Specification

3.2.10.1 QIDO-RS Search For Studies

McKesson Radiology™ 12.3 supports acting as a QIDO-RS Service Provider. It allows searches for DICOM Studies based on the following specification.

3.2.10.1.1   Command

https://mckhost/DICOMRestService/qido/studies[?query]

Table 137: QIDO-RS Search For Studies Specification

Parameter	Description
Media Types	Supported "multipart/related;type=application/dicom+xml" or "application/json"
Matching Attributes	See Table 138
Return Attributes	See Table 139
Limit	Supported The maximum number of results returned in a query is the lower of: • If specified, the Limit parameter value

Parameter	Description
	• If the request requires a database fetch, a site configurable database fetch limit • A site configurable query results limit
Offset	Supported
Fuzzymatching	Ignored Fuzzy matching applies to names in general, so Referring Physicians Name is searched as well with Fuzzy Matching. Matching is always case-insensitive and matches against the provided name as if there was a trailing wildcard regardless of what the fuzzymatching parameter is set to (either the true or false value).
Includefield	Supported See "includefield" related entries in Table 139.

Table 138: QIDO-RS STUDY attribute matching

Key Word	Tag	Types of Matching
StudyDate	00080020	S, U, R
StudyTime	00080030	S, U, R
AccessionNumber	00080050	S,U
IssuerOfAccessionNumberSequence	00080051	SQ
ModalitiesInStudy	00080061	S,U,
ReferringPhysicianName	00080090	S,*,U
PatientName	00100010	S,*,U
PatientID	00100020	S,U
IssuerOfPatientID	00100021	S,U
StudyID	00200010	S,U
StudyInstanceUID	0020000D	UNIQUE

The types of Matching supported by the QIDO-RS Service Provider

S   - indicates Single Value Matching is supported.

R   - indicates Range Matching is supported.

*   - indicates Wildcard Matching is supported.

U   - indicates Universal Matching is supported.

SQ   - indicates Sequence Matching is supported.

UNIQUE   - indicates that this is the unique key for this query level, in which case universal matching or single value matching is used depending on the query level.

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NOTE1: Only the first value in the Issuer of Accession Number Sequence will be used as the query key. This is the key for local namespace as opposed to universal entity ID.

NOTE2: The study level query by person name (patient name or Referring Physician Name) returns wildcard matches, even without a wild card specified in the person name query.

For example, a search for "Mill" would return patients whose last names begin with "Mill", such as "Miller" and "Millen".

For each matching Study, the QIDO-RS provider shall return all attributes in accordance with Table 139:

Table 139: QIDO-RS STUDY attribute returned

Attribute Name	Tag
Study Date	(0008,0020)
Study Time	(0008,0030)
Accession Number	(0008,0050)
Issuer of Accession Number Sequence	(0008,0051)
Instance Availability	(0008,0056)
Modalities in Study	(0008,0061)
Referring Physician's Name	(0008,0090)
Patient Name	(0010,0010)
Patient ID	(0010,0020)
Issuer of Patient ID	(0010,0021)
Patient's Birth Date	(0010,0030)
Patient's Sex	(0010,0040)
Study ID	(0020,0010)
Study Instance UID	(0020,000D)
Number of Study Related Series	(0020,1206)
Number of Study Related Instances	(0020,1208)
Retrieve URL	(0008,1190)
All other Study Level DICOM Attributes passed as "includefield" query values that are defined in PS3.3 of the DICOM 3.0 standard[1] (Study Level Attributes are the Attributes in the General Study, Patient Study, and Clinical Trial Study Modules in PS3.3.).	
All available Study Level DICOM Attributes defined in PS3.3 of the DICOM 3.0 standard[1] if the "includefield" query key is included with a value of "all"	

NOTE1: An attribute shall be returned only if a value is available (e.g. Rows for a non-image object will not be returned since there is no value available).

NOTE2: Issuer of Accession Number and Issuer of Patient ID are returned to provide information on the study and patient context. See section 3.2.10.4.

3.2.10.2 QIDO-RS Search For Series

The QIDO-RS Service AE allows searches for DICOM Series based on the following specification. This includes search by study instance UID, or series instance UID, or other study and series level search attributes.

3.2.10.2.1   Command

https://mckhost/DICOMRestService/qido/studies/<study instance uid>/series[?query]

https://mckhost/DICOMRestService/qido/series[?query]

Table 140: QIDO-RS Search For Series Specification

Parameter	Description
Media Types	Supported "multipart/related;type=application/dicom+xml" or "application/json"
Matching Attributes	See Table 138 and Table 141
Return Attributes	See Table 142
Offset	Supported
Limit	Supported The maximum number of results returned in a query is the lower of: • If specified, the Limit parameter value • If the request requires a database fetch, a site configurable database fetch limit • A site configurable query results limit
Includefield	Supported See "includefield" related entries in Table 142.
Relational Queries	Supported According to DICOM C-FIND Service, relational-queries allow any combination of keys at any level in the hierarchy. Support for relational-queries removes the baseline restriction that a Unique Key shall be specified for all levels above the Query/Retrieve level in the C-FIND request. McKesson Radiology™ 12.3 implementation does not support instance level query keys for series level queries. Only patient, study, series level keys are supported for the series level queries.

Table 141: QIDO-RS SERIES attribute matching

Key Word	Tag	Types of Matching
Modality	00080060	S, U,
SeriesNumber	00200011	S, U
SeriesInstanceUID	0020000E	UNIQUE
PerformedProcedureStepStartDate	00400244	S, U, R
PerformedProcedureStepStartTime	00400245	S, U, R

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Key Word	Tag	Types of Matching
RequestAttributeSequence	00400275	SQ
>ScheduledProcedureStepID	00400009	S, U
>RequestedProcedureID	00401001	S, U

The types of Matching supported by the QIDO-RS Service Provider

S   - indicates Single Value Matching is supported.

R   - indicates Range Matching is supported.

*   - indicates Wildcard Matching is supported.

U   - indicates Universal Matching is supported.

SQ   - indicates Sequence Matching is supported.

UNIQUE   - indicates that this is the unique key for this query level, in which case universal matching or single value matching is used depending on the query level.

For each matching Series, the QIDO-RS Service Provider shall return all attributes in accordance with Table 142.

Table 142: QIDO-RS SERIES attribute returned

Attribute Name	Tag
Instance Availability	(0008,0056)
Modality	(0008,0060)
Series Description	(0008,103E)
Series Number	(0020,0011)
Series Instance UID	(0020,000E)
Number of Series Related Instances	(0020,1209)
Performed Procedure Step Start Date	(0040,0244)
Performed Procedure Step Start Time	(0040,0245)
Request Attribute Sequence	(0040,0275)
>Scheduled Procedure Step ID	(0040,0009)
>Requested Procedure ID	(0040,1001)
Retrieve URL	(0040,1190)
All other Study or Series Level DICOM Attributes passed as "includefield" query values that are defined in PS3.3 of the DICOM 3.0 standard[1] (Series Level DICOM Attributes are the attributes in the General Series, Clinical Trial Series and SR Document Series Modules in PS3.3).	
All available Series Level DICOM Attributes that are defined in PS3.3 of the DICOM 3.0 standard[1] if the "includefield" query key is included with a value of "all"	
If {StudyInstanceUID} is not specified in the URL path, all Study-level attributes specified in Table 139	

NOTE1:   An attribute shall be returned only if a value is available (e.g. Rows for a non-image object will not be returned since there is no value available).

3.2.10.3 QIDO-RS Search For Instances

The QIDO-RS Service AE allows searches for DICOM Instances based on the following specification.

3.2.10.3.1   Command

For instance level query, the current implementation requires either study instance UID or Series instance UID to be specified in the URL or as query parameters.

For example, the following two queries are supported:

https://mckhost/DICOMRestService/qido/studies/<study instance uid>/instances?sopinstanceuid=<sop instance uid>
  or

https://mckhost/DICOMRestService/qido/instances?studyinstanceuid=<studyinstanceuid>&sopinstanceuid=<sop instance uid>

But the following query is not supported:

https://mckhost/DICOMRestService/qido/instances?sopinstanceuid=<sop instance uid>

For each matching Instances, the QIDO-RS provider shall return all attributes in accordance with Table 143:

Table 143: QIDO-RS Search For Instances Specification

Parameter	Restrictions
Media Types	Supported "multipart/related;type=application/dicom+xml" or "application/json"
Matching Attributes	See Table 138 and Table 141 and Table 144
Return Attributes	See Table 145
Offset	Supported
Limit	Supported The maximum number of results returned in a query is the lower of: • If specified, the Limit parameter value • If the request requires a database fetch, a site configurable database fetch limit • A site configurable query results limit
Includefield	Supported See "includefield" related entries in Table 145.
Relational Queries	Supported According to DICOM C-FIND Service, relational-queries allow any combination of keys at any level in the hierarchy. Support for relational-queries removes the baseline restriction that a Unique Key shall be specified for all levels above the Query/Retrieve level in the C-FIND request. McKesson Radiology™ 12.3 Relational Instance level query implementation requires either study instance UID or series instance UID to be specified.

Table 144: QIDO-RS Instance attributes matching

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Key Word	Tag	Types of Matching
SOPClassUID	00080016	S, U
SOPInstanceUID	00080018	UNIQUE
InstanceNumber	00200013	S, U

The types of Matching supported by the QIDO-RS Service Provider

    S   - indicates Single Value Matching is supported.

    R   - indicates Range Matching is supported.

    *   - indicates Wildcard Matching is supported.

    U   - indicates Universal Matching is supported.

    SQ   - indicates Sequence Matching is supported.

    UNIQUE   - indicates that this is the unique key for this query level, in which case universal matching or single value matching is used depending on the query level.

Table 145: QIDO-RS INSTANCE attribute returned

Attribute Name	Tag
SOP Class UID	(0008,0016)
SOP Instance UID	(0008,0018)
Instance Availability	(0008,0056)
Rows	(0028,0010)
Columns	(0028,0011)
Bits Allocated	(0028,0100)
Number of Frames	(0028,0008)
Retrieve URL	(0040,1190)
All other Study, Series or Instance Level DICOM Attributes passed as "includefield" query values that are defined in the PS3.3 of the DICOM 3.0 standard[1].	
All available Instance Level DICOM Attributes that are defined in PS3.3 of the DICOM 3.0 standard[1]. The "includefield" query key is included with a value of "all"	
If {StudyInstanceUID} is not specified in the URL path, all Study-level attributes specified in Table 139	
If {SeriesInstanceUID} is not specified in the URL path, all Series-level attributes specified in Table 142	

NOTE1: An attribute shall be returned only if a value is available (e.g. Rows for a non-image object will not be returned since there is no value available).

3.2.10.4 QIDO RS Multi-Context Support

The QIDO-RS service supports specifying the context for both Patient ID and Accession Number in the URL or with the URL parameters for searches.

If both the URL and URL parameters specify context information, the URL parameters shall take precedence in setting the context for the query.

If the context for the query does not match the context of the study, the accession number returned shall be blank in the QIDO-RS response.

For the study's patient, if the patient does not have a patient ID in the context for the query, the patient ID shall be returned as blank.

For example, for the URL:

https://mckhost/DICOMRestService/qido/Context/Context1/studies?accessionNumber=acc00001&IssuerOfPatientID=Context2.

The query will be performed for a study with access number of acc00001 in context of Context 1, and if there are results found then the results will contain a patient ID issued from Context2 or no patient ID if the patient does not have a patient ID from Context2. The return will not use the patient's patient ID issued from Context1 because the QIDO-RS Service AE will return the patient ID from Context2 only, due to the query parameters specifying that patient ID should be from Context2.

3.2.10.5 QIDO RS Limitations

Certain query types are not supported in the QIDO-RS implementation:

Searching for all studies, series, or instances in the system is not supported. These queries are too general and slow the system down.

In addition, searches solely with certain attributes are not supported:

Querying for only the issuer of patient ID is not supported.

Querying for only the issuer of accession number sequence is not supported.

Querying for only the modality attribute is not supported.

Querying for only the series number is not supported.

Querying for only the requested procedure ID is not supported.

Querying for only the scheduled procedure step ID is not supported.

Querying for only the performed procedure step start date is not supported.

The following shows two example queries that are not supported:

http://mckhost/DICOMRestService/qido/studies?modalitiesinstudy=us
http://mckhost/DICOMRestService/qido/series?modality=US

3.2.10.6 Preference Order for Multiple Accept Headers

The QIDO-RS Service Provider supports returning data in a supported format chosen from one of the formats that the client sent in an Accept header.

The QIDO-RS Service Provider will interpret the client's priority by using the q value in the HTTPS Accept headers , and then for all formats given that have the same q value, by the order in which the client lists the formats. Note that if the format does not include a q value, this is equivalent to the client specifying a q value of 1.0. For example, if the client gives an accept header of multipart/related; type=application/dicom+xml, application/json then the response will be a multipart response with each part containing an XML file. If however the client gives application/json, multipart/related;

type=application/dicom+xml then the client will get back the single part response with only JSON data contained.

3.2.10.7 QIDO-RS Status Codes

The QIDO-RS Service Provider shall return HTTP status codes to indicate the status of a request.

Table 146: QIDO-RS HTTP/1.1 STATUS CODES

HTTP Status Code	Name	Description
200	OK	The query completed and all matching results are returned in the response message body.
206	Partial Content	The query completed but the number of results exceeds the query limit set by the client or the site configuration. Some of the matching results are returned to the QIDO-RS Client.
400	Bad Request	The request could not be understood by the server
403	Forbidden	Server indicates the client did not present a recognized client certificate when the server is configured to require a client certificate.
404	Not Found	QIDO-RS Client has asked for information on a result not wholly contained in the database and a retrieval of files from archive is required to complete the request. An example is a query for an attribute that doesn't exist in the database and requires loading the DICOM instance from archive to read the information from the DICOM headers. For data that was online, the results will be returned along with the status code of 404. For data that was not online, the QIDO-RS Service Provider shall initiate retrieval of the data from archive. If the QIDO-RS Client makes the same query again moments later after the data has been retrieved from archive, the data will be returned and the client should be able to get an HTTP status code of 200 for the subsequent call.
413	Request Entity Too Large	This indicates that the query was too broad and a narrower query should be requested. This is returned when the number of QIDO-RS results exceeds a site configured limit. Some of the matching results that fit in the limit are returned to the QIDO-RS Client along with the status code of 413.

3.2.10.8 Connection Policies

3.2.10.8.1   General

QIDO-RS Service Provider supports TLS Client Certificates for its transport level security support. QIDO-RS Service Provider will refuse a connection over TLS from a source that is not signed by a signing certificate the service is configured to allow.

3.2.10.8.2   Security

QIDO-RS Service Provider supports TLS Client Certificates for its transport level security support.

QIDO-RS Service Provider supports site level configuration for Cross Origin Resource Sharing (CORS) which allows the resource to be requested from browsers running web applications served from servers in another domain than the one offering the DICOM RESTful services.

3.2.11 WADO-RS Service Provider Specification

3.2.11.1 Supported Transfer Syntaxes/Media Types

3.2.11.1.1 WADO-RS DICOM Object Transfer Syntaxes Support

The WADO-RS Service Provider supports the following transfer syntaxes for the application/dicom request type, which request DICOM instances:

Table 147: WADO-RS DICOM object transfer syntaxes

Transfer Syntax UID	Description	Media Type / Request Header Accept value
1.2.840.10008.1.2	DICOM Implicit VR Little Endian	application/dicom; transfer-syntax=1.2.840.10008.1.2
1.2.840.10008.1.2.1	DICOM Explicit VR Little Endian	application/dicom; transfer-syntax=1.2.840.10008.1.2.1
Unspecified	Format used is same as how McKesson Radiology™ 12.3 system stored the instances internally. This format will incur the least load on the server as the instances will be able to be transferred without having to convert the format. For WADO-RS Clients that support the formats that the system stores, it is suggested they use this request header accept value to get the best performance.	application/dicom
1.2.840.10008.1.2.2	DICOM Explicit VR Big Endian	application/dicom; transfer-syntax=1.2.840.10008.1.2.2
1.2.840.10008.1.2.4.50	DICOM JPEG Baseline Process 1	application/dicom; transfer-syntax=1.2.840.10008.1.2.4.50
1.2.840.10008.1.2.4.51	DICOM JPEG Extended Process 2 & 4	application/dicom; transfer-syntax=1.2.840.10008.1.2.4.51
1.2.840.10008.1.2.4.57	DICOM JPEG Lossless Proc 14	application/dicom; transfer-syntax=1.2.840.10008.1.2.4.57
1.2.840.10008.1.2.4.70	DICOM JPEG Lossless First Order Prediction	application/dicom; transfer-syntax=1.2.840.10008.1.2.4.70
1.2.840.10008.1.2.4.90	DICOM JPEG 2000 (Lossless Only)	application/dicom; transfer-syntax=1.2.840.10008.1.2.4.90
1.2.840.10008.1.2.4.91	DICOM JPEG 2000	application/dicom; transfer-syntax=1.2.840.10008.1.2.4.91
1.2.840.10008.1.2.5	DICOM RLE	application/dicom; transfer-syntax=1.2.840.10008.1.2.5

3.2.11.1.2 WADO-RS Image Transfer Syntaxes Support

The WADO-RS Service Provider supports the following transfer syntaxes for the image/dicom request type, which requests the pixel data of a DICOM images.

Table 148: WADO-RS Image Transfer Syntaxes

Transfer Syntax UID	Description	Media Type / Request Header Accept value
1.2.840.10008.1.2.4.50	DICOM JPEG Baseline Process 1	image/dicom+jpeg; transfer-syntax=1.2.840.10008.1.2.4.50
1.2.840.10008.1.2.4.51	DICOM JPEG Extended Process 2 & 4	image/dicom+jpeg; transfer-syntax=1.2.840.10008.1.2.4.51
1.2.840.10008.1.2.4.57	DICOM JPEG Lossless Proc 14	image/dicom+jpeg; transfer-syntax=1.2.840.10008.1.2.4.57
1.2.840.10008.1.2.4.70	DICOM JPEG Lossless First Order Prediction	image/dicom+jpeg; transfer-syntax=1.2.840.10008.1.2.4.70
1.2.840.10008.1.2.4.70	DICOM JPEG Lossless First Order Prediction	image/dicom+jpeg
1.2.840.10008.1.2.4.90	DICOM JPEG 2000 (Lossless Only)	image/dicom+jp2; transfer-syntax=1.2.840.10008.1.2.4.90
1.2.840.10008.1.2.4.90	DICOM JPEG 2000 (Lossless Only)	image/dicom+jp2
1.2.840.10008.1.2.4.91	DICOM JPEG 2000	image/dicom+jp2; transfer-syntax=1.2.840.10008.1.2.4.91
1.2.840.10008.1.2.5	DICOM RLE	image/dicom+rle; transfer-syntax=1.2.840.10008.1.2.5
1.2.840.10008.1.2.5	DICOM RLE	image/dicom+rle

3.2.11.1.3   DICOM Little Endian Media-Type / Transfer Syntax Support

The WADO-RS Service Provider supports returning DICOM binary pixel data contents of tag (7FE0,0010) in Little Endian format when clients send an Accept header with value application/octet-stream.

Table 149: DICOM Little Endian Media-Type / Transfer Syntax

Transfer Syntax UID	Description	Media Type / Request Header Accept value
n/a	Pixel data or frame data or bulk data in little endian format	application/octet-stream

3.2.11.1.4   Retrieve Metadata Media Type Support

Table 150: Retrieve Metadata Media Type Support

Media Type / Request Header Accept value	Description
multipart/related; type=application/dicom+xml or application/json	The returned metadata shall be provided in XML or JSON format.

3.2.11.2 HTTP Status Codes

The HTTP return codes from the McKesson Radiology™ 12.3 implementation of WADO-RS are as follows:

Table 151: WADO-RS HTTP/1.1 STATUS CODES

HTTP Status Code	Name	Description
200	OK	Request completed successfully and has returned all data requested.
206	Partial Content	Request completed and has returned SOME but not ALL of the requested data.
		An example scenario where this response code would be encountered would be if a client requests a study that contains a structured report (not an image), and the only media types they specify they Accept are image types from the tables in the requirements "WADO-RS image transfer syntaxes".
403	Forbidden	Server indicates the client did not present a recognized client certificate when the server is configured to require a client certificate.
404	Not Found	Requested data is not available in online storage.
		For data that was not online, the WADO-RS Service Provider shall initiate retrieval of the data from archive.
		If the WADO-RS Client makes the same retrieval request again moments later after the data has been retrieved from archive, the data will be returned and the client should be able to get an HTTP status code of 200 for the subsequent call.
406	Not Acceptable	Accept type, Transfer Syntax or decompression method not supported.
410	Gone	Requested data is not available at all in the system.

3.2.11.3 WADO-RS Retrieve Study

The RetrieveStudy action causes retrieval of the set of DICOM instances associated with a given study unique identifier (UID) that are then used to build the response, which can be DICOM or bulk data depending on the "Accept" type in the HTTP request header, and encapsulated in a multipart MIME response.

3.2.11.3.1   Command

https://mckhost/DICOMRestService/wado/studies/{StudyInstanceUID}

3.2.11.3.2   URL Parameters

StudyInstanceUID – the study instance UID for a single study

3.2.11.3.3   WADO-RS Retrieve Study Options

The WADO-RS service shall support RetrieveStudy requests per the standard, 6.5.1.1

Table 152: Retrieve Study Options

Options	Description
	multipart/related;type=application/dicom
	Specifies that the response can be full DICOM Instances encoded in PS3.10 format. When transfer-syntax is not specified, the server can freely choose which

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Options	Description
Allowable request header Accept values	transfer-syntax to use for each Instance (format will be same as what McKesson Radiology™ 12.3 has stored).
	multipart/related; type=application/dicom; transfer-syntax={TransferSyntaxUID} Specifies that the response can be full DICOM Instances encoded in PS3.10 format. The allowed Transfer Syntax UID is any chosen from Table 147
	multipart/related;type=application/octet-stream Uncompressed bulk and pixel data shall be encoded in a Little Endian format using the application/octet-stream media type. See Table 149. Specifies that the response includes instance elements with size larger than the bulk data size threshold output as bulk data in Little Endian binary format. DICOM pixel data is output in Little Endian uncompressed format.
	multipart/related; type={MediaType} Specifies that the response can be pixel data encoded using a {MediaType} chosen from Table 148.
SOP Class	SOP Classes supported in Table 14. In addition, the WADOS-RS Service Provider can be configured to exclude instances of specific SOP Classes from the retrieval results.
Size Restriction	Restricted to size supported by McKesson Radiology™ 12.3.

3.2.11.3.4   WADO-RS Retrieve Study Response

The WADO-RS service shall provide a response for RetrieveStudy, per standard, 6.5.1.2

3.2.11.3.4.1   Response Headers

HTTP status codes include all from Table 151.

The HTTP Response contains multi-level headers. The top level HTTP response headers include standard server headers plus a Content-Type of multipart/related with a boundary parameter used to separate the attached parts.

DICOM:

> Content Type

> multipart/related; type=application/dicom; boundary={MessageBoundary}

Bulk Data:

> Content Type

> multipart/related; type=application/octet-stream; boundary={MessageBoundary}

> multipart/related; type={MediaType}; boundary={MessageBoundary}

Table 153: Part Response Header

Part Response Header	Value
Content-Type	The media type (from table in section 3.2.11.1.1 or 3.2.11.1.2 or 3.2.11.1.3) representing the type of data in the content
Content-Location	1) When Media Type returned is one of those in section 3.2.11.1.1. URL is the same as the associated RESTful

	retrieve instance call
	2) When Media Type returned is one of those in section 3.2.11.1.3. URL value is for a bulk data URL for uncompressed bulk data element encoded in Little Endian binary format in each instance in each series in a specified study.
	3) (3) When Media Type returned is one of those in section 3.2.11.1.2
	URL value is for a bulk data URL for compressed pixel data for each frame, in each instance in each series in a specified study.

3.2.11.3.4.2   Response Content

Table 154: Response Content

A multipart response where each part contains either
1)   Instance binary data for each instance in each series in the specified study in the format specified by the part's Content-Type, when the Content-Type header is a media type chosen from the table "**WADO-RS DICOM object transfer syntaxes**"
2)   Binary bulk data or uncompressed pixel data in little endian format for each instance in each series in the specified study, when the Content-Type header is application/octet-stream. See "**DICOM Little Endian Media-Type / Transfer Syntax**"
3)   Pixel data for each frame in each instance in each series in the specified study in the format specified by the part's Content-Type, when the Content-Type header is a media type chosen from the table "**WADO-RS Image Transfer Syntaxes**"

NOTE1:   A requested transfer syntax of 1.2.840.10008.1.2.4.50 (DICOM JPEG Baseline Process 1) only works when the stored instance is 8 bits deep.

3.2.11.3.5   Retrieve Study Example

Retrieving JPEG 2000 lossy compressed frame data or JPEG 2000 lossless compressed frame data or complete DICOM binary data for each instance in explicit VR little endian format for a study

Example URL: https://mckhost/DICOMRestService/Wado/studies/1.2.3.5

Table 155: Request Headers Sent

Accept	multipart/related; type=image/dicom+jp2; transfer-syntax=1.2.840.10008.1.2.4.91; q=0.9
Accept	multipart/related; type=image/dicom+jp2; transfer-syntax=1.2.840.10008.1.2.4.90; q=0.8
Accept	multipart/related; type=application/dicom; transfer-syntax=1.2.840.10008.1.2.1; q=0.7

NOTE1:   For WADO-RS Clients that cannot accept all DICOM formats that the system may have stored the instances internally and thus cannot use "application/dicom" as their most preferred format, the WADO-RS Client will want to explicitly specify the formats that it does support.

For the example, the multiple Accept headers has three entries, the media type of image/dicom+jp2 with transfer syntax JPEG 2000 lossy compression format and "q" [14]

---

[14] The HTTP 1.1 specification defines the Accept HTTP header as a way for the client to tell the server what media types the client supports. The q parameter is used to tell the server what media types are preferred.

parameter set to 0.9, and the media type of image/dicom+jp2 with transfer syntax JPEG 2000 lossless compression format and "q" parameter set to 0.8 and the media type of application/dicom with transfer syntax explicit VR Little Endian and "q" parameter set to 0.7 means that all frames from image instances in the study will be send in JEPG 2000 lossy format, and for any instances that are not images, they will be returned as a full binary blob in explicit VR Little Endian format.

Since McKesson Radiology™ 12.3 understands all three of the WADO-RS Client requested formats, it will respond to the WADO-RS Client using the client's preferred format and will send DICOM instances back to the client using the JPEG 2000 lossy format.

3.2.11.4 WADO-RS Retrieve Series

The RetrieveSeries action causes retrieval of the set of DICOM instances associated with a given study and Series unique identifier (UID) that are then used to build the response, which can be DICOM or bulk data depending on the "Accept" type in the HTTP request header, and encapsulated in a multipart MIME response.

3.2.11.4.1   Command

https://mckhost/DICOMRestService/wado/studies/{StudyInstanceUID}/series/{SeriesInstanceUID}

3.2.11.4.2   URL Parameters

StudyInstanceUID – the study instance UID for a study

SeriesInstanceUID – the series UID for a series that belongs to the specified study

3.2.11.4.3   WADO-RS Retrieve Series Options

The WADO-RS Service Provider shall support RetrieveSeries requests per the standard, 6.5.2.1

Table 156: Retrieve Series Options

Options	Description
Allowable request header Accept values	multipart/related;type=application/dicom Specifies that the response can be full DICOM Instances encoded in PS3.10 format. When transfer-syntax is not specified, the server can freely choose which transfer-syntax to use for each Instance (format will be same as what McKesson Radiology™ 12.3 has stored).
	multipart/related; type=application/dicom; transfer-syntax={TransferSyntaxUID} Specifies that the response can be full DICOM Instances encoded in PS3.10 format. The allowed Transfer Syntax UID is any chosen from Table 147
	multipart/related;type=application/octet-stream Uncompressed bulk and pixel data shall be encoded in a Little Endian format using the application/octet-stream media type. See Table 149. Specifies that the response includes instance elements with size larger than the bulk data size threshold output as bulk data in Little Endian binary format. DICOM pixel data is output in Little Endian uncompressed format.
	multipart/related; type={MediaType} Specifies that the response can be pixel data encoded using a {MediaType} chosen from Table 148.

Options	Description
SOP Class	SOP Classes supported in Table 14 In addition, the WADOS-RS Service Provider can be configured to exclude instances of specific SOP Classes from the retrieval results.
Size Restriction	Restricted to size supported by McKesson Radiology™ 12.3.

3.2.11.4.4   WADO-RS Retrieve Series Response

The WADO-RS Service Provider shall provide a response for RetrieveSeries, per standard, 6.5.2.2.

3.2.11.4.4.1   Response Headers

HTTP status codes include all from Table 151.

The HTTP Response contains multi-level headers. The top level HTTP response headers include standard server headers plus a Content-Type of multipart/related with a boundary parameter used to separate the attached parts.

DICOM:

> Content Type
>
> multipart/related; type=application/dicom; boundary={MessageBoundary}

Bulk Data:

> Content Type
>
> multipart/related; type=application/octet-stream; boundary={MessageBoundary}
>
> multipart/related; type={MediaType}; boundary={MessageBoundary}

Table 157: Part Response Header

Part Response Header	Value
Content-Type	The media type (from table in section 3.2.11.1.1 or 3.2.11.1.2 or 3.2.11.1.3) representing the type of data in the content
Content-Location	4) When Media Type returned is one of those in section 3.2.11.1.1. URL is the same as the associated RESTful retrieve instance call 5) When Media Type returned is one of those in section 3.2.11.1.3. URL value is for a bulk data URL for uncompressed bulk data element encoded in Little Endian binary format in each instance in a specified series. 6) When Media Type returned is one of those in section 3.2.11.1.2. URL value is for a bulk data URL for compressed pixel data for each frame, in each instance in a specified series.

3.2.11.4.4.2   Response Content

Table 158: Response Content

A multipart response where each part contains either
1)   Instance binary data for the instance in the specified Series in the format specified by the part's Content-Type, when the Content-Type header is a media type chosen from the table in "**WADO-RS DICOM object transfer syntaxes**
2)   Binary bulk data or uncompressed pixel data in little endian format for the instance in the specified series, when the Content-Type header is application/octet-stream. See "**DICOM Little Endian Media-Type / Transfer Syntax**"
3)   Pixel data for each frame in each instance in a specified series, when the Content-Type header is a media type chosen from the table in "**WADO-RS Image Transfer Syntaxes**"

NOTE1:   A requested transfer syntax of 1.2.840.10008.1.2.4.50 (DICOM JPEG Baseline Process 1) only works when the stored instance is 8 bits deep.

3.2.11.4.5   Retrieve Series Example

Retrieving JPEG 2000 lossless compressed frame data or complete DICOM binary data for each instance for a Series.

Example URL: https://mckhost/DICOMRestService/Wado/studies/3.4.5/series/2.3.4

Table 159: Request Headers Sent

Accept	multipart/related; type=image/dicom+jp2; transfer-syntax=1.2.840.10008.1.2.4.90
Accept	multipart/related; type=application/dicom; q=0.9

NOTE1:   For the example, the multiple Accept headers has two entries, the media type of image/dicom+jp2 with transfer syntax JPEG 2000 lossless compression format and no "q" parameter (equivalent to q= 1.0), and the media type of application/dicom and "q" parameter set to 0.9 means that any image instances will have their pixel data returned with JPEG 2000 lossless compression format and all instances that do not contain pixel data will be returned as a full binary blob in the format that the McKesson Radiology™ 12.3 has the instance stored in.

3.2.11.5 WADO-RS Retrieve Instance

The RetrieveInstance action causes retrieval of the set of DICOM instances associated with a given study, Series, and SOP Instance unique identifier (UID) that are then used to build the response, which can be DICOM or bulk data depending on the "Accept" type in the HTTP request header, and encapsulated in a multipart MIME response.

3.2.11.5.1   Command

https://mckhost/DICOMRestService/wado/studies/{StudyInstanceUID}/series/{SeriesInstanceUID}/instances/{SOPInstanceUID}

3.2.11.5.2   URL Parameters

StudyInstanceUID – the study instance UID for a study

SeriesInstanceUID – the series UID for a series that belongs to the specified study

SOPInstanceUID – the instance UID for an instance in the specified series

3.2.11.5.3   WADO-RS Retrieve Instance Options

The WADO-RS service shall support RetrieveInstance requests per the standard, 6.5.3.1

Table 160: Retrieve Instance Options

Options	Description
Allowable request header Accept values	multipart/related;type=application/dicom Specifies that the response can be full DICOM Instances encoded in PS3.10 format. When transfer-syntax is not specified, the server can freely choose which transfer-syntax to use for each Instance (format will be same as what McKesson Radiology™ 12.3 has stored).
	multipart/related; type=application/dicom; transfer-syntax={TransferSyntaxUID} Specifies that the response can be full DICOM Instances encoded in PS3.10 format. The allowed Transfer Syntax UID is any chosen from Table 147
	multipart/related;type=application/octet-stream Uncompressed bulk and pixel data shall be encoded in a Little Endian format using the application/octet-stream media type. See Table 149. Specifies that the response includes instance elements with size larger than the bulk data size threshold output as bulk data in Little Endian binary format. DICOM pixel data is output in Little Endian uncompressed format.
	multipart/related; type={MediaType} Specifies that the response can be pixel data encoded using a {MediaType} chosen from Table 148.
SOP Class Restrictions	SOP Classes supported in Table 14 In addition, the WADOS-RS Service Provider can be configured to exclude instances of specific SOP Classes from the retrieval results.
Size Restriction	Restricted to size supported by McKesson Radiology™ 12.3.

3.2.11.5.4   WADO-RS Retrieve Instance Response

The WADO-RS Service Provider shall provide a response for RetrieveInstance, per standard, 6.5.3.2

3.2.11.5.4.1   Response Headers

HTTP status codes include all from Table 151.

The HTTP Response contains multi-level headers. The top level HTTP response headers include standard server headers plus a Content-Type of multipart/related with a boundary parameter used to separate the attached parts.

DICOM:

Content Type

multipart/related; type=application/dicom; boundary={MessageBoundary}

Bulk Data:

Content Type

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multipart/related; type=application/octet-stream; boundary={MessageBoundary}

multipart/related; type={MediaType}; boundary={MessageBoundary}

Table 161: Part Response Header

Part Response Header	Value
Content-Type	The media type (from table in section 3.2.11.1.1 or 3.2.11.1.2 or 3.2.11.1.3) representing the type of data in the content
Content-Location	1) When Media Type returned is one of those in section 3.2.11.1.1. URL is the same as the associated RESTful retrieve instance call 2) When Media Type returned is one of those in section 3.2.11.1.3. URL value is for a bulk data URL for uncompressed bulk data element encoded in Little Endian binary format for the specified instance. 3) When Media Type returned is one of those in section 3.2.11.1.2. URL value is for a bulk data URL for compressed pixel data for each frame in the specified SOP Instance.

3.2.11.5.4.2   Response Content

Table 162: Response Content

A multipart response where each part contains either
1) Instance binary data for the instance specified in the format specified by the part's Content-Type, when the Content-Type header is a media type chosen from the table in "**WADO-RS DICOM object transfer syntaxes**
2) Binary bulk data or uncompressed pixel data in little endian format for the instance specified, when the Content-Type header is application/octet-stream. See "**DICOM Little Endian Media-Type / Transfer Syntax**"
3) Pixel data for each frame in the specified instance, when the Content-Type header is a media type chosen from the table in "**WADO-RS Image Transfer Syntaxes**"

NOTE1: A requested transfer syntax of 1.2.840.10008.1.2.4.50 (DICOM JPEG Baseline Process 1) only works when the stored instance is 8 bits deep.

3.2.11.5.5   Retrieve Instance Example

Retrieving bulk data or complete DICOM binary data in Little Endian explicit VR specified instance.

Example URL: https://mckhost/DICOMRestService/Wado/studies/3.4.6/series/2.3.5/instances/1.2.3

Table 163: Request Headers Sent

Accept	multipart/related; type=application/octet-stream; q=1.0
Accept	multipart/related; type=application/dicom; transfer-syntax=1.2.840.10008.1.2.1;q=0.9

NOTE1: For WADO-RS Clients that cannot accept all DICOM formats that the system may have stored the instances internally and thus cannot use "application/dicom" as their most preferred format, the WADO-RS Client will want to explicitly specify the formats that it does support.

For the example, the multiple Accept headers sent has two entries, the media type of application/octet-stream and q parameter set to 1.0 and application/dicom media type with transfer syntax set to little endian VR explicit. Since both types are applicable to image and non-

image types, the matching instance will be output in the preferred type of octet-stream. All the elements that are larger than the bulk data size threshold will be output in little endian format. If the instance is an image, the pixel data will be uncompressed and output in Little Endian format.

3.2.11.6 WADO-RS Retrieve Frames

The Retrieveframes action causes the retrieval of the DICOM frames associated with a given study, Series, SOP Instance unique identifier (UID) and frame numbers that are then used to build the response, which is pixel data, and encapsulated in a multipart MIME response. The clients should use the WADO-RS Retrieve Metadata or a QIDO-RS instance level query to get the number of frames (0028,0008) before making this call to retrieve frames.

3.2.11.6.1   Command

https://mckhost/DICOMRestService/wado/studies/{StudyInstanceUID}/series/{SeriesInstanceUID}/instances/{SOPInstanceUID}/frames/{FrameList}

3.2.11.6.2   URL Parameters

StudyInstanceUID – the study instance UID for a study

SeriesInstanceUID – the series UID for a series that belongs to the specified study

SOPInstanceUID – the instance UID for an instance in the specified series

FrameList –Number or list of numbers that are comma separated, representing the set of frames (1 based index) that indicate what frames the client would like from the requested instance.

3.2.11.6.3   WADO-RS Retrieve Frames Options

The WADO-RS service shall support RetrieveFrames requests per the standard, 6.5.4.1.

Table 164: Retrieve Frames Options

Options	Description
Allowable request header Accept values	multipart/related;type=application/octet-stream Specifies that the response can be binary DICOM pixel data for one specific frame in Little Endian uncompressed format.
	multipart/related; type={MediaType} Specifies that the response can be pixel data encoded using a {MediaType} chosen from Table 148
SOP Class Restrictions	SOP Classes supported in Table 14 In addition, the WADOS-RS Service Provider can be configured to exclude instances of specific SOP Classes from the retrieval results.
Size Restriction	Restricted to size supported by McKesson Radiology™ 12.3.

3.2.11.6.4   WADO-RS Retrieve Frames Response

The WADO-RS service shall provide a response for RetrieveFrames, per standard, 6.5.4.2.

3.2.11.6.4.1   Response Headers

HTTP status codes include all from Table 151.

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The HTTP Response contains multi-level headers. The top level HTTP response headers include standard server headers plus a Content-Type of multipart/related with a boundary parameter used to separate the attached parts.

Pixel Data

Content Type

multipart/related; type=application/octet-stream; boundary={MessageBoundary}

multipart/related; type={MediaType}; boundary={MessageBoundary}

Table 165: Part Response Header

Part Response Header	Value
Content-Type	The media type (from table in section 3.2.11.1.2 or 3.2.11.1.3) representing the type of data in the content
Content-Location	The URL is the URL for BulkData to retrieve pixel data for the frame when the Media Type returned is one of in section 3.2.11.1.2 or 3.2.11.1.3

3.2.11.6.4.2   Response Content

Table 166: Response Content

A multipart response where each part contains either
1)   Pixel data for the requested frames, when the Content-Type header is a media type chosen from the table in "**WADO-RS Image Transfer Syntaxes**"
2)   Binary pixel data in little endian format for the frame specified, when the Content-Type header is application/octet-stream. See "**DICOM Little Endian Media-Type / Transfer Syntax**"

NOTE1:   A requested transfer syntax of 1.2.840.10008.1.2.4.50 (DICOM JPEG Baseline Process 1) only works when the stored instance is 8 bits deep.

3.2.11.6.5   Retrieve Frames Example

Retrieving JPEG baseline 1 compressed or lossy JPEG 2000 compressed middle 5 frames from 40 frame instance

Example URL:

https://mckhost/DICOMRestService/Wado/studies/4.5.6/series/3.4.5/instances/1.2.3/frames/18,19,20,21,22

Table 167: Request Headers Sent

Accept	multipart/related; type=image/dicom+jpeg; transfer-syntax=1.2.840.10008.1.2.4.50
Accept	multipart/related; type=image/dicom+jp2; transfer-syntax=1.2.840.10008.1.2.4.91; q=0.9

NOTE1:   The frames/18,19,20,21,22 portion of the URL after the 4.5.6, 3.4.5, 1.2.3 parameters indicate the client wants the middle five frames from the DICOM instance of 40 frames which the client could know because of making a prior WADO Retrieve Metadata or QIDO instance level query (See Table 145).

For the example, the multiple Accept headers sent with the first having media type of image/dicom+jpeg and transfer syntax of DICOM JPEG Baseline process 1 and the second sent having media type image/dicom+jp2 and transfer syntax indicating lossy JPEG 2000 indicates the client prefers the 8 bit deep JPEG that would be directly displayable in a browser if the frames are 8 bits deep, otherwise is willing to accept JPEG 2000 lossy compression (if bit depth is greater than 8). Since the WADO Service Provider supports both media types, the image will be converted to the most preferred type of dicom+jpeg for output. However, if the image turns out to be deeper than 8 bits, then there will be no pixel data returned in the multipart item as the conversion will fail (See 3.2.11.11).

3.2.11.7 WADO-RS Retrieve BulkData

The RetrieveBulkData action causes retrieval of the bulk data for a given bulk data URL that are then used to build the response, which is a single bulk data item. The WADO-RS Clients are expected to retrieve bulk data using a bulk data URL obtained from either a WADO-RS Retrieve Metadata Request or from an includefield in the QIDO-RS query response. The WADO-RS Clients are not expected to create a bulk data URL manually.

3.2.11.7.1   Command

The WADO-RS Client is expected to be getting bulk data URLs from either WADO-RS Retrieve Metadata Request or from an includefield in the QIDO-RS query response.

3.2.11.7.2   WADO-RS Retrieve BulkData Options

The WADO-RS Service Provider shall support the RetrieveBulkdata action type per the standard section 6.5.5.1.

Table 168: Retrieve BulkData Options

Options	Description
Allowable request header Accept values	multipart/related;type=application/octet-stream Specifies that the response can be binary bulk data or DICOM pixel data for one specific frame in Little Endian uncompressed format. See Table 149
	multipart/related; type={MediaType} Specifies that the response is pixel data encoded using a {MediaType} chosen from Table 148. The WADOS-RS clients are expected to use multipart/related; type={MediaType} if they intend to retrieve pixel data in compressed format.
SOP Class	SOP Classes supported in Table 14 In addition, the WADOS-RS Service Provider can be configured to exclude instances of specific SOP Classes from the retrieval results.
Size Restriction	Restricted to size supported by McKesson Radiology™ 12.3.

3.2.11.7.3   WADO-RS Retrieve BulkData Response

The WADO-RS Service Provider shall provide a response to the RetrieveBulkdata request per the standard, section 6.5.5.2.

3.2.11.7.3.1   Response Headers

HTTP status codes include all from Table 151.

The HTTP Response contains multi-level headers. The top level HTTP response headers include standard server headers plus a Content-Type of multipart/related with a boundary parameter used to separate the attached parts.

Pixel Data

Content Type

multipart/related; type=application/octet-stream; boundary={MessageBoundary}

multipart/related; type={MediaType}; boundary={MessageBoundary}

3.2.11.7.3.2   Retrieve BulkData response

Table 169: Part Response Header

Part Response Header	Value
Content-Type	The media type (from table in section 3.2.11.1.2 or 3.2.11.1.3) representing the type of data in the content
Content-Location	1) When Media Type returned is one of those in section 3.2.11.1.3. URL value is for a bulk data URL for uncompressed bulk data element encoded in Little Endian binary format for the specified instance. 2) When Media Type returned is one of those in section 3.2.11.1.2. URL value is for a bulk data URL for compressed pixel data for each frame. In the specified SOP Instance.

3.2.11.7.3.3   Response Content

Table 170: Response Content

A multipart response where each part contains either
1)   Pixel data for the specified instance if the media type is the one specified in "WADO-RS Image Transfer Syntaxes"
2)   Uncompressed pixel data if an instance was requested and application/octet-stream was the requested media type. See "**DICOM Little Endian Media-Type / Transfer Syntax**"
3)   Binary element value if the request was for non-pixel data and application/octet-stream was requested. See "DICOM Little Endian Media-Type / Transfer Syntax"

NOTE1:   A requested transfer syntax of 1.2.840.10008.1.2.4.50 (DICOM JPEG Baseline Process 1) only works when the stored instance is 8 bits deep.

3.2.11.7.4   Retrieve BulkData Example

Retrieve Frame Increment Pointer (tag (0028,0009)) from a specified instance. Assume the URL is the Bulkdata URL retrieved by the WADO-RS RetrieveMetadata request.

ExampleURL:

https://mckhost/DICOMRestService/Wado/studies/4.5.6/series/3.4.5/instances/1.2.3/attribs/00280009

Table 171: Request Headers Sent

Accept	multipart/related; type=application/octet-stream

3.2.11.8 WADO-RS Retrieve Metadata

The RetrieveMetadata action causes the retrieval of the DICOM instances presented as the full study metadata with the bulk data removed that are then used to build the response, which can be XML or JSON (PS 3.19 or PS 3.18 of the DICOM Standard[1]. encoded metadata for the DICOM attributes. The full study metadata includes all DICOM attributes under a certain size threshold which is determined by the McKesson Radiology™ 12.3.

3.2.11.8.1   Command

https://mckhost/DICOMRestService/wado/studies/{StudyInstanceUID}/metadata

3.2.11.8.2   URL Parameters

StudyInstanceUID – the study instance UID for a single study

3.2.11.8.3   WADO-RS Retrieve Metadata Options

The WADO-RS Service Provider supports the RetrieveMetadata action type per the standard section 6.5.6.1

Table 172: Retrieve Metadata Options

Options	Description
Allowable request header Accept values	Supported: multipart/related; type=application/dicom+xml application/json; See Table 150
Accept-Encoding	identity (the use of no transformation whatsoever)
SOP Class	SOP Classes supported in Table 14 In addition, the WADOS-RS Service Provider can be configured to exclude instances of specific SOP Classes from the retrieval results.
Size Restriction	Restricted to size supported by McKesson Radiology™ 12.3.

3.2.11.8.4   WADO-RS Retrieve Metadata Response

The response shall be per WADO-RS standard, sec 6.5.6.2.

3.2.11.8.4.1   Response Headers

HTTP status codes include all from Table 151.

The HTTP Response contains multi-level headers. The top level HTTP response headers include standard server headers plus a Content-Type of multipart/related with a boundary parameter used to separate the attached parts.

Pixel Data

    Content Type

    multipart/related; type=application/dicom+xml;

application/json;

3.2.11.8.4.2   Retrieve Metadata response

The response shall be per WADO-RS standard, sec 6.5.6.2.

Table 173: Part Response Header for application/dicom+xml

Part Response Header	Value
Content-Type	application/dicom+xml; charset=utf-8

NOTE1:   The "application/json" accept type will not generate a multipart response, so there is no "Part Response Header" for this content type. Multiple results returned in JSON are organized as a single top-level array of JSON objects.

3.2.11.8.4.3   Response Content

Table 174: Response Content

A multipart response where each part contains
Metadata shall be provided in XML or JSON format

NOTE1:   No matter the format the McKesson Radiology™ 12.3 has the data stored as; all binary valued elements are returned in the little endian format.

3.2.11.8.5   Retrieve Metadata Example

Retrieving metadata from study with study UID 1.2.3.4

Example URL: https://mckhost/DICOMRestService/Wado/studies/1.2.3.4/metadata

Table 175: Request Headers Sent

Accept	multipart/related; type= application/dicom+xml
Accept	application/json; q = 0.8

NOTE1:   For the example, the multiple Accept headers has two entries, the media type of application/dicom+xml with no "q" parameter (equivalent to 1.0) and the media type of application/json and "q" parameter set to 0.8 means that the WADO-RS Service Provider will return a multipart response with each part containing the XML document for each instance in the study. If xml format is not accepted, the WADO-RS Service Provider can return JSON array that contains all metadata for the specified Study.

Since McKesson Radiology™ 12.3 understands both WADO-RS Client requested formats, it will respond to the WADO-RS Client using the client's preferred format.

3.2.11.9 WADO RS Multi-Context Support

The WADO-RS Service Provider supports specifying the context for both Patient ID and Accession Number in the URL for searches.

If the context for the request does not match the context of the study, the accession number returned shall be blank in the WADO-RS response.

For the study's patient, if the patient does not have a patient ID in the context for the request, the patient ID shall be returned as blank.

Example:

https://mckhost/DICOMRestService/wado/Context/<context_code>/studies/1.22.333.4

3.2.11.10   Preference Order For Multiple Accept Headers

The WADO-RS Service Provider supports returning data in a supported format chosen from one of the formats that the client sent in an Accept header.

The format chosen by the WADO-RS Service Provider will be the first format supported that is applicable for the data to be returned from the prioritized client indicated formats.

The WADO-RS Service Provider will interpret the client's priority by using the q value in the HTTPS Accept headers , and then for all formats given that have the same q value, by the order in which the client lists the formats. Note that if the format does not include a q value, this is equivalent to the client specifying a q value of 1.0."

3.2.11.11   WADO RS Limitations

The WADO-RS Range parameter is not supported.

Accented characters are not supported for case-insensitive searches.

For WADO-RS conversion of an image to a lower bit depth is not supported, due to loss of image fidelity.

For example, a 12-bit image may not be converted to an 8-bit image format.

On-the-fly conversion of proprietary McKesson Radiology™ 12.3 formats to DICOM formats is not supported.

For example, conversion of annotations to GSPS and flagged image information to KIN objects is not supported.

3.2.11.12   Connection Policies

3.2.11.12.1 General

WADO-RS Service Provider supports TLS Client Certificates for its transport level security support. WADO-RS Service Provider will refuse a connection over TLS from a source that is not signed by a signing certificate the service is configured to allow.

3.2.11.12.2 Security

WADO-RS supports SSL Client Certificates for its transport level security support.

WADO-RS Service Provider supports site level configuration for Cross Origin Resource Sharing (CORS) which allows the resource to be requested from browsers running web applications served from servers in another domain than the one offering the DICOM RESTful services.

3.3   Network Interfaces

3.3.1   Physical Network Interface

McKesson Radiology™ 12.3 supports a single network interface. One of the following physical network interfaces will be available depending on installed hardware options:

Table 176: Supported Physical Network Interfaces

Ethernet 100baseT
Ethernet 10baseT

3.3.2   Additional Protocols

McKesson Radiology™ 12.3 conforms to the System Management Profiles listed in the Table below. All requested transactions for the listed profiles and actors are supported. Support for optional transactions is listed in the Table below:

Table 177: Supported System Management Profiles

Profile Name	Actor	Protocols Used	Optional Transactions	Security Support
Network Address Management	DHCP Client	DHCP	N/A	N/A
	DNS Client	DNS	N/A	N/A
Time Synchronization	NTP Client[15]	NTP	N/A	N/A

3.3.2.1   DHCP

DHCP can be used to obtain TCP/IP network configuration information. The network parameters obtainable via DHCP are shown in the Table below. The Default Value column of the table shows the default used if the DHCP server does not provide a value. Values for network parameters set in the Service/Installation tool take precedence over values obtained from the DHCP server. Support for DHCP can be configured via the Service/Installation Tool. The Service/Installation tool can be used to configure the machine name. If DHCP is not in use, TCP/IP network configuration information can be manually configured by McKesson MIG Service or Installation staff.

Table 178: Supported DHCP Parameters

DHCP Parameter	Default Value
IP Address	None
Hostname	Requested machine name
List of NTP servers	Empty list
List of DNS servers	Empty list

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[15] McKesson Radiology™ 12.3 uses NetTime™ 2.0 for time synchronization, which uses NTP.

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DHCP Parameter	Default Value
Routers	Empty list
Static routes	None
Domain name	None
Subnet mask	Derived from IP Address (see service manual)
Broadcast address	Derived from IP Address (see service manual)
Default router	None
Time offset	Site configurable (from Time Zone)
MTU	Network Hardware Dependent
Auto-IP permission	No permission

3.3.2.2   DNS

DNS can be used for address resolution. If DHCP is not in use or the DHCP server does not return any DNS server addresses, the identity of a DNS server can be configured via the Service/Installation Tool. If a DNS server is not in use, local mapping between hostname and IP address can be manually configured by McKesson MIG Service or Installation staff.

3.4   Configuration

3.4.1   AE Title/Presentation Address Mapping

3.4.1.1   Local AE Titles

All McKesson Radiology™ 12.3 Application Entities use configured AE Titles and TCP/IP Ports. These are assigned default values at the time of installation; However, these can be modified. The AE Title used by each individual application can be configured independently of the AE Title used by other applications on an individual McKesson Radiology™ 12.3 system.

By default, all Application Entities that only act as an Association Requestor are given the same AE Title, whereas those that can act as an Association Acceptor are all given unique AE Titles. It is possible to assign all McKesson Radiology™ 12.3 applications the same AE Title. However, this is not recommended as a single McKesson Radiology™ 12.3 system has multiple DICOM TCP/IP listening ports and associating multiple listening ports with a single AE Title can result in connectivity problems with other systems.

Table 179: AE Title Configuration

Application Entity	Default AE Title	Default TCP/IP Port
Sender	ALI_SCU	Not Applicable
Importer	ALI_STORE_SCP	4000
Query/Retrieve Server	ALI_QUERY_SCP	5000
Query/Retrieve Client	ALI_SCU	Not Applicable
Modality Worklist Client	ALI_SCU	Not Applicable
External Notifier	ALI_SCU	Not Applicable

Event Handler	ALI_EVENT_SCP	6000
Storage Commitment Client	ALI_EVENT_SCP	6000

3.4.1.2   Remote AE Title/Presentation Address Mapping

The AE Title, host names and port numbers of remote applications can be configured in the McKesson Radiology™ 12.3 configuration files by McKesson MIG Service or Installation staff.

3.4.1.2.1   Sender AE

The AE Titles, TCP/IP port-numbers, and host-names for the remote Storage SCPs must be defined in the McKesson Radiology™ 12.3 configuration files by McKesson MIG Service or Installation staff. Multiple remote Storage SCPs can be defined.

3.4.1.2.2   Importer AE

The AE Titles, TCP/IP port-numbers, host-names and capabilities for the remote Storage SCUs and Storage Commitment Push Model SCUs must be defined in the McKesson Radiology™ 12.3 configuration files by McKesson MIG Service or Installation staff.

The Importer AE can be configured to only accept Associations from systems having specific host-names. The Importer AE cannot presently be configured to check the Calling and Called AE Titles.

3.4.1.2.3   Query/Retrieve Server AE

The AE Titles, TCP/IP port-numbers, host-names and capabilities for the remote Query/Retrieve SCUs, Storage SCPs (C-MOVE Destination AEs), and Modality Worklist SCUs must be defined in the McKesson Radiology™ 12.3 configuration files by McKesson MIG Service or Installation staff. In addition, a mapping must be configured that links a possible C-MOVE Destination AE Title with a specific Presentation Address (host-name and TCP/IP port-number). Otherwise, the Query/Retrieve Server AE will not know where to send the SOP Instances in response to a C-MOVE Request.

The Query/Retrieve Server AE can be configured to only accept Associations from systems having specific host-names. The Query/Retrieve Server AE cannot presently be configured to check the Calling and Called AE Titles.

3.4.1.2.4   Query/Retrieve Client AE

The AE Titles, TCP/IP port-numbers, and host-names for the remote Query/Retrieve SCPs must be defined in the McKesson Radiology™ 12.3 configuration files by McKesson MIG Service or Installation staff. Multiple remote Query/Retrieve SCPs can be defined.

3.4.1.2.5   Modality Worklist Client AE

The AE Titles, TCP/IP port-numbers, and host-names for the remote Modality Worklist SCPs must be defined in the McKesson Radiology™ 12.3 configuration files by McKesson MIG Service or Installation staff. Only a single Modality Worklist SCP can be defined per McKesson Radiology™ 12.3 system.

3.4.1.2.6   Print Management AE

The AE Titles, TCP/IP port-numbers, and host-names for the remote Print Management SCPs must be defined in the McKesson Radiology™ 12.3 configuration files by McKesson MIG Service or Installation staff. Multiple remote Print Management SCPs can be defined.

3.4.1.2.7   External Notifier AE

The AE Titles, TCP/IP port-numbers, and host-names for the Modality Performed Procedure Step SCPs, must be defined in the McKesson Radiology™ 12.3 configuration files by McKesson MIG Service or Installation staff. Multiple remote AEs for each supported SOP Class can be defined.

3.4.1.2.8   Event Handler AE

The AE Titles, TCP/IP port-numbers, host-names and capabilities for the remote Modality Performed Procedure Step SCUs must be defined in the McKesson Radiology™ 12.3 configuration files by McKesson MIG Service or Installation staff.

The Query/Retrieve Server AE can be configured to only accept Associations from systems having specific host-names. The Query/Retrieve Server AE cannot presently be configured to check the Calling and Called AE Titles.

3.4.1.2.9   Storage Commitment Client AE

The AE Titles, TCP/IP port-numbers, and host-names for the remote Storage Commitment SCPs must be defined in the Image Repository configuration files by McKesson MIG Service or Installation staff.

3.4.2   Configurable Parameters

A large number of parameters related to acquisition and general operation can be specified in the McKesson Radiology™ 12.3 configuration files by McKesson MIG Service or Installation staff. The Table below only shows those configuration parameters relevant to DICOM communication. Users of McKesson Radiology™ 12.3 must contact McKesson Service or Installation personnel if they wish to change any of these settings.

Table 180: Configuration Parameters

Parameter	Configurable (Yes/No)	Default Value
General Parameters		
Maximum Exported PDU Size (Larger PDUs will never be sent, even if the receiver supports a larger Max PDU Receive Size. If the receiver supports a smaller Max PDU Receive Size, then the Max PDU Send Size will be reduced accordingly for the duration of the Association. Max PDU Receive Size information is exchanged during DICOM Association Negotiation in the Maximum Length Sub-Item of the A-ASSOCIATION-RQ and A-ASSOCIATE-AC)	No	232
Time-out waiting for a acceptance or rejection response to an Association Request (Application Level Timeout)	No	180s
Time-out waiting for a response to an Association release request (Application Level Timeout)	No	180s
Time-out waiting for completion of a TCP/IP connect request (Low-level timeout)	No	180s
Time-out awaiting a Response to a DIMSE Request (Low-Level Timeout)	No	180s
Time-out for waiting for data between TCP/IP-packets (Low	No	180s

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Level Timeout)		
Sender AE Parameters		
Supported SOP Classes	Yes	SOP Classes listed in Table 4: SOP Class Conformance of Sender AE
Supported Transfer Syntaxes	Yes	Transfer Syntaxes listed in Table 9: Sender AE Proposed Transfer Syntaxes.
Level of tracing for Service Logs (LOW, MEDIUM, HIGH). HIGH means the least amount of tracing. LOW means the most amount of tracing, including output of all DICOM Message content to the Service Logs.	Yes	HIGH
Remote Modality Worklist SCP AE to be queried by Modality Worklist Client AE. Includes AE Title, host-name, TCP/IP port number, etc.	Yes	NONE
Time-out waiting for a response to a C-STORE-RQ	No	180s
Number of Sender AE application instances that send to a single Storage SCP Remote AE.	Yes	1
Number of times a failed send job may be retried	Yes	20
Number of times a failed send job may be retried before demoting the send job's priority	Yes	5
CompressImage Attempt to compress all images before exporting them. If set to 'YES', and neither JPEG Lossy or Wavelet compression is enabled then the images will be JPEG Lossless compressed.	Yes	NO
ConvertLosslessToLossy If both this parameter and 'CompressImage' are configured to be 'YES', then the Sender AE will attempt to JPEG Lossy compress images before exporting them using 'CompressionRatio' and 'CineCompressionRatio'.	Yes	NO
ConvertLosslessToWavelet If both this parameter and 'CompressImage' are configured to be 'YES', then the Sender AE will attempt to Wavelet compress images before exporting them using 'CompressionRatio' and 'CineCompressionRatio'. If Wavelet compression fails and 'ConvertLosslessToLossy' is 'YES', then Sender AE will attempt to JPEG Lossy compress images before exporting them.	Yes	NO
ExcludeWaveletForModalities If 'ConvertLosslessToWavelet' is YES, then the images of modalities contained in this list will not be wavelet compressed.	Yes	US, XA
The desired lossy compression ratio for single frame images	Yes	10 : 1
The desired lossy compression ratio for cine images	Yes	30 : 1
Modify or add a configurable set of DICOM Elements in a SOP Instance before it is exported. The set of Elements and the values to assign them are also configurable.	Yes	NO
Process and send any cine files to Remote AE, including	Yes	YES

decompression if necessary.		
Importer AE Parameters		
Supported SOP Classes	Yes	SOP Classes listed in Table 14: SOP Class Conformance of Importer AE
Supported Transfer Syntaxes	Yes	Transfer Syntaxes listed in Table 24: Importer AE Accepted Transfer Syntaxes
Level of tracing for Service Logs (LOW, MEDIUM, HIGH, APP). HIGH means the least amount of tracing. LOW means the most amount of tracing, including output of all DICOM Message content to the Service Logs.	Yes	HIGH
Allow any Remote AE on another system to open an Association with the Importer AE. Enable only for demonstration purposes.	Yes	NO
List of host-names that are allowed to open an Association with the Importer AE.	Yes	NONE
Time-out waiting for a response to an N-ACTION-RQ or N-EVENT-RQ	No	180s
Number of Associations that can be active per Remote AE host.	Yes	10
Time to wait on an open Association for the next command (i.e. max time to wait for first C-STORE-RQ after a new Association has been opened).	Yes	3600s
Compression type to be used on received single frame images of a specific Modality Type	Yes	JPEG Lossless (US, CT, MR, CR, NM, RF) NONE (XA)
Compression type to be used on received multi-frame images of a specific Modality Type	Yes	NONE (US)
Compression type to be used if one is not defined for the type of Modality of an image.	Yes	JPEG Lossless
The desired lossy compression ratio for single frame images	Yes	10 : 1
The desired lossy compression ratio for cine images	Yes	30 : 1
List of host-names for which the original SOP Instance UID should be kept even though the images are lossy compressed.	Yes	NONE
Allow a Warning Status Code value to be returned in C-STORE-RSP.	Yes	NO
Create new SOP Instance UIDs for SOP Instances received from the specified Remote AE host-names.	Yes	NO
Receive and parse DICOM SOP Instances in memory rather than immediately writing each received PDU to a file (increases throughput performance but uses more memory resources).	Yes	YES
List of host-names that the Importer AE should always request a new Association with when sending a Storage Commitment N-EVENT-REPORT Request.	Yes	NONE
List of modalities to create a DICOMDIR for each group of SOP Instances received over an Association.	Yes	NONE

Query/Retrieve Server AE		
Supported SOP Classes as an SCU	Yes	SOP Classes listed in Table 14: SOP Class Conformance of Importer AE
Supported Transfer Syntaxes as an SCU	Yes	Transfer Syntaxes listed in Table 24: Importer AE Accepted Transfer Syntaxes
Supported Presentation Contexts as an SCP	Yes	Presentation Contexts listed in Table 41: Query/Retrieve Server AE Accepted Presentation Contexts
Enable IHE Image Manager compliance (full support for Image Level queries and return of additional Elements).	Yes	NO
Level of tracing for Service Logs (LOW, MEDIUM, HIGH, APP). APP means the least amount of tracing. LOW means the most amount of tracing, including output of all DICOM Message content to the Service Logs.	Yes	HIGH
Allow any Remote AE on another system to open an Association with the Query/Retrieve Server AE. Enable only for demonstration purposes.	Yes	NO
List of host-names that are allowed to open an Association with the Query/Retrieve Server AE.	Yes	NONE
Time to wait on an open Association for the next command (i.e. max time to wait for first C-FIND-RQ after a new Association has been opened).	Yes	600s
Allow queries with no identifier Attribute values	Yes	NO
Permit Image Level queries	Yes	NO
Whether the Requestor's AE title should be matched against the C-MOVE Destination AE title. If YES, and if the AE Titles are identical, then matching images will be routed to the Requestor's host. If NO, the C-MOVE Destination AE to Host Mapping table (listed below) will be used to resolve AE titles.	Yes	YES
C-MOVE Destination AE to Host Mapping table (Provides AE Title, TCP/IP port number, and host-name for C-MOVE Destination AEs).	Yes	NONE
Number of Associations that can be active per Remote AE host.	Yes	10
List of remote C-MOVE Destination AEs for which images will be compressed before export. If compression is enabled then JPEG Lossless will be used unless some other type is enabled.	Yes	NONE
List of remote C-MOVE Destination AEs for which images will be JPEG Lossy compressed before export.	Yes	NONE
List of remote C-MOVE Destination AEs for which images will be Wavelet compressed before export.	Yes	NONE
The desired lossy compression ratio for single frame images	Yes	10 : 1
The desired lossy compression ratio for cine images	Yes	30 : 1
Check for Cancel Requests from Remote AE	Yes	NO
List of remote AE Titles to which cine files should not be sent.	Yes	NONE

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Query/Retrieve Client AE		
Supported Presentation Contexts as an SCU	Yes	Presentation Contexts listed in Table 58: Query/Retrieve Client AE Proposed Presentation Contexts
Level of tracing for Service Logs (LOW, MEDIUM, HIGH, APP). APP means the least amount of tracing. LOW means the most amount of tracing, including output of all DICOM Message content to the Service Logs.	Yes	HIGH
Remote Query/Retrieve SCP AEs to be queried by Query/Retrieve Client AE. Includes AE Title, host-name, TCP/IP port number, etc.	Yes	NONE
Maximum number of query matches to be returned before Query/Retrieve Client AE issues a Cancel Request.	Yes	500
Modality Worklist Client AE		
Supported Presentation Contexts as an SCU	Yes	Presentation Contexts listed in Table 73: Modality Worklist Client AE Proposed Presentation Contexts
Level of tracing for Service Logs (LOW, MEDIUM, HIGH, APP). APP means the least amount of tracing. LOW means the most amount of tracing, including output of all DICOM Message content to the Service Logs.	Yes	APP
Remote Modality Worklist SCP AE to be queried by Modality Worklist Client AE. Includes AE Title, host-name, TCP/IP port number, etc.	Yes	NONE
Time interval between queries of Modality Worklist SCP.	Yes	900s
Maximum number of query matches to be returned before Query/Retrieve Client AE issues a Cancel Request.	Yes	200
Time interval, in seconds, to wait for the Modality Worklist SCP to return a C-FIND-RSP.	Yes	120s
Print Management AE		
Supported Presentation Contexts as an SCU	Yes	Presentation Contexts listed in Table 84: Proposed Presentation Contexts
Level of tracing for Service Logs (LOW, MEDIUM, HIGH, APP). APP means the least amount of tracing. LOW means the most amount of tracing, including output of all DICOM Message content to the Service Logs.	Yes	HIGH
Remote DICOM Printer AE (AE Title, host-name, TCP/IP port number, etc.).	Yes	NONE
Number of times to retry completing a print-job if some failure occurs.	Yes	0
External Notifier AE		
Supported Presentation Contexts as an SCU	Yes	Presentation Contexts listed in Table 106: External Notifier AE Proposed Presentation Contexts
Level of tracing for Service Logs (LOW, MEDIUM, HIGH, APP). APP means the least amount of tracing. LOW means the most amount of tracing, including output of all DICOM Message	Yes	HIGH

content to the Service Logs.		
Remote DICOM AE to be notified (AE Title, host-name, TCP/IP port number, etc.).	Yes	NONE
Number of times to retry sending a notification after a failure.	Yes	10
Time to wait before retrying a notification after a failure occurs.	Yes	60s
Event Handler AE		
Supported Presentation Contexts as an SCP	Yes	Presentation Contexts listed in Table 117: Event Handler AE Accepted Presentation Contexts
Level of tracing for Service Logs (LOW, MEDIUM, HIGH, APP). APP means the least amount of tracing. LOW means the most amount of tracing, including output of all DICOM Message content to the Service Logs.	Yes	HIGH
Time to wait on an open Association for the next command (i.e. max time to wait for first C-FIND-RQ after a new Association has been opened).	Yes	300s
Number of Associations that can be active per Remote AE host.	Yes	10
Allow any Remote AE on another system to open an Association with the Event Handler AE. Enable only for demonstration purposes.	Yes	NO
List of host-names that are allowed to open an Association with the Event Handler AE.	Yes	NONE
List of host-names that are allowed to send Messages to Event Handler AE to mark a Study as being Reported.	Yes	NONE
List of host-names that are allowed to send MPPS Messages to Event Handler AE.	Yes	NONE
Storage Commitment Client AE		
Supported Presentation Contexts as an SCU	NO	Presentation Contexts listed in Table 129
Supported Presentation Contexts as an SCP	YES	Presentation Contexts listed in Table 134
Level of tracing for Service Logs (LOW, MEDIUM, HIGH, APP). APP means the least amount of tracing. LOW means the most amount of tracing, including output of all DICOM Message content to the Service Logs.	YES	HIGH
Time to wait on an open Association for the next command (i.e. max time to wait for first C-FIND-RQ after a new Association has been opened).	YES	300s
Number of Associations that can be active per Remote AE host.	YES	10
Allow any Remote AE on another system to open an Association with the Storage Commitment Client AE – Listener is Event Handler AE.	YES	NO
List of host-names that are allowed to open an Association with the Storage Commitment Client AE – Listener is Event Handler AE.	YES	NONE
Determine if the Storage Commit Client AE should wait for the N-EVENT-REPORT on the N-ACTION-RQ association (	YES	YES

WAIT_FOR_RESULT)		
Specifies the delay time (in second) before the agent should start processing the Storage Commitment request for a job (START_DELAY)	YES	900s
Specifies the time (in second) to wait for the N-EVENT-REPORT result (RESULT_TIMEOUT)	YES	3600s
Specifies the number of retries before expiring the job (RETRY_LIMIT)	YES	3
Specifies the delay time in minutes before a job will be re-tried (RETRY_DELAY).	YES	1800s

4   Media Interchange

4.1   Implementation Model

4.1.1   Application Data Flow

Figure 11: McKesson Radiology™ 12.3 DICOM Media Data Flow Diagram
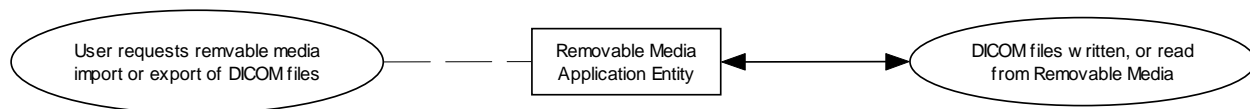
The Removable Media AE can export/import DICOM files to/from removable media. A user of McKesson Radiology™ 12.3 can choose to export all DICOM files for a specified study. When importing DICOM files from media, the user can also choose to only import those DICOM files belonging to a specific study. It is not possible to choose to import only particular SOP Instance files or all the files belonging to a particular patient or series.

4.1.2   Functional Definitions of AEs

4.1.2.1   Removable Media AE

The user can select access to removable media present in the system's media drive. They will then be prompted to choose which studies they wish to import into the system. Alternatively, they can choose the option to export a study to removable media. In either case, the system passes control to the Removable Media AE to actually create, read, or update the DICOM removable media.

4.1.3   Sequencing of Real-World Activities

The operator can insert new media at any time before or after invocation of the Removable Media AE through the user interface tool. The Removable Media AE will wait indefinitely for a media to be inserted before starting to export the specified DICOM files. If no media is available, the export job can be canceled by the user.

4.1.4   File Meta Information Options

The implementation information written to the File Meta Header in each exported DICOM file is as follows:

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Table 181: DICOM Implementation Class and Version for Query/Retrieve Server AE

Implementation Class UID	1.2.840.113711.9
Implementation Version Name	V1.0

4.2   AE Specifications

4.2.1   Removable Media AE Specification

The Removable Media AE provides standard Conformance to the DICOM Interchange Option of the Media Storage Service Class. Support for a particular Application Profile and role is dependent upon the type of removable media hardware with which the system is equipped. The table below lists all the Application Profiles and roles that can possibly be supported:

Table 182: Supported Application Profiles, Activities, and Roles

Application Profile	Real World Activity	FSR[16]	FSC	FSU
STD-GEN-CD	General Purpose CD-R Interchange	YES	YES	NO
STD-US-ID-SF-CDR	Ultrasound Image Display Media Interchange, CD-R.	YES	YES	NO
STD-US-SC-SF-CDR	Ultrasound Image Spatial Calibration Media Interchange, CD-R.	YES	YES	NO
STD-US-CC-SF- CDR	Ultrasound Image Combined Calibration Media Interchange, CD-R.	YES	YES	NO
STD-US-ID-MF- CDR	Ultrasound Image and Multi-frame Image Display Media Interchange, CD-R.	YES	YES	NO
STD-US-SC-MF- CDR	Ultrasound Image and Multi-frame Image Spatial Calibration Media Interchange, CD-R.	YES	YES	NO
STD-US-CC-MF- CDR	Ultrasound Image and Multi-frame Image Combined Calibration Media Interchange, CD-R.	YES	YES	NO
STD-US-ID-SF-MOD128	Ultrasound Image Display Media Interchange, 128MB MOD.	YES	YES	NO
STD-US-SC-SF-MOD128	Ultrasound Image Spatial Calibration Media Interchange, 128MB MOD.	YES	YES	NO
STD-US-CC-SF-MOD128	Ultrasound Image Combined Calibration Media Interchange, 128MB MOD.	YES	YES	NO
STD-US-ID-MF-MOD128	Ultrasound Image and Multi-frame Image Display Media Interchange, 128MB MOD.	YES	YES	NO
STD-US-SC-MF-MOD128	Ultrasound Image and Multi-frame Image Spatial Calibration Media Interchange, 128MB MOD.	YES	YES	NO
STD-US-CC-MF-MOD128	Ultrasound Image and Multi-frame Image Combined Calibration Media Interchange, 128MB MOD.	YES	YES	NO
STD-US-ID-SF-MOD230	Ultrasound Image Display Media Interchange, 230MB MOD.	YES	YES	NO
STD-US-SC-SF-MOD230	Ultrasound Image Spatial Calibration Media Interchange, 230MB MOD.	YES	YES	NO

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[16] For the system to act as an FSR of an Application Profile it must be equipped with the necessary hardware option for reading from the specified media. This is not a standard feature of all McKesson Radiology™ 12.2 systems.

STD-US-CC-SF-MOD230	Ultrasound Image Combined Calibration Media Interchange, 230MB MOD.	YES	YES	NO
STD-US-ID-MF-MOD230	Ultrasound Image and Multi-frame Image Display Media Interchange, 230MB MOD.	YES	YES	NO
STD-US-SC-MF-MOD230	Ultrasound Image and Multi-frame Image Spatial Calibration Media Interchange, 230MB MOD.	YES	YES	NO
STD-US-CC-MF-MOD230	Ultrasound Image and Multi-frame Image Combined Calibration Media Interchange, 230MB MOD.	YES	YES	NO
STD-US-ID-SF-MOD540	Ultrasound Image Display Media Interchange, 540MB MOD.	YES	YES	NO
STD-US-SC-SF-MOD540	Ultrasound Image Spatial Calibration Media Interchange, 540MB MOD.	YES	YES	NO
STD-US-CC-SF-MOD540	Ultrasound Image Combined Calibration Media Interchange, 540MB MOD.	YES	YES	NO
D-US-ID-MF-MOD540	Ultrasound Image and Multi-frame Image Display Media Interchange, 540MB MOD.	YES	YES	NO
STD-US-SC-MF-MOD540	Ultrasound Image and Multi-frame Image Spatial Calibration Media Interchange, 540MB MOD.	YES	YES	NO
STD-US-CC-MF-MOD540	Ultrasound Image and Multi-frame Image Combined Calibration Media Interchange, 540MB MOD.	YES	YES	NO
STD-US-ID-SF-MOD640	Ultrasound Image Display Media Interchange, 640MB MOD.	YES	YES	NO
STD-US-SC-SF-MOD640	Ultrasound Image Spatial Calibration Media Interchange, 640MB MOD.	YES	YES	NO
STD-US-CC-SF-MOD640	Ultrasound Image Combined Calibration Media Interchange, 640MB MOD.	YES	YES	NO
STD-US-ID-MF-MOD640	Ultrasound Image and Multi-frame Image Display Media Interchange, 640MB MOD.	YES	YES	NO
STD-US-SC-MF-MOD640	Ultrasound Image and Multi-frame Image Spatial Calibration Media Interchange, 640MB MOD.	YES	YES	NO
STD-US-CC-MF-MOD640	Ultrasound Image and Multi-frame Image Combined Calibration Media Interchange, 640MB MOD.	YES	YES	NO

In addition to supporting these Application Profiles, the Removable Media AE can act as an FSR, or FSC for the DICOM Interchange Option of the Media Storage Service Class for any of the Media Storage Standard SOP Classes listed in Table 183. The system can be configured to support any of the following media types: CD-R, 90mm MODs of 128MB, 230MB, 540MB, or 640MB capacity.

Table 183: Media Storage Standard SOP Classes Supported by the Removable Media AE

DICOM SOP Class Name	SOP Class UID	FSR	FSC
12-lead ECG Waveform	1.2.840.10008.5.1.4.1.1.9.1.1	Yes	No
Ambulatory ECG Waveform	1.2.840.10008.5.1.4.1.1.9.1.3	Yes	No
Basic Voice Audio Waveform	1.2.840.10008.5.1.4.1.1.9.4.1	Yes	No
Cardiac Electrophysiology Waveform	1.2.840.10008.5.1.4.1.1.9.3.1	Yes	No
Basic Text Structured Report	1.2.840.10008.5.1.4.1.1.88.11	Yes	No
Comprehensive Structured Report	1.2.840.10008.5.1.4.1.1.88.33	Yes	No

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DICOM SOP Class Name	SOP Class UID	FSR	FSC
Enhanced Structured Report	1.2.840.10008.5.1.4.1.1.88.22	Yes	No
Mammography CAD Structured Report	1.2.840.10008.5.1.4.1.1.88.50	Yes	No
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59	Yes	No
Chest CAD SR	1.2.840.10008.5.1.4.1.1.88.65	Yes	No
Encapsulated PDF	1.2.840.10008.5.1.4.1.1.104.1	Yes	No
Computed Radiography Image	1.2.840.10008.5.1.4.1.1.1	Yes	Yes
CT Image	1.2.840.10008.5.1.4.1.1.2	Yes	Yes
Digital X-Ray Image (Presentation)	1.2.840.10008.5.1.4.1.1.1.1	Yes	Yes
Digital X-Ray Image (Processing)	1.2.840.10008.5.1.4.1.1.1.1.1	Yes	Yes
Digital Mammography Image (Presentation)	1.2.840.10008.5.1.4.1.1.1.2	Yes	Yes
Digital Mammography Image (Processing)	1.2.840.10008.5.1.4.1.1.1.2.1	Yes	Yes
Digital Intra-oral X-Ray Image (Presentation)	1.2.840.10008.5.1.4.1.1.1.3	Yes	Yes
Breast Tomosynthesis image	1.2.840.10008.5.1.4.1.1.13.1.3	Yes	Yes
Digital Intra-oral X-Ray Image (Processing)	1.2.840.10008.5.1.4.1.1.1.3.1	Yes	Yes
General ECG Waveform	1.2.840.10008.5.1.4.1.1.9.1.2	Yes	No
Grayscale Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.1	Yes	No
Hardcopy Color Image	1.2.840.10008.5.1.1.30	Yes	Yes
Hardcopy Grayscale Image	1.2.840.10008.5.1.1.29	Yes	Yes
Hemodynamic Waveform	1.2.840.10008.5.1.4.1.1.9.2.1	Yes	No
Multi-frame Single Bit Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7.1	Yes	Yes
Multi-frame Grayscale Byte Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7.2	Yes	Yes
Multi-frame Grayscale Word Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7.3	Yes	Yes
Multi-frame True Color Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7.4	Yes	Yes
MR Image	1.2.840.10008.5.1.4.1.1.4	Yes	Yes
Nuclear Medicine Image (Retired)	1.2.840.10008.5.1.4.1.1.5	Yes	Yes
Positron Emission Tomography Image	1.2.840.10008.5.1.4.1.1.128	Yes	Yes
Raw Data	1.2.840.10008.5.1.4.1.1.66	Yes	No
RT Beams Treatment Record	1.2.840.10008.5.1.4.1.1.481.4	Yes	No
RT Brachy Treatment Record	1.2.840.10008.5.1.4.1.1.481.6	Yes	No
RT Dose	1.2.840.10008.5.1.4.1.1.481.2	Yes	No
RT Image	1.2.840.10008.5.1.4.1.1.481.1	Yes	Yes
RT Plan	1.2.840.10008.5.1.4.1.1.481.5	Yes	No
RT Structure Set	1.2.840.10008.5.1.4.1.1.481.3	Yes	No
RT Treatment Summary Record	1.2.840.10008.5.1.4.1.1.481.7	Yes	No
Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7	Yes	Yes

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DICOM SOP Class Name	SOP Class UID	FSR	FSC
Stand-alone Curve	1.2.840.10008.5.1.4.1.1.9	Yes	No
Stand-alone Modality LUT	1.2.840.10008.5.1.4.1.1.10	Yes	No
Stand-alone Overlay	1.2.840.10008.5.1.4.1.1.8	Yes	No
Stand-alone VOI LUT	1.2.840.10008.5.1.4.1.1.11	Yes	No
Standalone PET Curve	1.2.840.10008.5.1.4.1.1.129	Yes	No
Stored Print	1.2.840.10008.5.1.1.27	Yes	No
Ultrasound Image	1.2.840.10008.5.1.4.1.1.6.1	Yes	Yes
Ultrasound Image (Retired)	1.2.840.10008.5.1.4.1.1.6	Yes	Yes
Ultrasound Multi-frame Image	1.2.840.10008.5.1.4.1.1.3.1	Yes	Yes
Ultrasound Multi-frame Image (Retired)	1.2.840.10008.5.1.4.1.1.3	Yes	Yes
VL Endoscopic Image	1.2.840.10008.5.1.4.1.1.77.1.1	Yes	Yes
VL Microscopic Image	1.2.840.10008.5.1.4.1.1.77.1.2	Yes	Yes
VL Slide-Coordinates Microscopic Image	1.2.840.10008.5.1.4.1.1.77.1.3	Yes	Yes
VL Photographic Image	1.2.840.10008.5.1.4.1.1.77.1.4	Yes	Yes
VL Image (Retired)	1.2.840.10008.5.1.4.1.1.77.1	Yes	Yes
VL Multi-frame Image (Retired)	1.2.840.10008.5.1.4.1.1.77.2	Yes	Yes
X-Ray Angiographic Bi-Plane Image (retired)	1.2.840.10008.5.1.4.1.1.12.3	Yes	Yes
X-Ray Angiographic Image	1.2.840.10008.5.1.4.1.1.12.1	Yes	Yes
X-Ray Radiofluoroscopic Image	1.2.840.10008.5.1.4.1.1.12.2	Yes	Yes
X-Ray Radiation Dose Structured Report	1.2.840.10008.5.1.4.1.1.88.67	Yes	No
General Audio Waveform	1.2.840.10008.5.1.4.1.1.9.4.2	Yes	No
Arterial Pulse Waveform	1.2.840.10008.5.1.4.1.1.9.5.1	Yes	No
Respiratory Waveform	1.2.840.10008.5.1.4.1.1.9.6.1	Yes	No
Colon CAD SR Document	1.2.840.10008.5.1.4.1.1.88.69	Yes	No
Implantation Plan SR Document	1.2.840.10008.5.1.4.1.1.88.70	Yes	No
Encapsulated CDA IOD	1.2.840.10008.5.1.4.1.1.104.2	Yes	No
Color Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.2	Yes	No
Pseudo-Color Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.3	Yes	No
Blending Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.4	Yes	No
XA/XRF Grayscale Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.5	Yes	No
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2	Yes	No
Nuclear Medicine Image	1.2.840.10008.5.1.4.1.1.20	Yes	Yes
Spatial Registration	1.2.840.10008.5.1.4.1.1.66.1	Yes	No
Spatial Fiducials	1.2.840.10008.5.1.4.1.1.66.2	Yes	No
Deformable Spatial Registration	1.2.840.10008.5.1.4.1.1.66.3	Yes	No

DICOM SOP Class Name	SOP Class UID	FSR	FSC
Segmentation	1.2.840.10008.5.1.4.1.1.66.4	Yes	No
Surface Segmentation	1.2.840.10008.5.1.4.1.1.66.5	Yes	No
Real World Value Mapping	1.2.840.10008.5.1.4.1.1.67	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
RT Beams Delivery Instruction	1.2.840.10008.5.1.4.34.7	Yes	No
Video Endoscopic Image	1.2.840.10008.5.1.4.1.1.77.1.1.1	Yes	Yes
Video Microscopic Image	1.2.840.10008.5.1.4.1.1.77.1.2.1	Yes	Yes
Video Photographic Image	1.2.840.10008.5.1.4.1.1.77.1.4.1	Yes	Yes
Ophthalmic Photography 8 Bit Image	1.2.840.10008.5.1.4.1.1.77.1.5.1	Yes	Yes
Ophthalmic Photography 16 Bit Image	1.2.840.10008.5.1.4.1.1.77.1.5.2	Yes	Yes
Stereometric Relationship	1.2.840.10008.5.1.4.1.1.77.1.5.3	Yes	No
Lensometry Measurements	1.2.840.10008.5.1.4.1.1.78.1	Yes	No
Autorefraction Measurements	1.2.840.10008.5.1.4.1.1.78.2	Yes	No
eratometry Measurements	1.2.840.10008.5.1.4.1.1.78.3	Yes	No
Subjective Refraction Measurements	1.2.840.10008.5.1.4.1.1.78.4	Yes	No
Visual Acuity Measurements	1.2.840.10008.5.1.4.1.1.78.5	Yes	No
Spectacle Prescription Report	1.2.840.10008.5.1.4.1.1.78.6	Yes	No
Ophthalmic Axial Measurements	1.2.840.10008.5.1.4.1.1.78.7	Yes	No
Intraocular Lens Calculations	1.2.840.10008.5.1.4.1.1.78.8	Yes	No
Macular Grid Thickness and Volume Report	1.2.840.10008.5.1.4.1.1.79.1	Yes	No
Ophthalmic Visual Field Static Perimetry Measurements	1.2.840.10008.5.1.4.1.1.80.1	Yes	No
Basic Structured Display IOD	1.2.840.10008.5.1.4.1.1.131	Yes	No
Generic Implant Template	1.2.840.10008.5.1.4.43.1	Yes	No
Implant Assembly Template	1.2.840.10008.5.1.4.44.1	Yes	No
Implant Template Group	1.2.840.10008.5.1.4.45.1	Yes	No
Surface Scan Mesh Storage	1.2.840.10008.5.1.4.1.1.68.1	Yes	No
Surface Scan Point Cloud Storage	1.2.840.10008.5.1.4.1.1.68.2	Yes	No
Comprehensive 3D SR	1.2.840.10008.5.1.4.1.1.88.34	Yes	No
Procedure Log	1.2.840.10008.5.1.4.1.1.88.40	Yes	No
Radiopharmaceutical Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.68	Yes	No

4.2.1.1 File Meta Information for the Application Entity

The Source Application Entity Title included in the File Meta Header is configurable (see section 4.4).

4.2.1.2 Real-World Activities

4.2.1.2.1   Activity – User Imports Files from Removable Media

The Removable Media AE can be used as a File Set Reader (FSR): The user inserts DICOM Removable Media into the system and accesses the DICOM Part 10 format files already written to it. The user will be presented with the list of studies present on the media and can then choose to transfer one or more of these to the McKesson Radiology™ 12.3 database. According to the DICOM Interchange Option of the Media Storage Service Class, a DICOMDIR shall be included in the DICOM removable Media. The Removable Media AE uses the information from the DICOMDIR to determine the study information for import. But if no DICOMDIR exists, the McKesson Radiology™ 12.3 Removable Media AE will create a virtual DICOMDIR file from the DICOM files in the directory.

4.2.1.2.2   Activity – User Exports Files to Removable Media

The Removable Media AE can be used as a File Set Creator (FSC): The user can choose to create DICOM Removable Media for export of DICOM files already present in the McKesson Radiology™ database. The user will be prompted to insert empty media into the system and can then choose the particular studies to be written to it. A new DICOMDIR will be created for the DICOM Part 10 format files written to the media.

4.2.1.3   Options

In addition to the Media Storage Directory Storage SOP Class listed below, the Removable Media Application Entity supports all the SOP Classes listed in Table 183 and Transfer Syntaxes listed in Table 9: Sender AE Proposed Transfer Syntaxes. It can import any DICOM file having a combination of one of the SOP Classes and one of Transfer Syntaxes supported by the Sender AE.

Table 184: Proposed Presentation Contexts

Abstract Syntax		Transfer Syntax	
Name	**UID**	**Name**	**UID**
Media Storage Directory Storage	1.2.840.10008.1.3.10	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1
All combinations of SOP Classes listed in Table 183: Media Storage Standard SOP Classes Supported by the Removable Media AE and Transfer Syntaxes listed in Table 9: Sender AE Proposed Transfer Syntaxes.			

4.3   Augmented and Private Application Profiles

The Removable Media AE does not support any augmented or private Application Profiles.

4.4   Media Configuration

All local applications use the AE Titles configured via the Service/Installation Tool. The Application Entity Titles configurable for Media Services are listed in the Table below:

Table 185: AE Title Configuration

Parameter	Configurable (Yes/No)	Default Value
Removable Media AE	No	ALI_STORE_SCP

5   Support for Extended Character Sets

McKesson Radiology™ 12.3 supports the ISO-IR 100 Latin-1 supplementary character set, and includes this value for the Specific Character Set Attribute (0008,0005).

6   SECURITY

It is assumed that McKesson Radiology™ 12.3 is used within a secured environment. It is assumed that a secured environment includes at a minimum:

- Firewall or router protections to ensure that only approved external hosts have network access to McKesson Radiology™ 12.3.

- Firewall or router protections to ensure that McKesson Radiology™ 12.3 only has network access to approved external hosts and services.

- Any communication with external hosts and services outside the locally secured environment use appropriate secure network channels (e.g. such as a Virtual Private Network (VPN))

For QIDO-RS and WADO-RS RESTful operations supported by McKesson Radiology™ 12.3, TLS Client Certificates can be used to secure/restrict access to private information (See QIDO-RS 3.2.10.8.2 and WADO-RS Security 3.2.11.12.2).

Other network security procedures such as automated intrusion detection may be appropriate in some environments. Additional security features may be established by the local security policy and are beyond the scope of this conformance statement.

7 ANNEXES

7.1 IOD Contents

7.1.1 Importer AE Standard Element Use

7.1.1.1 Supported Composite SOP Classes for Display

SOP Instances conforming to the following Composite SOP Classes are fully supported for display on the McKesson Radiology™ 12.3 System workstation, McKesson Radiology™ 12.3 Station.

Table 186: Supported Composite Image SOP Classes for Display

DICOM SOP Class Name	SOP Class UID
Computed Radiography Image	1.2.840.10008.5.1.4.1.1.1
CT Image	1.2.840.10008.5.1.4.1.1.2
Digital X-Ray Image (Presentation)	1.2.840.10008.5.1.4.1.1.1.1
Digital X-Ray Image (Processing)	1.2.840.10008.5.1.4.1.1.1.1.1
Digital Mammography Image (Presentation)	1.2.840.10008.5.1.4.1.1.1.2 See note 1
Digital Mammography Image (Processing)	1.2.840.10008.5.1.4.1.1.1.2.1
Mammography CAD Structured Report	1.2.840.10008.5.1.4.1.1.88.50
Digital Intra-oral X-Ray Image (Presentation)	1.2.840.10008.5.1.4.1.1.1.3
Breast Tomosynthesis image	1.2.840.10008.5.1.4.1.1.13.1.3 See note 4
Digital Intra-oral X-Ray Image (Processing)	1.2.840.10008.5.1.4.1.1.1.3.1
Grayscale Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.1 See note 3
Color Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.2
Hardcopy Color Image	1.2.840.10008.5.1.1.30
Hardcopy Grayscale Image	1.2.840.10008.5.1.1.29
Multi-frame Grayscale Byte Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7.2
Multi-frame Grayscale Word Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7.3
Multi-frame True Color Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7.4
MR Image	1.2.840.10008.5.1.4.1.1.4
Nuclear Medicine Image	1.2.840.10008.5.1.4.1.1.20 See note 5
Nuclear Medicine Image (Retired)	1.2.840.10008.5.1.4.1.1.5
Positron Emission Tomography Image	1.2.840.10008.5.1.4.1.1.128
RT Image	1.2.840.10008.5.1.4.1.1.481.1
Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7
Stored Print	1.2.840.10008.5.1.1.27
Ultrasound Image	1.2.840.10008.5.1.4.1.1.6.1

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DICOM SOP Class Name	SOP Class UID
Ultrasound Image (Retired)	1.2.840.10008.5.1.4.1.1.6
Ultrasound Multi-frame Image	1.2.840.10008.5.1.4.1.1.3.1
Ultrasound Multi-frame Image (Retired)	1.2.840.10008.5.1.4.1.1.3
VL Endoscopic Image	1.2.840.10008.5.1.4.1.1.77.1.1
VL Microscopic Image	1.2.840.10008.5.1.4.1.1.77.1.2
VL Slide-Coordinates Microscopic Image	1.2.840.10008.5.1.4.1.1.77.1.3
VL Photographic Image	1.2.840.10008.5.1.4.1.1.77.1.4
VL Image (Retired)	1.2.840.10008.5.1.4.1.1.77.1
VL Multi-frame Image (Retired)	1.2.840.10008.5.1.4.1.1.77.2
X-Ray Angiographic Bi-Plane Image (Retired)	1.2.840.10008.5.1.4.1.1.12.3
X-Ray Angiographic Image	1.2.840.10008.5.1.4.1.1.12.1
X-Ray Radiofluoroscopic Image	1.2.840.10008.5.1.4.1.1.12.2
Encapsulated PDF	1.2.840.10008.5.1.4.1.1.104.1 See note 2
Video Endoscopic Image	1.2.840.10008.5.1.4.1.1.77.1.1.1
Video Microscopic Image	1.2.840.10008.5.1.4.1.1.77.1.2.1
Video Photographic Image	1.2.840.10008.5.1.4.1.1.77.1.4.1
Ophthalmic Photography 8 Bit Image	1.2.840.10008.5.1.4.1.1.77.1.5.1
Ophthalmic Photography 16 Bit Image	1.2.840.10008.5.1.4.1.1.77.1.5.2

NOTE1: McKesson Radiology™ 12.3 supports the display Mammography images and Mammo CAD SR as an Image Display Actor for the IHE Mammography Profile.

NOTE2: The PDF content of Encapsulated PDF SOP Instances can be displayed by the McKesson Radiology™ 12.3 RadReport reporting application.

NOTE3: McKesson Radiology™ 12.3 includes the ability to display Text and Graphic annotations and other presentation elements (i.e. Shutter, Display Area, VOILUT etc.) in DICOM compliant GSPS objects. See Table 189

NOTE4: McKesson Radiology™ 12.3 includes the ability to display Digital Breast Tomosynthesis (DBT) images for 64-bit McKesson Radiology™ 12.3 Station. A few of the functions include: scroll, power scroll, window/level, zoom, pan, annotate, creation of display protocols that support hanging of both 2D and DBT images and view DBT image data at different slice thicknesses to visualize anatomical regions of interest and calcifications in greater detail (slab DBT images). Please consult with a McKesson Representative for a complete list of features that McKesson Radiology™ 12.3 supports for DBT images.

NOTE5: McKesson Radiology™ 12.3 supports storing, querying and retrieving of DICOM nuclear medicine images from an external DICOM Application Entity. However, displaying DICOM nuclear medicine images in a format that is useful for analysis or interpretation is not supported without a 3rd party nuclear medicine viewer like Segami Oasis, Mirada Fusion XD2 or MedImage MedView. Please consult with a McKesson Representative for more information on 3rd party nuclear medicine viewers supported by McKesson Radiology™ 12.3.

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7.1.1.2   Unsupported Composite SOP Classes for Display

SOP Instances conforming to the following Composite SOP Classes can be received, archived, and exported, but are not supported for display on McKesson Radiology™ 12.3 Station. When a study is opened, any SOP Instances of these particular SOP Classes will not be displayed by the user interface. The contents of some Key Object Selection and Comprehensive SR SOP Instances can be displayed. Refer to the notes below the table for specific details.

Table 187: Unsupported Composite SOP Classes for Display

DICOM SOP Class Name	SOP Class UID
12-lead ECG Waveform	1.2.840.10008.5.1.4.1.1.9.1.1
Ambulatory ECG Waveform	1.2.840.10008.5.1.4.1.1.9.1.3
Basic Voice Audio Waveform	1.2.840.10008.5.1.4.1.1.9.4.1
Cardiac Electrophysiology Waveform	1.2.840.10008.5.1.4.1.1.9.3.1
Basic Text Structured Report	1.2.840.10008.5.1.4.1.1.88.11
Enhanced Structured Report	1.2.840.10008.5.1.4.1.1.88.22
Comprehensive Structured Report	1.2.840.10008.5.1.4.1.1.88.33
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59 See note 1
Chest CAD SR	1.2.840.10008.5.1.4.1.1.88.65
General ECG Waveform	1.2.840.10008.5.1.4.1.1.9.1.2
Hemodynamic Waveform	1.2.840.10008.5.1.4.1.1.9.2.1
Multi-frame Single Bit Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7.1
Raw Data	1.2.840.10008.5.1.4.1.1.66
RT Beams Treatment Record	1.2.840.10008.5.1.4.1.1.481.4
RT Brachy Treatment Record	1.2.840.10008.5.1.4.1.1.481.6
RT Dose	1.2.840.10008.5.1.4.1.1.481.2
RT Plan	1.2.840.10008.5.1.4.1.1.481.5
RT Structure Set	1.2.840.10008.5.1.4.1.1.481.3
RT Treatment Summary Record	1.2.840.10008.5.1.4.1.1.481.7
Stand-alone Curve	1.2.840.10008.5.1.4.1.1.9
Stand-alone Modality LUT	1.2.840.10008.5.1.4.1.1.10
Stand-alone Overlay	1.2.840.10008.5.1.4.1.1.8
Stand-alone VOI LUT	1.2.840.10008.5.1.4.1.1.11
Standalone PET Curve	1.2.840.10008.5.1.4.1.1.129
Stored Print	1.2.840.10008.5.1.1.27
X-Ray Radiation Dose Structured Report	1.2.840.10008.5.1.4.1.1.88.67 See Note 2
General Audio Waveform	1.2.840.10008.5.1.4.1.1.9.4.2

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DICOM SOP Class Name	SOP Class UID
Arterial Pulse Waveform	1.2.840.10008.5.1.4.1.1.9.5.1
Respiratory Waveform	1.2.840.10008.5.1.4.1.1.9.6.1
Colon CAD SR Document	1.2.840.10008.5.1.4.1.1.88.69
Implantation Plan SR Document	1.2.840.10008.5.1.4.1.1.88.70
Encapsulated CDA IOD	1.2.840.10008.5.1.4.1.1.104.2
Pseudo-Color Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.3
Blending Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.4
XA/XRF Grayscale Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.5
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2
Spatial Registration	1.2.840.10008.5.1.4.1.1.66.1
Spatial Fiducials	1.2.840.10008.5.1.4.1.1.66.2
Deformable Spatial Registration	1.2.840.10008.5.1.4.1.1.66.3
Segmentation	1.2.840.10008.5.1.4.1.1.66.4
Surface Segmentation	1.2.840.10008.5.1.4.1.1.66.5
Real World Value Mapping	1.2.840.10008.5.1.4.1.1.67
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
RT Beams Delivery Instruction	1.2.840.10008.5.1.4.34.7
Stereometric Relationship	1.2.840.10008.5.1.4.1.1.77.1.5.3
Lensometry Measurements	1.2.840.10008.5.1.4.1.1.78.1
Autorefraction Measurements	1.2.840.10008.5.1.4.1.1.78.2
Keratometry Measurements	1.2.840.10008.5.1.4.1.1.78.3
Subjective Refraction Measurements	1.2.840.10008.5.1.4.1.1.78.4
Visual Acuity Measurements	1.2.840.10008.5.1.4.1.1.78.5
Spectacle Prescription Report	1.2.840.10008.5.1.4.1.1.78.6
Ophthalmic Axial Measurements	1.2.840.10008.5.1.4.1.1.78.7
Intraocular Lens Calculations	1.2.840.10008.5.1.4.1.1.78.8
Macular Grid Thickness and Volume Report	1.2.840.10008.5.1.4.1.1.79.1
Ophthalmic Visual Field Static Perimetry Measurements	1.2.840.10008.5.1.4.1.1.80.1
Basic Structured Display IOD	1.2.840.10008.5.1.4.1.1.131
Generic Implant Template	1.2.840.10008.5.1.4.43.1
Implant Assembly Template	1.2.840.10008.5.1.4.44.1
Implant Template Group	1.2.840.10008.5.1.4.45.1
Surface Scan Mesh Storage	1.2.840.10008.5.1.4.1.1.68.1
Surface Scan Point Cloud Storage	1.2.840.10008.5.1.4.1.1.68.2

DICOM SOP Class Name	SOP Class UID
Comprehensive 3D SR	1.2.840.10008.5.1.4.1.1.88.34
Procedure Log	1.2.840.10008.5.1.4.1.1.88.40
Radiopharmaceutical Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.68

NOTE1: McKesson Radiology™ 12.3 includes the ability to 'flag' displayed images that are referenced by a Key Object Selection SOP Instance. This is only displayed if a KOS SOP Instance has a Document Title of "Of Interest" or roughly equivalent meaning ("Of Interest", "For Referring Provider", "For Surgery", etc.). For example, no 'flagging' will be displayed for referenced images of a "Rejected for Quality Reasons" KOS SOP Instance.

NOTE2: McKesson Radiology™ 12.3 supports receiving/storing DICOM X-Ray Radiation Dose SR objects from an external DICOM storage SCU and support sending DICOM X-Ray Radiation Dose SR objects to a remote AE SCP initiated by a DICOM C-MOVE Request for the Study. However, displaying of DICOM X-Ray Radiation Dose SR objects is not supported in McKesson Radiology™ 12.3 without a 3rd party Radiation Tracking product like Radimetrics eXposure that supports displaying the objects and DICOM Q/R for the CT X-Ray Radiation Dose SR objects from McKesson Radiology™ 12.3.

7.1.1.3   Significant Elements in Received Images

The following Elements of Composite SOP Instances received by the Importer AE are either stored to the permanent McKesson Radiology™ 12.3 database or are of particular importance in the received images:

Table 188: Significant Elements in Received Images

Module	Attribute Name	Tag ID	Significance
Patient	Patient Name	(0010,0010)	- Importing SCP can be configured to apply a default value if there is no value specified. - Value is saved to database as separate first and last names. Only first and last names are entered in the McKesson Radiology™ 12.3 database. - Names will be parsed correctly if they are in the format of 'lname^fname' or 'lname, fname'. If space separation is used (i.e. 'lname fname'), then the entire name will be treated as the last name. - McKesson Radiology™ 12.3 can be configured to convert all names to uppercase only.
	Patient ID	(0010,0020)	- Importing SCP can be configured to apply a default value if there is no value specified. - The Patient ID must be unique. - Verification on incoming Patient IDs is performed. If an ID already exists but the existing name does not match, then the ID is coerced to the form '<original ID>+1'. - Value is saved to database.
	Issuer of Patient ID	(0010,0021)	For MIMA support only. Used to determine the Patient ID Context Can be configured by Source. If the issuer Of Patient ID is not available, McKesson Radiology™ 12.3 can use AE Title in combination with the hostname to determine the patient context. This is configurable by source.

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	Other Patient IDs Sequence	(0010,1002)	For MIMA Support only. Used to convey known patient identifiers for the patient. Used for Patient Matching.
	>Patient ID	(0010,0020)	
	>Issuer of Patient ID	(0010,0021)	
	Patient's Birth Date	(0010,0030)	- Importing SCP can be configured to apply a default value if there is no value specified. Value is saved to database.
	Patient's Sex	(0010,0040)	- First character must be 'M', 'm', 'F', 'f', 'O', or 'o'. If a different value or not specified then will be entered in the database as 'U', unknown. - Value is saved to database. (The value 'U' is for internal use only, and is updated to 'O' on export).
General Study	Study Date	(0008,0020)	- Importing SCP can be configured to apply a default value if there is no value specified. - Value is saved to database.
	Accession Number	(0008,0050)	- Importing SCP can be configured to apply a default value if there is no value specified. - Value is saved to database.
	Issuer of Accession Number Sequence	(0008,0051)	For MIMA Support. Used to identify the Assigning Authority that issued the Accession Number. Used to identify the Study Context in PACS. Can be configured by Source. If the issuer Of Accession Number Sequence is not available, McKesson Radiology™ 12.3 can use AE Title in combination with the hostname to determine the Study context. This is configurable by source.
	>Local Namespace Entity ID	(0040,0031)	
	>Universal Entity ID	(0040,0032)	
	>Universal Entity ID Type	(0040,0033)	
	Referring Physician's Name	(0008,0090)	- Value is saved to database.
	Study Description	(0008,1030)	- Importer AE can be configured to use the Study Description value for the 'exam type' of the received study. If so configured and the value matches value(s) in the McKesson Radiology™ 12.3 exam type database, then it will be saved to the database as an exam type.
	Study Instance UID	(0020,000D)	- Must be provided. - Value is saved to database.
General Series	Series Description	(0008,103E)	- Importer AE can be configured to use the Series Description value for the 'exam type' of the received study. If so configured and the value matches value(s) in the McKesson Radiology™ 12.3 exam type database, then it will be saved to the database as an exam type.
	Modality	(0008,0060)	- Importer AE can be configured to apply a default value if there is no value specified.
	Operator's Name	(0008,1070)	- If name matches a valid User of McKesson Radiology™ 12.3, then it will be saved to the database as the sonographer of an ultrasound modality series.

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	Institution Name	(0008,0080)	For MIMA Support Only. Used to convey the institution where the SOP Instance was created.
	Institution Code Sequence	(0008,0082)	For MIMA Support Only. Used to convey the institution where the SOP Instance was created.
	>Code Value	(0008,0100)	
	>Coding Scheme Designator	(0008,0102)	
	>Coding Scheme Version	(0008,0103)	Required if the value of Coding Scheme Designator (0008,0102) is not sufficient to identify the Code Value (0008,0100) unambiguously. May be present otherwise.
	>Code Meaning	(0008,0104)	
	Body Part Examined	(0018,0015)	- Importer AE can be configured to use the Body Part Examined value for the 'exam type' of the received study. If so configured and the value matches value(s) in the McKesson Radiology™ 12.3 exam type database, then it will be saved to the database as an exam type.
General Image	Image Type	(0008,0008)	- Importer AE can be configured to use the Image Type value for the 'exam type' of the received study. If so configured and the third value, the modality specific value, matches value(s) in the McKesson Radiology™ 12.3 exam type database, then it will be saved to the database as an exam type.
Image Plane	Pixel Spacing	(0028,0030)	- Used for automatic scaling of measurement tool if specified in an image SOP Instance. - Also can be used for 'true size' printing if the McKesson Radiology™ 12.3 system is connected to a DICOM printer that supports such functionality.
US Region Calibration	Sequence of Ultrasound Regions	(0018,6011)	- Used for automatic scaling of measurement tool if specified in an Ultrasound or Ultrasound Multiframe Image SOP Instance. - Also can be used for 'true size' printing of ultrasound images if the McKesson Radiology™ 12.3 system is connected to a DICOM printer that supports such functionality.
Image Pixel	Photometric Interpretation	(0028,0004)	- The following photometric interpretations are supported for display purposes: MONOCHROME1, MONOCHROME2, RGB, PALETTE_COLOR, YBR_FULL, YBR_FULL_422, YBR_PARTIAL_422, YBR_ICT, and YBR_RCT. - YBR_FULL_422 and YBR_PARTIAL_422 are only supported for JPEG Lossy Transfer Syntaxes. - YBR_ICT and YBR_RCT are only supported for JPEG 2000 Transfer Syntaxes.
	Bits Allocated	(0028,0100)	- Must be 8 or 16 bits for display purposes. (If Bits Allocated is any other value, the image will be received and stored in the database, but cannot be displayed).
	Bits Stored	(0028,0101)	- All values of 16 or fewer are supported for display purposes
Overlay Plane	Overlay Rows	(60xx,0010)	- Required in order to display an Overlay included with a DICOM image SOP Instance.

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Module[17]			
	Overlay Columns	(60xx,0011)	- Required in order to display an Overlay included with a DICOM image SOP Instance.
	Overlay Type	(60xx,0040)	- Required in order to display an Overlay included with a DICOM image SOP Instance. - Overlay data is used only if the value is "G", Graphics. If included in a DICOM image SOP Instance, then it is automatically displayed with the image. "ROI", Region Of Interest, overlay data is not displayed.
	Overlay Origin	(60xx,0050)	- Required in order to display an Overlay included with a DICOM image SOP Instance. - Value must be 1\1 or greater. If either Overlay Origin coordinate is less than 1, then the overlay is not displayed.
	Overlay Bits Allocated	(60xx,0100)	- Required in order to display an Overlay included with a DICOM image SOP Instance. - Should be 8 or 16 if the overlay data is embedded, and 1 if it is not. However, McKesson Radiology™ actually checks whether the Overlay Data is present for the Overlay Group in order to decide whether the overlay data is actually embedded or not.
	Overlay Bit Position	(60xx,0102)	Required in order to display an Overlay included with a DICOM image SOP Instance. Used if the overlay data is embedded. If the data is embedded, then this position must indicate a bit not used by each image pixel sample.
	Overlay Data	(60xx,3000)	Required in order to display a non-embedded Overlay included with a DICOM image SOP Instance. Data present in this Element or embedded in the pixel data is supported for display. If this Element is present for an Overlay Group and has the required number of values, then these values will be used even if the Overlay Bits Allocated and/or Overlay Bit Position indicate that the overlay data should be embedded.
VOI LUT	Window Center	(0028,1050)	- It is recommended that this value be defined for images that have greater than 8 bits stored per pixel sample for image display.
	Window Width	(0028,1051)	- It is recommended that this value be defined for images that have greater than 8 bits stored per pixel sample for image display.

[17] McKesson Radiology™ can support the display of up to 16 overlays included in an image SOP Instance. If multiple Graphic overlays are present then they are all shown in the displayed image. In addition, McKesson Radiology™ can be configured to extract the values from specific DICOM Elements and create a new overlay to display them with an image.

SOP Common	SOP Instance UID	(0008,0018)	- Must be provided. - McKesson Radiology™ 12.3 can be configured to do one of two things if a received SOP Instance has the same Study Instance UID and SOP Instance UID as an existing SOP Instance. The default behavior is to not save the newly received SOP Instance. It can also be configured to save the newly received SOP Instance, but this can result in multiple SOP Instances having the same SOP Instance UID. - The system can also be configured to either preserve the original SOP Instance UID or assign a new UID if the received image data is lossy compressed prior to archival. The default behavior is to always assign a new SOP Instance UID. - In addition, McKesson Radiology™ 12.3 can be configured to always assign a new SOP Instance UID to any SOP Instances received from a specific host. This should only be enabled if the remote host is known to make errors when assigning SOP Instances (either assigning duplicates or UIDs that are not DICOM Conformant).

7.1.2   Significant Elements in Received GSPS Instances

The following Elements of GSPS instances received by the Importer AE are supported for Display in McKesson Radiology™ 12.3.

Table 189: Significant Elements in Received GSPS Instances

Module	Attribute Name	Tag ID	Type	Description	Usage
Presentation State Relationship	Referenced Series Sequence	(0008,1115)	1	- Sequence of Items where each Item includes the Attributes of one Series to which the Presentation applies. - One or more Items shall be present.	**Display supported**
	>Series Instance UID	(0020,000E)	1	- Unique identifier of a Series that is part of the Study defined by the Study Instance UID (0020,000D) in the enclosing dataset.	**Display supported**
	>Referenced Image Sequence	(0008,1140)	1	- Sequence of Items where each Item provides reference to a selected set of Image SOP Class/SOP Instance pairs to which the Presentation applies that are part of the Study defined by Study Instance UID (0020,000D) and the Series defined by Series Instance UID (0020,000E). -The referenced SOP Class shall be the same for all Images in any Item of this Referenced Series Sequence (0008,1115). Value is saved to database. - One or more Items shall be present.	**Display supported**

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Module	Attribute Name	Tag ID	Type	Description	Usage
	>> Referenced Frame Number	(0008,1160)	1C	Identifies the frame numbers within the Referenced SOP Instance to which the reference applies. The first frame shall be denoted as frame number 1. Note: This Attribute may be multi-valued. Required if the Referenced SOP Instance is a multi-frame image and the reference does not apply to all frames, and Referenced Segment Number (0062,000B) is not present.	**Display supported**
	Shutter Presentation Value	(0018,1622)	1C	A single grayscale unsigned value used to replace those parts of the image occluded by the shutter, when rendered on a monochrome display. The units are specified in P-Values. Required if the Display Shutter Module or Bitmap Display Shutter Module is present. Note: The requirement in this module is type 1C which overrides the type 3 in the Display Shutter Module. We do not currently support shutter colour value. Our shutters are always black.	**Display not supported**
Presentation State Shutter	Shutter Presentation Color CIELab Value	(0018,1624)	1C	A color triplet value used to replace those parts of the image occluded by the shutter, when rendered on a color display. The units are specified in PCS-Values, and the value is encoded as CIELab. See C.10.7.1.1. Required if the Display Shutter Module or Bitmap Display Shutter Module is present and the SOP Class is other than Grayscale Softcopy Presentation State Storage. Note: The requirement in this module is type 1C, which overrides the type 3 in the Display Shutter and Bitmap Display Shutter Modules.	**Display not supported**
Presentation	Mask Subtraction	(0028,6100)	1C		**Display not supported**

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Module	Attribute Name	Tag ID	Type	Description	Usage
State Mask	Sequence				

	>Mask Operation	(0028,6101)	1	Type of mask operation to be performed
				
				Enumerated Values:
				        AVG_SUB
				        TID
				
				See C.7.6.10.1 for further explanation.
				
				Note: The requirement in this module is for Enumerated Values which override the requirements of the Mask Module.
					Display not supported

	>Contrast Frame Averaging	(0028,6112)	1C	Specified the number of contrast frames to average together before performing the mask operation. Required if Mask Frame Numbers (0028,6110) specifies more than one frame (i.e. is multi-valued). Note: The requirement in this module is conditional and overrides the optional requirements of the Mask Module.	**Display not supported**
	Recommended Viewing Mode	(0028,1090)	1C	Specifies the recommended viewing protocol(s). Enumerated Value: SUB = for subtraction with mask images Required if Mask Subtraction Sequence (0028,6100) is present. Note: The requirement in this module is type 1C and an Enumerated Value is specified which override the requirements of the Mask Module.	**Display not supported**
Mask	Mask Subtraction Sequence	(0028,6100)	1	- Defines a sequence that describes mask subtraction operations for a Multiframe Image. - One or more items shall be included in this sequence.	**Display not supported**
	Recommended Viewing Mode	(0028,1090)	2	- Specifies the recommended viewing protocol(s). Defined terms: SUB = for subtraction with mask images;	**Display not supported**

Module	Attribute Name	Tag ID	Type	Description	Usage
				NAT = native viewing of image as sent. Note: If an implementation does not recognize the defined term for Recommended Viewing Mode (0028,1090), reverting to native display mode is recommended.	

Display Shutter	Shutter Shape	(0018,1600)	1	-Shape(s) of the shutter defined for display. Enumerated Values:
				
				     RECTANGULAR
				     CIRCULAR
				     POLYGONAL
				
				This multi-valued Attribute shall contain at most one of each Enumerated Value. When multiple values are present, and the shutter is applied to a displayed image, then all of the shapes shall be combined and applied simultaneously, that is, the least amount of image remaining shall be visible (unoccluded). See Figure C.7-4b.
					Display supported

	Shutter Left Vertical Edge	(0018,1602)	1C	- Required if Shutter Shape (0018,1600) is RECTANGULAR. Location of the left edge of the rectangular shutter with respect to pixels in the image given as column.	**Display supported**
	Shutter Right Vertical Edge	(0018,1604)	1C	- Required if Shutter Shape (0018,1600) is RECTANGULAR. Location of the right edge of the rectangular shutter with respect to pixels in the image given as column.	**Display supported**
	Shutter Upper Horizontal Edge	(0018,1606)	1C	- Required if Shutter Shape (0018,1600) is RECTANGULAR. Location of the upper edge of the rectangular shutter with respect to pixels in the image given as row.	**Display supported**
	Shutter Lower	(0018,1608)	1C	- Required if Shutter Shape	**Display supported**

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Module	Attribute Name	Tag ID	Type	Description	Usage
	Horizontal Edge			(0018,1600) is RECTANGULAR. Location of the lower edge of the rectangular shutter with respect to pixels in the image given as row.	
	Center of Circular Shutter	(0018,1610)	1C	- Required if Shutter Shape (0018,1600) is CIRCULAR. Location of the center of the circular shutter with respect to pixels in the image given as row and column.	**Display supported**
	Radius of Circular Shutter	(0018,1612)	1C	- Required if Shutter Shape (0018,1600) is CIRCULAR. Radius of the circular shutter with respect to pixels in the image given as a number of pixels along the row direction.	**Display supported**
	Vertices of the Polygonal Shutter	(0018,1620)	1C	- Required if Shutter Shape (0018,1600) is POLYGONAL. Multiple Values where the first set of two values are: row of the origin vertex column of the origin vertex Two or more pairs of values follow and are the row and column coordinates of the other vertices of the polygon shutter. Polygon shutters are implicitly closed from the last vertex to the origin vertex and all edges shall be non-intersecting except at the vertices.	**Display supported**
	Shutter Presentation Value	(0018,1622)	3	- A single gray unsigned value used to replace those parts of the image occluded by the shutter, when rendered on a monochrome display. The units are specified in P-Values, from a minimum of 0000H (black) up to a maximum of FFFFH (white). Note: The maximum P-Value for this Attribute may be different from the maximum P-Value from the output of the Presentation LUT,	**Display not supported**

Module	Attribute Name	Tag ID	Type	Description	Usage
				which may be less than 16 bits in depth.	
	Shutter Presentation Color CIELab Value	(0018,1624)	3	- A color triplet value used to replace those parts of the image occluded by the shutter, when rendered on a color display. The units are specified in PCS-Values, and the value is encoded as CIELab. See C.10.7.1.1.	**Display not supported**
Bitmap Display Shutter	Shutter Shape	(0018,1600)	1	Shape of the shutter defined for display. Enumerated Values are: BITMAP This Attribute shall contain one Value.	**Display not supported**
	Shutter Overlay Group	(0018,1623)	1	Specifies the Group (60xx) of an Overlay stored within the Presentation State IOD that contains the bitmap data, as defined in the Overlay Plane Module C.9.2.	**Display not supported**
	Shutter Presentation Value	(0018,1622)	1	A single gray unsigned value used to replace those parts of the image occluded by the shutter, when rendered on a monochrome display. The units are specified in P-Values, from a minimum of 0000H (black) up to a maximum of FFFFH (white). Note: The maximum P-Value for this Attribute may be different from the maximum P-Value from the output of the Presentation LUT, which may be less than 16 bits in depth.	**Display not supported**
	Shutter Presentation Color CIELab Value	(0018,1624)	3	A color triplet value used to replace those parts of the image occluded by the shutter, when rendered on a color display. The units are specified in PCS-Values, and the value is encoded as CIELab. See C.10.7.1.1.	**Display not supported**
Overlay Plane	Overlay Rows	(60xx,0010)	1	Number of Rows in Overlay.	**Display not supported**
	Overlay Columns	(60xx,0011)	1	Number of Columns in Overlay.	**Display not supported**
	Overlay Type	(60xx,0040)	1	Indicates whether this overlay represents a region of interest or other graphics. Enumerated Values: G = Graphics R = ROI.	**Display not supported**
	Overlay Origin	(60xx,0050)	1	Location of first overlay point with	**Display not supported**

Module	Attribute Name	Tag ID	Type	Description	Usage
				respect to pixels in the image, given as row\column. The upper left pixel of the image has the coordinate 1\1. Column values greater than 1 indicate the overlay plane origin is to the right of the image origin. Row values greater than 1 indicate the overlay plane origin is below the image origin. Values less than 1 indicate the overlay plane origin is above or to the left of the image origin. Note: Values of 0\0 indicate that the overlay pixels start 1 row above and one column to the left of the image pixels.	
	Overlay Bits Allocated	(60xx,0100)	1	Number of Bits Allocated in the Overlay. The value of this Attribute shall be 1. Note: Formerly the standard described embedding the overlay data in the Image Pixel Data (7FE0,0010), in which case the value of this Attribute was required to be the same as Bits Allocated (0028,0100). This usage has been retired. See PS 3.3 2004.	**Display not supported**
	Overlay Bit Position	(60xx,0102)	1	The value of this Attribute shall be 0. Note: Formerly the standard described embedding the overlay data in the Image Pixel Data (7FE0,0010), in which case the value of this Attribute specified the bit in which the overlay was stored. This usage has been retired. See PS 3.3 2004.	**Display not supported**
	Overlay Data	(60xx,3000)	1	Overlay pixel data. The order of pixels sent for each overlay is left to right, top to bottom, i.e., the upper left pixel is sent first followed by the remainder of the first row , followed by the first pixel of the 2nd row, then the remainder of the 2nd row and so on. Overlay data shall be contained in this Attribute. See C.9.2.1.1 for further explanation.	**Display not supported**
	Overlay	(60xx,0022)	3	User-defined comments about the	**Display not supported**

Module	Attribute Name	Tag ID	Type	Description	Usage
	Description			overlay.	
	Overlay Subtype	(60xx,0045)	3	Defined term which identifies the intended purpose of the Overlay Type. See C.9.2.1.3 for further explanation.	**Display not supported**
	Overlay Label	(60xx,1500)	3	A user defined text string which may be used to label or name this overlay.	**Display not supported**
	ROI Area	(60xx,1301)	3	Number of pixels in ROI area. See C.9.2.1.2 for further explanation.	**Display not supported**
	ROI Mean	(60xx,1302)	3	ROI Mean. See C.9.2.1.2 for further explanation.	**Display not supported**
	ROI Standard Deviation	(60xx,1303)	3	ROI standard deviation. See C.9.2.1.2 for further explanation.	**Display not supported**
Overlay Activation	Overlay Activation Layer	(60xx,1001)	2C	The layer (defined in Graphic Layer (0070,0002) of the Graphic Layer Module C.10.7) in which the Overlay described in group 60xx shall be displayed. If no layer is specified (zero length) then the overlay shall not be displayed. Required if Group 60xx is present in the referenced image(s) or the Presentation State instance containing this Module.	**Display not supported**
Display Area	Displayed Area Selection Sequence	(0070,005A)	1	A sequence of Items each of which describes the displayed area selection for a group of images or frames. Sufficient Items shall be present to describe every image and frame listed in the Presentation State Relationship Module. One or more Items shall be included in this sequence.	**Display supported**
	>Referenced Image Sequence	(0008,1140)	1C	The subset of images and frames listed in the Presentation State Relationship Module, to which this displayed area selection applies. One or more Items shall be included in this sequence. Required if the displayed area selection in this Item does not apply to all the images and frames listed in the Presentation State Relationship Module.	**Display supported**
	>>	(0008,1150)	1	Uniquely identifies the referenced	**Display supported**

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Module	Attribute Name	Tag ID	Type	Description	Usage
	Referenced SOP Class UID			SOP Class.	
	>> Referenced SOP Instance UID	(0008,1155)	1	Uniquely identifies the referenced SOP Instance.	**Display supported**
	>> Referenced Frame Number	(0008,1160)	1C	Identifies the frame numbers within the Referenced SOP Instance to which the reference applies. The first frame shall be denoted as frame number 1. Note: This Attribute may be multi-valued. Required if the Referenced SOP Instance is a multi-frame image and the reference does not apply to all frames, and Referenced Segment Number (0062,000B) is not present.	**Display supported**
	>> Referenced Segment Number	(0062,000B)	1C	Identifies the Segment Number to which the reference applies. Required if the Referenced SOP Instance is a Segmentation or Surface Segmentation and the reference does not apply to all segments and Referenced Frame Number (0008,1160) is not present.	**Display not supported**
	>Pixel Origin Interpretation	(0048,0301)	1C	For a referenced multi-frame image, specifies whether the Displayed Area Top Left Hand Corner (0070,0052) and Displayed Area Bottom Right Hand Corner (0070,0053) are to be interpreted relative to the individual frame pixel origins, or relative to the Total Pixel Matrix origin (see C.8.12.4.1.4). Required if the value of Referenced SOP Class UID (0008,1150) within Referenced Image Sequence (0008,1140) is 1.2.840.10008.5.1.4.1.1.77.1.6 (VL Whole Slide Microscopy Image). May be present otherwise. Enumerated Values: FRAME – relative to individual frame VOLUME – relative to Total Image Matrix If not present, TLHC and BRHC are defined relative to the frame	**Display not supported**

Module	Attribute Name	Tag ID	Type	Description	Usage
				pixel origins.	
	>Displayed Area Top Left Hand Corner	(0070,0052)	1	The top left (after spatial transformation) pixel in the referenced image to be displayed, given as column\row. Column is the horizontal (before spatial transformation) offset (X) and row is the vertical (before spatial transformation) offset (Y) relative to the origin of the pixel data before spatial transformation, which is 1\1. See Figure C.10.4-1.	**Display supported**
	>Displayed Area Bottom Right Hand Corner	(0070,0053)	1	The bottom right (after spatial transformation) pixel in the referenced image to be displayed, given as column\row. Column is the horizontal (before spatial transformation) offset (X) and row is the vertical (before spatial transformation) offset (Y) relative to the origin of the pixel data before spatial transformation, which is 1\1. See Figure C.10.4-1.	**Display supported**
	>Presentation Size Mode	(0070,0100)	1	Manner of selection of display size. Enumerated Values: SCALE TO FIT TRUE SIZE MAGNIFY	**Display supported**
	>Presentation Pixel Spacing	(0070,0101)	1C	Physical distance between the center of each pixel in the referenced image (before spatial transformation), specified by a numeric pair - adjacent row spacing (delimiter) adjacent column spacing in mm. See 10.7.1.3 for further explanation of the value order. Notes: 1. This value may be different from Pixel Spacing (0028,0030) or Imager Pixel Spacing (0018,1164) specified in the referenced image, which are ignored, since some form of calibration may have been performed (for example by reference to an object of known size in the image). 2. If the row and column spacing are different, then the pixel aspect ratio of the image is	**Display not supported**

Module	Attribute Name	Tag ID	Type	Description	Usage
				not 1:1. Required if Presentation Size Mode (0070,0100) is TRUE SIZE, in which case the values will correspond to the physical distance between the center of each pixel on the display device. May be present if Presentation Size Mode (0070,0100) is SCALE TO FIT or MAGNIFY, in which case the values are used to compute the aspect ratio of the image pixels. Note: Mckesson uses the value in the DICOM image header.	
	>Presentation Pixel Aspect Ratio	(0070,0102)	1C	Ratio of the vertical size and the horizontal size of the pixels in the referenced image, to be used to display the referenced image, specified by a pair of integer values where the first value is the vertical pixel size and the second value is the horizontal pixel size. See C.7.6.3.1.7. Required if Presentation Pixel Spacing (0070,0101) is not present. Notes: 1. This value may be different from the aspect ratio specified by Pixel Aspect Ratio (0028,0034) in the referenced image, or implied by the values of Pixel Spacing (0028,0030) or Imager Pixel Spacing (0018,1164) specified in the referenced image, which are ignored. 2. This value must be specified even if the aspect ratio is 1:1.	**Display not supported**
	>Presentation Pixel Magnification Ratio	(0070,0103)	1C	Ratio of displayed pixels to source pixels, specified in one dimension. Required if Presentation Size Mode (0070,0100) is MAGNIFY. Notes: 1. A value of 1.0 would imply that one pixel in the referenced image would be displayed as one pixel on the display (i.e. it would not be interpolated if the aspect ratio of the image pixels is 1:1). 2. A value of 2.0 would imply that one pixel in the referenced image would be	**Display supported**

Module	Attribute Name	Tag ID	Type	Description	Usage
				displayed as 4 pixels on the display (i.e. up-sampled by a factor of 2 in each of the row and column directions). 3. A value of 0.5 would imply that 4 pixels in the referenced image would be displayed as 1 pixel on the display (i.e. down-sampled by a factor of 2 in each of the row and column directions). 4. If the source pixels have an aspect ratio of other than 1:1, then they are assumed to have been interpolated to a display pixel aspect ratio of 1:1 prior to magnification.	
Graphic Annotation	Graphic Annotation Sequence	(0070,0001)	1	- A sequence of Items each of which represents a group of annotations composed of graphics or text or both. - One or more Items shall be present.	**Display supported**
	>Referenced Image Sequence	(0008,1140)	1C	- Sequence of Items where each Item provides reference to a selected set of Image SOP Class/SOP Instance pairs that are defined in the Presentation State Relationship Module. One or more Items shall be present. - Required if graphic annotations in this Item do not apply to all the images listed in the Presentation State Relationship Module.	**Display supported**
	>> Referenced SOP Class UID	(0008,1150)	1	Uniquely identifies the referenced SOP Class.	**Display supported**
	>> Referenced SOP Instance UID	(0008,1155)	1	Uniquely identifies the referenced SOP Instance.	**Display supported**
	>> Referenced Frame Number	(0008,1160)	1C	Identifies the frame numbers within the Referenced SOP Instance to which the reference applies. The first frame shall be denoted as frame number 1. Note: This Attribute may be multi-valued. Required if the Referenced SOP Instance is a multi-frame image	**Display supported**

Module	Attribute Name	Tag ID	Type	Description	Usage
				and the reference does not apply to all frames, and Referenced Segment Number (0062,000B) is not present.	
	>Graphic Layer	(0070,0002)	1	- The layers in which graphic and text may be Rendered	**Display not supported**
	>Text Object Sequence	(0070,0008)	1C	- Sequence that describes a text annotation. One or more Items may be present. - Either one or both of Text Object Sequence (0070,0008) or Graphic Object Sequence (0070,0009) are required .	**Display supported**
	>>Bounding Box Annotation Units	(0070,0003)	1C	- Units of measure for the axes of the text bounding box.	**Display supported**
	>>Anchor Point Annotation Units	(0070,0004)	1C	- Units of measure for the axes of the text anchor point annotation. Enumerated Values for Anchor Point Annotation Units (0070,0004) are the same as for Bounding Box Annotation Units (0070,0003). - Required if Anchor Point (0070,0014) is present.	**Display supported**
	>>Unformatted Text Value	(0070,0006)	1	- Text data which is unformatted and whose manner of display within the defined bounding box or relative to the specified anchor point is implementation dependent. The text value may contain spaces, as well as multiple lines separated by either LF, CR, CR LF or LF CR, but otherwise no format control characters (such as horizontal or vertical tab and form feed) shall be present, even if permitted by the Value Representation of ST. - In McKesson Radiology™ 12.3, Text is interpreted as ISO-IR 100	**Display supported**
	>>Bounding Box Top Left	(0070,0010)	1C	- Location of the Top Left Hand Corner (TLHC) of the bounding box in which Unformatted Text	**Display supported**

Module	Attribute Name	Tag ID	Type	Description	Usage
	Hand Corner			Value (0070,0006) is to be displayed, in Bounding Box Annotation Units (0070,0003), given as column\row. Column is the horizontal offset and row is the vertical offset. - Required if Anchor Point (0070,0014) is not present.	
	>>Bounding Box Bottom Right Hand Corner	(0070,0011)	1C	- Location of the Bottom Right Hand Corner (BRHC) of the bounding box in which Unformatted Text Value (0070,0006) is to be displayed, in Bounding Box Annotation Units (0070,0003), given as column\row. Column is the horizontal offset and row is the vertical offset. - Required if Anchor Point (0070,0014) is not present.	**Display supported**
	>>Bounding Box Text Horizontal Justification	(0070,0012)	1C	- Location of the text relative to the vertical edges of the bounding box. Enumerated Values: LEFT = closest to left edge RIGHT = closest to right edge CENTER = centered - Required if Bounding Box Top Left Hand Corner (0070,0010) is present.	**Display supported**
	>>Anchor Point	(0070,0014)	1C	- Location of a point in the image or Specified Displayed Area to which the Unformatted Text Value (0070,0006) is related, in Anchor Point Annotation Units (0070,0004), given as column\row. Column is the horizontal offset and row is the vertical offset. - Required if Bounding Box Top Left Hand Corner (0070,0010) and Bounding Box Bottom Right Hand Corner (0070,0011) are not present. May be present even if a bounding box is specified (i.e. Bounding Box Top Left Hand Corner (0070,0010) and Bounding Box Bottom Right Hand Corner	**Display supported**

Module	Attribute Name	Tag ID	Type	Description	Usage
				(0070,0011) are present).	
	>>Anchor Point Visibility	(0070,0015)	1C	- Flag to indicate whether or not a visible indication (such as a line or arrow) of the relationship between the text and the anchor point is to be displayed. Enumerated Values: Y = yes N = no - Required if Anchor Point (0070,0014) is present. McKesson Radiology™ 12.3 does not interpret this tag. An arrow is always present to indicate the relationship between the text and the anchor point.	**Display not supported**
	>Graphic Object Sequence	(0070,0009)	1C	- Sequence that describes a graphic annotation. One or more Items may be present. - Either one or both of Text Object Sequence (0070,0008) or Graphic Object Sequence (0070,0009) are required.	**Display supported**
	>>Graphic Annotation Units	(0070,0005)	1C	- Units of measure for the axes of the graphic annotation. Enumerated Values for Graphic Annotation Units (0070,0005) are the same as for Bounding Box Annotation Units (0070,0003).	**Display supported**
	>>Graphic Dimensions	(0070,0020)	1	Enumerated Value: 2 McKesson Radiology™ 12.3 supports Default Dimensions is 2.	**Display supported**
	>>Number of Graphic Points	(0070,0021)	1	- Number of data points in this graphic.	**Display supported**
	>> Graphic Data	(0070,0022)	1	- Coordinates that specify this graphic annotation. Depending on Graphic Type (0070,0023)	**Display supported**
	>>Graphic Type	(0070,0023)	1	The shape of graphic that is to be drawn.	**Display supported**

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Module	Attribute Name	Tag ID	Type	Description	Usage
				McKesson Radiology™ 12.3 supports the following graphic types: POINT POLYLINE INTERPOLATED CIRCLE ELLIPSE	
	>>Graphic Filled	(0070,0024)	1C	- Whether or not the closed graphics element is displayed as filled (in some unspecified manner that shall be distinguishable from an outline) or as an outline. Enumerated Values: Y = yes N = no Required if Graphic Data (0070,0022) is "closed", that is Graphic Type (0070,0023) is CIRCLE or ELLIPSE, or Graphic Type (0070,0023) is POLYLINE or INTERPOLATED and the first data point is the same as the last data point.	**Display supported**
Spatial Transformation	Image Rotation	(0070,0042)	1	How far to rotate the image clockwise in degrees, before any Image Horizontal Flip (0070,0041) is applied. Enumerated Values: 0, 90,180,270 Notes: Negative values are not permitted since the Value Representation is unsigned. **Only support rotation 90,180,270 degrees.**	**Display supported**

	Image Horizontal Flip	(0070,0041)	1	Whether or not to flip the image horizontally after any Image Rotation has been applied such that the left side of the image becomes the right side.
				Enumerated Values:
				      Y = yes,
				      N = no
				Note: No vertical flip is specified since the same result
					Display supported

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Module	Attribute Name	Tag ID	Type	Description	Usage
				can be achieved by a combination of a 180 degree rotation and a horizontal flip. **Only support horizontal flip.**	
Graphic Layer	Graphic Layer Sequence	(0070,0060)	1	A sequence of Items each of which represents a single layer in which overlays, curves, graphics or text may be rendered. One or more Items shall be included in this sequence. An Item is required for each layer referenced from the Graphic Annotation Module or the Overlay Activation Module.	**Display not supported**
	>Graphic Layer	(0070,0002)	1	A string which identifies the layer.	**Display not supported**
	>Graphic Layer Order	(0070,0062)	1	An integer indicating the order in which it is recommended that the layer be rendered, if the display is capable of distinguishing. Lower numbered layers are to be rendered first.	**Display not supported**
	>Graphic Layer Recommended Display Grayscale Value	(0070,0066)	3	A default single gray unsigned value in which it is recommended that the layer be rendered on a monochrome display. The units are specified in P-Values from a minimum of 0000H (black) up to a maximum of FFFFH (white). Note: The maximum P-Value for this Attribute may be different from the maximum P-Value from the output of the Presentation LUT, which may be **less** than 16 bits in depth.	**Display not supported**
	>Graphic Layer Recommended Display CIELab Value	(0070,0401)	3	A default color triplet value in which it is recommended that the layer be rendered on a color display. The units are specified in PCS-Values, and the value is encoded as CIELab. See C.10.7.1.1.	**Display not supported**
	>Graphic Layer Description	(0070,0068)	3	A free text description of the contents of this layer.	**Display not supported**
Graphic Group	Graphic Group Sequence	(0070,0234)	1	Sequence that describes the combined graphic object. One or more Items shall be included in this sequence.	**Display not supported**

Module	Attribute Name	Tag ID	Type	Description	Usage
	>Graphic Group ID	(0070,0295)	1	A unique number identifying the Graphic Group, i.e. the combined graphic object.	**Display not supported**
	>Graphic Group Label	(0070,0207)	1	Name used to identify the Graphic Group, i.e. the combined graphic object.	**Display not supported**
	>Graphic Group Description	(0070,0208)	3	Description of the group.	**Display not supported**
Modality LUT	Modality LUT Sequence	(0028,3000)	1C	Defines a sequence of Modality LUTs. Only a single Item shall be included in this sequence. Shall not be present if Rescale Intercept (0028,1052) is present.	**Display not supported**
	>LUT Descriptor	(0028,3002)	1C	Specifies the format of the LUT Data in this Sequence. See C.11.1.1 for further explanation. Required if the Modality LUT Sequence (0028,3000) is sent.	**Display not supported**
	>LUT Explanation	(0028,3003)	3	Free form text explanation of the meaning of the LUT.	**Display not supported**
	>Modality LUT Type	(0028,3004)	1C	Specifies the output values of this Modality LUT. See C.11.1.1.2 for further explanation. Required if the Modality LUT Sequence (0028,3000) is sent.	**Display not supported**
	>LUT Data	(0028,3006)	1C	LUT Data in this Sequence. Required if the Modality LUT Sequence (0028,3000) is sent.	**Display not supported**
	Rescale Intercept	(0028,1052)	1C	The value b in relationship between stored values (SV) and the output units specified in Rescale Type (0028,1054). Output units = m*SV + b. Required if Modality LUT Sequence (0028,3000) is not present. Shall not be present otherwise.	**Display supported**
	Rescale Slope	(0028,1053)	1C	m in the equation specified by Rescale Intercept (0028,1052). Required if Rescale Intercept is present.	**Display supported**
	Rescale Type	(0028,1054)	1C	Specifies the output units of Rescale Slope (0028,1053) and	**Display supported**

Module	Attribute Name	Tag ID	Type	Description	Usage
				Rescale Intercept (0028,1052). See C.11.1.1.2 for further explanation. Required if Rescale Intercept is present.	
	Softcopy VOI LUT Sequence	(0028,3110)	1	Defines a sequence of VOI LUTs or Window Centers and Widths and to which images and frames they apply. No more than one VOI LUT Sequence containing a single Item or one pair of Window Center/Width values shall be specified for each image or frame. One or more Items shall be included in this sequence.	**Display supported**
	>Referenced Image Sequence	(0008,1140)	1C	The subset of images and frames listed in the Presentation State Relationship Module, to which this VOI LUT or Window Center and Width applies. One or more Items shall be included in this sequence. Required if the VOI LUT transformation in this Item does not apply to all the images and frames listed in the Presentation State Relationship Module.	**Display supported**
Softcopy VOI LUT	>> Referenced SOP Class UID	(0008,1150)	1	Uniquely identifies the referenced SOP Class.	**Display supported**
	>> Referenced SOP Instance UID	(0008,1155)	1	Uniquely identifies the referenced SOP Instance.	**Display supported**
	>> Referenced Frame Number	(0008,1160)	1C	Identifies the frame numbers within the Referenced SOP Instance to which the reference applies. The first frame shall be denoted as frame number 1. Note: This Attribute may be multi-valued. Required if the Referenced SOP Instance is a multi-frame image and the reference does not apply to all frames, and Referenced Segment Number (0062,000B) is not present.	**Display supported**
	>> Referenced Segment	(0062,000B)	1C	Identifies the Segment Number to which the reference applies. Required if the Referenced SOP	**Display not supported**

Module	Attribute Name	Tag ID	Type	Description	Usage
	Number			Instance is a Segmentation or Surface Segmentation and the reference does not apply to all segments and Referenced Frame Number (0008,1160) is not present.	
	> VOI LUT Sequence	(0028,3010)	1C	Defines a sequence of VOI LUTs. One or more Items shall be included in this sequence. Required if Window Center (0028,1050) is not present. May be present otherwise.	**Display supported**
	>> LUT Descriptor	(0028,3002)	1	Specifies the format of the LUT Data in this Sequence. See C.11.2.1.1 for further explanation.	**Display supported**
	>> LUT Explanation	(0028,3003)	3	Free form text explanation of the meaning of the LUT. Export as Linear DICOM VOI LUT.	
	>> LUT Data	(0028,3006)	1	LUT Data in this Sequence.	
	>> Window Center	(0028,1050)	1C	Window Center for display. See C.11.2.1.2 for further explanation. Required if VOI LUT Sequence (0028,3010) is not present. May be present otherwise.	**Display supported**
	>> Window Width	(0028,1051)	1C	Window Width for display. See C.11.2.1.2 for further explanation. Required if Window Center (0028,1050) is sent.	**Display supported**
	>> Window Center & Width Explanation	(0028,1055)	3	Free form explanation of the meaning of the Window Center and Width. Multiple values correspond to multiple Window Center and Width values.	**Display supported**
Softcopy Presentation LUT	Presentation LUT Sequence	(2050,0010)	1C	Defines a sequence of Presentation LUTs. Only a single item shall be included in this sequence. Required if Presentation LUT Shape (2050,0020) is absent.	**Display not supported**
	>LUT Descriptor	(0028,3002)	1	Specifies the format of the LUT Data in this Sequence. See C.11.6.1.1 for further	**Display not supported**

Module	Attribute Name	Tag ID	Type	Description	Usage
				explanation.	
	>LUT Explanation	(0028,3003)	3	Free form text explanation of the meaning of the LUT.	**Display not supported**
	>LUT Data	(0028,3006)	1	LUT Data in this Sequence.	**Display not supported**
	Presentation LUT Shape	(2050,0020)	1C	Specifies predefined Presentation LUT transformation. Required if Presentation LUT Sequence (2050,0010) is absent. Enumerated Values: IDENTITY - no further translation necessary, input values are P-Values INVERSE - output values after inversion are P-Values See C.11.6.1.2 Only support value of **IDENTITY**	**Partial Display supported**

7.1.3   Significant Elements in Received CSPS Instances

The following Elements of CSPS instances received by the Importer AE are supported for Display in McKesson Radiology™ 12.3.

Module	Attribute Name	Tag ID	Type	Description	Usage
Presentation State Relationship	Referenced Series Sequence	(0008,1115)	1	- Sequence of Items where each Item includes the Attributes of one Series to which the Presentation applies. - One or more Items shall be present.	**Display supported**
	>Series Instance UID	(0020,000E)	1	- Unique identifier of a Series that is part of the Study defined by the Study Instance UID (0020,000D) in the enclosing dataset.	**Display supported**
	>Referenced Image Sequence	(0008,1140)	1	- Sequence of Items where each Item provides reference to a selected set of Image SOP Class/SOP Instance pairs to which the Presentation applies that are part of the Study defined by Study Instance UID (0020,000D) and the Series defined by Series Instance UID (0020,000E). -The referenced SOP Class shall be the same for all Images in any Item of this Referenced Series	**Display supported**

Module	Attribute Name	Tag ID	Type	Description	Usage
				Sequence (0008,1115). Value is saved to database. - One or more Items shall be present.	
	>> Referenced Frame Number	(0008,1160)	1C	Identifies the frame numbers within the Referenced SOP Instance to which the reference applies. The first frame shall be denoted as frame number 1. Note: This Attribute may be multi-valued. Required if the Referenced SOP Instance is a multi-frame image and the reference does not apply to all frames, and Referenced Segment Number (0062,000B) is not present.	**Display supported**
Presentation State Shutter	Shutter Presentation Value	(0018,1622)	1C	A single grayscale unsigned value used to replace those parts of the image occluded by the shutter, when rendered on a monochrome display. The units are specified in P-Values. Required if the Display Shutter Module or Bitmap Display Shutter Module is present. Note: The requirement in this module is type 1C which overrides the type 3 in the Display Shutter Module. We do not currently support shutter colour value. Our shutters are always black.	**Display not supported**
	Shutter Presentation Color CIELab Value	(0018,1624)	1C	A color triplet value used to replace those parts of the image occluded by the shutter, when rendered on a color display. The units are specified in PCS-Values, and the value is encoded as CIELab. See C.10.7.1.1. Required if the Display Shutter Module or Bitmap Display Shutter Module is present and the SOP Class is other than Grayscale Softcopy Presentation State Storage. Note: The requirement in this module is type 1C, which overrides the type 3 in the Display Shutter and Bitmap Display Shutter	**Display not supported**

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Module	Attribute Name	Tag ID	Type	Description	Usage
				Modules.	
Display Shutter	Shutter Shape	(0018,1600)	1	-Shape(s) of the shutter defined for display. Enumerated Values: RECTANGULAR CIRCULAR POLYGONAL This multi-valued Attribute shall contain at most one of each Enumerated Value. When multiple values are present, and the shutter is applied to a displayed image, then all of the shapes shall be combined and applied simultaneously, that is, the least amount of image remaining shall be visible (unoccluded). See Figure C.7-4b.	**Display supported**
	Shutter Left Vertical Edge	(0018,1602)	1C	- Required if Shutter Shape (0018,1600) is RECTANGULAR. Location of the left edge of the rectangular shutter with respect to pixels in the image given as column.	**Display supported**
	Shutter Right Vertical Edge	(0018,1604)	1C	- Required if Shutter Shape (0018,1600) is RECTANGULAR. Location of the right edge of the rectangular shutter with respect to pixels in the image given as column.	**Display supported**
	Shutter Upper Horizontal Edge	(0018,1606)	1C	- Required if Shutter Shape (0018,1600) is RECTANGULAR. Location of the upper edge of the rectangular shutter with respect to pixels in the image given as row.	**Display supported**
	Shutter Lower Horizontal Edge	(0018,1608)	1C	- Required if Shutter Shape (0018,1600) is RECTANGULAR. Location of the lower edge of the rectangular shutter with respect to pixels in the image given as row.	**Display supported**

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Module	Attribute Name	Tag ID	Type	Description	Usage
	Center of Circular Shutter	(0018,1610)	1C	- Required if Shutter Shape (0018,1600) is CIRCULAR. Location of the center of the circular shutter with respect to pixels in the image given as row and column.	**Display supported**
	Radius of Circular Shutter	(0018,1612)	1C	- Required if Shutter Shape (0018,1600) is CIRCULAR. Radius of the circular shutter with respect to pixels in the image given as a number of pixels along the row direction.	**Display supported**
	Vertices of the Polygonal Shutter	(0018,1620)	1C	- Required if Shutter Shape (0018,1600) is POLYGONAL. Multiple Values where the first set of two values are: row of the origin vertex column of the origin vertex Two or more pairs of values follow and are the row and column coordinates of the other vertices of the polygon shutter. Polygon shutters are implicitly closed from the last vertex to the origin vertex and all edges shall be non-intersecting except at the vertices.	**Display supported**
	Shutter Presentation Value	(0018,1622)	3	- A single gray unsigned value used to replace those parts of the image occluded by the shutter, when rendered on a monochrome display. The units are specified in P-Values, from a minimum of 0000H (black) up to a maximum of FFFFH (white). Note: The maximum P-Value for this Attribute may be different from the maximum P-Value from the output of the Presentation LUT, which may be less than 16 bits in depth.	**Display not supported**
	Shutter	(0018,1624)	3	- A color triplet value used to	**Display not supported**

Module	Attribute Name	Tag ID	Type	Description	Usage
	Presentation Color CIELab Value			replace those parts of the image occluded by the shutter, when rendered on a color display. The units are specified in PCS-Values, and the value is encoded as CIELab. See C.10.7.1.1.	
Bitmap Display Shutter	Shutter Shape	(0018,1600)	1	Shape of the shutter defined for display. Enumerated Values are: BITMAP This Attribute shall contain one Value.	**Display not supported**
	Shutter Overlay Group	(0018,1623)	1	Specifies the Group (60xx) of an Overlay stored within the Presentation State IOD that contains the bitmap data, as defined in the Overlay Plane Module C.9.2.	**Display not supported**
	Shutter Presentation Value	(0018,1622)	1	A single gray unsigned value used to replace those parts of the image occluded by the shutter, when rendered on a monochrome display. The units are specified in P-Values, from a minimum of 0000H (black) up to a maximum of FFFFH (white). Note: The maximum P-Value for this Attribute may be different from the maximum P-Value from the output of the Presentation LUT, which may be less than 16 bits in depth.	**Display not supported**
	Shutter Presentation Color CIELab Value	(0018,1624)	3	A color triplet value used to replace those parts of the image occluded by the shutter, when rendered on a color display. The units are specified in PCS-Values, and the value is encoded as CIELab. See C.10.7.1.1.	**Display not supported**
Overlay Plane	Overlay Rows	(60xx,0010)	1	Number of Rows in Overlay.	**Display not supported**
	Overlay Columns	(60xx,0011)	1	Number of Columns in Overlay.	**Display not supported**
	Overlay Type	(60xx,0040)	1	Indicates whether this overlay represents a region of interest or other graphics. Enumerated Values: G = Graphics R = ROI.	**Display not supported**
	Overlay Origin	(60xx,0050)	1	Location of first overlay point with respect to pixels in the image, given as row\column. The upper left pixel of the image	**Display not supported**

Module	Attribute Name	Tag ID	Type	Description	Usage
				has the coordinate 1\1. Column values greater than 1 indicate the overlay plane origin is to the right of the image origin. Row values greater than 1 indicate the overlay plane origin is below the image origin. Values less than 1 indicate the overlay plane origin is above or to the left of the image origin. Note: Values of 0\0 indicate that the overlay pixels start 1 row above and one column to the left of the image pixels.	
	Overlay Bits Allocated	(60xx,0100)	1	Number of Bits Allocated in the Overlay. The value of this Attribute shall be 1. Note: Formerly the standard described embedding the overlay data in the Image Pixel Data (7FE0,0010), in which case the value of this Attribute was required to be the same as Bits Allocated (0028,0100). This usage has been retired. See PS 3.3 2004.	**Display not supported**
	Overlay Bit Position	(60xx,0102)	1	The value of this Attribute shall be 0. Note: Formerly the standard described embedding the overlay data in the Image Pixel Data (7FE0,0010), in which case the value of this Attribute specified the bit in which the overlay was stored. This usage has been retired. See PS 3.3 2004.	**Display not supported**
	Overlay Data	(60xx,3000)	1	Overlay pixel data. The order of pixels sent for each overlay is left to right, top to bottom, i.e., the upper left pixel is sent first followed by the remainder of the first row , followed by the first pixel of the 2nd row, then the remainder of the 2nd row and so on. Overlay data shall be contained in this Attribute. See C.9.2.1.1 for further explanation.	**Display not supported**
	Overlay Description	(60xx,0022)	3	User-defined comments about the overlay.	**Display not supported**
	Overlay	(60xx,0045)	3	Defined term which identifies the intended purpose of the Overlay	**Display not supported**

Module	Attribute Name	Tag ID	Type	Description	Usage
	Subtype			Type. See C.9.2.1.3 for further explanation.	
	Overlay Label	(60xx,1500)	3	A user defined text string which may be used to label or name this overlay.	**Display not supported**
	ROI Area	(60xx,1301)	3	Number of pixels in ROI area. See C.9.2.1.2 for further explanation.	**Display not supported**
	ROI Mean	(60xx,1302)	3	ROI Mean. See C.9.2.1.2 for further explanation.	**Display not supported**
	ROI Standard Deviation	(60xx,1303)	3	ROI standard deviation. See C.9.2.1.2 for further explanation.	**Display not supported**
Overlay Activation	Overlay Activation Layer	(60xx,1001)	2C	The layer (defined in Graphic Layer (0070,0002) of the Graphic Layer Module C.10.7) in which the Overlay described in group 60xx shall be displayed. If no layer is specified (zero length) then the overlay shall not be displayed. Required if Group 60xx is present in the referenced image(s) or the Presentation State instance containing this Module.	**Display not supported**
Display Area	Displayed Area Selection Sequence	(0070,005A)	1	A sequence of Items each of which describes the displayed area selection for a group of images or frames. Sufficient Items shall be present to describe every image and frame listed in the Presentation State Relationship Module. One or more Items shall be included in this sequence.	**Display supported**
	>Referenced Image Sequence	(0008,1140)	1C	The subset of images and frames listed in the Presentation State Relationship Module, to which this displayed area selection applies. One or more Items shall be included in this sequence. Required if the displayed area selection in this Item does not apply to all the images and frames listed in the Presentation State Relationship Module.	**Display supported**
	>> Referenced SOP Class UID	(0008,1150)	1	Uniquely identifies the referenced SOP Class.	**Display supported**

Module	Attribute Name	Tag ID	Type	Description	Usage
	>> Referenced SOP Instance UID	(0008,1155)	1	Uniquely identifies the referenced SOP Instance.	**Display supported**
	>> Referenced Frame Number	(0008,1160)	1C	Identifies the frame numbers within the Referenced SOP Instance to which the reference applies. The first frame shall be denoted as frame number 1. Note: This Attribute may be multi-valued. Required if the Referenced SOP Instance is a multi-frame image and the reference does not apply to all frames, and Referenced Segment Number (0062,000B) is not present.	**Display supported**
	>> Referenced Segment Number	(0062,000B)	1C	Identifies the Segment Number to which the reference applies. Required if the Referenced SOP Instance is a Segmentation or Surface Segmentation and the reference does not apply to all segments and Referenced Frame Number (0008,1160) is not present.	**Display not supported**
	>Pixel Origin Interpretation	(0048,0301)	1C	For a referenced multi-frame image, specifies whether the Displayed Area Top Left Hand Corner (0070,0052) and Displayed Area Bottom Right Hand Corner (0070,0053) are to be interpreted relative to the individual frame pixel origins, or relative to the Total Pixel Matrix origin (see C.8.12.4.1.4). Required if the value of Referenced SOP Class UID (0008,1150) within Referenced Image Sequence (0008,1140) is 1.2.840.10008.5.1.4.1.1.77.1.6 (VL Whole Slide Microscopy Image). May be present otherwise. Enumerated Values: FRAME – relative to individual frame VOLUME – relative to Total Image Matrix If not present, TLHC and BRHC are defined relative to the frame pixel origins.	**Display not supported**
	>Displayed Area Top Left	(0070,0052)	1	The top left (after spatial transformation) pixel in the	**Display supported**

Module	Attribute Name	Tag ID	Type	Description	Usage
	Hand Corner			referenced image to be displayed, given as column\row. Column is the horizontal (before spatial transformation) offset (X) and row is the vertical (before spatial transformation) offset (Y) relative to the origin of the pixel data before spatial transformation, which is 1\1. See Figure C.10.4-1.	
	>Displayed Area Bottom Right Hand Corner	(0070,0053)	1	The bottom right (after spatial transformation) pixel in the referenced image to be displayed, given as column\row. Column is the horizontal (before spatial transformation) offset (X) and row is the vertical (before spatial transformation) offset (Y) relative to the origin of the pixel data before spatial transformation, which is 1\1. See Figure C.10.4-1.	**Display supported**

	>Presentation Size Mode	(0070,0100)	1	Manner of selection of display size.
				Enumerated Values:
				    SCALE TO FIT
				    TRUE SIZE
				MAGNIFY
					Display supported

	>Presentation Pixel Spacing	(0070,0101)	1C	Physical distance between the center of each pixel in the referenced image (before spatial transformation), specified by a numeric pair - adjacent row spacing (delimiter) adjacent column spacing in mm. See 10.7.1.3 for further explanation of the value order. Notes: 1. This value may be different from Pixel Spacing (0028,0030) or Imager Pixel Spacing (0018,1164) specified in the referenced image, which are ignored, since some form of calibration may have been performed (for example by reference to an object of known size in the image). 2. If the row and column spacing are different, then the pixel aspect ratio of the image is not 1:1. Required if Presentation Size Mode (0070,0100) is TRUE SIZE, in which case the values will	**Display not supported**

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Module	Attribute Name	Tag ID	Type	Description	Usage
				correspond to the physical distance between the center of each pixel on the display device. May be present if Presentation Size Mode (0070,0100) is SCALE TO FIT or MAGNIFY, in which case the values are used to compute the aspect ratio of the image pixels. Note: Mckesson uses the value in the DICOM image header.	
	>Presentation Pixel Aspect Ratio	(0070,0102)	1C	Ratio of the vertical size and the horizontal size of the pixels in the referenced image, to be used to display the referenced image, specified by a pair of integer values where the first value is the vertical pixel size and the second value is the horizontal pixel size. See C.7.6.3.1.7. Required if Presentation Pixel Spacing (0070,0101) is not present. Notes: 1. This value may be different from the aspect ratio specified by Pixel Aspect Ratio (0028,0034) in the referenced image, or implied by the values of Pixel Spacing (0028,0030) or Imager Pixel Spacing (0018,1164) specified in the referenced image, which are ignored. 2. This value must be specified even if the aspect ratio is 1:1.	**Display not supported**
	>Presentation Pixel Magnification Ratio	(0070,0103)	1C	Ratio of displayed pixels to source pixels, specified in one dimension. Required if Presentation Size Mode (0070,0100) is MAGNIFY. Notes: 1. A value of 1.0 would imply that one pixel in the referenced image would be displayed as one pixel on the display (i.e. it would not be interpolated if the aspect ratio of the image pixels is 1:1). 2. A value of 2.0 would imply that one pixel in the referenced image would be displayed as 4 pixels on the display (i.e. up-sampled by a factor of 2 in each of the row and column directions).	**Display supported**

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Module	Attribute Name	Tag ID	Type	Description	Usage
				3. A value of 0.5 would imply that 4 pixels in the referenced image would be displayed as 1 pixel on the display (i.e. down-sampled by a factor of 2 in each of the row and column directions). 4. If the source pixels have an aspect ratio of other than 1:1, then they are assumed to have been interpolated to a display pixel aspect ratio of 1:1 prior to magnification.	
Graphic Annotation	Graphic Annotation Sequence	(0070,0001)	1	- A sequence of Items each of which represents a group of annotations composed of graphics or text or both. - One or more Items shall be present.	**Display supported**
	>Referenced Image Sequence	(0008,1140)	1C	- Sequence of Items where each Item provides reference to a selected set of Image SOP Class/SOP Instance pairs that are defined in the Presentation State Relationship Module. One or more Items shall be present. - Required if graphic annotations in this Item do not apply to all the images listed in the Presentation State Relationship Module.	**Display supported**
	>> Referenced SOP Class UID	(0008,1150)	1	Uniquely identifies the referenced SOP Class.	**Display supported**
	>> Referenced SOP Instance UID	(0008,1155)	1	Uniquely identifies the referenced SOP Instance.	**Display supported**
	>> Referenced Frame Number	(0008,1160)	1C	Identifies the frame numbers within the Referenced SOP Instance to which the reference applies. The first frame shall be denoted as frame number 1. Note: This Attribute may be multi-valued. Required if the Referenced SOP Instance is a multi-frame image and the reference does not apply to all frames, and Referenced Segment Number (0062,000B) is not present.	**Display supported**

Module	Attribute Name	Tag ID	Type	Description	Usage
	>Graphic Layer	(0070,0002)	1	- The layers in which graphic and text may be Rendered	**Display not supported**
	>Text Object Sequence	(0070,0008)	1C	- Sequence that describes a text annotation. One or more Items may be present. - Either one or both of Text Object Sequence (0070,0008) or Graphic Object Sequence (0070,0009) are required .	**Display supported**
	>>Bounding Box Annotation Units	(0070,0003)	1C	- Units of measure for the axes of the text bounding box.	**Display supported**
	>>Anchor Point Annotation Units	(0070,0004)	1C	- Units of measure for the axes of the text anchor point annotation. Enumerated Values for Anchor Point Annotation Units (0070,0004) are the same as for Bounding Box Annotation Units (0070,0003). - Required if Anchor Point (0070,0014) is present.	**Display supported**
	>>Unformatted Text Value	(0070,0006)	1	- Text data which is unformatted and whose manner of display within the defined bounding box or relative to the specified anchor point is implementation dependent. The text value may contain spaces, as well as multiple lines separated by either LF, CR, CR LF or LF CR, but otherwise no format control characters (such as horizontal or vertical tab and form feed) shall be present, even if permitted by the Value Representation of ST. - In McKesson Radiology™ 12.3, Text is interpreted as ISO-IR 100	**Display supported**
	>>Bounding Box Top Left Hand Corner	(0070,0010)	1C	- Location of the Top Left Hand Corner (TLHC) of the bounding box in which Unformatted Text Value (0070,0006) is to be displayed, in Bounding Box Annotation Units (0070,0003), given as column\row. Column is	**Display supported**

Module	Attribute Name	Tag ID	Type	Description	Usage
				the horizontal offset and row is the vertical offset. - Required if Anchor Point (0070,0014) is not present.	
	>>Bounding Box Bottom Right Hand Corner	(0070,0011)	1C	- Location of the Bottom Right Hand Corner (BRHC) of the bounding box in which Unformatted Text Value (0070,0006) is to be displayed, in Bounding Box Annotation Units (0070,0003), given as column\row. Column is the horizontal offset and row is the vertical offset. - Required if Anchor Point (0070,0014) is not present.	**Display supported**
	>>Bounding Box Text Horizontal Justification	(0070,0012)	1C	- Location of the text relative to the vertical edges of the bounding box. Enumerated Values: LEFT = closest to left edge RIGHT = closest to right edge CENTER = centered - Required if Bounding Box Top Left Hand Corner (0070,0010) is present.	**Display supported**
	>>Anchor Point	(0070,0014)	1C	- Location of a point in the image or Specified Displayed Area to which the Unformatted Text Value (0070,0006) is related, in Anchor Point Annotation Units (0070,0004), given as column\row. Column is the horizontal offset and row is the vertical offset. - Required if Bounding Box Top Left Hand Corner (0070,0010) and Bounding Box Bottom Right Hand Corner (0070,0011) are not present. May be present even if a bounding box is specified (i.e. Bounding Box Top Left Hand Corner (0070,0010) and Bounding Box Bottom Right Hand Corner (0070,0011) are present).	**Display supported**
	>>Anchor Point Visibility	(0070,0015)	1C	- Flag to indicate whether or not a visible indication (such as a line or	**Display not supported**

Module	Attribute Name	Tag ID	Type	Description	Usage
				arrow) of the relationship between the text and the anchor point is to be displayed. Enumerated Values: Y = yes N = no - Required if Anchor Point (0070,0014) is present. McKesson Radiology™ 12.3 does not interpret this tag. An arrow is always present to indicate the relationship between the text and the anchor point.	
	>Graphic Object Sequence	(0070,0009)	1C	- Sequence that describes a graphic annotation. One or more Items may be present. - Either one or both of Text Object Sequence (0070,0008) or Graphic Object Sequence (0070,0009) are required.	**Display supported**
	>>Graphic Annotation Units	(0070,0005)	1C	- Units of measure for the axes of the graphic annotation. Enumerated Values for Graphic Annotation Units (0070,0005) are the same as for Bounding Box Annotation Units (0070,0003).	**Display supported**
	>>Graphic Dimensions	(0070,0020)	1	Enumerated Value: 2 McKesson Radiology™ 12.3 supports Default Dimensions is 2.	**Display supported**
	>>Number of Graphic Points	(0070,0021)	1	- Number of data points in this graphic.	**Display supported**
	>> Graphic Data	(0070,0022)	1	- Coordinates that specify this graphic annotation. Depending on Graphic Type (0070,0023)	**Display supported**
	>>Graphic Type	(0070,0023)	1	The shape of graphic that is to be drawn. McKesson Radiology™ 12.3 supports the following graphic types:	**Display supported**

Module	Attribute Name	Tag ID	Type	Description	Usage
				POINT POLYLINE INTERPOLATED CIRCLE ELLIPSE	
	>>Graphic Filled	(0070,0024)	1C	- Whether or not the closed graphics element is displayed as filled (in some unspecified manner that shall be distinguishable from an outline) or as an outline. Enumerated Values: Y = yes N = no Required if Graphic Data (0070,0022) is "closed", that is Graphic Type (0070,0023) is CIRCLE or ELLIPSE, or Graphic Type (0070,0023) is POLYLINE or INTERPOLATED and the first data point is the same as the last data point.	**Display supported**
Spatial Transformation	Image Rotation	(0070,0042)	1	How far to rotate the image clockwise in degrees, before any Image Horizontal Flip (0070,0041) is applied. Enumerated Values: 　　　0, 90,180,270 Notes:　　Negative values are not permitted since the Value Representation is unsigned. **Only support rotation 90,180,270 degrees.**	**Display supported**
	Image Horizontal Flip	(0070,0041)	1	Whether or not to flip the image horizontally after any Image Rotation has been applied such that the left side of the image becomes the right side. Enumerated Values: 　　　Y = yes, 　　　N = no Note:　　No vertical flip is specified since the same result can be achieved by a combination of a 180 degree rotation and a horizontal flip.	**Display supported**

Module	Attribute Name	Tag ID	Type	Description	Usage
				Only support horizontal flip.	
Graphic Layer	Graphic Layer Sequence	(0070,0060)	1	A sequence of Items each of which represents a single layer in which overlays, curves, graphics or text may be rendered. One or more Items shall be included in this sequence. An Item is required for each layer referenced from the Graphic Annotation Module or the Overlay Activation Module.	**Display not supported**
	>Graphic Layer	(0070,0002)	1	A string which identifies the layer.	**Display not supported**
	>Graphic Layer Order	(0070,0062)	1	An integer indicating the order in which it is recommended that the layer be rendered, if the display is capable of distinguishing. Lower numbered layers are to be rendered first.	**Display not supported**
	>Graphic Layer Recommended Display Grayscale Value	(0070,0066)	3	A default single gray unsigned value in which it is recommended that the layer be rendered on a monochrome display. The units are specified in P-Values from a minimum of 0000H (black) up to a maximum of FFFFH (white). Note: The maximum P-Value for this Attribute may be different from the maximum P-Value from the output of the Presentation LUT, which may be **less** than 16 bits in depth.	**Display not supported**
	>Graphic Layer Recommended Display CIELab Value	(0070,0401)	3	A default color triplet value in which it is recommended that the layer be rendered on a color display. The units are specified in PCS-Values, and the value is encoded as CIELab. See C.10.7.1.1.	**Display not supported**
	>Graphic Layer Description	(0070,0068)	3	A free text description of the contents of this layer.	**Display not supported**
Graphic Group	Graphic Group Sequence	(0070,0234)	1	Sequence that describes the combined graphic object. One or more Items shall be included in this sequence.	**Display not supported**
	>Graphic Group ID	(0070,0295)	1	A unique number identifying the Graphic Group, i.e. the combined graphic object.	**Display not supported**

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Module	Attribute Name	Tag ID	Type	Description	Usage
	>Graphic Group Label	(0070,0207)	1	Name used to identify the Graphic Group, i.e. the combined graphic object.	**Display not supported**
	>Graphic Group Description	(0070,0208)	3	Description of the group.	**Display not supported**
ICC Profile	ICC Profile	(0028,2000)	1	An ICC Profile encoding the transformation of device-dependent color stored pixel values into PCS-Values.	**Display not supported**
	Color Space	(0028,2002)	3	A label that identifies the well-known color space of the image. Shall be consistent with any ICC Profile (0028,2000) that is also present.	**Display not supported**

7.1.4   McKesson Radiology™ 12.3 Added Private Elements

The McKesson Radiology™ 12.3 system may add some or all of the following Private Elements to the SOP Instances that it receives:

Table 190: Private Elements Added by McKesson Radiology™ 12.3

Tag ID	Attribute Name	VR	VM	Significance
(3711,00xx)	Private Creator ID	LO	1	- The Private Creator ID for this block of added Private Elements. The value is "A.L.I. Technologies, Inc.".
(3711,xx01)	Filename	LO	1	- Holds the filename of the original SOP Instance.
(3711,xx02)	Data Blob of a Visit	OB	1	- Holds the McKesson Radiology™ 12.3 proprietary database information regarding the 'visit' for which the SOP Instance belongs.
(3711,xx03)	Revision Number	US	1	- The revision number of the extended info image.
(3711,xx04)	Unix Timestamp	UL	1	- The Unix format time-stamp of the creation of the extended info image.
(3711,xx05)	Bag ID	IS	1	- The McKesson Radiology™ 12.3 Bag ID associated with an image.
(3711,xx0C)	Original Study UID	UI	1	- The original Study UID specified in the SOP Instance
(3711,xx0D)	Overlay Grayscale Value	US	1	- The MONOCHROME2 grayscale value (0 to 255) to use when displaying or printing an overlay for the SOP Instance.
(3711,xx0E)	Anonymization Status	CS	1	- Value of "ANONYMIZED" means that the confidential patient information has been removed or replaced in the DICOM header. Note that this does not guarantee that any confidential information 'burned into' the pixel data has been removed.
(3711,xx0F)	Instance Type	CS	1	- The Instance Type of images created on McKesson Radiology™ 12.3. Possible values: "MOCK" = "mock" image that is added to zero-image studies

				"MONTAGE" = image is created by VMC Montage feature
(3711,xx30)	IP Converted Frame	LO	1	This tag will be used as a marker which will be checked when a DICOM attribute collection of NM images is being processed. It can be added with a value of "IPConvertedFrame" when McKesson Radiology™ 12.3 is processing NM images that have multiple frames.
(3711,xxC3)	ALI_SIM_PRIVATE_ MC_STRING	LO	1	- Medcon private Tag string that we store and return to the creator of the objects without modifying. This tag is added to MC images and DICOM objects for SIM18 when McKesson Radiology™ 12.3 is archiving these objects.

7.1.5   Sender AE and Query/Retrieve Server AE Element Modification

Both the Sender AE and Query/Retrieve Server AE always update SOP Instances with the latest information from the McKesson Radiology™ 12.3 database before exporting them. The following table contains a list of all Elements that can have a value modified by these AE's at the time of export using the Storage Service depending on the capabilities of the receiving remote AE:

Table 191: Significant Elements in Exported Composite SOP Instances

Module	Attribute Name	Tag ID	Significance
Patient	Patient Name	(0010,0010)	- Will be updated with value stored in database prior to export in case the Patient Name was altered after this SOP Instance was originally received.
	Patient ID	(0010,0020)	- Will be updated with value stored in database prior to export in case the Patient ID was altered after this SOP Instance was originally received.
	Patient's Birth Date	(0010,0030)	- Will be updated with value stored in database prior to export in case the Patient's Birth Date value was altered after this SOP Instance was originally received.
	Patient's Sex	(0010,0040)	- Will be updated with value stored in database prior to export in case the Patient's Sex value was altered after this SOP Instance was originally received.
General Study	Study Date	(0008,0020)	- Will be updated with value stored in database prior to export in case the Study Date value was altered after this SOP Instance was originally received.
	Accession Number	(0008,0050)	- Will be updated with value stored in database prior to export in case the Accession Number value was altered after this SOP Instance was originally received.
	Referring Physician's Name	(0008,0090)	- Will be updated with value stored in database prior to export in case the Referring Physician's Name value was altered after this SOP Instance was originally received.
	Study Description	(0008,1030)	- Will be updated with value stored in database prior to export in case the Study Description value was altered after this SOP Instance was originally received.
	Study Instance UID	(0020,000D)	- Will be updated with value stored in database prior to export in case the Study Instance UID value was altered after this SOP Instance was originally received.

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[18] SIM - Shared Image Management - With SIM, customers will have one PACS system to learn and maintain instead of having a separate PACS system for both Radiology and Cardiology Studies.

General Series	Series Description	(0008,103E)	- Will be updated with value stored in database prior to export in case the Series Description value was altered after this SOP Instance was originally received.
	Modality	(0008,0060)	- Will be updated with value stored in database prior to export in case the Modality value was altered after this SOP Instance was originally received.
	Operator's Name	(0008,1070)	- Will be updated with value stored in database prior to export in case the Operator's Name value was altered after this SOP Instance was originally received.
VOI LUT	Window Center	(0028,1050)	- Default Window Center value can be configured for a specific destination AE.
	Window Width	(0028,1051)	- Default Window Width value can be configured for a specific external destination AE.
SOP Common	SOP Instance UID	(0008,0018)	- The system can also be configured to either preserve the original SOP Instance UID or assign a new UID if the received image data is lossy compressed prior to archival. The default behavior is to always assign a new SOP Instance UID. - In addition, McKesson Radiology™ 12.3 can be configured to always assign a new SOP Instance UID to any SOP Instances received from a specific host. This should only be enabled if the remote host is known to make errors when assigning SOP Instances (either assigning duplicates or UIDs that are not DICOM Conformant).

7.1.6   Sender AE MIMA Element Support

The Sender AE sending a SOP Instance shall provide DICOM attributes conveying the Assigning Authorities of the Patient ID and Accession Number. It shall also convey the Institution Name (0008,0080) and Institution Code Sequence (0008,0082) so that the institution where the SOP Instance was created is identified.

If there is no patient identifier value defined for the preconfigured default Assigning Authority of the receiving Application Entity then the Patient ID value shall be left blank.

If there is no preconfigured default Assigning Authority for the receiving Application Entity then the Sending AE can specify a Patient ID value from any Assigning Authority in the images.

The Sender AE shall support sending attributes in the images as defined in the following table:

Table 192: SOP Instance Attributes for Multiple Identity Resolution

Attribute Name	Tag ID	Description
Patient's Name	(0010,0010)	This Name is referred to as the destination Patient's Name. Required if a Patient Name is known for the patient.
Patient ID	(0010,0020)	Used to identify the patient. Required if a Patient ID value is known for the Assigning Authority of the destination system. May be present otherwise. This ID is referred to as the destination Patient ID.

Issuer of Patient ID	(0010,0021)	Used to identify the Assigning Authority (system, organization, agency, or department) that issued the Patient ID. Required if Patient ID is not empty.
Other Patient IDs Sequence	(0010,1002)	Used to convey known patient identifiers for the patient. Required if a Patient ID is known for the patient.
>Patient ID	(0010,0020)	
>Issuer of Patient ID	(0010,0021)	
>Type of Patient ID	(0010,0022)	
Accession Number	(0008,0050)	Used to identify the order for the Study.
Issuer of Accession Number Sequence	(0008,0051)	Used to identify the Assigning Authority that issued the Accession Number. Required if Accession Number is not empty.
>Local Namespace Entity ID	(0040,0031)	
>Universal Entity ID	(0040,0032)	
>Universal Entity ID Type	(0040,0033)	
Institution Name	(0008,0080)	Used to convey the institution where the SOP Instance was created.
Institution Code Sequence	(0008,0082)	Used to convey the institution where the SOP Instance was created.
>Code Value	(0008,0100)	
>Coding Scheme Designator	(0008,0102)	
>Coding Scheme Version	(0008,0103)	Required if the value of Coding Scheme Designator (0008,0102) is not sufficient to identify the Code Value (0008,0100) unambiguously. May be present otherwise.
>Code Meaning	(0008,0104)	

7.1.7   Derived MPR Image Creation

McKesson Radiology Station™ 12.3 is capable of creating derived images from CT and MR image sets using Multi-Planar Reconstruction. The created images will belong to the same SOP Class as the images from which they are derived.

7.1.7.1   Derived MPR Image IODs

This section describes the IODs of the derived CT and MR SOP Instances by describing the Modules that will be used for such images.

Table 193 specifies the Modules used in the derived CT SOP Instances created by Multi-Planar Reconstruction of received CT images.

Table 193: IOD of Derived CT SOP Instances

IE	Module	DICOM Reference (PS3.3)	Value Description Table	Presence of Module
Patient	Patient	C.7.1.1	Table 195	ALWAYS
Study	General Study	C.7.2.1	Table 196	ALWAYS
Series	General Series	C.7.3.1	Table 197	ALWAYS
Frame of Reference	Frame of Reference	C.7.4.1	Table 198	ALWAYS
Equipment	General Equipment	C.7.5.1	Table 199	ALWAYS
Image	General Image	C.7.6.1	Table 200	ALWAYS
	Image Plane	C.7.6.2	Table 201	ALWAYS
	Image Pixel	C.7.6.3	Table 202	ALWAYS
	CT Image	C.8.2.1	Table 205	ALWAYS
	VOI LUT	C.11.2	Table 203	ALWAYS
	SOP Common	C.12.1	Table 204	ALWAYS

Table 194 specifies the Modules used in the derived MR SOP Instances created by Multi-Planar Reconstruction of received MR images.

Table 194: IOD of Derived MR SOP Instances

IE	Module	DICOM Reference (PS3.3)	Value Description Table	Presence of Module
Patient	Patient	C.7.1.1	Table 195	ALWAYS
Study	General Study	C.7.2.1	Table 196	ALWAYS
Series	General Series	C.7.3.1	Table 197	ALWAYS
Frame of Reference	Frame of Reference	C.7.4.1	Table 198	ALWAYS
Equipment	General Equipment	C.7.5.1	Table 199	ALWAYS
Image	General Image	C.7.6.1	Table 200	ALWAYS
	Image Plane	C.7.6.2	Table 201	ALWAYS
	Image Pixel	C.7.6.3	Table 202	ALWAYS
	MR Image	C.8.3.1	Table 206	ALWAYS
	VOI LUT	C.11.2	Table 203	ALWAYS
	SOP Common	C.12.1	Table 204	ALWAYS

7.1.7.2   Derived MPR Image Module Attributes

This section provides information on the Elements that are part of each module present in the derived CT and MR SOP Instances created by Multi-Planar Reconstruction. For each Element, the Value Description column describes the meaning of the element, whether it must be present in the MPR image header, and what the source of the value is.

The tables use the following abbreviations:

The abbreviations in the "Presence of Value" column are:

VNAP   Value not always present (attribute is always present but may not have a value).

ANAP   Attribute not always present.

ALWAYS   Attribute always present and has a value.

EMPTY   Attribute always present but has no value.

The abbreviations in the "Source" column are:

ORIGINAL Value is copied from an original image.

DB   Value is from the McKesson Radiology™ 12.3 database.

AUTO   Value is automatically generated by the McKesson Radiology™ 12.3 system.

7.1.7.3   Derived MPR Image Common Module Attributes

The following tables specify which Elements from Common Modules can be added to the derived MPR images:

Table 195: Patient Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Patient's Name	(0010,0010)	2	Copied from original acquisition object or database if a value is specified. Empty otherwise.	VNAP	ORIGINAL/ DB
Patient ID	(0010,0020)	2	Copied from original acquisition object or database.	ALWAYS	ORIGINAL/ DB
Issuer of Patient ID	(0010,0021)	3	Not present OR copied from original object.	ANAP	ORIGINAL
Patient's Birth Date	(0010,0030)	2	Copied from original acquisition object or database if a value is specified. Empty otherwise.	VNAP	ORIGINAL/ DB
Patient's Sex	(0010,0040)	2	Copied from original acquisition object or database if a value is specified. Empty otherwise.	VNAP	ORIGINAL/ DB
Referenced Patient Sequence	(0008,1120)	3	Not present OR copied from original object.	ANAP	ORIGINAL
>Referenced SOP Class UID	(0008,1150)	1C	Not present OR copied from original object.	ANAP	ORIGINAL

>Referenced SOP Instance UID	(0008,1155)	1C	Not present OR copied from original object.	ANAP	ORIGINAL
Patient's Birth Time	(0010,0032)	3	Not present OR copied from original object.	ANAP	ORIGINAL
Other Patient IDs	(0010,1000)	3	Not present OR copied from original object.	ANAP	ORIGINAL
Other Patient Names	(0010,1001)	3	Not present OR copied from original object.	ANAP	ORIGINAL
Ethnic Group	(0010,2160)	3	Not present OR copied from original object.	ANAP	ORIGINAL
Patient Comments	(0010,4000)	3	Not present OR copied from original object.	ANAP	ORIGINAL

Table 196: General Study Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Study Instance UID	(0020,000D)	1	Copied from original acquisition object or database.	ALWAYS	ORIGINAL/ DB
Study Date	(0008,0020)	2	Copied from original acquisition object or database if a value is specified. Empty otherwise.	VNAP	ORIGINAL/ DB
Study Time	(0008,0030)	2	Copied from original acquisition object or database if a value is specified. Empty otherwise.	VNAP	ORIGINAL/ DB
Referring Physician's Name	(0008,0090)	2	Copied from original acquisition object or database if a value is specified. Empty otherwise.	VNAP	ORIGINAL/ DB
Study ID	(0020,0010)	2	Copied from original acquisition object or database if a value is specified. Empty otherwise.	VNAP	ORIGINAL/ DB
Accession Number	(0008,0050)	2	Copied from original acquisition object or database if a value is specified. Empty otherwise.	VNAP	ORIGINAL/ DB
Study Description	(0008,1030)	3	Not present OR copied from original object or database	ANAP	ORIGINAL/ DB
Physician(s) of Record	(0008,1048)	3	Not present OR copied from original object.	ANAP	ORIGINAL
Name of Physician(s) Reading Study	(0008,1060)	3	Not present OR copied from original object.	ANAP	ORIGINAL

Table 197: General Series Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Modality	(0008,0060)	1	Copied from original acquisition object or database.	ALWAYS	ORIGINAL/ DB
Series Instance UID	(0020,000E)	1	Empty OR copied from original acquisition object or database.	ALWAYS	ORIGINAL/ DB
Series Number	(0020,0011)	2	Copied from original acquisition object or database if a value is specified. Empty otherwise.	VNAP	ORIGINAL/ DB
Laterality	(0020,0060)	2C	Not present if attribute is not present in original images. Empty if the attribute is specified in the original images.	ANAP	AUTO
Patient Position	(0018,5100)	2C	Not present if attribute is not present in original images. Empty if the attribute is specified in the original images.	ANAP	AUTO

Table 198: Frame of Reference Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Frame of Reference UID	(0020,0052)	1	Copied from original acquisition object.	ALWAYS	ORIGINAL
Position Reference Indicator	(0020,1040)	2	Copied from original acquisition object if a value is specified. Empty otherwise.	VNAP	ORIGINAL

Table 199: General Equipment Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Manufacturer	(0008,0070)	2	Value specified as "McKesson Medical Imaging Group"	ALWAYS	AUTO

Table 200: General Image Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Instance Number	(0020,0013)	2	Value specified as 1 to n for each subsequent MPR image created for a series.	ALWAYS	AUTO
Image Type	(0008,0008)	3	Value specified as "DERIVED\SECONDARY\MPR".	ALWAYS	AUTO
Derivation Description	(0008,2111)	3	Value specified as "MPR" or will indicate the type of compression used and compression ratio if the pixel data has been compressed.	ALWAYS	AUTO
Image Comments	(0020,4000)	3	Value specified as "MPR Image".	ALWAYS	AUTO
Quality Control Image	(0028,0300)	3	Value specified as "NO".	ALWAYS	AUTO
Burned In Annotation	(0028,0301)	3	Value specified as "NO".	ALWAYS	AUTO
Presentation LUT Shape	(2050,0020)	3	Value specified as "INVERSE" if the Photometric Interpretation is MONOCHROME1. Otherwise, the value is "IDENTITY".	ALWAYS	AUTO

Table 201: Image Plane Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Pixel Spacing	(0028,0030)	1	Calculated based on the values specified in the original images.	ALWAYS	AUTO
Image Orientation	(0020,0037)	1	Calculated based on the orientation of the MPR image relative to that specified for the original images.	ALWAYS	AUTO
Image Position	(0020,0032)	1	Calculated based on the position of the MPR image relative to that specified for the original images.	ALWAYS	AUTO
Slice Thickness	(0018,0050)	2	Copied from original acquisition object if a value is specified. Empty otherwise.	VNAP	ORIGINAL

Table 202: Image Pixel Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Samples per Pixel	(0028,0002)	1	Identical to that of the original images. For CT and MR this must be 1.	ALWAYS	ORIGINAL
Photometric Interpretation	(0028,0004)	1	Identical to that of the original images. For CT and MR this must be MONOCHROME1 or MONOCHROME2.	ALWAYS	ORIGINAL
Rows	(0028,0010)	1	Identical to that of the original images.	ALWAYS	ORIGINAL
Columns	(0028,0011)	1	Identical to that of the original images.	ALWAYS	ORIGINAL
Bits Allocated	(0028,0100)	1	Identical to that of the original images. For CT and MR this must be 16.	ALWAYS	ORIGINAL
Bits Stored	(0028,0101)	1	Identical to that of the original images.	ALWAYS	ORIGINAL
High Bit	(0028,0102)	1	Always specified as Bits Stored minus 1.	ALWAYS	AUTO
Pixel Representation	(0028,0103)	1	Identical to that of the original images.	ALWAYS	ORIGINAL
Pixel Data	(7FE0,0010)	1	The derived pixel data values calculated using Multi-Planar Reconstruction.	ALWAYS	AUTO

Table 203: VOI LUT Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Window Center	(0028,1050)	1	Calculated based on the derived MPR image data.	ALWAYS	AUTO
Window Width	(0028,1051)	1	Calculated based on the derived MPR image data.	ALWAYS	AUTO

Table 204: SOP Common Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
SOP Class UID	(0008,0016)	1	Identical to that of the original images. "1.2.840.10008.5.1.4.1.1.2" (CT) or "1.2.840.10008.5.1.4.1.1.4" (MR).	ALWAYS	ORIGINAL
SOP Instance UID	(0008,0018)	1	New UID generated by the McKesson Radiology™ 12.3 Station system.	ALWAYS	AUTO

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Instance Creation Date	(0008,0012)	3	Date on which the MPR image was created.	ALWAYS	AUTO
Instance Creation Time	(0008,0013)	3	Time at which the MPR image was created.	ALWAYS	AUTO
Instance Number	(0020,0013)	3	Value specified as 1 to n for each subsequent MPR image created for a series.	ALWAYS	AUTO

7.1.7.4   Derived MPR CT Image Specific Module Attributes

The following table specifies which Elements from CT Image IOD specific Modules can be added to the MPR images derived from original CT images:

Table 205: CT Image Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Image Type	(0008,0008)	1	Value specified as "DERIVED\SECONDARY\MPR".	ALWAYS	AUTO
Samples per Pixel	(0028,0002)	1	Identical to that of the original images. For CT this must be 1.	ALWAYS	ORIGINAL
Photometric Interpretation	(0028,0004)	1	Identical to that of the original images. For CT this must be MONOCHROME1 or MONOCHROME2.	ALWAYS	ORIGINAL
Bits Allocated	(0028,0100)	1	Identical to that of the original images. For CT this must be 16.	ALWAYS	ORIGINAL
Bits Stored	(0028,0101)	1	Identical to that of the original images. For CT this must be 12 to 16.	ALWAYS	ORIGINAL
High Bit	(0028,0102)	1	Always specified as Bits Stored minus 1.	ALWAYS	AUTO
Rescale Intercept	(0028,1052)	1	Identical to that of the original images.	ALWAYS	ORIGINAL
Rescale Slope	(0028,1053)	1	Identical to that of the original images.	ALWAYS	ORIGINAL
KVP	(0018,0060)	2	Copied from original acquisition object if a value is specified. Empty otherwise.	VNAP	ORIGINAL
Acquisition Number	(0020,0012)	2	No value is specified.	EMPTY	AUTO

7.1.7.5   Derived MPR MR Image Specific Module Attributes

The following table specifies which Elements from MR Image IOD specific Modules can be added to the MPR images derived from original MR images:

Table 206: MR Image Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Image Type	(0008,0008)	1	Value specified as "DERIVED\SECONDARY\MPR".	ALWAYS	AUTO
Samples per Pixel	(0028,0002)	1	Identical to that of the original images. For MR this must be 1.	ALWAYS	ORIGINAL
Photometric Interpretation	(0028,0004)	1	Identical to that of the original images. For MR this must be MONOCHROME1 or MONOCHROME2.	ALWAYS	ORIGINAL
Bits Allocated	(0028,0100)	1	Identical to that of the original images. For MR this must be 16.	ALWAYS	ORIGINAL
Scanning Sequence	(0018,0020)	1	Identical to that of the original images.	ALWAYS	ORIGINAL
Sequence Variant	(0018,0021)	1	Identical to that of the original images.	ALWAYS	ORIGINAL
Scan Options	(0018,0022)	2	Identical to that of the original images.	VNAP	ORIGINAL
MR Acquisition Type	(0018,0023)	2	Identical to that of the original images.	VNAP	ORIGINAL
Repetition Time	(0018,0080)	2C	Copied from original acquisition object if a value is specified. Empty if attribute is present in original object but has no value. Not present otherwise.	ANAP	ORIGINAL
Echo Time	(0018,0081)	2	Copied from original acquisition object if a value is specified. Empty otherwise.	VNAP	ORIGINAL
Echo Train Length	(0018,0091)	2	Copied from original acquisition object if a value is specified. Empty otherwise.	VNAP	ORIGINAL
Inversion Time	(0018,0082)	2C	Copied from original acquisition object if a value is specified. Empty if attribute is present in original object but has no value. Not present otherwise.	ANAP	ORIGINAL
Trigger Time	(0018,1060)	2C	Copied from original acquisition object if a value is specified. Empty if attribute is present in original object but has no value. Not present otherwise.	ANAP	ORIGINAL

7.1.8   Secondary Capture Image Creation for Scanned Document

McKesson Radiology™ 12.3 can create DICOM Secondary Capture Image objects from documents scanned directly into McKesson Radiology™ 12.3. The Secondary Capture Image objects can be exported via the Query/Retrieve or Storage Services.

7.1.8.1   Secondary Capture Image IODs for Scanned Document

This section describes the IODs of the Secondary Capture SOP Instances by describing the Modules that will be used for such images.

Table 207 specifies the Modules used in the creation of Secondary Capture SOP Instances for the Scanned Documents in the Study.

Table 207: IOD of Scanned Document SOP Instances

IE	Module	DICOM Reference (PS3.3)	Value Description Table	Presence of Module
Patient	Patient	C.7.1.1	Table 208	ALWAYS
Study	General Study	C.7.2.1	Table 209	ALWAYS
Series	General Series	C.7.3.1	Table 210	ALWAYS
Equipment	SC Equipment	C.8.6.1	Table 211	ALWAYS
Image	General Image	C.7.6.1	Table 212	ALWAYS
	Image Pixel	C.7.6.3	Table 213	ALWAYS
	SC Image	C.8.6.2	Table 214	ALWAYS
	SOP Common	C.12.1	Table 215	ALWAYS

7.1.8.2   Secondary Capture Image Module Attributes for Scan Document

This section provides information on the Elements that are part of each module present in the Secondary Capture SOP Instances for scanned documents. For each Element, the Value Description column describes the meaning of the element, whether it must be present in the secondary capture image header, and what the source of the value is.

The tables use the following abbreviations:

The abbreviations in the "Presence of Value" column are:

VNAP	Value not always present (attribute is always present but may not have a value).
ANAP	Attribute not always present.
ALWAYS	Attribute always present and has a value.
EMPTY	Attribute always present but has no value.

The abbreviations in the "Source" column are:

ORIGINAL	Value is copied from an original image.

DB   Value is from the McKesson Radiology™ 12.3 database.

AUTO   Value is automatically generated by the McKesson Radiology™ 12.3 system.

D   indicates a default hard-coded value is set.

Table 208: Patient Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Patient's Name	(0010,0010)	2	Copied from database if a value is specified. Empty otherwise.	VNAP	DB
Patient ID	(0010,0020)	2	Copied from database.	ALWAYS	DB
Patient's Birth Date	(0010,0030)	2	Copied from database if a value is specified. Empty otherwise.	VNAP	DB
Patient's Sex	(0010,0040)	2	Copied from database if a value is specified. Empty otherwise.	VNAP	DB

Table 209: General Study Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Study Instance UID	(0020,000D)	1	Copied from database.	ALWAYS	DB
Study Date	(0008,0020)	2	Copied from database if a value is specified. Empty otherwise.	VNAP	DB
Study Time	(0008,0030)	2	Copied from database if a value is specified. Empty otherwise.	VNAP	DB
Referring Physician's Name	(0008,0090)	2	Copied from database if a value is specified. Empty otherwise.	VNAP	DB
Study ID	(0020,0010)	2	Copied from database if a value is specified. Empty otherwise.	VNAP	DB
Accession Number	(0008,0050)	2	Copied from database if a value is specified. Empty otherwise.	VNAP	DB
Study Description	(0008,1030)	3	Not present OR copied from database if a value is specified. Empty otherwise.	ANAP	DB

Table 210: General Series Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Modality	(0008,0060)	1	Override by value in SC Equipment Module. Set to "OT"	ALWAYS	D
Series Instance UID	(0020,000E)	1	Generated on SOP Instance Creation.	ALWAYS	AUTO
Series Number	(0020,0011)	2	Set to "0"	ALWAYS	D
Series Description	(0008,103e)	3	Copied from database if a value is specified. Empty otherwise.	ANAP	DB

Table 211: SC Equipment Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Modality	(0008,0060)	3	Set to "SC"	ALWAYS	D
Conversion Type	(0008,0064)	1	Describes the kind of image conversion. Defined Terms : DV = Digitized Video DI = Digital Interface DF = Digitized Film WSD = Workstation **SD = Scanned Document** SI = Scanned Image DRW = Drawing SYN = Synthetic Image	ALWAYS	DB

Table 212: General Image Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Instance Number	(0020,0013)	2	Set to "0"	ALWAYS	D
Derivation Description	(0008,2111)	3	Value will indicate the type of compression used and compression ratio if the pixel data has been compressed.	ANAP	AUTO

Lossy Image Compression	(0028,2110)	3	Specifies whether an Image has undergone lossy compression. Enumerated Values: 00 = Image has NOT been subjected to lossy compression. 01 = Image has been subjected to lossy compression.	ANAP	AUTO

Table 213: Image Pixel Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Samples per Pixel	(0028,0002)	1	Number of sample planes in this image Color Images (3) Monochrome2 (1)	ALWAYS	AUTO
Photometric Interpretation	(0028,0004)	1	Specifies the intended interpretation of the pixel data Possible values: YBR_FULL_422 (default for JPEG lossy images) RGB	ALWAYS	AUTO
Rows	(0028,0010)	1	Depends on Scanned Document JPEG image matrix	ALWAYS	AUTO
Columns	(0028,0011)	1	Depends on Scanned Document JPEG image matrix	ALWAYS	AUTO
Bits Allocated	(0028,0100)	1	8	ALWAYS	D
Bits Stored	(0028,0101)	1	8	ALWAYS	D
High Bit	(0028,0102)	1	7	ALWAYS	D
Pixel Representation	(0028,0103)	1	0000H (unsigned integer)	ALWAYS	D
Pixel Data	(7FE0,0010)	1	The Scanned Document JPEG image will be added as the Pixel Data.	ALWAYS	AUTO

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Planar Configuration	(0028,0006)	1C	Indicates whether the pixel data are sent color-by-plane or color-by-pixel. Required if Samples per Pixel (0028,0002) has a value greater than 1. If the image is in color, it will be added with color-by-pixel (0) as its value.	ANAP	AUTO

Table 214: SC Image Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Pixel Spacing	(0028,0030)	1C	Physical distance in the patient between the center of each pixel, specified by a numeric pair - adjacent row spacing (delimiter) adjacent column spacing in mm. Required if the image has been calibrated. May be present otherwise	ANAP	AUTO

Table 215: SOP Common Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
SOP Class UID	(0008,0016)	1	1.2.840.10008.5.1.4.1.1.7(OT)	ALWAYS	D
SOP Instance UID	(0008,0018)	1	Generated UID.	ALWAYS	AUTO

7.1.9   Grayscale SoftCopy Presentation State Object Creation

In McKesson Radiology™ 12.3, internal (proprietary format) annotations and Presentation State information that are created by the McKesson Radiology™ 12.3 System can be exported using standard DICOM GSPS SOP Instances. With this feature, annotations and Presentation State information can be consistently displayed and interpreted by DICOM GSPS compliant systems.

This includes Text annotations and graphic annotations (point, polyline, interpolated, circle, eclipse) and other presentation elements (i.e. Shutter, Display Area, VOILUT etc.) described in A.33.1.2 Grayscale Softcopy Presentation State IOD Module Table in part 3 of the 2008 DICOM Standard.

McKesson Radiology™ 12.3 can create one or more DICOM GSPS SOP Instances to represent internal (proprietary format) annotations and Presentation State information in the following workflows: DICOM Archive, DICOM Send, DICOM Query/Retrieve and DICOM media Write.

McKesson Radiology™ 12.3 exports all text and graphic (point, polyline, interpolated, circle, eclipse) annotations and other presentation elements (i.e. Shutter, Display Area etc.) for both grayscale and color images as GSPS objects.

7.1.9.1   Grayscale SoftCopy Presentation State IODs Modules

This section describes the IODs of the GSPS SOP Instances by describing the Modules that will be used for such objects.

Table 216 specifies the Modules used in the creation of GSPS SOP Instances in the Study.

Table 216: IOD of GSPS SOP Instances

IE	Module	DICOM Reference (PS3.3)	Value Description Table	Presence of Module
Patient	Patient	C.7.1.1	Table 217	ALWAYS
Study	General Study	C.7.2.1	Table 218	ALWAYS
Series	General Series	C.7.3.1	Table 219	ALWAYS
	Presentation Series	C.11.9	Table 220	ALWAYS
Equipment	General Equipment	C.7.5.1	Table 221	ALWAYS
Presentation State	Presentation State Identification	C.11.10	Table 222	ALWAYS
	Presentation State Relationship	C.11.11	Table 224	ALWAYS
	Presentation State Shutter	C.11.12	Table 227	UNSUPPORTED
	Presentation State Mask	C11.13	Table 228	UNSUPPORTED
	Mask	C.7.6.10	Table 229	UNSUPPORTED
	Display Shutter	C.7.6.11	Table 230	UNSUPPORTED
	Bitmap Display Shutter	C.7.6.15	Table 231	UNSUPPORTED
	Overlay Plane	C.9.2	Table 232	UNSUPPORTED
	Overlay Activation	C.11.7	Table 233	UNSUPPORTED
	Displayed Area	C.10.4	Table 234	ALWAYS
	Graphic Annotation	C.10.5	Table 235	ALWAYS
	Spatial Transformation	C.10.6	Table 236	UNSUPPORTED
	Graphic Layer	C.10.7	Table 237	UNSUPPORTED
	Graphic Group	C.10.11	Table 238	UNSUPPORTED
	Modality LUT	C.11.1	Table 239	UNSUPPORTED
	Softcopy VOI LUT	C.11.8	Table 240	ALWAYS

	Softcopy Presentation LUT	C.11.6	Table 241	UNSUPPORTED See Note 1
	SOP Common	C.12.1	Table 242	ALWAYS

7.1.9.2   Grayscale SoftCopy Presentation State Module Attributes

This section provides information on the Elements that are part of each module present in the GSPS SOP Instances. For each Element, the Value Description column describes the meaning of the element, whether it must be present in the GSPS instance header, and what the source of the value is.

The tables use the following abbreviations:

The abbreviations in the "Presence of Value" column are:

VNAP   Value not always present (attribute is always present but may not have a value).

ANAP   Attribute not always present.

ALWAYS   Attribute always present and has a value.

EMPTY   Attribute always present but has no value.

UNSUPPORTED Attribute not supported

The abbreviations in the "Source" column are:

ORIGINAL Value is copied from an original image.

DB   Value is from the McKesson Radiology™ 12.3 database.

AUTO   Value is automatically generated by the McKesson Radiology™ 12.3 system.

D   indicates a default hard-coded value is set.

NA   Value not applicable

NOTE1:   Only support export IDENTITY value for Presentation LUT shape

Table 217: Patient Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Patient's Name	(0010,0010)	2	Copied from database if a value is specified. Empty otherwise.	VNAP	DB
Patient ID	(0010,0020)	2	Copied from database.	ALWAYS	DB
Patient's Birth Date	(0010,0030)	2	Copied from database if a value is specified. Empty otherwise.	VNAP	DB
Patient's Sex	(0010,0040)	2	Copied from database if a value is specified. Empty otherwise.	VNAP	DB

Table 218: General Study Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Study Instance UID	(0020,000D)	1	Copied from database.	ALWAYS	DB
Study Date	(0008,0020)	2	Copied from database if a value is specified. Empty otherwise.	VNAP	DB
Study Time	(0008,0030)	2	Copied from database if a value is specified. Empty otherwise.	VNAP	DB
Referring Physician's Name	(0008,0090)	2	Copied from database if a value is specified. Empty otherwise.	VNAP	DB
Study ID	(0020,0010)	2	Copied from database if a value is specified. Empty otherwise.	VNAP	DB
Accession Number	(0008,0050)	2	Copied from database if a value is specified. Empty otherwise.	VNAP	DB
Study Description	(0008,1030)	3	Not present OR copied from database if a value is specified. Empty otherwise.	ANAP	DB

Table 219: General Series Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Modality	(0008,0060)	1	Set to "PR"	ALWAYS	D
Series Instance UID	(0020,000E)	1	Generated on SOP Instance Creation. All GSPS SOP Instances in the same study has the same Series Instance UID.	ALWAYS	AUTO
Series Number	(0020,0011)	2	Set to "1"	ALWAYS	D
Series Description	(0008,103e)	3	Copied from database if a value is specified. Empty otherwise.	ANAP	DB

Table 220: Presentation Series Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Modality	(0008,0060)	1	The Presentation Series Module specializes some Attributes of the General Series Module. Set to "PR"	ALWAYS	D

Table 221: General Equipment Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Manufacturer	(0008,0070)	2	Value specified as "McKesson"	ALWAYS	AUTO

Table 222: Presentation State Identification Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Presentation Creation Date	(0070,0082)	1	Date on which this presentation was created. Note: This date may be different from the date that the DICOM SOP Instance was created, since the presentation state information contained may have been recorded earlier. Use the last modified date of McKesson Radiology™ 12.3 Internal/proprietary annotation or presentation files.	ALWAYS	AUTO
Presentation Creation Time	(0070,0083)	1	Time at which this presentation was created. Note: This time may be different from the time that the DICOM SOP Instance was created, since the presentation state information contained may have been recorded earlier. Use the last modified time of McKesson Radiology™ 12.3 Internal/proprietary annotation or presentation files.	ALWAYS	AUTO
Include Content Identification Macro Table 10-12			Note: The Content Label value may be used by an application as a Defined Term in order to imply some grouping of different presentation states, i.e. it may have the same value for different presentation state instances that share some common concept.	ALWAYS	AUTO

Table 223: Content Identification Macro Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Instance Number	(0020,0013)	1	Set to "1"	ALWAYS	D
Content Label	(0070,0080)	1	A label that is used to identify this SOP Instance. Set to "MCKESSONEMI GSPS"	ALWAYS	D
Content Description	(0070,0081)	2	A description of the content of the SOP Instance.	EMPTY	D
Content Creator's Name	(0070,0084)	2	Name of operator (such as a technologist or physician) creating the content of the SOP Instance.	EMPTY	D

Table 224: Presentation State Relationship Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Referenced Series Sequence	(0008,1115)	1	- Sequence of Items where each Item includes the Attributes of one Series to which the Presentation applies. - One or more Items shall be present.	ALWAYS	AUTO
>Series Instance UID	(0020,000E)	1	- Unique identifier of a Series that is part of the Study defined by the Study Instance UID (0020,000D) in the enclosing dataset.	ALWAYS	DB
>Referenced Image Sequence	(0008,1140)	1	- Sequence of Items where each Item provides reference to a selected set of Image SOP Class/SOP Instance pairs to which the Presentation applies that are part of the Study defined by Study Instance UID (0020,000D) and the Series defined by Series Instance UID (0020,000E). -The referenced SOP Class shall be the same for all Images in any Item of this Referenced Series Sequence (0008,1115). Value is saved to database. - One or more Items shall be present.	EMPTY	AUTO
>>Include Image SOP Instance Reference Macro, Table 225					

Table 225: Image SOP Instance Macro Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Include 'SOP Instance Reference Macro' Table 226					
Referenced Frame Number	(0008,1160)	1C	Identifies the frame numbers within the Referenced SOP Instance to which the reference applies. The first frame shall be denoted as frame number 1. Note: This Attribute may be multi-valued. Required if the Referenced SOP Instance is a multi-frame image and the reference does not apply to all frames, and Referenced Segment Number (0062,000B) is not present.	ANAP	ORIGINAL

Referenced Segment Number	(0062,000B)	1C	Identifies the Segment Number to which the reference applies. Required if the Referenced SOP Instance is a Segmentation or Surface Segmentation and the reference does not apply to all segments and Referenced Frame Number (0008,1160) is not present.	UNSUPPORTED	NA

Table 226: SOP Instance Reference Macro Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Referenced SOP Class UID	(0008,1150)	1	Uniquely identifies the referenced SOP Class.	ALWAYS	ORIGINAL
Referenced SOP Instance UID	(0008,1155)	1	Uniquely identifies the referenced SOP Instance.	ALWAYS	ORIGINAL

Table 227: Presentation State Shutter Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Shutter Presentation Value	(0018,1622)	1C	A single grayscale unsigned value used to replace those parts of the image occluded by the shutter, when rendered on a monochrome display. The units are specified in P-Values. Required if the Display Shutter Module or Bitmap Display Shutter Module is present. Note: The requirement in this module is type 1C which overrides the type 3 in the Display Shutter Module. - Export not supported	UNSUPPORTED	NA
Shutter Presentation Color CIELab Value	(0018,1624)	1C	A color triplet value used to replace those parts of the image occluded by the shutter, when rendered on a color display. The units are specified in PCS-Values, and the value is encoded as CIELab. See C.10.7.1.1. Required if the Display Shutter Module or Bitmap Display Shutter Module is present and the SOP Class is other than Grayscale Softcopy Presentation State Storage. Note: The requirement in this module is type 1C, which overrides the type 3 in the Display Shutter and Bitmap Display Shutter Modules. - Export not supported	UNSUPPORTED	DB

NOTE1:   This table contains Attributes that specialize Attributes in other Modules included in a Presentation State.

Table 228 Presentation State Mask Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Mask Subtraction Sequence	(0028,6100)	1C			NA

>Mask Operation	(0028,6101)	1	Type of mask operation to be performed
			
			Enumerated Values:
			    AVG_SUB
			    TID
			
			See C.7.6.10.1 for further explanation.
			
			Note: The requirement in this module is for Enumerated Values which override the requirements of the Mask Module.
			
			- Export not supported
				UNSUPPORTED
				
				Required if Mask Module is present.
				Only a single Item shall be included in this sequence.
				Applicable Frame Range (0028,6102) shall not be included in the Sequence Item.
				See C.7.6.10 for a complete definition of the Attributes in the Items of this Sequence other than Mask Operation(0028,6101) and Applicable Frame Range (0028,6102).
				
				Notes:
				
				1. This Sequence is replicated here in order to specify one Item, additional conditions on Mask Operation (0028,6101) and to forbid Applicable Frame Range (0028,6102).
				
				2. The role of Applicable Frame Range (0028,6102) is replaced by Referenced Frame Number (0008,1160).
					DB

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
>Contrast Frame Averaging	(0028,6112)	1C	Specified the number of contrast frames to average together before performing the mask operation. Required if Mask Frame Numbers (0028,6110) specifies more than one frame (i.e. is multi-valued). Note: The requirement in this module is conditional and overrides the optional requirements of the Mask Module. **- Export not supported**	UNSUPPORTED	NA
Recommended Viewing Mode	(0028,1090)	1C	Specifies the recommended viewing protocol(s). Enumerated Value: SUB = for subtraction with mask images Required if Mask Subtraction Sequence (0028,6100) is present. Note: The requirement in this module is type 1C and an Enumerated Value is specified which override the requirements of the Mask Module. **- Export not supported**	UNSUPPORTED	NA

NOTE1:   This table contains Attributes that specialize the use of masks in a Presentation State

Table 229: Mask Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Mask Subtraction Sequence	(0028,6100)	1	- Defines a sequence that describes mask subtraction operations for a Multiframe Image. - One or more items shall be included in this sequence. **- Export not supported**	UNSUPPORTED	NA
Recommended Viewing Mode	(0028,1090)	2	- Specifies the recommended viewing protocol(s). Defined terms:	UNSUPPORTED	NA

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
			SUB = for subtraction with mask images; NAT = native viewing of image as sent. Note: If an implementation does not recognize the defined term for Recommended Viewing Mode (0028,1090), reverting to native display mode is recommended. **- Export not supported**		

Table 230: Display Shutter Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Shutter Shape	(0018,1600)	1	-Shape(s) of the shutter defined for display. Enumerated Values: RECTANGULAR CIRCULAR POLYGONAL This multi-valued Attribute shall contain at most one of each Enumerated Value. When multiple values are present, and the shutter is applied to a displayed image, then all of the shapes shall be combined and applied simultaneously, that is, the least amount of image remaining shall be visible (unoccluded). See Figure C.7-4b. **- Export not supported**	UNSUPPORTED	NA
Shutter Left Vertical Edge	(0018,1602)	1C	- Required if Shutter Shape (0018,1600) is RECTANGULAR. Location of the left edge of the rectangular shutter with respect to pixels in the image given as column. **- Export not supported**	UNSUPPORTED	NA
Shutter Right Vertical Edge	(0018,1604)	1C	- Required if Shutter Shape (0018,1600) is	UNSUPPORTED	NA

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
			RECTANGULAR. Location of the right edge of the rectangular shutter with respect to pixels in the image given as column. **- Export not supported**		
Shutter Upper Horizontal Edge	(0018,1606)	1C	- Required if Shutter Shape (0018,1600) is RECTANGULAR. Location of the upper edge of the rectangular shutter with respect to pixels in the image given as row. **- Export not supported**	UNSUPPORTED	NA
Shutter Lower Horizontal Edge	(0018,1608)	1C	- Required if Shutter Shape (0018,1600) is RECTANGULAR. Location of the lower edge of the rectangular shutter with respect to pixels in the image given as row. **- Export not supported**	UNSUPPORTED	NA
Center of Circular Shutter	(0018,1610)	1C	- Required if Shutter Shape (0018,1600) is CIRCULAR. Location of the center of the circular shutter with respect to pixels in the image given as row and column. **- Export not supported**	UNSUPPORTED	NA
Radius of Circular Shutter	(0018,1612)	1C	- Required if Shutter Shape (0018,1600) is CIRCULAR. Radius of the circular shutter with respect to pixels in the image given as a number of pixels along the row direction. **- Export not supported**	UNSUPPORTED	NA

Vertices of the Polygonal Shutter	(0018,1620)	1C	- Required if Shutter Shape (0018,1600) is POLYGONAL.
			Multiple Values where the first set of two values are:
			        row of the origin vertex
			        column of the origin vertex
			Two or more pairs of values follow and are the row and
				UNSUPPORTED	NA

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
			column coordinates of the other vertices of the polygon shutter. Polygon shutters are implicitly closed from the last vertex to the origin vertex and all edges shall be non-intersecting except at the vertices. **- Export not supported**		
Shutter Presentation Value	(0018,1622)	3	- A single gray unsigned value used to replace those parts of the image occluded by the shutter, when rendered on a monochrome display. The units are specified in P-Values, from a minimum of 0000H (black) up to a maximum of FFFFH (white). Note: The maximum P-Value for this Attribute may be different from the maximum P-Value from the output of the Presentation LUT, which may be less than 16 bits in depth. **- Export not supported**	UNSUPPORTED	NA
Shutter Presentation Color CIELab Value	(0018,1624)	3	- A color triplet value used to replace those parts of the image occluded by the shutter, when rendered on a color display. The units are specified in PCS-Values, and the value is encoded as CIELab. See C.10.7.1.1. **- Export not supported**	UNSUPPORTED	NA

Table 231: Bitmap Display Shutter Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Shutter Shape	(0018,1600)	1	Shape of the shutter defined for display. Enumerated Values are: BITMAP This Attribute shall contain one Value.	UNSUPPORTED	NA

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
			- Export not supported		
Shutter Overlay Group	(0018,1623)	1	Specifies the Group (60xx) of an Overlay stored within the Presentation State IOD that contains the bitmap data, as defined in the Overlay Plane Module C.9.2. **- Export not supported**	UNSUPPORTED	NA
Shutter Presentation Value	(0018,1622)	1	A single gray unsigned value used to replace those parts of the image occluded by the shutter, when rendered on a monochrome display. The units are specified in P-Values, from a minimum of 0000H (black) up to a maximum of FFFFH (white). Note: The maximum P-Value for this Attribute may be different from the maximum P-Value from the output of the Presentation LUT, which may be less than 16 bits in depth. **- Export not supported**	UNSUPPORTED	NA
Shutter Presentation Color CIELab Value	(0018,1624)	3	A color triplet value used to replace those parts of the image occluded by the shutter, when rendered on a color display. The units are specified in PCS-Values, and the value is encoded as CIELab. See C.10.7.1.1. **- Export not supported**	UNSUPPORTED	NA

Table 232: Overlay Plane Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Overlay Rows	(60xx,0010)	1	Number of Rows in Overlay. **- Export not supported**	UNSUPPORTED	NA
Overlay Columns	(60xx,0011)	1	Number of Columns in Overlay. **- Export not supported**	UNSUPPORTED	NA
Overlay Type	(60xx,0040)	1	Indicates whether this overlay represents a region of interest or other graphics. Enumerated	UNSUPPORTED	NA

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Attribute Name	Tag	Type	Value Description	Presence of Value	Source

			Values:
			     G = Graphics
			     R = ROI.
			
			- Export not supported		

Overlay Origin	(60xx,0050)	1	Location of first overlay point with respect to pixels in the image, given as row\column. The upper left pixel of the image has the coordinate 1\1. Column values greater than 1 indicate the overlay plane origin is to the right of the image origin. Row values greater than 1 indicate the overlay plane origin is below the image origin. Values less than 1 indicate the overlay plane origin is above or to the left of the image origin. Note: Values of 0\0 indicate that the overlay pixels start 1 row above and one column to the left of the image pixels.	UNSUPPORTED	NA
Overlay Bits Allocated	(60xx,0100)	1	Number of Bits Allocated in the Overlay. The value of this Attribute shall be 1. Note: Formerly the standard described embedding the overlay data in the Image Pixel Data (7FE0,0010), in which case the value of this Attribute was required to be the same as Bits Allocated (0028,0100). This usage has been retired. See PS 3.3 2004. **- Export not supported**	UNSUPPORTED	NA
Overlay Bit Position	(60xx,0102)	1	The value of this Attribute shall be 0. Note: Formerly the standard described embedding the overlay data in the Image Pixel Data (7FE0,0010), in which case the value of this Attribute specified the bit in which the overlay was stored. This usage has been retired. See PS 3.3 2004. **- Export not supported**	UNSUPPORTED	NA
Overlay Data	(60xx,3000)	1	Overlay pixel data. The order of pixels sent for each overlay is left to right, top to	UNSUPPORTED	NA

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
			bottom, i.e., the upper left pixel is sent first followed by the remainder of the first row , followed by the first pixel of the 2nd row, then the remainder of the 2nd row and so on. Overlay data shall be contained in this Attribute. See C.9.2.1.1 for further explanation. **- Export not supported**		
Overlay Description	(60xx,0022)	3	User-defined comments about the overlay. **- Export not supported**	UNSUPPORTED	NA
Overlay Subtype	(60xx,0045)	3	Defined term which identifies the intended purpose of the Overlay Type. See C.9.2.1.3 for further explanation. **- Export not supported**	UNSUPPORTED	NA
Overlay Label	(60xx,1500)	3	A user defined text string which may be used to label or name this overlay. **- Export not supported**	UNSUPPORTED	NA
ROI Area	(60xx,1301)	3	Number of pixels in ROI area. See C.9.2.1.2 for further explanation. **- Export not supported**	UNSUPPORTED	NA
ROI Mean	(60xx,1302)	3	ROI Mean. See C.9.2.1.2 for further explanation. **- Export not supported**	UNSUPPORTED	NA
ROI Standard Deviation	(60xx,1303)	3	ROI standard deviation. See C.9.2.1.2 for further explanation. **- Export not supported**	UNSUPPORTED	NA

Table 233: Overlay Activation Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Overlay Activation Layer	(60xx,1001)	2C	The layer (defined in Graphic Layer (0070,0002) of the Graphic Layer Module C.10.7) in which the Overlay described in group 60xx shall be displayed. If no layer is specified (zero length) then the overlay shall not be displayed. Required if Group 60xx is present in the referenced image(s) or the Presentation State instance containing this Module. - Export not supported	UNSUPPORTED	NA

Table 234: Display Area Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Displayed Area Selection Sequence	(0070,005A)	1	A sequence of Items each of which describes the displayed area selection for a group of images or frames. Sufficient Items shall be present to describe every image and frame listed in the Presentation State Relationship Module. One or more Items shall be included in this sequence.	ALWAYS	AUTO
>Referenced Image Sequence	(0008,1140)	1C	The subset of images and frames listed in the Presentation State Relationship Module, to which this displayed area selection applies. One or more Items shall be included in this sequence. Required if the displayed area selection in this Item does not apply to all the images and frames listed in the Presentation State Relationship Module.	ANAP	AUTO
>> Referenced SOP Class UID	(0008,1150)	1	Uniquely identifies the referenced SOP Class.	ALWAYS	ORIGINAL
>> Referenced SOP Instance UID	(0008,1155)	1	Uniquely identifies the referenced SOP Instance.	ALWAYS	ORIGINAL

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Attribute Name	Tag	Type	Value Description	Presence of Value	Source
>> Referenced Frame Number	(0008,1160)	1C	Identifies the frame numbers within the Referenced SOP Instance to which the reference applies. The first frame shall be denoted as frame number 1. Note: This Attribute may be multi-valued. Required if the Referenced SOP Instance is a multi-frame image and the reference does not apply to all frames, and Referenced Segment Number (0062,000B) is not present.	ANAP	AUTO
>> Referenced Segment Number	(0062,000B)	1C	Identifies the Segment Number to which the reference applies. Required if the Referenced SOP Instance is a Segmentation or Surface Segmentation and the reference does not apply to all segments and Referenced Frame Number (0008,1160) is not present. **- Export not supported**	UNSUPPORTED	NA
>Pixel Origin Interpretation	(0048,0301)	1C	For a referenced multi-frame image, specifies whether the Displayed Area Top Left Hand Corner (0070,0052) and Displayed Area Bottom Right Hand Corner (0070,0053) are to be interpreted relative to the individual frame pixel origins, or relative to the Total Pixel Matrix origin (see C.8.12.4.1.4). Required if the value of Referenced SOP Class UID (0008,1150) within Referenced Image Sequence (0008,1140) is 1.2.840.10008.5.1.4.1.1.77.1.6 (VL Whole Slide Microscopy Image). May be present otherwise. Enumerated Values: FRAME – relative to individual frame VOLUME – relative to Total Image Matrix If not present, TLHC and	UNSUPPORTED	NA

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Attribute Name	Tag	Type	Value Description	Presence of Value	Source
			BRHC are defined relative to the frame pixel origins.		
>Displayed Area Top Left Hand Corner	(0070,0052)	1	The top left (after spatial transformation) pixel in the referenced image to be displayed, given as column\row. Column is the horizontal (before spatial transformation) offset (X) and row is the vertical (before spatial transformation) offset (Y) relative to the origin of the pixel data before spatial transformation, which is 1\1. See Figure C.10.4-1.	ALWAYS	AUTO
>Displayed Area Bottom Right Hand Corner	(0070,0053)	1	The bottom right (after spatial transformation) pixel in the referenced image to be displayed, given as column\row. Column is the horizontal (before spatial transformation) offset (X) and row is the vertical (before spatial transformation) offset (Y) relative to the origin of the pixel data before spatial transformation, which is 1\1. See Figure C.10.4-1.	ALWAYS	AUTO
>Presentation Size Mode	(0070,0100)	1	Manner of selection of display size. Enumerated Values: SCALE TO FIT TRUE SIZE MAGNIFY	ALWAYS	AUTO
>Presentation Pixel Spacing	(0070,0101)	1C	Physical distance between the center of each pixel in the referenced image (before spatial transformation), specified by a numeric pair - adjacent row spacing (delimiter) adjacent column spacing in mm. See 10.7.1.3 for further explanation of the value order. Notes: 1) This value may be different from Pixel Spacing (0028,0030) or Imager Pixel Spacing (0018,1164)	ANAP	AUTO

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Attribute Name	Tag	Type	Value Description	Presence of Value	Source
			specified in the referenced image, which are ignored, since some form of calibration may have been performed (for example by reference to an object of known size in the image). 2) If the row and column spacing are different, then the pixel aspect ratio of the image is not 1:1. Required if Presentation Size Mode (0070,0100) is TRUE SIZE, in which case the values will correspond to the physical distance between the center of each pixel on the display device. May be present if Presentation Size Mode (0070,0100) is SCALE TO FIT or MAGNIFY, in which case the values are used to compute the aspect ratio of the image pixels.		
>Presentation Pixel Aspect Ratio	(0070,0102)	1C	Ratio of the vertical size and the horizontal size of the pixels in the referenced image, to be used to display the referenced image, specified by a pair of integer values where the first value is the vertical pixel size and the second value is the horizontal pixel size. See C.7.6.3.1.7. Required if Presentation Pixel Spacing (0070,0101) is not present. Notes: 1) This value may be different from the	ANAP	AUTO

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
			aspect ratio specified by Pixel Aspect Ratio (0028,0034) in the referenced image, or implied by the values of Pixel Spacing (0028,0030) or Imager Pixel Spacing (0018,1164) specified in the referenced image, which are ignored. 2) This value must be specified even if the aspect ratio is 1:1.		
>Presentation Pixel Magnification Ratio	(0070,0103)	1C	Ratio of displayed pixels to source pixels, specified in one dimension. Required if Presentation Size Mode (0070,0100) is MAGNIFY. Notes: 1) A value of 1.0 would imply that one pixel in the referenced image would be displayed as one pixel on the display (i.e. it would not be interpolated if the aspect ratio of the image pixels is 1:1). 2) A value of 2.0 would imply that one pixel in the referenced image would be displayed as 4 pixels on the display (i.e. up-sampled by a factor of 2 in each of the row and column directions). 3) A value of 0.5 would imply that 4 pixels in the referenced image would be displayed as 1 pixel on the display (i.e. down-	SUPPORTED	AUTO

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
			sampled by a factor of 2 in each of the row and column directions). 4) If the source pixels have an aspect ratio of other than 1:1, then they are assumed to have been interpolated to a display pixel aspect ratio of 1:1 prior to magnification.		

Table 235: Graphic Annotation Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Graphic Annotation Sequence	(0070,0001)	1	A sequence of Items each of which represents a group of annotations composed of graphics or text or both. One or more Items shall be included in this sequence.	ALWAYS	AUTO
>Referenced Image Sequence	(0008,1140)	1C	The subset of images and frames listed in the Presentation State Relationship Module, to which this graphic annotation applies. One or more Items shall be included in this sequence. Required if graphic annotations in this Item do not apply to all the images and frames listed in the Presentation State Relationship Module.	ANAP	AUTO
>> Referenced Frame Number	(0008,1160)	1C	Identifies the frame numbers within the Referenced SOP Instance to which the reference applies. The first frame shall be denoted as frame number 1. Note: This Attribute may be multi-valued. Required if the Referenced SOP Instance is a multi-frame image and the reference does not apply to all frames, and Referenced Segment Number (0062,000B) is not present.	ANAP	AUTO
>Graphic Layer	(0070,0002)	1	- The layers in which graphic and text may be Rendered	UNSUPPORTED	NA

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Attribute Name	Tag	Type	Value Description	Presence of Value	Source
			- Export not supported		
>Text Object Sequence	(0070,0008)	1C	- Sequence that describes a text annotation. One or more Items may be present. - Either one or both of Text Object Sequence (0070,0008) or Graphic Object Sequence (0070,0009) are required .	ANAP	AUTO
>>Bounding Box Annotation Units	(0070,0003)	1C	- Units of measure for the axes of the text bounding box. **- Export not supported**	UNSUPPORTED	NA
>>Anchor Point Annotation Units	(0070,0004)	1C	- Units of measure for the axes of the text anchor point annotation. Enumerated Values for Anchor Point Annotation Units (0070,0004) are the same as for Bounding Box Annotation Units (0070,0003). PIXEL = Image relative position specified with sub-pixel resolution such that the origin, which is at the Top Left Hand Corner (TLHC) of the TLHC pixel is 0.0\0.0, the Bottom Right Hand Corner (BRHC) of the TLHC pixel is 1.0\1.0, and the BRHC of the BRHC pixel is Columns\Rows (see figure C.10.5-1). The values must be within the range 0\0 to Columns\Rows. DISPLAY = Fraction of Specified Displayed Area where 0.0\0.0 is the TLHC and 1.0\1.0 is the BRHC. The values must be within the range 0.0 to 1.0. MATRIX = Image relative position specified with sub-pixel resolution such that the origin, which is at the Top Left Hand Corner (TLHC) of the TLHC pixel of the Total Pixel Matrix, is 0.0\0.0, the Bottom Right Hand Corner (BRHC) of the TLHC pixel is 1.0\1.0, and the BRHC of the BRHC pixel of the Total Pixel Matrix is Total Pixel Matrix Columns\Total Pixel Matrix Rows (see C.8.12.4.1.3). The values	ALWAYS	AUTO

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
			must be within the range 0.0\0.0 to Total Pixel Matrix Columns\Total Pixel Matrix Rows. MATRIX may be used only if the value of Referenced SOP Class UID (0008,1150) within Referenced Image Sequence (0008,1140) is 1.2.840.10008.5.1.4.1.1.77.1.6 (VL Whole Slide Microscopy Image). - Required if Anchor Point (0070,0014) is present.		
>>Unformatted Text Value	(0070,0006)	1	- Text data which is unformatted and whose manner of display within the defined bounding box or relative to the specified anchor point is implementation dependent. The text value may contain spaces, as well as multiple lines separated by either LF, CR, CR LF or LF CR, but otherwise no format control characters (such as horizontal or vertical tab and form feed) shall be present, even if permitted by the Value Representation of ST. - In HMI, Text is interpreted as ISO-IR 100	ALWAYS	AUTO
>>Bounding Box Top Left Hand Corner	(0070,0010)	1C	- Location of the Top Left Hand Corner (TLHC) of the bounding box in which Unformatted Text Value (0070,0006) is to be displayed, in Bounding Box Annotation Units (0070,0003), given as column\row. Column is the horizontal offset and row is the vertical offset. - Required if Anchor Point (0070,0014) is not present. **- Export not supported**	UNSUPPORTED	NA
>>Bounding Box Bottom Right Hand Corner	(0070,0011)	1C	- Location of the Bottom Right Hand Corner (BRHC) of the bounding box in which Unformatted Text Value (0070,0006) is to be displayed, in Bounding Box Annotation Units	UNSUPPORTED	NA

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Attribute Name	Tag	Type	Value Description	Presence of Value	Source
			(0070,0003), given as column\row. Column is the horizontal offset and row is the vertical offset. - Required if Anchor Point (0070,0014) is not present. **- Export not supported**		
>>Bounding Box Text Horizontal Justification	(0070,0012)	1C	- Location of the text relative to the vertical edges of the bounding box. Enumerated Values: LEFT = closest to left edge RIGHT = closest to right edge CENTER = centered - Required if Bounding Box Top Left Hand Corner (0070,0010) is present. **- Export not supported**	UNSUPPORTED	NA
>>Anchor Point	(0070,0014)	1C	- Location of a point in the image or Specified Displayed Area to which the Unformatted Text Value (0070,0006) is related, in Anchor Point Annotation Units (0070,0004), given as column\row. Column is the horizontal offset and row is the vertical offset. - Required if Bounding Box Top Left Hand Corner (0070,0010) and Bounding Box Bottom Right Hand Corner (0070,0011) are not present. May be present even if a bounding box is specified (i.e. Bounding Box Top Left Hand Corner (0070,0010) and Bounding Box Bottom Right Hand Corner (0070,0011) are present).	ALWAYS	AUTO
>>Anchor Point Visibility	(0070,0015)	1C	- Flag to indicate whether or not a visible indication (such as a line or arrow) of the relationship between the text and the anchor point is to be displayed.	UNSUPPORTED	NA

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
			Enumerated Values: Y = yes N = no - Required if Anchor Point (0070,0014) is present. HMI does not interpret this tag. An arrow is always present to indicate the relationship between the text and the anchor point. **- Export not supported**		
>Graphic Object Sequence	(0070,0009)	1C	- Sequence that describes a graphic annotation. One or more Items may be present. - Either one or both of Text Object Sequence (0070,0008) or Graphic Object Sequence (0070,0009) are required.	ANAP	AUTO
>>Graphic Annotation Units	(0070,0005)	1C	- Units of measure for the axes of the graphic annotation. Enumerated Values for Graphic Annotation Units (0070,0005) are the same as for Bounding Box Annotation Units (0070,0003).	ALWAYS	AUTO
>>Graphic Dimensions	(0070,0020)	1	Enumerated Value: 2 McKesson Radiology™ 12.3 exports a default Dimensions with a value of 2. **- Export supported**	ALWAYS	D
>>Number of Graphic Points	(0070,0021)	1	- Number of data points in this graphic.	ALWAYS	AUTO
>> Graphic Data	(0070,0022)	1	- Coordinates that specify this graphic annotation. Depending on Graphic Type (0070,0023)	ALWAYS	AUTO
>>Graphic Type	(0070,0023)	1	The shape of graphic that is to be drawn. McKesson Radiology™ 12.3 supports the following graphic types:	ALWAYS	AUTO

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
			POINT POLYLINE INTERPOLATED CIRCLE ELLIPSE		
>>Graphic Filled	(0070,0024)	1C	- Whether or not the closed graphics element is displayed as filled (in some unspecified manner that shall be distinguishable from an outline) or as an outline. Enumerated Values: Y = yes N = no Required if Graphic Data (0070,0022) is "closed", that is Graphic Type (0070,0023) is CIRCLE or ELLIPSE, or Graphic Type (0070,0023) is POLYLINE or INTERPOLATED and the first data point is the same as the last data point. McKesson Radiology™ 12.3 export a default value of "N" **- Export not supported**	ALWAYS	D

Table 236: Spatial Transformation Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Image Rotation	(0070,0042)	1	How far to rotate the image clockwise in degrees, before any Image Horizontal Flip (0070,0041) is applied. Enumerated Values: 0, 90,180,270 Notes: Negative values are not permitted since the Value Representation is unsigned. **- Export not supported**	UNSUPPORTED	NA
Image Horizontal Flip	(0070,0041)	1	Whether or not to flip the image horizontally after any Image Rotation has been applied such that the left	UNSUPPORTED	NA

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
			side of the image becomes the right side. Enumerated Values: Y = yes, N = no Note: No vertical flip is specified since the same result can be achieved by a combination of a 180 degree rotation and a horizontal flip. **- Export not supported**		

Table 237: Graphic Layer Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Graphic Layer Sequence	(0070,0060)	1	A sequence of Items each of which represents a single layer in which overlays, curves, graphics or text may be rendered. One or more Items shall be included in this sequence. An Item is required for each layer referenced from the Graphic Annotation Module or the Overlay Activation Module. **- Export not supported**	UNSUPPORTED	NA
>Graphic Layer	(0070,0002)	1	A string which identifies the layer. **- Export not supported**	UNSUPPORTED	NA
>Graphic Layer Order	(0070,0062)	1	An integer indicating the order in which it is recommended that the layer be rendered, if the display is capable of distinguishing. Lower numbered layers are to be rendered first. **- Export not supported**	UNSUPPORTED	NA
>Graphic Layer Recommended Display Grayscale Value	(0070,0066)	3	A default single gray unsigned value in which it is recommended that the layer be rendered on a monochrome display. The units are specified in P-Values from a minimum of	UNSUPPORTED	NA

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
			0000H (black) up to a maximum of FFFFH (white). Note: The maximum P-Value for this Attribute may be different from the maximum P-Value from the output of the Presentation LUT, which may be less than 16 bits in depth.		
>Graphic Layer Recommended Display CIELab Value	(0070,0401)	3	A default color triplet value in which it is recommended that the layer be rendered on a color display. The units are specified in PCS-Values, and the value is encoded as CIELab. See C.10.7.1.1. **- Export not supported**	UNSUPPORTED	NA
>Graphic Layer Description	(0070,0068)	3	A free text description of the contents of this layer. **- Export not supported**	UNSUPPORTED	NA

Table 238: Graphic Group Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Graphic Group Sequence	(0070,0234)	1	Sequence that describes the combined graphic object. One or more Items shall be included in this sequence. - Export not supported	UNSUPPORTED	NA
>Graphic Group ID	(0070,0295)	1	A unique number identifying the Graphic Group, i.e. the combined graphic object. - Export not supported	UNSUPPORTED	NA
>Graphic Group Label	(0070,0207)	1	Name used to identify the Graphic Group, i.e. the combined graphic object. - Export not supported	UNSUPPORTED	NA
>Graphic Group Description	(0070,0208)	3	Description of the group - Export not supported.	UNSUPPORTED	NA

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Table 239: Modality LUT Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Modality LUT Sequence	(0028,3000)	1C	Defines a sequence of Modality LUTs. Only a single Item shall be included in this sequence. Shall not be present if Rescale Intercept (0028,1052) is present. **- Export not supported**	UNSUPPORTED	NA
>LUT Descriptor	(0028,3002)	1C	Specifies the format of the LUT Data in this Sequence. See C.11.1.1 for further explanation. Required if the Modality LUT Sequence (0028,3000) is sent. **- Export not supported**	UNSUPPORTED	NA
>LUT Explanation	(0028,3003)	3	Free form text explanation of the meaning of the LUT.	UNSUPPORTED	NA
>Modality LUT Type	(0028,3004)	1C	Specifies the output values of this Modality LUT. See C.11.1.1.2 for further explanation. Required if the Modality LUT Sequence (0028,3000) is sent. **- Export not supported**	UNSUPPORTED	NA
>LUT Data	(0028,3006)	1C	LUT Data in this Sequence. Required if the Modality LUT Sequence (0028,3000) is sent. **- Export not supported**	UNSUPPORTED	NA
Rescale Intercept	(0028,1052)	1C	The value b in relationship between stored values (SV) and the output units specified in Rescale Type (0028,1054). Output units = m*SV + b. Required if Modality LUT Sequence (0028,3000) is not present. Shall not be present otherwise. **- Export not supported**	UNSUPPORTED	NA

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Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Rescale Slope	(0028,1053)	1C	m in the equation specified by Rescale Intercept (0028,1052). Required if Rescale Intercept is present. **- Export not supported**	UNSUPPORTED	NA
Rescale Type	(0028,1054)	1C	Specifies the output units of Rescale Slope (0028,1053) and Rescale Intercept (0028,1052). See C.11.1.1.2 for further explanation. Required if Rescale Intercept is present. **- Export not supported**	UNSUPPORTED	NA

Table 240: Softcopy VOI LUT Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Softcopy VOI LUT Sequence	(0028,3110)	1	Defines a sequence of VOI LUTs or Window Centers and Widths and to which images and frames they apply. No more than one VOI LUT Sequence containing a single Item or one pair of Window Center/Width values shall be specified for each image or frame. One or more Items shall be included in this sequence.	ANAP	AUTO
>Referenced Image Sequence	(0008,1140)	1C	The subset of images and frames listed in the Presentation State Relationship Module, to which this VOI LUT or Window Center and Width applies. One or more Items shall be included in this sequence. Required if the VOI LUT transformation in this Item does not apply to all the images and frames listed in the Presentation State Relationship Module.	ANAP	AUTO
>> Referenced SOP Class UID	(0008,1150)	1	Uniquely identifies the referenced SOP Class.	ALWAYS	AUTO
>> Referenced SOP Instance UID	(0008,1155)	1	Uniquely identifies the referenced SOP Instance.	ALWAYS	AUTO
>> Referenced Frame Number	(0008,1160)	1C	Identifies the frame numbers within the Referenced SOP Instance to which the reference applies. The first frame shall be denoted as frame number 1. Note: This Attribute may be multi-valued. Required if the Referenced SOP Instance is a multi-frame image and the reference does not apply to all	ANAP	AUTO

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
			frames, and Referenced Segment Number (0062,000B) is not present.		
>> Referenced Segment Number	(0062,000B)	1C	Identifies the Segment Number to which the reference applies. Required if the Referenced SOP Instance is a Segmentation or Surface Segmentation and the reference does not apply to all segments and Referenced Frame Number (0008,1160) is not present. **- Export not supported**	UNSUPPORTED	NA
> VOI LUT Sequence	(0028,3010)	1C	Defines a sequence of VOI LUTs. One or more Items shall be included in this sequence. Required if Window Center (0028,1050) is not present. May be present otherwise.	ANAP	AUTO
>> LUT Descriptor	(0028,3002)	1	Specifies the format of the LUT Data in this Sequence. See C.11.2.1.1 for further explanation.	ALWAYS	AUTO
>> LUT Explanation	(0028,3003)	3	Free form text explanation of the meaning of the LUT. Export as Linear DICOM VOI LUT.	ANAP	AUTO
>> LUT Data	(0028,3006)	1	LUT Data in this Sequence.	ALWAYS	AUTO
>> Window Center	(0028,1050)	1C	Window Center for display. See C.11.2.1.2 for further explanation. Required if VOI LUT Sequence (0028,3010) is not present. May be present otherwise. Will be exported as linear VOILUT **- Export not supported**	UNSUPPORTED	NA
>> Window Width	(0028,1051)	1C	Window Width for display. See C.11.2.1.2 for further explanation. Required if Window Center (0028,1050) is sent. Will be exported as linear VOILUT **- Export not supported**	UNSUPPORTED	NA
>> Window Center & Width Explanation	(0028,1055)	3	Free form explanation of the meaning of the Window Center and Width. Multiple values correspond to multiple Window Center and Width values. **- Export not supported**	UNSUPPORTED	NA

Table 241: Softcopy Presentation LUT Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Presentation LUT Sequence	(2050,0010)	1C	Defines a sequence of Presentation LUTs. Only a single item shall be included in this sequence. Required if Presentation LUT Shape (2050,0020) is absent. - Export not supported	UNSUPPORTED	NA
>LUT Descriptor	(0028,3002)	1	Specifies the format of the LUT Data in this Sequence. See C.11.6.1.1 for further explanation. - Export not supported	UNSUPPORTED	NA
>LUT Explanation	(0028,3003)	3	Free form text explanation of the meaning of the LUT. - Export not supported	UNSUPPORTED	NA
>LUT Data	(0028,3006)	1	LUT Data in this Sequence. - Export not supported	UNSUPPORTED	NA
Presentation LUT Shape	(2050,0020)	1C	Specifies predefined Presentation LUT transformation. Required if Presentation LUT Sequence (2050,0010) is absent. Enumerated Values: IDENTITY - no further translation necessary, input values are P-Values INVERSE - output values after inversion are P-Values See C.11.6.1.2 Export default value IDENTITY	ALWAYS	D

Table 242: SOP Common Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
SOP Class UID	(0008,0016)	1	1.2.840.10008.5.1.4.1.1.11.1 (PR)	ALWAYS	D

SOP Instance UID	(0008,0018)	1	Generated UID. Reuse existing UID if there is one already generated for the annotation file in the study.	ALWAYS	AUTO

Table 243:   McKesson Private Attributes in GSPS Objects

Tag ID	Attribute Name	VR	VM	Significance
(3711,00xx)	Private Creator ID	LO	1	- The Private Creator ID for this block of added Private Elements. The value is "A.L.I. Technologies, Inc.".
(3711,xxB0)	ALI_SERIALIZED_ANNOTATIONS	OB	1	-Serialized Internal annotations in proprietary format
(3711,xxB1)	ALI_SERIALIZED_GSPS_DATE	DA	1	- Serialization Date
(3711,xxB2)	ALI_SERIALIZED_GSPS_TIME	TM	1	- Serialization Time
(3711,xxB3)	ALI_SERIALIZED_PRESENTATION	OB	1	-Serialized Internal presentation elements in proprietary format

NOTE1: McKesson Radiology™ 12.3 User created annotations (e.g. distance, ellipse etc.) and presentation elements (zoom, w/l etc.) are serialized in the above private attributes in the GSPS object. This allows the McKesson Radiology™ 12.3 application to deserialize our own richer representation than what can be represented by DICOM standard GSPS attributes.

7.1.10   Raw Data Instance Creation for MC Study Data Files

McKesson Radiology™ 12.3 can create DICOM Raw Data instances from Non-DICOM data files[19] in McKesson Cardiology studies that McKesson Radiology™ 12.3 has a reference to for SIM[20] customers. This allows the encapsulated files to be DICOM archived to a DICOM archive SCP and Query/Retrieved back from a DICOM archive SCP.

7.1.10.1 Raw Data IOD for MC Study Data Files

This section describes the IOD of the Raw Data SOP Instances by describing the Modules that will be used for such objects.

Table 244 specifies the Modules used in the creation of Raw Data SOP Instances for HC Non-DICOM data files in the Study.

Table 244: IOD of Raw Data SOP Instances

IE	Module	DICOM Reference (PS3.3)	Value Description Table	Presence of Module
Patient	Patient	C.7.1.1	Table 245	ALWAYS

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19 Some examples of Non-DICOM file types that SIM needs to wrap as DICOM Raw Data instances (.ant, .wav, .txt, .doc, .htm, and jpg, fds etc.).

20 SIM - Shared Image Management - With SIM, customers will have one PACS system to learn and maintain instead of having a separate PACS system for both Radiology and Cardiology Studies.

Study	General Study	C.7.2.1	Table 246	ALWAYS
Series	General Series	C.7.3.1	Table 247	ALWAYS
Equipment	General Equipment	C.7.5.1	Table 248	ALWAYS
Raw Data	Acquisition Context	C.7.6.14	Table 249	VNAP
	Raw Data	C.19.1	Table 250	ALWAYS
	SOP Common	C.12.1	Table 251	ALWAYS

7.1.10.2 RAW Data Object Module Attributes for MC Data files

This section provides information on the Elements that are part of each module present in the Raw Data SOP Instances for McKesson Cardiology Non-DICOM data files[19]. For each Element, the Value Description column describes the meaning of the element, whether it must be present in the Raw Data header, and what the source of the value is.

The tables use the following abbreviations:

The abbreviations in the "Presence of Value" column are:

VNAP   Value not always present (attribute is always present but may not have a value).

ANAP   Attribute not always present.

ALWAYS   Attribute always present and has a value.

EMPTY   Attribute always present but has no value.

The abbreviations in the "Source" column are:

ORIGINAL   Value is copied from an original image.

DB   Value is from the McKesson Radiology™ 12.3 database.

AUTO   Value is automatically generated by the McKesson Radiology™ 12.3 system.

D   indicates a default hard-coded value is set.

Table 245: Patient Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Patient's Name	(0010,0010)	2	Copied from database if a value is specified. Empty otherwise.	VNAP	DB
Patient ID	(0010,0020)	2	Copied from database.	ALWAYS	DB
Patient's Birth Date	(0010,0030)	2	Copied from database if a value is specified. Empty otherwise.	VNAP	DB
Patient's Sex	(0010,0040)	2	Copied from database if a value is specified. Empty otherwise.	VNAP	DB

Table 246: General Study Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Study Instance UID	(0020,000D)	1	Copied from database.	ALWAYS	DB
Study Date	(0008,0020)	2	Copied from database if a value is specified. Empty otherwise.	VNAP	DB
Study Time	(0008,0030)	2	Copied from database if a value is specified. Empty otherwise.	VNAP	DB
Referring Physician's Name	(0008,0090)	2	Copied from database if a value is specified. Empty otherwise.	VNAP	DB
Study ID	(0020,0010)	2	Copied from database if a value is specified. Empty otherwise.	VNAP	DB
Accession Number	(0008,0050)	2	Copied from database if a value is specified. Empty otherwise.	VNAP	DB
Study Description	(0008,1030)	3	Not present OR copied from database if a value is specified. Empty otherwise.	ANAP	DB

Table 247: General Series Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Modality	(0008,0060)	1	Type of equipment that originally acquired the data used to create the images in this Series. Set to appropriate modality etc "OT"	ALWAYS	D
Series Instance UID	(0020,000E)	1	Generated on SOP Instance Creation. A single series instance uid will be used for all raw data files in a study when archived. If a new raw data file is added to a study after it has been archived a new series instance uid will be created when the raw data file is added to the dicom archive.	ALWAYS	AUTO
Series Number	(0020,0011)	2	Set to empty value	ALWAYS	D
Series Description	(0008,103e)	3	Copied from database if a value is specified. Empty otherwise.	ANAP	DB

Table 248: General Equipment Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Manufacturer	(0008,0070)	2	Value specified as "McKesson Medical Imaging Group"	ALWAYS	AUTO

Table 249: Acquisition Context Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Acquisition Context Sequence	(0040,0555)	2	A sequence of Items that describes the conditions present during the acquisition of the data of the SOP Instance. Zero items shall be included in this sequence.	EMPTY	D

Table 250: Raw Data Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Instance Number	(0020,0013)	2	A number that identifies this raw data. The value shall be unique within a series. Set to empty value.	ALWAYS	D
Content Date	(0008,0023)	1	The date the raw data creation was started. Content Date will use the same date as General Study Module Attributes, Study Date	ALWAYS	AUTO
Content Time	(0008,0033)	1	The time the raw data creation was started. Content Time will use the same time as General Study Module Attributes, Study time	ALWAYS	AUTO
Creator-Version UID	(0008,9123)	1	Unique identification of the equipment and version of the software that has created the Raw Data information. The UID allows one to avoid attempting to interpret raw data with an unknown format. Use: 1.2.840.113711.25.<version> so use 1.2.840.113711.25.1	ALWAYS	D
Private attributes that contain Raw Data Information See Table 252: Private Elements Added To Raw Data Object					

Table 251: SOP Common Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
SOP Class UID	(0008,0016)	1	1.2.840.10008.5.1.4.1.1.66	ALWAYS	D
SOP Instance UID	(0008,0018)	1	Generated UID.	ALWAYS	AUTO

Table 252: Private Elements Added To Raw Data Object

Tag ID	Attribute Name	VR	VM	Significance
(3711,00xx)	Private Creator ID	LO	1	- The Private Creator ID for this block of added Private Elements. The value is "A.L.I. Technologies, Inc.".
(3711,xxC4)	ALI_SIM_DATA_SEQUENCE	SQ	1	- A sequence of Items each of which represents a section of the McKesson Radiology™ 12.3 HC proprietary data and size of data blob for Horizon Cardiology Study objects types. - 10 Items shall be included in this sequence.

Tag ID	Attribute Name	VR	VM	Significance
> (3711,00xx)	Private Creator ID	LO	1	- The Private Creator ID for this block of added Private Elements. The value is "A.L.I. Technologies, Inc.".
> (3711,xxC0)	ALI_SIM_DATA_BLOB	OB	1	- Holds the McKesson Radiology™ 12.3 HC proprietary data for McKesson Cardiology Study objects types19.
> (3711,xxC2)	ALI_SIM_DATA_BLOB_SIZE	UL	1	- Size of the data blob
(3711,xxC1)	ALI_SIM_WRAP_FILE_CREATOR_ID	LO	1	- Unique Identifier to indicate this is a HMI wrapped DICOM file; "HMI SIM"
(3711,xxC3)	ALI_SIM_PRIVATE_MC_STRING	LO	1	- Medcon private Tag string that we store and return to them without modifying
(3711,xx01)	ALI_FILENAME_TAG	LO	1	- Original filename
(3711,xx05)	ALI_BAG_ID_TAG	IS	1	- bag ID that the file belongs to

7.1.11   Encapsulated PDF Instance Creation for MC Study PDF Files

McKesson Radiology™ 12.3 can create DICOM encapsulated PDF instances from Non-DICOM .pdf data files in McKesson Cardiology studies that McKesson Radiology™ 12.3 has a reference to for SIM[21] customers. This allows the encapsulated files to be DICOM archived to a DICOM archive SCP and Query/Retrieved back from a DICOM archive SCP.

7.1.11.1 EPDF IOD for MC Study PDF Files

This section describes the IOD of the EPDF SOP Instances by describing the Modules that will be used for such objects.

Table 253 specifies the Modules used in the creation of EPDF SOP Instances for `MC .pdf data files` in the Study.

Table 253: IOD of EPDF SOP Instances

IE	Module	DICOM Reference (PS3.3)	Value Description Table	Presence of Module
Patient	Patient	C.7.1.1	Table 254	ALWAYS
Study	General Study	C.7.2.1	Table 255	ALWAYS
Series	Encapsulated Document Series	C.24.1	Table 256	ALWAYS
Equipment	General Equipment	C.7.5.1	Table 257	ALWAYS
	SC Equipment	C.8.6.1	Table 258	ALWAYS
Raw Data	Encapsulated Document	C.7.6.14	Table 259	ALWAYS

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[21] SIM - Shared Image Management - With SIM, customers will have one PACS system to learn and maintain instead of having a separate PACS system for both Radiology and Cardiology Studies.

	SOP Common	C.12.1	Table 260	ALWAYS

7.1.11.2 EPDF Object Module Attributes for MC PDF files

This section provides information on the Elements that are part of each module present in the encapsulated PDF SOP Instances for McKesson Cardiology .pdf data files. For each Element, the Value Description column describes the meaning of the element, whether it must be present in the EPDF header, and what the source of the value is.

The tables use the following abbreviations:

The abbreviations in the "Presence of Value" column are:

VNAP	Value not always present (attribute is always present but may not have a value).
ANAP	Attribute not always present.
ALWAYS	Attribute always present and has a value.
EMPTY	Attribute always present but has no value.
NA	Not applicable

The abbreviations in the "Source" column are:

ORIGINAL	Value is copied from an original image.
DB	Value is from the McKesson Radiology™ 12.3 database.
AUTO	Value is automatically generated by the McKesson Radiology™ 12.3 system.
D	indicates a default hard-coded value is set.
NA	Not applicable

Table 254: Patient Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Patient's Name	(0010,0010)	2	Copied from database if a value is specified. Empty otherwise.	VNAP	DB
Patient ID	(0010,0020)	2	Copied from database.	ALWAYS	DB
Patient's Birth Date	(0010,0030)	2	Copied from database if a value is specified. Empty otherwise.	VNAP	DB
Patient's Sex	(0010,0040)	2	Copied from database if a value is specified. Empty otherwise.	VNAP	DB

Table 255: General Study Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Study Instance UID	(0020,000D)	1	Copied from database.	ALWAYS	DB

Study Date	(0008,0020)	2	Copied from database if a value is specified. Empty otherwise.	VNAP	DB
Study Time	(0008,0030)	2	Copied from database if a value is specified. Empty otherwise.	VNAP	DB
Referring Physician's Name	(0008,0090)	2	Copied from database if a value is specified. Empty otherwise.	VNAP	DB
Study ID	(0020,0010)	2	Copied from database if a value is specified. Empty otherwise.	VNAP	DB
Accession Number	(0008,0050)	2	Copied from database if a value is specified. Empty otherwise.	VNAP	DB
Study Description	(0008,1030)	3	Not present OR copied from database if a value is specified. Empty otherwise.	ANAP	DB

Table 256: Encapsulated Document Series Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Modality	(0008,0060)	1	The modality appropriate for the encapsulated document. This Type definition shall override the definition in the SC Equipment Module. See section C.7.3.1.1.1 for Defined Terms. Use "DOC"	ALWAYS	D
Series Instance UID	(0020,000E)	1	Generated on SOP Instance Creation. A single series instance uid will be used for all PDF files in a bag when a study is archived If a new PDF file is added to a study after it has been archived a new series instance uid will be created when that PDF file is added to the dicom archive	ALWAYS	AUTO
Series Number	(0020,0011)	2	Series Number will be an empty value	ALWAYS	D
Series Description	(0008,103e)	3	Copied from database if a value is specified. Empty otherwise.	ANAP	DB

Table 257: General Equipment Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Manufacturer	(0008,0070)	2	Value specified as "McKesson Medical Imaging Group"	ALWAYS	AUTO

Table 258: SC Equipment Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Modality	(0008,0060)	3	Set to "DOC"	ALWAYS	D
Conversion Type	(0008,0064)	1	Describes the kind of image conversion. Defined Term used: **SI = Scanned Image**	ALWAYS	DB

Table 259: Encapsulated Document Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
Instance Number	(0020,0013)	1	A number that identifies this SOP Instance. The value shall be unique within a series. Instance Number will be an empty value	ALWAYS	D
Content Date	(0008,0023)	2	The date the document content creation was started. Content Date will use the same date as General Study Module Attributes, Study Date.	ALWAYS	AUTO
Content Time	(0008,0033)	2	The time the document creation was started. Content Time will use the same time as General Study Module Attributes, Study time.	ALWAYS	AUTO
Acquisition DateTime	(0008,002A)	2	The date and time that the original generation of the data in the document started.	EMPTY	D
Burned In Annotation	(0028,0301)	1	Indicates whether or not the encapsulated document contains sufficient burned in annotation to identify the	ALWAYS	D

Attribute Name	Tag	Type	Value Description	Presence of Value	Source

			patient and date the data was acquired.
			
			Enumerated Values:
			
			     YES
			     NO
			
			Identification of patient and date as text in an encapsulated document (e.g., in an XML attribute or element) is equivalent to "burned in annotation". A de-identified document may use the value NO.
			
			Burned In Annotation. We will use "YES".
			
			Our understanding is that the PDF files will contain reports so we expect them to include enough information to identify the patient. If this understanding is incorrect and some PDF files contain patient information and some do not contain patient information, since we have no way of determining which is which it is safest to use "YES" for all PDF files.		

Source Instance Sequence	(0042,0013)	1C	A sequence that identifies the set of Instances that were used to derive the encapsulated document.	NA	NA
Document Title	(0042,0010)	2	The title of the document.	VNAP	ORIGINAL
Verification Flag	(0040,A493)	3	Indicates whether the Encapsulated Document is Verified. Enumerated Values: UNVERIFIED = Not attested by a legally accountable person. VERIFIED = Attested to (signed) by a Verifying Observer or Legal Authenticator named in the document, who is accountable for its content.	NA	NA
HL7 Instance Identifier	(0040,E001)	1C	Instance Identifier of the encapsulated HL7 Structured Document, encoded as a UID (OID or UUID), concatenated with a caret ("^") and Extension value (if Extension is present	NA	NA

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Attribute Name	Tag	Type	Value Description	Presence of Value	Source
			in Instance Identifier). Required if encapsulated document is a CDA document.		
MIME Type of Encapsulated Document	(0042,0012)	1	The type of the encapsulated document stream described using the MIME Media Type (see RFC 2046). Set to "application/pdf"	ALWAYS	D
List of MIME Types	(0042,0014)	1C	MIME Types of subcomponents of the encapsulated document. Required if the encapsulated document incorporates subcomponents with MIME types different than the primary MIME Type of the encapsulated document. Note: An Encapsulated CDA that includes an embedded JPEG image and an embedded PDF would list "image/jpeg\application/pdf".	NA	NA
Encapsulated Document	(0042,0011)	1	Encapsulated Document stream, containing a document encoded according to the MIME Type. - Contains the pdf data	ALWAYS	ORIGINAL

Table 260: SOP Common Module Attributes

Attribute Name	Tag	Type	Value Description	Presence of Value	Source
SOP Class UID	(0008,0016)	1	1.2.840.10008.5.1.4.1.1.104.1	ALWAYS	D
SOP Instance UID	(0008,0018)	1	Generated UID.	ALWAYS	AUTO

Table 261: Private Elements Added To PDF Data Object

Tag ID	Attribute Name	VR	VM	Significance
(3711,00xx)	Private Creator ID	LO	1	- The Private Creator ID for this block of added Private Elements. The value is "A.L.I. Technologies, Inc.".
(3711,xxC1)	ALI_SIM_WRAP_FILE_CREATOR_ID	LO	1	- Unique Identifier to indicate this is a HMI wrapped DICOM file; "HMI SIM"
(3711,xxC2)	ALI_SIM_DATA_BLOB_SIZE	UL	1	- Size of the pdf file blob
(3711,xxC3)	ALI_SIM_PRIVATE_MC_STRING	LO	1	- Medcon private Tag string that we store and return to them without modifying
(3711,xx01)	ALI_FILENAME_TAG	LO	1	- Original filename

(3711,xx05)	ALI_BAG_ID_TAG	IS	1	- bag ID that the file belongs to

7.1.12 Significant Elements in Received Mammography CAD SR

McKesson Radiology™ 12.3 supports displaying information about CAD findings encoded in R2 and iCAD DICOM Mammography SR objects. This information can be graphical marks on related Digital Mammography images or textual information (e.g. Algorithm Name, Algorithm Version, and Number of Calcifications) about the findings. The types of CAD findings supported for display includes Density mass, Calcification Cluster and Mass with Calcifications. CAD Processing status indicates whether the CAD detection algorithms succeeded and if there are any findings is also supported for display. McKesson Radiology™ 12.3 can display the Mammography Breast Density data such as Volume of fibroglandular tissue, Volume of Breast, and percentage of fibroglandular tissue encoded in R2, iCAD, VuCOMP and Volpara DICOM Mammography SR objects. In addition, McKesson Radiology™ 12.3 can also display a Breast Density Score to categorize the breast as almost entirely fat, having scattered fibroglandular tissue, being heterogeneously dense, or as extremely dense. Support for CAD SR is available only for Digital Mammography images and other types of CAD SR, such as CAD SR for Chest X-Rays, are not supported.

Table 262 lists the templates and their content items in the Mammography CAD SR instances that are supported by McKesson Radiology™ 12.3.

Table 262: Supported Content Items in Mammography CAD SR Instances

Template	Rows	Expected Value
TID 4000, Mammography CAD Document Root	1,3,4,5,6,8	See Table 263 TID 4000
TID 4001, Mammography CAD Overall Impression/Recommendation	1,2,3	See Table 264 TID 4001
TID 4003, Mammography CAD Individual Impression/Recommendation	1,2,3,4,5	See Table 266 TID 4003
TID 4004, Mammography CAD Composite Feature	1,2,5,6	See Table 267 TID 4004
TID 4005 Mammography CAD Composite Feature Body	1,2	See Table 268 TID 4005
TID 4006, Mammography CAD Single Image Finding	1,2,5,6,7,8,12-14	See Table 269 TID 4006
TID 4007 Mammography CAD Breast Composition Template	1,2	See Table 270 TID 4007
TID 4015, CAD Detections Performed	1	See Table 271 TID 4015
TID 4016, CAD Analyses Performed	1	See Table 272 TID 4016
TID 4020, CAD Image Library Entry	1	See Table 273 TID 4020

Template	Rows	Expected Value
TID 4021, Mammography CAD Geometry	1-4	See Table 274 TID 4021
Volpara Private Elements for Volpara Breast Density Score	1-2	See Table 275

Table 263 TID 4000 Mammography CAD Document Root

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint	Usage
1			CONTAINER	EV(111036, DCM, "Mammography CAD Report")	1	M			**Supported**
2	>	HAS CONCEPT MOD	INCLUDE	DTID (1204) Language of Content Item and Descendants	1	M			**Not Supported** Hard code for English.
3	>	CONTAINS	CONTAINER	EV(111028, DCM, "Image Library")	1	M			**Supported**
4	>>	CONTAINS	INCLUDE	DTID (4020) CAD Image Library Entry	1-n	M		$ImageLaterality = DCID (6022) Side, $ImageView = DCID (4014) View for Mammography, $ImageViewMod = DCID (4015) View Modifier for Mammography	**Supported** Support the Referenced SOP Sequence containing the Referenced SOP Class UID and Referenced SOP Instance UID for display. Other observations related to the image are parsed but not used for display. E.g. Image Laterality, Patient Orientation.
5	>	CONTAINS	INCLUDE	DTID (4001) Mammography CAD Overall Impression / Recommendation"	1	M			**Supported**
6	>	CONTAINS	CODE	EV(111064, DCM, "Summary of Detections")	1	M		DCID (6042) Status of Results	**Supported**
7	>>	INFERRED FROM	INCLUDE	DTID (4015) CAD Detections Performed	1	MC	Shall be present unless the value of (111064, DCM, "Summary of Detections") is (111225, DCM, "Not	$DetectionCode = DCID (6014) Mammography Single Image Finding	**Not Supported** McKesson Radiology™ 12.3 does not use this information**.**

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	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint	Usage
							Attempted")		
8	>	CONTAINS	CODE	EV(111065, DCM, "Summary of Analyses")	1	M		DCID (6042) "Status of Results"	**Supported**
9	>>	INFERRED FROM	INCLUDE	DTID (4016) CAD Analyses Performed	1	MC	Shall be present unless the value of (111065, DCM, "Summary of Analyses") is (111225, DCM, "Not Attempted")	$AnalysisCode = DCID (6043) Types of Mammography CAD Analysis	**Not Supported** McKesson Radiology™ 12.3 does not use this information

Table 264 TID 4001 Mammography CAD Overall Impression/Recommendation

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint	Usage
1			CODE	EV (111017, DCM, "CAD Processing and Findings Summary")	1	M		DCID (6047) CAD Processing and Findings Summary	**Supported**
2	>	HAS PROPERTIES	INCLUDE	DTID (4002) Mammography CAD Impression/Recommendation Body"	1	U			**Supported** Only for McKesson Radiology™ 12.3, rows 12-13 of TID 4002
3	>	INFERRED FROM	INCLUDE	DTID (4003) Mammography CAD Individual Impression/Recommendation	1-n	MC	Shall be present if 1 or more (111059, DCM, "Single Image Finding") or (111015, DCM, "Composite Feature") content items are reported.		**Supported**

Table 265 TID 4002 Mammography CAD Impression/Recommendation Body

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint	Usage
12			NUM	DCID (6142) Calculated Value	1-n	U			**Supported** Some breast density measurements from R2 uses

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint	Usage
									their own 99R2TECH coding scheme. **iCAD and Volpara, VuCOMP** - 112191, DCM, 'Breast tissue density - 112192, DCM, 'Volume of parenchymal tissue' - 112193, DCM, 'Volume of breast **R2 5.x:** - 112193, DCM, 'Volume of breast - R2cn015, 99R2TECH,'Volume of fibroglandular tissue = 112192, DCM, 'Volume of parenchymal tissue' - R2cn016, 99R2TECH, 'Percentage of fibroglandular tissue') = 112191, DCM, 'Breast tissue density **R2 Quantra:** - R2cn018, 99R2TECH,'VFG Volume of fibroglandular tissue = 112192, DCM, 'Volume of parenchymal tissue' - R2cn019, 99R2TECH, 'Vbd:Volumetric breast density tissue') = 112191, DCM, 'Breast tissue density - R2cn020, 99R2TECH, 'Vbd:Volumetric breast density tissue') = 112193, DCM, 'Volume of breast - R2cn027, 99R2TECH, 'Q_abd:Quartile area breast density (integral)')
13	>	HAS CONCEPT MOD	CODE	EV (G-C171, SRT, "Laterality")	1	U		DCID (6022) Side	

Table 266 TID 4003 Mammography CAD Individual Impression/Recommendation

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint	
1			CONTAINER	EV (111034, DCM, "Individual Impression/ Recommendation")	1	M			**Supported**
2	>	HAS CONCEPT MOD	CODE	EV (111056, DCM, "Rendering Intent")	1	M		DCID (6034) Intended Use of CAD Output	**Supported** Only display as tooltips information about CAD marks not interpreted for intended use of CAD Output.
3	>	CONTAINS	INCLUDE	DTID (4002) Mammography CAD Impression / Recommendation Body	1	U			**Not Supported**
4	>	CONTAINS	INCLUDE	DTID (4004) Mammography CAD Composite Feature	1-n	MC	At least one of rows 4, 5 shall be present.		**Supported**
5	>	CONTAINS	INCLUDE	DTID (4006) Mammography CAD Single Image Finding	1-n	MC	At least one of rows 4, 5 shall be present.		**Supported**

Table 267 TID 4004 Mammography CAD Composite Feature

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint	Usage
1			CODE	EV (111015, DCM, "Composite Feature")	1	M		DCID (6016) Mammography Composite Feature	**Supported** Only (DCM 111459 Mass with calcifications)
2	>	HAS CONCEPT MOD	CODE	EV (111056, DCM, "Rendering Intent")	1	M		DCID (6034) Intended Use of CAD Output	**Supported** Only display as tooltips information about CAD marks. Not interpreted for intended use of CAD Output
3	>	HAS OBS CONTEXT	INCLUDE	DTID (4108) Tracking Identifier	1	U			**Not Supported**
4	>	HAS PROPERTIES	INCLUDE	DTID (4005) Mammography CAD Composite Feature Body	1	M			**Supported** McKesson can display the Marks that are spatially related and on only one of the images from R2

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint	Usage
5	>	INFERRED FROM	INCLUDE	DTID (4004) Mammography CAD Composite Feature	1-n	MC	At least two items shall be present: two of row 5, two of row 6, or one of each.		**Not Supported**
6	>	INFERRED FROM	INCLUDE	DTID (4006) Mammography CAD Single Image Finding	1-n	MC	At least two items shall be present: two of row 5, two of row 6, or one of each.		**Supported**
7	>	HAS OBS CONTEXT	INCLUDE	DTID (4022) CAD Observation Context	1	MC	Shall be present only if this feature is incorporated from a different report than its parent.		**Not Supported**

Table 268 TID 4005 Mammography CAD Composite Feature Body

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint	Usage
1			CODE	EV (111016, DCM, "Composite type")	1	M		DCID (6035) Composite Feature Relations. The value shall be (111154, DCM, "Target content items are related spatially")	**Supported** From R2: (111154, DCM, 'Target content items are related spatially')
2			CODE	EV (111057, DCM, "Scope of Feature")	1	M		DCID (6036) Scope of Feature	**Supported** From R2: (111157, DCM, 'Feature detected on only one of the images')

Table 269 TID 4006 Mammography CAD Single Image Finding

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint	Usage
1			CODE	EV (111059, DCM, "Single Image Finding")	1	M		DCID (6014) Mammography Single Image Finding	**Supported** SRT F-01796 Mammographic breast density SRT F-01776 Individual Calcification SRT F-01775 Calcification Cluster
2	>	HAS CONCEPT MOD	CODE	EV (111056, DCM, "Rendering Intent")	1	M		DCID (6034) Intended Use of CAD Output	**Supported** Only display as tooltips information about CAD marks. Not interpreted for intended use of CAD Output.
3	>>	HAS PROPERTIES	NUM	EV (111071, DCM, "CAD Operating Point")	1	UC	IFF value of row 2 is (111151, DCM, "Presentation Optional") and row 9 of TID 4017 is present	UNITS = DT ({1:n}, UCUM, "range: 1:n"), where n is the maximum specified in Row 9 of TID 4017. Value is restricted to being an integer	**Not Supported**
4	>	HAS OBS CONTEXT	INCLUDE	DTID (4108) Tracking Identifier	1	U			**Not Support**
5	>	HAS PROPERTIES	INCLUDE	DTID (4019) CAD Algorithm Identification	1	M			**Supported** Display as tooltips information about CAD marks
6	>	HAS PROPERTIES	NUM	EV(111012, DCM, "Certainty of Finding")	1	U		UNITS = EV(%, UCUM, "Percent") Value = 0 – 100	**Supported** Display as tooltips information about CAD marks if available
7	>	HAS PROPERTIES	NUM	EV (111047, DCM, "Probability of cancer")	1	UC	May be present unless value of parent is (F-01710,SRT, "Breast composition"), (111100, DCM,	UNITS = EV(%, UCUM, "Percent") Value = 0 – 100	**Not Supported**

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint	Usage
							"Breast geometry"), (T-04100, SRT, "Nipple"), (111099, DCM, "Selected region"), (111101, DCM, "Image quality") or (111102, DCM, "Non-lesion")		
8	>	HAS PROPERTIES	INCLUDE	DTID (4021) Mammography CAD Geometry	1	MC	Shall be present unless value of parent is (F-01710,SRT, "Breast composition"), (111100, DCM, "Breast geometry") or (111101, DCM, "Image quality")		**Supported** Rows 1-4 of DTID (4021)
9	>	HAS PROPERTIES	INCLUDE	DTID (4007) Mammography CAD Breast Composition	1	MC	Shall be present only if value of parent is (F-01710,SRT, "Breast composition")		**Supported**
10	>	R-INFERRED FROM	CODE		1-n	UC	May be present only if value of parent is (F-01710,SRT, "Breast composition")	Shall reference a (111059, DCM, "Single Image Finding") of value: EV (111100, DCM, "Breast geometry")	**Not Supported**
11	>	HAS PROPERTIES	INCLUDE	DTID (4008) Mammography CAD Breast Geometry	1	MC	Shall be present only if value of parent is (111100, DCM, "Breast geometry")		**Not Supported**
12	>	HAS PROPERTIES	INCLUDE	DTID (4009) Mammography CAD Individual Calcification	1	UC	May be present only if value of parent is (F-01776,SRT, "Individual Calcification")		**Supported**
13	>	HAS PROPERTIES	INCLUDE	DTID (4010) Mammography CAD Calcification Cluster	1	UC	May be present only if value of parent is (F-01775,SRT, "Calcification Cluster")		**Supported**

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint	Usage
14	>	HAS PROPERTIES	INCLUDE	DTID (4011) Mammography CAD Density	1	UC	May be present only if value of parent is (F-01796,SRT,"Mammography breast density")		**Supported**
15	>	HAS PROPERTIES	CODE	EV (111297,DCM, "Nipple Characteristic")	1	UC	May be present only if value of parent is (T-04100, SRT, "Nipple")	DCID (6039) Nipple Characteristic	**Not Supported**
16	>	HAS PROPERTIES	INCLUDE	DTID (4012) Mammography CAD Non-Lesion	1	MC	Shall be present only if value of parent is (111102, DCM, "Non-lesion")		**Not Supported**
17	>	HAS PROPERTIES	INCLUDE	DTID (4013) Mammography CAD Selected Region	1	MC	Shall be present only if value of parent is (111099, DCM, "Selected Region")		**Not Supported**
18	>	R-INFERRED FROM	IMAGE		1	MC	IF value of parent is (111101, DCM, "Image quality") and IFF row 19 is not present	Shall reference an IMAGE content item in the (111028, DCM, "Image Library")	**Not Supported**
19	>	HAS PROPERTIES	SCOORD	EV (111030, DCM, "Image Region")	1-n	MC	IF value of parent is (111101, DCM, "Image quality") and IFF row 18 is not present		**Not Supported**
20	>>	R-SELECTED FROM	IMAGE		1	M		All the (111030, DCM, "Image Region") content items in a single invocation of this template shall reference the same IMAGE content item in the (111028, DCM, "Image Library")	**Not Supported**
21	>	HAS PROPERTIES	INCLUDE	DTID (4014) CAD Image Quality	1-n	MC	Shall be present only if value of parent is (111101, DCM, "Image quality")	$QualityFinding = DCID (6041) "Mammography Image Quality Finding", $QualityStandard = DCID (6045) "Mammography Types of Quality Control Standard"	**Not Supported**

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	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint	Usage
22	>	HAS PROPERTIES	NUM	DCID (6142) Calculated Value	1-n	U			**Not Supported**
23	>>	HAS CONCEPT MOD	CODE	EV (121401, DCM, "Derivation")	1	M		DCID (6140) Calculation Methods	**Not Supported**
24	>>	INFERRED FROM	TEXT	EV (112034, DCM, "Calculation Description")	1	U			**Not Supported**
25	>	INFERRED FROM	INCLUDE	DTID (4006) Mammography CAD Single Image Finding	1-n	UC	May be present only if value of parent is (F-01775,SRT, "Calcification Cluster")	EV (F-01776,SRT, "Individual Calcification")	**Supported**
26	>	HAS OBS CONTEXT	INCLUDE	DTID (4022) CAD Observation Context	1	MC	Shall be present only if this finding is incorporated from a different report than its parent.		**Not Supported**

Table 270 TID 4007 Mammography CAD Breast Composition Template

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint	Usage
1			CODE	EV (F-01710,SRT, "Breast composition")	1	MC	At least one of row 1 or 2 shall be present	DCID (6000) Overall Breast Composition	Supported For R2, iCAD and VuCOMP For Volpara, the vendor will send the Volpara Density Grade in private attribute in Table 275
2			NUM	EV (111046, DCM, "Percent Fibroglandular Tissue")	1	MC	At least one of row 1 or 2 shall be present	UNITS = EV (%, UCUM, "Percent") Value = 0 – 100	Supported

Table 271 TID 4015 CAD Detections Performed

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint	Usage
1			CONTAINER	EV(111063, DCM, "Successful Detections")	1	MC	Shall be present only if value of parent is (111222, DCM, "Succeeded") or (111223, DCM, "Partially Succeeded")		**Supported**
2	>	CONTAINS	INCLUDE	DTID (4017) CAD Detection Performed	1-n	M		$DetectionCode = $DetectionCode	**Not Supported**
3			CONTAINER	EV(111025, DCM, "Failed Detections")	1	MC	Shall be present only if value of parent is (111224, DCM, "Failed") or (111223, DCM, "Partially Succeeded")		**Not Supported**
4	>	CONTAINS	INCLUDE	DTID (4017) CAD Detection Performed	1-n	M		$DetectionCode = $DetectionCode	**Not Supported**

Table 272 TID 4016 CAD Analyses Performed

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint	Usage
1			CONTAINER	EV(111062, DCM, "Successful Analyses")	1	MC	Shall be present only if value of parent is (111222, DCM, "Succeeded") or (111223, DCM, "Partially Succeeded")		Supported
2	>	CONTAINS	INCLUDE	DTID (4018) CAD Analysis Performed	1-n	M		$AnalysisCode=$AnalysisCode	Not Supported
3			CONTAINER	EV(111024, DCM, "Failed Analyses")	1	MC	Shall be present only if value of parent is (111224, DCM, "Failed") or (111223, DCM, "Partially Succeeded")		Not Supported
4	>	CONTAINS	INCLUDE	DTID (4018) CAD Analysis Performed	1-n	M		$AnalysisCode=$AnalysisCode	Not Supported

Table 273 TID 4020 CAD Image Library Entry

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint	Usage
1			IMAGE		1	M			**Supported** Used the Referenced SO P Sequence containing the Referenced SOP Class UID and Referenced SOP Instance UID for display. Other observations related to the image are parsed but not used for display. E.g. Image Laterality, Patient Orientation.
2	>	HAS ACQ CONTEXT	CODE	EV(111027, DCM, "Image Laterality")	1	MC	Shall be present if (0020,0062) is in the Image Instance	$ImageLaterality	**Not Supported**
3	>	HAS ACQ CONTEXT	CODE	EV (111031, DCM, "Image View")	1	MC	Shall be present if (0054,0220) is in the Image Instance	$ImageView	**Not Supported**
4	>>	HAS CONCEPT MOD	CODE	EV (111032, DCM, "Image View Modifier")	1-n	MC	Shall be present if (0054,0222) is in the Image Instance	$ImageViewMod	**Not Supported**
5	>	HAS ACQ CONTEXT	TEXT	EV (111044, DCM, "Patient Orientation Row")	1	MC	Shall be present if (0020,0020) is in the Image Instance		**Not Supported**
6	>	HAS ACQ CONTEXT	TEXT	EV (111043, DCM, "Patient Orientation Column")	1	MC	Shall be present if (0020,0020) is in the Image Instance		**Not Supported**
7	>	HAS ACQ CONTEXT	DATE	EV (111060, DCM, "Study Date")	1	MC	Shall be present if (0008,0020) is in the		**Not Supported**

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint	Usage
							Image Instance		
8	>	HAS ACQ CONTEXT	TIME	EV (111061, DCM, "Study Time")	1	MC	Shall be present if (0008,0030) is in the Image Instance		**Not Supported**
9	>	HAS ACQ CONTEXT	DATE	EV (111018, DCM, "Content Date")	1	MC	Shall be present if (0008,0023) is in the Image Instance		**Not Supported**
10	>	HAS ACQ CONTEXT	TIME	EV (111019, DCM, "Content Time")	1	MC	Shall be present if (0008,0033) is in the Image Instance		**Not Supported**
11	>	HAS ACQ CONTEXT	NUM	EV (111026, DCM, "Horizontal Pixel Spacing")	1	MC	Shall be present if (0018,1164) or (0028,0030) is in the Image Instance	UNITS = EV (um, UCUM, "micrometer")	**Not Supported**
12	>	HAS ACQ CONTEXT	NUM	EV (111066, DCM, "Vertical Pixel Spacing")	1	MC	Shall be present if (0018,1164) or (0028,0030) is in the Image Instance	UNITS = EV (um, UCUM, "micrometer")	**Not Supported**
13	>	HAS ACQ CONTEXT	NUM	EV (112011, DCM, "Positioner Primary Angle")	1	UC	May be present if (0018,1510) is in the Image Instance		**Not Supported**
14	>	HAS ACQ CONTEXT	NUM	EV (112012, DCM, "Positioner Secondary Angle")	1	UC	May be present if (0018,1511) is in the Image Instance		**Not Supported**

Table 274 TID 4021 Mammography CAD Geometry

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint	Usage
1			SCOORD	EV(111010, DCM, "Center")	1	M		GRAPHIC TYPE = {POINT}	**Supported**
2	>	R-SELECTED FROM	IMAGE		1	M		Shall reference an IMAGE content item in the (111028, DCM, "Image Library")	**Supported**
3			SCOORD	EV(111041, DCM, "Outline")	1	U			**Supported**
4	>	R-SELECTED FROM	IMAGE		1	M		Shall reference the same content item as row 2	**Supported**
5			SCOORD	DCID (6166) CAD Geometry Secondary Graphical Representation	1-n	U			**Not Supported**
6	>	R-SELECTED FROM	IMAGE		1	M		Shall reference the same content item as row 2	**Not Supported**

Table 275: Private Elements for Volpara Breast Density Score

Tag ID	Attribute Name	VR	VM	Significance	Usage
(0015,0010)	Private Creator ID	LO	1	- The Private Creator ID "MATAKINA_10" for Volpara Breast Density score".	**Supported**
(0015,1028)	Volpara Density Grade	LO	1	- (Volpara Density Grade; VDG) from Volpara automated volumetric breast density assessment system.	**Supported**

Table 276: Context ID 6000

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
Include CID 6001		

Table 277: Context ID 6001

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
SRT	F-01711	Almost entirely fat
SRT	F-01712	Scattered fibroglandular densities
SRT	F-01713	Heterogeneously dense
SRT	F-01714	Extremely dense

8   Approvers

Note: Formal approval of this document is done via electronic signature(s) in MasterControl.

Rostislav Boguslavsky	Date
Director, Software Architecture	

Elliot Silver	Date
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