# RADSpa+

# DICOM Conformance Statement

**Version 1.0**

**Nov 2025**

## Contents

# 1. INTRODUCTION

## *1.1. Scope and Field of Application*

This document is the DICOM conformance statement for the RADSpa+ software developed by Telerad Tech Pvt. Ltd. This document contains details on how various components of the software interfaces with other devices and applications that conform to the DICOM 3.0 standard. This document is meant for users involved in system design and system integration. It is assumed that the user is familiar with the DICOM standard and related concepts.

This document provides the conformance for the below components part of the RADSpa+ platform:

- RADSpa+ PACS Server: Receives and stores the images acquired on the modality and allows these to be retrieved at a later time. Supports DIMSE operations and DICOMweb operations.
- JViewer+: A DICOM image viewing application integrated with the RADSpa+ platform. It can also be used as a standalone component.

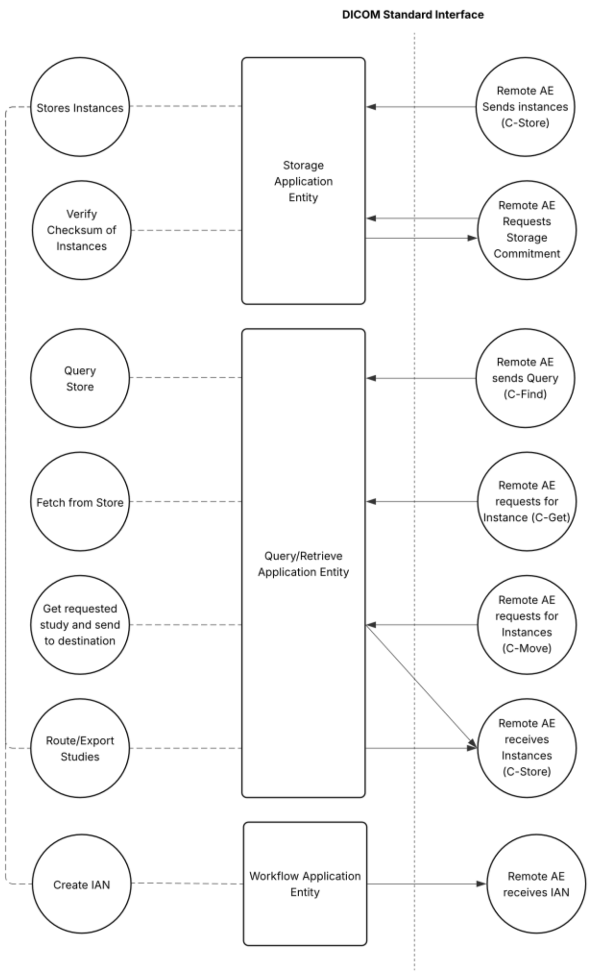
## *1.2.* References and Definitions

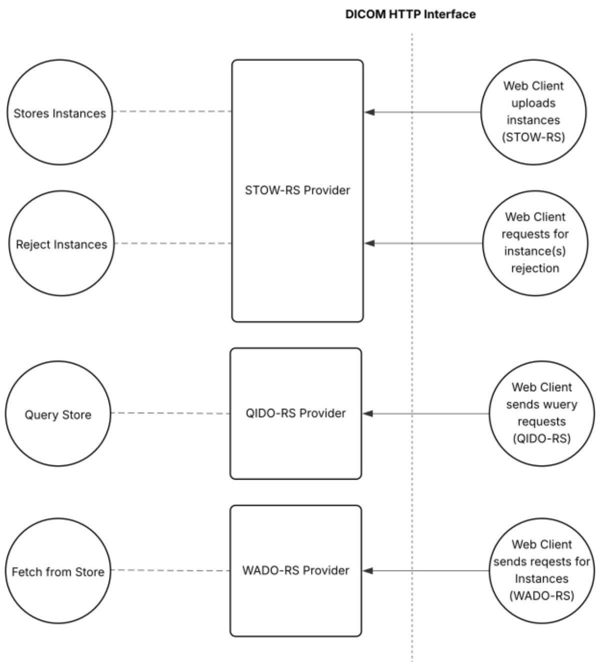
All definitions have been taken from the Digital Imaging and Communications in Medicine (DICOM) standard, parts 1 through 18.

# 2. IMPLEMENTATION MODEL

## 2.1. Application Data Flow Diagram

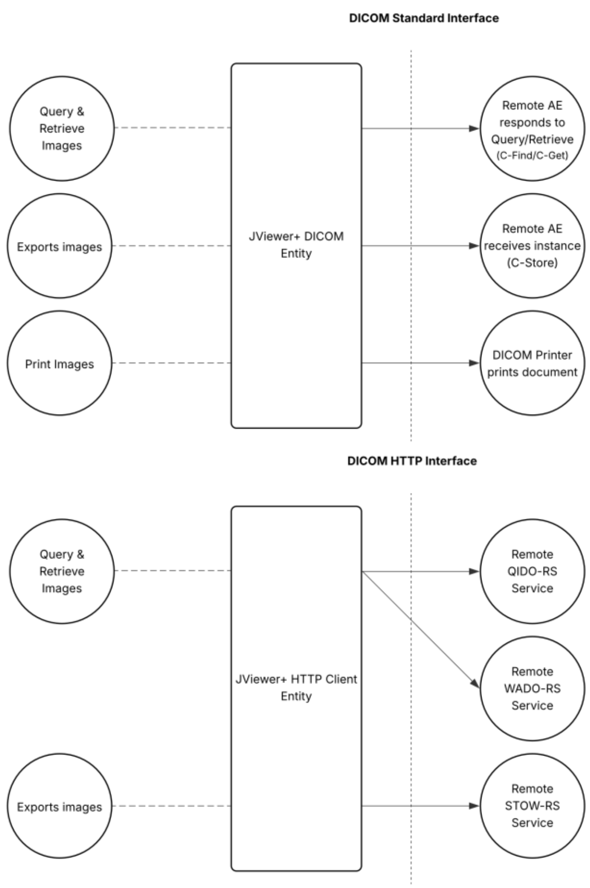
Data flow for the RADSpa+ PACS Server is shown below. The flow diagram depicts the RADSpa+ PACS Server divided into logical AEs segregated by the functionality provided. The flow is also further segregated by the nature of interface (TCP and HTTP).






The RADSpa+ server is deployed as a container-based application and it can be deployed on any OS supporting containerized deployments.

Data flow for the JViewer+ application, which is primarily a DICOM Viewer is as below. The flow diagram is segregated logically based on the nature of interfaces (TCP and HTTP)




## *2.2. Functional Definitions of Application Entities*

### 2.2.1. *Storage Application Entity*

Storage application entity receives DICOM images from other AEs. Below are a few key aspects supported by the storage application entity:

The accepted transfer syntaxes are pre-configured.

It allows for configuration of the compression rules which would be applied while storing the images received.

Auto routing rules can also be configured along with any need for modifying the DICOM attributes prior to routing to other AEs.

Retention period for the images can also be defined.

Upon storage of the images, the system would trigger Instance Availability Notifications to the configured SCPs.

### 2.2.2. *Query/Retrieve Application Entity*

Query/Retrieve Application Entity provides the ability to support queries on study, series or instances based on pre-defined set DICOM attributes of the received images. It also enables retrieval of instances.

### 2.2.3. *Workflow Application Entity*

Workflow Application Entity provides the ability to notify availability of images through IAN messages to any of the configured AEs.

### 2.2.4. *STOW-RS Provider*

Provides the ability to receive studies, series or instances over a HTTP protocol through a RESTFul web service. This also supports the same abilities as mentioned above the Storage Application Entity for.

### 2.2.5. *QIDO-RS Provider*

Provides the ability to query studies, series or instances over a HTTP protocol through a RESTFul web service.

### 2.2.6. *WADO-RS Provider*

Provides the ability to retrieve DICOM instances over a HTTP protocol through a RESTFul web service.

### 2.2.7. *JViewer+ DICOM Entity*

Provides the ability to configure remote AEs as DICOM nodes on which query, retrieve and load images can be triggered in the viewer using the various DIMSE operations – C-FIND, C-GET. The application allows users to export and store images, with additional presentation state, KO etc. on remote AEs using C-STORE. It also provides ability to print images.

### 2.2.8. *JViewer+ HTTP Client Entity*

In addition to the ability to find/load images in the viewer using DIMSE operations, the application supports the same abilities using DICOMWeb operations too (QIDO-RS, WADO-RS and STOW-RS).

## *2.3. Sequencing of Real World activities*

This would be detailed in subsequent version of the document.

# 3. APPLICATION ENTITY SPECIFICATIONS

## *3.1.* Storage Application Entity Specifications

### 3.1.1. SOP Classes

Storage Application Entity in the RADSpa+ PACS server provides conformance to the below pre-configured SOP classes.

*Table 1 - SOP Classes for Storage Application Entity*

| SOP Class Name | SOP Class UID | SCU | SCP |
|---|---|---|---|
| Verification SOP Class | 1.2.840.10008.1.1 | Yes | Yes |
| Storage Commitment Push Model SOP Class | 1.2.840.10008.1.20.1 | No | Yes |
| **Image Storage SOP Classes:** | | | |
| Computed Radiography Image Storage | 1.2.840.10008.5.1.4.1.1.1 | No | Yes |
| Digital X-Ray Image Storage - For Presentation | 1.2.840.10008.5.1.4.1.1.1.1 | No | Yes |
| Digital X-Ray Image Storage - For Processing | 1.2.840.10008.5.1.4.1.1.1.1.1 | No | Yes |
| Digital Mammography X-Ray Image Storage - For Presentation | 1.2.840.10008.5.1.4.1.1.1.2 | No | Yes |
| Digital Mammography X-Ray Image Storage - For Processing | 1.2.840.10008.5.1.4.1.1.1.2.1 | No | Yes |
| Digital Intra-Oral X-Ray Image Storage - For Presentation | 1.2.840.10008.5.1.4.1.1.1.3 | No | Yes |
| Digital Intra-Oral X-Ray Image Storage - For Processing | 1.2.840.10008.5.1.4.1.1.1.3.1 | No | Yes |
| CT Image Storage | 1.2.840.10008.5.1.4.1.1.2 | No | Yes |
| Enhanced CT Image Storage | 1.2.840.10008.5.1.4.1.1.2.1 | No | Yes |
| Ultrasound Multi-frame Image Storage (Retired) | 1.2.840.10008.5.1.4.1.1.3 | No | Yes |
| Ultrasound Multi-frame Image Storage | 1.2.840.10008.5.1.4.1.1.3.1 | No | Yes |
| MR Image Storage | 1.2.840.10008.5.1.4.1.1.4 | No | Yes |
| Enhanced MR Image Storage | 1.2.840.10008.5.1.4.1.1.4.1 | No | Yes |
| Nuclear Medicine Image Storage (Retired) | 1.2.840.10008.5.1.4.1.1.5 | No | Yes |

| | | | |
|---|---|---|---|
| Ultrasound Image Storage (Retired) | 1.2.840.10008.5.1.4.1.1.6 | No | Yes |
| Ultrasound Image Storage | 1.2.840.10008.5.1.4.1.1.6.1 | No | Yes |
| Enhanced US Volume Storage | 1.2.840.10008.5.1.4.1.1.6.2 | No | Yes |
| Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7 | No | Yes |
| Multi-frame Grayscale Byte Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.2 | No | Yes |
| Multi-frame Grayscale Word Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.3 | No | Yes |
| Multi-frame True Color Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.4 | No | Yes |
| X-Ray Angiographic Image Storage | 1.2.840.10008.5.1.4.1.1.12.1 | No | Yes |
| Enhanced XA Image Storage | 1.2.840.10008.5.1.4.1.1.12.1.1 | No | Yes |
| X-Ray Radiofluoroscopic Image Storage | 1.2.840.10008.5.1.4.1.1.12.2 | No | Yes |
| Enhanced XRF Image Storage | 1.2.840.10008.5.1.4.1.1.12.2.1 | No | Yes |
| X-Ray Angiographic Bi-Plane Image Storage (Retired) | 1.2.840.10008.5.1.4.1.1.12.3 | No | Yes |
| X-Ray 3D Angiographic Image Storage | 1.2.840.10008.5.1.4.1.1.13.1.1 | No | Yes |
| X-Ray 3D Craniofacial Image Storage | 1.2.840.10008.5.1.4.1.1.13.1.2 | No | Yes |
| Breast Tomosynthesis Image Storage | 1.2.840.10008.5.1.4.1.1.13.1.3 | No | Yes |
| Nuclear Medicine Image Storage | 1.2.840.10008.5.1.4.1.1.20 | No | Yes |
| VL Endoscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.1 | No | Yes |
| VL Microscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.2 | No | Yes |
| VL Photographic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.4 | No | Yes |
| Ophthalmic Photography 8 Bit Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.1 | No | Yes |
| Ophthalmic Photography 16 Bit Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.2 | No | Yes |
| Ophthalmic Tomography Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.4 | No | Yes |
| Positron Emission Tomography Image Storage | 1.2.840.10008.5.1.4.1.1.128 | No | Yes |
| Enhanced PET Image Storage | 1.2.840.10008.5.1.4.1.1.130 | No | Yes |
| RT Image Storage | 1.2.840.10008.5.1.4.1.1.481.1 | No | Yes |

| | | | |
|---|---|---|---|
| **Video Storage SOP Classes:** | | | |
| Video Endoscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.1.1 | No | Yes |
| **Structured Report Storage SOP Classes:** | | | |
| Basic Text SR Storage | 1.2.840.10008.5.1.4.1.1.88.11 | No | Yes |
| Enhanced SR Storage | 1.2.840.10008.5.1.4.1.1.88.22 | No | Yes |
| Comprehensive SR Storage | 1.2.840.10008.5.1.4.1.1.88.33 | No | Yes |
| Procedure Log Storage | 1.2.840.10008.5.1.4.1.1.88.40 | No | Yes |
| Mammography CAD SR Storage | 1.2.840.10008.5.1.4.1.1.88.50 | No | Yes |
| Key Object Selection Document Storage | 1.2.840.10008.5.1.4.1.1.88.59 | No | Yes |
| Chest CAD SR Storage | 1.2.840.10008.5.1.4.1.1.88.65 | No | Yes |
| X-Ray Radiation Dose SR Storage | 1.2.840.10008.5.1.4.1.1.88.67 | No | Yes |
| **Other Storage SOP Classes:** | | | |
| MR Spectroscopy Storage | 1.2.840.10008.5.1.4.1.1.4.2 | No | Yes |
| 12-lead ECG Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.1.1 | No | Yes |
| General ECG Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.1.2 | No | Yes |
| Ambulatory ECG Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.1.3 | No | Yes |
| Cardiac Electrophysiology Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.3.1 | No | Yes |
| Basic Voice Audio Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.4.1 | No | Yes |
| Grayscale Softcopy Presentation State Storage SOP Class | 1.2.840.10008.5.1.4.1.1.11.1 | No | Yes |
| Color Softcopy Presentation State Storage SOP Class | 1.2.840.10008.5.1.4.1.1.11.2 | No | Yes |
| Pseudo-Color Softcopy Presentation State Storage SOP Class | 1.2.840.10008.5.1.4.1.1.11.3 | No | Yes |
| Blending Softcopy Presentation State Storage SOP Class | 1.2.840.10008.5.1.4.1.1.11.4 | No | Yes |
| Raw Data Storage | 1.2.840.10008.5.1.4.1.1.66 | No | Yes |
| Spatial Registration Storage | 1.2.840.10008.5.1.4.1.1.66.1 | No | Yes |
| Encapsulated PDF Storage | 1.2.840.10008.5.1.4.1.1.104.1 | No | Yes |

| | | | |
|---|---|---|---|
| Standalone PET Curve Storage (Retired) | 1.2.840.10008.5.1.4.1.1.129 | No | Yes |
| RT Dose Storage | 1.2.840.10008.5.1.4.1.1.481.2 | No | Yes |
| RT Structure Set Storage | 1.2.840.10008.5.1.4.1.1.481.3 | No | Yes |
| RT Beams Treatment Record Storage | 1.2.840.10008.5.1.4.1.1.481.4 | No | Yes |
| RT Plan Storage | 1.2.840.10008.5.1.4.1.1.481.5 | No | Yes |
| RT Brachy Treatment Record Storage | 1.2.840.10008.5.1.4.1.1.481.6 | No | Yes |
| RT Treatment Summary Record Storage | 1.2.840.10008.5.1.4.1.1.481.7 | No | Yes |

## 3.1.2. Association establishment policies

### 3.1.2.1. General

RADSpa+ PACS server Storage Application Entity accepts association requests for the Verification, Storage, and Storage Commitment Push Model Services. It will propose Associations for the Storage Commitment Push Model Service only. Maximum accepted PDU size is 16KB

### 3.1.2.2. Number of associations

RADSpa+ PACS server Storage Application Entity supports multiple simultaneous Associations requested by external AEs. Maximum total number of simultaneous Associations accepted from an AEs is configurable but not limited by default. Storage Application Entity initiates up to 5 Associations at a time for sending Storage Commitment Push Model N-EVENT-REPORTs to AEs.

### 3.1.2.3. Asynchronous Nature

This is not supported currently.

### 3.1.2.4. Implementation identifying information

The implementation identifying information for the RADSpa+ Server is

**Implementation class UID:** <To be obtained from Telerad team>

**Commented [RS1]:** To get from Telerad team

## 3.1.3. Association Initiation Policy

### 3.1.3.1. Real world activity – Respond to Storage Commitment Requests

#### *3.1.3.1.1. Associated real world activity*

Storage Application Entity initiates an association with the remote AE, post verification of storage within the server and sends the Storage Commitment Notification over the association established. In case of any errors, the entity would retry for a configured number of times to resend the notification.

##### 3.1.3.1.2. *Proposed presentation contexts*

| Abstract Syntax | | Transfer Syntax | | Role | Ext. Neg. |
|---|---|---|---|---|---|
| **Name** | **UID** | **Name** | **UID** | | |
| Storage Commitment Push Model | 1.2.840.10008.1.20.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | None |

### 3.1.4. Association Acceptance Policy

#### 3.1.4.1. Real world activity – Receive images or storage commitment requests from remote AE

##### 3.1.4.1.1. *Associated real world activity*

When RADSpa+ Server receives association initiation request for a C-STORE operation or for storage commitment requests from remote AE, it accepts the request and establishes the association.

##### 3.1.4.1.2. *Accepted Presentation Contexts*

| Presentation Context Table | | | | | |
|---|---|---|---|---|---|
| **Abstract Syntax** | | **Transfer Syntax** | | **Role** | **Ext. Neg.** |
| **Name** | **UID** | **Name** | **UID** | | |
| Verification | 1.2.840.10008.1.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | None |
| Storage Commitment Push Model | 1.2.840.10008.1.20.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | None |
| Image Storage SOP Classes in SOP Classes for Storage Application Entity (SCP) | | See Transfer Syntax for Image Storage SOP Classes | | SCP | None |
| Video Storage SOP Classes in SOP Classes for Storage Application Entity (SCP) | | See Transfer Syntax for Video Storage SOP Classes | | SCP | None |
| SR Storage SOP Classes in SOP Classes for Storage Application Entity (SCP) | | See Transfer Syntaxes for SR Storage SOP Classes | | SCP | None |

| | | | |
|---|---|---|---|
| Other Storage SOP Classes in SOP Classes for Storage Application Entity (SCP) | See Transfer Syntaxes for Other Storage SOP Classes | SCP | None |

*Table 2 - Transfer Syntax for Image Storage SOP Classes*

| **Transfer Syntax Name** | **UID** |
|---|---|
| Implicit VR Little Endian | 1.2.840.10008.1.2 |
| Explicit VR Little Endian | 1.2.840.10008.1.2.1 |
| JPEG Baseline (Process 1) | 1.2.840.10008.1.2.4.50 |
| JPEG Extended (Process 2 & 4) | 1.2.840.10008.1.2.4.51 |
| JPEG Lossless, Non-Hierarchical (Process 14) | 1.2.840.10008.1.2.4.54 |
| JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14 [Selection Value 1]) | 1.2.840.10008.1.2.4.70 |
| JPEG-LS Lossless | 1.2.840.10008.1.2.4.80 |
| JPEG-LS Lossy (Near-Lossless) | 1.2.840.10008.1.2.4.81 |
| JPEG 2000 (Lossless Only) | 1.2.840.10008.1.2.4.90 |
| JPEG 2000 | 1.2.840.10008.1.2.4.91 |
| High-Throughput JPEG 2000 (Lossless Only) | 1.2.840.10008.1.2.4.201 |
| High-Throughput JPEG 2000 with RPCL (Lossless Only) | 1.2.840.10008.1.2.4.202 |
| High-Throughput JPEG 2000 | 1.2.840.10008.1.2.4.203 |
| RLE Lossless | 1.2.840.10008.1.2.5 |

*Table 3 - Transfer Syntax for Video Storage SOP Classes*

| **Transfer Syntax Name** | **UID** |
|---|---|
| JPEG Baseline (Process 1) | 1.2.840.10008.1.2.4.50 |
| MPEG2 Main Profile @ Main Level | 1.2.840.10008.1.2.4.100 |
| Fragmentable MPEG2 Main Profile @ Main Level | 1.2.840.10008.1.2.4.100.1 |
| MPEG2 Main Profile @ High Level | 1.2.840.10008.1.2.4.101 |
| Fragmentable MPEG2 Main Profile @ High Level | 1.2.840.10008.1.2.4.101.1 |
| MPEG-4 AVC/H.264 High Profile / Level 4.1 | 1.2.840.10008.1.2.4.102 |
| Fragmentable MPEG-4 AVC/H.264 High Profile / Level 4.1 | 1.2.840.10008.1.2.4.102.1 |
| MPEG-4 AVC/H.264 BD-compatible High Profile / Level 4.1 | 1.2.840.10008.1.2.4.103 |
| Fragmentable MPEG-4 AVC/H.264 BD-compatible High Profile / Level 4.1 | 1.2.840.10008.1.2.4.103.1 |

| | |
|---|---|
| MPEG-4 AVC/H.264 High Profile / Level 4.2 For 2D Video | 1.2.840.10008.1.2.4.104 |
| Fragmentable MPEG-4 AVC/H.264 High Profile / Level 4.2 For 2D Video | 1.2.840.10008.1.2.4.104.1 |
| MPEG-4 AVC/H.264 High Profile / Level 4.2 For 3D Video | 1.2.840.10008.1.2.4.105 |
| Fragmentable MPEG-4 AVC/H.264 High Profile / Level 4.2 For 3D Video | 1.2.840.10008.1.2.4.105.1 |
| MPEG-4 AVC/H.264 Stereo High Profile / Level 4.2 | 1.2.840.10008.1.2.4.106 |
| Fragmentable MPEG-4 AVC/H.264 Stereo High Profile / Level 4.2 | 1.2.840.10008.1.2.4.106.1 |
| HEVC/H.265 Main Profile / Level 5.1 | 1.2.840.10008.1.2.4.107 |
| HEVC/H.265 Main 10 Profile / Level 5.1 | 1.2.840.10008.1.2.4.108 |

*Table 4 - Transfer Syntaxes for SR Storage SOP Classes*

| Transfer Syntax Name | UID |
|---|---|
| Implicit VR Little Endian | 1.2.840.10008.1.2 |
| Explicit VR Little Endian | 1.2.840.10008.1.2.1 |
| Deflated Explicit VR Little Endian | 1.2.840.10008.1.2.1.99 |

*Table 5 - Transfer Syntaxes for Other Storage SOP Classes*

| Transfer Syntax Name | UID |
|---|---|
| Implicit VR Little Endian | 1.2.840.10008.1.2 |
| Explicit VR Little Endian | 1.2.840.10008.1.2.1 |

## *3.2.* Query/Retrieve Application Entity

### 3.2.1. SOP Classes

Query/Retrieve application entity in the RADSpa+ PACS server provides conformance to the below pre-configured SOP classes.

*Table 6 - SOP Classes for Query/Retrieve Application Entity*

| SOP Class Name | SOP Class UID | SCU | SCP |
|---|---|---|---|
| Verification SOP Class | 1.2.840.10008.1.1 | Yes | Yes |

| | | | |
|---|---|---|---|
| Study Root Query/Retrieve Information Model - FIND | 1.2.840.10008.5.1.4.1.2.2.1 | No | Yes |
| Study Root Query/Retrieve Information Model – MOVE | 1.2.840.10008.5.1.4.1.2.2.2 | No | Yes |
| Study Root Query/Retrieve Information Model - GET | 1.2.840.10008.5.1.4.1.2.2.3 | No | Yes |
| Image Storage SOP Classes: | | | |
| Computed Radiography Image Storage | 1.2.840.10008.5.1.4.1.1.1 | Yes | No |
| Digital X-Ray Image Storage - For Presentation | 1.2.840.10008.5.1.4.1.1.1.1 | Yes | No |
| Digital X-Ray Image Storage - For Processing | 1.2.840.10008.5.1.4.1.1.1.1.1 | Yes | No |
| Digital Mammography X-Ray Image Storage - For Presentation | 1.2.840.10008.5.1.4.1.1.1.2 | Yes | No |
| Digital Mammography X-Ray Image Storage - For Processing | 1.2.840.10008.5.1.4.1.1.1.2.1 | Yes | No |
| Digital Intra-Oral X-Ray Image Storage - For Presentation | 1.2.840.10008.5.1.4.1.1.1.3 | Yes | No |
| Digital Intra-Oral X-Ray Image Storage - For Processing | 1.2.840.10008.5.1.4.1.1.1.3.1 | Yes | No |
| CT Image Storage | 1.2.840.10008.5.1.4.1.1.2 | Yes | No |
| Enhanced CT Image Storage | 1.2.840.10008.5.1.4.1.1.2.1 | Yes | No |
| Ultrasound Multi-frame Image Storage (Retired) | 1.2.840.10008.5.1.4.1.1.3 | Yes | No |
| Ultrasound Multi-frame Image Storage | 1.2.840.10008.5.1.4.1.1.3.1 | Yes | No |
| MR Image Storage | 1.2.840.10008.5.1.4.1.1.4 | Yes | No |
| Enhanced MR Image Storage | 1.2.840.10008.5.1.4.1.1.4.1 | Yes | No |
| Nuclear Medicine Image Storage (Retired) | 1.2.840.10008.5.1.4.1.1.5 | Yes | No |
| Ultrasound Image Storage (Retired) | 1.2.840.10008.5.1.4.1.1.6 | Yes | No |
| Ultrasound Image Storage | 1.2.840.10008.5.1.4.1.1.6.1 | Yes | No |
| Enhanced US Volume Storage | 1.2.840.10008.5.1.4.1.1.6.2 | Yes | No |
| Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7 | Yes | No |
| Multi-frame Grayscale Byte Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.2 | Yes | No |
| Multi-frame Grayscale Word Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.3 | Yes | No |
| Multi-frame True Color Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.4 | Yes | No |

| | | | |
|---|---|---|---|
| X-Ray Angiographic Image Storage | 1.2.840.10008.5.1.4.1.1.12.1 | Yes | No |
| Enhanced XA Image Storage | 1.2.840.10008.5.1.4.1.1.12.1.1 | Yes | No |
| X-Ray Radiofluoroscopic Image Storage | 1.2.840.10008.5.1.4.1.1.12.2 | Yes | No |
| Enhanced XRF Image Storage | 1.2.840.10008.5.1.4.1.1.12.2.1 | Yes | No |
| X-Ray Angiographic Bi-Plane Image Storage (Retired) | 1.2.840.10008.5.1.4.1.1.12.3 | Yes | No |
| X-Ray 3D Angiographic Image Storage | 1.2.840.10008.5.1.4.1.1.13.1.1 | Yes | No |
| X-Ray 3D Craniofacial Image Storage | 1.2.840.10008.5.1.4.1.1.13.1.2 | Yes | No |
| Breast Tomosynthesis Image Storage | 1.2.840.10008.5.1.4.1.1.13.1.3 | Yes | No |
| Nuclear Medicine Image Storage | 1.2.840.10008.5.1.4.1.1.20 | Yes | No |
| VL Endoscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.1 | Yes | No |
| VL Microscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.2 | Yes | No |
| VL Photographic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.4 | Yes | No |
| Ophthalmic Photography 8 Bit Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.1 | Yes | No |
| Ophthalmic Photography 16 Bit Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.2 | Yes | No |
| Ophthalmic Tomography Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.4 | Yes | No |
| Positron Emission Tomography Image Storage | 1.2.840.10008.5.1.4.1.1.128 | Yes | No |
| Enhanced PET Image Storage | 1.2.840.10008.5.1.4.1.1.130 | Yes | No |
| RT Image Storage | 1.2.840.10008.5.1.4.1.1.481.1 | Yes | No |
| Video Storage SOP Classes: | | | |
| Video Endoscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.1.1 | Yes | No |
| Structured Report Storage SOP Classes: | | | |
| Basic Text SR Storage | 1.2.840.10008.5.1.4.1.1.88.11 | Yes | No |
| Enhanced SR Storage | 1.2.840.10008.5.1.4.1.1.88.22 | Yes | No |
| Comprehensive SR Storage | 1.2.840.10008.5.1.4.1.1.88.33 | Yes | No |
| Procedure Log Storage | 1.2.840.10008.5.1.4.1.1.88.40 | Yes | No |
| Mammography CAD SR Storage | 1.2.840.10008.5.1.4.1.1.88.50 | Yes | No |
| Key Object Selection Document Storage | 1.2.840.10008.5.1.4.1.1.88.59 | Yes | No |
| Chest CAD SR Storage | 1.2.840.10008.5.1.4.1.1.88.65 | Yes | No |

| | | | |
|---|---|---|---|
| X-Ray Radiation Dose SR Storage | 1.2.840.10008.5.1.4.1.1.88.67 | Yes | No |
| Other Storage SOP Classes: | | | |
| MR Spectroscopy Storage | 1.2.840.10008.5.1.4.1.1.4.2 | Yes | No |
| 12-lead ECG Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.1.1 | Yes | No |
| General ECG Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.1.2 | Yes | No |
| Ambulatory ECG Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.1.3 | Yes | No |
| Cardiac Electrophysiology Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.3.1 | Yes | No |
| Basic Voice Audio Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.4.1 | Yes | No |
| Grayscale Softcopy Presentation State Storage SOP Class | 1.2.840.10008.5.1.4.1.1.11.1 | Yes | No |
| Color Softcopy Presentation State Storage SOP Class | 1.2.840.10008.5.1.4.1.1.11.2 | Yes | No |
| Pseudo-Color Softcopy Presentation State Storage SOP Class | 1.2.840.10008.5.1.4.1.1.11.3 | Yes | No |
| Blending Softcopy Presentation State Storage SOP Class | 1.2.840.10008.5.1.4.1.1.11.4 | Yes | No |
| Raw Data Storage | 1.2.840.10008.5.1.4.1.1.66 | Yes | No |
| Spatial Registration Storage | 1.2.840.10008.5.1.4.1.1.66.1 | Yes | No |
| Encapsulated PDF Storage | 1.2.840.10008.5.1.4.1.1.104.1 | Yes | No |
| Standalone PET Curve Storage (Retired) | 1.2.840.10008.5.1.4.1.1.129 | Yes | No |
| RT Dose Storage | 1.2.840.10008.5.1.4.1.1.481.2 | Yes | No |
| RT Structure Set Storage | 1.2.840.10008.5.1.4.1.1.481.3 | Yes | No |
| RT Beams Treatment Record Storage | 1.2.840.10008.5.1.4.1.1.481.4 | Yes | No |
| RT Plan Storage | 1.2.840.10008.5.1.4.1.1.481.5 | Yes | No |
| RT Brachy Treatment Record Storage | 1.2.840.10008.5.1.4.1.1.481.6 | Yes | No |
| RT Treatment Summary Record Storage | 1.2.840.10008.5.1.4.1.1.481.7 | Yes | No |

### 3.2.2. Association establishment policies

#### 3.2.2.1. Number Of Associations

RADSpa+ PACS server Query/Retrieve application entity supports multiple parallel associations from other AEs to perform operations like C-FIND, C-GET. As part of handling of the C-MOVE requests too, it supports initiation of multiple associations with the destination AEs.

### 3.2.3. Association Initiation Policy

#### 3.2.3.1. Real world activity – Remote AE requests for Instances or Rule based routing is initiated

##### *3.2.3.1.1. Associated real world activity*

RADSpa+ PACS server allows the other AEs to request for instances through C-MOVE, in which case the server would initiate association with the destination AE specified in the C-MOVE request.

Also, when the server receives instances, it validates against configured rules to determine if the instances have to be forwarded/routed to other configured AEs and in this scenario too the server would initiate association with the configured destination AE.

##### *3.2.3.1.2. Proposed Presentation Contexts*

| **Abstract Syntax** | | **Transfer Syntax** | | **Role** | **Ext. Neg.** |
|---|---|---|---|---|---|
| **Name** | **UID** | **Name** | **UID** | | |
| Verification | 1.2.840.10008.1.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| Image Storage SOP Class in SOP Classes for Query/Retrieve Application Entity | | See Transfer Syntax for Image Storage SOP Classes | | SCU | None |
| Video Storage SOP Class in SOP Classes for Query/Retrieve Application Entity | | See Transfer Syntax for Video Storage SOP Classes | | SCU | None |
| SR Storage SOP Class in SOP Classes for Query/Retrieve Application Entity | | See Transfer Syntaxes for SR Storage SOP Classes | | SCU | None |
| Other Storage SOP Class in SOP Classes for Query/Retrieve Application Entity | | See Transfer Syntaxes for Other Storage SOP Classes | | SCU | None |

### 3.2.4. Association Acceptance Policy

#### 3.2.4.1. Real world activity – Remote AE sends query/retrieve requests for instances

##### *3.2.4.1.1. Associated real world activity*

RADSpa+ PACS server accepts requests from other AEs querying for available instances through C-FIND and subsequently retrieve the instances using C-GET. The server also accepts requests to send instances through a C-MOVE request, and in response initiates new association to send instances through C-STORE as mentioned above.

#### *3.2.4.1.2. Accepted Presentation Contexts*

| **Presentation Context Table** | | | | | |
|---|---|---|---|---|---|
| **Abstract Syntax** | | **Transfer Syntax** | | **Role** | **Ext. Neg.** |
| **Name** | **UID** | **Name** | **UID** | | |
| Verification | 1.2.840.10008.1.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | None |
| Study Root Query/Retrieve Information Model - FIND | 1.2.840.10008.5.1.4.1.2.2.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | Relational |
| | | | | | Date Range |
| | | | | | Fuzzy |
| | | | | | Timezone |
| Study Root Query/Retrieve Information Model - MOVE | 1.2.840.10008.5.1.4.1.2.2.2 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | Relational |
| Study Root Query/Retrieve Information Model - GET | 1.2.840.10008.5.1.4.1.2.2.3 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | Relational |
| Image Storage SOP Class in SOP Classes for Query/Retrieve Application Entity (SCU) | | See Transfer Syntax for Image Storage SOP Classes | | SCU | None |
| Video Storage SOP Class in SOP Classes for Query/Retrieve Application Entity (SCU) | | See Transfer Syntax for Video Storage SOP Classes | | SCU | None |
| SR Storage SOP Class in SOP Classes for Query/Retrieve Application Entity (SCU) | | See Transfer Syntaxes for SR Storage SOP Classes | | SCU | None |
| Other Storage SOP Class in SOP Classes for Query/Retrieve Application Entity (SCU) | | See Transfer Syntaxes for Other Storage SOP Classes | | SCU | None |

#### *3.2.4.1.3. SOP specific conformance statement for SOP query class*

All required (R) and Unique (U) study and series level keys are supported for Study Root information model. The following table indicates the supported keys.

| Level | Description | Tag | Support |
|---|---|---|---|
| STUDY | Patient ID | (0010, 0020) | S,*,U |
| | Patient Name | (0010, 0010) | S,*,U |
| | Patient Sex | (0010, 0040) | |
| | Patient Birth Date | (0010, 0030) | NONE |
| | Study Date | (0008, 0020) | S,*,U,R |
| | Study | (0020, 000D) | S,U,L |
| | Instance UID | | |
| | Study Description | (0008, 1030) | S<br>S,*,U,M |
| | Accession Number | (0008, 0050) | S,*,U |
| | Referring Physician | (0008, 0090) | S,*,U |
| | Modalities in study | (0008, 0061) | S,*,U,M |
| SERIES | Series UID | (0020, 000E) | S,*,U,L |
| | Series Description | (0008, 103E) | S,*,U,M |
| | Series number | (0020, 0011) | S,*,U |
| | Series Date | (0008, 0021) | NONE |
| | Series Time | (0008, 0031) | NONE |
| | Modality | (0008, 0060) | S,*,U,M |
| | Instance UID | (0008, 0018) | S,*,U,L |
| IMAGE | Image Number | (0020, 0013) | S,*,U |
| | Rows | (0028, 0010) | NONE |
| | Columns | (0028, 0011) | NONE |

The RADSpa+ server supports the following types of attribute matching:

- Single Value matching (S)
- Universal matching (U)
- Wild card matching (*)
- Multiple Value Matching (M)
- List of UID Matching (L)
- No matching is supported, but values for this attribute in the database can be returned. (NONE)

## *3.3.* Workflow Application Entity Specification

### 3.3.1. SOP Classes

| SOP Class Name | SOP Class UID | SCU | SCP |
|---|---|---|---|
| Instance Availability Notification | 1.2.840.10008.5.1.4.33 | Yes | No |

### 3.3.2. Association establishment policies

#### 3.3.2.1. Number of Associations

The Workflow Application Entity initiates one Association at a time to send Instance Availability Notifications to peer AEs.

### 3.3.3. Association Initiation Policies

#### 3.3.3.1. Activity - Send Instance Available Notification

##### *3.3.3.1.1. Associated real world activity*

When images are received by the server, it sends the IAN to configured SCPs.

##### *3.3.3.1.2. Proposed Presentation Contexts*

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

| Presentation Context Table | | | | |
|---|---|---|---|---|
| **Abstract Syntax** | | **Transfer Syntax** | | **Role** |
| **Name** | **UID** | **Name** | **UID** | |
| Instance Availability Notification | 1.2.840.10008.5.1.4.33 | DICOM Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU |
| | | DICOM Explicit VR Little Endian | 1.2.840.10008.1.2.1 | |

## STOW-RS Specifications

### 3.3.4. STOW-RS Store Instance

| Category | Restrictions |
|---|---|
| Media Types Supported (Accept header) | Restricted to application/dicom or |

| | |
|---|---|
| | application/dicom+xml |
| Transfer Syntaxes Supported (Media Type parameter) | See - Transfer Syntaxes for Image Storage SOP Classes |
| | |
| SOP Class Restrictions | See - SOP Classes for Storage Application Entity (SCP) |

## 3.3.5. Connection Policies

### 3.3.5.1. General

STOW-RS adheres to all standard RESTful service connection policies, with no additional extensions or modifications specific to STOW-RS options.

### 3.3.5.2. Number Of Connections

The maximum number of simultaneous HTTP requests is configurable, with no default limit imposed.

### 3.3.5.3. Response Status

The response contains status codes indicating success, warning, or failure as shown in the “HTTP Standard Response Codes” below. No additional status codes are used.

HTTP Standard Response Codes

| Service Status | HTTP Status Code | STOW-RS Description |
|---|---|---|
| **Failure** | 400 - Bad Request | This indicates that the STOW-RS Service was unable to store any instances due to bad syntax. |
| | 401 - Unauthorized | This indicates that the STOW-RS Service refused to create or append any instances because the client is not authenticated. |
| | 403 - Forbidden | This indicates that the STOW-RS Service understood the request, but is refusing to fulfill it (e.g., an authenticated user with insufficient privileges). |
| | 409 - Conflict | This indicates that the STOW-RS Service request was formed correctly but the service was unable to store any instances due to a conflict in the request (e.g., unsupported SOP Class or Study Instance UID mismatch). This may also be used to indicate that a STOW-RS Service was unable to store any instances for a mixture of reasons. Additional information regarding the instance errors can be found in the XML response message body. |
| | 503 - Busy | This indicates that the STOW-RS Service was unable to store any instances because it was out of resources. |
| **Warning** | 202 - Accepted | This indicates that the STOW-RS Service stored some of the instances but warnings or failures exist for others. Additional information regarding this error can be found in the XML response message body. |

| | | |
|---|---|---|
| **Success** | 200 - OK | This indicates that the STOW-RS Service successfully stored all the instances. |

The following table indicates the meaning of values returned in **FailureReason (0008,1197)** tag in any of the above STOW-RS error responses:

| Service Status | Further Meaning | Error Code (Hex) | Error Code (Decimal ) | Error Comment | Behaviour |
|---|---|---|---|---|---|
| **Refused** | Out of Resources | A700 | 42752 | | Indicates that there was not enough disk space to store the image. Error message is output to the Service Log. The SOP Instance will not be saved. |
| | Duplicate Rejection Note | A770 | 42864 | Rejection Note [uid={SOP Instance UID}] already received. | Indicates that rejection note was already received. |
| | Subsequen t Occurrence of Rejected Object | A771 | 42865 | Subsequent occurrence of rejected Object [uid={SOP Instance UID}, rejection={Rejectio n Note Code}] | Indicates that there was a subsequent occurrence of a rejected object during store operation. |
| | Rejection Failed - No Such Instance | A772 | 42866 | Failed to reject Instance[uid={SOP Instance UID}] - no such Instance. | Indicates that one or more objects were not previously stored in archive to be rejected. |
| | Rejection Failed - Class Instance Conflict | A773 | 42867 | Failed to reject Instance[uid={SOP Instance UID}] - class-instance conflict. | Indicates that there was a conflict in SOP Class UIDs of object (between that of the previously received object and the one referenced in the current rejection note) to be rejected. |
| | Rejection Failed - Already Rejected | A774 | 42868 | Failed to reject Instance[uid={SOP Instance UID}] - already rejected. | Indicates that the rejected object was already rejected. |
| | Rejection for Retention Policy Expired not | A775 | 42869 | Rejection for Retention Policy Expired not authorized. | Indicates that rejection of objects with type as Retention Expired are not allowed by LDAP configuration. |

| | | | | | |
|---|---|---|---|---|---|
| | Authorized | | | | |
| | Retention Period of Study not yet Expired | A776 | 42870 | Retention Period of Study not yet expired. | Indicates that rejection of objects is not allowed as Study Retention Period has not expired yet. |
| | No Patient ID (from trusted Assigning Authority) in object. | A777 | 42871 | Storage denied as Patient ID missing in object. | Indicates that the Patient ID is missing in the object or is not from a trusted Assigning Authority. |
| | Conflicting Patient ID in Object | A778 | 42872 | Patient ID in incoming object does not match with that of patient associated with study. | Indicates that the Patient ID in incoming object does not match with that of patient associated with study. |
| | Conflicting Patient Attributes in Object | A779 | 42873 | Patient differs from previous received object in attribute {Keyword <Tag>}. | Indicates that the Patient in incoming object has differing attributes with that of same patient associated with previous received object. |
| | Missing Bulkdata | A922 | 43298 | Bulkdata missing in STOW-RS request payload. | Indicates that no bulkdata file was sent in the request body. |
| | Different Study Instance UID | C409 | 50185 | Study Instance UID differs from Accepted Study Instance UID. | Indicates that Accepted Study Instance UID varies from the Study Instance UID received in the request body. |
| | Failed to parse DICOM stream | C499 | 50329 | Receive of non(-valid) DICOM stream | Indicates that non(-valid) DICOM stream was received in the request body. |
| | Not Authorized | 124 | 292 | Storage denied. | Indicates that the storage is denied. |
| **Error** | Data Set does not match SOP Class | A900 | 43264 | | Indicates that the Data Set does not encode a valid instance of the SOP Class specified. This status is returned if the DICOM Object stream can be successfully parsed but does not contain values for one or more mandatory Elements of the SOP Class. The STORAGE-SCP AE does not perform a |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | comprehensive check, as it only checks a subset of required Elements. In addition, if the SOP Class is for a type of image but the SOP Instance does not contain values necessary for its display then this status is returned. Error message is output to the Service Log. The system can be configured to temporarily save such Data Sets in order to aid problem diagnosis. |
| | Cannot understand | C000 | 49152 | | Indicates that the STORAGE-SCP AE cannot parse the Data Set into Elements. Error message is output to the Service Log. The system can be configured to temporarily save such Data Sets in order to aid problem diagnosis. |
| | Failed to parse DICOM stream | C499 | 50329 | | Indicates that the STORAGE-SCP AE failed to parse received object. |
| **Warning** | Coercion of Data Elements | B000 | 45056 | | Indicates that one or more Element values were coerced. Refer to the Attributes defined in Annex for a list of those that can be coerced. Note that return of this status is disabled by default, as some SCUs treat it as an Error code rather than a Warning. |

**Web Service Endpoint URL¶**

http[s]://<host>:<port>/radspaplus-pacs/aets/{AETitle}/rs

Replace *{AETitle}* in the URL with the configured AE title.

## *3.4.* QIDO-RS Specifications

### 3.4.1. QIDO-RS Search For Studies

| **QIDO-RS Search for Studies Specification** | |
|---|---|
| **Parameter** | **Restrictions** |
| Media Types | Restricted to ‘multipart/related; type=application/dicom+xml’ or ‘application/json’ |

| | |
|---|---|
| Matching Attributes | Refer QIDO-RS Study Attribute Matching |
| Return Attributes | Refer QIDO-RS Study Attribute Matching |
| Limit and Offset supported | Yes |
| Person Name Matching | Refer Person Name Matching Note |

QIDO-RS Study Attribute Matching

| **Attributes Names** | **Tag** | **Query Keys Matching (SCP)** | **Return Attributes (SCP)** |
|---|---|---|---|
| Study Instance UID | 0020000D | UNIQUE | UNIQUE |
| Study ID | 200010 | S,*,U | S,*,U |
| Study Date | 80020 | S,*,U,R | S,*,U,R |
| Study Time | 80030 | S,*,U,R | S,*,U,R |
| Study Description | 81030 | S,*,U | S,*,U |
| Accession Number | 80050 | S,*,U | S,*,U |
| Issuer of Accession Number | 80051 | | |
| Referring Physician’s Name | 80090 | S,*,U | S,*,U |
| Institution Name | 80080 | S,*,U | |
| Station Name | 81010 | S,*,U | |
| Body Part Examined | 180015 | S,*,U | |
| SOP Classes in Study | 80062 | S,*,U | |
| Institutional Department Name | 81040 | S,*,U | |
| Series Description | 0008103E | S,*,U | |
| Sending Application Entity Title of Series | | S,*,U | |
| Patient Name | 100010 | S,*,U | |
| Patient ID | 100020 | S,*,U | |
| Issuer of Patient ID | 100021 | UNIQUE | |
| Modality | 80061 | S,*,U | |

| | | | |
|---|---|---|---|
| Failed SOP Instance UID List | 80058 | L | |
| Procedure Code Sequence | 81032 | | NONE |
| Patient Age | 101010 | | NONE |
| Patient Size | 101020 | | NONE |
| Patient Size Code Sequence | 101021 | | NONE |
| Patient Weight | 101030 | | NONE |
| Occupation | 102180 | | NONE |
| Additional Patient History | 001021B0 | | NONE |
| Patient Sex Neutered | 102203 | | NONE |
| Physicians of Record | 81048 | | NONE |
| Specific Character Set | 80005 | | NONE |
| Retrieve URL | 81190 | | NONE |
| Retrieve AE Title | 80054 | | NONE |
| Instance Availability | 80056 | | NONE |
| Number of Study Related Series | 201206 | | NONE |
| Number of Study Related Instances | 201208 | | NONE |

Types of Matching:

- "S" indicates the identifier attribute uses Single Value Matching.
- "L" indicates UID List Matching.
- "U" indicates Universal Matching. (Note : If only Universal Matching is supported for an attribute then that attribute can only be passed as an "include field" query key.)
- "*" indicates wild card matching.
- "R" indicates Range Matching.
- "SEQUENCE" indicates Sequence Matching.
- "NONE" indicates that no matching is supported, but that values for this Element requested will be returned with all requests.
- "UNIQUE" indicates that this is the Unique Key for that query level, in which case Universal Matching or Single Value Matching is used depending on the query level.

### 3.4.2. QIDO-RS Search For Series

QIDO-RS Search for Series Specification

| Parameter | Restrictions |
|---|---|
| Media Types | Restricted to ‘multipart/related; type=application/dicom+xml’ or ‘application/json’ |
| Matching Attributes | Refer QIDO-RS Study Attribute Matching and QIDO-RS Series Attribute Matching |
| Return Attributes | Refer QIDO-RS Series Attribute Matching |
| Limit and Offset supported | Yes |
| Relational Queries Supported | Yes |
| Person Name Matching | Refer Person Name Matching Note |

Types of Matching: As explained above in QIDO-RS Search For Studies

QIDO-RS Series Attribute Matching

| Attributes Names | Tag | Query Keys Matching (SCP) | Return Attributes (SCP) |
|---|---|---|---|
| Series Instance UID | 0020000E | UNIQUE | UNIQUE |
| Series Number | 200011 | S,*,U | S,*,U |
| Modality | 80060 | S,*,U | S,*,U |
| Body Part Examined | 180015 | S,*,U | S,*,U |
| Performed Procedure Step Start Date | 400244 | S,*,U,R | S,*,U,R |
| Performed Procedure Step Start Time | 400245 | S,*,U,R | S,*,U,R |
| Performing Physician Name | 81050 | S,*,U | S,*,U |
| Station Name | 81010 | S,*,U | S,*,U |
| Series Description | 0008103E | S,*,U | S,*,U |
| Institutional Department Name | 81040 | S,*,U | S,*,U |
| Institution Name | 80080 | S,*,U | S,*,U |
| Request Attributes Sequence | 400275 | SEQUENCE | SEQUENCE |
| >Accession Number | 80050 | S,*,U | S,*,U |

| | | | |
|---|---|---|---|
| >Issuer of Accession Number | 80051 | | |
| >Requesting Service | 321033 | S,*,U | S,*,U |
| >Requesting Physician | 321032 | S,*,U | S,*,U |
| >Requested Procedure ID | 401001 | S,*,U | S,*,U |
| >Study Instance UID | 0002000D | UNIQUE | UNIQUE |
| >Scheduled Procedure ID | 400009 | S,*,U | S,*,U |
| Institution Code Sequence | 80082 | SEQUENCE | SEQUENCE |
| >Code Value | 80100 | S,*,U | S,*,U |
| >Coding Scheme Designator | 80102 | S,*,U | S,*,U |
| >Coding Scheme Version | 80103 | S,*,U | S,*,U |
| Sending Application Entity Title of Series | | S,*,U | |
| Failed SOP Instance UID List | 80058 | L | |
| Laterality | 200060 | | NONE |
| Manufacturer | 80070 | | NONE |
| Manufacturer Model Name | 81090 | | NONE |
| Referenced Performed Procedure Step Sequence | 81111 | | NONE |
| Specific Character Set | 80005 | | NONE |
| Retrieve URL | 81190 | | NONE |
| Retrieve AE Title | 80054 | | NONE |
| Instance Availability | 80056 | | NONE |
| Number of Series Related Instances | 201209 | | NONE |

### 3.4.3. QIDO-RS Search For Instances

QIDO-RS Search for Instances Specification

| Parameter | Restrictions |
|---|---|
| Media Types | Restricted to ‘multipart/related; type=application/dicom+xml’ or ‘application/json’ |
| Matching Attributes | Refer QIDO-RS Study Attribute Matching, QIDO-RS Series Attribute Matching and QIDO-RS Instance Attribute Matching |

| | |
|---|---|
| Return Attributes | Refer QIDO-RS Instance Attribute Matching |
| Limit and Offset supported | Yes |
| Relational Queries Supported | Yes |
| Person Name Matching | Refer Person Name Matching Note |

Types of Matching: As explained above in QIDO-RS Search For Studies

QIDO-RS Instance Attribute Matching

| **Attributes Names** | **Tag** | **Query Keys Matching (SCP)** | **Return Attributes (SCP)** |
|---|---|---|---|
| SOP Class UID | 80016 | L | L |
| SOP Instance UID | 80018 | UNIQUE | UNIQUE |
| Content Date | 80023 | S,*,U,R | S,*,U,R |
| Content Time | 80033 | S,*,U,R | S,*,U,R |
| Instance Number | 200013 | S,*,U | S,*,U |
| Concept Name Code Sequence | 0040A043 | SEQUENCE | SEQUENCE |
| >Code Value | 80100 | S,*,U | S,*,U |
| >Coding Scheme Designator | 80102 | S,*,U | S,*,U |
| >Coding Scheme Version | 80103 | S,*,U | S,*,U |
| Verifying Observer Sequence | 0040A073 | SEQUENCE | SEQUENCE |
| >Verifying Observer Name | 0040A075 | S,*,U | S,*,U |
| >Verification Date Time | 0040A030 | S,*,U, R | S,*,U, R |
| Completion Flag | 0040A491 | S,*,U | S,*,U |
| Verification Flag | 0040A493 | S,*,U | S,*,U |
| Content Sequence | 0040A730 | SEQUENCE | SEQUENCE |
| >Value Type | 0040A040 | S | S |
| >Concept Name Code Sequence | 0040A043 | SEQUENCE | SEQUENCE |
| >>Code Value | 80100 | S,*,U | S,*,U |
| >>Coding Scheme Designator | 80102 | S,*,U | S,*,U |

| | | | |
|---|---|---|---|
| >>Coding Scheme Version | 80103 | S,*,U | S,*,U |
| >Relationship Type | 0040A010 | S,*,U | S,*,U |
| >Concept Code Sequence | 0040A168 | SEQUENCE | SEQUENCE |
| >>Code Value | 80100 | S,*,U | S,*,U |
| >>Coding Scheme Designator | 80102 | S,*,U | S,*,U |
| >>Coding Scheme Version | 80103 | S,*,U | S,*,U |
| >Text Value | 0040A160 | S,*,U | S,*,U |
| Image Type | 80008 | | NONE |
| Observation Date Time | 0040A032 | | NONE |
| Referenced Series Sequence | 81115 | | NONE |
| Number of Frames | 280008 | | NONE |
| Rows | 280010 | | NONE |
| Columns | 280011 | | NONE |
| Bits Allocated | 280100 | | NONE |
| Referenced Request Sequence | 0040A370 | | NONE |
| Current Requested Procedure Evidence Sequence | 0040A375 | | NONE |
| Content Template Sequence | 0040A504 | | NONE |
| Identical Documents Sequence | 0040A525 | | NONE |
| Document Title | 420010 | | NONE |
| MIME Type of Encapsulated Document | 420012 | | NONE |
| Content Label | 700080 | | NONE |
| Content Description | 700081 | | NONE |
| Presentation Creation Date | 700082 | | NONE |
| Presentation Creation Time | 700083 | | NONE |
| Content Creator’s Name | 700084 | | NONE |
| Specific Character Set | 80005 | | NONE |
| Retrieve URL | 81190 | | NONE |
| Retrieve AE Title | 80054 | | NONE |

| | | | |
|---|---|---|---|
| Instance Availability | 80056 | | NONE |

### 3.4.4. QIDO-RS Connection Policies

#### 3.4.4.1. General

All standard RS connection policies apply. There are no extensions for RS options.

#### 3.4.4.2. Number Of Connections

The maximal number of simultaneous HTTP Requests is configurable; default being unlimited.

#### 3.4.4.3. Response Status

Service shall provide a response message header containing the appropriate status code indicating success, warning, or failure as shown below:

HTTP Standard Response Codes

| Code | Name | Description |
|---|---|---|
| Success | | |
| 200 | OK | The query completed and any matching results are returned in the message body. |
| Failure | | |
| 400 | Bad Request | This indicates that the QIDO-RS Provider was unable to fulfill it because it cannot understand the query component. |
| 401 | Unauthorized | This indicates that the QIDO-RS Provider refused to fulfill it because the client is not authorized. |
| 403 | Forbidden | This indicates that the QIDO-RS Provider understood the request, but is refusing to fulfill it (e.g., no single patient specified, an authorized user with insufficient privileges, etc.). |
| 413 | Request entity too large | This indicates that the query was too broad and a narrower query or paging should be requested. This code will be returned for queries that do not specify PatientID. |
| 503 | Busy | Service is unavailable. |

#### 3.4.4.4. Web Service Endpoint URL

*http://localhost:8080/radspaplus-pacs/aets/{AETitle}/rs*

Replace *{AETitle}* in the URL with the configured AE title

## 3.5. WADO-RS Specifications

### 3.5.1. WADO-RS Retrieve Study

WADO-RS Retrieve Study

| Options | Restrictions |
|---|---|
| Data Types Supported (Accept Type) | multipart/related;type=application/dicom |
| | multipart/related;type=application/octet-stream |
| | multipart/related;type=application/pdf |
| | multipart/related;type=image/jpeg |
| | multipart/related;type=image/jp2 |
| | multipart/related;type=image/jpx |
| | multipart/related;type=image/x-dicom+rle |
| | multipart/related;type=image/x-jls |
| | |
| | multipart/related;type=text/xml |
| | multipart/related;type=video/mpeg |
| | multipart/related;type=video/mp4 |
| | application/zip |
| Transfer Syntaxes Supported (transfer-syntax Accept parameter) | See - Transfer Syntaxes for Image Storage SOP Classes |
| SOP Class restrictions | See - SOP Classes for Storage Application Entity (SCP) |

### 3.5.2. WADO-RS Retrieve Series

WADO-RS Retrieve Series

| Options | Restrictions |
|---|---|
| Data Types Supported (Accept Type) | multipart/related;type=application/dicom |
| | multipart/related;type=application/octet-stream |
| | multipart/related;type=application/pdf |
| | multipart/related;type=image/jpeg |
| | multipart/related;type=image/jp2 |
| | multipart/related;type=image/jpx |
| | multipart/related;type=image/x-dicom+rle |

| | |
|---|---|
| | multipart/related;type=image/x-jls |
| | multipart/related;type=text/xml |
| | multipart/related;type=video/mpeg |
| | multipart/related;type=video/mp4 |
| | application/zip |
| Transfer Syntaxes Supported (transfer-syntax Accept parameter) | See - Transfer Syntaxes for Image Storage SOP Classes |
| SOP Class restrictions | See - SOP Classes for Storage Application Entity (SCP) |

### 3.5.3. WADO-RS Retrieve Instance

WADO-RS Retrieve Instance

| Options | Restrictions |
|---|---|
| Data Types Supported (Accept Type) | multipart/related;type=application/dicom |
| | multipart/related;type=application/octet-stream |
| | multipart/related;type=application/pdf |
| | multipart/related;type=image/jpeg |
| | multipart/related;type=image/jp2 |
| | multipart/related;type=image/jpx |
| | multipart/related;type=image/x-dicom+rle |
| | multipart/related;type=image/x-jls |
| | multipart/related;type=text/xml |
| | multipart/related;type=video/mpeg |
| | multipart/related;type=video/mp4 |
| | application/zip |
| Transfer Syntaxes Supported (transfer-syntax Accept parameter) | See - Transfer Syntaxes for Image Storage SOP Classes |
| SOP Class restrictions | See - SOP Classes for Storage Application Entity (SCP) |

## *3.6.* JViewer+ DICOM Entity Specifications

### 3.6.1. SOP Classes

| SOP Class Name | SOP Class UID | SCU |
|---|---|---|
| Computed Radiography Image Storage | 1.2.840.10008.5.1.4.1.1.1 | Yes |
| CT Image Storage | 1.2.840.10008.5.1.4.1.1.2 | Yes |
| Enhanced CT Image Storage | 1.2.840.10008.5.1.4.1.1.2.1 | Yes |
| Legacy Converted Enhanced CT Image Storage | 1.2.840.10008.5.1.4.1.1.2.2 | Yes |
| MR Image Storage | 1.2.840.10008.5.1.4.1.1.4 | Yes |
| Enhanced MR Image Storage | 1.2.840.10008.5.1.4.1.1.4.1 | Yes |
| Enhanced MR Color Image Storage | 1.2.840.10008.5.1.4.1.1.4.3 | Yes |
| Ultrasound Image Storage | 1.2.840.10008.5.1.4.1.1.6.1 | Yes |
| Enhanced US Volume Storage | 1.2.840.10008.5.1.4.1.1.6.2 | Yes |
| Ultrasound Multi-frame Image Storage | 1.2.840.10008.5.1.4.1.1.3.1 | Yes |
| Digital Mammography X-Ray Image Storage - For Presentation | 1.2.840.10008.5.1.4.1.1.1.2 | Yes |
| Digital Mammography X-Ray Image Storage - For Processing | 1.2.840.10008.5.1.4.1.1.1.2.1 | Yes |
| Nuclear Medicine Image Storage | 1.2.840.10008.5.1.4.1.1.20 | Yes |
| Positron Emission Tomography Image Storage | 1.2.840.10008.5.1.4.1.1.128 | Yes |
| Digital X-Ray Image Storage - For Presentation | 1.2.840.10008.5.1.4.1.1.1.1 | Yes |
| Digital X-Ray Image Storage - For Processing | 1.2.840.10008.5.1.4.1.1.1.1.1 | Yes |
| X-Ray Angiographic Image Storage | 1.2.840.10008.5.1.4.1.1.12.1 | Yes |
| X-Ray Radiofluoroscopic Image Storage | 1.2.840.10008.5.1.4.1.1.12.2 | Yes |
| Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7 | Yes |
| Multi-frame Single Bit Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.1 | Yes |
| Multi-frame Grayscale Byte Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.2 | Yes |
| Multi-frame True Color Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.4 | Yes |
| Basic Text SR | 1.2.840.10008.5.1.4.1.1.88.11 | Yes |

| | | |
|---|---|---|
| Enhanced SR | 1.2.840.10008.5.1.4.1.1.88.22 | Yes |
| Comprehensive SR | 1.2.840.10008.5.1.4.1.1.88.33 | Yes |
| Mammography CAD SR | 1.2.840.10008.5.1.4.1.1.88.50 | Yes |
| X-Ray Radiation Dose SR | 1.2.840.10008.5.1.4.1.1.88.67 | Yes |
| Grayscale Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.1 | Yes |
| Color Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.2 | Yes |
| Pseudo-Color Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.3 | Yes |
| Blending Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.4 | Yes |
| Key Object Selection Document Storage | 1.2.840.10008.5.1.4.1.1.88.59 | Yes |
| Segmentation Storage | 1.2.840.10008.5.1.4.1.1.66.4 | Yes |
| RT Structure Set Storage | 1.2.840.10008.5.1.4.1.1.481.3 | Yes |
| RT Plan Storage | 1.2.840.10008.5.1.4.1.1.481.5 | Yes |
| RT Dose Storage | 1.2.840.10008.5.1.4.1.1.481.2 | Yes |
| RT Image Storage | 1.2.840.10008.5.1.4.1.1.481.1 | Yes |
| 12-lead ECG Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.1.1 | Yes |
| General ECG Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.1.2 | Yes |
| Encapsulated PDF Storage | 1.2.840.10008.5.1.4.1.1.104.1 | Yes |
| Encapsulated CDA Storage | 1.2.840.10008.5.1.4.1.1.104.2 | Yes |
| Video Endoscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.1.1 | Yes |
| Video Microscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.2.1 | Yes |
| Video Photographic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.4.1 | Yes |
| Verification | 1.2.840.10008.1.1 | Yes |
| Study Root Query/Retrieve Model – FIND | 1.2.840.10008.5.1.4.1.2.2.1 | Yes |
| Study Root Query/Retrieve Model – MOVE | 1.2.840.10008.5.1.4.1.2.2.2 | Yes |
| Study Root Query/Retrieve Model – GET | 1.2.840.10008.5.1.4.1.2.2.3 | Yes |

#### 3.6.1.1. General

JViewer+ Application accepts initiates requests to Find, Retrieve and Storage Services on remote AEs configured as DICOM Nodes. The DICOM standard application context name for DICOM 3.0 is always accepted and proposed . Maximum accepted PDU size is 16KB

#### 3.6.1.2. Number of associations

It allows maximum of 3 series download.

#### 3.6.1.3. Asynchronous Nature

JViewer+ application does not support asynchronous operation.

### 3.6.2. Association Initiation Policy

#### 3.6.2.1. Real world activity – Query and Retrieve images

| Presentation Context Table | | | | | |
|---|---|---|---|---|---|
| **Abstract Syntax** | | **Transfer Syntax** | | **Role** | **Ext. Neg.** |
| **Name** | **UID** | **Name** | **UID** | | |
| Patient Root Query/Retrieve Information Model - FIND | 1. .2.840.10008.5.1.4.1.2.1.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| Study Root Query/Retrieve | 1.2.840.10008.5.1.4.1.2.2.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| Information Model - FIND | | | | | |
| Study Root Query/Retrieve Information Model - GET | 1.2.840.10008.5.1.4.1.2.2.2 | Implicit VR Little Endian | UID: 1.2.840.10008.1.2 | SCU | None |

##### *3.6.2.1.1. Associated real world activity*

JViewer+ initiates association with remote AEs which are configured as DICOM nodes to find images and subsequently retrieve images. The retrieval is supported using C-GET.

##### *3.6.2.1.2. Proposed presentation contexts*

Transfer Syntaxes:

| Transfer Syntax | UID |
|---|---|
| Implicit VR - Little Endian | 1.2.840.10008.1.2 |
| Explicit VR - Little Endian | 1.2.840.10008.1.2.1 |
| Deflated Explicit VR Little Endian | 1.2.840.10008.1.2.1.99 |
| Explicit VR Big Endian (Retired) | 1.2.840.10008.1.2.2 |
| RLE (Run Length Encoding) Lossless | 1.2.840.10008.1.2.5 |

| | |
|---|---|
| JPEG Baseline (Process 1): Default Transfer Syntax for Lossy JPEG 8 Bit Image Compression | 1.2.840.10008.1.2.4.50 |
| JPEG Extended (Process 2 & 4): Default Transfer Syntax for Lossy JPEG 12 Bit Image Compression (Process 4 only) | 1.2.840.10008.1.2.4.51 |
| JPEG Spectral Selection, Non-Hierarchical (Process 6 & 8) (Retired) | 1.2.840.10008.1.2.4.53 |
| JPEG Full Progression, Non-Hierarchical (Process 10 & 12) (Retired) | 1.2.840.10008.1.2.4.55 |
| JPEG Lossless, Non-Hierarchical (Process 14) | 1.2.840.10008.1.2.4.57 |
| JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14 [Selection Value 1]) | 1.2.840.10008.1.2.4.70 |
| JPEG-LS Lossless Image Compression | 1.2.840.10008.1.2.4.80 |
| JPEG-LS Lossy (Near-Lossless) Image Compression | 1.2.840.10008.1.2.4.81 |
| JPEG 2000 Image Compression (Lossless Only) | 1.2.840.10008.1.2.4.90 |
| JPEG 2000 Image Compression | 1.2.840.10008.1.2.4.91 |
| JPEG 2000 Part 2 Multi-component Image Compression (Lossless Only) | 1.2.840.10008.1.2.4.92 |
| JPEG 2000 Part 2 Multi-component Image Compression | 1.2.840.10008.1.2.4.93 |
| JPEG XL Lossless | 1.2.840.10008.1.2.4.110 |
| JPEG XL JPEG Recompression | 1.2.840.10008.1.2.4.111 |
| JPEG XL | 1.2.840.10008.1.2.4.112 |
| High-Throughput JPEG 2000 Image Compression (Lossless Only) | 1.2.840.10008.1.2.4.201 |
| High-Throughput JPEG 2000 with RPCL Options Image | 1.2.840.10008.1.2.4.202 |

| | |
|---|---|
| Compression (Lossless Only) | |
| High-Throughput JPEG 2000 Image Compression | 1.2.840.10008.1.2.4.203 |
| RFC 2557 MIME Encapsulation | 1.2.840.10008.1.2.6.1 |
| MPEG-2 Main Profile Main Level | 1.2.840.10008.1.2.4.100 |
| MPEG-2 Main Profile High Level | 1.2.840.10008.1.2.4.101 |
| MPEG-4 AVC/H.264 High Profile / Level 4.1 | 1.2.840.10008.1.2.4.102 |
| MPEG-4 AVC/H.264 BD-compatible High Profile / Level 4.1 | 1.2.840.10008.1.2.4.103 |
| MPEG-4 AVC/H.264 High Profile / Level 4.2 For 2D Video | 1.2.840.10008.1.2.4.104 |
| MPEG-4 AVC/H.264 High Profile / Level 4.2 For 3D Video | 1.2.840.10008.1.2.4.105 |
| MPEG-4 AVC/H.264 Stereo High Profile / Level 4.2 | 1.2.840.10008.1.2.4.106 |
| HEVC/H.265 Main Profile / Level 5.1 | 1.2.840.10008.1.2.4.107 |
| HEVC/H.265 Main 10 Profile / Level 5.1 | 1.2.840.10008.1.2.4.108 |

##### *3.6.2.1.3. SOP specific conformance for C-FIND*

C-FIND can be initiated on the following DICOM fields:

Patient's Name

Patient ID

Accession Number

Study ID

Study Instance UID

Study Date

Study Description

Modalities In Study

Referring Physician's Name

Performing Physician's Name

Name of Physician(s) Reading Study

#### 3.6.2.2. Real world activity –Export images

#### 3.6.2.2.1. *Associated real world activity*

Users of JViewer+ can choose to export images along with annotations/presentation state, KO and such other information to configured remote AEs supporting C-STORE. As part of this process, it supports generation of new UIDs for the images being exported.

### 3.6.2.3. Real world activity – Print to a DICOM printer

#### 3.6.2.3.1. *Associated real world activity*

The users send images from the viewer to the composer. Here the user can change the print parameters and click on the print button.

#### 3.6.2.3.2. *Accepted Presentation Contexts*

| **Presentation Context Table for print to DICOM printer** | | | | |
|---|---|---|---|---|
| **Abstract Syntax** | | **Transfer Syntax** | | **Extended Negotiation** |
| UID | Name | | Role | |
| | Basic Grayscale Print Management | Implicit VR, Little Endian | | |
| | | | | |
| 1.2.840.1000.8.5.1.1.9 | | | SCU | None |

#### 3.6.2.3.3. *SOP specific conformance statement for SOP classes Basic Grayscale*

Print Management Meta classes:

The following table contains a list of mandatory print SOP classes supported by the RADSpa+ as an SCU.

| **Basic Grayscale Print Management Meta classes** | |
|---|---|
| **SOP Class Name** | **SOP Class UID** |
| Basic Film Session | 1.2.840.10008.5.1.1.1 |
| Basic Film Box | 1.2.840.10008.5.1.1.2 |
| Basic Grayscale Image Box | 1.2.840.10008.5.1.1.4 |
| Printer | 1.2.840.10008.5.1.1.16 |

#### 3.6.2.3.4. *Conformance for SOP Class Basic Film Session*

| **Basic Film Session SOP class N-CREATE: Attributes** |
|---|

| Description | Tag |
|---|---|
| Number of copies | (2000, 0010) |
| Print Priority | (2000, 0020) |
| Medium Type | (2000, 0030) |
| Film Destination | (2000, 0040) |

##### *3.6.2.3.5. Conformance for SOP Class Basic Film Box*

| **Basic Film Box SOP class N-CREATE: Attributes** | |
|---|---|
| **Description** | **Tag** |
| Print Priority | (2000, 0020) |
| Image Display Format | (2010, 0010) |
| Film Orientation | (2010, 0040) |
| Film Size ID | (2010, 0050) |
| Magnification Type | (2010, 0060) |
| Trim | (2010, 0140) |

## *3.7.* JViewer+ HTTP Client Entity Specifications

### 3.7.1. General

JViewer+ allows users to perform query/retrieval on configured DICOM nodes using QIDO-RS and WADO-RS. It also supports exporting studies with the annotations/presentation state, KO, etc. to the DICOM nodes using STOW-RS.

As part of the DICOM node configuration, the supported operations can be configured and accordingly the Query/Retrieve or Export options would be provided to the user on the relevant screens. Users can customize headers to be sent as part of the request. OAuth2 based authentication mechanism also can be configured to connect to secure AEs.

### 3.7.2. SOP Specific Conformance

Filtering can be applied using the same fields as mentioned in SOP specific conformance for C-FIND

## *3.8.* Media Storage Services

JViewer+ conforms to the DICOM Media Storage Service and File Format (PS 3.10) and the Media Storage Application Profiles (PS 3.11) for reading images stored on recordable media. The following application profile is supported by JViewer+:

| **Supported Application Profile** | |
|---|---|
| **Description** | **Identifier** |
| General Purpose CD-R Image Interchange Profile | STD-GEN-CD |

Through its supported application profile listed above, supports the real world activities listed below:

| **Supported Application Profile** | | |
|---|---|---|
| **Real world activity** | **Role** | **SC Option** |
| Display directory of CD-R | FSR | Interchange |
| Read images from CD-R | FSR | Interchange |

When importing DICOM images / DICOMDIR, the user has the option to import the images to the local database.

#### 3.8.1.1. Read images from a CD-R

JViewer+ assumes the role of a FSR when reading the DICOMDIR. The application will automatically display a hierarchical structure of the contents. The PatientID, Study UID, Series UID and Image Instance UID keys are used to distinguish between objects.

#### 3.8.1.2. Image Export

JViewer + supports the creation of a General Purpose CD-R Image Interchange Profile as a File Set Creator. A conformant DICOMDIR file will be created as part of the file set, and image object files will be located in the appropriate directory structure, with proper Part 10 formatting.

## *3.9. Supported communication stacks*

DICOM Part 8 is supported by RADSpa+ Server through TCP/IP and HTTPS.

## *3.10. TCP/IP Stack*

The TCP/IP and HTTPS stack supported by RADSpa+ Server is inherited from the host operating system.

### 3.10.1. Physical Media Support

Any host operating system supported physical media.

# 4. CONFIGURATION

Local AE titles are configurable.

## *4.1. Standard extended/specialized/private SOPs*

The local AE title can be configured by authorized users using the administration tool provided.

## *4.2. Configuration parameters*

The following fields are configurable for store AE

- Local AE Title
- Secure Listening port (default – 2762)

The following fields are configurable for remote AE

- AE Title
- Port number
- Alias name
- IP Address
- Supported DICOM operations