



PaxeraHealth
Transforming Healthcare Through Innovation

DICOM

Conformance Statement

2020

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CONFORMANCE STATEMENT OVERVIEW

PaxeraServer is comprised of a storage facility. PaxeraServer is a single application entity that stores images sent to it by service class users, takes responsibility for storage of the images, allows queries based on several standard query models, and retrieves requested images.

- PaxeraServer acts as a service class provider (SCP) for Verification, Storage, Storage Commitment, Query/Retrieve.
- PaxeraServer acts as a service class user (SCU) for Verification, Storage, Storage Commitment, Query/Retrieve.
- PaxeraServer conforms to the DICOM 2008 standard.

A list of Supported Networking DICOM Service (SOP) Classes is shown below in Table 1.

NETWORK SERVICES

SOP Class Name	SOP Class UID	SCU	SCP
Verification			
Verification	1.2.840.10008.1.1	Yes	Yes
Transfer			
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	Yes	Yes
Arterial Pulse Waveform Storage	1.2.840.10008.5.1.4.1.1.9.5.1	Yes	Yes
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Yes	Yes
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Yes	Yes
Digital X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Yes	Yes
Digital Mammography X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.2	Yes	Yes
Digital Mammography X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	Yes	Yes
Breast Tomosynthesis Image Storage	1.2.840.10008.5.1.4.1.1.13.1.3	Yes	Yes
Breast Projection X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.13.1.5	Yes	Yes
Breast Projection X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.13.1.4	Yes	Yes
Digital Intra-oral X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.3	Yes	Yes
Digital Intra-oral X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.3.1	Yes	Yes
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Yes	Yes
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	Yes	Yes
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Yes	Yes

MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Yes	Yes
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	Yes	Yes
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2	Yes	Yes
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Yes	Yes
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Yes	Yes
Multi-frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	Yes	Yes
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	Yes	Yes
Multi-frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	Yes	Yes
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Yes	Yes
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	Yes	Yes
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	Yes	Yes
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	Yes	Yes
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1	Yes	Yes
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1	Yes	Yes
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1	Yes	Yes
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	Yes	Yes
Color Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.2	Yes	Yes
Pseudo-Color Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.3	Yes	Yes
Blending Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.4	Yes	Yes
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Yes	Yes
Enhanced XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1.1	Yes	Yes
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	Yes	Yes
Enhanced XRF Image Storage	1.2.840.10008.5.1.4.1.1.12.2.1	Yes	Yes
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	Yes	Yes
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66	Yes	Yes
Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.1	Yes	Yes
Spatial Fiducials Storage	1.2.840.10008.5.1.4.1.1.66.2	Yes	Yes
Deformable Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.3	Yes	Yes
Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.4	Yes	Yes
Real World Value Mapping Storage	1.2.840.10008.5.1.4.1.1.67	Yes	Yes

VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	Yes	Yes
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	Yes	Yes
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	Yes	Yes
Video Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2.1	Yes	Yes
VL Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3	Yes	Yes
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	Yes	Yes
VL Whole Slide Microscopy Image Storage	1.2.840.10008.5.1.4.1.1.77.1.6	Yes	Yes
Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1	Yes	Yes
Ophthalmic Photography 8 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	Yes	Yes
Ophthalmic Photography 16 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.2	Yes	Yes
Stereometric Relationship Storage	1.2.840.10008.5.1.4.1.1.77.1.5.3	Yes	Yes
Basic Text SR	1.2.840.10008.5.1.4.1.1.88.11	Yes	Yes
Enhanced SR	1.2.840.10008.5.1.4.1.1.88.22	Yes	Yes
Comprehensive SR	1.2.840.10008.5.1.4.1.1.88.33	Yes	Yes
Mammography CAD SR	1.2.840.10008.5.1.4.1.1.88.50	Yes	Yes
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59	Yes	Yes
Chest CAD SR	1.2.840.10008.5.1.4.1.1.88.65	Yes	Yes
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67	Yes	Yes
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Yes	Yes
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	Yes	Yes
Procedural Event Logging SOP Class	1.2.840.10008.5.1.4.1.1.88.40	Yes	Yes
Respiratory Waveform Storage	1.2.840.10008.5.1.4.1.1.9.6.1	Yes	Yes
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	Yes	Yes
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	Yes	Yes
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	Yes	Yes
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4	Yes	Yes
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	Yes	Yes
RT Brachy Treatment Storage	1.2.840.10008.5.1.4.1.1.481.6	Yes	Yes
RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7	Yes	Yes
SOP Class Name	SOP Class UID	SCU	SCP
RT Ion Plan Storage	1.2.840.10008.5.1.4.1.1.481.8	Yes	Yes

RT Ion Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.9	Yes	Yes
Hardcopy Grayscale Image Storage (Retired)	1.2.840.10008.5.1.1.1.29	Yes	Yes
Hardcopy Color Image Storage (Retired)	1.2.840.10008.5.1.1.1.30	Yes	Yes
Nuclear Medicine Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.5	Yes	Yes
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	Yes	Yes
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	Yes	Yes
X-Ray Angiographic Bi-plane Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.12.3	Yes	Yes
Overlay Storage (Retired)	1.2.840.10008.5.1.4.1.1.8	Yes	Yes
Standalone Curve Storage (Retired)	1.2.840.10008.5.1.4.1.1.9	Yes	Yes
Standalone Modality LUT Storage (Retired)	1.2.840.10008.5.1.4.1.1.10	Yes	Yes
Standalone VOI LUT Storage (Retired)	1.2.840.10008.5.1.4.1.1.11	Yes	Yes
Standalone PET Curve Storage (Retired)	1.2.840.10008.5.1.4.1.1.129	Yes	Yes
VL Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.77.1	Yes	Yes
VL Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.77.2	Yes	Yes
Agfa Attribute Presentation State	1.2.124.113532.3500.7	Yes	Yes
Siemens CSA Non-Image Storage	1.3.12.2.1107.5.9.1	Yes	Yes
Dcm4che Encapsulated Document Storage	1.2.40.0.13.1.5.1.4.1.1.104.1	Yes	Yes
Query/Retrieve			
Patient Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	Yes	Yes
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	Yes	Yes
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Yes	Yes
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Yes	Yes
Patient/Study Only Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.3.1	Yes	Yes
Patient/Study Only Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.3.2	Yes	Yes

Table 1: Support Network Services

1. INTRODUCTION

PaxeraServer is a storage facility. PaxeraServer is a single Application Entity that stores images/objects sent to it by service class users, takes responsibility for storage of the images/objects, allows queries based on several standard query models, and retrieves requested images/objects.

PaxeraServer is a system that provides services for safe storage and retrieval of DICOM evidence objects such as Images, Key Image Notes, Presentation States, Structured Reports, and others.

1.1. Audience

This document is directed to readers who are concerned with PaxeraServer and its integration into a healthcare facility. This includes both those responsible for overall imaging network policy and architecture, as well as integrators who need to have a detailed understanding of the DICOM features of the product. This document contains some basic DICOM definitions so that any reader may understand how this product implements DICOM features. However, integrators are expected to fully understand all the DICOM terminology, how the tables in this document relate to the product's functionality, and how that functionality integrates with other devices that support compatible DICOM features.

1.2. Remarks

The scope of this DICOM Conformance Statement is to facilitate integration between PaxeraServer and other DICOM products. The Conformance Statement should be read and understood in conjunction with the DICOM Standard. DICOM by itself does not guarantee interoperability. The Conformance Statement does, however, facilitate a first-level comparison for interoperability between different applications supporting Compatible DICOM functionality.

This Conformance Statement is not supposed to replace validation with other DICOM equipment to ensure proper exchange of intended information. In fact, the user should be aware of the following important issues:

- The comparison of different Conformance Statements is just the first step towards assessing interconnectivity and interoperability between the product and other DICOM conformant equipment.
- Test procedures should be defined and executed to validate the required level of interoperability with specific compatible DICOM equipment, as established by the healthcare facility.
- PaxeraServer has participated in an industry-wide testing program sponsored by Integrating the Healthcare Enterprise (IHE). The IHE Integration Statement for PaxeraServer, together with the IHE Technical Framework, may facilitate the process of validation testing.

1.3. Basics of DICOM Communication

This section describes terminology used in this Conformance Statement for the non-specialist. The key terms used in the Conformance Statement are highlighted in italics below. This section is not a substitute for training about DICOM and it makes many simplifications about the meanings of DICOM terms.

Two Application Entities (devices) that want to communicate with each other over a network using DICOM protocol must first agree on several things during an initial network handshake. One of the two devices must initiate an Association (a connection to the other device), and ask if specific services, information, and encoding can be supported by the other device (Negotiation).

DICOM specifies a number of network services and types of information objects, each of which is called an Abstract Syntax for the Negotiation. DICOM also specifies a variety of methods for encoding data, denoted Transfer Syntaxes. The Negotiation allows the initiating Application Entity to propose combinations of Abstract Syntax and Transfer Syntax to be used on the Association; these combinations are called Presentation Contexts. The receiving Application Entity accepts the Presentation Contexts it supports.

For each Presentation Context, the Association Negotiation also allows the devices to agree on Roles – which one is the Service Class User (SCU - client) and which is the Service Class Provider (SCP - server). Normally the device initiating the connection is the SCU, i.e., the client system calls the server, but not always. The Association Negotiation finally enables exchange of maximum network packet (PDU) size, security information, and network service options (called Extended Negotiation information).

The Application Entities, having negotiated the Association parameters, may now commence exchanging data. Common data exchanges include queries for worklists and lists of stored images, transfer of image objects and analyses (structured reports), and sending images to film printers. Each exchangeable unit of data is formatted by the sender in accordance with the appropriate Information Object Definition, and sent using the Negotiated Transfer Syntax. There is a Default Transfer Syntax that all systems must accept, but it may not be the most efficient for some use cases. Each transfer is explicitly acknowledged by the receiver with a Response Status indicating success, failure, or that query or retrieve operations are still in process.

Two Application Entities may also communicate with each other by exchanging media (such as a CD-R). Since there is no Association Negotiation possible, they both use a Media Application Profile that specifies pre-negotiated exchange media format, Abstract Syntax and Transfer Syntax.

1.4. References

The Digital Imaging and Communications in Medicine (DICOM) standard (NEMA PS 3.X):
National Electrical Manufacturers Association (NEMA),

[ACR-NEMADigitalImagingandCommunicationsinMedicine \(DICOM\)V3.0](#)

1.5. Definitions

Association Establishment - An Association Establishment is the first phase of communication between two DICOM Application Entities (AEs). The AEs use the Association Establishment to negotiate how data will be encoded and the type of data to be exchanged.

Called Application Entity Title - The Called AE Title defines the intended receiver of an Association.

Calling Application Entity Title - The Calling AE Title defines the requestor of an Association.

DICOM Message Service Element (DIMSE) - A DIMSE defines the services and protocols utilized by an Application Entity to exchange messages.

Information Object Definition (IOD) - An IOD is the data model which is an abstraction of the real-world information. This data model defines the nature and attributes relevant to the class of real-world objects represented.

Service Class Provider (SCP) - A SCP plays the server role to perform operations and invoke notifications during an Association. An example of a Storage Class Provider would be an image storage device. In this case, the image storage device is storing the image that was sent by a Service Class User.

Service Class User (SCU) - A SCU plays the client role to invoke operations and perform notifications during an Association. An example of a SCU would be an image acquisition device. In this case, the image acquisition device will create and send DICOM image by requesting that a SCP store the image.

Service/Object Pair (SOP) Class - A SOP Class is defined by the union of an Information Object Definition and set of DIMSE Services. A DICOM Application Entity may support one or more SOP Classes. Each SOP Class is uniquely identified by a SOP Class UID.

SOP Instance - A specific occurrence of a Information Object.

Transfer Syntax – The Transfer Syntax is a set of encoding rules that allow DICOM Application Entities to negotiate the encoding techniques (e.g. data element structure, byte ordering, compression) they are able to support. The Transfer Syntax is negotiated during Association Negotiation.

Unique Identifier (UID) – A UID is a globally unique, ISO compliant. ASCII – numeric string. It guarantees uniqueness across multiple countries, sites, vendors and equipment.

1.6. Acronyms, Abbreviations and Symbols

ACC	American College of Cardiology
ACR	American College of Radiology
ASCII	American Standard Code for Information Interchanges
AE	Application Entity
ANSI	American National Standards Institute
DICOM	Digital Imaging and Communication in Medicine
DIMSE	DICOM Message Service Element
DIMSE-C	DICOM Message Service Element - Composite
DIMSE-N	DICOM Message Service Element - Normalized
DICOM	Message Service Element - Normalized
HIS	Hospital Information System
HL7	Health Level 7
IE	Information Entity
IOD	Information Object Definition
ISO	International Standard Organization
NEMA	National Electric Manufacturers
Association PDU	Protocol Data Unit
RIS	Radiology Information System
SCP	Service Class Provider
SCU	Service Class User
SOP	Service Object Pair
TCP/IP	Transmission Control Protocol/Internet
UID	Unique Identifier

2. IMPLEMENTATION MODEL

PaxeraServer is a storage facility. PaxeraServer is a single Application Entity that stores images/ objects sent to it by service class users, takes responsibility for storage of the images/objects, allows queries based on several standard query models, and retrieves requested images/objects.

PaxeraServer Store SCP is designed to receive images from remote devices, using DICOM C- Store, saving these images in a local database which contains the whole demographic patient data as well as the study, series and image important information.

PaxeraServer Store SCU has the ability to send images, using DICOM C-Store, to a remote AE which is predefined in the DICOM connecting remote AEs. PaxeraServer Query/Retrieve SCP could perform the Query/Retrieve Service (Find/Move/Get) with the remote AE, using DICOM C-Find/C-Move/C-Get; it accepts the Query requests and generates the Response by using of the local database. The response is sent to the requesting AE.

PaxeraServer Query/Retrieve SCU finds and retrieves images from remote AE SCP, using DICOM C-Find/C-Move; the user could define the matching critical and remote AE which is predefined in the DICOM connecting remote AEs.

PaxeraServer Modality Worklist SCP is used to retrieve the Worklist from any HIS/RIS Worklist SCP, using DICOM C-Find, according to the search critical that the user defines.

PaxeraServer Storage commitment SCP is used to confirm the Store-SCU that all requested instances are stored safely in the long-term archive, by sending N-EVENT-REPORT to the Store- SCU with a list of successfully store or failed instances.

2.1. Verification

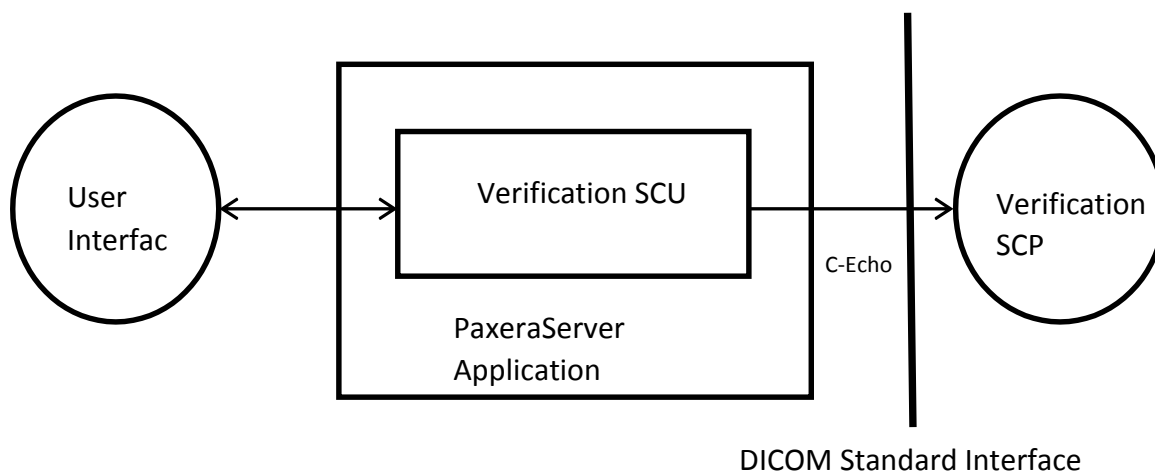


FIGURE 1: Application data flow diagram of verification SCU

Functional Definitions of AE's

The Echo function provides an easy way to determine if the remote AE is available. When C-Echo Function is used, an association which includes a Presentation Context for Verification Class is proposed. A successful response indicates that the remote AE is available. The association is immediately closed.

2.2. Storage

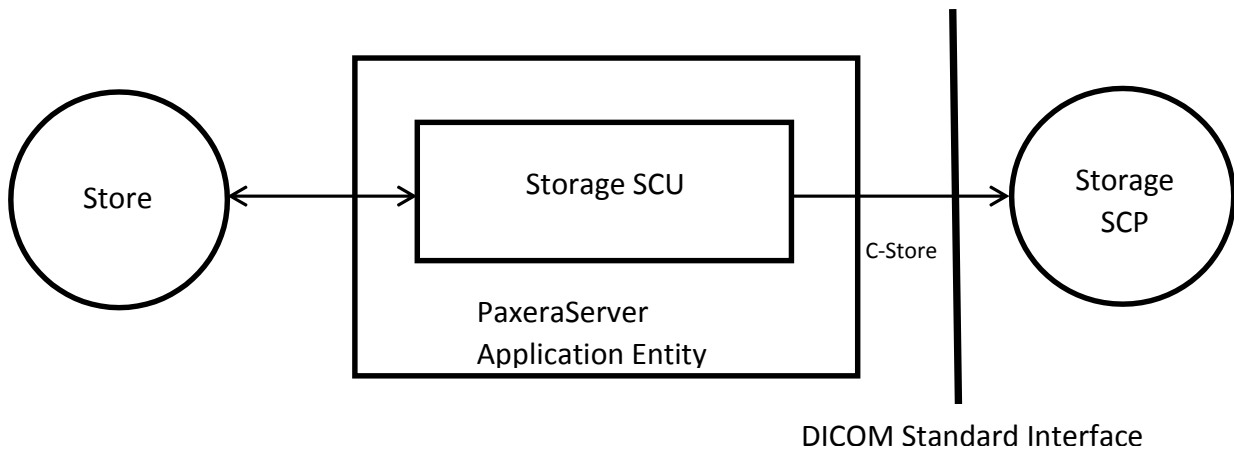


FIGURE 2: Application data flow diagram of Storage SCU

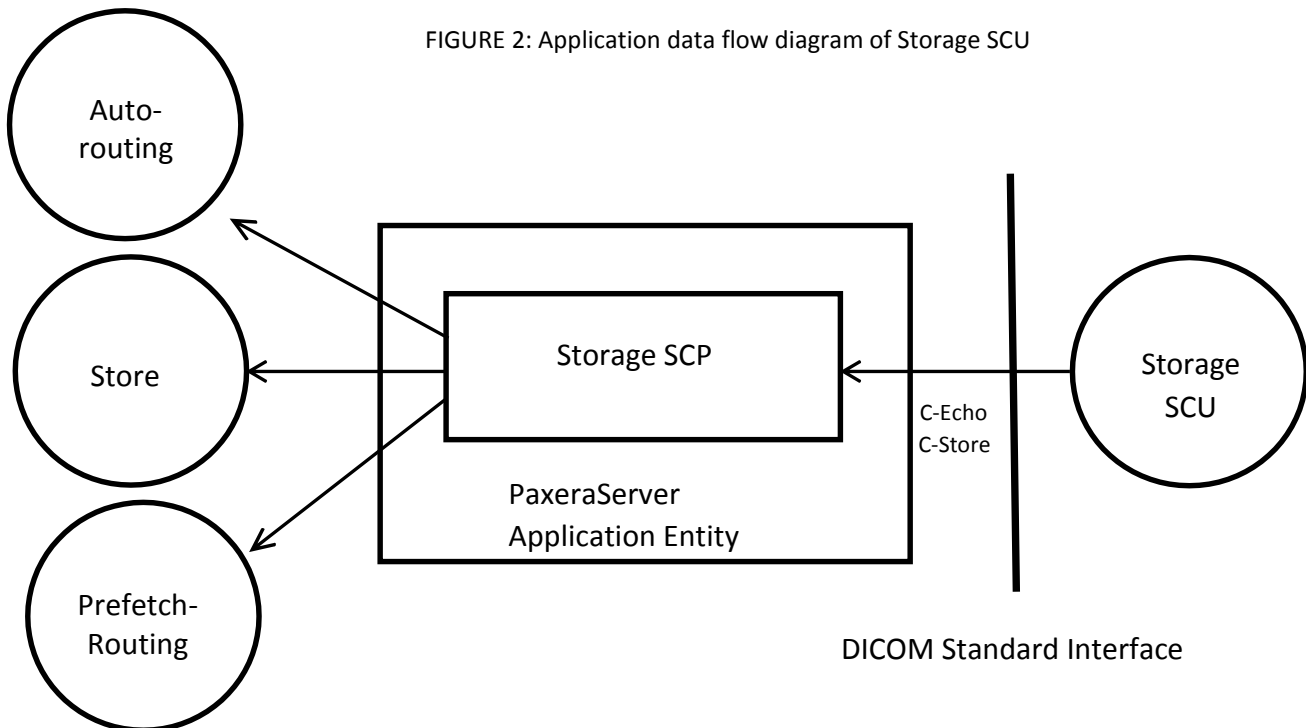


FIGURE 3: Application data flow diagram of Storage SCP

Functional Definitions of AE's

1) Storage SCP

PaxeraServer C-Store SCP (image receiving software) waits for another application to connect at the presentation address configured for its Application Entity Title. The application that connects must be a DICOM application. Associations are accepted with Presentation Contexts for SOP Classes of the Storage Service Class, or the Verification Service Class. It will receive images on the Storage Service Class Presentation Contexts and insert image information into local database. Images which are sent could be saved normally as they were sent or they could be compressed first, this is an option which the administrator could change per modality (AE) from settings.

PaxeraServer supports prefetching of prior studies based on incoming instance parameters. If prefetching for incoming studies is enabled, each incoming study triggers the prefetch of priors according to predefined rules. These priors can then be routed to one or more remote Application Entities.

2) Storage SCU

When using PaxeraServer C-Store SCU, the user selects files to send to remote AE, from the presentation context of each file the SCP will include a list of Presentation Contexts which is proposed to the destination AE. The destination AE determines which of these Presentation Contexts it can support. The image send software then goes through the list of files selected by the user. For each file, it determines the Presentation Context to be used and checks to see if this Presentation Context is supported by the destination AE. If so, the file is transferred. When all files have been processed the association is closed.

2.3. Query and Retrieve

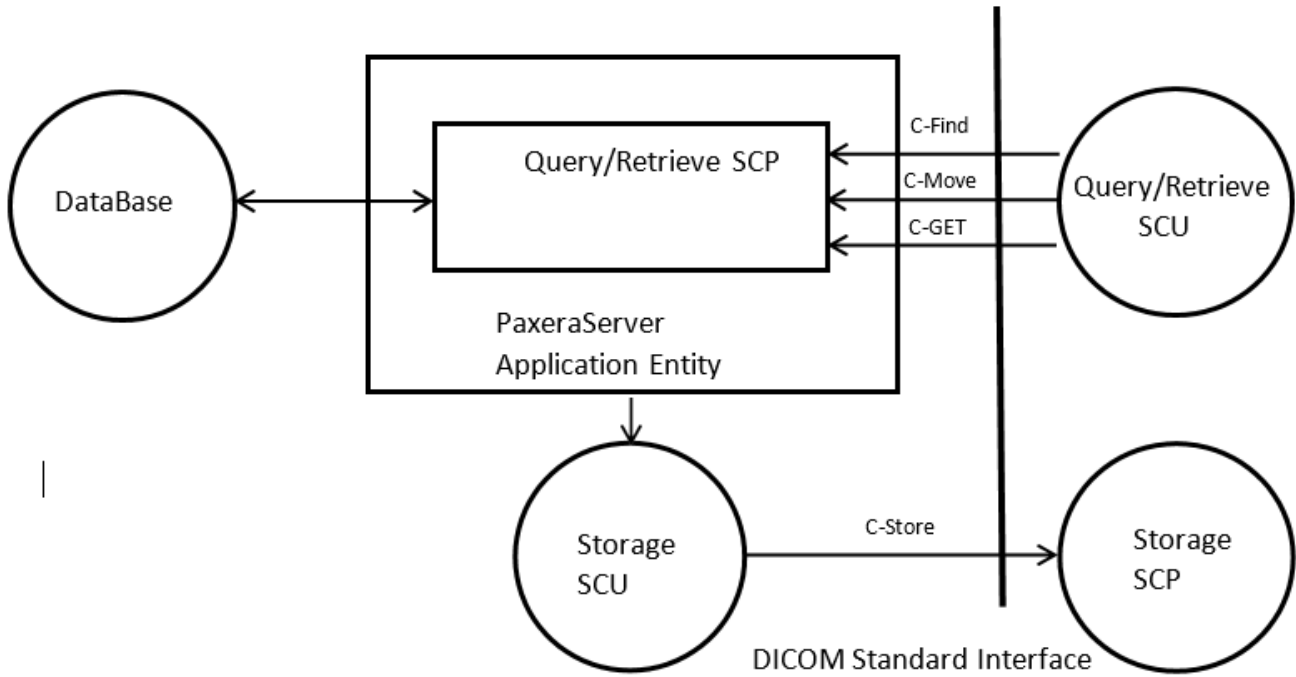


FIGURE 4: Application data flow diagram of Query/Retrieve SCP

Functional Definitions of AE's

1) Query/Retrieve SCP

PaxeraServer C-Find/C-Move/C-Get SCP waits for another application to connect at the presentation address configured for its Application Entity Title. The application that connects must be a DICOM application. Associations are accepted with Presentation Contexts for SOP Classes of the Query/Retrieve Service Class, or the Verification Service Class. As a result of the Find or Move request sent by Remote AE the PaxeraServer Query/Retrieve SCP will search the database for the received matching criteria, and generates a response to the requesting AE. If request is C-Move Request a new association is created with the moving destination with all the supported Storage Service Class. Files are then sent to this destination; association is closed directly after files sending.

2) Query/Retrieve SCU

When using PaxeraServer C-Find/C-Move SCU, an association which includes the Presentation Contexts of the selected Query Level defined by the user from the DICOM Query/Retrieve information models (i.e. Patient Root, Study Root, and Patient/Study Only). If Query/Retrieve SCP accepts the request. Then, request directory information at any of these levels is sent depending on the user choice. A new association is created for each directory search, and is immediately closed as soon as the requested information is received. The operator may also request that a patient, study, series or image be retrieved from the remote AE by pressing the Move button. A new association is initiated for the request, which remains open until all files have been received. The actual file transfer occurs on a separate association initiated by the remote AE.

2.4. Workflow Management

2.4.1. Modality Worklist

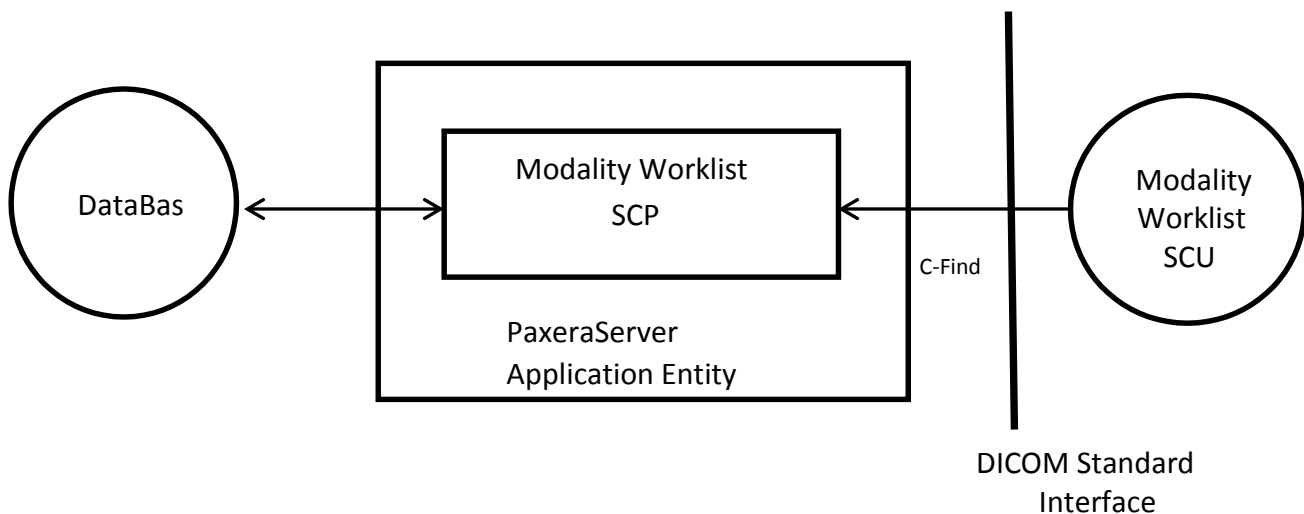


FIGURE 5: Application data flow diagram of Modality Worklist SCU

Functional Definitions of AE's

PaxeraServer Modality Worklist SCP is implemented as a single application entity as a Service Class Provider for providing demographic information. The DICOM C-Find Modality Worklist Service is used to retrieve demographic information. Create a DICOM basic worklist management data request. Then initiate a DICOM association to send the request. Then, issue a C-Find request and wait for the worklist responses, after receiving response a list is generated containing the patient demographic data and a Close Association request is sent.

2.4.2. Storage Commitment

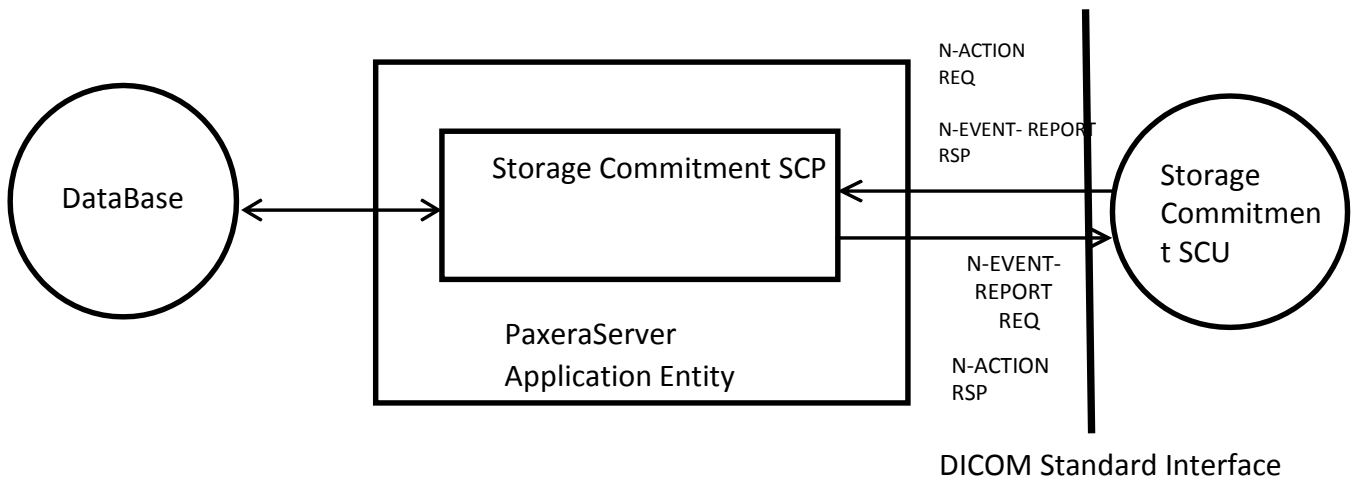


FIGURE 6: Application data flow diagram of Storage Commitment SCP

Functional Definitions of AE's

After sending instances to PaxeraServer, the Store-SCU may want to confirm the proper storage of these instances in PaxeraServer by sending N-ACTION request including the list of the instances that needs to be confirmed.

PaxeraServer Storage Commitment SCP upon receipt of the N-ACTION request assesses a list of references for which Storage Commitment is requested and returns an N-EVENT-REPORT.

3. AE SPECIFICATIONS

3.1. Verification AE Specifications

3.1.1. Association Policy

PaxeraServer DICOM Service Tool application attempts to initiate a new association for DIMSE C-ECHO Service operation.

- (1) Verification SCU
- (2) Association Initiation Policy - Verification SCU

The associated Real-World activity is a C-ECHO request initiated by the DICOM Service Tool application. If the process successfully establishes an association to a remote Application Entity, it will send the C-ECHO-Request via the open association to verify that the remote Application Entity is responding to DICOM messages.

- (3) Proposed Presentation Contexts - Verification SCU

PaxeraServer DICOM application will propose Presentation Contexts as shown in the following table:

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID		
Verification	1.2.840.10008.1.1	Implicit VR - Little Endian	1.2.840.10008.1.2	SCU	None

Table 2: Network Services Initializing Presentation Context Verification

- (4) SOP Specific Conformance Statement - Verification SCP

The Application conforms to the definition of a Verification SCU in accordance to the DICOM Standard.

3.2. Storage AE Specifications

3.2.1. Store-SCU

(1) SOP Classes

PaxeraServer Store SCU provides Standard Conformance to the following DICOM SOP Classes:

SOP Name	SOP UID	SCU
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	Yes
Arterial Pulse Waveform Storage	1.2.840.10008.5.1.4.1.1.9.5.1	Yes
Basic Text SR Storage	1.2.840.10008.5.1.4.1.1.88.11	Yes
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1	Yes
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1	Yes
Chest CAD SR Storage	1.2.840.10008.1.4.1.1.88.50	Yes
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Yes
Comprehensive SR Storage	1.2.840.10008.5.1.4.1.1.88.33	Yes
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Yes
Digital Intra-Oral X-Ray Image Storage For Presentation	1.2.840.10008.5.1.4.1.1.1.3	Yes
Digital Intra-Oral X-Ray Image Storage For Processing	1.2.840.10008.5.1.4.1.1.1.3.1	Yes
Digital Mammography X-Ray Image Storage For Presentation	1.2.840.10008.5.1.4.1.1.1.2	Yes
Digital Mammography X-Ray Image Storage For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	Yes
Breast Tomosynthesis Image Storage	1.2.840.10008.5.1.4.1.1.13.1.3	Yes
Breast Projection X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.13.1.5	Yes
Breast Projection X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.13.1.4	Yes
Digital X-Ray Image Storage For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Yes
Digital X-Ray Image Storage For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Yes
ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	Yes
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Yes
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	Yes
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	Yes
Enhanced SR Storage	1.2.840.10008.5.1.4.1.1.88.22	Yes
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	Yes
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	Yes
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1	Yes
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59	Yes
Mammography CAD SR	1.2.840.10008.5.1.4.1.1.88.50	Yes

MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Yes
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2	Yes
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	Yes
Multi-frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	Yes
Multi-frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	Yes
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Yes
PET Image Storage	1.2.840.10008.5.1.4.1.1.128	Yes
Procedural Event Logging SOP Class	1.2.840.10008.5.1.4.1.1.88.40	Yes
Respiratory Waveform Storage	1.2.840.10008.5.1.4.1.1.9.6.1	Yes
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	Yes
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	Yes
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4	Yes
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	Yes
RT Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6	Yes
RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7	Yes
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	Yes
Nuclear Medicine Image Storage - Retired	1.2.840.10008.5.1.4.1.1.5	Yes
Stand Alone PET Curve Storage	1.2.840.10008.5.1.4.1.1.129	Yes
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Yes
Ultrasound Multi-frame Image Storage - Retired	1.2.840.10008.5.1.4.1.1.3	Yes
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6	Yes
Ultrasound Image Storage - Retired	1.2.840.10008.5.1.4.1.1.3	Yes
VL Image Storage – Retried	1.2.840.10008.5.1.4.1.1.77.1	Yes
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	Yes
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	Yes
VL Multi-Frame Image Storage - Retired	1.2.840.10008.5.1.4.1.1.77.2	Yes
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	Yes
VL Slide Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3	Yes
VL Whole Slide Microscopy Image Storage	1.2.840.10008.5.1.4.1.1.77.1.6	Yes
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Yes
X-Ray Angiographic Bi-Plane Image Storage - Retired	1.2.840.10008.5.1.4.1.1.12.3	Yes
X-Ray Fluoroscopy Image Storage	1.2.840.10008.5.1.4.1.1.12.2	Yes
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67	Yes

Table 3: Store-SCU supported SOP Classes

(2) Association Policies

a) General

The configuration of the PaxeraServer defines the Application Entity Titles, the port numbers, the host name and net address.

b) Number of Association

PaxeraServer initiates several associations at a time, one for each transfer request being processed.

c) Asynchronous Nature

PaxeraServer does not support asynchronous communication. (Multiple outstanding transactions over a single association).

d) Implementation Identifying Information

PaxeraServer Implementation Class UID: "1.2.826.0.1.3680043.2.773"

PaxeraServer Implementation Version: "PaxeraHealth_226"

(3) Association Initiation Policy

PaxeraServer Store SCU attempts to initialize a new association for DIMSE C-STORE Service operations. PaxeraServer Store SCU will send C-STORE request to the Remote AE. If the association accepted, Entity, it will transfer each image one after another via the open association. If the C-STORE Response from the remote Application contains an error status the association is aborted.

Proposed Presentation Contexts

Name	UID	Role	Extended Negotiation
Implicit VR - Little Endian	1.2.840.10008.1.2	SCU	None
Explicit VR - Little Endian	1.2.840.10008.1.2.1	SCU	None
Explicit VR - Big Endian	1.2.840.10008.1.2.2	SCU	None
JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCU	None
JPEG Extended (Process 2 & 4)	1.2.840.10008.1.2.4.51	SCU	None
JPEG Lossless, Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCU	None
RLE Lossless	1.2.840.10008.1.2.5	SCU	None

Table 4: Store-SCU supported Transfer Syntaxes

(4) Association Acceptance Policy

PaxeraServer Store-SCU doesn't accept requested associations.

3.2.2. Store-SCP

(1) SOP Classes

PaxeraServer Store-SCP provides Standard Conformance to the following DICOM SOP Classes:

SOP Name	SOP UID	SCP
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	Yes
Arterial Pulse Waveform Storage	1.2.840.10008.5.1.4.1.1.9.5.1	Yes
Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	Yes
Basic Text SR Storage	1.2.840.10008.5.1.4.1.1.88.11	Yes
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1	Yes
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1	Yes
Chest CAD SR Storage	1.2.840.10008.1.4.1.1.88.50	Yes
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Yes
Comprehensive SR Storage	1.2.840.10008.5.1.4.1.1.88.33	Yes
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Yes
Digital Intra-Oral X-Ray Image Storage For Presentation	1.2.840.10008.5.1.4.1.1.1.3	Yes
Digital Intra-Oral X-Ray Image Storage For Processing	1.2.840.10008.5.1.4.1.1.1.3.1	Yes
Digital Mammography X-Ray Image Storage For Presentation	1.2.840.10008.5.1.4.1.1.1.2	Yes
Digital Mammography X-Ray Image Storage For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	Yes
Breast Tomosynthesis Image Storage	1.2.840.10008.5.1.4.1.1.13.1.3	Yes
Breast Projection X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.13.1.5	Yes
Breast Projection X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.13.1.4	Yes
Digital X-Ray Image Storage For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Yes
Digital X-Ray Image Storage For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Yes
ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	Yes
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Yes
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	Yes
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	Yes
Enhanced SR Storage	1.2.840.10008.5.1.4.1.1.88.22	Yes
Enhanced XRF Image Storage	1.2.840.10008.5.1.4.1.1.12.2.1	Yes
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	Yes
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1	Yes
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59	Yes
Mammography CAD SR	1.2.840.10008.5.1.4.1.1.88.50	Yes
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Yes

MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2	Yes
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	Yes
Multi-frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	Yes
Multi-frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	Yes
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Yes
PET Image Storage	1.2.840.10008.5.1.4.1.1.128	Yes
Procedural Event Logging SOP Class	1.2.840.10008.5.1.4.1.1.88.40	Yes
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	Yes
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	Yes
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	Yes
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4	Yes
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	Yes
RT Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6	Yes
RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7	Yes
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	Yes
Nuclear Medicine Image Storage - Retired	1.2.840.10008.5.1.4.1.1.5	Yes
Stand Alone PET Curve Storage	1.2.840.10008.5.1.4.1.1.129	Yes
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Yes
Ultrasound Multi-frame Image Storage - Retired	1.2.840.10008.5.1.4.1.1.3	Yes
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6	Yes
Ultrasound Image Storage - Retired	1.2.840.10008.5.1.4.1.1.3	Yes
VL Image Storage – Retried	1.2.840.10008.5.1.4.1.1.77.1	Yes
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	Yes
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	Yes
VL Multi-Frame Image Storage - Retired	1.2.840.10008.5.1.4.1.1.77.2	Yes
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	Yes
VL Slide Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3	Yes
VL Whole Slide Microscopy Image Storage	1.2.840.10008.5.1.4.1.1.77.1.6	Yes
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Yes
X-Ray Angiographic Bi-Plane Image Storage - Retired	1.2.840.10008.5.1.4.1.1.12.3	Yes
X-Ray Fluoroscopy Image Storage	1.2.840.10008.5.1.4.1.1.12.2	Yes

Table 5: Store-SCP supported SOP Classes

(2) Association Policies

(3) General

The configuration of the PaxeraServer defines the Application Entity Titles, the port numbers, the host name and net address.

(4) Number of Association

PaxeraServer initiates several associations at a time, one for each transfer request being processed.

(5) Asynchronous Nature

PaxeraServer does not support asynchronous communication. (Multiple outstanding transactions over a single association).

(6) Implementation Identifying Information

PaxeraServer Implementation Class UID: "1.2.826.0.1.3680043.2.773"

PaxeraServer Implementation Version: "PaxeraHealth_226"

(3) Association Initiation Policy

PaxeraServer Store SCP attempts to initialize a new association for DIMSE C-STORE Service operations. PaxeraServer will receive C-STORE request from the Remote AE. If the association accepted, Entity, it will receive each image one after another via the open association. If the C-STORE Response to the remote Application contains an error status the association will continue until the remote AE aborts the association.

Accepted Presentation Contexts

Name	UID	Role	Extended Negotiation
Implicit VR - Little Endian	1.2.840.10008.1.2	SCP	None
Explicit VR - Little Endian	1.2.840.10008.1.2.1	SCP	None
Explicit VR - Big Endian	1.2.840.10008.1.2.2	SCP	None
JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCP	None
JPEG Extended (Process 2 & 4)	1.2.840.10008.1.2.4.51	SCP	None
JPEG Lossless, Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCP	None
RLE Lossless	1.2.840.10008.1.2.5	SCP	None

Table 6: Store-SCP supported Transfer Syntaxes

(4) SOP Specific Conformance for SOP Classes

PaxeraServer Store-SCP returns the following status:

- *Success* (0000): upon successful operation
- *Refused* (A700): This error status indicates a lack of resources (e.g. not enough disk space) on the <xxx> modality.
- *Error* (A900 or C000): An error occurred while processing the image which makes it impossible to proceed. The image will not be stored and the association aborted.

If an instance with the same SOP Instance UID is already present in the archive then the received instance will replace the old instance. So, if a remote node sends twice the same instance (same SOP Instance UID) the old instance will be replaced by the latest received instance.

(5) Association Acceptance Policy

PaxeraServer Store SCP will accept all incoming association; there’s no need for the Store SCU to be registered.

3.3. Query/Retrieve AE Specifications

The Query/Retrieve SCU requests that the remote SCP perform a match of all keys specified in the request, against the information in its database and the identified images will be moved or retrieved to the same or a different storage association.

The Query/Retrieve SCP responds to queries based on the records based on its database and images will be sent to the requesting SCU or to a different storage destination. PaxeraServer provides Standard Conformance to the following DICOM V3.0 SOP Classes as SCU and SCP:

SOP Name	SOP UID
Patient Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2
Patient Root Query/Retrieve Information Model – GET	1.2.840.10008.5.1.4.1.2.1.3
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2
Study Root Query/Retrieve Information Model – GET	1.2.840.10008.5.1.4.1.2.2.3
Patient/Study Only Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.3.1
Patient/Study Only Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.3.2
Patient/Study Only Query/Retrieve Information Model – GET	1.2.840.10008.5.1.4.1.2.3.3

Table 7: Query/Retrieve SOP Classes

3.3.1. Find-SCU

(1) SOP Classes

The Find-SCU shall support the following SOP Classes:

SOP Name	SOP UID	Role
Patient Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	SCU
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	SCU
Patient/Study Only Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.3.1	SCU

Table 7: Find-SCU Supported SOP Classes

(2) Association Policies

(7) General

The configuration of the PaxeraServer defines the Application Entity Titles, the port numbers, the host name and net address.

(8) Number of Association

PaxeraServer initiates several associations at a time, one for each transfer request being processed.

(9) Asynchronous Nature

PaxeraServer does not support asynchronous communication. (Multiple outstanding transactions over a single association).

(10) Implementation Identifying Information

PaxeraServer Implementation Class UID: “1.2.826.0.1.3680043.2.773”

PaxeraServer Implementation Version: “PaxeraHealth_226”

(3) Association Initiation Policy

The Find-SCU establishes an association by using the DICOM association services. During association establishment the Query/Retrieve application entities negotiate the supported SOP classes to exchange the capabilities of the SCU and the SCP.

PaxeraServer will initiate associations for the DICOM Query/Retrieve Service in order to perform prefetch operations. Inbound information received from Order and Scheduling systems will trigger prefetch activities within the PaxeraServer.

Prefetch activities will cause the PaxeraServer to query for and retrieve older DICOM studies from a remote DICOM entity which are determined to be relative to the currently ordered and scheduled studies.

Proposed Presentation Contexts

Name	UID	Role	Extended Negotiation
Implicit VR - Little Endian	1.2.840.10008.1.2	SCU	None
Explicit VR - Little Endian	1.2.840.10008.1.2.1	SCU	None
Explicit VR - Big Endian	1.2.840.10008.1.2.2	SCU	None

Table 8: Find-SCU Supported Transfer Syntaxes

SOP Specific Conformance for SOP Classes

The following tables describe the search keys for the different query models that the Find SCU Query supports:

Patient Level	Study Level	Series Level	Instance Level
Patient Name.	Patient Name	Series Description.	SOP Instance UID.
Patient ID.	Patient ID.	Series Date.	Instance Number.
Patient's Birth Date.	Study Instance UID.	Series Time.	
Patient's Sex.	Study ID.	Series Instance UID.	
	Study Date.	Series Number.	
	Study Time.	Modality.	
	Accession Number.		
	Modalities in Study		

Table 9: Patient Root and Study Root Query Attributes

The Find SCU can decode the following responses:

- Success (0000):** Success
- Refused (A700):** General refusal status
- Warning (B000):** General warning status
- Failure (C000)** General failure status

3.3.2. Move-SCU

(1) SOP Classes

The Move-SCU shall support the following SOP Classes:

SOP Name	SOP UID	Role
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	SCU
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	SCU
Patient/Study Only Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.3.2	SCU

Table 10: Move-SCU Supported SOP Classes

(2) Association Policies

(11) General

The configuration of the PaxeraServer defines the Application Entity Titles, the port numbers, the host name and net address.

(12) Number of Association

PaxeraServer initiates several associations at a time, one for each transfer request being processed.

(13) Asynchronous Nature

PaxeraServer does not support asynchronous communication. (Multiple outstanding transactions over a single association).

(14) Implementation Identifying Information

PaxeraServer Implementation Class UID: “1.2.826.0.1.3680043.2.773”

PaxeraServer Implementation Version: “PaxeraHealth_226”

(3) Association Initiation Policy

At association establishment time the C-MOVE/C-GET presentation context shall be negotiated. The C-STORE sub-operations must be done on a different association to transfer images to another SCP of the Storage Service Class.

If C-GET is used, the resultant files are moved to the calling AE Title on the same association. If C-MOVE is used, a new association will be created using the registered AE in the settings. C-GET is more efficient but implemented by fewer vendors.

Proposed Presentation Contexts

Name	UID	Role	Extended Negotiation
Implicit VR - Little Endian	1.2.840.10008.1.2	SCU	None
Explicit VR - Little Endian	1.2.840.10008.1.2.1	SCU	None
Explicit VR - Big Endian	1.2.840.10008.1.2.2	SCU	None

Table 11: Move-SCU Supported Transfer Syntaxes

SOP Specific Conformance for SOP Classes

The following tables describe the move keys for the different query models that the Move SCU supports:

Patient Level	Study Level	Series Level	Instance Level
Patient Name.	Patient Name	Series Description.	SOP Instance UID.
Patient ID.	Patient ID.	Series Date.	Instance Number.
Patient’s Birth Date.	Study Instance UID.	Series Time.	
Patient’s Sex.	Study ID.	Series Instance UID.	
	Study Date.	Series Number.	
	Study Time.	Modality.	
	Accession Number.		
	Modalities in Study		

Table 12: Patient Root and Study Root Query/Retrieve Attributes

The Move SCU can decode the following responses:

- Success (0000):** Success
- Refused (A702):** Unable to perform sub operation (due to failure of a C- Store)
- Refused (A802)** Move destination unknown.
- Refused (A700):** General refusal status.
- Warning (B000):** General warning status.
- Failure (C000):** General failure status.
- Pending (FF00):** Sub-operations are in progress.

3.3.3. Find-SCP

(1) SOP Classes

PaxeraServer Find-SCP supports the following SOP Classes:

SOP Name	SOP UID	Role
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	SCU
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	SCU
Patient/Study Only Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.3.2	SCU

Table 13: Find-SCP supported SOP Classes

(2) Association Policies

(15) General

The configuration of the PaxeraServer defines the Application Entity Titles, the port numbers, the host name and net address.

(16) Number of Association

PaxeraServer initiates several associations at a time, one for each transfer request being processed.

(17) Asynchronous Nature

PaxeraServer does not support asynchronous communication. (Multiple outstanding transactions over a single association).

(18) Implementation Identifying Information

PaxeraServer Implementation Class UID: "1.2.826.0.1.3680043.2.773"

PaxeraServer Implementation Version: "PaxeraHealth_226"

(3) Association Initiation Policy

PaxeraServer Find-SCP is to respond to query request with the query model Patient Root or Study Root or Patient/Study Only.

Accepted Presentation Contexts

Name	UID	Role	Extended Negotiation
Implicit VR - Little Endian	1.2.840.10008.1.2	SCP	None
Explicit VR - Little Endian	1.2.840.10008.1.2.1	SCP	None
Explicit VR - Big Endian	1.2.840.10008.1.2.2	SCP	None

Table 14: Find-SCP supported Transfer Syntaxes

SOP Specific Conformance for SOP Classes

The PaxeraServer Find-SCP supports hierarchical queries with all mandatory and required search keys. The following tables describe the search keys for different query models that the PaxeraServer Query application supports as an SCP:

Patient Level	Study Level	Series Level	Instance Level
Patient	Patient Name	Series Description.	SOP Instance UID.
Name. Ethnic	Patient ID. Patient's	Series Date.	Instance Number.
Group.	Age. Patient's Size.	Series Time.	Acquisition Date.
Patient ID.	Patient's Weight.	Series Instance UID.	Acquisition
Patient's Birth Date.	Study Instance UID.	Series Number.	Time.
Patient's Sex.	Study ID.	Modality.	Contrast Bolus Agent
	Study Date.	Performing Physician Name.	
	Study Time.	Manufacture Model Name.	
	Referring Physician's Name.	Body Part Examined.	
	Accession Number.		
	Modalities in Study.		

Table 15: Find-SCP Study Root and Patient Root Query Attributes

The Remote DICOM AE can cancel the query by sending a C-CANCEL request. If the Find SCP receives C-CANCEL request before it has completed the processing of the matches it shall stop the database matching process and return a status of Cancelled to the Remote DICOM AE.

The Find SCP returns following status codes:

- Success (0000):** Success
- Refused (A700):** General refusal status
- Warning (B000):** General warning status.
- Failure (C000):** General failure status.
- Pending (FF00):** Sub-operations are in progress.

3.3.4. Move-SCP, Get-SCP

(1) SOP Classes

The Move-SCU, Get-SCP shall support the following SOP Classes:

SOP Name	SOP UID	Role
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	SCP
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	SCP
Patient/Study Only Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.3.2	SCP
Patient Root Query/Retrieve Information Model – GET	1.2.840.10008.5.1.4.1.2.1.3	SCP
Study Root Query/Retrieve Information Model – GET	1.2.840.10008.5.1.4.1.2.2.3	SCP
Patient/Study Only Query/Retrieve Information Model – GET	1.2.840.10008.5.1.4.1.2.3.3	SCP

Table 16: Move-SCP/Get-SCP supported SOP Classes

(2) Association Policies

(19) General

The configuration of the PaxeraServer defines the Application Entity Titles, the port numbers, the host name and net address.

(20) Number of Association

PaxeraServer initiates several associations at a time, one for each transfer request being processed.

(21) Asynchronous Nature

PaxeraServer does not support asynchronous communication. (Multiple outstanding transactions over a single association).

(22) Implementation Identifying Information

PaxeraServer Implementation Class UID: "1.2.826.0.1.3680043.2.773"

PaxeraServer Implementation Version: "PaxeraHealth_226"

(3) Association Initiation Policy

At association establishment time the C-MOVE/C-GET presentation context shall be negotiated. The C-STORE sub-operations must be done on a different association to transfer images to another SCP of the Storage Service Class.

PaxeraServer Move-SCP requires the requesting SCU to be registered to continue processing the request.

Accepted Presentation Contexts

Name	UID	Role	Extended Negotiation
Implicit VR - Little Endian	1.2.840.10008.1.2	SCP	None
Explicit VR - Little Endian	1.2.840.10008.1.2.1	SCP	None
Explicit VR - Big Endian	1.2.840.10008.1.2.2	SCP	None

Table 17: Move-SCP/Get-SCP supported Transfer Syntaxes

SOP Specific Conformance for SOP Classes

The following tables describe the move keys for the different query models that the Move SCP supports:

Patient Level	Study Level	Series Level	Instance Level
Patient Name.	Patient Name Patient ID.	Series Description.	SOP Instance UID. Instance Number.
Ethnic Group.	Patient's Age. Patient's Size. Patient's Weight.	Series Date.	Acquisition Date.
Patient ID.	Study Instance UID.	Series Time.	Acquisition Time.
Patient's Birth Date. Patient's Sex.	Study ID.	Series Instance UID.	Contrast Bolus Agent
	Study Date. Study Time.	Series Number.	
		Modality.	
		Performing Physician Name.	
		Manufacture Model Name.	
		Body Part Examined.	
	Referring Physician's Name.		
	Accession Number.		
	Modalities in Study.		

Table 18: Move-SCP/Get-SCP Query/Retrieve Attributes

The Move SCP returns following status codes:

- Success (0000):** Success
- Refused (A702):** Unable to perform sub operation (due to failure of a C- Store)
- Refused (A802):** Move destination unknown.
- Refused (A700):** General refusal status.
- Warning (B000):** General warning status.
- Failure (C000):** General failure status.
- Pending (FF00):** Sub-operations are in progress.

3.4. DICOM Prefetching

(1) Association Policies

PaxeraServer performs a Query/Retrieve operations to PACS archives to retrieve prior studies to configured workstation.
Prefetching prior studies are triggered when receiving a new study or a new order ORM.

When a new study or a new order is scheduled a list of prior studies is fetched from the configured PACS servers using DICOM C-FIND using the Study Root Information model. For each prior a DICOM C-MOVE request is initiated to the configured PACS archived and routed to the configured destination.

3.4.1. Proposed Presentation Contexts

Refere to Table 7.

3.4.2. SOP Specific Conformance

The following table lists the elements in the C-FIND request for DICOM Prefetching

Description	Tag
Patient Name	(0010,0010)
Patient ID	(0010,0020)
Other Patient ID	(0010,1000)
Modality	(0008,0060)
Study Description	(0008,1030)
Referring Physician	(0008,0090)
Patient's Birth Date	(0010,0030)
Patient's Sex	(0010,0040)
Other Patient's Name	(0010,1001)
Responsible Person	(0010,2297)
Responsible Person Rule	(0010,2298)
Responsible Organization	(0008,0116)
Other Tags	When prefetching is required using any other tag than that predefined.

3.4. Workflow Management AE Specifications

3.4.1. Modality Worklist SCP

(1) SOP Classes

SOP Name	SOP UID	Role
Modality Worklist Information Model C-Find	1.2.840.10008.5.1.4.31	SCP

Table 19: Modality Worklist SOP Class support

(2) Association Policies

(23) General

The configuration of the PaxeraServer defines the Application Entity Titles, the port numbers, the host name and net address.

(24) Number of Association

PaxeraServer initiates several associations at a time, one for each transfer request being processed.

(25) Asynchronous Nature

PaxeraServer does not support asynchronous communication. (Multiple outstanding transactions over a single association).

(26) Implementation Identifying Information

PaxeraServer Implementation Class UID: "1.2.826.0.1.3680043.2.773"

PaxeraServer Implementation Version: "PaxeraHealth_226"

(3) Association Initiation Policy

The Modality Worklist SCP AE provides conformance to the DICOM FIND SOP classes as SCP. Listed below are currently supported Matching key attributes and default Return attributes. The Modality Worklist SCP accepts an association by using the DICOM association services. The following DIMSE-C operation is supported as SCP: C-FIND

Accepted Presentation Contexts

Name	UID	Role	Extended Negotiation
Implicit VR - Little Endian	1.2.840.10008.1.2	SCP	None
Explicit VR - Little Endian	1.2.840.10008.1.2.1	SCP	None
Explicit VR - Big Endian	1.2.840.10008.1.2.2	SCP	None

Table 20: Modality Worklist SOP Transfer Syntaxes

SOP Specific Conformance for SOP Classes

The PaxeraServer Modality Worklist SCP supports Worklist queries with all required search keys. The following tables describe the search keys that the SCP supports.

Attribute Name	Tag	Matching
Sop Common		
Specific Character Set	(0008,0005)	
Scheduled Procedure Step		
Scheduled Procedure Step Sequence	(0008,0005)	
> Scheduled Station AE Title	(0040,0100)	Single value, multiple value or wild card
> Scheduled procedure Step Start Date	(0040,0001)	Single value or range
> Scheduled procedure Step Start Time	(0040,0002)	Single value or range
>Modality	(0008,0060)	Single value or wild card
>Scheduled Performing Physician Name	(0040,0006)	
>Scheduled Procedure Step Description	(0040,0007)	
>Scheduled Station Name	(0040,0010)	Single value, multiple value or wild card
>Scheduled Procedure Step Location	(0040,0011)	
>Pre-Medication	(0040,0012)	
>Scheduled Procedure Step ID	(0040,0009)	
Requested Procedure ID		
Requested Procedure ID	(0040,1001)	Single value or wild card
Requested Procedure Description	(0032,1060)	
Study Instance UID	(0020,000D)	
Requested Procedure Priority	(0040,1003)	
Patient Transport Arrangement	(0040,1004)	
Imaging Service Request		
Accession Number	(0008,0050)	Single value
Requesting Physician	(0032,1032)	
Referring Physician's Name	(0008,0090)	
Visit Identification		
Admission ID	(0038,0010)	
Visit Status		
Current Patient Location	(0038,0300)	
Patient Identification		
Patient's Name	(0010,0010)	Single value or wild card
Patient's ID	(0010,0020)	Single value or wild card
Patient Demographic		
Patient's Birth Date	(0010,0030)	
Patient's Sex	(0010,0040)	
Patient's Weight	(0010,1030)	
Confidentiality Constraint on Patient Data	(0040,3001)	
Patient Medical		
Patient State	(0038,0500)	

Pregnancy Status	(0010,21C0)	
Medical Alerts	(0010,2000)	
Contrast Allergies	(0010,2100)	
Special Needs	(0038,0050)	

Table 21: Scheduled Procedure Step and Patient Identification Search keys

3.4.2. Storage Commitment SCP

(1) SOP Classes

SOP Name	SOP UID	Role
Storage Commitment Push Model	1.2.840.10008.1.20.1	SCP

Table 22: Storage Commitment supported SOP Class

(2) Association Policies

(27) General

The configuration of the PaxeraServer defines the Application Entity Titles, the port numbers, the host name and net address.

(28) Number of Association

PaxeraServer initiates several associations at a time, one for each transfer request being processed.

(29) Asynchronous Nature

PaxeraServer does not support asynchronous communication. (Multiple outstanding transactions over a single association).

(30) Implementation Identifying Information

PaxeraServer Implementation Class UID: "1.2.826.0.1.3680043.2.773"
PaxeraServer Implementation Version: "PaxeraHealth_226"

(3) Association Initiation Policy

The PaxeraServer Storage commitment SCP will always initiate a new Association when a Peer AE requests Storage Commitment of Composite SOP Instances.

The PaxeraServer Storage commitment SCP attempts to send a Storage Commitment Push Model Notification (N-EVENT-REPORT) on a new Association to the requesting SCU.

The Storage commitment SCU AE should be registered in PaxeraServer settings for initializing a new association.

Accepted Presentation Contexts

Name	UID	Role	Extended Negotiation
Implicit VR - Little Endian	1.2.840.10008.1.2	SCP	None
Explicit VR - Little Endian	1.2.840.10008.1.2.1	SCP	None
Explicit VR - Big Endian	1.2.840.10008.1.2.2	SCP	None

Table 23: Storage Commitment supported Transfer Syntaxes

SOP Specific Conformance for SOP Classes

- The PaxeraServer Storage Commitment SCP responds to Storage Commitment SCU by sending the SOP Instance UID of the successfully stored or failed instances.
- PaxeraServer stores images that are sent to it from an SCU. The request for storage commitment may then be transmitted together with a list of references to one or more SOP instances.
- PaxeraServer will receive and respond to DIMSE N-ACTION. The following Request message is supported:

Action Name	Action Type ID	Attribute Name	Tag
Request Storage Commitment	1	Transaction UID	(0008,1195)
		Referenced SOP Sequence	(0008,1199)
		>Referenced SOP Class UID	(0008,1150)
		>Referenced SOP Instance UID	(0008,1155)

Table 24: Storage Commitment request attributes

- PaxeraServer determines that it has successfully completed storage commitment.
- PaxeraServer issues an N-EVENT-REPORT to the SCU including references to the successfully stored SOP Instances contained in the N-ACTION.
- The N-EVENT-REPORT contains the Transaction UID value contained in the initiating N-ACTION.
- The N-EVENT-REPORT is sent on a separate association from the N-ACTION operation.

The following Response message is supported:

Action Name	Action Type ID	Attribute Name	Tag
Storage Commitment Request Successful	1	Transaction UID	(0008,1195)
		Referenced SOP Sequence	(0008,1199)
		>Referenced SOP Class UID	(0008,1150)
		>Referenced SOP Instance UID	(0008,1155)
Storage Commitment Request Complete Failures Exists	2	Transaction UID	(0008,1195)
		Referenced SOP Sequence	(0008,1199)
		>Referenced SOP Class UID	(0008,1150)
		>Referenced SOP Instance UID	(0008,1155)
		Failed SOP Sequence	(0008,1198)
		>Referenced SOP Class UID	(0008,1150)
		>Referenced SOP Instance UID	(0008,1155)
		>Failure Reason	(0008,1197)

Table 25: Storage Commitment response attributes

4. COMMUNICATION PROFILE

4.1. Supported Communication Stack

PaxeraServer provides DICOM V3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard.

OSI Stack	Not Supported.
TCP/IP Stack	PaxeraServer uses the TCP/IP stack from the Windows NT system upon which it executes
API	PaxeraServer is based on a TCP/IP socket interface.
Physical Support Medial	PaxeraServer is indifferent to the physical medium over which TCP/IP executes; it inherits this from the Windows NT system upon which it executes.
Point-to-Point Stack	Not Supported.

Table 26: Supported Communication Stack

5. CONFIGURATION

5.1. AE Title / Presentation Address Mapping

To ensure unique identification the hostname should be part of the AE Titles (e.g. PX_myhost). The string can be up to 16 characters long and must not contain any extended characters, only 7 bit ASCII characters (excluding control characters) are allowed according to DICOM standard.

5.1.1. Local AE Titles and Presentation Addresses

The user can configure the Listener TCP Port and AE title via Settings application of the PaxeraServer.

5.1.2. Remote AE Titles and Presentation Addresses

For remote AETs, host names, IP addresses and port numbers can be configured via the Settings application. For each AET a list of supported services can also be configured.

5.2. Configurable Parameters

5.2.1. Storage and Query Retrieve

The Settings application can be used to set the AETs, port numbers, host names, IP addresses and capabilities for the remote nodes' (SCP's). The user can select operator and compression types for each SCP separately.

5.2.2. Time out Parameters

The Service application can be used to set all the following time out constants to a certain value depending on user input:

- Time-out for accepting / rejecting an associated request
- Time-out for responding to an association open / close request
- Time-out for accepting a message over network.
- Time-out for waiting for data between TCP/IP-packets
- Time-out for waiting for receiving request / response for Storage, Query/Retrieve, and Basic Worklist SCP/SCU

5.3. Default Parameters

PDU size is set to 65536 Byte

6. SECURITY PROFILE

6.1. Association Level Security

PaxeraServer provides association level security by restricting acceptance to association requests only from DICOM AEs configured in PaxeraServer. Association requests from unknown DICOM AEs will be rejected.

6.2. Application Level Security

Administration Tools running at PACS AE and Service Tools running at Integration Services AE requires a valid user name and password pair to login

7. Data Dictionary of Private Attributes

The following are the PaxeraServer private attributes:

Tag	Attribute Name	VR	VM	Description
(0087,0010)	Private creator identification code	LO	1	Stores annotation preferences in presentation states, it has the value "PX MultiModality"
(0087,1000)	Annotation type	SS	1	Stores the annotation type in presentation state
(0087,1001)	Annotation color	SL	1	Stores the annotation color in presentation state
(0087,1002)	Annotation width	US	1	Stores the annotation width in presentation state
(0087,1003)	Annotation fill color	SL	1	Stores the annotation fill color in presentation state
(0087,1004)	Annotation font size	US	1	Stores the annotation font size in presentation state
(0087,1005)	Annotation font color	SL	1	Stores the font color in presentation state
(0087,1006)	Annotation background color	SL	1	Stores the annotation background color in presentation state
(0087,1008)	Text arrow head point	FL	2	Stores the text arrow head point in presentation state
(0087,1007)	Sequence of private annotations	SQ	N	Stores sequence of private annotations in presentation state

Table 27: PaxeraServer private attributes