eRAD PACS

Version 8.0/9.0

DICOM Conformance Statement

eRAD PACS DICOM Conformance Statement
Document Control Number: IMC-0491-CS.1
File: CS_eRADPACS.doc

eRAD, Inc.
201 Brookfield Parkway
Suite 106
Greenville, SC 29607
www.erad.com

Revision Table

Rev #	Date	Author	Comments
1.0	26-Oct-99	JKC	Compiled drafts into final draft for PracticeBuilder 0.85
1.1	30-Aug-00	JKC	Added report objects
1.2	6-Feb-01	JKC	Added printing, additional storage SOP classes
1.3	16-Nov-01	JKC	Added query/retrieve SOP classes
1.4	12-Jul-02	JKC	Added MWL, study mgmt, report mgmt SOP classes and security support.
1.5	3-Apr-03	JKC	Added Structured Report storage SOP classes
1.6	13-Jan-04	JKC	Added JPEG transfer syntaxes to presentation context tables
1.7	12-Aug-04	JKC	Updated for PracticeBuilder 5.0. Added Storage Commitment SCP
1.8	21-Sep-04	JKC	Updated Storage SOP class transfer syntaxes
1.9	28-Sep-05	JKC	Updated supported transfer syntaxes
1.10	6-Jan-06	JKC	Change name to eRAD PACS, updated implementation UID and version
1.11	15-Aug-06	JKC	Modified presentation state conformance
1.12	6-Sep-06	JKC	Corrected error in private SOP class abstract syntax in table 4.1.2.1.2
1.13	12-Apr-07	JKC	Added SOP classes supported in eRAD PACS v6.0. Removed support for retired study management SOP classes.
1.14	29-Dec-10	JKC	Updated PB Report and Dictation object definitions and added support for Software Presentation State SOP Class as an SCU for v7.0.
1.15	24-Oct-11	JKC	Inserted PB Storage Module definition
1.16	14-Mar-13	JKC	Added Breast Tomosynthesis SOP Class to supported storage classes
1.17	7-Jun-13	JKC	Added (missing) conformance information for DICOM media
1.18	29-Jul-13	JKC	Added the private EP Task Information SOP Class section
1.19	11-Dec-15	JKC	Updated for v7.3. Added Breast Projection X-Ray SOP Classes, Spatial Registration SOP Classes, EP CD Meta Data object definition
1.20	19-Oct-16	JKC	Added private code scheme designators.
1.21	20-Jun-17	JKC	Added DICOM Enhanced US Volume SOP Class
1.22	1-Feb-19	JKC	Reviewed and updated for EP Evolution v8.0.
1.23	22-Jul-19	JKC	Corrected condition for generating presentation state objects.
1.24	13-Jul-23	JKC	Added support for Ophthalmic image SOP classes
1.25	13-Oct-23	JKC	Noted treatment of time fractions in C-FIND requests
1.26	17-Mar-25	JKC	Added support for segmentation SOP classes

CONTENTS

INTRODUCTION

This Document provides the DICOM conformance statement for the **eRAD PACS** version 8.0 and 9.0 implementation of the DICOM standard.

1 - IMPLEMENTATION MODEL

eRAD PACS is a multi-modality storage server with viewing and processing features. It uses the DICOM protocol to provide the following services:

- Receive images and structure reports sent by remote stations
- Send images and structured reports to remote stations
- Print images to a remote printer
- Query remote entities and initiate retrieval from those entities
- Accept queries from remote entities and initiate image transfers as directed from those entities
- Issue and accept verification messages
- Request scheduled worklist from the RIS
- Accept queries from modalities for scheduled procedure information
- Receive procedure step updates from modalities

1.1 Application Data Flow Diagram

Figure 1.1-1 graphically depicts the application data flow diagram. The eRAD PACS system provides DICOM services using the following Application Entities:

- **STORESCP** – This AE is a daemon process that implements a Service Class Provider (SCP) for the Storage service class. It also supports the Verification service class as an SCP.
- **SENDSCU** – This AE is a Service Class User (SCU) for the Storage service class.
- **PRINTSCU** – This AE is a SCU for the Print Management service class.
- **QRAE** – This AE is both a SCU (QRSCU) and a SCP (QRSCP) of the Query/Retrieve service class.
- **MWLAE** – This AE is both a SCU (MWLSCU) and a SCP (MWLSCP) of the Modality Worklist Management service class, and an SCP (MPPSSCP) of the Modality Performed Procedure Step service class.
- **COMMITSCP** – This AE is a Service Class Provider for the Storage Commitment service class.
- **MEDIAMGR** – This AE performs the File Set Reader (FSR) and File Set Creator (FSC) roles for the purpose of interchange with remote DICOM application entities.

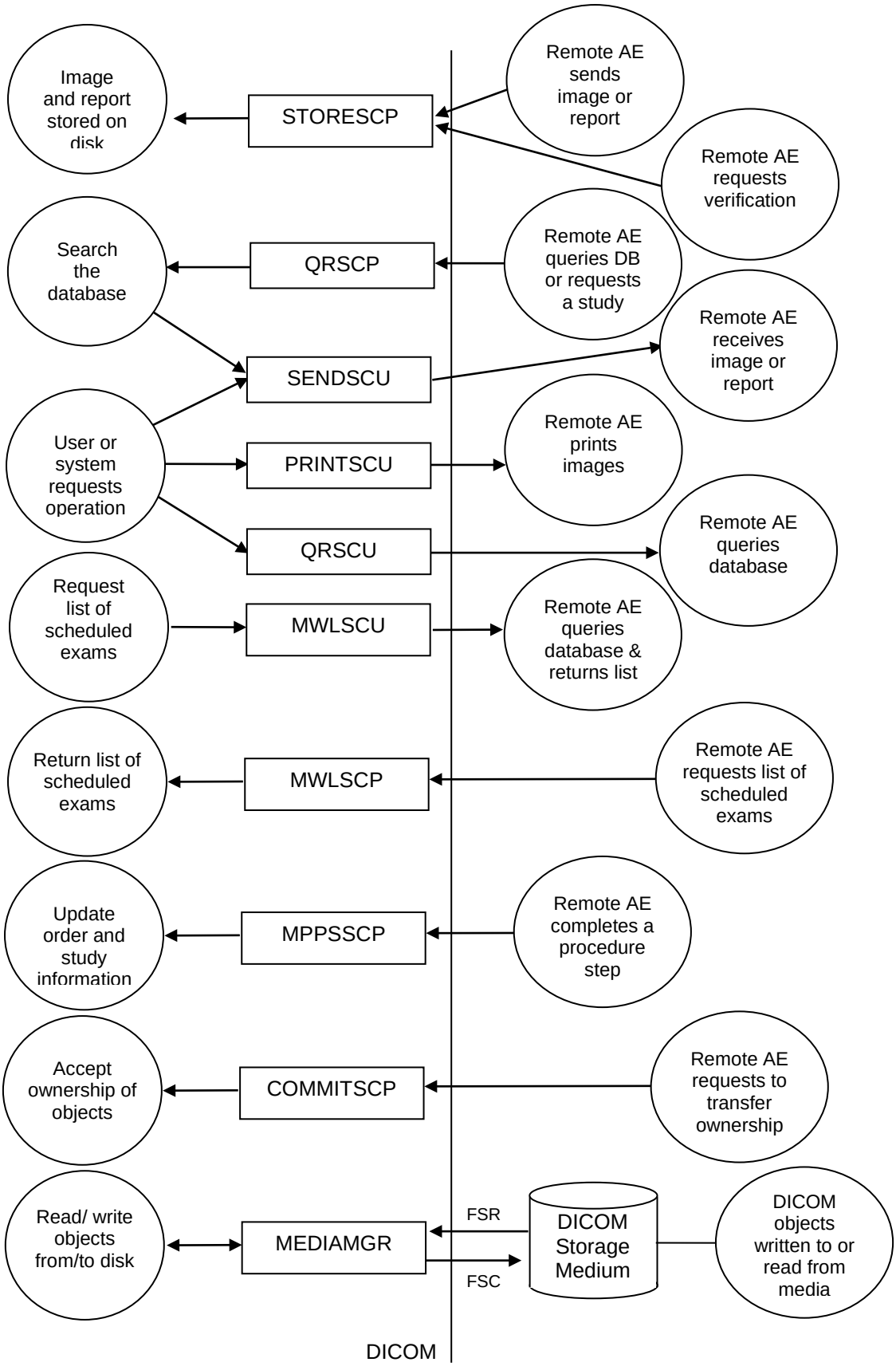

Figure 1.1-1 Application Data Flow Diagram

1.2 Functional Definitions of AE

STORESCP waits for a remote application entity to connect to the presentation address configured for its application entity. The TCP/IP port is defined in its control script (default 104). When the other application connects, STORESCP verifies that it is a DICOM application entity capable of supporting its SOP classes. It can receive images and structure reports conforming to the Storage Service Class and verification requests conforming to the Verification Service Class. STORESCP stores received images and reports in files, and the corresponding demographic information (patient, study, series and image details) in the internal database.

SENDSCU is the process that sends image and report objects stored on the local disk and resident in the database to other DICOM AEs. The objects transmitted by SENDSCU are identical to the stored object, meaning SENDSCU does not alter it or its attributes in any way. The DICOM address information SENDSCU uses for connecting to a remote AE is defined in the control scripts.

PRINTSCU is the process that sends objects stored on the local disk and resident in the database to print AEs for printing. Some of the print parameters are defined in the control scripts. The user defines the remaining information in the print session at the time the system initiates the print request.
The DICOM address information PRINTSCU uses for connecting to a remote AE is defined in the control scripts.

QRAE consists of a service class user (QRSCU) and a service class provider (QRSCP). **QRSCU** is the process that sends query and move requests to other DICOM AEs. The user defines the parameters of the query requests at the time the system initiates the query request. The user selects one or more objects to move before initiating a move request. The DICOM address information QRSCU uses for connecting to a remote AE, whether it is a query provider or a move destination, is defined in the control scripts. **QRSCP** waits for a remote application entity to connect to it and then services the query and move requests. QRSCP uses the query parameters in the request and compares them to the information in the database. It then returns the matches to the remote AE in a query response. When QRSCP receives a move request, it verifies the requested destination and the existence of the requested object(s) and then sends them to SENDSCU for transmission to the destination AE.

MWLAE consists of a service class user (MWLSCU) and two service class providers (MWLSCP, MPPSSCP). **MWLSCU** requests the list of scheduled exams and patient demographic information. When enabled, MWLSCU periodically issues a query request to a remote AE. The response messages are parsed and inserted into the worklist as scheduled exams. The patient demographics in the response messages are used to verify the demographic information contained in the image objects. **MWLSCP** accepts query requests from remote applications, particularly modalities, which are looking for patient demographic information for scheduled exams. MWLSCP returns to the requesting AE the list of scheduled exams that match the query parameters. **MPPSSCP** creates and maintains procedure step information sent by an AE, usually an imaging modality.

COMMITSCP is a process that accepts ownership of some composite objects when requested to by a remote AE. The affected objects were transmitted to and acknowledged by STORESCP prior to COMMITSCP accepting the transfer of ownership. Once COMMITSCP accepts ownership of the object(s), eRAD PACS retains a copy of this data.

MEDIAMGR is a process that reads and writes DICOM-compliant media. When physical media is available, the File Set Reader (FSR) loads the DICOMDIR object to generate a list of DICOM objects stored on it. Based on user input, it then reads the data from the media, stores the objects on local storage and registers the objects in the database. The File Set Creator (FSC) collects a set of DICOM objects currently available on local storage, creates the applicable DICOMDIR object and then builds a file that can be written to the DICOM media.

Private AEs exist. They communicate solely within eRAD PACS. Details are found in section 4.

1.3 Sequencing of Real Word Activities

SENDSCU only transmits, PRINTSCU only prints, QRSCP only responds to query and retrieve requests for, COMMITSCP only commits, and MEDIAMGR FSC only write objects that STORESCP or MEDIAMGR FSR previously acquired and successfully registered into the eRAD PACS database.

MWLSCP only responds to query requests for objects that MWLSCU previously received and loaded into the database.

MWLSCU is configured to automatically query the remote AE at a scheduled interval. eRAD PACS can disable these two AEs so that they do not query at any time.

MPPSSCP responds to requests to modify existing orders received from the RIS or manually created in eRAD PACS.

COMMITSCP responds to requests issued by modalities, and requires the study referenced in the request to be resident in eRAD PACS.

1.4 File Meta Information

The values assigned to the File Meta Information attributes by MEDIAMGR FSC are as follows:

File Meta Information Version:	1
Implementation Class UID:	1.2.826.0.1.3680043.2.93.0.99
Implementation Version Name:	ERAD_xx, where xx represents an eRAD PACS version number. Eg., ERAD_60.

2 - AE SPECIFICATIONS

2.1 STORESCP - Specification

STORESCP provides Standard Conformance to the following DICOM V3.0 SOP Class as an SCP.

Verification	1.2.840.10008.1.1
Computed Tomography (CT) Image	1.2.840.10008.5.1.4.1.1.2
Enhanced CT Image	1.2.840.10008.5.1.4.1.1.2.1
Computed Radiography Image	1.2.840.10008.5.1.4.1.1.1
Digital IntraOral Xray Image for Presentation	1.2.840.10008.5.1.4.1.1.1.3
Digital IntraOral Xray Image for Processing	1.2.840.10008.5.1.4.1.1.1.3.1
Digital Mammography Xray Image for Presentation	1.2.840.10008.5.1.4.1.1.1.2
Digital Mammography Xray Image for Processing	1.2.840.10008.5.1.4.1.1.1.2.1
Digital Xray Image for Presentation	1.2.840.10008.5.1.4.1.1.1.1
Digital Xray Image for Processing	1.2.840.10008.5.1.4.1.1.1.1.1
Hardcopy Color Image	1.2.840.10008.5.1.1.30
Hardcopy Grayscale Image	1.2.840.10008.5.1.1.29
MR Image	1.2.840.10008.5.1.4.1.1.4
Enhanced MR Image	1.2.840.10008.5.1.4.1.1.4.1
MR Spectroscopy	1.2.840.10008.5.1.4.1.1.4.2
Nuclear Medicine Image	1.2.840.10008.5.1.4.1.1.20
Nuclear Medicine Image (Retired)	1.2.840.10008.5.1.4.1.1.5
Raw Data	1.2.840.10008.5.1.4.1.1.66
Spatial Registration	1.2.840.10008.5.1.4.1.1.66.1
Deformable Spatial Registration	1.2.840.10008.5.1.4.1.1.66.3
Real World Value Mapping	1.2.840.10008.5.1.4.1.1.67
PET Curve	1.2.840.10008.5.1.4.1.1.129
PET Image	1.2.840.10008.5.1.4.1.1.128
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 Image	1.2.840.10008.5.1.4.1.1.481.1

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
Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7
Multi-frame Single Bit Secondary Capture	1.2.840.10008.5.1.4.1.1.7.1
Multi-frame Grayscale Byte Secondary Capture	1.2.840.10008.5.1.4.1.1.7.2
Multi-frame Grayscale Word Secondary Capture	1.2.840.10008.5.1.4.1.1.7.3
Multi-frame True Color Secondary Capture	1.2.840.10008.5.1.4.1.1.7.4
Standalone Curve	1.2.840.10008.5.1.4.1.1.9
Standalone Modality LUT	1.2.840.10008.5.1.4.1.1.10
Standalone Overlay	1.2.840.10008.5.1.4.1.1.8
Standalone VOI LUT	1.2.840.10008.5.1.4.1.1.11
Stored Print	1.2.840.10008.5.1.1.27
Ultrasound Image (Retired)	1.2.840.10008.5.1.4.1.1.6
Ultrasound Image	1.2.840.10008.5.1.4.1.1.6.1
Enhanced US Volume	1.2.840.10008.5.1.4.1.1.6.2
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
Twelve Lead ECG Waveform	1.2.840.10008.5.1.4.1.1.9.1.1
General ECG Waveform	1.2.840.10008.5.1.4.1.1.9.1.2
Ambulatory ECG Waveform	1.2.840.10008.5.1.4.1.1.9.1.3
Hemodynamic Waveform	1.2.840.10008.5.1.4.1.1.9.2.1
Cardiac Electrophysiology Waveform	1.2.840.10008.5.1.4.1.1.9.3.1
Basic Voice Audio Waveform	1.2.840.10008.5.1.4.1.1.9.4.1
Grayscale Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.1
Color Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.2
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
X-ray Angiographic Image	1.2.840.10008.5.1.4.1.1.12.1
Enhanced XA Image	1.2.840.10008.5.1.4.1.1.12.1.1
X-ray Fluoroscopy Image	1.2.840.10008.5.1.4.1.1.12.2
Enhanced XA Image	1.2.840.10008.5.1.4.1.1.12.2.1
X-ray Angiographic BiPlane Image (Retired)	1.2.840.10008.5.1.4.1.1.12.3
Breast Tomosynthesis Image	1.2.840.10008.5.1.4.1.1.13.1.3
Breast Projection X-Ray Image for Presentation	1.2.840.10008.5.1.4.1.1.13.1.4
Breast Projection X-Ray Image for Processing	1.2.840.10008.5.1.4.1.1.13.1.5
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 Photographic Image	1.2.840.10008.5.1.4.1.1.77.1.4
VL Slide Coordinates Microscopic Image	1.2.840.10008.5.1.4.1.1.77.1.3
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
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
Stereometric Relationship	1.2.840.10008.5.1.4.1.1.77.1.5.3
Ophthalmic Tomography Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.4
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
Procedure Log	1.2.840.10008.5.1.4.1.1.88.40
Mammography CAD Structured Report	1.2.840.10008.5.1.4.1.1.88.50
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59
Chest CAD Structured Report	1.2.840.10008.5.1.4.1.1.88.65
X-ray Radiation Dose Structured Report	1.2.840.10008.5.1.4.1.1.88.67
Encapsulated PDF	1.2.840.10008.5.1.4.1.1.104.1
Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.4
Surface Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.5

2.1.1 Association Establishment

2.1.1.1 General

The maximum PDU size that the STORESCP AE uses is configurable, with a minimum of 8K bytes. Default is 16K. Maximum is 128K.

2.1.1.2 Number of Associations

The number of simultaneous associations that STORESCP will accept is limited by the kernel parameters of the underlying TCP/IP implementation and by a configurable parameter in one of the configuration files.

2.1.1.3 Asynchronous Nature

STORESCP will only allow a single outstanding operation on an Association. Therefore STORESCP does not perform asynchronous window negotiation.

2.1.1.4 Implementation Identifying Information

STORESCP will provide a single implementation Class UID, which is 1.2.826.0.1.3680043.2.93.0.99

STORESCP will provide an implementation version name of *ERAD_<version>*, where <version> is the software version number. An example is *ERAD_60*.

2.1.2 Association Initiation

STORESCP does not initiate Associations.

2.1.3 Association Acceptance

STORESCP accepts an association when it receives a valid Association request delivered to the configured TCP port which contains a valid application entity title, and offers at least one of the presentation contexts listed in the tables below. STORESCP will receive any images transmitted on that association and store images on disk. The AE also supports the Verification Service Class. STORESCP places no limitation on who may connect to it when running in promiscuous.

2.1.3.1 Remote System Request - Verification

This section explains how STORESCP handles a remote system request verification from an SCU using the C-ECHO command.

2.1.3.1.1 Associated Real-World Activity - Verification

STORESCP performs the verification Service Class by responding with
C-ECHO-RSP to provide the SCU with the ability to determine if it is receiving DICOM requests.

2.1.3.1.2 Presentation Context Table - Verification

Acceptable Verification Presentation Contexts for STORESCP					
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

2.1.3.1.2.1 SOP Specific Conformance to Verification SOP Class

STORESCP provides standard conformance to the DICOM V3.0 Verification Service Class as an SCP.

2.1.3.1.3 Presentation Context Acceptance Criterion - Verification

STORESCP accepts any Presentation Context from the table in section 2.1.3.1.2.

2.1.3.1.4 Transfer Syntax Selection Policies - Verification

STORESCP receives requests encoded using the transfer syntax listed in section 2.1.3.1.2.

2.1.3.2 Remote System Request - Storage

This section explains how STORESCP handles a remote system request from an SCU using the C-STORE operation.

2.1.3.2.1 Associated Real-World Activity - Storage

The associated Real-World Activity associated with the storage operation is the transmission of an object from a remote AE to the system upon which STORESCP is running. STORESCP issues a failure status if it is unable to store the object on disk. STORESCP also invokes an attached application for each object received. STORESCP does not respond to the C-STORE-REQ until it has verified the data and determines it is able to insert it into the database.

2.1.3.2.2 Presentation Context Table - Storage

Acceptable Storage Presentation Contexts for STORESCP					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name**	**UID**		
Computed Radiography Image	1.2.840.10008.5.1.4.1.1.1	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Digital X-ray Image - Presentation	1.2.840.10008.5.1.4.1.1.1.1	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Digital X-ray Image - Processing	1.2.840.10008.5.1.4.1.1.1.1.1	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Digital Mammo X-ray Image -Presentation	1.2.840.10008.5.1.4.1.1.1.2	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Digital Mammo X-ray Image -Processing	1.2.840.10008.5.1.4.1.1.1.2.1	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Digital IntraOral X-ray Image-Presentation	1.2.840.10008.5.1.4.1.1.1.3	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Digital IntraOral X-ray Image – Processing	1.2.840.10008.5.1.4.1.1.1.3.1	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Computed Tomography Image	1.2.840.10008.5.1.4.1.1.2	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Enhanced CT Image	1.2.840.10008.5.1.4.1.1.2.1	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Ultrasound Multi-frame Image (Retired)	1.2.840.10008.5.1.4.1.1.3	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Ultrasound Multi-frame Image	1.2.840.10008.5.1.4.1.1.3.1	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
MR Image	1.2.840.10008.5.1.4.1.1.4	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Enhanced MR Image	1.2.840.10008.5.1.4.1.1.4.1	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
MR Spectroscopy Image	1.2.840.10008.5.1.4.1.1.4.2	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Ultrasound Image (Retired)	1.2.840.10008.5.1.4.1.1.6	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Ultrasound Image	1.2.840.10008.5.1.4.1.1.6.1	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Enhanced US Volume	1.2.840.10008.5.1.4.1.1.6.2	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Multi-frame Single Bit Secondary Capture	1.2.840.10008.5.1.4.1.1.7.1	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Multi-frame Grayscale Byte Secondary Capture	1.2.840.10008.5.1.4.1.1.7.2	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Multi-frame Grayscale Word Secondary Capture	1.2.840.10008.5.1.4.1.1.7.3	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Multi-frame True Color Secondary Capture	1.2.840.10008.5.1.4.1.1.7.4	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None

Acceptable Storage Presentation Contexts for STORESCP					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name**	**UID**		
General ECG Waveform	1.2.840.10008.5.1.4.1.1.9.1.2	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Ambulatory ECG Waveform	1.2.840.10008.5.1.4.1.1.9.1.3	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Cardiac Electrophysiology Waveform	1.2.840.10008.5.1.4.1.1.9.3.1	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Basic Voice Audio Waveform	1.2.840.10008.5.1.4.1.1.9.4.1	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Grayscale Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.1	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Color Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.2	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Pseudo-color Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.3	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Blending Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.4	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
X-ray Angiographic Image	1.2.840.10008.5.1.4.1.1.12.1	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Enhanced XA Image	1.2.840.10008.5.1.4.1.1.12.1.1	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
X-ray Fluoroscopy Image	1.2.840.10008.5.1.4.1.1.12.2	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Enhanced XRF Image	1.2.840.10008.5.1.4.1.1.12.2.1	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Breast Tomo-synthesis Image	1.2.840.10008.5.1.4.1.1.13.1.3	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Breast Projection X-Ray Image for Presentation	1.2.840.10008.5.1.4.1.1.13.1.4	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Breast Projection X-Ray Image for Processing	1.2.840.10008.5.1.4.1.1.13.1.5	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Nuclear Medicine Image	1.2.840.10008.5.1.4.1.1.20	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Raw Data	1.2.840.10008.5.1.4.1.1.66	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Spatial Registration	1.2.840.10008.5.1.4.1.1.66.1	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Deformable Spatial Registration	1.2.840.10008.5.1.4.1.1.66.3	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.4	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Surface Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.5	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Real World Value Mapping	1.2.840.10008.5.1.4.1.1.67	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
VL Endoscopic Image	1.2.840.10008.5.1.4.1.1.77.1.1	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
VL Microscopic Image	1.2.840.10008.5.1.4.1.1.77.1.2	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
VL Photographic Image	1.2.840.10008.5.1.4.1.1.77.1.4	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
VL Slide Coordinates Microscopic Image	1.2.840.10008.5.1.4.1.1.77.1.3	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Ophthalmic Photography 8 Bit Image	1.2.840.10008.5.1.4.1.1.77.1.5.1	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Ophthalmic Photography 16 Bit Image	1.2.840.10008.5.1.4.1.1.77.1.5.2	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None

Acceptable Storage Presentation Contexts for STORESCP					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name**	**UID**		
Stereometric Relationship	1.2.840.10008.5.1.4.1.1.77.1.5.3	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Ophthalmic Tomography Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.4	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Basic Text SR	1.2.840.10008.5.1.4.1.1.88.11	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Enhanced SR	1.2.840.10008.5.1.4.1.1.88.22	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Comprehensive SR	1.2.840.10008.5.1.4.1.1.88.33	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Procedure Log	1.2.840.10008.5.1.4.1.1.88.40	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Key Object Selection	1.2.840.10008.5.1.4.1.1.88.59	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Mammography CAD SR	1.2.840.10008.5.1.4.1.1.88.50	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Chest CAD SR	1.2.840.10008.5.1.4.1.1.88.65	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
PET Curve	1.2.840.10008.5.1.4.1.1.129	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
PET Image	1.2.840.10008.5.1.4.1.1.128	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Encapsulated PDF	1.2.840.10008.5.1.4.1.1.104.1	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
RT Beams Treatment Record	1.2.840.10008.5.1.4.1.1.481.4	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
RT Brachy Treatment Record	1.2.840.10008.5.1.4.1.1.481.6	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
RT Dose	1.2.840.10008.5.1.4.1.1.481.2	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
RT Image	1.2.840.10008.5.1.4.1.1.481.1	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
RT Plan	1.2.840.10008.5.1.4.1.1.481.5	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
RT Structure Set	1.2.840.10008.5.1.4.1.1.481.3	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
RT Treatment Summary Record	1.2.840.10008.5.1.4.1.1.481.7	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None

The following Storage SOP Classes are supported for archiving, but are not included in the default configuration.

Acceptable Storage Presentation Contexts for STORESCP					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name**	**UID**		
Stored Print	1.2.840.10008.5.1.1.27	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Hardcopy Grayscale Image	1.2.840.10008.5.1.1.29	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Hardcopy Color Image	1.2.840.10008.5.1.1.30	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Nuclear Medicine Image (Retired)	1.2.840.10008.5.1.4.1.1.5	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Standalone Overlay	1.2.840.10008.5.1.4.1.1.8	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Standalone Curve	1.2.840.10008.5.1.4.1.1.9	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None

Acceptable Storage Presentation Contexts for STORESCP					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name**	**UID**		
Twelve Lead ECG Waveform	1.2.840.10008.5.1.4.1.1.9.1.1	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Hemodynamic Waveform	1.2.840.10008.5.1.4.1.1.9.2.1	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Standalone Modality LUT	1.2.840.10008.5.1.4.1.1.10	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
Standalone VOI LUT	1.2.840.10008.5.1.4.1.1.11	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
X-ray Angio BiPlane Image (Ret.)	1.2.840.10008.5.1.4.1.1.12.3	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
VL Image (Retired)	1.2.840.10008.5.1.4.1.1.77.1	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None
VL Multi-Frame Image (Retired)	1.2.840.10008.5.1.4.1.1.77.2	*See default transfer syntax table*	*See default transfer syntax table*	SCP	None

The default transfer syntaxes STORESCP supports are as defined in the table below. Unless noted otherwise, all SOP classes STORESCP supports can use any of these transfer syntaxes. The selection of which one STORESCP prefers if given the option is configurable.

Default Transfer Syntax Table	
Transfer Syntax	**UID**
Implicit VR Little Endian	1.2.840.10008.1.2
Explicit VR Little Endian	1.2.840.10008.1.2.1
Explicit VR Big Endian	1.2.840.10008.1.2.2
JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50
JPEG Lossless Non-hierarchical 1st Order Predication	1.2.840.10008.1.2.4.70
RLE Lossless	1.2.840.10008.1.2.5
JPEG 2000 Lossless Only	1.2.840.10008.1.2.4.90
JPEG 2000	1.2.840.10008.1.2.4.91

2.1.3.2.2.1 SOP Specific Conformance to Storage SOP Classes

STORESCP conforms to each Storage SOP Class at Level 2 (full) and Signature Level 3. In the case of a successful C-STORE, the object is stored on the disk. Otherwise STORESCP returns an error and purges the object. If STORESCP returns one of the following status codes, the C-STORE was unsuccessful:

- A700 (Out of Resources) - Indicates that there was insufficient disk space to store the image.
- A800 (SOP Class Not Supported) - Indicates that the SOP Class of the object in the C-STORE operation did not match the Abstract Syntax negotiated for the Presentation Context.
- A900 (Data Set does not match SOP Class) - Indicates that the Data Set does not contain an instance of the SOP Class specified or the Affected SOP Instance UID does not match the object's SOP Instance UID.
- C000 (Cannot understand) - Indicates that the Data Set cannot be parsed into elements.

The stored objects may be accessed through eRAD PACS's viewer, or DICOM Query/Retrieve SOP classes. The following stored objects can be viewed or applied using eRAD PACS's viewer:

Computed Tomography Image
Enhanced CT Image
Computed Radiography Image
Grayscale Softcopy Presentation State
MR Image
Enhanced MR Image
MR Spectroscopy Image
Digital Mammography Image for Presentation
Digital Mammography Image for Processing
Breast Tomosynthesis Image
Breast Projection X-Ray Image for Presentation
Breast Projection X-Ray Image for Processing
Digital X-ray Image for Presentation
Digital X-ray Image for Processing
Nuclear Medicine Image
Nuclear Medicine Image (Retired)
PET Image
RT Image
Secondary Capture Image
Multi-frame Single Bit Secondary Capture
Multi-frame Grayscale Byte Secondary Capture
Multi-frame Grayscale Word Secondary Capture

Multi-frame True Color Secondary Capture
Ultrasound Image
Ultrasound Image (Retired)
Ultrasound Multi-frame Image
Ultrasound Multi-frame Image (Retired)
Enhanced US Volume
VL Endoscopic Image
VL Microscopic Image
VL Photographic Image
VL Slide Coordinates Microscopic Image
VL Image (Retired)
VL Multi-frame Image (Retired)
X-ray Angiographic Image
Enhanced XA Image
X-ray Fluoroscopy Image
Enhanced XRF Image
X-ray Angiographic Bi-Plane Image (Retired)
Basic Text Structured Report
Comprehensive Structured Report
Enhanced Structured Report
Mammography CAD SR
Spatial Registration
Deformable Spatial Registration
Segmentation Storage

STORESCP does not delete a file it has received unless directed to do so by a user or administrator.

STORESCP may add private attributes to any acquired object. The attributes are from the PB Storage Module.

PB Storage Module

Tag	VR	Type	Description	Additional Comment
F215,00xx	LO	1	PB Private Data Identifier	=PB Group A
F215,xx15	DA	1	PB Last Modified Date	
F215,xx16	TM	1	PB Last Modified Time	
F215,xx17	DA	3	PB Acquisition Date	
F215,xx18	TM	3	PB Acquisition Time	
F215,xx45	CS	3	Obsolete Status	Enumerated value: STUDY – entire study is obsolete PARTIAL – some objects are obsolete. See (F215,xx46) for object list.
F215,xx46	SQ	1C	Obsolete Object Sequence	Required if (F215,xx45) is PARTIAL.
> 0008,1150	UI	1	Referenced SOP Class UID	
> 0008,1155	UI	1	Referenced SOP Instance UID	
> F215,xx47	DA	1	Invalidate Date	
> F215,xx48	TM	1	Invalidate Time	
F215,xx75	CS	3	Attachment Type	Document Type value of this attribute.
F215,xxA0	SQ	3	PB Custom Field Sequence	User-defined fields containing values
>F215,xxA1	LO	1	PB Field Name	Name of the user-defined field
>F215,xxA2	UT	1	PB Field Value	Value of the user-defined field
		3	All other DICOM Attributes	All DICOM-defined Attributes included at the root level in the PB Report object contain values added to or modified from the original objects in this study, or attributes not defined by the Requested Procedure.

2.1.3.2.2.2 SOP Specific Conformance to Structured Report Storage SOP Classes

In addition to the basic support for Storage SOP Classes listed in the previous section, STORESCP will interpret and display structure reports objects that conform to the Basic Text SR, Enhanced SR and Composite SR SOP Classes. All of the conformance conditions for general Storage SOP Classes applied, in addition to those given in the following paragraph.

STORESCP renders the information in the structured report object in both the web and viewing graphical user interfaces. The text and images are rendered, along with the supported report demographics.

2.1.3.2.2.3 SOP Specific Conformance to Grayscale Softcopy Presentation State SOP Classes

When a grayscale softcopy presentation state object exists for any image object listed as viewable (in section 2.1.3.2.2.1) and displayed on the screen, eRAD PACS informs the user it exists and allows the user to apply it to the image. If multiple presentation state objects exist, the user can apply any number of them selectively. If more than one presentation state object affects the same display parameter, the last one applied takes precedence. Currently, eRAD PACS applies the VOI LUT,

spatial transformation (zoom, pan, crop, flip/rotate) and graphic annotations (lines, ellipses, polylines, etc.) Other presentation state information, including screen layout, is ignored.

2.1.3.2.3 Presentation Context Acceptance Criterion - Storage

STORESCP will accept any and all Presentation Contexts listed in the table in section 2.1.3.2.2.

2.1.3.2.4 Transfer Syntax Selection Policies - Storage

The default behavior of the STORESCP application is to prefer transfer syntaxes having an explicit value representation to those using the default implicit VR. If STORESCP is running on big-endian hardware it will prefer DICOM Explicit Value Representation Big Endian transfer syntax (and vice versa)

STORESCP does not support extended negotiation.

2.2 SENDSCU - Specification

SENDSCU provides Standard Conformance to the DICOM V3.0 SOP Classes listed in section 2.1, as an SCU. SENDSCU also provides supports for the DICOM Structured Report SOP Class for Basic Text SR objects.

2.2.1 Association Establishment

2.2.1.1 General

The maximum PDU size that SENDSCU uses is configurable, with a minimum of 8K bytes. Default is 16K. Maximum is 64K.

2.2.1.2 Number of Associations

The number of simultaneous associations that SENDSCU will initiate is limited by the kernel parameters of the underlying TCP/IP implementation and by a configurable parameter that defaults to 5 simultaneous associations.

2.2.1.3 Asynchronous Nature

SENDSCU will only allow a single outstanding operation on an Association. Therefore SENDSCU does not perform asynchronous window negotiation.

2.2.1.4 Implementation Identifying Information

SENDSCU provides a single implementation Class UID, 1.2.826.0.1.3680043.2.93.0.99

SENDSCU provides an implementation version name of *ERAD_<version>*, where *<version>* is the software version number. An example is *ERAD_60*.

2.2.2 Association Initiation

SENDSCU initiates an association when it receives a request from a user or system process to transmit one or more stored objects to a specified DICOM AE. The destination AE's IP address, port number and AE Title come from a list of preconfigured entries. SENDSCU attempts to establish a connection and, if successful, sends the image and/or report objects as queued. Failed transmission will be retried for a defined period of time, and then returned to the user or system for resolution.

2.2.2.1 eRAD PACS Request – Send Images

This section explains how STORESCU handles a user or system request to send one or more image objects using the C-STORE operation.

2.2.2.1.1 Associated Real-World Activity – Send Images

The associated Real-World Activity associated with the C-STORE operation is the user or system request for transmitting a selected set of image objects to a remote AE.

2.2.2.1.2 Presentation Context Table – Send Images

The Abstract Syntax of the proposed Association conforms to that which is stored in the object being transmitted. Since SENDSCU only supports the SOPs STORESCP supports, the full list of possible Abstract Syntaxes is listed in the table in section 2.1.3.2.2. The remainder of the presentation context information is shown in the table below.

Proposed Presentation Contexts for SENDSCU					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name**	**UID**		
As Defined in Object	*As Defined in Object*	*As defined in section 2.1.3.2.2*	*As defined in section 2.1.3.2.2*	SCU	None

2.2.2.1.2.1 SOP Specific Conformance to Storage SOP Classes

Upon receiving a successful status from the remote AE, SENDSCU returns to the requesting user a good status. By default, SENDSCU does not take action upon the stored image object.

Upon a failure status or a warning from the remote AE, SENDSCU closes the Association and places the objects on a retry queue. At scheduled intervals, SENDSCU attempts to resend the object(s). After attempting to resend the object(s) a defined number of times, SENDSCU places them on a failed queue, waiting for user action.

SENDSCU may add private attributes to the object. These attributes can be found in private group 0xF215, marked with a private creator value of “PB group A”. These attributes can be excluded through configuration.

SENDSCU does not support extended negotiation.

2.2.2.2 eRAD PACS Request – Send Reports

This section explains how SENDSCU handles a user or the system uses the C-STORE operation to send one or more structured report objects created by SENDSCU.

2.2.2.2.1 Associated Real-World Activity – Send Reports

Before SENDSCU attempts to send a structured report, one must be created. A user can create the report by entering the report text and image information into the eRAD PACS Viewer. Alternatively, an information system can send the report text information to eRAD PACS and SENDSCU will convert the HL7 data into a structured report object. The associated Real-World Activity associated with the C-STORE operation is the user or system request to transmit a selected set of image objects to a remote AE. If a structured report for the study exists, SENDSCU will attempt to negotiate a Presentation Context for the report object and transmit it.

2.2.2.2.2 Presentation Context Table – Send Reports

The Abstract Syntax of the proposed Association conforms to the Basic Text SR SOP Class.

Proposed Presentation Contexts for SENDSCU					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name**	**UID**		
Basic Text SR	1.2.840.10008.5.1.4.1.1.88.11	Impl.VR Little Endian Expl.VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None

2.2.2.2.2.1 SOP Specific Conformance to Structured Report Storage SOP Classes

Upon receiving a successful status from the remote AE, SENDSCU returns to the requesting user a good status. Upon a failure status or a warning from the remote AE, SENDSCU places the object on a retry queue and periodically attempts to resend them for a defined period of time. When SENDSCU reaches the maximum number of retries and has not successfully transmitted the object(s), it places them on a failed queue, waiting for user action.

SENDSCU supports structure report objects for the image and other composite objects listed in the table in section 2.1.3.2.2. SENDSCU supports the following Value Types:

Text	PNAME	Container

SENDSCU supports the following Relationship Types:

Source Value Type	Relationship Type	Target Value Type
Container	CONTAINS	Text, Container
Container	HAS OBS CONTEXT	PNAME

SENDSCU may include private attributes in the objects. Private attributes exist in private groups as defined by DICOM's encoding rules. These attributes can be found in private group 0xF215, marked with a private creator value of "ImageMedical".

SENDSCU does not support extended negotiation.

2.2.2.3 eRAD PACS Request – Send Presentation State

This section explains how SENDSCU uses the C-STORE operation to send one or more software presentation state objects created by eRAD PACS.

2.2.2.3.1 Associated Real-World Activity – Send Presentation State Object

SENDSCU creates a presentation state object when a study containing saved presentation states is about to be transmitted across a DICOM Association to an AE that does not report an eRAD Implementation Class UID in the Association Response message.

2.2.2.3.2 Presentation Context Table – Send Presentation State Object

The Abstract Syntax of the proposed Association conforms to the Software Presentation State SOP Class.

Proposed Presentation Contexts for SENDSCU					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name**	**UID**		
Grayscale software presentation state	1.2.840.10008.5.1.4.1.1.11.1	Impl.VR Little Endian Expl.VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None

2.2.2.3.2.1 SOP Specific Conformance to Software Presentation State SOP Classes

Presentation state objects are derived from grayscale transformation (window and level settings), spatial transformation (orientation, zoom factor) and graphical and text annotations applied by the user and explicitly saved from the eRAD PACS graphical user interface (Viewer). Presentation state may be saved for any object supported by the eRAD PACS Viewer, as listed in section 2.1.3.2.2.1. SENDSCU converts the information stored in eRAD PACS's proprietary format into a Grayscale Software Presentation State object immediately before transmitting the data across a DICOM Association.

2.2.3 Association Acceptance

SENDSCU does not accept Associations.

2.3 PRINTSCU - Specification

PRINTSCU provides Standard Conformance to the DICOM V3.0 Print Management SOP Class as an SCU.

2.3.1 Association Establishment

2.3.1.1 General

The maximum PDU size that the PRINTSCU AE uses is configurable, with a minimum of 8K bytes. Default is 16K. Maximum is 64K.

2.3.1.2 Number of Associations

The number of simultaneous associations that PRINTSCU initiates is limited by the kernel parameters of the underlying TCP/IP implementation and by a configurable parameter in one of the configuration files.

2.3.1.3 Asynchronous Nature

PRINTSCU will only allow a single outstanding operation on an Association. Therefore PRINTSCU does not perform asynchronous window negotiation.

2.2.1.4 Implementation Identifying Information

PRINTSCU will provide a single implementation Class UID of 1.2.826.0.1.3680043.2.93.0.99

PRINTSCU will provide an implementation version name of *ERAD_<version>*, where <*version*> is the software version number. An example is *ERAD_60*.

2.3.2 Association Initiation

PRINTSCU initiates an association when it receives a request from a user or system process to print one or more image objects to a specified DICOM Print AE. The destination AE's IP address, port number and AE Title come from a list of preconfigured entries. PRINTSCU will attempt to establish a connection and, if successful, will send the print session information. Failed transmission will be returned to the user or system for a resolution.

2.3.2.1 eRAD PACS Request - Print

This section explains how PRINTSCUU handles a user or the system request to print image objects using the DICOM DIMSE services.

2.3.2.1.1 Associated Real-World Activity - Print

The associated Real-World Activity associated with the print operation is the user or system request for transmitting a selected set of image objects to a remote AE.

2.3.2.1.2 Presentation Context Table – Print

The Association contains all supported Abstract Syntaxes. The list of supported presentation context information is shown in the table below.

Proposed Presentation Contexts for PRINTSCU					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name**	**UID**		
Basic Grayscale Print Meta SOP Class	1.2.840.10008.5.1.1.9	Impl.VR Little Endian Expl.VR Little Endian Expl.VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None

2.3.2.1.2.1 SOP Specific Conformance to Print SOP Classes

Upon receiving a successful status from the remote AE, PRINTSCU returns to the requesting user a good status. By default, PRINTSCU does not take action upon the printed image object.

Upon a failure status or a warning from the remote AE, PRINTSCU closes the Association and returns to the requesting user a failed status. The user must then decide what action to take next. PRINTSCU takes no further action until it receives instruction from the user.

2.3.3 Association Acceptance

PRINTSCU does not accept Associations.

2.4 QRAE - Specification

QRAE consists of two application entities. **QRSCU** provides Standard Conformance to the DICOM V3.0 Query/Retrieve SOP Class as an SCU. **QRSCP** provides Standard Conformance to the DICOM V3.0 Query/Retrieve SOP Class as an SCP.

2.4.1 Association Establishment

2.4.1.1 General

The maximum PDU size that the QRSCU and QRSCP uses is configurable, with a minimum of 8K bytes. Default is 16K. Maximum is 64K.

2.4.1.2 Number of Associations

The number of simultaneous associations that QRSCU and QRSCP initiate is limited by the kernel parameters of the underlying TCP/IP implementation and by a configurable parameter stored in a configuration file.

2.4.1.3 Asynchronous Nature

QRSCU and QRSCP each allow only a single outstanding operation on an Association. Therefore QRSCU and QRSCP do not perform asynchronous window negotiation.

2.4.1.4 Implementation Identifying Information

QRSCU and QRSCP provide a single implementation Class UID of 1.2.826.0.1.3680043.2.93.0.99. QRSCU and QRSCP provide an implementation version name of *ERAD_<version>*, where *<version>* is the software version number. An example is *ERAD_60*.

2.4.2 Association Initiation

QRSCU initiates an association when it receives a request from a user or system process to search the database of a specified DICOM Q/R AE, or to request that a specified object be transmitted from on AE to another. The destination AE's IP address, port number, AE Title, and move destinations come from a list of preconfigured entries. QRSCU will attempt to establish a connection and, if successful, will send the query or move parameters. Failed transmission will be returned to the user or system for a resolution.

2.4.2.1 eRAD PACS Request - Find

This section explains how QRSCU handles a user or the system request to query a remote AE using DICOM's DIMSE C-FIND services.

2.4.2.1.1 Associated Real-World Activity - Find

The associated Real-World Activity associated with the find operation is a user or system request to list the items that match the specified criteria. The matching criteria are selected from a user interface or from some encoded data. The activity completes when the remote AE returns the matching items.

2.4.2.1.2 Presentation Context Table – Find

The Association contains all supported Abstract Syntaxes. The list of supported presentation context information is shown in the table below.

Proposed Presentation Contexts for QRSCU					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name**	**UID**		
Patient Root Q/R Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	Impl.VR Little Endian Expl.VR Little Endian Expl.VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	Time zone query adjustment
Study Root Q/R Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Impl.VR Little Endian Expl.VR Little Endian Expl.VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	Time zone query adjustment

2.4.2.1.2.1 SOP Specific Conformance to Find SOP Classes

QRSCU conforms to the Patient Root, Study Root and Patient/Study Only SOP Class groups as an SCU. QRSCU does not negotiate relational queries.

The complete list of keys supported by QRSCU is given in the following table.

Tag	Attribute Description	Type
0008, 0018	SOP Instance UID	O
0008, 0020	Study Date	R
0008, 0030	Study Time	R
0008, 0050	Accession Number	R
0008, 0060	Modality	O
0008, 0090	Referring Physician	O
0008, 1030	Study Description	O
0008, 1060	Reading Physician	O
0010, 0010	Patient Name	R
0010, 0020	Patient ID	R
0010, 0030	Patient Date of Birth	O
0010, 0032	Patient Time of Birth	O
0010, 0040	Patient Sex	O
0020, 000D	Study UID	U
0020, 000E	Series UID	O
0020, 0010	Study ID	R
0020, 0011	Series Number	O
0020, 0013	Image Number	O

Upon receiving a successful status from the remote AE, QRSCU returns to the requesting user a good status and all the records that match the requested criteria. QRSCU then closes the Association.

Upon a failure status or a warning from the remote AE, QRSCU closes the Association and returns to the requesting user a failed status. The user must then decide what action to take next.

2.4.2.2 eRAD PACS Request - Move

This section explains how QRSCU handles a user or the system request to move one or more image objects from the remote AE to another AE using DICOM's DIMSE C-MOVE service.

2.4.2.2.1 Associated Real-World Activity - Move

The associated Real-World Activity associated with the move operation is the user or system request for transmitting a selected set of image objects from the remote AE to another AE.

2.4.2.2.2 Presentation Context Table – Move

The Association contains all supported Abstract Syntaxes. The list of supported presentation context information is shown in the table below.

Proposed Presentation Contexts for QRSCU					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name**	**UID**		
Patient Root Q/R Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	Impl.VR Little Endian Expl.VR Little Endian Expl.VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	Time zone adjustment
Study Root Q/R Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Impl.VR Little Endian Expl.VR Little Endian Expl.VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	Time zone adjustment

2.4.2.2.2.1 SOP Specific Conformance to Move SOP Classes

QRSCU conforms to the Patient Root - Move, Study Root – Move and Patient/Study Only – Move SOP Classes as an SCU.

Upon receiving a successful status from the remote AE, QRSCU returns to the requesting user a good status. QRSCU then closes the Association.

Upon a failure status or a warning from the remote AE, QRSCU closes the Association and returns to the requesting user a failed status. The user must then decide what action to take next.

2.4.3 Association Acceptance

QRSCP accepts an association when it receives a valid Association request delivered to the configured TCP port which contains a valid application entity title, and offers at least one of the presentation contexts listed in the tables below. QRSCP will receive query and move requests transmitted on that association, search the database for matching records, and then either return the matches to the requesting AE or initiate a SENDSCU operation to send the objects to the specified AE. QRSCP places no limitation on who may connect to it when running in promiscuous mode.

2.4.3.1 Remote System Request - Find

This section explains how QRSCP handles a remote system Find request from an SCU using the C-FIND command.

2.4.3.1.1 Associated Real-World Activity - Find

QRSCP performs a search of the database looking for records that match the specified criteria whenever it receives a valid C-FIND request from an AE. For each match, QRSCP will return a response message. When all responses are sent, QRSCP will wait for another request or for the SCU to close the association.

2.4.3.1.2 Presentation Context Table – Find

QRSCP will accept the Presentation Contexts listed in the following table.

Proposed Presentation Contexts for QRSCP					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name**	**UID**		
Patient Root Q/R Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	Impl.VR Little Endian Expl.VR Little Endian Expl.VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	Time zone query adjustment
Study Root Q/R Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Impl.VR Little Endian Expl.VR Little Endian Expl.VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	Time zone query adjustment
Patient/Study Only Q/R Information Model – FIND	1.2.840.10008.5.1.4.1.2.3.1	Impl.VR Little Endian Expl.VR Little Endian Expl.VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	Time zone query adjustment

2.4.3.1.2.1 SOP Specific Conformance to Query/Retrieve SOP Classes

QRSCP provides standard conformance to the DICOM Patient Root – Find, Study Root – Find, and Patient/Study Only - Find Service Classes as an SCP. QRSCP support all of the attributes listed in the table in section 2.4.2.1.2.1. QRSCP does not negotiate for relational queries and therefore does not support them. QRSCP supports both case sensitive and case insensitive queries. The option is specified in the configuration file. QRSCP does not support extended negotiation.

> Note: Even though time fragments received in the C-Find requests are handled, there are no fragments stored in the database for datetime fields. As a result, fractional times in query requests are effectively ignored.

2.4.3.1.3 Presentation Context Acceptance Criterion - Find

QRSCP will accept any Presentation Context from the table in section 2.4.3.1.2. Preference will be given to the Study Root SOP classes if multiple Presentation Contexts are requested.

2.4.3.1.4 Transfer Syntax Selection Policies - Find

QRSCP will receive requests encoded using the transfer syntax listed in the table in section 2.4.3.1.2.

2.4.3.2 Remote System Request - Move

This section explains how QRSCP handles a remote system move request from an SCU using the C-MOVE command.

2.4.3.2.1 Associated Real-World Activity - Move

QRSCP performs a search of the database looking for the requested object(s) and then sends them to SENDSCU for transmission to the specified AE. For each match, QRSCP will return a response message to the requesting AE. When all objects are sent, QRSCP will wait for another request or for the SCU to close the association.

2.4.3.2.2 Presentation Context Table – Move

QRSCP will accept the Presentation Contexts listed in the following table.

Proposed Presentation Contexts for QRSCP					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name**	**UID**		
Patient Root Q/R Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	Impl.VR Little Endian Expl.VR Little Endian Expl.VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	Time zone query adjustment
Study Root Q/R Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Impl.VR Little Endian Expl.VR Little Endian Expl.VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	Time zone query adjustment
Patient/Study Only Q/R Information Model – MOVE	1.2.840.10008.5.1.4.1.2.3.2	Impl.VR Little Endian Expl.VR Little Endian Expl.VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	Time zone query adjustment

2.4.3.2.2.1 SOP Specific Conformance to Query/Retrieve SOP Classes

QRSCP provides standard conformance to the DICOM Patient Root – Move, Study Root – Move, and Patient/Study Only - Move Service Classes as an SCP. QRSCP supports sub-operations for all of the Storage SOP classes listed in section 2.1.

2.4.3.2.3 Presentation Context Acceptance Criterion - Move

QRSCP will accept any Presentation Context from the table in section 2.4.3.2.2. Preference will be given to the Study Root SOP classes if multiple Presentation Contexts are requested.

2.4.3.2.4 Transfer Syntax Selection Policies - Move

QRSCP will receive requests encoded using the transfer syntax listed in the table in section 2.4.3.2.2.

2.5 MWLAE - Specification

MWLSCU provides Standard Conformance to the DICOM V3.0 Modality Worklist Management SOP Class as an SCU. **MWLSCP** provides Standard Conformance to the DICOM V3.0 Modality Worklist SOP Class as an SCP. **MPPSSCP** provides Standard Conformance to the DICOM V3.0 Modality Performed Procedure Step SOP Class as an SCP.

2.5.1 Association Establishment

2.5.1.1 General

The maximum PDU size that MWLSCU, MWLSCP and MPPSSCP uses is configurable, with a minimum of 8K bytes. Default is 16K. Maximum is 64K.

2.5.1.2 Number of Associations

The number of simultaneous associations that MWLSCU, MWLSCP and MPPSSCP initiates is limited by the kernel parameters of the underlying TCP/IP implementation and by a configurable parameter that defaults to 5 simultaneous associations.

2.5.1.3 Asynchronous Nature

MWLSCU, MWLSCP and MPPSSCP only allows a single outstanding operation on an Association and therefore do not perform asynchronous window negotiation.

2.5.1.4 Implementation Identifying Information

MWLSCU, MWLSCP and MPPSSCP provide a single implementation Class UID, 1.2.826.0.1.3680043.2.93.0.99

MWLSCU, MWLSCP and MPPSSCP provide an implementation version name of *ERAD_<version>*, where *<version>* is the software version number. An example is *ERAD_60*.

2.5.2 Association Initiation

MWLSCU initiates an association when it receives a request from the system to request a list of scheduled procedures from the remote AE. The destination AE's IP address, port number and AE Title come from the configuration settings. MWLSCU issues a request for all procedures that have been scheduled since the last successful query. Responses to the query request will be inserted into the database and made available on the worklist.

2.5.2.1 eRAD PACS Request – Get Worklist Item

This section explains how MWLSCU handles a system request to query a remote AE using DICOM's DIMSE C-FIND services.

2.5.2.1.1 Associated Real-World Activity – Get Worklist Item

When eRAD PACS wants to retrieve the most recent list of scheduled exam procedures, it calls upon MWLSCU to query the worklist manager for a list of items. The matching criteria are hardcoded into MWLSCU. The activity completes when the remote AE returns the matching items, if any, and the final response message.

2.5.2.1.2 Presentation Context Table – Get Worklist Item

The Association contains all supported Abstract Syntaxes. The list of supported presentation context information is shown in the table below.

Proposed Presentation Contexts for MWLSCU					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name**	**UID**		
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	Impl.VR Little Endian Expl.VR Little Endian Expl.VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None

2.5.2.1.2.1 SOP Specific Conformance to Find SOP Classes

MWLSCU may request any of the attributes in the following table. The Attributes of type *R* will be in every query request. The *O* type attributes may be in the query.

Tag	Attribute Description	Type
0008, 0050	Accession Number	R
0008, 0080	Institution Name	O
0008, 0081	Institution Address	O
0008, 0082	Institution Code Sequence	O
0008, 0090	Referring Physician	R
0008, 0092	Referring Physician Address	R
0008, 0094	Referring Physician Telephone Number	R
0008, 1080	Admitting Diagnosis Description	O
0008, 1084	Admitting Diagnosis Code Sequence	O
0008, 1110	Referenced Study Sequence	O
0008, 1120	Referenced Patient Sequence	O
0008, 1125	Referenced Visit Sequence	O
0010, 0010	Patient Name	R
0010, 0020	Patient ID	R

Tag	Attribute Description	Type
0010, 0021	Issuer of Patient ID	O
0010, 0030	Patient Date of Birth	R
0010, 0032	Patient Time of Birth	R
0010, 0040	Patient Sex	R
0010, 0050	Patient Insurance Plan Code Sequence	O
0010, 1000	Other Patient IDs	O
0010, 1001	Other Patient Names	O
0010, 1005	Patient Birth Name	O
0010, 1010	Patient Age	O
0010, 1020	Patient Size	O
0010, 1030	Patient Weight	O
0010, 1040	Patient Address	R
0010, 1060	Patient's Mother's Birth Name	O
0010, 1080	Military Rank	O
0010, 1081	Branch of Service	O
0010, 1090	Medical Record Locator	O
0010, 2000	Medical Alerts	O
0010, 2110	Contrast Allergies	O
0010, 2150	Country of Residence	O
0010, 2152	Region of Residence	O
0010, 2154	Patient's Telephone Number	R
0010, 2160	Ethnic Group	O
0010, 2180	Occupation	O
0010, 21A0	Smoking Status	O
0010, 21B0	Additional Patient History	R
0010, 21C0	Pregnancy Status	O
0010, 21D0	Last Menstrual Date	O
0010, 21F0	Patient Religious Preference	O
0010, 4000	Patient Comments	O
0020, 000D	Study UID	R
0032, 1032	Requesting Physician	R
0032, 1033	Requesting Service	O
0032, 1060	Requested Procedure Description	R
0032, 1064	Requested Procedure Code Sequence	R
0038, 0004	Referenced Patient Alias Sequence	O
0038, 0008	Visit Status ID	O
0038, 0010	Admission ID	O
0038, 0011	Issuer of Admission ID	O
0038, 0016	Route of Admissions	O
0038, 0020	Admitting Date	O
0038, 0021	Admitting Time	O
0038, 0050	Special Needs	O
0038, 0300	Current Patient Location	R
0038, 0400	Patient Institution Residence	O
0038, 0500	Patient State	O
0038, 4000	Visit Comments	O
0040, 0100	Scheduled Procedure Step Sequence	R
0040, 1001	Requested Procedure ID	O
0040, 1002	Reason for the Requested Procedure	R
0040, 1003	Requested Procedure Priority	R
0040, 1004	Patient Transport Arrangements	O
0040, 1005	Requested Procedure Location	O
0040, 1008	Confidentiality Code	O
0040, 1009	Reporting Priority	O
0040, 1010	Names of Intended Results Recipients	O
0040, 1400	Requested Procedure Comments	O
0040, 2001	Reason for the Imaging Service Request	R
0040, 2004	Issue Date of Imaging Service Request	O
0040, 2005	Issue Time of Imaging Service Request	O
0040, 2008	Order Entered By	O
0040, 2009	Order Enterer's Location	O
0040, 2010	Order Callback Phone Number	O
0040, 2016	Placer Order Number Imaging Svc Req.	O

Tag	Attribute Description	Type
0040, 2017	Filler Order Number Imaging Svc Req.	O
0040, 2400	Imaging Service Request Comments	O
0040, 3001	Confidentiality Constraint on Patient Data	O

Upon a failure status or a warning from the remote AE, MWLSCU closes the Association. The system will attempt the query at the next scheduled interval.

2.5.3 Association Acceptance

MWLSCP and MPPSSCP accept associations when either one receives a valid Association request delivered to the configured TCP port which contains a valid application entity title, and offers one of the presentation contexts listed in section 2.5.3.1.2 or 2.5.3.2.2. MWLSCP receives query requests transmitted on that association, search the database for matching records, and then return the matches to the requesting AE. MPPSSCP received N-CREATE and N-SET requests transmitted on the association and updates the database with the data conveyed in its attributes. Neither MWLSCP nor MPPSSCP place limitations on who may connect to it when running in promiscuous mode.

2.5.3.1 Remote System Request – Request Worklist Items

This section explains how MWLSCP handles a remote system Find request from an SCU using the C-FIND command.

2.5.3.1.1 Associated Real-World Activity – Request Worklist Items

MWLSCP performs a search of the database looking for records that match the specified criteria whenever it receives a valid C-FIND request from an AE. For each match, MWLSCP returns a response message. When all responses are sent, MWLSCP waits for another request or for the SCU to close the association.

2.5.3.1.2 Presentation Context Table – Request Worklist Items

MWLSCP will accept the Presentation Contexts listed in the following table.

Proposed Presentation Contexts for MWLSCP					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name**	**UID**		
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	Impl.VR Little Endian Expl.VR Little Endian Expl.VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None

2.5.3.1.2.1 SOP Specific Conformance to the Modality Worklist SOP Class

MWLSCP supports all of the attributes listed in the table in section 2.5.2.1.2.1, with the noted exceptions listed below. The attributes listed in this table as type *R* are searchable attributes, although there is no guarantee that any of these attributes actually contain any value. The remaining, type *O*, attributes may be requested, but MWLSCP will not perform any matching on values.

Tag	Attribute Description	Comment
0040, 0020	Scheduled Procedure Step Status	This attribute of the Scheduled Procedure Step Sequence only supports the following values: STAT, MEDIUM, LOW

MWLSCP supports both case sensitive and case insensitive queries. The option is specified in the configuration file.

> Note: Even though time fragments received in the C-Find requests are handled, there are no fragments stored in the database for datetime fields. As a result, fractional times in query requests are effectively ignored.

2.5.3.1.3 Presentation Context Acceptance Criterion – Request Worklist Items

MWLSCP will accept any Presentation Context from the table in section 2.5.3.1.2.

2.5.3.1.4 Transfer Syntax Selection Policies – Request Worklist Items

MWLSCP will receive requests encoded using the transfer syntax listed in the table in section 2.5.3.1.2.

2.5.3.2 Remote System Request – Update Procedure Step

This section explains how MPPSSCP handles a remote system request to create and update procedure step information using the N-CREATE and N-SET commands.

2.5.3.2.1 Associated Real-World Activity – Update Procedure Step

MPPSSCP received the attribute list in the N-CREATE or N-SET request, finds the corresponding procedure step instance, and updates the information in the database with the information in the request. After updating the database, MPPSSCP returns the completion status and waits for another request or for the SCU to close the association.

2.5.3.2.2 Presentation Context Table – Request Worklist Items

MPPSSCP accepts the Presentation Contexts listed in the following table.

Proposed Presentation Contexts for MWLSCP					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name**	**UID**		
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Impl.VR Little Endian Expl.VR Little Endian Expl.VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None

2.5.3.2.2.1 SOP Specific Conformance to the Modality Performed Procedure Step SOP Class

MPPSSCP supports the attributes listed in the table below. Other attributes are accepted but their values are unused.

Attribute Name	Tag	N-CREATE	N-SET
Specific Character Set	(0008,0005)	1C	Not allowed
Scheduled Step Attribute Sequence	(0040,0270)	1	Not allowed
>Study Instance UID	(0020,000D)	1	Not allowed
>Requested Procedure ID	(0040,1001)	2	Not allowed
>Scheduled Procedure Step ID	(0040,0009)	2	Not allowed
Performed Procedure Step ID	(0040,0253)	1	Not allowed
Performed Procedure Step Status	(0040,0252)	1	1

When MPPSSCP receives an N-CREATE request for a procedure step already in the IN PROGRESS state, it acknowledges the request with an error status (InvalidAttributeValue), and takes no action on the data in the message.

When MPPSSCP receives a request updating the Performed Procedure Step State attribute to COMPLETE, it updates the performed procedure state status, removes the procedure step instance from the database, updates the exam order, sends an update message to the RIS, if one is present, and sets the eRAD PACS study state to Completed.

When MPPSSCP receives a request updating the Performed Procedure Step State attribute to DISCONTINUED, it updates the performed procedure step status, removes the procedure step instance from the database, but leaves the exam order in the system, to be cancelled by the RIS or manually.

MPPSSCP does not coerce any data attributes when it receives a request updating the Performed Procedure Step State attribute, except for modifying the attributes listed in the table in this section as specified in the request message.

Modality performed procedure step SOP instances persist until MPPSSCP receives a request updating the Performed Procedure Step State attribute to DISCONTINUED or COMPLETED.

2.5.3.2.3 Presentation Context Acceptance Criterion – Request Worklist Items

MPPSSCP accepts any Presentation Context from the table in section 2.5.3.2.2.

2.5.3.2.4 Transfer Syntax Selection Policies – Request Worklist Items

MPPSSCP receives requests encoded using the transfer syntax listed in the table in section 2.5.3.2.2.

2.6 COMMITSCP - Specification

COMMITSCP provides Standard Conformance to the DICOM V3.0 Storage Commitment Push Model SOP Class as an SCP.

2.6.1 Association Establishment

2.6.1.1 General

The maximum PDU size that the COMMITSCP AE uses is configurable, with a minimum of 8K bytes. Default is 16K. Maximum is 64K.

2.6.1.2 Number of Associations

The number of simultaneous associations that COMMITSCP initiates is limited by the kernel parameters of the underlying TCP/IP implementation and by a configurable parameter in one of the configuration files.

2.6.1.3 Asynchronous Nature

COMMITSCP will only allow a single outstanding operation on an Association. COMMITSCP does not perform asynchronous window negotiation.

2.6.1.4 Implementation Identifying Information

COMMITSCP provides a single implementation Class UID of 1.2.826.0.1.3680043.2.93.0.99. COMMITSCP provides an implementation version name of *ERAD_<version>*, where <*version*> is the software version number. An example is *ERAD_60*.

2.6.2 Association Initiation

COMMITSCP initiates associations in order to send N-EVENT-REPORT messages to a remote AE. When COMMITSCP requests an association, it always negotiates the SCU/SCP role such that it performs as the SCP.

2.6.2.1 eRAD PACS Request – Acknowledge Commit

This section explains how COMMITSCP acknowledges the transfer of ownership in response to a previously issues commit request.

2.6.2.1.1 Associated Real-World Activity – Acknowledge Commit

When eRAD PACS processes the commit request, it verifies it has previously received the specified objects, marks them to indicate it now owns the data, and verifies they are archived. Once eRAD PACS finishes processing the request, it acknowledges the request by issuing an N-EVENT-REPORT to the requesting AE.

2.6.2.1.2 Presentation Context Table – Acknowledge Commit

The Association request contains all supported Abstract Syntaxes. The list of supported presentation context information is shown in the table below.

Proposed Presentation Contexts for PRINTSCU					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name**	**UID**		
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	Impl.VR Little Endian Expl.VR Little Endian Expl.VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	Role Neg.

2.6.2.1.2.1 SOP Specific Conformance to Storage Commitment Push Model SOP Classes

eRAD PACS uses the DICOM Storage SOP Classes to accept the SOP Instances the remote AE is requesting COMMITSCP to accept. Section 2.2 lists the specific Storage SOP Classes eRAD PACS supports.

COMMITSCP initiates an N-EVENT-REPORT to the remote AE after it verifies that the selected objects are archived by either an eRAD PACS archive or some other archiving system. If no space is available in the archive, COMMITSCP shall not issue an N-EVENT-REPORT message accepting the transfer of ownership.

Once COMMITSCP processes the request and issues the N-EVENT-REPORT message, eRAD PACS does not remove the object from its database. The data is archive internally or externally, and can be retrieved using the user interface tools, or DICOM Query/Retrieve SOP class.

COMMITSCP does not support the optional Storage Media File-set ID and UID attributes.

COMMITSCP does not support the optional Retrieve AE Title attribute in the N-EVENT-REPORT message.

2.6.3 Association Acceptance

COMMITSCP accepts associations when a remote AE wants to pass ownership of one or more objects to eRAD PACS. The objects listed in the N-ACTION request must already reside within eRAD PACS, received and acknowledged by STORESCP.

2.6.3.1 Remote System Request – Commit

This section explains how COMMITSCP handles a system request to transfer the ownership of an object using the DICOM DIMSE services.

2.6.3.1.1 Associated Real-World Activity –Commit

The associated Real-World Activity associated with the commit operation is the remote AE request to transfer ownership of an object to a COMMITSCP. This action can only happen after the respective object has been successfully transferred to STORESCP before initiating the commit action.

2.6.3.1.2 Presentation Context Table –Commit

COMMITSCP accepts the Presentation Contexts listed in the table listed in section 2.6.2.1.2.

2.6.3.1.3 Transfer Syntax Selection Policies – Commit

COMMITSCP will receive requests encoded using any one of the transfer syntaxes listed in the table in section 2.6.2.1.2.

2.7 MEDIAMGR - Specification

MEDIAMGR provides Standard Conformance to the DICOM V3.0 File Service as a File Set Creator (FSC) and File Set Reader (FSR).

2.7.1 Media Manager Specification

The Media Manager specification defines the MEDIAMGR's role as a File Set Creator and File Set Reader. The following table lists the Application Profiles MEDIAMGR supports, their real-world activity and their respective roles.

Application Profile	Profile Class	Real-World Activity	Roles
General Purpose CD-R Interchange	STD-GEN-CD	Import media function	FSR
		Create media function	FSC
General Purpose DVD-RAM Interchange	STD-GEN-DVD-RAM	Import media function	FSR
		Create media function	FSC
General Purpose DVD Interchange with JPEG	STD-GEN-DVD-JPEG	Import media function	FSR
		Create media function	FSC
General Purpose DVD Interchange with JPEG 2000	STD-GEN-DVD-J2K	Import media function	FSR
		Create media function	FSC
General Purpose USB Media Interchange with JPEG	STD-GEN-USB-JPEG	Import media function	FSR
		Create media function	FSC
General Purpose USB Media Interchange with JPEG 2000	STD-GEN-USB-J2K	Import media function	FSR
		Create media function	FSC
General Purpose MultiMedia Card Interchange with JPEG	STD-GEN-MMC-JPEG	Import media function	FSR
		Create media function	FSC
General Purpose MultiMedia Card Interchange with JPEG 2000	STD-GEN-MMC-J2K	Import media function	FSR
		Create media function	FSC
General Purpose CompactFlash Interchange with JPEG	STD-GEN-CF-JPEG	Import media function	FSR
		Create media function	FSC
General Purpose CompactFlash Interchange with JPEG 2000	STD-GEN-CF-J2K	Import media function	FSR
		Create media function	FSC
General Purpose Digital Card Interchange with JPEG	STD-GEN-SD-JPEG	Import media function	FSR
		Create media function	FSC
General Purpose Digital Card Interchange with JPEG 2000	STD-GEN-SD-J2K	Import media function	FSR
		Create media function	FSC

2.7.1.1 File Meta Information for Media Manager

MEDIAMGR does not use the optional file meta information fields.

2.7.1.2 Real World Activities

The MEDIAMGR application supports File Set Creator and File Set Reader roles for the Media Storage Standard SOP Classes listed in the following table.

SOP Class Name	SOP Class UID	Roles
Media Storage Directory Storage	1.2.840.10008.1.3.10	FSC, FSR
<All Storage SOP Classes listed in the table in section 2.1.3.2.2>	*<Refer to SOP Class UID in the table in section 2.1.3.2.2>*	FSC, FSR

2.7.1.2.1 CREATE MEDIA FUNCTION

The Create Media Function is invoked by selecting the Media Creation tool from the eRAD PACS user interface. The user is prompted to select an application profile class. eRAD PACS creates the object files in the format required to write them to the media.

2.7.1.2.1.1 Media Storage Application Profile

All media storage application profiles listed in section 2.7.1 are available to the Create Media Function.

Additional files might be included on the media. This information is not specified in the DICOMDIR directory. The optional files are listed below.

Filename	Description
autorun.inf	Windows autorun file to launch the viewer application.
pbcdview.exe	eRAD PACS viewer application
EPViewerHelp.chm	eRAD PACS viewer application help file.
profile.ini	eRAD PACS viewer user profile.
README	Media creation details.
<EP PbR Object file>	eRAD PACS private object: PB Report object.
<EP PbD Object files>	eRAD PACS private object: PB Dictation object.

2.7.1.2.2 IMPORT MEDIA FUNCTION

The Import Media Function is invoked by selecting the Import Media tool from the eRAD PACS user interface. The system reads the media and builds a list of available Studies. The user selects one or more to be imported into eRAD PACS.

2.7.1.2.2.1 Media Storage Application Profile

All media storage application profiles listed in section 2.7.1 are available to the Import Media Function.

3 - COMMUNICATION PROFILES

3.1 Supported Communication Stacks

All eRAD PACS AEs provides DICOM V3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM standard.

3.2 TCP/IP Stack

All eRAD PACS AEs inherit their TCP/IP stack from the operating system upon which it executes.

3.2.1 Physical Media Support

All eRAD PACS AEs are indifferent to the physical medium over which TCP/IP executes. It inherits this from the OS.

4 - EXTENSIONS/SPECIALIZATIONS/PRIVATIZATIONS

4.1 eRAD PACS Report SOP Class Specification

eRAD PACS stores reports using a privatized DICOM object. The object contains some common identification information using the identified encoded syntax and the eRAD PACS Report private SOP classes.

4.1.1 Association Establishment

4.1.1.1 General

The maximum PDU size that the eRAD PACS report AE uses is configurable, with a minimum of 8K bytes. Default is 16K. Maximum is 64K.

4.1.1.2 Number of Associations

The number of simultaneous associations that the report AE initiates is limited only by the kernel parameters of the underlying TCP/IP implementation. Therefore it can have multiple simultaneous connections.

4.1.1.3 Implementation Identifying Information

The eRAD PACS report AE provides a single implementation Class UID of 1.2.826.0.1.3680043.2.93.0.99, and contain an implementation version name of *ERAD_<version>*, where <*version*> is the software version number. An example is *ERAD_60*.

4.1.2 Association Initiation

eRAD PACS initiates an Association when a PB report or dictation object exists for a study that a user requested be transmitted to a remote DICOM entity. The Association request consists of two application contexts. One context manages the transmission of PB private reports between communicating entities. The second context manages the transmission of dictation files.

4.1.2.1 eRAD PACS Request – Send a PB Report

When the application successfully negotiates a presentation context for eRAD PACS reports, the SCU shall use the DICOM C-STORE DIMSE service to pass the object to the SCP. The operation is considered successful when the SCP returns a C-STORE response message with a status of SUCCESS.

4.1.2.1.1 PB Report Object Definition

eRAD PACS's private report object is defined as follows:

Tag	VR	Type	Description	Additional Comment
0008,0005	CS	1	Specific Character Set	Defaults to ISO_IR_100
0008,0012	DA	1	Instance Creation Date	
0008,0013	TM	1	Instance Creation Time	
0008,0014	UI	1	Instance Creator UID	= 1.2.826.0.1.3680043.2.93.6.1
0008,0016	UI	1	SOP Class UID	= 1.2.826.0.1.3680043.2.93.1.0.1
0008,0018	UI	1	SOP Instance UID	
0020,000d	UI	1	Study Instance UID	
F215,00xx	LO	1	PB Private Data Identifier	=PB Group A
F215,xx02	IS	1C	PB Status	Required if state is not Unviewed. Enumerated Values: -80 = Scheduled 20 = Viewed -40 = Ordered 40 = Read -20 = In Process 60 = Dictated -5 = Completed80 = Preliminary 0 = Unviewed 100 = Final
F215,xx10	IS	1	PB Data Structures Version	=2 for this object definition
F215,xx15	DA	1	PB Last Modified Date	
F215,xx16	TM	1	PB Last Modified Time	
F215,xx17	DA	3	PB Acquisition Date	
F215,xx18	TM	3	PB Acquisition Time	
F215,xx21	ST	3	Requesting Physician Address	
F215,xx22	LO	3	Requesting Physician Email	
F215,xx23	SH	3	Requesting Physician Fax	
F215,xx24	SH	3	Requesting Physician Phone	
F215,xx25	SH	3	Requesting Physician Pager	
F215,xx2A	CS	3	PB Procedure CPT4 Code	
F215,xx2B	CS	3	PB ICD9 Code	
F215,xx3A	UT	3	PB Study State At Report Time	Encoded string of image object UIDs and acquisition date/times existing at the time the report was created
F215,xx45	CS	3	Obsolete Status	Enumerated value: STUDY – entire study is obsolete PARTIAL – some objects are obsolete. See (F215,xx46) for object list.
F215,xx46	SQ	1C	Obsolete Object Sequence	Required if (F215,xx45) is PARTIAL.
> 0008,1150	UI	1	Referenced SOP Class UID	
> 0008,1155	UI	1	Referenced SOP Instance UID	
> F215,xx47	DA	1	Invalidate Date	
> F215,xx48	TM	1	Invalidate Time	
F215,xx51	ST	3	*PB User 1*	*Retired*
F215,xx52	LO	3	*PB User 2*	*Retired*
F215,xx53	LO	3	*PB User 3*	*Retired*
F215,xx54	LO	3	*PB User 4*	*Retired*
F215,xx55	LO	3	*PB User 5*	*Retired*
F215,xx56	LO	3	*PB User 6*	*Retired*
F215,xx57	SH	3	*PB User 7*	*Retired*
F215,xx58	SH	3	*PB User 8*	*Retired*
F215,xx59	SH	3	*PB User 9*	*Retired*
F215,xx5A	SH	3	*PB User 10*	*Retired*
F215,xx61	LO	3	*PB Folder*	*Retired*
F215,xx62	SQ	1	PB Study Sequence	Modified attributes in original image object. See Note 1.

Tag	VR	Type	Description	Additional Comment
>*Any Attribute*		1C	Any DICOM image object attribute	Modified value applied to all objects in this study. Required if a soft edit has been applied.
F215,xx76	UI	3	PB Proposed Study UID	Proposed UID for the study
F215,xx78	LO	3	PB Warning Indicator	= yes | no
F215,xx7A	SQ	3	PB Procedure Sequence	Attributes making up the requested procedure, acquired from RIS.
> F215,xx77	SH	1	PB Scheduler Order Number	
>*Any Attribute*		1C	Any DICOM procedure (order) attribute or sequence	Modified value applied to all objects in this study. Required if an attribute has been added or edited.
F215,xx7B	SQ	3	PB Performed Procedure Step Sequence	Attributes making up the requested procedure step, acquired from RIS.
> *Any Attribute*		1C	Any DICOM procedure step attribute or sequence	Modified value applied to all objects in this study. Required if an attribute has been added or edited.
F215,xx80	CS	3	PB HL7 Message Trigger	
F215,xx81	CS	3	PB Last Message Triggered	
F215,xx82	LO	3	Reading Location Registered ID	
F215,xx83	LO	3	Reading Location Name	
F215,xx84	ST	3	Reading Location Address	
F215,xx94	OB	3	PB Plug-in State	
F215,xxA0	SQ	3	PB Custom Field Sequence	User-defined fields containing values
>F215,xxA1	LO	1	PB Field Name	Name of the user-defined field
>F215,xxA2	UT	1	PB Field Value	Value of the user-defined field
		3	All other DICOM Attributes	All DICOM-defined Attributes included at the root level in the PB Report object contain values added to or modified from the original objects in this study, or attributes not defined by the Requested Procedure.

Note 1 Attributes in the PB Study Sequence contain the following
- original (image) object attributes modified by the user, system or interface
- attributes copied from the RIS order during study-order Correction

4.1.2.1.2 Presentation Context Table – Send a Report

The Association request contains all supported Abstract Syntaxes. The list of supported presentation context information is shown in the table below.

Proposed Presentation Contexts for eRAD PACS Report AE					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name**	**UID**		
PB Report Text	1.2.826.0.1.3680043.2.93.1.0.1	Impl.VR Little Endian Expl.VR Little Endian Expl.VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None

4.1.2.2 eRAD PACS Request – Send a Dictation

When the application successfully negotiates a presentation context for eRAD PACS dictations, the SCU shall use the DICOM C-STORE DIMSE service to pass the object to the SCP. The operation is considered successful when the SCP returns a C-STORE response message with a status of SUCCESS.

4.1.2.2.1 Dictation Object Definition

eRAD PACS's private dictation object is defined as follows:

Tag	VR	Type	Description	Additional Comment
0008,0012	DA	1	Instance Creation Date	
0008,0013	TM	1	Instance Creation Time	
0008,0014	UI	1	Instance Creator UID	= 1.2.826.0.1.3680043.2.93.6.1
0008,0016	UI	1	SOP Class UID	= 1.2.826.0.1.3680043.2.93.1.0.2
0008,0018	UI	1	SOP Instance UID	

Tag	VR	Type	Description	Additional Comment
0020,000d	UI	1	Study Instance UID	
F215,00xx	LO	1	PB Private Data Identifier	=PB Group A
F215,xx10	IS	1	PB Data Structures Version	=2 for this object definition
F215,xx15	DA	1	PB Last Modified Date	
F215,xx16	TM	1	PB Last Modified Time	
F215,xx17	DA	3	PB Acquisition Date	
F215,xx18	TM	3	PB Acquisition Time	
F215,xx33	SQ	1	PB Dictation Sequence	
>0008,0012	DA	1	Instance Creation Date	
>0008,0013	TM	1	Instance Creation Time	
>0008,0014	UI	1	Instance Creator UID	=1.2.826.0.1.3680043.2.93.6.1
>0008,0018	UI	1	SOP Instance UID	Instance of the dictation item. One UID required for each dictation item.
>F215,00xx	LO	1	PB Data	
>F215,xx0E	OB	1	PB Dictation	WAV file data
>F215,xx35	UI	1	PB Referenced Interpretation UID	UID of the corresponding interpretation instance
		3	All other DICOM Attributes	DICOM-defined Attributes included at the root level in the Dictation object contain values added to or modified from the original objects in this study.

4.1.2.2.2 Presentation Context Table – Send a Dictation

The Association request contains all supported Abstract Syntaxes. The list of supported presentation context information is shown in the table below.

Proposed Presentation Contexts for eRAD PACS Report AE					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name**	**UID**		
PB Dictation	1.2.826.0.1.3680043.2.93.1.0.2	Impl.VR Little Endian Expl.VR Little Endian Expl.VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None

4.1.3 Association Acceptance

eRAD PACS accepts an Association when an Application Context exists for the PB Report Text or Dictation SOP Classes.

4.1.3.1 Remote System Request – Store PB Report

When the remote AE sends a PB report object using DICOM C-STORE request, the receiving AE will store that file on disk. Provided the store process completed successfully, the AE will return a C-STORE response packet containing a SUCCESS status to the sending AE. This AE will then wait for the next packet.

4.1.3.1.1 Presentation Context Table – Store PB Report

The PB report AE accepts presentation contexts containing the Abstract Syntaxes listed in the Presentation Context table in section 4.1.2.1. For all Abstract Syntaxes, the PB report AE functions in the Role of an SCP.

4.1.3.2 Remote System Request – Store Dictation

When the remote AE sends a Dictation object using DICOM C-STORE request, the receiving AE will store that file on disk. Provided the store process completed successfully, the AE will return a C-STORE response packet containing a SUCCESS status to the sending AE. This AE will then wait for the next packet.

4.1.3.2.2 Presentation Context Table – Store Dictation

The eRAD PACS Dictation AE accepts presentation contexts containing the Abstract Syntaxes listed in the Presentation Context table in section 4.1.2.2. For all Abstract Syntaxes, the Dictation AE functions in the Role of an SCP.

4.2 eRAD PACS Task Information SOP Class Specification

eRAD PACS passes job-related information within its server hierarchy using the eRAD PACS Task Information private SOP class. The objects contain job details such as priority, identifiers and display information. This SOP class is offered by an eRAD PACS server when communicating with another eRAD PACS server configured as an eRAD PACS parent or child device within the same server hierarchy.

4.2.1 Association Establishment

4.2.1.1 General

The maximum PDU size that the task information AE uses is configurable, with a minimum of 8K bytes. Default is 16K. Maximum is 64K.

4.2.1.2 Number of Associations

The number of simultaneous associations that the task information AE initiates is limited only by the kernel parameters of the underlying TCP/IP implementation. Therefore it can have multiple simultaneous connections.

4.2.1.3 Implementation Identifying Information

The eRAD PACS task information AE supports a single implementation Class UID of 1.2.826.0.1.3680043.2.93.0.99, and contains an implementation version name of *ERAD_<version>*, where <*version*> is the software version number. An example is *ERAD_60*.

4.2.2 Association Initiation

eRAD PACS initiates an Association when an EP server needs to convey job-related information to another EP server. For example, prior to forwarding an object from child to parent, the SCU sends the job and priority information so the SCP can create the StorescpReg tasks for the image objects.

4.2.2.1 eRAD PACS Request – Update Job Information

When the application successfully negotiates a presentation context for eRAD PACS task information, the SCU shall use the DICOM N-ACTION DIMSE service to pass the task information to the SCP.

The N-ACTION supports the following Action Type IDs:

Action Type ID	Description
0x01	Passing job information

The operation is considered successful when the SCP returns an N-ACTION response message with a status of SUCCESS.

4.2.2.1.1 EP Task Information Object Definition

The eRAD PACS task information object is defined as follows:

Tag	VR	Type	Description	Additional Comment
F215,0010	LO	1	Private creator	=PB Group A
F215,106a	SQ	1	PB Property Sequence	
> F215,106b	LO	1	PB Property Name	Enumerated values: Jobid – ID of the task job Jobinfo – Display name for the job RelativePriority – Relative priority of the job
> F215,106c	LT	1	PB Property Value	Value assigned to the PBPropertyName variable

4.2.2.1.2 Presentation Context Table – Update Job Information

The list of supported presentation context information is shown in the table below.

Proposed Presentation Contexts for eRAD PACS Report AE					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name**	**UID**		
EP Task Information	1.2.826.0.1.3680043.2.93.1.0.4	Impl.VR Little Endian Expl.VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None

4.2.3 Association Acceptance

eRAD PACS accepts an Association when an Application Context exists for the EP Task Information SOP Class.

4.2.3.1 Remote System Request – Process Job Information

When the remote AE sends an EP task information object using DICOM N-ACTION request, the receiving AE extracts the task information and submits the information to the EP task manager. The AE returns an N-ACTION response packet containing the status of the operation to the sending AE. This AE then waits for the next packet or release of the Association.

4.2.3.1.1 Presentation Context Table – Process Job Information

The EP task information AE accepts presentation contexts containing the Abstract Syntaxes listed in the Presentation Context table in section 4.2.2.1.2. For each Abstract Syntax, the EP task information AE functions in the Role of an SCP.

4.2.3.1.2 SOP Specific Conformance to EP Task Information Request

The N-ACTION response message contains no dataset.

In the case of a successful N-ACTION, a SUCCESS response is returned to the SCU. Otherwise the EP task information AE returns one of the following warnings or errors.

- 0x0120 (Missing Attribute) – No PBPropertySequence exists in the request. Request was not processed.
- 0x0107 (Attribute List Error) – An invalid PBPropertyName or PBPropertyValue entry exists in the request. The remaining sequence items are processed.

4.3 eRAD PACS CD Meta Data Application Profile Specification

eRAD PACS passes meta information to the CD viewer using privatized attributes in a DICOM Structured Report object.

This object exists on DICOM media only. It is never passed between AE objects across a DICOM Association.

4.3.1 EP CD Meta Data Object Definition

The eRAD PACS task information object is defined as follows:

Tag	VR	Type	Description	Additional Comment
0008,0005	CS	3	Specific Character Set	
0008,0012	DA	1	Instance Creation Date	
0008,0013	TM	1	Instance Creation Time	
0008,0014	UI	1	Instance Creator UID	= 1.2.826.0.1.3680043.2.93.6.1
0008,0016	UI	1	SOP Class UID	= 1.2.840.10008.5.1.4.1.1.88.22
0008,0018	UI	1	SOP Instance UID	
0008,0020	DA	3	Study Date	
0008,0023	TM	1	Content Date	
0008,0030	DA	3	Study Time	
0008,0033	TM	1	Content Time	
0008,0050	SH	3	Accession Number	
0008,0060	CS	3	Modality	
0008,0070	LO	3	Manufacturer	= eRAD

Tag	VR	Type	Description	Additional Comment
0008,0090	PN	3	Referring Physician	
0008,1030	LO	3	Study Description	
0008,1111	SQ	3	Referenced Performed Procedure Step Sequence	
0010,0010	PN	2	Patient Name	
0010,0020	LO	2	Patient ID	
0010,0030	DA	3	Patient Birth Date	
0010,0040	CS	3	Patient Sex	
0018,0015	CS	3	Body Part Examined	
0020,000d	UI	1	Study Instance UID	
0020,000e	UI	1	Series Instance UID	
0020,0010	SH	2	Study ID	
0020,0011	IS	2	Series Number	
0020,0013	IS	2	Instance Number	
0040,a040	CS	1	Value Type	= CONTAINER
0040,a043	SQ	1	Concept Name Code Sequence	
> 0008,0100	SH	1	Code Value	= 50001
> 0008,0100	SH	1	Coding Scheme Designator	= IMPB
> 0008,0100	LO	1	Code Meaning	= EP Study Open Information
0040,a050	CS	1	Continuity Of Content	= SEPARATE
0040,a372	SQ	3	Performed Procedure Code Sequence	
0040,a491	CS	3	Completion Flag	
0040,a493	CS	3	Verification Flag	
F215,00xx	LO	1	PB Private Data Identifier	=PB Group A
F215,xx10	IS	1	PB Data Structures Version	=2 for this object definition
F215,xx15	DA	1	PB Last Modified Date	
F215,xx16	TM	1	PB Last Modified Time	
F215,xx17	DA	3	PB Acquisition Date	
F215,xx18	TM	3	PB Acquisition Time	
F215,xx90	OB	1	PB Blue Line Data	Encoded study details

4.4 eRAD PACS Private Code Designators

eRAD PACS inserts containers into DICOM Structured Report objects which are identified using private code designators. This list of code designators and their list of available values and meanings are defined in the sections below.

4.4.1 eRAD PACS 99IMPB Code Designator

The 99IMPB code designator consists of a collection of codes used by eRAD PACS to define values, states and other information specifically used by eRAD PACS reports. These codes are commonly found in DICOM Basic Text Structured Report objects but might be found in other objects.

> Note: Some versions of eRAD PACS, specifically v7.3 and earlier, used the code scheme designator IMPB instead of 99IMPB. Implementations should be aware of this and treat both designators as the same.

The 99IMPB code values are defined as follows:

Coding Scheme Designator*	Code Value	Code Meaning	Comment
99IMPB	37100	Comments	Report panel notes
99IMPB	37110	Normality Status	Normality status code. Values defined by CID 242.
99IMPB	38100	Html Impression	Rich text (HTML) version of report impression.
99IMPB	38110	Html Finding	Rich text (HTML) version of report findings.
99IMPB	50001	EP Study Open Information	Concept name of the root node of Blue Line SR documents containing the herpa content and added to DICOM media

* See note in this section regarding alternative designators used by some versions of eRAD PACS.

4.4.2 eRAD PACS 99ERADREGID Code Designator

The 99ERADREGID code designator consists of a collection of codes used by eRAD PACS to define values, states and other information specifically used to identify radiologist (person) IDs. These codes are commonly found in DICOM Basic Text Structured Report and eRAD PACS Report (PbR) objects but might be found in other objects.

The 99ERADREGID code values are defined as follows:

Coding Scheme Designator	Code Value	Code Meaning	Comment
99ERADREGID	[Radiologist ID value]	[Radiologist Name value]	Follows the structure of the Person Identification Code Sequence defined by the Person Identification Macro.

5 - CONFIGURATION

All eRAD PACS AEs (STORESCP, SENDSCU, PRINTSCU, etc.) attempt to load DICOM data dictionaries specified in the DCMDICTPATH environment variable. By default, if the DCMDICTPATH environment variable is not set, the file

/usr/local/dicom/lib/dicom.dic

is loaded. The DCMDICTPATH environment variable has the same format as the shell PATH variable in that a colon (":") separates entries. The data dictionary code will attempt to load each file specified in the DCMDICTPATH environment variable. It is an error if no data dictionary can be loaded.

5.1 AE Title/Presentation Address Mapping

All supported AEs use a presentation address constructed from the host-name of the server on which it executes, and a port number specified as a command line parameter at the start of eRAD PACS's DCMTK daemon.

STORESCP's, QRSCP's, MPPSSCP's and COMMITSCP's application titles are the same. It is configurable in the command scripts and from the administration web pages. The default is PBUILDER. QRSCP can have two application titles. One is to direct query and retrieve requests to just the worklist database. The other is to query and retrieve from the entire system archive.

SENDSCU's, QRSCU's, and MWLSCU's application titles are the same and are configurable. The default is PBUILDER.

PRINTSCU's application title is a configurable parameter. The default is DCMPSTATE.

5.2 Configurable Parameters

- Maximum PDU size (default is 32K)
- Preferred transfer syntax (default is implicit VR little endian)
- Host name
- TCP and TLS port number (default for regular DICOM is 104; default for secure DICOM is 2762)
- Remote Application Entity IP addresses, port numbers and AE Titles
- Number of simultaneous DICOM associations (default is 5)
- AE Title to specify query/retrieve of worklist only or entire archive
- Which FIND and MOVE SOP class to use in Query/Retrieve SOP classes (default is Study Root)
- Use case sensitive or case insensitive query matching (default is case insensitive)
- Accept all DICOM Associations (promiscuous mode) or only those originating at known AEs.
- Remove private attributes when forwarding previously acquired image Storage SOP Class objects.

6 - SUPPORT OF EXTENDED CHARACTER SETS

STORESCP, SENDSCU, PRINTSCU, MPPSSCP and COMMITSCP are indifferent to Extended Character Sets, as the application doesn't rely on the information contained within the Data Elements. However, since it is possible to obtain lists of data contained in the database (for administrative functions), only the default character set is supported.

QRSCU, QRSCP and MWLSCU support the default character set only.

7 – CODES AND CONTROLLED TERMINOLOGY

This implementation makes use of the Baseline Context Groups as specified in the IODs for the SOP Classes supported. No private mapping resource or coding schemes are employed. All available codes are selected from values specified in the SOP instances when they arrive at eRAD PACS.

8 – SECURITY PROFILES

eRAD PACS supports the Basic TLS Secure Transport Connection Profile. All association requests directed to and accepted at the TLS port address will use this profile. eRAD PACS uses the following standards for its key management:

Exchange of Master Secrets	RSA
Data Integrity	SHA
Privacy	Triple DES EDE, CBC
Entity Authentication	RSA based certificates