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ImageDrive DICOM Conformance Statement

Version 12

1. Conformance Statement Overview

1.1 Overview

The ClearCanvas ImageDrive is a DICOM cataloging and project management system. ImageDrive can be used to organize DICOM and non-DICOM data in a virtual file system. ImageDrive makes the data available via DICOM communication and through a RESTful API.

ImageDrive supports the long term storage of images, waveforms, reports and measurements. It also supports querying of a subset of its contents by remote system, and retrieval of the stored objects. It also contains a rules engine that supports the auto-routing of DICOM studies to other DICOM devices.

In addition to listing the DICOM network services supported by ImageDrive, the following table also tells which types of images can be viewed in the ImageDrive Web GUI.

**Table 1-1
Network Services**

SOP Classes	User of Service (SCU)	Provider of Service (SCP)	Viewing
Image Transfer			
Breast Tomosynthesis Image Storage	Yes	Yes	Yes
Computed Radiography Image Storage	Yes	Yes	Yes
CT Image Storage	Yes	Yes	Yes
DICOS CT Image Storage	Yes	Yes	No
DICOS Digital X-Ray Image Storage – For Presentation	Yes	Yes	No
DICOS Digital X-Ray ImageStorage – For Processing	Yes	Yes	No
Digital Intra-oral X-Ray Image Storage – For Presentation	Yes	Yes	Yes
Digital Intra-oral X-Ray Image Storage – For Processing	Yes	Yes	Yes
Digital Mammography X-Ray Image Storage – For Presentation	Yes	Yes	Yes
Digital Mammography X-Ray Image Storage – For Processing	Yes	Yes	Yes
Digital X-Ray Image Storage – For	Yes	Yes	Yes

Presentation			
Digital X-Ray Image Storage – For Processing	Yes	Yes	Yes
Eddy Current Image Storage	Yes	Yes	No
Eddy Current Multi-frame Image Storage	Yes	Yes	No
Enhanced CT Image Storage	Yes	Yes	Yes
Enhanced MR Image Storage	Yes	Yes	Yes
Enhanced PET Image Storage	Yes	Yes	Yes
Enhanced US Volume Storage	Yes	Yes	Yes
Enhanced XA Image Storage	Yes	Yes	Yes
Enhanced XRF Image Storage	Yes	Yes	Yes
Intravascular Optical Coherence Tomography Image Storage – For Presentation	Yes	Yes	No
Intravascular Optical Coherence Tomography Image Storage – For Processing	Yes	Yes	No
MR Image Storage	Yes	Yes	Yes
Multi-frame True Color Secondary Capture Image Storage	Yes	Yes	Yes
Multi-frame Grayscale Byte Secondary Capture Image Storage	Yes	Yes	Yes
Multi-frame Grayscale Word Secondary Capture Image Storage	Yes	Yes	Yes
Multi-frame Single Bit Secondary Capture Image Storage	Yes	Yes	Yes
Nuclear Medicine Image Storage	Yes	Yes	Yes
Ophthalmic Photography 16 Bit Image Storage	Yes	Yes	Yes
Ophthalmic Photography 8 Bit Image Storage	Yes	Yes	Yes
Ophthalmic Tomography Image Storage	Yes	Yes	Yes

Positron Emission Tomography Image Storage	Yes	Yes	Yes
RT Image Storage	Yes	Yes	Yes
Secondary Capture Image Storage	Yes	Yes	Yes
Ultrasound Image Storage	Yes	Yes	Yes
Ultrasound Multi-frame Image Storage	Yes	Yes	Yes
Video Endoscopic Image Storage	Yes	Yes	Limited
Video Microscopic Image Storage	Yes	Yes	Limited
Video Photographic Image Storage	Yes	Yes	Limited
VL Endoscopic Image Storage	Yes	Yes	Yes
VL Microscopic Image Storage	Yes	Yes	Yes
VL Photographic Image Storage	Yes	Yes	Yes
VL Slide-Coordinates Microscopic Image Storage	Yes	Yes	Yes
VL Whole Slide Microscopy Image Storage	Yes	Yes	Yes
X-Ray 3D Angiographic Image Storage	Yes	Yes	Yes
X-Ray 3D Craniofacial Image Storage	Yes	Yes	Yes
X-Ray Angiographic Image Storage	Yes	Yes	Yes
X-Ray Radiofluoroscopic Image Storage	Yes	Yes	Yes
Query/Retrieve			
Study Root Information Model FIND	No	Yes	
Study Root Information Model MOVE	No	Yes	
Waveforms, Notes, Reports, Measurements Transfer			
12-lead ECG Waveform Storage	Yes	Yes	No
Ambulatory ECG Waveform Storage	Yes	Yes	No
Arterial Pulse Waveform	Yes	Yes	No
Autorefraction Measurements Storage	Yes	Yes	No
Basic Text SR	Yes	Yes	No
Basic Voice Audio Waveform Storage	Yes	Yes	No
Blending Softcopy Presentation State Storage SOP Class	Yes	Yes	No

Cardiac Electrophysiology Waveform Storage	Yes	Yes	No
Chest CAD SR	Yes	Yes	No
Colon CAD SR	Yes	Yes	No
Color Softcopy Presentation State Storage SOP Class	Yes	Yes	No
Comprehensive SR	Yes	Yes	No
Deformable Spatial Registration Storage	Yes	Yes	No
DICOS Threat Detection Report Storage	Yes	Yes	No
Encapsulated CDA Storage	Yes	Yes	No
Encapsulated PDF Storage	Yes	Yes	No
Enhanced SR	Yes	Yes	No
General Audio Waveform Storage	Yes	Yes	No
General ECG Waveform Storage	Yes	Yes	No
General Implant Template Storage	Yes	Yes	No
Grayscale Softcopy Presentation State Storage SOP Class	Yes	Yes	Yes, Key Object Selections Only
Hemodynamic Waveform Storage	Yes	Yes	No
Implant Assembly Template Storage	Yes	Yes	No
Implant Template Group Storage	Yes	Yes	No
Implantation Plan SR Storage	Yes	Yes	No
Intraocular Lens Calculations Storage	Yes	Yes	No
Keratometry Measurements Storage	Yes	Yes	No
Key Object Selection Document	Yes	Yes	Yes, Images Only
Lensometry Measurements Storage	Yes	Yes	No
Macular Grid Thickness and Volume Report	Yes	Yes	No
Mammography CAD SR	Yes	Yes	No
MR Spectroscopy Storage	Yes	Yes	No
Ophthalmic Axial Measurements Storage	Yes	Yes	No

Ophthalmic Visual Field Static Perimetry Measurements Storage	Yes	Yes	No
Procedure Log Storage	Yes	Yes	No
Pseudo-Color Softcopy Presentation State Storage SOP Class	Yes	Yes	No
Raw Data Storage	Yes	Yes	No
Real World Value Mapping Storage	Yes	Yes	No
Respiratory Waveform Storage	Yes	Yes	No
RT Beams Delivery Instruction Storage	Yes	Yes	No
RT Beams Treatment Record Storage	Yes	Yes	No
RT Brachy Treatment Record Storage	Yes	Yes	No
RT Dose Storage	Yes	Yes	No
RT Ion Beams Treatment Record Storage	Yes	Yes	No
RT Ion Plan Storage	Yes	Yes	No
RT Plan Storage	Yes	Yes	No
RT Structure Set Storage	Yes	Yes	No
RT Treatment Summary Record Storage	Yes	Yes	No
Segmentation Storage	Yes	Yes	No
Spatial Fiducials Storage	Yes	Yes	No
Spatial Registration Storage	Yes	Yes	No
Spectacle Prescription Report Storage	Yes	Yes	No
Stereometric Relationship Storage	Yes	Yes	No
Subjective Refraction Measurements Storage	Yes	Yes	No
Surface Segmentation Storage	Yes	Yes	No
Visual Acuity Measurements Storage	Yes	Yes	No
XA/XRF Grayscale Softcopy Presentation State Storage	Yes	Yes	No
X-Ray Radiation Dose SR	Yes	Yes	No

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3. Introduction

3.1 Revision History

Document Version	Date of Issue	Author	Description
1.0	April 15, 2014	Steve Wranovsky	Initial version for ImageDrive 12.0.

3.2 Audience

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

3.3 Remarks

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

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

- The comparison of different Conformance Statements is just the first step towards assessing interconnectivity and interoperability between the product and other DICOM conformant equipment.
- Test procedures should be defined and executed to validate the required level of interoperability with specific compatible DICOM equipment, as established by the healthcare facility.

3.4 Terms and Definitions

Informal definitions are provided for the following terms used in this Conformance Statement. The DICOM Standard is the authoritative source for formal definitions of these terms.

Abstract Syntax – the information agreed to be exchanged between applications, generally equivalent to a Service/Object Pair (SOP) Class. Examples : Verification SOP Class, Modality Worklist Information Model Find SOP Class, Computed Radiography Image Storage SOP Class.

Application Entity (AE) – an end point of a DICOM information exchange, including the DICOM network or media interface software; i.e., the software that sends or receives DICOM information objects or messages. A single device may have multiple Application Entities.

Application Entity Title – the externally known name of an *Application Entity*, used to identify a DICOM application to other DICOM applications on the network.

Application Context – the specification of the type of communication used between *Application Entities*. Example: DICOM network protocol.

Association – a network communication channel set up between *Application Entities*.

Attribute – a unit of information in an object definition; a data element identified by a *tag*. The information may be a complex data structure (Sequence), itself composed of lower level data elements. Examples: Patient ID (0010,0020), Accession Number (0008,0050), Photometric Interpretation (0028,0004), Procedure Code Sequence (0008,1032).

Information Object Definition (IOD) – the specified set of *Attributes* that comprise a type of data object; does not represent a specific instance of the data object, but rather a class of similar data objects that have the same properties. The *Attributes* may be specified as Mandatory (Type 1), Required but possibly unknown (Type 2), or Optional (Type 3), and there may be conditions associated with the use of an Attribute (Types 1C and 2C). Examples: MR Image IOD, CT Image IOD, Print Job IOD.

Joint Photographic Experts Group (JPEG) – a set of standardized image compression techniques, available for use by DICOM applications.

Media Application Profile – the specification of DICOM information objects and encoding exchanged on removable media (e.g., CDs).

Module – a set of *Attributes* within an *Information Object Definition* that are logically related to each other. Example: Patient Module includes Patient Name, Patient ID, Patient Birth Date, and Patient Sex.

Negotiation – first phase of *Association* establishment that allows *Application Entities* to agree on the types of data to be exchanged and how that data will be encoded.

Presentation Context – the set of DICOM network services used over an *Association*, as negotiated between *Application Entities*; includes *Abstract Syntaxes* and *Transfer Syntaxes*.

Protocol Data Unit (PDU) – a packet (piece) of a DICOM message sent across the network. Devices must specify the maximum size packet they can receive for DICOM messages.

Security Profile – a set of mechanisms, such as encryption, user authentication, or digital signatures, used by an *Application Entity* to ensure confidentiality, integrity, and/or availability of exchanged DICOM data.

Service Class Provider (SCP) – role of an *Application Entity* that provides a DICOM network service; typically, a server that performs operations requested by another *Application Entity (Service Class User)*. Examples: Picture Archiving and Communication System (image storage SCP, and image query/retrieve SCP), Radiology Information System (modality worklist SCP).

Service Class User (SCU) – role of an *Application Entity* that uses a DICOM network service; typically, a client. Examples: imaging modality (image storage SCU, and modality worklist SCU), imaging workstation (image query/retrieve SCU).

Service/Object Pair (SOP) Class – the specification of the network or media transfer (service) of a particular type of data (object); the fundamental unit of DICOM interoperability specification. Examples: Ultrasound Image Storage Service, Basic Grayscale Print Management.

Service/Object Pair (SOP) Instance – an information object; a specific occurrence of information exchanged in a *SOP Class*. Examples: a specific x-ray image.

Tag – a 32-bit identifier for a data element, represented as a pair of four digit hexadecimal numbers, the “group” and the “element”. If the “group” number is odd, the tag is for a private (manufacturer-specific) data element. Examples: (0010,0020) [Patient ID], (07FE,0010) [Pixel Data], (0019,0210) [private data element]

Transfer Syntax – the encoding used for exchange of DICOM information objects and messages. Examples: *JPEG* compressed (images), little endian explicit value representation.

Unique Identifier (UID) – a globally unique “dotted decimal” string that identifies a specific object or a class of objects; an ISO-8824 Object Identifier. Examples: Study Instance UID, SOP Class UID, SOP Instance UID.

Value Representation (VR) – the format type of an individual DICOM data element, such as text, an integer, a person’s name, or a code. DICOM information objects can be transmitted with either explicit identification of the type of each data element (Explicit VR), or without explicit identification (Implicit VR); with Implicit VR, the receiving application must use a DICOM data dictionary to look up the format of each data element.

3.5 Basics of DICOM Communication

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

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

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

For each Presentation Context, the Association Negotiation also allows the devices to agree on *Roles* – which one is the *Service Class User* (SCU– client) and which is the *Service Class Provider* (SCP– server). Normally the device initiating the connection is the SCU, i.e., the client system calls the server, but not always.

The Association Negotiation finally enables exchange of maximum network packet (*PDU*) size, security information, and network service options (called *Extended Negotiation* information).

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

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

3.6 Abbreviations

Abbreviations should be listed here. These may be taken from the following list, deleting terms that are not used within the Conformance Statement, and adding any additional terms that are used:

AE	Application Entity
AET	Application Entity Title
CAD	Computer Aided Detection
CDA	Clinical Document Architecture
CD-R	Compact Disk Recordable
CSE	Customer Service Engineer
CR	Computed Radiography
CT	Computed Tomography
DHCP	Dynamic Host Configuration Protocol
DICOM	Digital Imaging and Communications in Medicine
DNS	Domain Name System
DX	Digital X-ray
GSPPS	Grayscale Softcopy Presentation State
HIS	Hospital Information System
HL7	Health Level 7 Standard
IHE	Integrating the Healthcare Enterprise
IOD	Information Object Definition
Ipv4	Internet Protocol version 4
Ipv6	Internet Protocol version 6
ISO	International Organization for Standards
IO	Intra-oral X-ray
JPEG	Joint Photographic Experts Group
LUT	Look-up Table
MPEG	Moving Picture Experts Group
MG	Mammography (X-ray)
MPPS	Modality Performed Procedure Step
MR	Magnetic Resonance Imaging
MSPPS	Modality Scheduled Procedure Step
MTU	Maximum Transmission Unit (IP)
MWL	Modality Worklist
NM	Nuclear Medicine
NTP	Network Time Protocol
OP	Ophthalmic Photography
OSI	Open Systems Interconnection
PACS	Picture Archiving and Communication System
PET	Positron Emission Tomography
PDU	Protocol Data Unit
R	Required (Key Attribute)
RF	Radiofluoroscopy
RIS	Radiology Information System.
RT	Radiotherapy
SC	Secondary Capture
SCP	Service Class Provider

SCU	Service Class User
SOP	Service-Object Pair
SPS	Scheduled Procedure Step
SR	Structured Reporting
TCP/IP	Transmission Control Protocol/Internet Protocol
U	Unique (Key Attribute)
UL	Upper Layer
US	Ultrasound
VL	Visible Light
VR	Value Representation
XA	X-ray Angiography

3.7 References

- NEMA PS3 Digital Imaging and Communications in Medicine(DICOM) Standard, available free at <http://medical.nema.org/>

4. Networking

4.1 Implementation Model

4.1.1 Application Data Flow

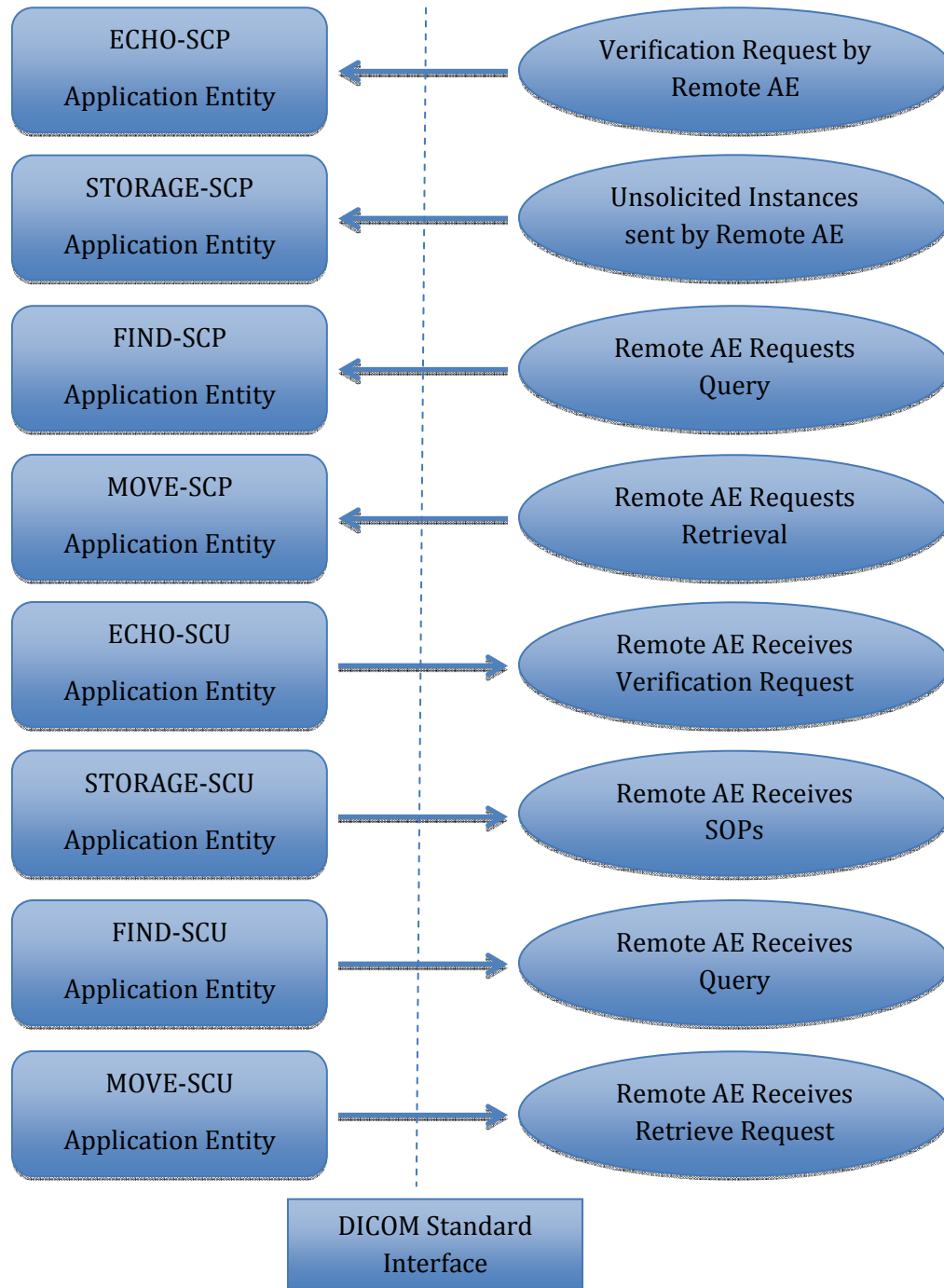


Figure 4.1-1 Implementation Model

The application is a .NET and Javascript application that provides a Web based user interface, internal database, and network listener that spawns additional threads as necessary to handle incoming connections.

The ImageDrive's virtual file system allows for the creation of DICOM folders. Studies can be moved into and out of a DICOM folder from the user interface or through the RESTful API. A DICOM folder has a configurable AE Title and acts as an SCP for the studies contained in the folder. The SCPs supported are:

- ECHO-SCP, which responds to verification requests
- STORAGE-SCP, which receives incoming composite instances and stores them into the DICOM folder
- FIND-SCP, which receives incoming queries for lists of studies within the DICOM folder
- MOVE-SCP, which responds to requests for studies within the DICOM folder

The ImageDrive web GUI supports a number of operations as an SCU. The AEs share a single (configurable) AE Title:

- ECHO-SCU, which sends verification requests to DICOM devices
- STORAGE-SCU, which sends outbound composite instances to configured DICOM devices
- FIND-SCU, which queries for studies on DICOM devices configured within the virtual file system
- MOVE-SCU, which retrieves studies from a DICOM device configured within the virtual file system

4.1.2 Functional Definitions of AE's

4.1.2.1 ECHO-SCP

ECHO-SCP waits in the background for connections, will accept associations with Presentation Contexts for the SOP Class of the Verification Service Class, and will respond successfully to echo requests.

4.1.2.2 STORAGE-SCP

STORAGE-SCP waits in the background for connections, will accept associations with Presentation Contexts for SOP Classes of the Storage Service Class, and will store the

received instances to the local database where they may subsequently be listed and viewed within the DICOM Folder of the virtual file system where they were received.

4.1.2.3 FIND-SCP

FIND- SCP waits in the background for connections, will accept associations with Presentation Contexts for the SOP Class of the Study Root Query/Retrieve Information Model – FIND Service Class, and will respond successfully to query requests.

4.1.2.4 MOVE-SCP

MOVE-SCP waits in the background for connections, will accept associations with Presentation Contexts for the SOP Class of the Study Root Query/Retrieve Information Model – MOVE Service Class and will respond successfully to retrieve requests by initiating storage of instances to the remote Application Entity.

4.1.2.5 ECHO-SCU

ECHO-SCU is activated through the user interface in two places. It can be activated when creating a new DICOM device within ImageDrive’s virtual file system. It can also be activated from the DICOM device’s details page after it has been created. It will attempt to negotiate an association and send a C-ECHO to the configured device.

4.1.2.6 STORAGE-SCU

STORAGE-SCU is activated through the user interface when a user selects studies from within the ImageDrive’s virtual file system and requests that they be sent to a DICOM device configured with the virtual file system. STORAGE-SCU is also activated in ImageDrive when a rule is created within a folder to do a DICOM send.

4.1.2.7 FIND-SCU

FIND-SCU is activated through the user interface when a user performs a query against a DICOM device configured within the ImageDrive’s virtual file system.

4.1.2.8 MOVE-SCU

MOVE-SCU is activated through the user interface when a user requests studies found with the FIND-SCU to be retrieve to a DICOM folder in ImageDrive’s virtual file system.

4.1.3 Sequencing of Real-World Activities

All SCP activities are performed asynchronously in the background and are not dependent on any sequencing.

All SCU activities are initiated through the user interface, with the exception of STORAGE-SCU which is also initiated by the MOVE-SCP in order to store the requested instances or from a rule specified in an ImageDrive virtual file system Folder.

4.2 AE Specifications

4.2.1 ECHO-SCP

4.2.1.1 SOP Classes

ECHO-SCP provides Standard Conformance to the following SOP Class(es):

Table 4.2-1
SOP Classes supported by ECHO-SCP

SOP Class Name	SOP Class UID
Verification SOP Class	1.2.840.10008.1.1

4.2.1.2 Association Policies

4.2.1.2.1 General

ECHO-SCP accepts but never initiates associations.

Table 4.2-2
Maximum PDU size received as a SCP for ECHO-SCP

Maximum PDU size received	114kB (approximate)
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4.2.1.2.2 Number of Associations

Table 4.2-3
Number of Associations as a SCP for ECHO-SCP

Maximum number of simultaneous associations	Unlimited
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4.2.1.2.3 Asynchronous Nature

ECHO-SCP will only allow a single outstanding operation on an Association. Therefore, ECHO-SCP will not perform asynchronous operations window negotiation.

4.2.1.2.4 Implementation Identifying Information

Table 4.2-4
DICOM Implementation Class and Version for ECHO-SCP

Implementation Class UID	1.3.6.1.4.1.25403.1.1.1
Implementation Version Name	Dicom 0.1

4.2.1.3 Association Initiation Policy

ECHO-SCP does not initiate associations.

4.2.1.4 Association Acceptance Policy

When ECHO-SCP accepts an association, it will respond to echo requests. If the Called AE Title does not match the pre-configured AE Title shared by all the SCPs of the application, the association will be rejected.

4.2.1.4.1 Activity – Receive Echo Request

4.2.1.4.1.1 Description and Sequencing of Activities

As requests are received, they are responded to immediately.

4.2.1.4.1.2 Accepted Presentation Contexts

**Table 4.2-5
Acceptable Presentation Contexts for ECHO-SCP and Receive Echo Request**

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Verification	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

4.2.1.4.1.2.1 Extended Negotiation

No extended negotiation is performed.

4.2.1.4.1.3 SOP Specific Conformance

4.2.1.4.1.3.1 SOP Specific Conformance to Verification SOP Class

ECHO-SCP provides standard conformance to the Verification Service Class.

4.2.1.4.1.3.2 Presentation Context Acceptance Criterion

ECHO-SCP will only accept a Presentation Context compatible with the one listed in Table 4.2-5.

4.2.1.4.1.3.3 Transfer Syntax Selection Policies

If proposed, ECHO-SCP prefers the Explicit VR Little Endian Transfer Syntax.

ECHO-SCP will accept duplicate Presentation Contexts; that is, if it is offered multiple Presentation Contexts, each of which offers acceptable Transfer Syntaxes, it will accept all Presentation Contexts, applying the same method for selecting a Transfer Syntax for each.

4.2.2 STORAGE-SCP

4.2.2.1 SOP Classes

STORAGE-SCP provides Standard Conformance to the following image based SOP Class(es) and non-image based SOP Class(es):

**Table 4.2-6
Image SOP Classes supported by STORAGE-SCP**

SOP Class Name	SOP Class UID
Breast Tomosynthesis Image Storage	1.2.840.10008.5.1.4.1.1.13.1.3
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1
CT Image Storage	1.2.840.10008.5.1.4.1.1.2
DICOS CT Image Storage	1.2.840.10008.5.1.4.1.1.501.1
DICOS Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.501.2.1
DICOS Digital X-Ray Image Storage - For Processing:	1.2.840.10008.5.1.4.1.1.501.2.2
Digital Intra-oral X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.3
Digital Intra-oral X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.3.1
Digital Mammography X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.2
Digital Mammography X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.2.1
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1
Digital X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1
Eddy Current Image Storage	1.2.840.10008.5.1.4.1.1.601.1
Eddy Current Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.601.2
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1
Enhanced PET Image Storage	1.2.840.10008.5.1.4.1.1.130
Enhanced US Volume Storage	1.2.840.10008.5.1.4.1.1.6.2
Enhanced XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1.1
Enhanced XRF Image Storage	1.2.840.10008.5.1.4.1.1.12.2.1
Intravascular Optical Coherence Tomography Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.14.1
Intravascular Optical Coherence Tomography Image	1.2.840.10008.5.1.4.1.1.14.2

Storage - For Processing	
MR Image Storage	1.2.840.10008.5.1.4.1.1.4
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4
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 Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20
Ophthalmic Photography 16 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.2
Ophthalmic Photography 8 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1
Ophthalmic Tomography Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.4
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1
Video Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2.1
Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4
VL Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3
VL Whole Slide Microscopy Image Storage:	1.2.840.10008.5.1.4.1.1.77.1.6
X-Ray 3D Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.13.1.1
X-Ray 3D Craniofacial Image Storage	1.2.840.10008.5.1.4.1.1.13.1.2
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2

Table 4.2-7
Non-Image SOP Classes supported by STORAGE-SCP

SOP Class Name	SOP Class UID
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3
Arterial Pulse Waveform Storage	1.2.840.10008.5.1.4.1.1.9.5.1
Autorefractometry Measurements Storage:	1.2.840.10008.5.1.4.1.1.78.2
Basic Text SR	1.2.840.10008.5.1.4.1.1.88.11
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1
Blending Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.4
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1
Chest CAD SR	1.2.840.10008.5.1.4.1.1.88.65
Colon CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.69
Color Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.2
Comprehensive SR	1.2.840.10008.5.1.4.1.1.88.33
Deformable Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.3
DICOS Threat Detection Report Storage	1.2.840.10008.5.1.4.1.1.501.3
Encapsulated CDA Storage	1.2.840.10008.5.1.4.1.1.104.2
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1
Enhanced SR	1.2.840.10008.5.1.4.1.1.88.22
General Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.2
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2
Generic Implant Template Storage	1.2.840.10008.5.1.4.43.1
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1
Implant Assembly Template Storage	1.2.840.10008.5.1.4.44.1
Implant Template Group Storage	1.2.840.10008.5.1.4.45.1
Implantation Plan SR Storage	1.2.840.10008.5.1.4.1.1.88.70
Intraocular Lens Calculations Storage	1.2.840.10008.5.1.4.1.1.78.8
Keratometry Measurements Storage	1.2.840.10008.5.1.4.1.1.78.3
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59
Lensometry Measurements Storage	1.2.840.10008.5.1.4.1.1.78.1
Macular Grid Thickness and Volume Report Storage	1.2.840.10008.5.1.4.1.1.79.1
Mammography CAD SR	1.2.840.10008.5.1.4.1.1.88.50

MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2
Ophthalmic Axial Measurements Storage	1.2.840.10008.5.1.4.1.1.78.7
Ophthalmic Visual Field Static Perimetry Measurements Storage	1.2.840.10008.5.1.4.1.1.80.1
Procedure Log Storage	1.2.840.10008.5.1.4.1.1.88.40
Pseudo-Color Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.3
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66
Real World Value Mapping Storage	1.2.840.10008.5.1.4.1.1.67
Respiratory Waveform Storage	1.2.840.10008.5.1.4.1.1.9.6.1
RT Beams Delivery Instruction Storage	1.2.840.10008.5.1.4.34.7
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 Dose Storage	1.2.840.10008.5.1.4.1.1.481.2
RT Ion Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.9
RT Ion Plan Storage	1.2.840.10008.5.1.4.1.1.481.8
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3
RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7
Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.4
Spatial Fiducials Storage	1.2.840.10008.5.1.4.1.1.66.2
Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.1
Spectacle Prescription Report Storage	1.2.840.10008.5.1.4.1.1.78.6
Stereometric Relationship Storage	1.2.840.10008.5.1.4.1.1.77.1.5.3
Subjective Refraction Measurements Storage	1.2.840.10008.5.1.4.1.1.78.4
Surface Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.5
Visual Acuity Measurements Storage	1.2.840.10008.5.1.4.1.1.78.5
XA/XRF Grayscale Softcopy Presentation State Storage:	1.2.840.10008.5.1.4.1.1.11.5
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67

4.2.2.2 Association Policies

4.2.2.2.1 General

STORAGE-SCP accepts but never initiates associations.

**Table 4.2-8
Maximum PDU size received as a SCP for STORAGE-SCP**

Maximum PDU size received	114kB (approx...)
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4.2.2.2.2 Number of Associations

**Table 4.2-9
Number of Associations as a SCP for STORAGE-SCP**

Maximum number of simultaneous associations	Unlimited
---	-----------

4.2.2.2.3 Asynchronous Nature

STORAGE-SCP will only allow a single outstanding operation on an Association. Therefore, STORAGE-SCP will not perform asynchronous operations window negotiation.

4.2.2.2.4 Implementation Identifying Information

**Table 4.2-10
DICOM Implementation Class and Version for STORAGE-SCP**

Implementation Class UID	1.3.6.1.4.1.25403.1.1.1
Implementation Version Name	Dicom 0.1

4.2.2.3 Association Initiation Policy

STORAGE-SCP does not initiate associations.

4.2.2.4 Association Acceptance Policy

When STORAGE-SCP accepts an association, it will respond to storage requests. If the Called AE Title does not match one of the AE Titles associated with a DICOM folder, the association will be rejected.

4.2.2.4.1 Activity – Receive Storage Request

4.2.2.4.2.1 Description and Sequencing of Activities

As instances are received, they are stored to a configured file system and a record inserted into the local database. The STORAGE-SCP will always accept duplicate SOP Instances and overwrite the existing SOP Instance.

4.2.2.4.2.2 Accepted Presentation Contexts

Table 4.2-11 contains the transfer syntaxes supported for Image SOP Classes and Table 4.2-12 contains the transfer syntaxes supported for Non-Image SOP Classes.

Note that ImageDrive supports a wide range of different transfer syntaxes. ImageDrive, however, has limited support for codecs. Only those transfer syntaxes marked with an asterisk (*) in Table 4.2-11 have codecs and thus can be decompressed by ImageDrive.

Table 4.2-11
Acceptable Presentation Contexts for
STORAGE-SCP and Receive Storage Request FOR Image SOP Classes

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
See Table 4.2-6	See Table 4.2-6	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
		RLE Lossless*	1.2.840.10008.1.2.5	SCP	None
		JPEG Extended (Process 2 & 4)*	1.2.840.10008.1.2.4.51	SCP	None
		JPEG Baseline (Process 1)*	1.2.840.10008.1.2.4.50	SCP	None
		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	SCP	None
		JPEG 2000 Image Compression (Lossless Only)*	1.2.840.10008.1.2.4.90	SCP	None
		JPEG 2000 Image Compression*	1.2.840.10008.1.2.4.91	SCP	None
		JPE G 2000 Part 2 Multi-component Image Compression	1.2.840.10008.1.2.4.93	SCP	None
		JPEG 2000 Part 2 Multi-component	1.2.840.10008.1.2.4.92	SCP	None

	Image Compression (Lossless Only)			
	JPEG Lossless, Non-Hierarchical (Process 14):	1.2.840.10008.1.2.4.57	SCP	None
	JPEG-LS Lossless Image Compression	1.2.840.10008.1.2.4.80	SCP	None
	JPEG-LS Lossy (Near-Lossless) Image Compression	1.2.840.10008.1.2.4.81	SCP	None
	MPEG2 Main Profile @ High Level	1.2.840.10008.1.2.4.101	SCP	None
	MPEG2 Main Profile @ Main Level	1.2.840.10008.1.2.4.100	SCP	None
	MPEG-4 AVC/H.264 BD-compatible High Profile / Level 4.1	1.2.840.10008.1.2.4.103	SCP	None
	MPEG-4 AVC/H.264 High Profile / Level 4.1	1.2.840.10008.1.2.4.102	SCP	None

Table 4.2-12
Acceptable Presentation Contexts for
STORAGE-SCP and Receive Storage Request For Non-Image SOP Classes

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
See Table 4.2-7	See Table 4.2-7	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
		Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

NOTE: The RT Structure Set Storage SOP Class is configured to only support the Implicit VR Little Endian transfer syntax during association negotiation. DICOM Correction Proposal 548 notes an issue with the RT Structure Set IOD where it can have attributes of a length that cannot be encoded in the Explicit VR Little Endian transfer syntax.

4.2.2.4.2.3 Extended Negotiation

No extended negotiation is performed, though STORAGE-SCP:

- is a Level 2 Storage SCP (Full – does not discard any data elements)
- does not support digital signatures

4.2.2.4.2.4 SOP Specific Conformance

4.2.2.4.2.4.1 SOP Specific Conformance to Storage SOP Classes

STORAGE-SCP provides standard conformance to the Storage Service Class.

4.2.2.4.2.4.2 Presentation Context Acceptance Criterion

STORAGE-SCP will always accept any Presentation Context for the supported SOP Classes with the supported Transfer Syntaxes. More than one proposed Presentation Context will be accepted for the same Abstract Syntax if the Transfer Syntax is supported, whether or not it is the same as another Presentation Context.

4.2.2.4.2.4.3 Transfer Syntax Selection Policies

The STORAGE-SCP will prefer Explicit Transfer Syntaxes over Implicit Transfer Syntaxes and it prefers lossless compressed Transfer Syntaxes over lossy compressed Transfer Syntaxes.

STORAGE-SCP will accept duplicate Presentation Contexts; that is, if it is offered multiple Presentation Contexts, each of which offers acceptable Transfer Syntaxes, it will accept all Presentation Contexts, applying the same method for selecting a Transfer Syntax for each.

4.2.2.4.2.4.4 Response Status

STORAGE-SCP will behave as described in the Table below when generating the C-STORE response command message.

Table 4.2-13
Response Status for STORAGE-SCP and Receive Storage Request

Service Status	Further Meaning	Status Codes	Reason
Failure	Processing Failure	0110	A failure was encountered when processing the SOP Instance.
Success		0000	

4.2.3 FIND-SCP

4.2.3.1 SOP Classes

FIND-SCP provides Standard Conformance to the following SOP Class(es):

Table 4.2-14
SOP Classes supported by FIND-SCP

SOP Class Name	SOP Class UID
Study Root Query/Retrieve Information Model –	1.2.840.10008.5.1.4.1.2.2.1

FIND	
------	--

4.2.3.2 Association Policies

4.2.3.2.1 General

FIND-SCP accepts but never initiates associations.

**Table 4.2-15
Maximum PDU size received as a SCP for FIND-SCP**

Maximum PDU size received	114kB (approx.)
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4.2.3.2.2 Number of Associations

**Table 4.2-16
Number of Associations as a SCP for FIND-SCP**

Maximum number of simultaneous associations	Unlimited
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4.2.3.2.3 Asynchronous Nature

FIND-SCP will only allow a single outstanding operation on an Association. Therefore, FIND-SCP will not perform asynchronous operations window negotiation.

4.2.3.2.4 Implementation Identifying Information

**Table 4.2-17
DICOM Implementation Class and Version for FIND-SCP**

Implementation Class UID	1.3.6.1.4.1.25403.1.1.1
Implementation Version Name	Dicom 0.1

4.2.3.3 Association Initiation Policy

FIND-SCP does not initiate associations.

4.2.3.4 Association Acceptance Policy

When FIND-SCP accepts an association, it will respond to query requests. If the Called AE Title does not match the pre-configured AE Title shared by all the SCPs of the application, the association will be rejected.

4.2.3.4.1 Activity – Receive Query Request

4.2.3.4.1.1 Description and Sequencing of Activities

When a query is received, the local database is queried for the result set. Note that the results will be based on all of the studies stored in the DICOM folder in the ImageDrive’s virtual file system associated with the AE Title.

4.2.3.4.1.2 Accepted Presentation Contexts

Table 4.2-18
Acceptable Presentation Contexts for FIND-SCP and Incoming Query from Remote AE

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
See Table 4.2-14	See Table 4.2-14	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

4.2.3.4.1.2.1 Extended Negotiation

No extended negotiation is performed.

In particular, relational queries are not supported.

4.2.3.4.1.3 SOP Specific Conformance

4.2.3.4.1.3.1 SOP Specific Conformance to C-FIND SOP Classes

FIND-SCP provides standard conformance to the supported C-FIND SOP Classes.

Only those attributes that are requested are returned in a C-FIND response. Some optional requested attributes will be returned for Study Root queries as per Table 4.2-20.

Table 4.2-20
Study Root Response Identifier for FIND-SCP

Name	Tag	Types of Matching	Software Edition
<i>STUDY Level</i>			
Study Instance UID	(0020,000D)	UNIQUE	
Patient ID	(0010,0020)	S,*,U	
Patient's Name	(0010,0010)	S,*,U	
Patient's Birth Date	(0010,0030)	R,U	
Patient's Sex	(0010,0040)	S,*,U	
Study ID	(0020,0010)	S,*,U	
Study Description	(0008,1030)	S,*,U	
Modalities In Study	(0008,0061)	S,*,U	
Study Date	(0008,0020)	S,U,R	
Study Time	(0008,0030)	R,U	

Accession Number	(0008,0050)	S,*,U	
Referring Physician's Name	(0008,0090)	S,*,U	
Number Of Study Related Series	(0020, 1206)	S,*,U	
Number Of Study Related Instances	(0020, 1208)	S,*,U	
<i>SERIES Level</i>			
Series Instance UID	(0020, 000E)	UNIQUE	
Modality	(0008, 0060)	S,*,U	
Series Description	(0008, 103E)	S,*,U	
Series Number	(0020, 0011)	S,*,U	
Number Of Series Related Instances	(0020, 1209)	S,*,U	
<i>IMAGE Level</i>			
SOP Instance UID	(0008, 0018)	UNIQUE	
SOP Class UID	(0008,0016)	S,U	
Instance Number	(0020,0013)	S,U	
Common to all query levels			
Specific Character Set	(0008,0005)	N/A	

Types of Matching:

An "S" indicates the identifier attribute uses Single Value Matching, an "R" indicates Range Matching, a "*" indicates wildcard matching, a 'U' indicates Universal Matching, and an 'L' indicates that UID lists are sent. "NONE" indicates that no matching is supported, but that values for this Element are requested to be returned (i.e. universal matching), and "UNIQUE" indicates that this is the Unique Key for that query level, in which case Universal Matching or Single Value Matching is used depending on the query level.

FIND-SCP is configured to limit the maximum number of responses sent to a single C-FIND-RQ. If the maximum limit is reached, the ImageServer will log a warning message and return a Success status to the client. The default maximum number of responses is 5,000.

Specific Character Set may or may not be included in the C-FIND responses. If present in the response, Specific Character Set can be used to identify character sets other than the default character set used for encoding the other attributes in the response. C-FIND SCP will always encode the responses using UTF-8 (ISO-IR 192).

4.2.3.4.1.3.2 Presentation Context Acceptance Criterion

FIND-SCP will always accept any Presentation Context for the supported SOP Classes with the supported Transfer Syntaxes. More than one proposed Presentation Context will be accepted for the same Abstract Syntax if the Transfer Syntax is supported, whether or not it is the same as another Presentation Context.

4.2.3.4.1.3.3 *Transfer Syntax Selection Policies*

FIND-SCP will prefer explicit transfer syntaxes over implicit transfer syntaxes.

FIND-SCP will accept duplicate Presentation Contexts; that is, if it is offered multiple Presentation Contexts, each of which offers acceptable Transfer Syntaxes, it will accept all Presentation Contexts, applying the same method for selecting a Transfer Syntax for each.

4.2.3.4.1.3.4 *Response Status*

FIND-SCP will behave as described in Table 4.2-21 in response to the status returned in the C-FIND response command message(s).

Table 4.2-21
Response Status for FIND-SCP and Receive Query Request

Service Status	Further Meaning	Status Codes	Behavior
Failure	Unable to process	C000	Sent if a failure occurred processing the query.
Failure	Identifier does not match SOP Class	A900	Sent if an invalid query retrieve level is set.
Cancel	Matching terminated due to Cancel request	FE00	Sent when a C-CANCEL-RQ is received.
Success	Matching is complete	0000	Sent when matching is complete.
Pending	Matches are continuing – Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys	FF00	Sent while sending matching results.

4.2.4 MOVE-SCP

4.2.4.1 *SOP Classes*

MOVE-SCP provides Standard Conformance to the following SOP Class(es):

Table 4.2-22
SOP Classes supported by MOVE-SCP

SOP Class Name	SOP Class UID
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2

4.2.4.2 Association Policies

4.2.4.2.1 General

MOVE-SCP accepts but never initiates associations.

**Table 4.2-23
Maximum PDU size received as an SCP for MOVE-SCP**

Maximum PDU size received	114kB (32pprox..)
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4.2.4.2.2 Number of Associations

**Table 4.2-24
Number of Associations as an SCP for MOVE-SCP**

Maximum number of simultaneous associations	Unlimited
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4.2.4.2.3 Asynchronous Nature

MOVE-SCP will only allow a single outstanding operation on an Association. Therefore, MOVE-SCP will not perform asynchronous operations window negotiation.

4.2.4.2.4 Implementation Identifying Information

**Table 4.2-25
DICOM Implementation Class and Version for MOVE-SCP**

Implementation Class UID	1.3.6.1.4.1.25403.1.1.1
Implementation Version Name	Dicom 0.1

4.2.4.3 Association Initiation Policy

MOVE-SCP initiates an association with the AE specified as the Move Destination in the MOVE request, in order to store the requested instances. The AE must be configured in ImageDrive’s virtual file system within the same account or group that the MOVE-SCP’s DICOM Folder is configured within.

4.2.4.4 Association Acceptance Policy

When MOVE-SCP accepts an association, it will respond to move requests. If configured, the association will be rejected if the Calling AE Title is not pre-configured as a DICOM device within the virtual file system of the same account or group that the MOVE-SCP’s DICOM Folder is configured within.

4.2.4.4.1 Activity – Receive Move Request

4.2.4.4.1.1 Description and Sequencing of Activities

As requests are received, a STORAGE-SCU operation is initiated to send the requested instances to the specified remote AE.

4.2.4.4.1.2 Proposed Presentation Contexts

Table 4.2-26
Acceptable Presentation Contexts for MOVE-SCP and receive Retrieve Request

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
See Table 4.2-22	See Table 4.2-22	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

4.2.4.4.1.2.1 Extended Negotiation

No extended negotiation is performed through MOVE-SCP.

In particular, relational retrievals are not supported.

4.2.4.4.1.3 SOP Specific Conformance

4.2.4.4.1.3.1 SOP Specific Conformance to C-MOVE SOP Classes

MOVE-SCP provides standard conformance to the supported C-MOVE SOP Classes.

The move is performed to the destination AE Title specified in the original request. If the destination AE is not configured in ImageDrive's virtual file system, the store operations are not performed.

Table 4.2-27
STUDY Root Request Identifier for MOVE-SCP

Name	Tag	Unique, Matching or Return Key
STUDY level		
Study Instance UID	(0020,000D)	U
SERIES level		
Study Instance UID	(0020,000D)	U
Series Instance UID	(0020,000E)	U
IMAGE level		
Study Instance UID	(0020,000D)	U
Series Instance UID	(0020,000E)	U
Sop Instance UID	(0008,0018)	U

4.2.4.4.1.3.2 Presentation Context Acceptance Criterion

MOVE-SCP will only accept a Presentation Context compatible with the one listed in Table 4.2-26.

4.2.4.4.1.3.3 Transfer Syntax Selection Policies

MOVE-SCP prefers explicit transfer syntaxes over implicit transfer syntaxes.

MOVE-SCP will accept duplicate Presentation Contexts; that is, if it is offered multiple Presentation Contexts, each of which offers acceptable Transfer Syntaxes, it will accept all Presentation Contexts, applying the same method for selecting a Transfer Syntax for each.

4.2.4.4.1.3.4 Response Status

MOVE-SCP will behave as described in the Table below when generating the C-MOVE response command message.

Table 4.2-28
Response Status for MOVE-SCP and Send to Remote AE Request

Service Status	Further Meaning	Status Codes	Related Fields	Behavior
Failure	Refused: Out of Resources – Unable to perform sub-operations	A702	(0000,1020) (0000,1021) (0000,1022) (0000,1023)	The selected retrieve objects could not be found.
	Refused: Move Destination unknown	A801	(0000,0902)	Sent if the destination AE Title is not contained in ImageDrive, or a connection failure occurs when connecting to the destination AE.
	Identifier does not match SOP Class	A900	(0000,0901) (0000,0902)	Sent when the Query/Retrieve Level is not present or is invalid
	Unable to process	C000	(0000,0901) (0000,0902)	Sent if the local database query fails or an internal exception occurred during processing
	Sub-operations terminated due to Cancel Indication	FE00	(0000,1020) (0000,1021) (0000,1022) (0000,1023)	Sent if Move association is cancelled Sub-operations are also cancelled
	Sub-operations	B000	(0000,1020)	Sent

	Complete – One or more Failures		(0000,1022) (0000,1023)	
Success	Sub-operations Complete – No Failures	0000	(0000,1020) (0000,1021) (0000,1022) (0000,1023)	Sent
Pending	Sub-operations are continuing	FF00	(0000,1020) (0000,1021) (0000,1022) (0000,1023)	Sent every 2.5 seconds independent of how many operations are completed by STORAGE-SCU.

4.2.4.4.1.3.5 Sub-operation dependent behavior

Since the C-MOVE operation is dependent on completion of C-STORE sub-operations that are occurring on a separate association, the question of failure of operations on the other association(s) must be considered.

MOVE-SCP initiates a C-STORE sub-operation for each request. The responses from the MOVE-SCP are purely dependent on the success or failure of the C-STORE sub-operations, not on any explicit action by MOVE-SCP.

Whether or not the remote AE accepts the C-STORE sub-operations is beyond the control of MOVE-SCU.

If the association on which the C-MOVE was issued is aborted for any reason, the C-STORE sub-operations will be canceled.

If the C-MOVE operation is canceled by the remote AE, MOVE-SCP will also attempt to cancel the corresponding C-STORE sub-operation.

4.2.5 ECHO-SCU

4.2.5.1 SOP Classes

ECHO-SCU provide Standard Conformance to the following SOP Class(es):

**Table 4.2-29
SOP Classes supported by ECHO-SCU**

SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1

4.2.5.2 Association Policies

4.2.5.2.1 General

ECHO-SCU initiates but never accepts associations.

Table 4.2-30
Maximum PDU size received as a SCP for ECHO-SCU

Maximum PDU size received	114kB (approx.)
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4.2.5.2.2 Number of Associations

Table 4.2-31
Number of Associations as a SCP for ECHO-SCU

Maximum number of simultaneous associations	Unlimited by default
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4.2.5.2.3 Asynchronous Nature

ECHO-SCU will only allow a single outstanding operation on an Association. Therefore, ECHO-SCU will not perform asynchronous operations window negotiation.

4.2.5.2.4 Implementation Identifying Information

Table 4.2-32
DICOM Implementation Class and Version for ECHO-SCU

Implementation Class UID	1.3.6.1.4.1.25403.1.1.1
Implementation Version Name	Dicom 0.1

4.2.5.3 Association Initiation Policy

ECHO-SCU initiates a new association when prompted by a user in ImageDrive’s GUI. The association can be initiated when the user is initially configuring a DICOM device in ImageDrive’s virtual file system. It can also be initiated after configuration to ensure connectivity with the remote AE.

4.2.5.3.1 Activity – Send Echo Request

4.2.5.3.1.1 Description and Sequencing of Activities

For each user requested send echo request, a single association will be opened and negotiated with the desired SCP. A single echo request will be attempted to be sent over the association. The user will be notified of failures related to the performing of the activity.

4.2.5.3.1.2 Proposed Presentation Contexts

Table 4.2-33
Proposed Presentation Contexts for ECHO-SCU

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

		Explicit VR Little Endian	1.2.840.10008.1.2. 1	SCU	None
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ECHO-SCU will propose a single presentation Context for the Verification SOP Class.

4.2.5.3.1.1.1 Extended Negotiation

No extended negotiation is performed.

4.2.5.3.1.2 SOP Specific Conformance

4.2.5.3.1.2.1 SOP Specific Conformance to Verification SOP Class

ECHO-SCU provides standard conformance to the Verification Service Class.

4.2.5.3.1.2.2 Presentation Context Acceptance Criterion

ECHO-SCU does not accept associations.

4.2.5.3.1.2.3 Transfer Syntax Selection Policies

ECHO-SCU does not have any special transfer syntax selection policies and will use the transfer syntax negotiated over the association.

4.2.5.3.1.2.1 Response Status

ECHO-SCU will behave as described in the Table below in response to the status returned in the C-STORE response command message.

**Table 4.2-34
Response Status for STORAGE-SCU and Send Echo Request**

Service Status	Further Meaning	Status Codes	Behavior
Failure	Any Failure	xxxx	Status logged.
Success		0000	Ignored

4.2.5.4 Association Acceptance Policy

ECHO-SCU does not accept associations.

4.2.6 STORAGE-SCU

4.2.6.1 SOP Classes

STORAGE-SCU provides Standard Conformance to the following Image and Non-Image SOP Class(es):

**Table 4.2-35
Image SOP Classes supported by STORAGE-SCU**

SOP Class Name	SOP Class UID
Breast Tomosynthesis Image Storage	1.2.840.10008.5.1.4.1.1.13.1.3
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1
CT Image Storage	1.2.840.10008.5.1.4.1.1.2
DICOS CT Image Storage	1.2.840.10008.5.1.4.1.1.501.1
DICOS Digital X-Ray Image Storage - For Presentation:	1.2.840.10008.5.1.4.1.1.501.2.1
DICOS Digital X-Ray Image Storage - For Processing:	1.2.840.10008.5.1.4.1.1.501.2.2
Digital Intra-oral X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.3
Digital Intra-oral X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.3.1
Digital Mammography X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.2
Digital Mammography X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.2.1
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1
Digital X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1
Eddy Current Image Storage	1.2.840.10008.5.1.4.1.1.601.1
Eddy Current Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.601.2
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1
Enhanced PET Image Storage	1.2.840.10008.5.1.4.1.1.130
Enhanced US Volume Storage	1.2.840.10008.5.1.4.1.1.6.2
Enhanced XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1.1
Enhanced XRF Image Storage	1.2.840.10008.5.1.4.1.1.12.2.1
Intravascular Optical Coherence Tomography Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.14.1
Intravascular Optical Coherence Tomography Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.14.2
MR Image Storage	1.2.840.10008.5.1.4.1.1.4
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4
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 Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1

Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20
Ophthalmic Photography 16 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.2
Ophthalmic Photography 8 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1
Ophthalmic Tomography Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.4
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1
Video Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2.1
Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4
VL Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3
VL Whole Slide Microscopy Image Storage:	1.2.840.10008.5.1.4.1.1.77.1.6
X-Ray 3D Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.13.1.1
X-Ray 3D Craniofacial Image Storage	1.2.840.10008.5.1.4.1.1.13.1.2
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2

Table 4.2-36
Non-Image SOP Classes supported by STORAGE-SCU

SOP Class Name	SOP Class UID
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3
Arterial Pulse Waveform Storage	1.2.840.10008.5.1.4.1.1.9.5.1
Autorefracton Measurements Storage:	1.2.840.10008.5.1.4.1.1.78.2
Basic Text SR	1.2.840.10008.5.1.4.1.1.88.11
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1
Blending Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.4

Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1
Chest CAD SR	1.2.840.10008.5.1.4.1.1.88.65
Colon CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.69
Color Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.2
Comprehensive SR	1.2.840.10008.5.1.4.1.1.88.33
Deformable Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.3
DICOS Threat Detection Report Storage	1.2.840.10008.5.1.4.1.1.501.3
Encapsulated CDA Storage	1.2.840.10008.5.1.4.1.1.104.2
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1
Enhanced SR	1.2.840.10008.5.1.4.1.1.88.22
General Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.2
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2
Generic Implant Template Storage	1.2.840.10008.5.1.4.43.1
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1
Implant Assembly Template Storage	1.2.840.10008.5.1.4.44.1
Implant Template Group Storage	1.2.840.10008.5.1.4.45.1
Implantation Plan SR Storage	1.2.840.10008.5.1.4.1.1.88.70
Intraocular Lens Calculations Storage	1.2.840.10008.5.1.4.1.1.78.8
Keratometry Measurements Storage	1.2.840.10008.5.1.4.1.1.78.3
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59
Lensometry Measurements Storage	1.2.840.10008.5.1.4.1.1.78.1
Macular Grid Thickness and Volume Report Storage	1.2.840.10008.5.1.4.1.1.79.1
Mammography CAD SR	1.2.840.10008.5.1.4.1.1.88.50
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2
Ophthalmic Axial Measurements Storage	1.2.840.10008.5.1.4.1.1.78.7
Ophthalmic Visual Field Static Perimetry Measurements Storage	1.2.840.10008.5.1.4.1.1.80.1
Procedure Log Storage	1.2.840.10008.5.1.4.1.1.88.40
Pseudo-Color Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.3
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66
Real World Value Mapping Storage	1.2.840.10008.5.1.4.1.1.67

Respiratory Waveform Storage	1.2.840.10008.5.1.4.1.1.9.6.1
RT Beams Delivery Instruction Storage	1.2.840.10008.5.1.4.34.7
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 Dose Storage	1.2.840.10008.5.1.4.1.1.481.2
RT Ion Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.9
RT Ion Plan Storage	1.2.840.10008.5.1.4.1.1.481.8
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3
RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7
Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.4
Spatial Fiducials Storage	1.2.840.10008.5.1.4.1.1.66.2
Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.1
Spectacle Prescription Report Storage	1.2.840.10008.5.1.4.1.1.78.6
Stereometric Relationship Storage	1.2.840.10008.5.1.4.1.1.77.1.5.3
Subjective Refraction Measurements Storage	1.2.840.10008.5.1.4.1.1.78.4
Surface Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.5
Visual Acuity Measurements Storage	1.2.840.10008.5.1.4.1.1.78.5
XA/XRF Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.5
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67

4.2.6.2 Association Policies

4.2.6.2.1 General

STORAGE-SCU initiates but never accepts associations.

**Table 4.2-37
Maximum PDU size received as a SCP for STORAGE-SCU**

Maximum PDU size received	114kB (approx.)
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4.2.6.2.2 Number of Associations

**Table 4.2-38
Number of Associations as a SCP for STORAGE-SCU**

Maximum number of simultaneous associations	Limited by configuration on the server.
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4.2.6.2.3 Asynchronous Nature

STORAGE-SCU will only allow a single outstanding operation on an Association. Therefore, STORAGE-SCU will not perform asynchronous operations window negotiation.

4.2.6.2.4 Implementation Identifying Information

**Table 4.2-39
DICOM Implementation Class and Version for STORAGE-SCU**

Implementation Class UID	1.3.6.1.4.1.25403.1.1.1
Implementation Version Name	Dicom 0.1

4.2.6.3 Association Initiation Policy

STORAGE-SCU attempts to initiate a new association for each study selected by the user (e.g. one association per user-initiated send operation). When initiated by MOVE-SCP, one association is initiated per move request. For move requests initiated from the web interface or initiated by rules, one association is used per study.

4.2.6.3.1 Activity – Send Storage Request

4.2.6.3.1.1 Description and Sequencing of Activities

For each instance selected from the user interface to be transferred, a single attempt will be made to transmit it to the selected remote AE. If the send fails, for whatever reason, no retry will be performed, and an attempt will be made to send the next instance.

4.2.6.3.1.2 Proposed Presentation Contexts

**Table 4.2-40
Proposed Presentation Contexts for STORAGE-SCU**

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
See Table 4.2-35 (Image SOP Classes)	See Table 4.2-35 (Image SOP Classes)	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		RLE Lossless	1.2.840.10008.1.2.5	SCU	None
		JPEG Baseline (Process 1):	1.2.840.10008.1.2.4.50	SCU	None
		JPEG Extended	1.2.840.10008.1.2.	SCU	None

	(Process 2 & 4)	4.51		
	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	SCU	None
	JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90	SCU	None
	JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91	SCU	None
	JPE G 2000 Part 2 Multi-component Image Compression	1.2.840.10008.1.2.4.93	SCU	None
	JPEG 2000 Part 2 Multi-component Image Compression (Lossless Only)	1.2.840.10008.1.2.4.92	SCU	None
	JPEG Lossless, Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57	SCU	None
	JPEG-LS Lossless Image Compression	1.2.840.10008.1.2.4.80	SCU	None
	JPEG-LS Lossy (Near-Lossless) Image Compression	1.2.840.10008.1.2.4.81	SCU	None
	MPEG2 Main Profile @ High Level	1.2.840.10008.1.2.4.101	SCU	None
	MPEG2 Main Profile @ Main	1.2.840.10008.1.2.4.100	SCU	None

		Level			
		MPEG-4 AVC/H.264 BD-compatible High Profile / Level 4.1	1.2.840.10008.1.2.4.103	SCU	None
		MPEG-4 AVC/H.264 High Profile / Level 4.1	1.2.840.10008.1.2.4.102	SCU	None
See Table 4.2-36 (Non-Image SOP Classes)	See Table 4.2-36 (Non-Image SOP Classes)	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

STORAGE-SCU will propose Presentation Contexts only for the SOP Class(es) of the instances that are to be transferred.

For each SOP Class being transferred, STORAGE-SCU will propose two Presentation Contexts. One containing the transfer syntax that the SOP class is encoded on for the server, and a second Presentation Context using the uncompressed transfer syntaxes. When the server cannot decompress an image because it does not have the appropriate codec(s), the second Presentation Context (uncompressed syntaxes) is not proposed.

4.2.6.3.1.1.1 Extended Negotiation

No extended negotiation is performed.

4.2.6.3.1.2 SOP Specific Conformance

4.2.6.3.1.2.1 SOP Specific Conformance to Storage SOP Classes

STORAGE-SCU provides standard conformance to the Storage Service Class.

4.2.6.3.1.2.2 Presentation Context Acceptance Criterion

STORAGE-SCU does not accept associations.

4.2.6.3.1.2.3 Transfer Syntax Selection Policies

STORAGE-SCU prefers to send each instance using its current Transfer Syntax, and will find the first Presentation Context where the Transfer Syntax was accepted. In the case where the Transfer Syntax was not accepted by the remote STORAGE-SCP, STORAGE-SCU will check for the acceptance of Explicit VR Little Endian and Implicit VR Little Endian, in that order. If STORAGE-SCU cannot change the Transfer Syntax, the sub-operation will fail and it will not store the instance.

4.2.6.3.1.2.1 Response Status

STORAGE-SCU will behave as described in the Table below in response to the status returned in the C-STORE response command message.

Table 4.2-41
Response Status for STORAGE-SCU and Receive Storage Request

Service Status	Further Meaning	Status Codes	Behavior
Failure	Refused: Out of Resources	A7xx	Status logged.
	Data Set does not match SOP Class	A9xx	Status logged.
	Cannot understand	Cxxx	Status logged.
Warning	Coercion of Data Elements	B000	Status logged.
	Data Set does not match SOP Class	B007	Status logged.
	Elements Discarded	B006	Status logged.
Success		0000	Ignored

4.2.6.4 Association Acceptance Policy

STORAGE-SCU does not accept associations.

4.2.7 FIND-SCU

4.2.7.1 SOP Classes

FIND-SCU provides Standard Conformance to the following SOP classes:

Table 0-42
SOP Classes Supported by FIND-SCU

SOP Class Name	SOP Class UID
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1

4.2.7.2 Association Policies

4.2.7.2.1 General

FIND-SCU initiates but never accepts associations.

Table 0-43
Maximum PDU Size Received for FIND-SCU

Maximum PDU size received	114kB (approx.)
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4.2.7.2.2 Number of Associations

Table 0-44
Number of Associations for FIND-SCU

Maximum number of simultaneous associations	Unlimited
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4.2.7.2.3 Asynchronous Nature

FIND-SCU will only allow a single outstanding operation on an association. Therefore, FIND-SCU will not perform asynchronous operations window negotiation.

4.2.7.2.4 Implementation Identifying Information

Table 0-45
DICOM Implementation Class and Version for FIND-SCU

Implementation Class UID	1.3.6.1.4.1.25403.1.1.1
Implementation Version Name	Dicom 0.1

4.2.7.3 Association Initiation Policy

FIND-SCU initiates a new association in two ways. The first is for prior studies when viewing a study through CleomeCast. The second method is when a user requests to query a remote AE through ImageDrive’s user interface.

4.2.7.3.1 Activity – Query Remote AE

4.2.7.3.1.1 Description and Sequencing of Activities

A single attempt will be made to query the remote AE. If the query fails for whatever reason, no retry will be performed.

4.2.7.3.1.1 Proposed Presentation Contexts

Table 0-46
Proposed Presentation Contexts for FIND-SCU and Query Remote AE

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

4.2.7.3.1.1.1 Extended Negotiation

No extended negotiation is performed.

In particular, relational queries are not supported.

4.2.7.3.1.2 SOP Specific Conformance

4.2.7.3.1.2.1 SOP Specific Conformance to C-FIND SOP Classes

FIND-SCU provides standard conformance to the supported C-FIND SOP Classes.

Only a single information model, Study Root, is supported and when triggered from the user interface, only STUDY level queries are performed. SERIES and IMAGE level queries are never performed.

A CANCEL request by default is issued after receiving 50 responses. The user can expand the number of responses in increments of 50, adjusting sending the CANCEL request as appropriate.

Unexpected attributes returned in a C-FIND response (those not requested) are discarded. Requested return attributes not returned by the SCP are ignored. In general, non-matching responses returned by the SCP due to unsupported (hopefully optional) matching keys are not filtered locally by the FIND-SCU and thus will still be presented in the browser, with the exception of *Modalities in Study*, which is filtered by the SCU.

Specific Character Set is not included in the C-FIND request at any level. If present in the response, Specific Character Set will be used to identify character sets other than the default character set for display of strings in the browser.

Instance Availability is not included in the C-FIND request at any level. For STUDY level queries initiated by the user, the value is shown in the results table if it was returned in the response.

Retrieve AE Title is not included in the C-FIND request at any level. If present in the response, it is ignored. The application currently assumes that the AE queried is also the AE from which to retrieve; normally, this is a reasonable assumption.

Table 0-47
Study Root Request Identifier for FIND-SCU

Name	Tag	Types of Matching
STUDY Level		
Study Instance UID	(0020,000D)	UNIQUE
Patient's ID	(0010,0020)	S,*U
Patient's Name	(0010,0010)	S,*U
Patient's Birth Date	(0010,0030)	U
Referring Physician's Name	(0008,0090)	S,*U
Study Description	(0008,1030)	S,*U
Modalities In Study	(0008,0061)	S,U

Study Date	(0008,0020)	S,U,R
Study Time	(0008,0030)	U
Accession Number	(0008,0050)	S,*,U
Number Of Study Related Instances	(0020, 1208)	U
SERIES Level		
N/A		
IMAGE Level		
N/A		
Common to all query levels		
Specific Character Set	(0008,0005)	N/A

Types of Matching:

An "S" indicates the identifier attribute uses Single Value Matching, an "R" indicates Range Matching, a "*" indicates wildcard matching, a 'U' indicates Universal Matching, an 'SQ' indicates Sequence Matching, an 'L' indicates that a UID list is sent, and "UNIQUE" indicates that this is the Unique Key for that query level.

4.2.7.3.1.2.2 Presentation Context Acceptance Criterion

FIND-SCU does not accept associations.

4.2.7.3.1.2.3 Transfer Syntax Selection Policies

FIND-SCU prefers Explicit VR Little Endian Transfer Syntax, which is always first in the proposed Presentation Context.

4.2.7.3.1.2.4 Response Status

FIND-SCU will behave as described in **Error! Reference source not found.** in response to the status returned in the C-FIND response command message(s).

Table 0-48
Response Status for FIND-SCU and Query Remote AE Request

Service Status	Further Meaning	Status Codes	Behavior
Failure	N/A	Any	Association closed, message shown to user
Cancel	Matching terminated due to Cancel request	FE00	Association closed, message shown to user
Success	Matching is complete - No final Identifier is	0000	Association closed

	supplied		
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4.2.8 MOVE-SCU

4.2.8.1 SOP Classes

MOVE-SCU provides Standard Conformance to the following SOP classes:

Table 0-49
SOP Classes Supported by MOVE-SCU

SOP Class Name	SOP Class UID
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2

4.2.8.2 Association Policies

4.2.8.2.1 General

MOVE-SCU initiates but never accepts associations.

Table 0-50
Maximum PDU Size Received for MOVE-SCU

Maximum PDU size received	114kB (approx.)
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4.2.8.2.2 Number of Associations

Table 0-51
Number of Associations for MOVE-SCU

Maximum number of simultaneous associations	Unlimited
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4.2.8.2.3 Asynchronous Nature

MOVE-SCU will only allow a single outstanding operation on an Association. Therefore, MOVE-SCU will not perform asynchronous operations window negotiation.

4.2.8.2.4 Implementation Identifying Information

Table 0-52
DICOM Implementation Class and Version for MOVE-SCU

Implementation Class UID	1.3.6.1.4.1.25403.1.1.1
Implementation Version Name	Dicom 0.1

4.2.8.3 Association Initiation Policy

MOVE-SCU attempts to initiate a new association when the user performs the retrieve action from the user interface. MOVE-SCU utilizes a single configured AE Title for ImageDrive.

4.2.8.3.1 Activity – Retrieve from Remote AE

4.2.8.3.1.1 Description and Sequencing of Activities

For the studies or series selected from the user interface to be retrieved, a single attempt will be made to retrieve them from the selected remote AE. If the retrieve fails, for whatever reason, no retry will be performed.

4.2.8.3.1.2 Proposed Presentation Contexts

Table 0-53
Proposed Presentation Contexts for MOVE-SCU and Retrieve From Remote AE Request

Presentation Context Table					
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	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

4.2.8.3.1.2.1 Extended Negotiation

No extended negotiation is performed.

In particular, relational retrievals are not supported.

4.2.8.3.1.3 SOP Specific Conformance

4.2.8.3.1.3.1 SOP Specific Conformance to C-MOVE SOP Classes

MOVE-SCU provides standard conformance to the supported C-MOVE SOP Classes, with one exception: the retrieval is performed from the AE that was queried by FIND-SCU, rather than the AE specified in the Retrieve AE Title attribute of the C-FIND response.

Only a single information model, Study Root, is supported.

Retrievals can be performed at the STUDY, SERIES, and IMAGE levels through an ImageDrive REST API. The user interface only implements STUDY level retrievals.

Cancel requests can be sent when the retrieve operation is canceled by a user or in the case of the request to shut down the application.

The instances are retrieved to a specified DICOM folder in the ImageDrive virtual file system. The Move Destination will likely be different than the AE Title used to issue the C-MOVE request. This implies that the remote C-MOVE SCP must be preconfigured to determine the presentation address corresponding to the local application’s AE.

Table 0-54
Study Root Request Identifier for MOVE-SCU

Name	Tag	Unique, Matching or Return Key
STUDY level		
Study Instance UID	(0020,000D)	UNIQUE
SERIES level		
Study Instance UID	(0020,000D)	UNIQUE
Series Instance UID	(0020,000E)	UNIQUE
IMAGE level		
Study Instance UID	(0020,000D)	UNIQUE
Series Instance UID	(0020,000E)	UNIQUE
SOP Instance UID	(0008,0018)	UNIQUE

4.2.8.3.1.3.2 Presentation Context Acceptance Criterion

MOVE-SCU does not accept associations.

4.2.8.3.1.3.3 Transfer Syntax Selection Policies

MOVE-SCU prefers Explicit VR Little Endian Transfer Syntax, which is always first in the proposed Presentation Context.

4.2.8.3.1.3.4 Response Status

MOVE-SCU will behave as described in the Table below in response to the status returned in the C-MOVE response command message(s).

Table 0-55
Response Status for MOVE-SCU and Retrieve from Remote AE Request

Service Status	Further Meaning	Status Codes	Behavior
Failure	N/A	Any	Association closed, message shown in Receive Queue UI
Cancel	Sub-operations terminated due to Cancel Indication	FE00	Association closed, message shown in Activity Monitor
Warning	N/A	Any	Message shown in the Activity Monitor
Success	Sub-operations Complete - No	0000	Association closed

	Failures		
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4.2.8.3.1.3.5 Sub-operation Dependent Behavior

Since the C-MOVE operation is dependent on completion of C-STORE sub-operations that are occurring on another association, the question of failure of operations on the other association(s) must be considered.

With the exception of showing error messages in the Activity Monitor, MOVE-SCU completely ignores whatever activities are taking place in relation to the STORAGE-SCP AE that is receiving the retrieved instances. Once the C-MOVE has been initiated it runs to completion (or failure) as described in the C-MOVE response command message(s). There is no attempt by MOVE-SCU to confirm that instances have actually been successfully received or locally stored.

Whether or not completely or partially successful retrievals are made available to the user in the destination DICOM folder is purely dependent on the success or failure of the C-STORE sub-operations, not on any explicit action by MOVE-SCU.

Whether or not the remote AE attempts to retry any failed C-STORE sub-operations is beyond the control of MOVE-SCU.

If the association on which the C-MOVE was issued is aborted for any reason, whether or not the C-STORE sub-operations continue is dependent on the remote AE; the local STORAGE-SCP will continue to accept associations and storage operations regardless. In this case, an error indicating why the MOVE-SCU association terminated before the C-MOVE operation completed should be shown in the application's Activity Monitor.

4.2.8.4 Association Acceptance Policy

MOVE-SCU does not accept associations.

4.3 Network Interfaces

4.3.1 Physical Network Interface

The application is indifferent to the physical medium over which TCP/IP executes; which is dependent on the underlying operating system and hardware.

4.3.4 IPv4 and IPv6 Support

By default, this product supports IPv4. When configured, it will also support IPv6. It does not utilize any of the optional configuration identification or security features of IPv6.

4.4 Configuration

Configuration is performed through the use of configuration store saved in the ClearCanvas EnterpriseServer and through local files. The configuration must be accessed through the ImageDrive user interface.

4.4.1 AE Title/Presentation Address Mapping

The Calling AE Title of the local application is configurable through settings management in the ImageDrive user interface.

4.4.2 Parameters

Table 4.4-1
Configuration Parameters table

Parameter	Configurable	Default Value
General Parameters		
PDU size	No	N/A
Time-out waiting for acceptance or rejection Response to an Association Open Request. (Application Level timeout)	Yes	10 seconds
General DIMSE level time-out values	No	30 seconds
Time-out waiting for response to TCP/IP connect() request. (Low-level timeout)	Yes	10 seconds
Time-out waiting for acceptance of a TCP/IP message over the network. (Low-level timeout)	Yes	30 seconds
Time-out for waiting for data between TCP/IP packets. (Low-level timeout)	Yes	900 seconds
Send Buffer Size (TCP/IP socket)	Yes	118341 bytes
Receive Buffer Size (TCP/IP socket)	Yes	118341 bytes
Any changes to default TCP/IP settings, such as configurable stack parameters.	No	None
AE Specific Parameters (all AEs)		
Size constraint in maximum object size	No	None
Maximum PDU size the AE can receive	Yes	116794bytes
Maximum PDU size the AE can send	Yes	116794 bytes
AE specific DIMSE level time-out values	No	30 seconds
Number of simultaneous Associations by Service and/or SOP Class	N/A	N/A
SOP Class support	No	All supported SOP Classes always proposed and accepted
Transfer Syntax support	No	All supported Transfer Syntaxes always proposed and accepted

Other parameters that are configurable	No	None
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5. MEDIA INTERCHANGE

ImageDrive does not support any form of Media Interchange.

6. SUPPORT OF CHARACTER SETS

6.1 Overview

The application supports all extended character sets defined in the DICOM 2008 standard, including single-byte and multi-byte character sets as well as code extension techniques using ISO 2022 escapes.

Support extends to correctly decoding and displaying the correct symbol for all names and strings received over the network, and in the local database.

No specific support for sorting of strings other than in the default character set is provided in the Web GUI. All strings are converted to Unicode before display.

6.2 Character Sets

In addition to the default character repertoire, the Defined Terms for Specific Character Set in Table 6.2-1 are supported:

Table 6.2-1
Supported Specific Character Set Defined Terms

Character Set Description	Defined Term
Latin alphabet No. 1	ISO_IR 100
Latin alphabet No. 2	ISO_IR 101
Latin alphabet No. 3	ISO_IR 109
Latin alphabet No. 4	ISO_IR 110
Cyrillic	ISO_IR 144
Arabic	ISO_IR 127
Greek	ISO_IR 126
Hebrew	ISO_IR 138
Latin alphabet No. 5	ISO_IR 148
Japanese	ISO_IR 13
Thai	ISO_IR 166
Unicode in UTF-8	ISO-IR 192
Default repertoire	ISO 2022 IR 6
Latin alphabet No. 1	ISO 2022 IR 100
Latin alphabet No. 2	ISO 2022 IR 101
Latin alphabet No. 3	ISO 2022 IR 109
Latin alphabet No. 4	ISO 2022 IR 110
Cyrillic	ISO 2022 IR 144
Arabic	ISO 2022 IR 127

Greek	ISO 2022 IR 126
Hebrew	ISO 2022 IR 138
Latin alphabet No. 5	ISO 2022 IR 148
Thai	ISO 2022 IR 166
Japanese	ISO 2022 IR 13
Japanese	ISO 2022 IR 87
Japanese	ISO 2022 IR 159
Korean	ISO 2022 IR 149
Chinese (Simplified) Extended	GB18030

6.3 Character Set Configuration

Whether or not characters are displayed correctly depends on the presence of font support in the underlying operating system. Typically it may be necessary for the user to add one of the “all Unicode” fonts to their system configuration in order to correctly display characters that would not typically be used in the default locale.

C-FIND SCP will be default always encode the responses using UTF-8 (ISO-IR 192).

7. SECURITY

7.1 Security Profiles

7.1.1 Basic Application Level Confidentiality Profile

The application provides partial conformance to the Basic Application Level Confidentiality Profile for de-identification only. The following describes the application's de-identification conformance:

- Removes, re-maps, nulls (makes empty), or adjusts required attributes as specified in DICOM 2011 PS 3.15 Table E.1-1 (Basic Application Level Confidentiality Profile Attributes) with the following notable exceptions:
 - Content Sequence (0040,A730) is retained
 - Graphic Annotation Sequence (0070,0001) is retained
- Optionally supports the "Retain Device Identification" option, which is enabled by default.
- Optionally supports the "Retain Patient Characteristics" option, which is enabled by default. However, the option (in DICOM PS 3.15) specifies some attributes should be "cleaned", but currently there is no cleaning support; the attributes are simply kept.
- By default, supports the "Retain Modified Full Dates" option, except that Timezone Offset From UTC (0008, 0201) is always removed (as specified in basic profile).
- When configured by the user, supports the "Retain Longitudinal Full Dates" option, except that Timezone Offset From UTC (0008, 0201) is always removed (as specified in basic profile). Some additional attributes not specified or discussed in DICOM PS 3.15 are also adjusted (consult Table 7.1-2).
- By default, retains those private tags deemed safe in DICOM PS 3.15 E.3.10 "Retain Safe Private Option", as well as one other attribute indicated with an asterisk (*) in Table 7.1-2.
- Optionally allows retaining ALL private tags, not only the ones which are considered to be 'safe'.
- Optionally supports a custom "Keep Safe Descriptions" option, which is enabled by default. This option allows a few descriptions that don't normally contain any sensitive information, such as Study Description and Series Description, to be kept.
- Does NOT put original or modified attributes into the Encrypted Attributes Sequence.
- Does not automatically obscure text or features in pixel data; however, blackout rules can be configured using basic string matching on attributes like Manufacturer and Series Description, or code can be written in Python where the entire DICOM image header is available for use in blackout logic.
- Does NOT obscure information in formatted documents embedded in the data set. This is of particular importance for ancillary content such as Encapsulated PDFs, whose PDF content may contain non-structured references to patient information and, therefore, the application will not be able to completely de-identify the documents.
- Sets the Patient Identity Removed (0012,0062) attribute, but does not fill in the De-identification Method Code Sequence (0012, 0064). Instead, the value "ClearCanvas ImageDrive Script" is inserted into De-identification Method (0012, 0063).

- The actions are applied recursively to nested data sets (items in sequence attributes).

The following table describes the attributes modified during de-identification:

Table 0-1
Attributes Modified During De-Identification

Attribute	Tag	Action
Accession Number	(0008,0050)	S
Acquisition Comments	(0018,4000)	X
Acquisition Context Sequence	(0040,0555)	X
Acquisition Date	(0008,0022)	D
Acquisition DateTime	(0008,002A)	D
Acquisition Device Processing Description	(0018,1400)	X
Acquisition Protocol Description	(0018,9424)	X
Acquisition Time	(0008,0032)	D
Actual Human Performers Sequence	(0040,4035)	X
Additional Patient History	(0010,21B0)	X
Admission ID	(0038,0010)	X
Admitting Date	(0038,0020)	D
Admitting Diagnoses Code Sequence	(0008,1084)	X
Admitting Diagnoses Description	(0008,1080)	X
Admitting Time	(0038,0021)	D
Affected SOP Instance UID	(0000,1000)	X
Allergies	(0010,2110)	X,K
Approval Status DateTime	(0044,0004)	D
Arbitrary	(4000,0010)	X
Attribute Modification DateTime	(0400,0562)	D
Author Observer Sequence	(0040,A078)	X
Branch of Service	(0010,1081)	X
Calibration Date	(0014,407E)	(K)
Calibration Time	(0014,407C)	(K)
Cassette ID	(0018,1007)	X,K
Comments on the Performed Procedure Step	(0040,0280)	X
Concatenation UID	(0020,9161)	U
Confidentiality Constraint on Patient Data Description	(0040,3001)	X
Content Creator's Identification Code Sequence	(0070,0086)	X
Content Creator's Name	(0070,0084)	Z
Content Date	(0008,0023)	D
Content Time	(0008,0033)	D

Context Group Extension Creator UID	(0008,010D)	U
Contrast/Bolus Agent	(0018,0010)	X,K
Contribution Date Time	(0018,A002)	D
Contribution Description	(0018,A003)	X
Country of Residence	(0010,2150)	X
Creation Date	(2100,0040)	(K)
Creation Time	(2100,0050)	(K)
Creator-Version UID	(0008,9123)	U
Current Patient Location	(0038,0300)	X
Curve Data	(5000,3000)	X
Curve Date	(0008,0025)	D
Curve Time	(0008,0035)	D
Custodial Organization Sequence	(0040,A07C)	X
Data Set Trailing Padding	(FFFC,FFFC)	X
Date	(0040,A121)	D
Date of Document or Verbal Transaction (Trial)	(0040,A110)	(K)
Date of Gain Calibration	(0014,3076)	(K)
Date of Last Calibration	(0018,1200)	D
Date of Last Detector Calibration	(0018,700C)	D
Date of Secondary Capture	(0018,1012)	D
DateTime	(0040,A120)	D
Decay Correction DateTime	(0018,9701)	D
Derivation Description	(0008,2111)	X,K
Detector ID	(0018,700A)	X,K
Device Serial Number	(0018,1000)	X,K
Device UID	(0018,1002)	X,K
Digital Signature DateTime	(0400,0105)	(K)
Digital Signature UID	(0400,0100)	X
Digital Signatures Sequence	(FFFA,FFFA)	X
Dimension Organization UID	(0020,9164)	U
Discharge Date	(0038,0030)	(K)
Discharge Diagnosis Description	(0038,0040)	X
Discharge Time	(0038,0032)	(K)
Distribution Address	(4008,011A)	X
Distribution Name	(4008,0119)	X
Dose Reference UID	(300A,0013)	U
Effective DateTime	(0068,6226)	D
End Acquisition DateTime	(0018,9517)	D
Ethnic Group	(0010,2160)	X,K

Exclusion Start Datetime	(0018,9804)	D
Expected Completion Date Time	(0040,4011)	D
Expiry Date	(0014,1020)	(K)
Failed SOP Instance UID List	(0008,0058)	U
Fiducial UID	(0070,031A)	U
Filler Order Number / Imaging Service Request	(0040,2017)	Z
Findings Group Recording Date (Trial)	(0040,A023)	(K)
Findings Group Recording Time (Trial)	(0040,A024)	(K)
First Treatment Date	(3008,0054)	D
Frame Acquisition DateTime	(0018,9074)	D
Frame Comments	(0020,9158)	X
Frame of Reference UID	(0020,0052)	U
Frame Reference DateTime	(0018,9151)	D
Gantry ID	(0018,1008)	X,K
Generator ID	(0018,1005)	X,K
Hanging Protocol Creation DateTime	(0072,000A)	D
Human Performer's Name	(0040,4037)	X
Human Performer's Organization	(0040,4036)	X
Icon Image Sequence	(0088,0200)	X
Identifying Comments	(0008,4000)	X
Image Comments	(0020,4000)	X
Image Presentation Comments	(0028,4000)	X
Imaging Service Request Comments	(0040,2400)	X
Impressions	(4008,0300)	X
Information Issue DateTime	(0068,6270)	D
Instance Creation Date	(0008,0012)	D
Instance Creation Time	(0008,0013)	D
Instance Creator UID	(0008,0014)	U
Institution Address	(0008,0081)	X
Institution Code Sequence	(0008,0082)	X
Institution Name	(0008,0080)	X
Institutional Department Name	(0008,1040)	X
Insurance Plan Identification	(0010,1050)	X
Intended Recipients of Results Identification Sequence	(0040,1011)	X
Interpretation Approval Date	(4008,0112)	(K)
Interpretation Approval Time	(4008,0113)	(K)
Interpretation Approver Sequence	(4008,0111)	X
Interpretation Author	(4008,010C)	X

Interpretation Diagnosis Description	(4008,0115)	X
Interpretation ID Issuer	(4008,0202)	X
Interpretation Recorded Date	(4008,0100)	(K)
Interpretation Recorded Time	(4008,0101)	(K)
Interpretation Recorder	(4008,0102)	X
Interpretation Text	(4008,010B)	X
Interpretation Transcriber	(4008,010A)	X
Interpretation Transcription Date	(4008,0108)	(K)
Interpretation Transcription Time	(4008,0109)	(K)
Irradiation Event UID	(0008,3010)	U
Issue Date of Imaging Service Request	(0040,2004)	D
Issue Time of Imaging Service Request	(0040,2005)	D
Issuer of Admission ID	(0038,0011)	X
Issuer of Patient ID	(0010,0021)	X
Issuer of Service Episode ID	(0038,0061)	X
Large Palette Color Lookup Table UID	(0028,1214)	U
Last Menstrual Date	(0010,21D0)	D
MAC	(0400,0404)	X
Media Storage SOP Instance UID	(0002,0003)	U
Medical Alerts	(0010,2000)	X
Medical Record Locator	(0010,1090)	X
Military Rank	(0010,1080)	X
Modified Attributes Sequence	(0400,0550)	X
Modified Image Date	(0020,3403)	(K)
Modified Image Description	(0020,3406)	X
Modified Image Time	(0020,3405)	(K)
Modifying Device ID	(0020,3401)	X
Modifying Device Manufacturer	(0020,3404)	X
Most Recent Treatment Date	(3008,0056)	D
Name of Physician(s) Reading Study	(0008,1060)	X
Names of Intended Recipients of Results	(0040,1010)	X
Observation Date (Trial)	(0040,A192)	(K)
Observation Date Time	(0040,A032)	D
Observation Time (Trial)	(0040,A193)	(K)
Occupation	(0010,2180)	X
Operator Identification Sequence	(0008,1072)	X
Operators' Name	(0008,1070)	X
Order Callback Phone Number	(0040,2010)	X
Order Entered By	(0040,2008)	X

Order Enterer's Location	(0040,2009)	X
Original Attributes Sequence	(0400,0561)	X
Other Patient IDs	(0010,1000)	X
Other Patient IDs Sequence	(0010,1002)	X
Other Patient Names	(0010,1001)	X
Overlay Comments	(6000,4000)	X
Overlay Date	(0008,0024)	D
Overlay Time	(0008,0034)	D
Palette Color Lookup Table UID	(0028,1199)	U
Participant Sequence	(0040,A07A)	X
Participation DateTime	(0040,A082)	D
Patient Comments	(0010,4000)	X
Patient ID	(0010,0020)	S
Patient State	(0038,0500)	X,K
Patient Transport Arrangements	(0040,1004)	X
Patient's Address	(0010,1040)	X
Patient's Age	(0010,1010)	X,K
Patient's Birth Date	(0010,0030)	S
Patient's Birth Name	(0010,1005)	X
Patient's Birth Time	(0010,0032)	Z
Patient's Institution Residence	(0038,0400)	X
Patient's Insurance Plan Code Sequence	(0010,0050)	X
Patient's Mother's Birth Name	(0010,1060)	X
Patient's Name	(0010,0010)	S
Patient's Primary Language Code Sequence	(0010,0101)	X
Patient's Primary Language Modifier Code Sequence	(0010,0102)	X
Patient's Religious Preference	(0010,21F0)	X
Patient's Sex	(0010,0040)	Z,K
Patient's Sex Neutered	(0010,2203)	Z,K
Patient's Size	(0010,1020)	X,K
Patient's Telephone Numbers	(0010,2154)	X
Patient's Weight	(0010,1030)	X,K
Performed Location	(0040,0243)	X
Performed Procedure Step Description	(0040,0254)	X
Performed Procedure Step ID	(0040,0253)	X
Performed Procedure Step Start Date	(0040,0244)	D
Performed Procedure Step Start Time	(0040,0245)	D
Performed Station AE Title	(0040,0241)	X,K
Performed Station Geographic Location Code	(0040,4030)	X,K

Sequence		
Performed Station Name	(0040,0242)	X,K
Performed Station Name Code Sequence	(0040,4028)	X,K
Performing Physician Identification Sequence	(0008,1052)	X
Performing Physician's Name	(0008,1050)	X
Person Identification Code Sequence	(0040,1101)	X
Person Name	(0040,A123)	X
Person's Address	(0040,1102)	X
Person's Telephone Numbers	(0040,1103)	X
Physician Approving Interpretation	(4008,0114)	X
Physician(s) of Record	(0008,1048)	X
Physician(s) of Record Identification Sequence	(0008,1049)	X
Physician(s) Reading Study Identification Sequence	(0008,1062)	X
Placer Order Number / Imaging Service Request	(0040,2016)	X
Plate ID	(0018,1004)	X,K
Pregnancy Status	(0010,21C0)	X,K
Pre-Medication	(0040,0012)	X,K
Presentation Creation Date	(0070,0082)	D
Presentation Creation Time	(0070,0083)	D
Procedure Expiration Date	(0014,4078)	(K)
Procedure Last Modified Date	(0014,407A)	(K)
Procedure Step Cancellation DateTime	(0040,4052)	D
Product Expiration DateTime	(0044,000B)	(K)
Protocol Name	(0018,1030)	Z,K
Radiopharmaceutical Start DateTime	(0018,1078)	D
Radiopharmaceutical Stop DateTime	(0018,1079)	D
Reason for Study	(0032,1030)	X
Reason for the Imaging Service Request	(0040,2001)	X
Referenced DateTime	(0040,A13A)	D
Referenced Digital Signature Sequence	(0400,0402)	X
Referenced Frame of Reference UID	(3006,0024)	U
Referenced General Purpose Scheduled Procedure Step Transaction UID	(0040,4023)	U
Referenced Patient Alias Sequence	(0038,0004)	X
Referenced Patient Sequence	(0008,1120)	X
Referenced Performed Procedure Step Sequence	(0008,1111)	X
Referenced SOP Instance MAC Sequence	(0400,0403)	X
Referenced SOP Instance UID	(0008,1155)	U
Referenced SOP Instance UID in File	(0004,1511)	U

Referring Physician Identification Sequence	(0008,0096)	X
Referring Physician's Address	(0008,0092)	X
Referring Physician's Name	(0008,0090)	Z
Referring Physician's Telephone Numbers	(0008,0094)	X
Region of Residence	(0010,2152)	X
Related Frame of Reference UID	(3006,00C2)	U
Request Attributes Sequence	(0040,0275)	X
Requested Contrast Agent	(0032,1070)	X,K
Requested Procedure Comments	(0040,1400)	X
Requested Procedure Description	(0032,1060)	X
Requested Procedure ID	(0040,1001)	X
Requested Procedure Location	(0040,1005)	X
Requested SOP Instance UID	(0000,1001)	U
Requesting Physician	(0032,1032)	X
Requesting Service	(0032,1033)	X
Responsible Organization	(0010,2299)	X
Responsible Person	(0010,2297)	X
Results Comments	(4008,4000)	X
Results Distribution List Sequence	(4008,0118)	X
Results ID Issuer	(4008,0042)	X
Review Date	(300E,0004)	D
Review Time	(300E,0005)	D
Reviewer Name	(300E,0008)	X
RT Plan Date	(300A,0006)	D
RT Plan Time	(300A,0007)	D
Safe Position Exit Date	(3008,0162)	D
Safe Position Exit Time	(3008,0164)	D
Safe Position Return Date	(3008,0166)	D
Safe Position Return Time	(3008,0168)	D
Scheduled Admission Date	(0038,001A)	(K)
Scheduled Admission Time	(0038,001B)	(K)
Scheduled Discharge Date	(0038,001C)	(K)
Scheduled Discharge Time	(0038,001D)	(K)
Scheduled Human Performers Sequence	(0040,4034)	X
Scheduled Patient Institution Residence	(0038,001E)	X
Scheduled Performing Physician Identification Sequence	(0040,000B)	X
Scheduled Performing Physician's Name	(0040,0006)	X
Scheduled Procedure Step Description	(0040,0007)	X

Scheduled Procedure Step End Date	(0040,0004)	D
Scheduled Procedure Step End Time	(0040,0005)	D
Scheduled Procedure Step Location	(0040,0011)	X
Scheduled Procedure Step Modification Date Time	(0040,4010)	D
Scheduled Procedure Step Start Date	(0040,0002)	D
Scheduled Procedure Step Start Time	(0040,0003)	D
Scheduled Station AE Title	(0040,0001)	X,K
Scheduled Station Geographic Location Code Sequence	(0040,4027)	X,K
Scheduled Station Name	(0040,0010)	X,K
Scheduled Station Name Code Sequence	(0040,4025)	X,K
Scheduled Study Location	(0032,1020)	X,K
Scheduled Study Location AE Title	(0032,1021)	X,K
Scheduled Study Start Date	(0032,1000)	(K)
Scheduled Study Start Time	(0032,1001)	(K)
Series Date	(0008,0021)	D
Series Description	(0008,103E)	X,K
Series Instance UID	(0020,000E)	U
Series Time	(0008,0031)	D
Service Episode Description	(0038,0062)	X
Service Episode ID	(0038,0060)	X
Smoking Status	(0010,21A0)	X,K
SOP Authorization DateTime	(0100,0420)	D
SOP Instance UID	(0008,0018)	U
Source Strength Reference Date	(300A,022C)	D
Source Strength Reference Time	(300A,022E)	D
Special Needs	(0038,0050)	X,K
Start Acquisition DateTime	(0018,9516)	D
Station Name	(0008,1010)	Z,K
Storage Media File-set UID	(0088,0140)	U
Structure Set Date	(3006,0008)	D
Structure Set Time	(3006,0009)	D
Study Arrival Date	(0032,1040)	(K)
Study Arrival Time	(0032,1041)	(K)
Study Comments	(0032,4000)	X
Study Completion Date	(0032,1050)	(K)
Study Completion Time	(0032,1051)	(K)
Study Date	(0008,0020)	D
Study Description	(0008,1030)	X,K

Study ID	(0020,0010)	S
Study ID Issuer	(0032,0012)	X
Study Instance UID	(0020,000D)	U
Study Read Date	(0032,0034)	(K)
Study Read Time	(0032,0035)	(K)
Study Time	(0008,0030)	D
Study Verified Date	(0032,0032)	(K)
Study Verified Time	(0032,0033)	(K)
Substance Administration DateTime	(0044,0010)	D
Synchronization Frame of Reference UID	(0020,0200)	U
Template Extension Creator UID	(0040,DB0D)	U
Template Extension Organization UID	(0040,DB0C)	U
Text Comments	(4000,4000)	X
Text String	(2030,0020)	X
Time	(0040,A122)	D
Time of Document Creation or Verbal Transaction (Trial)	(0040,A112)	(K)
Time of Gain Calibration	(0014,3077)	(K)
Time of Last Calibration	(0018,1201)	(K)
Time of Last Detector Calibration	(0018,700E)	D
Time of Secondary Capture	(0018,1014)	D
Timezone Offset From UTC	(0008,0201)	X
Topic Author	(0088,0910)	X
Topic Keywords	(0088,0912)	X
Topic Subject	(0088,0906)	X
Topic Title	(0088,0904)	X
Transaction UID	(0008,1195)	U
Treatment Control Point Date	(3008,0024)	D
Treatment Control Point Time	(3008,0025)	D
Treatment Date	(3008,0250)	D
Treatment Time	(3008,0251)	D
UID	(0040,A124)	X
Verification Date Time	(0040,A030)	D
Verifying Observer Identification Code Sequence	(0040,A088)	Z
Verifying Observer Name	(0040,A075)	X
Verifying Observer Sequence	(0040,A073)	X
Verifying Organization	(0040,A027)	X
Visit Comments	(0038,4000)	X

In the modification method column, the following legend applies:

- Z: the attribute is nulled, or set to an empty value
- X: the attribute is removed entirely
- U: the value is a DICOM UID that is re-mapped
- S: the value is specified by the user
- D: date or date/time offset by the difference between the original and modified Study Date
- K: the value is not modified (“kept”)
- (K): the value is not modified, but most of not all are not even mentioned in DICOM PS 3.15 or PS 3.3.

Note that where there are multiple values in the “Action” column, it is because the action is dependent on how the de-identifier is configured.

During de-identification, no attributes are added, with the exception of those configured by the user.

With the exception of UIDs, the Date or Date/Time attributes offset by the difference in Study Date (those marked with a ‘D’ in Table 0-1), and those values configured by the user, no attribute values are generated.

The integrity of UIDs for all files de-identified in the same session will be maintained, meaning that all relationships, such as Study and Series relationships, will be maintained in the de-identified SOP Instances. Additionally, a de-identifier in ImageDrive can be configured to maintain the relationships across all studies it de-identifies, meaning Patient IDs and DICOM UIDs will be consistently re-mapped, maintaining inter- and intra-study relationships.

Table 0-2
Private Attributes Kept by “Safe Private Option”

Data Element	Private Creator	VR	VM	Meaning
(7053,xx00)	Philips PET Private Group	DS	1	SUV Factor – Multiplying stored pixel values by Rescale Slope then this factor results in SUVbw in g/l
(7053,xx09)	Philips PET Private Group	DS	1	Activity Concentration Factor – Multiplying stored pixel values by Rescale Slope then this factor results in MBq/ml.
(00E1,xx21)	ELSCINT1	DS	1	DLP
(01E1,xx26)	ELSCINT1	CS	1	Phantom Type
(01E1,xx50)	ELSCINT1	DS	1	Acquisition Duration
(01F1,xx01)	ELSCINT1	CS	1	Acquisition Type
(01F1,xx07)	ELSCINT1	DS	1	Table Velocity
(01F1,xx26)	ELSCINT1	DS	1	Pitch
(01F1,xx27)	ELSCINT1	DS	1	Rotation Time

(0019,xx23)	GEMS_ACQU_01	DS	1	Table Speed [mm/rotation]
(0019,xx24)	GEMS_ACQU_01	DS	1	Mid Scan Time [sec]
(0019,xx27)	GEMS_ACQU_01	DS	1	Rotation Speed (Gantry Period)
(0043,xx27)	GEMS_PARM_01	SH	1	Scan Pitch Ratio in the form "n.nnn:1"
(0045,xx01)	GEMS_HELIOS_01	SS	1	Number of Macro Rows in Detector
(0045,xx02)	GEMS_HELIOS_01	FL	1	Macro width at ISO Center
(0903,xx10)	GEIIS PACS	US	1	Reject Image Flag
(0903,xx11)	GEIIS PACS	US	1	Significant Flag
(0903,xx12)	GEIIS PACS	US	1	Confidential Flag
(2001,xx03)	Philips Imaging DD 001	FL	1	Diffusion B-Factor
(2001,xx04)	Philips Imaging DD 001	CS	1	Diffusion Direction
(0019,xx0C)	SIEMENS MR HEADER	IS	1	B Value
(0019,xx0D)	SIEMENS MR HEADER	CS	1	Diffusion Directionality
(0019,xx0E)	SIEMENS MR HEADER	FD	3	Diffusion Gradient Direction
(0019,xx27)	SIEMENS MR HEADER	FD	6	B Matrix
(0043,xx39)	GEMS_PARM_01	IS	4	1 st value is B Value
(0009,xx0D)*	GEMS_PETD_01	DT	1	GE Private Scan Time

* GE Private scan time is adjusted along with the other date/time attributes in order to ensure Standardized Uptake Value calculations remain accurate.

7.2 Association level security

None supported.

The system can be configured to only allow configured AEs to open an association.

7.3 Application level security

ImageDrive supports Audit Trail logging according to the final text of DICOM Supplement 95. The following Audit messages are generated.

**Table 7.3-1
Supported Audit Trail Messages**

Audit Trail Message
ApplicationActivity
BeginTransferringDicomInstances
DicomInstancesAccessed

DicomInstancesTransferred
Query

8. ANNEXES

8.1 IOD contents

8.1.1 Coerced/Modified fields

Not applicable.

8.1.2 Created SOP Instances

ImageDrive will create Grayscale Softcopy Presentation States, Color Softcopy Presentation States, Key Object selection Documents, and Encapsulated PDF Documents. Please see the ClearCanvas Workstation DICOM Conformance Statements for details on the content of these created IODs.

8.2 Data Dictionary of private attributes

Not applicable.

8.3 Coded terminology and templates

Not applicable.

8.4 Grayscale Image Consistency

Not applicable.

8.5 Standard extended/specialized/private SOP Classes

Secondary capture image SOP instances created by the application for the purposes of supporting key images conform to the Standard Extended SOP Class based on the Secondary Capture Image Storage SOP Class (1.2.840.10008.5.1.4.1.1.88.59). The contents of this Standard Extended SOP Class are described in the ClearCanvas Workstation DICOM Conformance Statement.

No specialized or private SOP classes are used.

8.6 Private Transfer Syntaxes

None