



Kodak DirectView PACS Archive Server 4.0.2

DICOM Conformance Statement

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Revision History

Revision	Date	Author	Description
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1.2	06/18/2001	Truong Bui	Added new supported SOP Classes.
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1 Introduction

This document is the DICOM conformance statement for **Kodak DirectView** PACS Archive Server 4.0.2. This document serves as a statement of requirements for connecting Archive Server with other DICOM implementations (e.g. products from other vendors). Other vendors should review this document before connecting their products with Archive Server. This implementation of DICOM has been carefully tested to assure adherence to the DICOM Standard. However this Conformance Statement and the DICOM standard do not guarantee interoperability with other vendors. The user must compare the relevant Conformance Statements and if a successful interconnection should be possible, the user is responsible to specify an appropriate test suite and to validate the interoperability, which is required.

This section gives a description of the DICOM V3.0 services supported by Archive Server.

Archive Server is a product manufactured by **Kodak Health Imaging**. Its purpose is to provide image management in a medical imaging environment that communicates using DICOM V3.0 protocols. Archive Server provides the following functions:

- Receive medical images sent by image acquisition devices (scanners), workstations, or other devices and store them in a local database.
- Retrieve medical images from the local database and send them to requesting devices.
- Respond to query and retrieve requests for information stored in the database.
- Respond to verification requests for DICOM services.

Archive Server provides the following DICOM V3.0 services:

- Verification service class as a service class provider (SCP).
- Storage service classes used as both a service class user (SCU) and a service class provider (SCP). The following Service-Object Pair (SOP) classes are supported:
 - Computed Radiography (CR) Image Storage
 - Computed Tomography (CT) Image Storage
 - Magnetic Resonance (MR) Image Storage
 - *Enhanced MR Image Storage*

- *MR Spectroscopy Image Storage*
- Nuclear Medicine (NM) Image Storage (Retired)
- Nuclear Medicine (NM) Image Storage
- Ultrasound (US) Image Storage (Retired)
- Ultrasound (US) Image Storage
- Ultrasound (US) Multi-frame Image Storage (Retired)
- Ultrasound (US) Multi-frame Image Storage
- RT Image Storage
- RT Dose Storage
- RT Structure Set Storage
- RT Beams Treatment Record Storage
- RT Plan Storage
- RT Brachy Treatment Record Storage
- RT Treatment Summary Record Storage
- Secondary Capture Image Storage
- *Multi-Frame Single Bit Secondary Capture Image Storage*
- *Multi-Frame Grayscale Byte Secondary Capture Image Storage*
- *Multi-Frame Grayscale Word Secondary Capture Image Storage*
- *Multi-Frame True Color Secondary Capture Image Storage*
- *Visible Light (VL) Image Storage (Retired)*
- *Visible Light (VL) Endoscopic Image Storage*
- *Visible Light (VL) Microscopic Image Storage*
- *Visible Light (VL) Slide-Coordinates Microscopic Image Storage*

- *Visible Light (VL) Multi-Frame Image Storage (Retired)*
- Standalone Overlay Storage
- Standalone Curve Storage
- *12-Lead ECG Waveform Storage*
- *General ECG Waveform Storage*
- *Ambulatory ECG Waveform Storage*
- *Hemodynamic Waveform Storage*
- *Cardiac Electrophysiology Waveform Storage*
- *Basic Voice Audio Waveform Storage*
- Standalone Modality LUT Storage
- Standalone VOI LUT Storage
- *Grayscale Softcopy Presentation State Storage*
- *Raw Data Storage*
- PET Image Storage
- Standalone PET Curve Storage
- *Basic Text SR Storage*
- *Enhanced SR Storage*
- *Comprehensive SR Storage*
- *Mammography CAD SR Storage*
- *Stored Print Storage*
- *Hardcopy Grayscale Image Storage*
- *Hardcopy Color Image Storage*
- X-Ray Angiographic (XA) Image Storage
- X-Ray Angiographic (XA) Bi-Plane Image Storage (Retired)
- X-Ray Radiofluoroscopic (RF) Image Storage

- Digital X-Ray Image Storage (DX) for Presentation
- Digital X-Ray Image Storage (DX) for Processing
- Digital Mammography Image Storage (MG) for Presentation
- Digital Mammography Image Storage (MG) for Processing
- Digital Intra-Oral X-Ray Image Storage (IO) for Presentation
- Digital Intra-Oral X-Ray Image Storage (IO) for Processing

Note: All Storage SOP Classes must be validated between Kodak and OEM DICOM implementations before clinical usage, especially for all *Storage SOP Classes emphasized above in italics.*

- Query/retrieve (Q/R) service class as an SCP. The following SOP classes are supported:
 - Patient Root Query/Retrieve Information Model — FIND
 - Patient Root Query/Retrieve Information Model — MOVE
 - Study Root Query/Retrieve Information Model — FIND
 - Study Root Query/Retrieve Information Model — MOVE
 - Patient/Study Only Query/Retrieve Information Model — FIND
 - Patient/Study Only Query/Retrieve Information Model — MOVE
 - Kodak Private Series Root Query/Retrieve Information Model — FIND
 - Kodak Private Series root query/retrieve information Model — MOVE

- HIS/RIS-related service classes as an SCU. The following SOP classes are supported:
 - Detached Patient Management
 - Detached Study Management
 - Kodak Specialized Detached Patient Management
 - Kodak Specialized Detached Study Management

2 Implementation Model

2.1 Application Data Flow Diagram

This section discusses the flow of data to and from the Archive Server. Figure 1 depicts the DICOM Implementation Model that illustrates the flow of DICOM data. Figure 2 depicts the DICOM Application Entities that are illustrated in Figure 1 and shows where they fit into the overall architecture of the product.

In the remote real-world activity labeled “Verify Communication”, a remote application entity (AE) initiates a DICOM association and requests verification from the Archive Server (DIMSE C-ECHO operation). When the Archive Server receives the request, it responds to the remote AE and communication between the two AE’s has been verified.

In the remote real-world activity “Send Images,” a remote AE initiates an association with the Archive Server and sends one or more images (i.e. invokes C-STORE operations) to Archive Server that causes the local real-world activity “Store Images”. Some minor modification of the images may occur (e.g. compression) before they are stored as a set of individual DICOM Files¹. The name of the file as well as information describing the contents of the file (e.g. Patient’s Name, Study Instance UID) is eventually stored in Archive Server’s Patient Database.

The set of actions that are performed when storing images in Archive Server may trigger the local real-world activity “Forward Images”. In this activity, the DICOM Image Forwarding Service sends the images that were just received to one or more DICOM Applications that may be external to Archive Server. The mechanism that triggers the DICOM Image Forwarding Service is based on pre-configured rules in Archive Server. For example, some rules may be as simple as selecting all images for a particular DICOM Application or they may be more complex such as requiring the (0008, 0018) Body Part Examined attribute to be set to a particular value (e.g. forward all CHEST images to a particular diagnostic workstation).

¹ The images are stored as a set of DICOM Files. It should be noted that this set of files does not constitute a DICOM File-Set according to the specification of the DICOM File Service in Part 10 of the DICOM standard. There is no DICOMDIR file present. Archive Server is therefore not an FSC (File-Set Creator). Only the DICOM File Format in Part 10 is employed, not the DICOM File Service.

In the remote real-world activity “Query (Find) Images”, a remote AE initiates an association with Archive Server and invokes the DIMSE C-FIND operation. This causes the local real-world activity “Query/Retrieve” to occur. During this activity, Archive Server searches through its Patient Database for possible matches with composite SOP instances (e.g. images). The results of the query are returned to the remote AE (i.e. C-FIND-RSP messages with a pending status) on the same association.

In the remote real-world activity “Retrieve (Move) Images”, a remote AE initiates an association with Archive Server and requests some composite SOP instances (e.g. images) to be retrieved. This causes the local real-world activity “Query/Retrieve” to occur. During this activity, Archive Server searches through its Patient Database for possible matches with composite SOP instances (e.g. images). The resulting composite SOP instances are transferred (i.e. the C-STORE operation is invoked) to the AE specified in the C-MOVE request. The local real-world activity “Send Images” occurs and Archive Server initiates an association with the destination AE and the transfer of the images causes the remote real-world activity “Store Images” to occur.

In the remote real-world activity “Notify Change in State of Patient and/or Study,” a remote AE initiates an association with Archive Server and sends a notification event (i.e. invokes the N-EVENT-REPORT notification) containing changes in the state of a real-world patient and/or study. This causes the local real-world activity “Process Notification” to occur. If the notification event does not contain all of the information required by Archive Server, then Archive Server initiates a new association (after the original association was terminated) with the same remote AE, and requests the missing information (i.e. invokes the N-GET operation). This causes the remote real-world activity “Get Patient and/or Study Information” to occur.

When the notification event that is received is either “Study Scheduled” or “Study Updated”, the set of actions that are performed may trigger the local real-world activity “Prefetch Prior Studies”. In this activity, the DICOM Study Prefetch Service sends the images of all studies for the same patient that were previously received to one or more DICOM Applications that may be external to Archive Server. The criterion used by the DICOM Study Prefetch Service is very similar to that used by the DICOM Image Forwarding Service. That is all images may be sent to a particular DICOM Application or there may be more complex conditions specified such as requiring the (0008, 0018) Body Part Examined attribute to be set to a particular value (e.g. send all prior CHEST images to a particular diagnostic workstation).

All of the DICOM services that are performed by Archive Server are (for the most part) delegated to other non-DICOM entities within Archive Server. The mechanism by which the DICOM Applications communicate with these other entities is IIOP (Internet Inter-Orb Protocol). IIOP enables Archive Server to implement its internal CORBA (Common Object Request Broker Architecture) architecture. With reference to Figure 2, all of the internal entities such as “Store Server” and “Find Server” are CORBA servers. The DICOM Server and the HIS/RIS DICOM Server are CORBA clients. They translate DICOM messages into CORBA messages and send those messages using IIOP to the other CORBA servers in Archive Server that actually perform the majority of the operations. Likewise, the DICOM Image Forwarding Service and the DICOM Study Prefetch Service are CORBA servers that translate CORBA messages into DICOM C-STORE-RQ messages.

The internal architecture depicted in Figure 2 only touches on the inter-workings of Archive Server. Its presence in this document is not required for reasons of inter-operability. It's objective is to establish a context by which the DICOM Applications function.

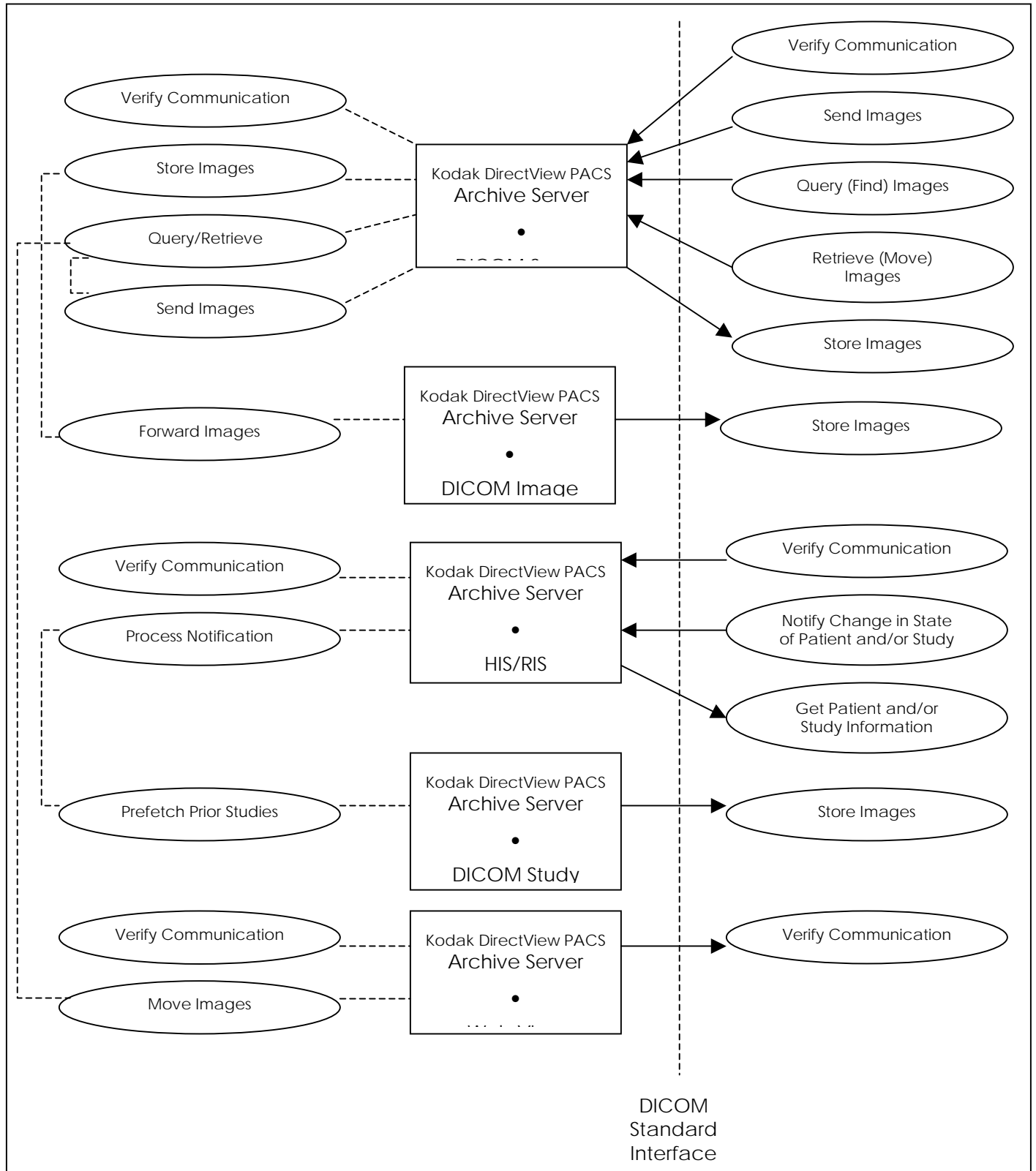


Figure 1. Kodak DirectView PACS Archive Server Implementation Model

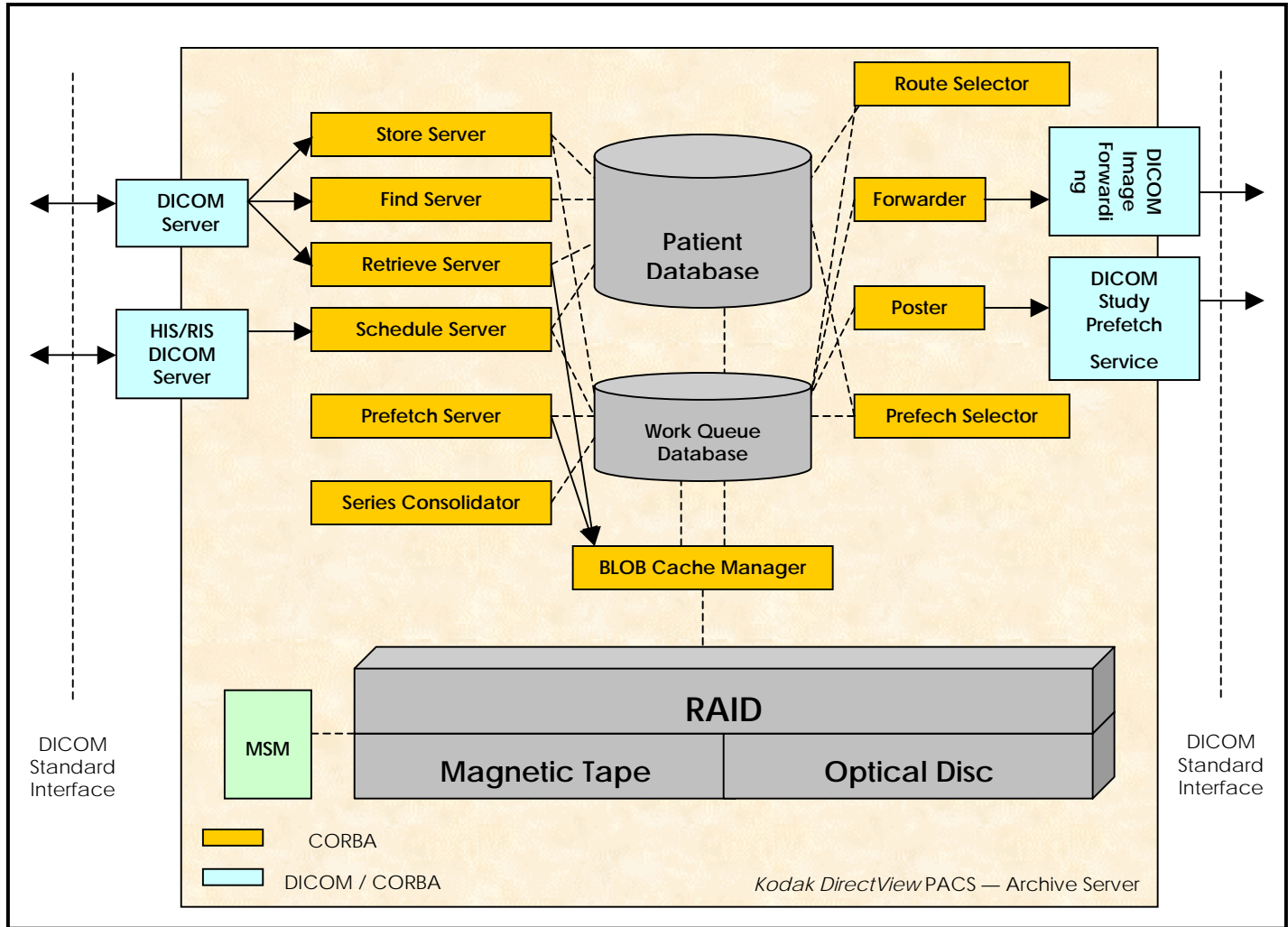


Figure 2. Kodak DirectView PACS Archive Server Architecture

2.2 Functional Definition of AE's

Archive Server operates as several DICOM Application Entities. These Application Entities and their function with respect to DICOM are as follows:

DICOM Application Entity	Functional Definition	DICOM Services
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<p>DICOM Server</p>	<p>The DICOM Server is the receptor for DICOM Images and other Composite SOP Instances. It also provides management of these images using the DICOM Query/Retrieve service.</p> <p>At the DIMSE service level, the DICOM Server performs the C-ECHO, C-STORE, C-FIND, and C-MOVE operations. The only operation that it invokes is the DIMSE C-STORE operation as sub-operations of the DIMSE C-MOVE operation.</p> <p>Note: The DICOM Server is implemented as a multi-threaded, single-process application. All threads are created at the time of initialization. There is no relationship between the number of threads and the number of associations.</p>	<ul style="list-style-type: none"> • VERIFICATION • STORAGE • QUERY/RETRIEVE
<p>HIS/RIS DICOM Server</p>	<p>The HIS/RIS DICOM Server is the receptor for DICOM messages that originate from a HIS/RIS or a proxy to a HIS/RIS. The type of services that it offers is limited to the Detached Patient Management and the Detached Study Management SOP Classes.</p> <p>At the DIMSE service level, the HIS/RIS DICOM Server performs the N-EVENT-REPORT notification and may invoke the N-GET operation if necessary.</p> <p>Note: The HIS/RIS DICOM Server is a second instance of the DICOM Server application except that it is configured differently. The HIS/RIS DICOM Server listens on a port number that is different from the main DICOM Server.</p>	<ul style="list-style-type: none"> • VERIFICATION • DETACHED PATIENT MANAGEMENT • DETACHED STUDY MANAGEMENT
<p>DICOM Image Forwarding Service</p>	<p>The DICOM Image Forwarding Service is responsible for sending DICOM Images and other Composite SOP Instances to external DICOM Application Entities.</p> <p>The criterion for selecting the images to send is based on the images received by the Storage SCP in the DICOM Server.</p> <p>At the DIMSE service level, the DIMSE C-STORE operation is invoked. No DIMSE operations are performed.</p>	<ul style="list-style-type: none"> • STORAGE
<p>DICOM Study Prefetch Service</p>	<p>The DICOM Study Prefetch Service is responsible for sending DICOM Images and other Composite SOP Instances to external DICOM Application Entities.</p>	<ul style="list-style-type: none"> • STORAGE

	<p>The criterion for selecting the images to send is based on the notification events “Study Scheduled” and “Study Updated” that are received by the HIS/RIS DICOM Server.</p> <p>At the DIMSE service level, the DIMSE C-STORE operation is invoked. No DIMSE operations are performed.</p>	
Web View	<p>The Web View component of Archive Server performs many functions most of which are non-DICOM related.</p> <p>However, one of its DICOM-related functions is the verification of application-level DICOM communication.</p> <p>The other DICOM-related function is the transfer of images from the archive. Images can be queried (using the direct database API not DICOM) and then selected for transfer using the DICOM Storage Service Class. The destination of the images is chosen from a list of pre-configured Application Entities.</p>	<ul style="list-style-type: none"> • VERIFICATION • STORAGE

Table 2. Functional Definition of AE's

2.3 Sequencing of Real-World Activities

Not available.

3 AE Specification

3.1 DICOM Server — Specification

The DICOM Server provides standard conformance to the following DICOM V3.0 SOP classes as an SCU:

SOP Class UID Name	SOP Class UID Value
Hardcopy Grayscale Image Storage	1.2.840.10008.5.1.1.29
Hardcopy Color Image Storage	1.2.840.10008.5.1.1.30
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1
Computed Tomography Image Storage	1.2.840.10008.5.1.4.1.1.2
Magnetic Resonance Image Storage	1.2.840.10008.5.1.4.1.1.4

Enhanced Magnetic Resonance Image Storage	1.2.840.10008.5.1.4.1.1.4.1
Magnetic Resonance Spectroscopy Image Storage	1.2.840.10008.5.1.4.1.1.4.2
Nuclear Medicine Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.5
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Ultrasound Multi-Frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3
Ultrasound Multi-Frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Multi-Frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1
Multi-Frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2
Multi-Frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3
Multi-Frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4
Standalone Overlay Storage	1.2.840.10008.5.1.4.1.1.8
Standalone Curve Storage	1.2.840.10008.5.1.4.1.1.9
Standalone Modality LUT Storage	1.2.840.10008.5.1.4.1.1.11
Standalone VOI LUT Storage	1.2.840.10008.5.1.4.1.1.8
12-Lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2
Ambulatory Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1

Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1
Basic Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1
X-Ray Angiographic Bi-Plane Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.12.3
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4
RT Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6
RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7
Digital X-Ray Image Storage (DX) for Presentation	1.2.840.10008.5.1.4.1.1.1.1
Digital X-Ray Image Storage (DX) for Processing	1.2.840.10008.5.1.4.1.1.1.1.1
Digital Mammography Image Storage (MG) for Presentation	1.2.840.10008.5.1.4.1.1.1.2
Digital Mammography Image Storage (MG) for Processing	1.2.840.10008.5.1.4.1.1.1.2.1
Digital Intra-Oral X-Ray Image Storage (IO) for Presentation	1.2.840.10008.5.1.4.1.1.1.3
Digital Intra-Oral X-Ray Image Storage (IO) for Processing	1.2.840.10008.5.1.4.1.1.1.3.1

PET Image Storage	1.2.840.10008.5.1.4.1.1.128
Standalone PET Curve Storage	1.2.840.10008.5.1.4.1.1.129
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66
Visible Light Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.77.1
Visible Light Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1
Visible Light Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2
Visible Light Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3
Visible Light Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4
Visible Light Multi-Frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.77.2
Stored Print Storage	1.2.840.10008.5.1.1.27
Basic Text SR Storage	1.2.840.10008.5.1.4.1.1.88.11
Enhanced SR Storage	1.2.840.10008.5.1.4.1.1.88.22
Comprehensive SR Storage	1.2.840.10008.5.1.4.1.1.88.33
Mammography CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.50

Table 3. DICOM Server — Supported SOP Classes as an SCU

The DICOM Server provides standard conformance to the following DICOM V3.0 SOP classes as an SCP:

SOP Class UID Name	SOP Class UID Value
Verification	1.2.840.10008.1.1
Hardcopy Grayscale Image Storage	1.2.840.10008.5.1.1.29
Hardcopy Color Image Storage	1.2.840.10008.5.1.1.30
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1
Computed Tomography Image Storage	1.2.840.10008.5.1.4.1.1.2

SOP Class UID Name	SOP Class UID Value
Magnetic Resonance Image Storage	1.2.840.10008.5.1.4.1.1.4
Enhanced Magnetic Resonance Image Storage	1.2.840.10008.5.1.4.1.1.4.1
Magnetic Resonance Spectroscopy Image Storage	1.2.840.10008.5.1.4.1.1.4.2
Nuclear Medicine Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.5
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Ultrasound Multi-Frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3
Ultrasound Multi-Frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Multi-Frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1
Multi-Frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2
Multi-Frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3
Multi-Frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4
Standalone Overlay Storage	1.2.840.10008.5.1.4.1.1.8
Standalone Curve Storage	1.2.840.10008.5.1.4.1.1.9
Standalone Modality LUT Storage	1.2.840.10008.5.1.4.1.1.11
Standalone VOI LUT Storage	1.2.840.10008.5.1.4.1.1.8
12-Lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1

SOP Class UID Name	SOP Class UID Value
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2
Ambulatory Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1
Basic Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1
X-Ray Angiographic Bi-Plane Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.12.3
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4
RT Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6
RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7
Digital X-Ray Image Storage (DX) for Presentation	1.2.840.10008.5.1.4.1.1.1.1
Digital X-Ray Image Storage (DX) for Processing	1.2.840.10008.5.1.4.1.1.1.1.1
Digital Mammography Image Storage (MG) for Presentation	1.2.840.10008.5.1.4.1.1.1.2
Digital Mammography Image Storage (MG) for Processing	1.2.840.10008.5.1.4.1.1.1.2.1

SOP Class UID Name	SOP Class UID Value
Digital Intra-Oral X-Ray Image Storage (IO) for Presentation	1.2.840.10008.5.1.4.1.1.1.3
Digital Intra-Oral X-Ray Image Storage (IO) for Processing	1.2.840.10008.5.1.4.1.1.1.3.1
PET Image Storage	1.2.840.10008.5.1.4.1.1.128
Standalone PET Curve Storage	1.2.840.10008.5.1.4.1.1.129
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66
Visible Light Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.77.1
Visible Light Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1
Visible Light Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2
Visible Light Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3
Visible Light Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4
Visible Light Multi-Frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.77.2
Stored Print Storage	1.2.840.10008.5.1.1.27
Basic Text SR Storage	1.2.840.10008.5.1.4.1.1.88.11
Enhanced SR Storage	1.2.840.10008.5.1.4.1.1.88.22
Comprehensive SR Storage	1.2.840.10008.5.1.4.1.1.88.33
Mammography CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.50
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
Kodak Private Series Root Query/Retrieve Information Model—FIND	1.2.840.113674.5.1.4.1.2.4.1

SOP Class UID Name	SOP Class UID Value
Kodak Private Series Root Query/Retrieve Information Model—MOVE	1.2.840.113674.5.1.4.1.2.4.2

Table 4. DICOM Server — Supported SOP Classes as an SCP

3.1.1 Association Establishment Policies

3.1.1.1 General

The DICOM Server recognizes the following Application Context Names:

Standard DICOM Application Context Name	1.2.840.10008.3.1.1.1
Kodak Private DICOM Application Context Name	1.2.840.113674.3.1.1.1

Table 5. DICOM Server — Application Context Names

The maximum PDU size that is offered and accepted by the DICOM Server is configurable.

3.1.1.2 Number of Associations

The DICOM Server supports a number of associations whose upper limit is configured at the time of its initialization.

It should be noted that response time for an association degrades with increasing simultaneous associations. This slow response may trigger timers in remote systems.

3.1.1.3 Asynchronous Nature

The DICOM Server does not require asynchronous communications. The DICOM Server does not support asynchronous message transfer; it only accepts one outstanding message.

3.1.1.4 Implementation Identifying Information

The DICOM Server provides the following implementation identifying information:

Implementation Class UID	1.2.840.113674.6.15.95
Implementation Version Name	AS402YYYYMMDDU <p style="text-align: center;">where</p> <ul style="list-style-type: none"> ▪ <p style="text-align: center;">is the date on which the application was built</p> <div style="text-align: right;">YYYYMMDD</div>

Table 6. DICOM Server — Implementation Identifying Information

3.1.2 Association Initiation by Real-World Activity

The DICOM Server only initiates an association under the following real-world activities:

- Send Images

3.1.2.1 Real-World Activity — Send Images

3.1.2.1.1 Associated Real-World Activity

In this real-world activity, the DICOM Server is processing a DIMSE C-MOVE operation. The DICOM Server establishes an association with the move destination and invokes the DIMSE C-STORE operation for the images found during the DIMSE C-MOVE operation.

Note: Archive Server places an upper limit on the number of C-STORE operations that it invokes on an association. When this limit is reached, the association is released and a new one is established. Refer to the section entitled Configuration for more information.

3.1.2.1.2 Proposed Presentation Contexts

The DICOM Server will propose the following presentation contexts:

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	See referenced table.	SCU	None
Computed Tomography Image Storage	1.2.840.10008.5.1.4.1.1.2	See referenced table.	SCU	None
Magnetic Resonance Image Storage	1.2.840.10008.5.1.4.1.1.4	See referenced table.	SCU	None
Enhanced Magnetic Resonance Image Storage	1.2.840.10008.5.1.4.1.1.4.1	See referenced table.	SCU	None
Magnetic Resonance Spectroscopy Image Storage	1.2.840.10008.5.1.4.1.1.4.2	See referenced table.	SCU	None
Nuclear Medicine Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.5	See referenced table.	SCU	None
Nuclear Medicine Image	1.2.840.10008.5.1.4.1.1.20	See	SCU	None

Storage		referenced table.		
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	See referenced table.	SCU	None
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	See referenced table.	SCU	None
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	See referenced table.	SCU	None
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	See referenced table.	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	See referenced table.	SCU	None
Multi-Frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	See referenced table.	SCU	None
Multi-Frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	See referenced table.	SCU	None
Multi-Frame Grayscale Word Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	See referenced table.	SCU	None
Multi-Frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	See referenced table.	SCU	None
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	See referenced table.	SCU	None
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	See referenced table.	SCU	None
X-Ray Angiographic Bi-Plane Image Storage	1.2.840.10008.5.1.4.1.1.12.3	See referenced table.	SCU	None
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	See referenced	SCU	None

		table.		
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	See referenced table.	SCU	None
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	See referenced table.	SCU	None
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4	See referenced table.	SCU	None
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	See referenced table.	SCU	None
RT Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6	See referenced table.	SCU	None
RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7	See referenced table.	SCU	None
Digital X-Ray Image Storage (DX) for Presentation	1.2.840.10008.5.1.4.1.1.1.1	See referenced table.	SCU	None
Digital X-Ray Image Storage (DX) for Processing	1.2.840.10008.5.1.4.1.1.1.1.1	See referenced table.	SCU	None
Digital Mammography Image Storage (MG) for Presentation	1.2.840.10008.5.1.4.1.1.1.2	See referenced table.	SCU	None
Digital Mammography Image Storage (MG) for Processing	1.2.840.10008.5.1.4.1.1.1.2.1	See referenced table.	SCU	None
Digital Intra-Oral X-Ray Image Storage (IO) for Presentation	1.2.840.10008.5.1.4.1.1.1.3	See referenced table.	SCU	None
Digital Intra-Oral X-Ray Image Storage (IO) for Processing	1.2.840.10008.5.1.4.1.1.1.3.1	See referenced table.	SCU	None
PET Image Storage	1.2.840.10008.5.1.4.1.1.128	See referenced table.	SCU	None

Standalone PET Curve Storage	1.2.840.10008.5.1.4.1.1.129	See referenced table.	SCU	None
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66	See referenced table.	SCU	None
Visible Light Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.77.1	See referenced table.	SCU	None
Visible Light Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	See referenced table.	SCU	None
Visible Light Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	See referenced table.	SCU	None
Visible Light Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3	See referenced table.	SCU	None
Visible Light Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	See referenced table.	SCU	None
Visible Light Multi-Frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.77.2	See referenced table.	SCU	None
Hardcopy Grayscale Image Storage	1.2.840.10008.5.1.1.29	See referenced table.	SCU	None
Hardcopy Color Image Storage	1.2.840.10008.5.1.1.30	See referenced table.	SCU	None
Standalone Overlay Storage	1.2.840.10008.5.1.4.1.1.8	See referenced table.	SCU	None
Standalone Curve Storage	1.2.840.10008.5.1.4.1.1.9	See referenced table.	SCU	None
Standalone Modality LUT Storage	1.2.840.10008.5.1.4.1.1.10	See referenced table.	SCU	None

Standalone VOI LUT Storage	1.2.840.10008.5.1.4.1.1.11	See referenced table.	SCU	None
12-Lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	See referenced table.	SCU	None
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	See referenced table.	SCU	None
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	See referenced table.	SCU	None
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1	See referenced table.	SCU	None
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1	See referenced table.	SCU	None
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1	See referenced table.	SCU	None
Basic Text SR Storage	1.2.840.10008.5.1.4.1.1.88.11	See referenced table.	SCU	None
Enhanced SR Storage	1.2.840.10008.5.1.4.1.1.88.22	See referenced table.	SCU	None
Comprehensive SR Storage	1.2.840.10008.5.1.4.1.1.88.33	See referenced table.	SCU	None
Mammography CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.50	See referenced table.	SCU	None
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	See referenced table.	SCU	None
Stored Print Storage	1.2.840.10008.5.1.1.27	See referenced table.	SCU	None

Table 7. DICOM Server — Proposed Presentation Contexts, Send Images

Proposal Type ¹	Transfer Syntax		
	Set ²	Name	Value
SIMPLE	A	Implicit VR Little Endian	1.2.840.10008.1.2
COMPAT	A	Explicit VR Big Endian	1.2.840.10008.1.2.2
		Explicit VR Little Endian	1.2.840.10008.1.2.1
		Implicit VR Little Endian	1.2.840.10008.1.2
COMPAT_LOSSLESS	A	JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14 [Selection Value 1]): Default Transfer Syntax for Lossless JPEG Image Compression	1.2.840.10008.1.2.4.70
		JPEG Lossless, Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57
		Explicit VR Big Endian	1.2.840.10008.1.2.2
		Explicit VR Little Endian	1.2.840.10008.1.2.1
		Implicit VR Little Endian	1.2.840.10008.1.2
EVERYTHING	A	JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14 [Selection Value 1]): Default Transfer Syntax for Lossless JPEG Image Compression	1.2.840.10008.1.2.4.70
		JPEG Lossless, Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57
		Explicit VR Big Endian	1.2.840.10008.1.2.2
		Explicit VR Little Endian	1.2.840.10008.1.2.1
		Implicit VR Little Endian	1.2.840.10008.1.2
	B	JPEG Extended (Process 2 & 4): Default Transfer Syntax for Lossy JPEG 12 Bit Image Compression (Process 4 only)	1.2.840.10008.1.2.4.51

		JPEG Baseline (Process 1): Default Transfer Syntax for Lossy JPEG 8 Bit Image Compression	1.2.840.10008.1.2.4.50
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Table 8. DICOM Server — Proposed Transfer Syntaxes, Send Images

- Notes:
1. The Proposal Type is a DICOM Code String (CS) that is configured for each and every Called AE. The default is “COMPAT”.
 2. Each set of transfer syntaxes is included in one presentation context item for every applicable Abstract Syntax. An alphabetic character identifies each set. Most Proposal Types are only associated with one set of transfer syntaxes, however the Proposal Type named “EVERYTHING” is associated with two set of transfer syntaxes and hence two presentation context items are proposed for each applicable Abstract Syntax.
 3. The order of transfer syntaxes that are proposed within a presentation context item is the order presented in this table.

3.1.3 Association Acceptance Policy

The DICOM Server accepts associations under the following real-world activities:

- Verify Communication
- Store Images
- Query/Retrieve

3.1.3.1 Real-World Activity — Verify Communication

3.1.3.1.1 Associated Real-World Activity

The DICOM Server verifies application level communication with a peer DICOM AE.

3.1.3.1.2.Presentation Context Table

The single presentation context shown in the following table is acceptable for the DICOM Server to verify application level communication.

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Verification SOP class	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None

Table 9. DICOM Server — Acceptable Presentation Contexts, Verify Communication

3.1.3.1.2.1 SOP Specific Conformance to the Verification SOP Class

The DICOM Server provides standard conformance to the DICOM Verification Service Class.

3.1.3.1.3 Presentation Context Acceptance Criterion

The criterion for accepting presentation contexts is based on configuration data. See the section on Configuration for more information.

3.1.3.1.4 Transfer Syntax Selection Policy

Several transfer syntax selection policies are available. The particular one that is used is based on configuration data. See the section on Configuration for more information.

3.1.3.2 Real-World Activity — Store Images

3.1.3.2.1 Associated Real-World Activity

The associated real-world activity associated with the C-STORE operation is the storage of the image by the DICOM Server. The DICOM Server will issue a failure status if it is unable to store the image in its database.

3.1.3.2.2 Presentation Context Table

The presentation contexts shown in the following table are acceptable for the DICOM Server to store their corresponding images in its database.

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	See referenced table.	SCP	None
Computed Tomography Image Storage	1.2.840.10008.5.1.4.1.1.2	See referenced	SCP	None

		table.		
Magnetic Resonance Image Storage	1.2.840.10008.5.1.4.1.1.4	See referenced table.	SCP	None
Enhanced Magnetic Resonance Image Storage	1.2.840.10008.5.1.4.1.1.4.1	See referenced table.	SCP	None
Magnetic Resonance Spectroscopy Image Storage	1.2.840.10008.5.1.4.1.1.4.2	See referenced table.	SCP	None
Nuclear Medicine Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.5	See referenced table.	SCP	None
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	See referenced table.	SCP	None
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	See referenced table.	SCP	None
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	See referenced table.	SCP	None
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	See referenced table.	SCP	None
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	See referenced table.	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	See referenced table.	SCP	None
Multi-Frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	See referenced table.	SCP	None
Multi-Frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	See referenced table.	SCP	None
Multi-Frame Grayscale Word Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	See referenced table.	SCP	None

Multi-Frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	See referenced table.	SCP	None
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	See referenced table.	SCP	None
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	See referenced table.	SCP	None
X-Ray Angiographic Bi-Plane Image Storage	1.2.840.10008.5.1.4.1.1.12.3	See referenced table.	SCP	None
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	See referenced table.	SCP	None
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	See referenced table.	SCP	None
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	See referenced table.	SCP	None
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4	See referenced table.	SCP	None
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	See referenced table.	SCP	None
RT Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6	See referenced table.	SCP	None
RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7	See referenced table.	SCP	None
Digital X-Ray Image Storage (DX) for Presentation	1.2.840.10008.5.1.4.1.1.1.1	See referenced table.	SCP	None
Digital X-Ray Image Storage (DX) for Processing	1.2.840.10008.5.1.4.1.1.1.1.1	See referenced table.	SCP	None
Digital Mammography	1.2.840.10008.5.1.4.1.1.1.2	See	SCP	None

Image Storage (MG) for Presentation		referenced table.		
Digital Mammography Image Storage (MG) for Processing	1.2.840.10008.5.1.4.1.1.1.2.1	See referenced table.	SCP	None
Digital Intra-Oral X-Ray Image Storage (IO) for Presentation	1.2.840.10008.5.1.4.1.1.1.3	See referenced table.	SCP	None
Digital Intra-Oral X-Ray Image Storage (IO) for Processing	1.2.840.10008.5.1.4.1.1.1.3.1	See referenced table.	SCP	None
PET Image Storage	1.2.840.10008.5.1.4.1.1.128	See referenced table.	SCP	None
Standalone PET Curve Storage	1.2.840.10008.5.1.4.1.1.129	See referenced table.	SCP	None
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66	See referenced table.	SCP	None
Visible Light Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.77.1	See referenced table.	SCP	None
Visible Light Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	See referenced table.	SCP	None
Visible Light Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	See referenced table.	SCP	None
Visible Light Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3	See referenced table.	SCP	None
Visible Light Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	See referenced table.	SCP	None
Visible Light Multi-Frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.77.2	See referenced table.	SCP	None

Hardcopy Grayscale Image Storage	1.2.840.10008.5.1.1.29	See referenced table.	SCP	None
Hardcopy Color Image Storage	1.2.840.10008.5.1.1.30	See referenced table.	SCP	None
Standalone Overlay Storage	1.2.840.10008.5.1.4.1.1.8	See referenced table.	SCP	None
Standalone Curve Storage	1.2.840.10008.5.1.4.1.1.9	See referenced table.	SCP	None
Standalone Modality LUT Storage	1.2.840.10008.5.1.4.1.1.10	See referenced table.	SCP	None
Standalone VOI LUT Storage	1.2.840.10008.5.1.4.1.1.11	See referenced table.	SCP	None
12-Lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	See referenced table.	SCP	None
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	See referenced table.	SCP	None
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	See referenced table.	SCP	None
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1	See referenced table.	SCP	None
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1	See referenced table.	SCP	None
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1	See referenced table.	SCP	None
Basic Text SR Storage	1.2.840.10008.5.1.4.1.1.88.11	See referenced table.	SCP	None

Enhanced SR Storage	1.2.840.10008.5.1.4.1.1.88.22	See referenced table.	SCP	None
Comprehensive SR Storage	1.2.840.10008.5.1.4.1.1.88.33	See referenced table.	SCP	None
Mammography CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.50	See referenced table.	SCP	None
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	See referenced table.	SCP	None
Stored Print Storage	1.2.840.10008.5.1.1.27	See referenced table.	SCP	None

Table 10. DICOM Server — Acceptable Presentation Contexts, Store Images

Transfer Syntax	
Name	UID
Implicit VR Little Endian	1.2.840.10008.1.2
Explicit VR Little Endian	1.2.840.10008.1.2.1
Explicit VR Big Endian	1.2.840.10008.1.2.2
JPEG Baseline (Process 1): Default Transfer Syntax for Lossy JPEG 8 Bit Image Compression	1.2.840.10008.1.2.4.50
JPEG Extended (Process 2 & 4): Default Transfer Syntax for Lossy JPEG 12 Bit Image Compression (Process 4 only)	1.2.840.10008.1.2.4.51
JPEG Lossless, Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57
JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14 [Selection Value 1]): Default Transfer Syntax for Lossless JPEG Image Compression	1.2.840.10008.1.2.4.70

Table 11. DICOM Server — Acceptable Transfer Syntaxes, Store Images

3.1.3.2.2.1 SOP Specific Conformance to Storage SOP Classes

Archive Server is fully conformant to all Storage SOP Classes that it supports. That is, as an SCP of Storage SOP Classes, Archive Server is level 2 conformant.

The composite SOP Instance may be modified. Modification of the SOP Instances is based either on factory pre-set behavior or run-time (site-based) configuration. The following filters are applied to each and every Storage SOP Instance that is received by Archive Server:

1. Low Tag Group Filter. All attributes whose tag group number is less than 0008H (e.g. 0000H, 0002H, 0004H) are removed. These attributes should not be present. They are most likely either command set elements (0000H), file meta information elements (0002H), directory storage elements (0004H) , or unused (0006H). Note: Also, by the very definition of a private data element, the minimum private group number is 0009H so 0001H, 0003H, 0005H, 0007H are also invalid.
2. Group Length Attribute Filter. All group length attributes (gggg, 0000) are removed. Note: This is also true, for group length attributes contained within sequence items.
3. Date Filter. If any attribute with a Date (DA) Value Representation whose value is not deemed valid is present, then the value is removed. Note: A date is valid if it satisfies the definition of the Date Value Representation and the year is in the range from 1880 to 2099 inclusive.
4. Image Compression Filter. Archive Server will compress an image if all of the following conditions are satisfied:
 1. The image is not already compressed.
 2. The configuration for the Calling Application Entity (i.e. Remote AE) has been set such that all of the following conditions are true:
 - a. SOP Class UID. The SOP Class UID that is configured is either the special case "*All SOP Classes*" or an explicit SOP Class UID is configured and it matches the (0008, 0016) SOP Class UID of the image.
 - b. Body Part. The Body Part Examined that is configured is either the special case "*All Body Parts*" or an explicit Body Part is configured and it matches the (0018, 0015) Body Part Examined of the image.

The configuration also includes a desired JPEG compression ratio that is used to determine the Transfer Syntax that is applied to the image:

- if *ratio* ≤ 3 then *applied Transfer Syntax UID* = 1.2.840.10008.1.2.4.70
 - if *ratio* > 3 and *Bits Allocated* ≤ 8 then *applied Transfer Syntax UID* = 1.2.840.10008.1.2.4.50
 - if *ratio* > 3 and *Bits Allocated* > 8 then *applied Transfer Syntax UID* = 1.2.840.10008.1.2.4.51
3. The configuration for the Called Application Entity (i.e. Local AE) has been set according to the same conditions outlined for the configuration of the Calling Application Entity.
 4. The attribute (0028, 0101) Bits Stored must have a value that is acceptable to the JPEG Transfer Syntax that is being applied. Note: The number of bits that is acceptable to a JPEG Transfer Syntax is specified in DICOM Part 5 Table F.1-1. For example, the Lossless JPEG Transfer Syntax 1.2.840.10008.1.2.4.70 accepts 2-16 bits while the Lossy JPEG Transfer Syntaxes 1.2.840.10008.1.2.4.50 accepts up to 8 bits and 1.2.840.10008.1.2.4.51 accepts up to 12 bits.
 5. The location of each Pixel Sample must be in the low-order bits. That is the value of the attribute (0028, 0101) Bits Stored must be equal to the value of the attribute (0028, 0102) High Bit plus one.
 6. The attribute (0028, 0004) Photometric Interpretation must have one of the following values:
 - A. MONOCHROME1
 - B. MONOCHROME2
 - C. RGB
 - D. HSV
 - E. ARGB
 - F. CYMK
 - G. YBR_FULL

This means that the following values are not permitted:

- A. PALETTE COLOR

- B. YBR_FULL_422
 - C. YBR_PARTIAL_422
 - D. Any other non-standard value
7. The image cannot contain embedded overlays. That is attributes (60xx, 0102) Overlay Bit Position cannot exist in the image for any xx.

If Lossy Image Compression is applied to the image (i.e. the (7FE0, 0010) Pixel Data attribute is modified), then the following additional attributes are also modified:

- 8. (0008, 0008) Image Type. The first value is set to "DERIVED". The second value is set to "SECONDARY".
 - 9. (0008, 0018) SOP Instance UID. A new SOP Instance UID is created.
 - 10. (0008, 2111) Derivation Description.
 - 11. (0008, 2112) Source Image Sequence. A new item is added to reflect the original SOP Instance UID.
 - 12. (0028, 2110) Lossy Image Compression. The value is set to "01".
 - 13. (0028, 2112) Lossy Image Compression Ratio. The resulting Image Compression Ratio is appended to this list of values. This value will most likely be different than the desired compression ratio that was configured.
5. Attribute Mapping Filter. If a pre-defined (i.e. configured) attribute is present in the SOP Instance, then the private attribute (0033, 1000) is added. The presence of this private attribute signifies a higher level of priority to Archive Server.
6. Attribute Translation Filter. If a pre-defined (i.e. configured) attribute is present in the SOP Instance, then another pre-defined attribute is added. The value of the newly added attribute is either the value of the original attribute or a subset of the value.

When all of the above filters have been applied, a DICOM File (see DICOM Part 10) is created to contain the modified SOP Instance. If the SOP Instance is not compressed either as a result of the negotiated Transfer Syntax or an Image Compression Filter, then the (0002, 0010) Transfer Syntax UID of the DICOM File is either Explicit VR Little Endian or Explicit VR Big Endian. The byte order will be identical to the byte order of the Transfer Syntax for which the SOP Instance was received. The DICOM File will always be encoded with Explicit VR so that the Value Representation of private attributes (and standard attributes that are unknown to Archive Server) can be retained.

If any matching forwarding rules are configured, then the image is forwarded to the configured destinations. That is Archive Server behaves as a DICOM Storage SCU and invokes the C-STORE operation. Refer to the real-world activity “Forward Images” for more information.

Upon completion of a successful C-STORE operation, the images are archived in storage for as long as the user of the local database system desires. Users can retrieve this data through the query/retrieve service.

Archive Server may modify the values of any attribute except those attributes of modules at the image level in order to resolve any database inconsistencies.

The following table lists the C-STORE status values, and their meanings, that may be returned by Archive Server.

Service Status	Status Codes	Further Meaning
Success	0000	Storage was completed successfully
Error	A900	Data Set does not match SOP Class
	C002	Cannot understand
Failed	0110	Processing failure

Table 12. DICOM Server — C-STORE Status Values

3.1.3.2.3 Presentation Context Acceptance Criterion

The criterion for accepting presentation contexts is based on configuration data. See the section on Configuration for more information.

3.1.3.2.4 Transfer Syntax Selection Policy

Several transfer syntax selection policies are available. The particular one that is used is based on configuration data. See the section on Configuration for more information.

3.1.3.3 Real-World Activity — Query/Retrieve

3.1.3.3.1 Associated Real-World Activity

The associated real-world activity is the simple management of images and other Composite SOP Instance using the Query/Retrieve Service Class.

3.1.3.3.2 Presentation Context Table

The presentation contexts shown in the following table are acceptable for Archive Server to respond to the real-world activity.

Abstract Syntax	Transfer	Role	Extended
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Name	UID	Syntax		Negotiation
Patient Root Query/Retrieve Information Model — FIND	1.2.840.10008.5.1.4.1.2.1.1	See referenced table.	SCP	None
Patient Root Query/Retrieve Information Model — MOVE	1.2.840.10008.5.1.4.1.2.1.2	See referenced table.	SCP	None
Study Root Query/Retrieve Information Model — FIND	1.2.840.10008.5.1.4.1.2.2.1	See referenced table.	SCP	None
Study Root Query/Retrieve Information Model — MOVE	1.2.840.10008.5.1.4.1.2.2.2	See referenced table.	SCP	None
Patient/Study Only Query/Retrieve Information Model — FIND	1.2.840.10008.5.1.4.1.2.3.1	See referenced table.	SCP	None
Patient/Study Only Query/Retrieve Information Model — MOVE	1.2.840.10008.5.1.4.1.2.3.2	See referenced table.	SCP	None
Series Root Query/Retrieve Information Model — FIND	1.2.840.113674.5.1.4.1.2.4.1	See referenced table.	SCP	None
Series Root Query/Retrieve Information Model — MOVE	1.2.840.113674.5.1.4.1.2.4.2	See referenced table.	SCP	None

Table 13. DICOM Server — Acceptable Presentation Contexts, Query/Retrieve

Transfer Syntax	
Name	UID
Implicit VR Little Endian	1.2.840.10008.1.2
Explicit VR Little Endian	1.2.840.10008.1.2.1
Explicit VR Big Endian	1.2.840.10008.1.2.2

Table 14. DICOM Server — Acceptable Transfer Syntaxes, Query/Retrieve

3.1.3.3.3 SOP Specific Conformance

3.1.3.3.3.1 SOP Specific Conformance to the Query/Retrieve Information Models — FIND

Archive Server is indifferent to the particular Query/Retrieve Information Model. That is the same behavior will result if the Affected SOP Class UID refers to any one of the Query/Retrieve Information Model — FIND SOP Classes.

Archive Server ignores the (0000,0700) Priority attribute in C-FIND-RQ messages.

Archive Server only supports hierarchical queries; it does not support relational queries.

The following table defines the attributes at the various Query/Retrieve Levels that Archive Server supports for C-FIND operations:

Query/Retrieve Level	Tag	Attribute Name	Type
PATIENT	(0010,0010)	Patient's Name	R
	(0010,0020)	Patient ID	U
	(0010,0030)	Patient's Birth Date	O
	(0010,0032)	Patient's Birth Time	O
	(0010,0040)	Patient's Sex	O
	(0010,1000)	Other Patient IDs	O
	(0010,1001)	Other Patient Names	O
	(0010,2160)	Ethnic Group	O
	(0010,4000)	Patient Comments	O
STUDY	All attributes at the PATIENT level.		
	(0008,0020)	Study Date	R
	(0008,0030)	Study Time	R
	(0008,0050)	Accession Number	R
	(0008,0080)	Institution Name	O
	(0008,0090)	Referring Physician's Name	O
	(0008,1060)	Name of Physician(s) Reading Study	O
	(0010,1010)	Patient's Age	O

	(0010,1020)	Patient's Size	O
	(0010,1030)	Patient's Weight	O
	(0010,2180)	Occupation	O
	(0020,0010)	Study ID	R
	(0020,000D)	Study Instance UID	U
	(0032,000A)	Study Status ID	O
	(0032,0034)	Study Read Date	O
	(0032,0035)	Study Read Time	O
SERIES	All attributes at the STUDY level.		
	(0008,0060)	Modality	R
	(0018,0015)	Body Part Examined	O
	(0020,000E)	Series Instance UID	U
	(0020,0011)	Series Number	R
	(0020,1209)	Number of Series Related Instances	O
IMAGE	Not supported.		

Table 15. DICOM Server — Query/Retrieve Information Model Keys

The following table lists the C-FIND status values, and their meaning, that may be returned by Archive Server.

Service Status	Status Code	Further Meaning
Success	0000	Matching is complete; no final identifier is supplied.
Pending	FF00	Matches are continuing; current match is supplied and all optional keys are supported.

Service Status	Status Code	Further Meaning
	FF01	Matches are continuing; current match is supplied and one or more optional keys are not supported.
Refused	A700	Out of resources.
Failed	0106	Invalid attribute value (e.g. (0008, 0052) Query/Retrieve Level).
	0120	Missing attribute (e.g. (0008, 0052) Query/Retrieve Level).
	0122	SOP Class not supported.
	C000	Unable to process (e.g. (0008, 0052) Query/Retrieve Level is "IMAGE").
	C001	Unable to process.
Canceled	FE00	Matching terminated due to cancel request.

Table 16. DICOM Server — C-FIND Status Values

3.1.3.3.3.2 SOP Specific Conformance to the Query/Retrieve Information Models — MOVE

Archive Server is indifferent to the particular Query/Retrieve Information Model. That is the same behavior will result if the Affected SOP Class UID refers to any one of the Query/Retrieve Information Model — MOVE SOP Classes.

Archive Server ignores the (0000,0700) Priority attribute in C-MOVE-RQ messages.

Archive Server only supports hierarchical queries; it does not support relational queries.

Archive Server supports the Storage SOP Classes listed in the Real-World Activity “Move Images” for the C-STORE sub-operations generated by C-MOVE operations.

Table 15 defines the attributes at the various Query/Retrieve Levels that Archive Server supports for C-MOVE operations.

Table 22 lists the C-MOVE status values, and their meaning, that may be returned by Archive Server.

Status	Code	Meaning
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Status	Code	Meaning
Success	0000	Sub-operations complete with no failures
	0018	Sub-operations complete with no failures — No Matches
Pending	FF00	Sub-operations are continuing
Warning	B000	Sub-operations completed with one or more failures
Refused	A700	Out of resources.
	A701	Out of resources—unable to calculate number of matches
	A801	Move destination unknown
Failed	0106	Invalid attribute value (e.g. (0008, 0052) Query/Retrieve Level).
	0110	Processing failure.
	0120	Missing attribute (e.g. (0008, 0052) Query/Retrieve Level).
	0122	SOP Class not supported.
	C000	Unable to process.
Canceled	FE00	Sub-operations terminated due to cancel request

Table 17. DICOM Server — C-MOVE Status Values

3.1.3.3.4 Presentation Context Acceptance Criterion

The criterion for accepting presentation contexts is based on configuration data. See the section on Configuration for more information.

3.1.3.3.5 Transfer Syntax Selection Policy

Several transfer syntax selection policies are available. The particular one that is used is based on configuration data. See the section on Configuration for more information.

3.2 HIS/RIS DICOM Server — Specification

The HIS/RIS DICOM Server provides standard conformance to the following DICOM V3.0 SOP classes as an SCU:

SOP Class UID Name	SOP Class UID Value
Detached Patient Management SOP Class	1.2.840.10008.3.1.2.1.1
Detached Study Management SOP Class	1.2.840.10008.3.1.2.3.1
Kodak Specialized Detached Patient Management SOP Class	1.2.840.113674.3.1.2.1.1
Kodak Specialized Detached Study Management SOP Class	1.2.840.113674.3.1.2.3.1

Table 18. HIS/RIS DICOM Server — Supported SOP Classes as an SCU

The HIS/RIS DICOM Server provides standard conformance to the following DICOM V3.0 SOP classes as an SCP:

SOP Class UID Name	SOP Class UID Value
Verification	1.2.840.10008.1.1

Table 19. HIS/RIS DICOM Server — Supported SOP Classes as an SCP

Note: Even though the only SOP Class supported as an SCP is the Verification SOP Class, the HIS/RIS DICOM Server is capable of receiving the DIMSE N-EVENT-REPORT message. It should be noted that according to the DICOM Standard, a DICOM Application that receives an N-EVENT-REPORT-RQ message is technically an SCU of the respective SOP Class not an SCP.

3.2.1 Association Establishment Policies

3.2.1.1 General

The HIS/RIS DICOM Server recognizes the following Application Context Name:

Standard DICOM Application Context Name	1.2.840.10008.3.1.1.1
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Table 20. HIS/RIS DICOM Server — Application Context Name

The maximum PDU size that is offered and accepted by the HIS/RIS DICOM Server is configurable.

3.2.1.2 Number of Associations

Archive Server accepts a number of associations that whose upper limit is configured at the time of its initialization. It should be noted that response time for an association degrades with increasing simultaneous associations. This slow response may trigger timers in remote systems.

3.2.1.3 Asynchronous Nature

The HIS/RIS DICOM Server does not support negotiation of multiple outstanding transactions.

3.2.1.4 Implementation Identifying Information

The HIS/RIS DICOM Server provides the following implementation identifying information:

Implementation Class UID	1.2.840.113674.6.15.95
Implementation Version Name	AS402YYYYMMDDU <p style="text-align: center;">where</p> <p style="text-align: center;">▪</p> <p style="text-align: center;">is the date on which the application was built</p> <p style="text-align: right;">YYYYMMDD</p>

Table 21. HIS/RIS DICOM Server — Implementation Identifying Information

3.2.2 Association Initiation by Real-World Activity

The HIS/RIS DICOM Server only initiates an association under the following real-world activity:

- Process Notification

3.2.2.1 Real-World Activity — Process Notification

3.2.2.1.1 Associated Real-World Activity

After the HIS/RIS DICOM Server receives a notification, that is the N-EVENT-REPORT message, and the attributes contained within the actual event do not include all of the required attributes (Table 22), then it initiates an association with the DICOM Application that invoked the notification so that it can request the missing attributes that it requires using an N-GET operation.

Tag	Attribute Name
(0010, 0010)	Patient's Name
(0010, 0020)	Patient ID
(0010, 0030)	Patient's Birth Date

(0010, 0040)	Patient's Sex
(0010, 1040)	Patient's Address
(0008, 1120)*	Referenced Patient Sequence
(0008, 1150)*	Referenced SOP Class UID
(0008, 1155)*	Referenced SOP Class Instance UID
(0008, 0050)*	Accession Number
(0032, 000C)*	Study Priority ID
(0032, 1000)*	Scheduled Study Start Date
(0032, 1001)*	Scheduled Study Start Time
(0032, 1060)*	Requested Procedure Description
* Attribute is required if the SOP class is the Detached Study Management SOP Class	

Table 22. HIS/RIS DICOM Server — Required Notification Event Attributes

Note: The association will only be initiated if the Called (Remote) DICOM AE is present in Archive Server's configuration and the parameter for its TCP Port Number is valid (i.e. non-zero).

3.2.2.1.2 Proposed Presentation Contexts

Archive Server will propose the following presentation contexts:

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Detached Patient Management	1.2.840.10008.3.1.2.1.1	See referenced table.	SCU	None

Detached Study Management	1.2.840.10008.3.1.2.3.1	See referenced table.	SCU	None
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Table 23. HIS/RIS DICOM Server — Proposed Presentation Contexts, Process Notification

Transfer Syntax		
Name	UID	Note
Explicit VR Little Endian	1.2.840.10008.1.2.1	1
Implicit VR Little Endian	1.2.840.10008.1.2	1

Table 24. HIS/RIS DICOM Server — Proposed Transfer Syntaxes, Process Notification

Notes: 1. The order of transfer syntaxes that are proposed within a presentation context item is the order presented in this table.

3.2.2.1.3 SOP Specific Conformance to the Detached 3.2.2.1.4 Patient Management SOP Class

In this real-world activity, the HIS/RIS DICOM Server invokes the N-GET operation. The attributes requested are as follows:

Tag	Attribute Name
(0010, 0010)	Patient's Name
(0010, 0020)	Patient ID
(0010, 0030)	Patient's Birth Date
(0010, 0040)	Patient's Sex
(0010, 1040)	Patient's Address

Table 25. HIS/RIS DICOM Server — Detached Patient Management SOP Class, N-GET Attributes, Patient Updated

3.2.2.1.5 SOP Specific Conformance to the Detached Study Management SOP Class

In this real-world activity, the HIS/RIS DICOM Server invokes the N-GET operation.

If the cause of this real-world activity is due to the receipt of an “Study Scheduled” or “Study Updated” event then the maximum set of attributes that are requested in the (0000, 1005) Attribute Identifier List are as follows:

Tag	Attribute Name
(0008, 1120)	Referenced Patient Sequence
(0008, 1150)	> Referenced SOP Class UID
(0008, 1155)	> Referenced SOP Instance UID
(0008, 0050)	Accession Number
(0032, 000C)	Study Priority ID
(0032, 1000)	Scheduled Study Start Date
(0032, 1001)	Scheduled Study Start Time
(0032, 1060)	Requested Procedure Description

Table 26. HIS/RIS DICOM Server — Detached Study Management SOP Class, N-GET Attributes, Study Scheduled and Study Updated

If the cause of this real-world activity is due to the receipt of an “Study Deleted” event then the maximum set of attributes that are requested in the (0000, 1005) Attribute Identifier List are as follows:

Tag	Attribute Name
(0008, 1120)	Referenced Patient Sequence
(0008, 1150)	> Referenced SOP Class UID
(0008, 1155)	> Referenced SOP Instance UID
(0008, 0050)	Accession Number

Table 27. HIS/RIS DICOM Server — Detached Study Management SOP Class, N-GET Attributes, Study Deleted

3.2.3 Association Acceptance Policy

The HIS/RIS DICOM Server accepts associations under the following real-world activities:

- Verify Communication
- Process Notification

3.2.3.1 Real-World Activity — Verify Communication

This real-world activity is identical to that for the AE Specification for the main DICOM Server.

3.2.3.2 Real-World Activity — Process Notification

3.2.3.2.1 Associated Real-World Activity

This real-world activity pertains to notifications received from other AE's. That is the receipt of the N-EVENT-REPORT message service element.

3.2.3.2.2 Presentation Context Table

The presentation contexts shown in the following table are acceptable for the HIS/RIS DICOM Server to respond to the real-world activity:

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Detached Patient Management	1.2.840.10008.3.1.2.1.1	See referenced table.	SCP	None
Detached Study Management	1.2.840.10008.3.1.2.3.1	See referenced table.	SCP	None
Kodak Specialized Detached Patient Management	1.2.840.113674.3.1.2.1.1	See referenced table.	SCP	None
Kodak Specialized Detached Study Management	1.2.840.113674.3.1.2.3.1	See referenced table.	SCP	None

Table 28. HIS/RIS DICOM Server — Acceptable Presentation Contexts, Process Notification

Transfer Syntax	
Name	UID
Implicit VR Little Endian	1.2.840.10008.1.2
Explicit VR Little Endian	1.2.840.10008.1.2.1
Explicit VR Big Endian	1.2.840.10008.1.2.2

Table 29. HIS/RIS DICOM Server — Acceptable Transfer Syntaxes, Process Notification

3.2.3.2.2.1 SOP Specific Conformance to the Detached Patient Management SOP Class

The HIS/RIS DICOM Server does not invoke any operations for this real-world activity.

The HIS/RIS DICOM Server receives the notification N-EVENT-REPORT message service element. It supports the following event types for this notification:

Event Type ID	Event Type Name	Behavior
1	Patient Created	This event type is ignored.
2	Patient Deleted	This event type is ignored.
3	Patient Updated	<p>The following attributes are updated in the patient:</p> <p>(0010, 0030) Patient's Birth Date (0010, 0032) Patient's Birth Time (0010, 0040) Patient's Sex (0010, 1000) Other Patient IDs (0010, 1001) Other Patient Names</p> <p>It is expected that the attributes (0010, 0010) Patient's Name and (0010, 0020) Patient ID are also present for the purpose of identifying the patient object, however no update of these attributes is performed. See the Kodak Private Detached Patient Management SOP Class for this functionality.</p> <p>If there is no patient object with these identifying parameters, then this event type is effectively ignored.</p>

Table 30. HIS/RIS DICOM Server — Supported Notification Events, Detached Patient Management SOP Class

3.2.3.2.2.2 SOP Specific Conformance to the Kodak Specialized Detached Patient Management SOP Class

The HIS/RIS DICOM Server does not invoke any operations for this real-world activity.

The HIS/RIS DICOM Server receives the notification N-EVENT-REPORT message service element. It supports the following event types for this notification:

Event Type ID	Event Type Name	Behavior
1	Patient Created	This event type is ignored.
2	Patient Deleted	This event type is ignored.
3	Patient Demographics Updated	This event type is used to update the demographic-related attributes of a patient. It is similar to the Patient Updated event type in the standard Detached Patient

		<p>Management SOP Class.</p> <p>The following attributes are updated in the patient:</p> <p>(0010, 0030) Patient's Birth Date (0010, 0032) Patient's Birth Time (0010, 0040) Patient's Sex (0010, 1000) Other Patient IDs (0010, 1001) Other Patient Names</p> <p>It is expected that the attributes (0010, 0010) Patient's Name and (0010, 0020) Patient ID are also present for the purpose of identifying the patient object, however no update of these attributes is performed.</p> <p>If there is no patient object with these identifying parameters, then this event type is effectively ignored.</p>
4	Patient Name Updated	<p>This event type is used to update the name of a patient. The updated Patient Name is expected to be present in the attribute (0010,0010) Patient's Name. The corresponding Patient ID expected to be present in the attribute (0010,0020) Patient ID.</p>
5	Patient ID Updated	<p>This event type is used to update a Patient ID. The updated Patient ID is expected to be present in the attribute (0010,0020) Patient ID. The corresponding Patient's Name expected to be present in the attribute (0010,0010) Patient's Name.</p>
6	Patient Merged	<p>This event type is used to merge one patient object into another.</p> <p>The following attributes must be present in the notification event:</p> <p>(0010, 0010) Patient's Name (0010, 0020) Patient ID (0010, 1000) Other Patient IDs (0010, 1001) Other Patient Names</p> <p>All patient objects referenced by these Patient Names and Patient IDs are merged together to form one patient object. The identifying attributes of the resulting merged patient object are those present in (0010, 0010) Patient's Name and (0010, 0020) Patient ID.</p>

Table 31. HIS/RIS DICOM Server — Supported Notification Events, Kodak Specialized Detached Patient Management SOP Class

3.2.3.2.2.3 SOP Specific Conformance to the Detached Study Management SOP Class

The HIS/RIS DICOM Server does not invoke any operations for this real-world activity.

The HIS/RIS DICOM Server receives the notification N-EVENT-REPORT message service element. It supports the following event types for this notification:

Event Type ID	Event Type Name	Behavior
1	Study Created	This event type is ignored.
2	Study Scheduled	<p>If the following study attributes are not present in the notification event</p> <p>(0008, 0050) Accession Number (0008, 1120) Referenced Patient Sequence (0008, 1150) > Referenced SOP Class UID (0008, 1155) > Referenced SOP Instance UID (0032, 000C) Study Priority ID (0032, 1000) Scheduled Study Start Date (0032, 1001) Scheduled Study Start Time (0032, 1060) Requested Procedure Description</p> <p>then the DIMSE N-GET operation is invoked for the Detached Study Management SOP Instance^Δ.</p> <p>If the following patient attributes are not present in the notification event^Θ</p> <p>(0010, 0010) Patient's Name (0010, 0020) Patient ID (0010, 0030) Patient's Birth Date (0010, 0040) Patient's Sex (0010, 1040) Patient's Address</p> <p>then the DIMSE N-GET operation is invoked for the Detached Patient Management SOP Instance^Δ. The Requested SOP Instance UID attribute is set to the value of the Referenced SOP Instance UID in the Referenced Patient Sequence that was present in the notification event.</p> <p><u>Note:</u> The following actions are performed regardless of the outcome of any preceding N-GET operations. That is even if one or more attempts are made to invoke an N-GET operation and they fail then the following actions still occur.</p> <p>If the "Patient Walk-In" feature is enabled, then</p> <p>If the following conditions are satisfied:</p> <ul style="list-style-type: none"> • The corresponding patient and study objects exist in the database. • The value of the attribute (0032, 1000) Scheduled Study Start Date is

		<p>“18880808”.</p> <ul style="list-style-type: none"> • At least one matching prefetch rule has been configured. <p>Then the following action is performed:</p> <ul style="list-style-type: none"> • A message is inserted into the Poster’s prefetch queue[Ⓞ]. <p>Otherwise [“Patient Walk-In” feature is disabled],</p> <p>If the following conditions are satisfied:</p> <ul style="list-style-type: none"> • The corresponding patient and study objects exist in the database. • The value of the attribute (0032, 1000) Scheduled Study Start Date is greater than the current system date and its value with respect to the current system date is less than a certain configurable amount of time called the Poster Interval (usually 60 days). • At least one matching prefetch rule has been configured. <p>Then the following actions are performed:</p> <ul style="list-style-type: none"> • The patient and study objects in the database are updated accordingly[Ⓟ]. • A message is inserted into the Poster’s prefetch queue[Ⓞ]. <p><u>Notes:</u></p> <p>[△]Refer to the real-world activity, “Process Notification”, under Association Initiation by Real-World Activity for more information.</p> <p>[Ⓞ]The DICOM Standard does not require the patient attributes to be present in the notification event. However, some implementations may not conform to the standard. Some implementations may not be capable of listening for DICOM association requests.</p>
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		<p>^ΨThe following attributes are updated in the patient and study objects:</p> <p>(0008, 0050) Accession Number (0008, 0080) Institution Name (0008, 0090) Referring Physician Name (0010, 1080) Military Rank (0010, 1081) Branch of Service (0010, 2160) Ethnic Group (0010, 21C0) Pregnancy Status (0020, 000D) Study Instance UID (see note) (0032, 000C) Study Priority ID (0032, 1000) Scheduled Study Start Date (0032, 1001) Scheduled Study Start Time (0032, 1020) Scheduled Study Location (0032, 1032) Requesting Physician (0032, 1060) Requested Procedure Description (0032, 1070) Requested Contrast Agent (0038, 001E) Patient Institution Residence (0038, 0300) Current Patient Location</p> <p><u>Note:</u> The value of the (0020, 000D) Study Instance UID attribute is the same as the value of the (0000, 1000) Affected SOP Instance UID attribute present in the notification event.</p> <p>^ΦWhen a message is inserted into the Poster’s prefetch queue, this application behaves as a DICOM Storage SCU; all images in prior studys are sent to pre-configured destinations (i.e. DICOM Storage SCPs). Refer to the real-world activity, “Prefetch Prior Studies”, for more information.</p>
3	Patient Arrived	This event type is ignored.
4	Study Started	This event type is ignored.
5	Study Completed	This event type is ignored.
6	Study Verified	This event type is ignored.
7	Study Read	This event type is ignored.
8	Study Deleted	<p>If the following study attributes are not present in the notification event</p> <p>(0008, 0050) Accession Number (0008, 1120) Referenced Patient Sequence (0008, 1150) > Referenced SOP Class UID (0008, 1155) > Referenced SOP Instance UID</p> <p>then the DIMSE N-GET operation is invoked for the Detached Study Management SOP Instance^Δ.</p>

		<p>If the following patient attributes are not present in the notification event[⊖]</p> <p style="padding-left: 40px;">(0010, 0010) Patient's Name (0010, 0020) Patient ID (0010, 0030) Patient's Birth Date (0010, 0040) Patient's Sex (0010, 1040) Patient's Address</p> <p>then the DIMSE N-GET operation is invoked for the Detached Patient Management SOP Instance^Δ. The Requested SOP Instance UID attribute is set to the value of the Referenced SOP Instance UID in the Referenced Patient Sequence that was present in the notification event.</p> <p><u>Note</u>: The following actions are performed regardless of the outcome of any preceding N-GET operations. That is even if one or more attempts are made to invoke an N-GET operation and they fail then the following actions still occur.</p> <p>If the following conditions are satisfied:</p> <ul style="list-style-type: none"> • The corresponding patient and study objects exist in the database and there are no images associated with the study (i.e. shell study). <p>Then the following actions are performed:</p> <ul style="list-style-type: none"> • The study object is deleted in the database and the patient object is also deleted if no other study objects are associated with the patient. • All applicable messages are removed from the Poster's prefetch queue. <p>^ΔRefer to the real-world activity, "Process Notification", under Association Initiation by Real-World Activity for more information.</p> <p>[⊖]The DICOM Standard does not require the patient attributes to be present in the notification event. However, some implementations may not conform to the standard. Some implementations may not be capable of listening for DICOM association requests.</p>
9	Study Updated	The behavior for this event type is the same as the "Study Scheduled" event type.

Table 32. HIS/RIS DICOM Server — Supported Notification Events, Detached Study Management SOP Class

3.2.3.2.4 SOP Specific Conformance to the Kodak Specialized Detached Study Management SOP Class

The HIS/RIS DICOM Server does not invoke any operations for this real-world activity.

The HIS/RIS DICOM Server receives the notification N-EVENT-REPORT message service element. It supports the following event types for this notification:

Event Type ID	Event Type Name	Behavior
1	Study Created	This event type is ignored.
2	Study Scheduled	The actions performed for this event type is identical to those performed by the “Study Scheduled” event type in the standard Detached Study Management SOP Class.
3	Patient Arrived	This event type is ignored.
4	Study Started	This event type is ignored.
5	Study Completed	This event type is ignored.
6	Study Verified	This event type is ignored.
7	Study Read	This event type is ignored.
8	Study Deleted	The actions performed for this event type is identical to those performed by the “Study Deleted” event type in the standard Detached Study Management SOP Class.
9	Study Updated	The actions performed for this event type is identical to those performed by the “Study Updated” event type in the standard Detached Study Management SOP Class.
10	Study Updated (Accession Number)	If the following study attributes are not present in the notification event (0008, 0050) Accession Number (0008, 1120) Referenced Patient Sequence (0008, 1150) > Referenced SOP Class UID (0008, 1155) > Referenced SOP Instance UID

	<p>then the DIMSE N-GET operation is invoked for the Detached Study Management SOP Instance^Δ.</p> <p>If the following patient attributes are not present in the notification event[⊙]</p> <p style="padding-left: 40px;">(0010, 0010) Patient's Name (0010, 0020) Patient ID (0010, 0030) Patient's Birth Date (0010, 0040) Patient's Sex (0010, 1040) Patient's Address</p> <p>then the DIMSE N-GET operation is invoked for the Detached Patient Management SOP Instance^Δ. The Requested SOP Instance UID attribute is set to the value of the Referenced SOP Instance UID in the Referenced Patient Sequence that was present in the notification event.</p> <p><u>Note:</u> The following actions are performed regardless of the outcome of any preceding N-GET operations. That is even if one or more attempts are made to invoke an N-GET operation and they fail then the following actions still occur.</p> <p>If the following conditions are satisfied:</p> <ul style="list-style-type: none"> • The corresponding patient and study objects exist in the database. • At least one matching prefetch rule has been configured. <p>Then the following actions are performed:</p> <ul style="list-style-type: none"> • The Accession Number for applicable study object in the database is updated. • A message is inserted into the Poster's prefetch queue[⊙]. <p><u>Notes:</u></p> <p>^ΔRefer to the real-world activity, "Process Notification", under Association Initiation by Real-World Activity for more information.</p> <p>[⊙]The DICOM Standard does not require the patient attributes to be present in the notification event. However, some implementations may not conform to the standard. Some implementations may not be capable of</p>
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		listening for DICOM association requests. ^Φ When a message is inserted into the Poster’s prefetch queue, this application behaves as a DICOM Storage SCU; all images in prior studys are sent to pre-configured destinations (i.e. DICOM Storage SCPs). Refer to the real-world activity, “Prefetch Prior Studies”, for more information.
11	Study Deleted	This event type is intended to be used for the physical deletion of the study object in the database. This feature is currently not implemented.

Table 33. HIS/RIS DICOM Server — Supported Notification Events, Kodak Specialized Detached Study Management SOP Class

3.2.3.2.3 Presentation Context Acceptance Criterion

The criterion for accepting presentation contexts is based on configuration data. See the section on Configuration for more information.

3.2.3.2.4 Transfer Syntax Selection Policy

Several transfer syntax selection policies are available. The particular one that is used is based on configuration data. See the section on Configuration for more information.

3.3 DICOM Image Forwarding Service — Specification

The DICOM Image Forwarding Service provides standard conformance to the same DICOM V3.0 SOP classes as an SCU as the DICOM Server.

3.3.1 Association Establishment Policies

3.3.1.1 General

The DICOM Image Forwarding Service recognizes the following Application Context Names:

Standard DICOM Application Context Name	1.2.840.10008.3.1.1.1
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Table 34. DICOM Image Forwarding Service — Application Context Name

The maximum PDU size that is offered by the DICOM Image Forwarding Service is configurable.

3.3.1.2 Number of Associations

The DICOM Image Forwarding Service is not limited to any particular number of associations. The number of simultaneous associations at any given point in time is dictated by the configuration and the workflow.

It should be noted that response time for an association degrades with increasing simultaneous associations. This slow response may trigger timers in remote systems.

3.3.1.3 Asynchronous Nature

The DICOM Image Forwarding Service does not support negotiation of multiple outstanding transactions.

3.3.1.4 Implementation Identifying Information

The DICOM Image Forwarding Service provides the following implementation identifying information:

Implementation Class UID	1.2.840.113674.6.15.95
Implementation Version Name	ASS402YYYYMMDDU <p style="text-align: center;">where</p> <ul style="list-style-type: none"> ▪ YYYYMMDD <p style="text-align: center;">is the date on which the application was built</p>

Table 35. DICOM Image Forwarding Service — Implementation Identifying Information

3.3.2 Association Initiation by Real-World Activity

The DICOM Image Forwarding Service only initiates an association under the following real-world activity:

- Forward Images

3.3.2.1 Real-World Activity — Forward Images

Associated Real-World Activity

In this real-world activity, the DICOM Image Forwarding Service is sending images (i.e. composite SOP Instances) that Archive Server has previously archived. The DICOM Image Forwarding Service establishes an association with pre-configured destinations and invokes the C-STORE operation for the images selected by its rule engine.

Note: Archive Server places an upper limit on the number of C-STORE operations that it invokes on an association. When this limit is reached, the association is released and a new one is established. Refer to the section entitled Configuration for more information.

Proposed Presentation Contexts

The DICOM Image Forwarding Service will propose the same presentation contexts as the DICOM Server does when it initiates an association for the purpose of Sending Images. See Table 7.

3.4 DICOM Study Prefetch Service — Specification

The DICOM Study Prefetch Service provides standard conformance to the same DICOM V3.0 SOP classes as the DICOM Image Forwarding Service.

3.4.1 Association Establishment Policies

The DICOM Study Prefetch Service adheres to the same Association Establishment Policies as the DICOM Image Forwarding Service.

3.4.2 Association Initiation by Real-World Activity

The DICOM Study Prefetch Service only initiates an association under the following real-world activity:

- Prefetch Prior Studies

3.4.2.1 Real-World Activity — Prefetch Prior Studies

3.4.2.1.1 Associated Real-World Activity

In this real-world activity, the DICOM Study Prefetch Service is sending images (i.e. composite SOP Instances) that Archive Server has previously archived. The DICOM Study Prefetch Service establishes an association with pre-configured destinations and invokes the C-STORE operation for the images selected by its rule engine.

Note: Archive Server places an upper limit on the number of C-STORE operations that it invokes on an association. When this limit is reached, the association is released and a new one is established. Refer to the section entitled Configuration for more information.

3.4.2.1.2 Proposed Presentation Contexts

The DICOM Study Prefetch Service will propose the same presentation contexts as the DICOM Image Forwarding Service. See Table 7.

3.5 Web View — Specification

The Web View’s DICOM applications provide standard conformance to the following DICOM V3.0 SOP classes as an SCU:

SOP Class UID Name	SOP Class UID Value
Verification	1.2.840.10008.1.1
Study Root Query/Retrieve Information Model — MOVE	1.2.840.10008.5.1.4.1.2.2.2

Table 36. Web View — Supported SOP Classes as an SCU

In this real-world activity, the Web View establishes an association with pre-configured destinations and invokes the DIMSE C-ECHO operation.

The Test Association feature in the Web View’s Service Tool is responsible for initiating this real-world activity. This feature permits a user to verify DICOM communication with another DICOM application. These DICOM applications are identified by their respective DICOM AE Titles that are configured in Archive Server.

Note: The set of AE Titles that are used in the real-world activity entitled “Send Images” are the same as the set of AE Titles presented to the user in this real-world activity.

3.5.2.1.2 Proposed Presentation Contexts

The Web View will propose the following presentation context:

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Verification SOP class	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

Table 39. Web View — Proposed Presentation Contexts, Verify Communication

3.5.2.2 Real-World Activity — Move Images

3.5.2.2.1 Associated Real-World Activity

In this real-world activity, the Web View invokes a DIMSE C-MOVE operation on the DICOM Server thereby indirectly sending images (i.e. composite SOP Instances) that Archive Server has previously archived.

The Query Tool and Update Tool in the Web View are responsible for initiating this real-world activity. These tools permit a user to perform a query of the archive. Each result or match of the query includes a hyperlink, labeled as “Send To...” which enables the matching images to be transferred to another DICOM application. These DICOM applications are identified by their respective DICOM AE Titles that are configured in Archive Server.

Note: The set of AE Titles that are used in the real-world activity entitled “Send Images” are the same as the set of AE Titles presented to the user in this real-world activity.

Note: The contents of the DIMSE C-MOVE-RQ are

Tag	Name	Value
(0000, 0000)	Group Length	-
(0000, 0002)	Affected SOP Class UID	1.2.840.10008.5.1.4.1.2.2.2 [Study Root Query/Retrieve Information Model — MOVE]
(0000, 0100)	Command Field	0021H

(0000, 0110)	Message ID	-
(0000, 0700)	Priority	0000H [MEDIUM]
(0000, 0800)	Data Set Type	0000H
(0000, 0600)	Move Destination	[AE Title selected by the user]
(0008, 0052)	Query/Retrieve Level	PATIENT
(0010, 0010)	Patient's Name	[Patient's Name displayed in Web View]
(0010, 0020)	Patient ID	[Patient ID displayed in Web View]

Table 40. Web View — DIMSE C-MOVE-RQ attributes

3.5.2.2.2 Proposed Presentation Contexts

The Web View will propose the following presentation context to the DICOM Server:

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

Table 41. Web View — Proposed Presentation Contexts, Move Images

The DICOM Server does when it initiates an association for the purpose of Sending Images. See the local real-world activity, “Send Images”, for the DICOM Server for a list of the presentation contexts that the DICOM Server proposes to the eventual destination (Table 7).

4 Communication Profiles

Archive Server provides the DICOM V3.0 TCP/IP network communication support as defined in Part 8 of the DICOM Standard.

4.1 TCP/IP Stack

Archive Server uses the TCP/IP stack from the operating system on which it executes: Sun Solaris 2.6.

4.1.1 Physical Media Support

Archive Server is indifferent to the physical medium over which TCP/IP executes, for example, Ethernet, IEEE 802.3, ATM, or FDDI.

5 Extensions / Specializations / Privatizations

5.1 Data Dictionary

In addition to the attributes and unique identifiers defined in the DICOM V3.0 Standard, Archive Server also supports the following private attributes and unique identifiers. These attributes and unique identifiers are of private domain and defined for and used solely by **Kodak Health Imaging (PARIS)** products.

Tag	Name	VR	VM
(0019, 00xx)	Private Creator Note: The value is "CEMAX-ICON" however this attribute is often absent.	LT	1
(0019, xx00)	CR Processing Parameters	LT	1
(0019, xx10)	CR Exposure Menu Code	LO	1
(0019, xx20)	CR Exposure Menu String	LO	1
(0019, xx30)	CR EDR Mode	LO	1
(0019, xx40)	CR Latitude	LO	1
(0019, xx50)	CR Group Number	LO	1
(0019, xx60)	CR Equipment ID	LO	1
(0019, xx70)	CR Image Serial Number	LO	1
(0019, xx80)	CR Bar Code Number	LO	1
(0019, xx90)	CR Film Output Exposure	LO	1
(0029, 00xx)	Private Creator Note: The value is "CEMAX-ICON".	LT	1
(0029, xx00)	Key Image	LO	1
(0029, xx10)	Note	LT	1-n
(0029, xx20)	Annotation Sequence	SQ	1

(0029, xx30)	X Start Position	IS	1
(0029, xx40)	Y Start Position	IS	1
(0029, xx50)	X End Position	IS	1
(0029, xx60)	Y End Position	IS	1
(0029, xx70)	Annotation Text	LO	1
(0029, xx80)	Which Marker	IS	1
(0029, xx90)	Annotation Sequence	SQ	1
(0029, xx91)	X Coordinates	IS	1-n
(0029, xx92)	Y Coordinates	IS	1-n
(0029, xx93)	Annotation Type	IS	1
(0029, xx94)	Number of points	IS	1
(0029, xx95)	Fill Type	IS	1
(3033, 00xx)	Private Creator Note: The value is "CEMAX-ICON".	LT	1
(3033, xx00)	Study Priority Status	CS	1

Table 42. Registry of Private DICOM Data Elements

UID Value	UID Name	UID Type
1.2.840.113674.3.1.1.1	Kodak Private DICOM Application Context Name	Application Context Name
1.2.840.113674.3.1.2.1.1	Kodak Specialized Detached Patient Management SOP Class	SOP Class
1.2.840.113674.3.1.2.3.1	Kodak Specialized Detached Study Management SOP Class	SOP Class
1.2.840.113674.5.1.4.1.2.4.1	Kodak Private Series	SOP Class

	Root Query/Retrieve Information Model — FIND	
1.2.840.113674.5.1.4.1.2.4.2	Kodak Private Series Root Query/Retrieve Information Model — MOVE	SOP Class

Table 43. Registry of Private DICOM Unique Identifiers (UID)

5.2 Kodak Private Application Context Name

All Application Entities are capable of accepting associations with the Kodak Private Application Context UID of “1.2.840.113674.3.1.1.1”. The behavior of Application Entities operating under this private application context is identical to their behavior under the standard application context (“1.2.840.10008.3.1.1.1”) with the exception of the following real-world activities:

5.2.1 Move Images In Any Supported Query/Retrieve Information Model

C-MOVE-RSP messages with a status of ‘pending’ include an optional data set that is not allowed under the standard application context. This data set (Table 44) contains information about the composite SOP Instance that is stored at the Move Destination (destination AE).

Tag	Attribute Name
(0008, 0018)	SOP Instance UID
(0010, 0010)	Patient’s Name
(0010, 0020)	Patient ID
(0020, 000D)	Study Instance UID
(0020, 000E)	Series Instance UID

Table 44. Pending C-MOVE-RSP Data Set

The motivation for sending this additional information is so that the Move Originator (i.e. Q/R SCU) has detailed information regarding the progress of the Move operation. This enables certain DICOM Applications with user interfaces to report the progress to the end-user in specialized graphical user-interface(s).

5.3 Specialized SOP Classes

5.3.1 Kodak Specialized Detached Patient Management SOP Class

The Kodak Specialized Detached Patient Management SOP Class is identical to the standard Detached Patient Management SOP Class except for the specification of the N-EVENT-REPORT service. Additional event types are available which permit the modification of (0010, 0010) Patient's Name and (0010, 0020) Patient ID. There is also an event type that enables several patient objects to be merged into one patient object.

Note: A Kodak Specialized Detached Patient Management SOP Instance shall refer to an identical Detached Patient Management SOP Instance. That is the SOP Instance UIDs shall be identical. This enables the SCU to invoke the DIMSE N-GET service using a standard Detached Patient Management SOP Instance in response to DIMSE N-EVENT-REPORT service using a Kodak Specialized Detached Patient Management SOP Instance.

The Kodak Specialized Detached Patient Management SOP Class shall be uniquely identified by the Kodak Specialized Detached Patient Management SOP Class UID and shall have the value "1.2.840.113674.3.1.2.1.1".

The following specification shall serve as a "replacement" for the sub-section entitled "Notifications" in PS 3.4 Annex E.3, "Detached Patient Management SOP Class".

5.3.1.1 Notifications

The Application Entity that claims conformance as an SCU to this SOP Class shall be permitted to receive the following notification. The Application Entity that claims conformance as an SCP to this SOP Class shall be capable of providing the following notifications.

5.3.1.1.1 Receive Patient Event Notification

This notification allows an SCU to receive from the SCP an unsolicited notification of a change in the Detached Patient Management SOP Instance (which is the same as the Kodak Specialized Detached Patient Management SOP Instance). These notifications shall be invoked by the SCP through the use of the DIMSE N-EVENT-REPORT Service used in conjunction with the appropriate Detached Patient Management SOP Instance (which is the same as the Kodak Specialized Detached Patient Management SOP Instance).

The SCU shall return, via the N-EVENT-REPORT response primitive, the N-EVENT-REPORT response status code applicable to the associated request. The SCU shall accept all Attributes included in any notification. This Service Class Specification places no requirements on what the SCU shall do as a result of receiving this information.

5.3.1.1.2 Provide Patient Event Notification

These notifications allow an SCU to receive from the SCP an unsolicited notification of a change in the state of a real-world patient. This notification shall be invoked by the SCP through the use of the DIMSE N-EVENT-REPORT Service used in conjunction with the appropriate Detached Patient Management SOP Instance (which is the same as the Kodak Specialized Detached Patient Management SOP Instance).

The SCP shall specify in the N-EVENT-REPORT request primitive the UID of the Detached Patient Management SOP Instance (which is the same as the Kodak Specialized Detached Patient Management SOP Instance) for which the event is associated and the Event Type ID. The SCP shall additionally include Attributes related to the event as defined in the following table.

Event Type Name	Event Type ID	Attribute	Tag	Req. Type SCU/SCP
Patient Created	1	Same as the standard Detached Patient Management SOP Class.		
Patient Deleted	2	Same as the standard Detached Patient Management SOP Class.		
Patient Demographics Updated	3	Specific Character Set	(0008, 0005)	-/1C (Required if expanded/ replacement character set used)
		Patient's Name	(0010, 0010)	-/1
		Patient ID	(0010, 0020)	-/1
		Patient's Birth Date	(0010, 0030)	-/3
		Patient's Birth Time	(0010, 0032)	-/3
		Patient's Sex	(0010, 0040)	-/3
		Other Patient IDs	(0010, 1000)	-/3
		Other Patient Names	(0010, 1001)	-/3
Patient Name Updated	4	Specific Character Set	(0008, 0005)	-/1C (Required if expanded/ replacement character set used)
		Patient's Name	(0010, 0010)	-/1
		Patient ID	(0010, 0020)	-/1

Patient ID Updated	5	Specific Character Set	(0008, 0005)	-/1C (Required if expanded/ replacement character set used)
		Patient's Name	(0010, 0010)	-/1
		Patient ID	(0010, 0020)	-/1
Patient Merged	6	Specific Character Set	(0008, 0005)	-/1C (Required if expanded/ replacement character set used)
		Patient's Name	(0010, 0010)	-/1
		Patient ID	(0010, 0020)	-/1
		Other Patient IDs	(0010, 1000)	-/1
		Other Patient Names	(0010, 1001)	-/1

Table 45. Patient Notification Event Information

5.3.2 Kodak Specialized Detached Study Management SOP Class

The Kodak Specialized Detached Study Management SOP Class is identical to the standard Detached Study Management SOP Class except for the specification of the N-EVENT-REPORT service. Additional event types are available which permit the modification of the (0008, 0050) Accession Number and the physical deletion of the study.

Note: A Kodak Specialized Detached Study Management SOP Instance shall refer to an identical Detached Study Management SOP Instance. That is the SOP Instance UIDs shall be identical. This enables the SCU to invoke the DIMSE N-GET service using a standard Detached Study Management SOP Instance in response to DIMSE N-EVENT-REPORT service using a Kodak Specialized Detached Study Management SOP Instance.

The Kodak Specialized Detached Study Management SOP Class shall be uniquely identified by the Kodak Specialized Detached Study Management SOP Class UID and shall have the value "1.2.840.113674.3.1.2.1.1".

The following specification shall serve as a "replacement" for the sub-section entitled "Notifications" in PS 3.4 Annex F.3, "Detached Study Management SOP Class".

5.3.2.1 Notifications

The Application Entity that claims conformance as an SCU to this SOP Class shall be permitted to receive the following notification. The Application Entity that claims conformance as an SCP to this SOP Class shall be capable of providing the following notifications.

5.3.2.1.1 Receive Study Status Event Notification

This notification allows an SCU to receive from the SCP an unsolicited notification of a change in the study status (as represented by the value of the Study Status Attribute). These notifications shall be invoked by the SCP through the use of the DIMSE N-EVENT-REPORT Service used in conjunction with the appropriate Detached Study Management SOP Instance (which is the same as the Kodak Specialized Detached Study Management SOP Instance).

The SCU shall return, via the N-EVENT-REPORT response primitive, the N-EVENT-REPORT response status code applicable to the associated request. The SCU shall accept all Attributes included in any notification.

An SCU of Detached Study Management SOP Instance (which is the same as the Kodak Specialized Detached Study Management SOP Instance) shall utilize the value of the Detached Study Management SOP Instance UID (0020, 000D) to identify all Image SOP Instances created as part of the scheduled Study.

5.3.2.1.2 Provide Study Status Event Notification

These notifications allow an SCU to receive from the SCP an unsolicited notification of a change in the study status (as represented by the value of the Study Status Attribute). This notification shall be invoked by the SCP through the use of the DIMSE N-EVENT-REPORT Service used in conjunction with the appropriate Detached Study Management SOP Instance (which is the same as the Kodak Specialized Detached Study Management SOP Instance).

The SCP shall specify in the N-EVENT-REPORT request primitive the UID of the Detached Study Management SOP Instance (which is the same as the Kodak Specialized Detached Study Management SOP Instance) for which the event is associated and the Event Type ID. The SCP shall additionally include Attributes related to the event as defined in the following table.

Event Type Name	Event Type ID	Attribute	Tag	Req. Type SCU/SCP
Study Created	1	Same as the standard Detached Study Management SOP Class.		
Study Scheduled	2	Same as the standard Detached Study Management SOP Class.		
Patient Arrived	3	Same as the standard Detached Study Management SOP Class.		

Study Started	4	Same as the standard Detached Study Management SOP Class.		
Study Completed	5	Same as the standard Detached Study Management SOP Class.		
Study Verified	6	Same as the standard Detached Study Management SOP Class.		
Study Read	7	Same as the standard Detached Study Management SOP Class.		
Study Deleted	8	Same as the standard Detached Study Management SOP Class.		
Study Updated	9	Same as the standard Detached Study Management SOP Class.		
Study Updated (Accession Number)	10	Specific Character Set	(0008, 0005)	-/1C (Required if expanded/replacement character set used)
		Referenced Patient Sequence	(0008, 1120)	-/1
		> Referenced SOP Class UID	(0008, 1150)	-/1
		> Referenced SOP Instance UID	(0008, 1155)	-/1
		Accession Number	(0008, 0050)	-/1
Study Deleted (Database Deletion)	11			

Table 46. Study Notification Event Information

5.4 Private SOP Classes

5.4.1 Kodak Private Series Root Query/Retrieve Information Model — FIND

The behavior of Archive Server for C-FIND operations is identical for all Query/Retrieve — FIND values of the Affected SOP Class UID attribute.

A Private Series Root Query/Retrieve Information Model — FIND SOP Class is also included in this list of Query/Retrieve — FIND values by Archive Server. This is necessary for legacy Kodak Health Imaging products that are only capable of proposing this SOP Class UID as an Abstract Syntax UID for C-FIND operations.

The Kodak Private Series Root Query/Retrieve Information Model — FIND SOP Class shall be uniquely identified by the Kodak Private Series Root Query/Retrieve Information Model — FIND SOP Class UID and shall have a value of “1.2.840.113674.5.1.4.1.2.4.1”.

5.4.2 Kodak Private Series Root Query/Retrieve Information Model — MOVE

The behavior of Archive Server for C-MOVE operations is identical for all Query/Retrieve — MOVE values of the Affected SOP Class UID attribute.

A Private Series Root Query/Retrieve Information Model — MOVE SOP Class is also included in this list of Query/Retrieve — MOVE values by Archive Server. This is necessary for legacy Kodak Health Imaging products that are only capable of proposing this SOP Class UID as an Abstract Syntax UID for C- MOVE operations.

The Kodak Private Series Root Query/Retrieve Information Model — MOVE SOP Class shall be uniquely identified by the Kodak Private Series Root Query/Retrieve Information Model — MOVE SOP Class UID and shall have a value of “1.2.840.113674.5.1.4.1.2.4.2”.

6 Configuration

Archive Server is a highly configurable product, especially the portion that deals with DICOM communications. This section highlights the parameters that are configurable. Details on the implementation and specification of these configuration parameters are provided in the “Archive Server Service and Training Manual”.

6.1 AE Title/Presentation Address Mapping

The translation from AE Title to Presentation Address is primarily achieved using persistent configuration data that is accessible using the Service Tool.

However certain default settings are present at the time of installation. These are:

Application	Role	Default AE Title	Default TCP/IP
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Entity			Port
DICOM Server	Both	AMSERVER	3002
HIS/RIS DICOM Server	Both	AMSERVER	3050
DICOM Image Forwarding Service	SCU	AMSERVER	N/A
DICOM Study Prefetch Service	SCU	AMSERVER	N/A
Web View	SCU	AMSERVER	N/A

Table 47. Default AE Title/Presentation Address Mapping

6.2 Configurable Parameters

Parameter Specify (e.g. PDU Size)	Configurable Yes/No	Default Value Specify (e.g. 64 kB)
General Parameters		
Time-out waiting for an Association Open Request. (Application Level timeout)	Yes ^{2,A}	2 minutes
Time-out waiting for acceptance or rejection Response to an Association Open Request. (Application Level timeout)	Yes ^{2,B}	2 minutes
General DIMSE level time-out values	Yes ^{2,C}	Not set; no time-out.
Time-out waiting for response to TCP/IP connect() request. (Low-level timeout)	Yes ¹	See note.
Time-out waiting for acceptance of a TCP/IP message over the network. (Low-level timeout)	Yes ¹	See note.
Time-out for waiting for data between TCP/IP packets. (Low-level timeout)	Yes ¹	See note.
Any changes to default TCP/IP settings, such as configurable stack parameters.	Yes ^{1,2,D}	See notes.
AE Specific Parameters		

Size constraint in maximum object size	No	
Maximum PDU size the AE can receive	Yes ^{2,E}	8192 bytes
Maximum PDU size the AE can send	Yes ^{2,E}	8192 bytes
AE specific DIMSE level time-out values	Yes ²	Defaults to the general parameter value.
Number of simultaneous Associations by Service and/or SOP Class	No	
Presentation Context Acceptance Criterion	Yes ^{2,F}	
Transfer Syntax Selection Policy	Yes ^{2,G}	The first transfer syntax in the list of proposed transfer syntaxes that matches one of the configured transfer syntaxes for the abstract syntax is accepted.
AE is privileged to over-write attributes at the patient, study, and/or series level	Yes ^{2,H}	No
General Parameters		
SOP Class support (e.g. Multiframe vs. single frame vs SC support), when configurable	No	
Transfer syntax support, e.g. JPEG, Explicit VR, when configurable	No	
Other configurable parameters		
General number of simultaneous associations	Yes ^{2,H}	
Association handling strategy	Yes ^{2,I}	Single process, multi-threaded (thread pool)
Number of threads in general DICOM I/O pool	Yes ^{2,J}	10
Number of additional threads dedicated to performing DIMSE C-STORE operations	Yes ²	10
Number of additional threads dedicated to performing	Yes ²	10

DIMSE C-FIND operations		
Number of additional threads dedicated to performing DIMSE C-MOVE operations	Yes ²	10
Number of additional threads dedicated to performing DIMSE N-EVENT-REPORT operations	Yes ²	5
Maximum number of C-STORE operations invoked on an association	Yes ^{2,O}	300
DICOM logging information	Yes ^{2,K}	None
Patient Walk-In	Yes ^{2,P}	Disabled
Poster Interval	Yes ^{2,Q}	Sixty (60) Days
Notes		
<p>1. The parameter is configurable by the operating system. See the documentation for the operating system for the affected system-level parameters. The value of all TCP parameters can be queried and set using the commands “<code>ndd -get /dev/tcp name</code>” and “<code>ndd -set /dev/tcp name value</code>” respectively.</p> <p>2. The parameter is configurable by the application.</p> <p>A. This is the initial value of the ARTIM (Association Request, Reject, Release) Timer in PS 3.8.</p> <p>B. This is referred to as the “Association Response Timeout” in the service and training manual. The consequence of this timeout is an automatic abort of the association.</p> <p>C. This is referred to as the “DIMSE Timeout” in the service and training manual. The consequence of this timeout is an automatic abort of the association.</p> <p>D. The default TCP/IP settings are specified by the operating system. However, some of the settings can be over-ridden by the application. This includes the maximum number of pending connections that is used as the backlog parameter of the TCP/IP socket <code>listen</code> call. This also includes the TCP/IP socket options <code>debug</code>, <code>local address reuse</code>, <code>keep connections alive</code>, <code>routing bypass for outgoing messages</code>, <code>output buffer size</code>, and <code>input buffer size</code>.</p> <p>E. The maximum length of P-DATA PDUs that is configurable must be greater than six bytes. The value zero which indicates no maximum length cannot be specified as it is not supported by this implementation. The values one through six are not supported because some implementations get confused between the maximum length of the entire P-DATA PDU and the maximum length of the value of the P-DATA PDU.</p> <p>F. A set of presentation context items can be specified. When an A-ASSOCIATE-RQ PDU is received, the presentation context items contained within it are compared to the configured set of presentation</p>		

context items. The response (A-ASSOCIATE-AC PDU or A-ASSOCIATE-RJ PDU) and its exact contents is based on the outcome of this comparison. No prioritization rules are imposed upon the acceptance of presentation contexts.

G. There are two transfer syntax selection policies available:

(i). First proposed and configured. The first transfer syntax that is proposed and also included the list of transfer syntaxes configured for the abstract syntax is accepted. Note: The order of the transfer syntaxes configured is not important.

(ii) First configured to accept. The first transfer syntax that is configured for the abstract syntax and also included in the list of transfer syntaxes proposed is accepted. Note: The order of the transfer syntaxes configured is important.

H. An upper limit on the number of simultaneous associations may be imposed or the number of simultaneous associations may be unlimited. If an upper limit is imposed and that limit is reached by a peer DICOM Application negotiating an association with Archive Server, then an A-ASSOCIATE-RJ PDU is sent in response with the following parameters: Result = 2 — rejected-transient, Source = 3 — DICOM UL service-provider (presentation related function), Reason/Diag. = 1 — temporary congestion.

I. The following strategies are available for handling incoming associations: (i) single process, single thread, (ii) multi-process, single-thread — process-per-association, and (iii) single-process, multi-thread — thread pool.

J. An initial number of processing threads can be specified which are dispatched to handling association establishment and DIMSE messages on a first come first serve basis. Note: There is no relationship between the number of threads and the number of simultaneous associations.

K. Certain messages can be logged based upon their severity (e.g. informational, warning, error) and type (e.g. message exchange, compression operations).

L. Image Compression Filter. An image that is received using an uncompressed transfer syntax can be compressed for storage. That is a compression transfer syntax can be applied to the image. Conditions can be placed upon the image such as the value of SOP Class UID (0008, 0016) and/or Body Part Examined (0018, 0015). The desired compression ratio can be specified.

M. Attribute Mapping Filter.

N. Attribute Translation Filter. If a specified data element is present with a specified value, then another specified data element is added to the data set.

O. Archive Server places an upper limit on the number of C-STORE

operations that it invokes on an association. The following DICOM Application Entities obey this upper limit: the DICOM Server (for C-MOVE sub-operations), the DICOM Image Forwarding Service, and the DICOM Study Prefetch Service. This upper limit can be overridden by setting the environment variable named “AM_DICOMSERVER_MAX_SENDS_PER_ASSOCIATION”.

P. Patient Walk-In. If the environment variable named “AM_POSTFETCH_FLAG” is set to a non-zero numeric value, then the Patient Walk-In feature is enabled otherwise it is disabled. Note: The “Patient Walk-In” feature affects the processing behavior of “Study Scheduled” and “Study Updated” notification events. See the real-world activity “Process Notification” for more information.

Q. Poster Interval. If the environment variable named “AM_POSTER_PROCESS_INTERVAL” is set to a non-zero numeric value, then the Poster Interval is this numeric value (units are number of days). Otherwise the Poster Interval is sixty days. Note: The Poster Interval is used when during the processing of “Study Scheduled” and “Study Updated” notification events. See the real-world activity “Process Notification” for more information.

Table 48. Configurable Parameters

7 Support of Extended Character Sets

Extended character sets are not supported.

8 Codes and Controlled Terminology

Not used.

9 IOD and Attribute Specifications

This DICOM implementation is not dependent upon nor enforce the maximum length requirements of Value Representation for DICOM attributes. This DICOM implementation will even accept DICOM attributes whose value exceeds the maximum length requirements for their Value Representation.

In general, this DICOM implementation is not dependent upon nor enforce the character set requirements of Value Representation for DICOM attributes. However, there are some specific exceptions to this behavior. Common exceptions are attributes that have a Date or a Date-Time Value Representation. See the corresponding real-world activities for more information.

In general, this DICOM implementation is not dependent upon nor enforce any particular number of values for an attribute. That is the VM for an attribute in the Data Dictionary has no bearing on the acceptance of an attribute. This behavior enables this DICOM implementation to support Standard Extended SOP Classes. However, there are some specific exceptions to this behavior. These usually have to do with attributes that identify certain DICOM objects such as Patient's Name, Patient ID, Study Instance UID, etc. See the corresponding real-world activities for more information.

This DICOM implementation is not dependent upon nor enforce the value of Group Length attributes when decoding Data Sets. In fact, Group Length attributes are usually filtered out of incoming messages and are usually not presented in outgoing messages (with the exception of (0000, 0000) which is mandatory in all command sets).

The Unknown (UN) Value Representation is fully supported. This includes explicit recognition of this VR in data sets that have been encoded using transfer syntaxes that convey Explicit VR. All unknown attributes that have been encoded with implicit or undefined length (i.e. Value Representations OB, OL, OW, SQ) are treated as a sequence of items. The content of each item value is decoded as a data set if the length of each item is encoded with implicit or undefined length. This means that this implementation cannot handle attributes that have a Value Representation of OB, OL, or OW, and the Value Length has been encoded with implicit length and at least one item in the value has been encoded with implicit length. The corresponding association will be aborted under such circumstances.

10 IHE

Integrating the Healthcare Enterprise (IHE) is an initiative designed to stimulate the integration of the information systems that support modern healthcare institutions.

The IHE Technical Framework identifies a subset of the functional components of the healthcare enterprise and specifies their interactions in terms of a set of coordinated transactions.

— IHE Technical Framework

Archive Server does not implement any of the IHE Integration Profiles as specified in the IHE Technical Framework. However, Archive Server does implement several IHE Transactions.

The following table lists the IHE Transactions present in Revision 5.3 (year 4) of the IHE Technical Framework. Several IHE Actors are listed for each IHE Transaction and whether or not they are involved in the transaction. The final column indicates whether or not Archive

Server is able to play a role in the transaction. Each of the IHE Actors and Archive Server can be compared for the similarities and differences among the IHE Transactions:

IHE Transaction		Protocol	Services	IHE Actor				Archive Server
				Image Archive	Image Manager	Report Repository	Report Manager	
1	Patient Registration	HL7	ADT					
2	Placer Order Management	HL7	ORM					
3	Filler Order Management	HL7	ORM					
4	Procedure Scheduled	HL7	ORM		•			• ^B
5	Modality Worklist Provided	DICOM	MWL (C-FIND)					
6	Modality Procedure Step In Progress	DICOM	MPPS (N-CREATE)		•			
7	Modality Procedure Step Completed/Discontinued	DICOM	MPPS (N-SET)		•			
8	Modality Images Stored	DICOM	Storage (C-STORE)	•				•
9	Modality Presentation State Stored	DICOM	Storage (C-STORE)	•				•
10	Storage Commitment	DICOM	Storage Commitment (N-ACTION, N-EVENT-REPORT)		•			
11	Image Availability Query	DICOM	Q/R (C-FIND)		•			
12	Patient Update	HL7	ADT		•			• ^A
13	Procedure Update	HL7	ORM		•			• ^C
14	Query Images	DICOM	Q/R (C-FIND)	•				•
15	Query Presentation States	DICOM	Q/R (C-FIND)	•				• ^D
16	Retrieve Images	DICOM	Q/R (C-MOVE)	•				•
17	Retrieve Presentation States	DICOM	Q/R (C-MOVE)	•				• ^D
18	Creator Images Stored	DICOM	Storage (C-STORE)	•				•

19	Creator Presentation State Stored	DICOM	Storage (C-STORE)	•				•
20	Creator Procedure Step In Progress	DICOM	MPPS (N-CREATE)		•			
21	Creator Procedure Step Completed	DICOM	MPPS (N-SET)		•			
22	Intentionally Left Blank							
23	Print Request with Presentation LUT	DICOM	Print					
24	Report Submission	DICOM	Storage (C-STORE)				•	•
25	Report Issuing	DICOM	Storage (C-STORE)			•	•	•
26	Query Reports	DICOM	Q/R (C-FIND)			•		• ^D
27	Retrieve Reports	DICOM	Q/R (C-MOVE)			•		• ^D
28	Structured Report Export	HL7	ORU				•	
29	Key Image Note Stored	DICOM	Storage (C-STORE)	•				•
30	Query Key Image Notes	DICOM	Q/R (C-FIND)	•				• ^D
31	Retrieve Key Images Notes	DICOM	Q/R (C-MOVE)	•				• ^D
32	Authenticate Node	DICOM	A-ASSOCIATE via TLS					
33	Maintain Time	NTP						
34	Record Audit Event	SYSLOG						
35	Charge Posted	HL7	DFT					
36	Account Management	HL7	BAR					
37	Worklist Provided	DICOM	GP-W (C-FIND)					
38	Workitem Claimed	DICOM	GP-SPS (N-ACTION)					
39	Workitem Performed Procedure Step In Progress	DICOM	GP-PPS (N-CREATE)					
40	Workitem Performed Procedure Step Completed	DICOM	GP-PPS (N-SET)					

41	Workitem Completed	DICOM	GP-SPS (N-ACTION)					
42	Performed Work Status Update	DICOM	GP-PPS (N-CREATE, N-SET)		•			
43	Evidence Document Stored	DICOM	Storage (C-STORE)	•				•
44	Query Evidence Documents	DICOM	Q/R (C-FIND)	•				• ^D
45	Retrieve Evidence Documents	DICOM	Q/R (C-MOVE)	•				• ^D
<p>A. Supported via the DICOM Detached Patient Management SOP Class (Patient Updated Event Type).</p> <p>B. Supported via the DICOM Detached Study Management SOP Class (Study Scheduled Event Type).</p> <p>C. Supported via the DICOM Detached Study Management SOP Class (Study Updated and Study Deleted Event Types).</p> <p>D. Not all required Q/R keys are supported for matching. Only the Q/R keys that involve image objects are supported for matching.</p>								

