GE Healthcare

Technical Publications

Direction 2067192-001
Revision 4

Universal Viewer* Web Client Version 5.0 SP5

DICOM CONFORMANCE STATEMENT

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Acknowledgments

Prepared by Mark Niggemann.

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Revision History

Revision	Date	Author	Description
1	August 10, 2012	Eric Feingold	Initial Version for IR2.
2	October 18, 2012	Eric Feingold	Updated for IR3 with new support for RTSS and Breast Tomosynthesis
3	August 13, 2013	Mark Niggemann	Updated revision info, specific to Universal Viewer product and added reference to Volume Viewer DCS.
4	August 19, 2014	Mark Niggemann	Updated conformance to be standalone reference for display abilities without regard to backend. Added Basic Text SR as a supported displayable object. Expanded sections to cover generation of GSPS and KOS objects and incorporated content from the PACS-IW server side DCS relevant to each. Additional updates made as result of Interop CoE feedback.

CONFORMANCE STATEMENT OVERVIEW

Table 0.1 provides an overview of the DICOM objects supported by Universal Viewer web client..

Note: The Universal Viewer web client is a viewing application that may be deployed with Centricity PACS or Centricity PACS-IW backend application servers. Universal Viewer does not directly use DICOM network features to communicate with any external application. However it does display DICOM information objects from the backend application servers. It also has the ability to generate Grayscale Presentation States and Key Object Selection objects and store them in the backend application servers which manages them.

Table 0.1 Supported SOP Classes

SOP Classes	Input	Output
Computed Radiography Image Storage	Yes	No
Digital X-Ray Image Storage – For Presentation	Yes	No
Digital X-Ray Image Storage – For Processing	Yes	No
Digital Mammography X-Ray Image Storage – For Presentation	Yes	No
Digital Mammography X-Ray Image Storage – For Processing	Yes	No
Digital Intra-oral X-Ray Image Storage – For Presentation	Yes	No
Digital Intra-oral X-Ray Image Storage – For Processing	Yes	No
CT Image Storage	Yes	No
Ultrasound Multi-frame Image Storage (Retired)	Yes	No
Ultrasound Multi-frame Image Storage	Yes	No
MR Image Storage	Yes	No
Ultrasound Image Storage (Retired)	Yes	No
Ultrasound Image Storage	Yes	No
Secondary Capture Image Storage	Yes	No
Grayscale Softcopy Presentation State Storage	Yes	Yes
X-Ray Angiographic Image Storage	Yes	No
X-Ray Radiofluoroscopic Image Storage	Yes	No
Breast Tomosynthesis Image Storage	Yes	No
Nuclear Medicine Image Storage	Yes	No
VL Endoscopic Image Storage	Yes	No
VL Microscopic Image Storage	Yes	No
VL Slide-Coordinates Microscopic Image Storage	Yes	No
VL Photographic Image Storage	Yes	No
Basic Text SR Storage	Yes	No
Mammography CAD SR Storage	Yes	No
Key Object Selection Document	Yes	Yes
Positron Emission Tomography Image Storage	Yes	No
RT Structure Set Storage	Yes	No

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1. INTRODUCTION

1.1 OVERVIEW

This DICOM Conformance Statement is divided into Sections as described below:

Section 1 (Introduction), which describes the overall structure, intent, and references for this Conformance Statement

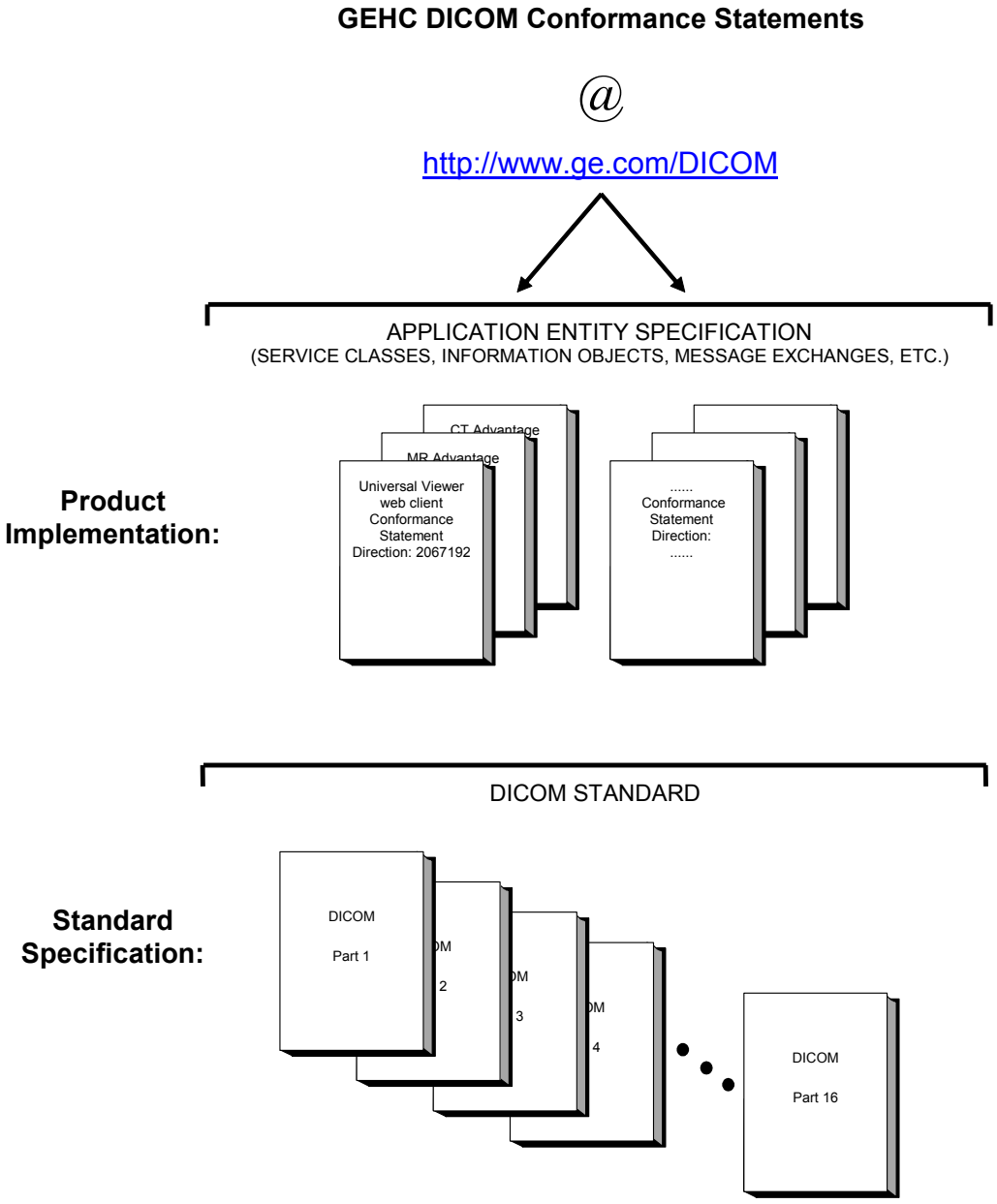
Section 2 (Network Conformance Statement), which specifies the GEHC equipment compliance to the DICOM requirements for the implementation of Networking features.

Section 3 (Grayscale Presentation State IOD), which specifies the GEHC equipment compliance to DICOM requirements for the implementation of a Grayscale Presentation State Information Object.

Section 4 (Key Object Selection IOD), which specifies the GEHC equipment compliance to DICOM requirements for the implementation of Key Object Selection Information Object.

1.2 OVERALL DICOM CONFORMANCE STATEMENT DOCUMENT STRUCTURE

The Documentation Structure of the GEHC DICOM Conformance Statements is shown in the Illustration below.



This document specifies the DICOM implementation. It is entitled:

Universal Viewer Web Client Version 5.0 SP5

DICOM Conformance Statement

Direction 2067192-001

This DICOM Conformance Statement documents the DICOM Conformance Statement and Technical Specification required to interoperate with the GEHC network interface.

The GEHC Conformance Statement, contained in this document, also specifies the Lower Layer communications which it supports (e.g., TCP/IP). However, the Technical Specifications are defined in the DICOM Part 8 standard.

For more information regarding DICOM, copies of the Standard may be obtained on the Internet at http://medical.nema.org. Comments on the Standard may be addressed to:

DICOM Secretariat
NEMA
1300 N. 17th Street, Suite 1752
Rosslyn, VA 22209
USA
Phone: +1.703.841.3200

1.3 INTENDED AUDIENCE

The reader of this document is concerned with software design and/or system integration issues. It is assumed that the reader of this document is familiar with the DICOM 3.0 standard and with the terminology and concepts that are used in this standard.

1.4 SCOPE AND FIELD OF APPLICATION

It is the intent of this document to provide an unambiguous specification for GEHC implementations. This specification, called a Conformance Statement, includes a DICOM Conformance Statement and is necessary to ensure proper processing and interpretation of GEHC medical data exchanged using DICOM. The GEHC Conformance Statements are available to the public.

The reader of this DICOM Conformance Statement should be aware that different GEHC devices are capable of using different Information Object Definitions. For example, a GEHC CT Scanner may send images using the CT Information Object, MR Information Object, Secondary Capture Object, etc.

Included in this DICOM Conformance Statement are the Module Definitions which define all data elements used by this GEHC implementation. If the user encounters unspecified private data elements while parsing a GEHC Data Set, the user is well advised to ignore those data elements (per the DICOM standard). Unspecified private data element information is subject to change without notice. If, however, the device is acting as a "full fidelity storage device", it should retain and re-transmit all of the private data elements which are sent by GEHC devices.

1.5 IMPORTANT REMARKS

The Universal Viewer web client conforms to NEMA PS3(2011) DICOM standards.

The use of these DICOM Conformance Statements, in conjunction with the DICOM Standards, is intended to facilitate communication with GE imaging equipment. However, **by itself, it is not sufficient to ensure that inter-operation will be successful**. The **user (or user's agent)** needs to proceed with caution and address at least four issues:

Integration - The integration of any device into an overall system of interconnected devices goes beyond the scope of standards (DICOM v3.0), and of this introduction and associated DICOM Conformance Statements when interoperability with non-GE equipment is desired. The responsibility to analyze the applications requirements and to design a solution that integrates GE imaging equipment with non–GE systems is the **user's** responsibility and should not be underestimated. The **user** is strongly advised to ensure that such an integration analysis is correctly performed.

Validation - Testing the complete range of possible interactions between any GE device and non–GE devices, before the connection is declared operational, should not be overlooked. Therefore, the **user** should ensure that any non–GE provider accepts full responsibility for all validation required for their connection with GE devices. This includes the accuracy of the image data once it has crossed the interface between the GE imaging equipment and the non–GE device and the stability of the image data for the intended applications.

Such a validation is required before any clinical use (diagnosis and/or treatment) is performed. It applies when images acquired on GE imaging equipment are processed/displayed on a non-GE device, as well as when images acquired on non-GE equipment is processed/displayed on a GE console or workstation.

Future Evolution - GE understands that the DICOM Standard will evolve to meet the user's growing requirements. GE is actively involved in the development of the DICOM Standard. DICOM will incorporate new features and technologies and GE may follow the evolution of the Standard. The GEHC protocol is based on DICOM as specified in each DICOM Conformance Statement. Evolution of the Standard may require changes to devices which have implemented DICOM. **In addition, GE reserves the right to discontinue or make changes to the support of communications features (on its products) described by these DICOM Conformance Statements.** The **user** should ensure that any non–GE provider, which connects with GE devices, also plans for the future evolution of the DICOM Standard. Failure to do so will likely result in the loss of function and/or connectivity as the DICOM Standard changes and GE Products are enhanced to support these changes.

Interaction - It is the sole responsibility of the **non–GE provider** to ensure that communication with the interfaced equipment does not cause degradation of GE imaging equipment performance and/or function.

1.6 REFERENCES

NEMA PS3(2011) Digital Imaging and Communications in Medicine (DICOM) Standard, available free at http://medical.nema.org/

Centricity PACS 4.0 DICOM Conformance Statement, DOC1145900

Centricity PACS-IW 5.0 Server DICOM Conformance Statement, DOC1193612

Centricity Enterprise Archive 4.0 DICOM Conformance Statement, DOC0708777

1.7 DEFINITIONS

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

1.8 SYMBOLS AND ABBREVIATIONS

Term	Description
AE	Application Entity
AET	Application Entity Title
CAD	Computer Aided Detection
CD-R	Compact Disk Recordable
CR	Computerized radiography
CSE	Customer Service Engineer
CT	Computerized Tomography
DHCP	Dynamic Host Configuration Protocol
DICOM	Digital Imaging and Communications in Medicine
DX	Digital X-ray
FSC	File-Set Creator
FSU	File-Set Updater
FSR	File-Set Reader
GSDF	Grayscale Standard Display Function
GSPS	Grayscale Softcopy Presentation State
HIS	Hospital Information System
HL7	Health Level 7 Standard
IE	Information Entity
IHE	Integrating the Healthcare Enterprise
IO	Intra-oral X-ray
IOD	Information Object Definition
ISO	International Standards Organization
JPEG	Joint Photographic Experts Group
LUT	Look-up Table
MG	Mammography (X-ray)
MR	Magnetic Resonance
NM	Nuclear Medicine
O	Optional (Key Attribute)
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

Term	Description
SR	Structured Reporting
TCP/IP	Transmission Control Protocol/Internet Protocol
UID	Unique Identifier
U	Unique (Key Attribute)
UL	Upper Layer
US	Ultrasound
VM	Value Multiplicity
VL	Visible Light
VR	Value Representation
XA	X-ray Angiography

2. NETWORK CONFORMANCE STATEMENT

2.1 INTRODUCTION

This section of the DICOM Conformance Statement specifies the Universal Viewer web client compliance to DICOM requirements for networking features.

Note: The Universal Viewer web client does not directly communicate using DICOM networking and data encoding features with external equipment.

Universal Viewer displays DICOM information objects retrieved from supported backend server application systems using proprietary communications. Universal Viewer currently supports either:

- Centricity PACS version 4.0 SP1 or later
- Centricity PACS-IW Server version 5.0 or later.

Any DICOM related real world activities initiated from Universal Viewer are communicated to the backend server application where respective host services are utilized to carry out DICOM functions such as DICOM query/retrieve and DICOM send.

Note: Universal Viewer may be capable of displaying SOP classes that are not supported for storage by the respective backend server. Please refer to the DICOM Conformance Statement of the appropriate backend application server for more information.

Although the hosted backed server may support additional SOP Classes, Universal Viewer clients are only able to interpret objects that meet the conditions in the table below.

TABLE 2-1
DISPLAYABLE SOP CLASSES

SOP Class Name	SOP Class UID
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1
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
Digital Mammography Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.2
Digital Mammography Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.2.1
Digital Intro-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
CT Image Storage	1.2.840.10008.5.1.4.1.1.2
Ultrasound Multi-Frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1
MR Image Storage	1.2.840.10008.5.1.4.1.1.4
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2

SOP Class Name	SOP Class UID
Breast Tomosynthesis Image Storage	1.2.840.10008.5.1.4.1.1.13.1.3
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20
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 Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4
Basic Text SR Storage	1.2.840.10008.5.1.4.1.1.88.11
Mammography CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.50
Key Object Selection Storage	1.2.840.10008.5.1.4.1.1.88.59
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3

TABLE 2-2
DISPLAYABLE PHOTOMETRIC INTERPRETATION SUPPORTED

Photometric Interpretation	(0028,0004)	The image SOP Instance must contain one of the following Photometric Interpretation values: MONOCHROME1 MONOCHROME2 RGB PALETTE COLOR

Universal Viewer is capable of generating the following SOP classes and store them in any of the supported backend servers utilizing an internal service API.

TABLE 2-3
GENERATED SOP CLASSES

SOP Class Name	SOP Class UID
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1
Key Object Selection Storage	1.2.840.10008.5.1.4.1.1.88.59

2.2 IMPLEMENTATION MODEL

2.2.1 Application Data Flow Diagrams

2.2.1.1 STORAGE AE FOR SOP INSTANCE DISPLAY

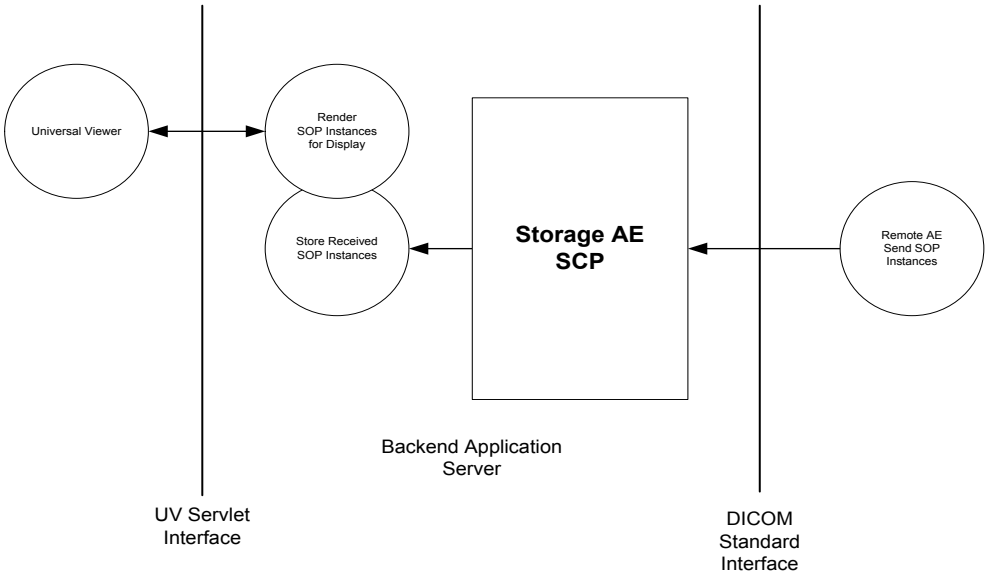
The Storage AE implements the SCP roles of the DICOM Storage SOP classes for storing DICOM Storage SOP instances.

Note: The Storage AE services are provided by their configured backend application server. As such, Universal Viewer does not directly handle DICOM network features related to Storage AE. It communicates to the backend application server using an internal service API.

Both the Centricity PACS and Centricity PACS-IW backend application servers support a conceptual Storage AE that may be named differently in their conformance statements.

Please refer to the DICOM Conformance Statement of the appropriate backend application server for more information.

FIGURE 2-1
DATA FLOW DIAGRAM OF STORAGE AE FOR SOP INSTANCE DISPLAY



2.2.1.2 SEND AE FOR SOP INSTANCE TRANFER TO REMOTE AE

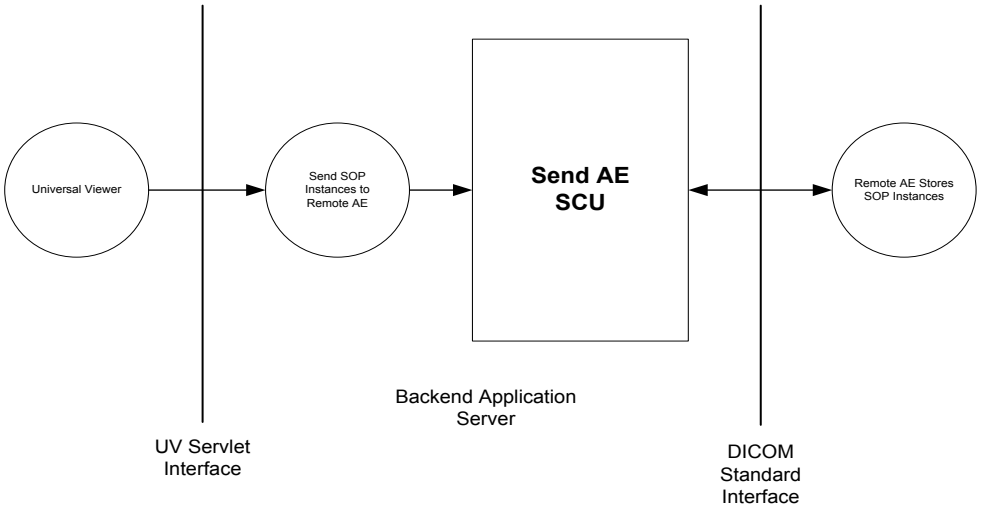
The Send AE implements the SCU roles of the DICOM Storage SOP classes for sending DICOM Storage SOP instances to a remote AE.

Note: The Send AE services are provided by their configured backend application server. As such, Universal Viewer does not directly initiate DICOM network features related to Send AE. It communicates to the backend application server using an internal service API.

At this time, only the Centricity PACS backend application server provides the Send AE service.

Please refer to the Centricity PACS DICOM Conformance Statement for more information.

FIGURE 2-2
DATA FLOW DIAGRAM OF SEND AE FUNCTIONALITY



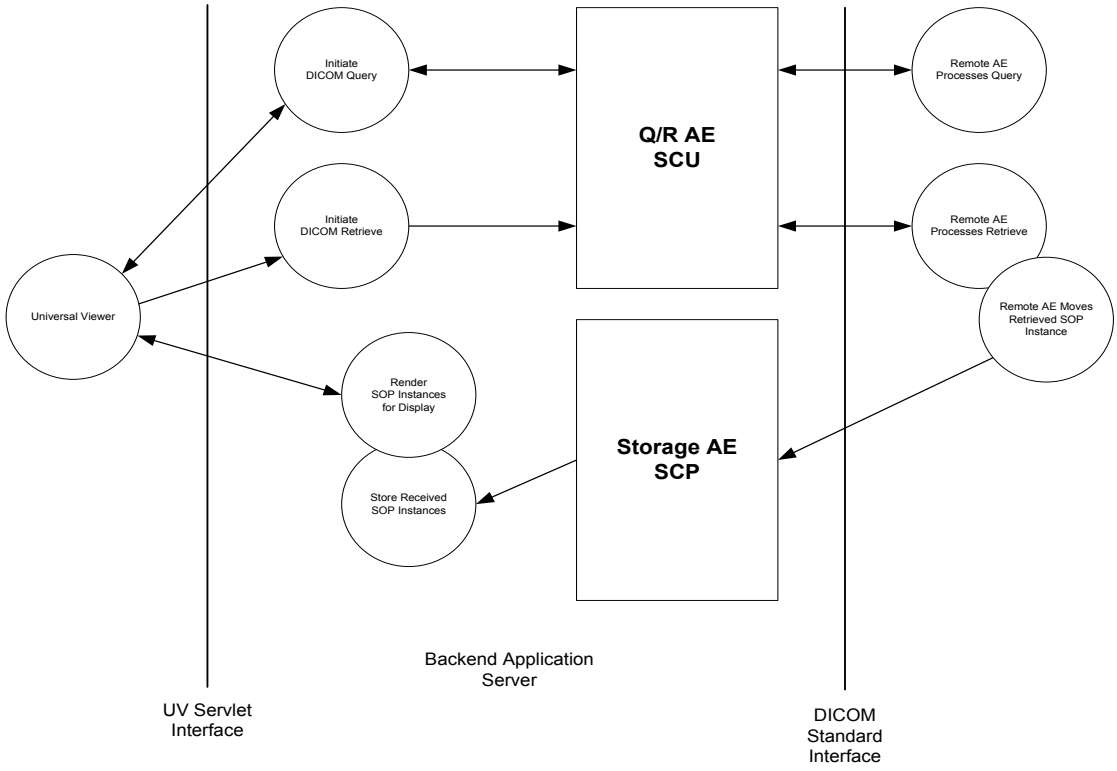
2.2.1.3 QUERY/RETRIEVE AE FUNCTIONALITY

Note: The Query/Retrieve AE services are provided by the configured backend application server. Universal Viewer communicates to the backend application server using an host service API and thus does not directly initiate DICOM network features related to Query/Retrieve.

Both the Centricity PACS and Centricity PACS-IW backend application servers support Query/Retrieve AE.

Please refer to the DICOM Conformance Statement of the appropriate backend application server for more information.

FIGURE 2-3
DATA FLOW DIAGRAM OF QUERY/RETRIEVE AE FUNCTIONALITY



2.2.2 Functional Definition of AE's

Not Applicable.

Note: Universal Viewer does not directly initiate or accept DICOM associations regardless of the backend server configuration.

Please refer to the DICOM conformance statement of the appropriate backend application server for more information.

2.2.3 Sequencing of Real-World Activities

2.2.3.1 REAL-WORLD ACTIVITY – VIEWING A DICOM OBJECT

The user may load any supported DICOM object into the Universal Viewer web client for viewing.

2.2.3.2 REAL WORLD ACTIVITY – CREATION OF GRAYSCALE PRESENTATION STATES

The user may create Grayscale Presentation States in the Universal Viewer web client and save the results in the configured backend server using direct access services.

2.2.3.3 Real World Activity – Creation of Key Object Selection

The user may create Key Object Selection documents in the Universal Viewer web client and save the results in the configured backend server using direct access services.

2.3 AE Specifications

Not Applicable.

Note: Universal Viewer does not directly initiate or accept DICOM associations regardless of the backend server configuration.

Please refer to the DICOM conformance statement of the appropriate backend application server for more information.

2.4 Communication Profiles

Not Applicable.

Note: Universal Viewer does not directly initiate or accept DICOM associations regardless of the backend server configuration.

Please refer to the DICOM conformance statement of the appropriate backend application server for more information.

2.5 Extensions / Specializations / Privatizations

2.5.1 Window/Level Computation

It is expected that optimal Window Center and Width values are specified in the DICOM Object Objects if they have greater than 8 bits of data stored per sample. If optimal Window Center and Width values are not provided, then Universal Viewer is capable of estimating values using histogram analysis.

2.6 Configuration

Not Applicable.

Note: Universal Viewer does not directly initiate or accept DICOM associations regardless of the backend server configuration.

Please refer to the DICOM conformance statement of the appropriate backend application server for more information.

2.7 Support of Extended Character Sets

The Universal Viewer is configurable with a single single-byte or multi-byte extended character set, depending on the language selected during installation of the system. The following extended Character Sets are supported:

TABLE 2-3
Extended Character Set Support

Encoding	DICOM Term in Specific Character Set (0008,0005)	Supported Languages
ASCII	Attribute is not present (ISO IR-6)	English
Latin-1	ISO IR-100	English, Faeroese, Finnish, French, German, Italian, Portuguese, Spanish,
Latin-2	ISO IR-101	English, Polish, Hungarian.

Encoding	DICOM Term in Specific Character Set (0008,0005)	Supported Languages
Latin/Cyrillic	ISO IR-144	English, Russian
Latin/Hebrew	ISO IR-138	English, Hebrew
JIS X 0201	ISO IR-13	English, Japanese (in Katakana alphabet). Limited use as Japanese encoding does not support hieroglyphic alphabet
JIS X 0208	ISO 2022 IR-87	English, Japanese Kanji (hieroglyphic) – uses escape sequences to switch between ASCII (single byte) and Japanese (two-byte per character)
KS X 1001	ISO 2022 IR-149	English, Korean – uses escape sequences to switch between ASCII (single byte) and Korean (two-byte per character)
GB18030	GB18030	English, Simplified Chinese

While the backend servers may support additional character sets, the Centricity Universal Viewer will display in the user interface only characters specified as within ISO IR-6 (ASCII) or the configured extended character set.

The user interface will allow the user to enter characters from the console keyboard that are within ASCII or the configured extended character set.

Whether character sets are displayed correctly depends on the characteristics of the backend system, the validity of the DICOM header contents, and the presence of appropriate fonts on the client system.

2.8 CODES AND CONTROLLED TERMINOLOGY

The product uses no coded terminology. Universal Viewer does not directly parse DICOM SOP instances regardless of the backend server configuration.

Please refer to the DICOM conformance statement of the appropriate backend application server for more information.

3. GRAYSCALE SOFTCOPY PRESENTATION STATE IOD IMPLEMENTATION

This section specifies the use of the DICOM Grayscale Softcopy Presentation State IOD to represent the information included in GSPSs produced by the Universal Viewer implementation. Corresponding attributes are conveyed using the module construct.

Universal Viewer can create Grayscale Presentation State SOP Instances explicitly or they may be created when a user selects to export the internal presentation state of a study, or internal print pages (sets of key images). One or more objects may be created to represent content of the internal presentation state. If more than one GSPS object is created, all of them are created with the same values of Presentation Label, Description, Author, Creation Date and Time.

The Presentation Label and Description are entered by the user at the time of the export of the presentation state. If GSPS objects are created as part of the export the key image set, the Label and description are set automatically.

The product supports calibration of the monitors used for user creation of presentation states to the Grayscale Display Function Standard of DICOM. The monitors shall be calibrated according to their manufacturers' recommendations and instructions.

3.1 MAPPING OF DICOM ENTITIES

Universal Viewer maps DICOM Information Entities to local information entities in the product's database and user interface.

Table 3-1
Mapping of DICOM Entities to Local Entities

DICOM IE	Local Entity
Patient	Patient
Study	Study
Series	Series
Presentation State	Presentation State

3.2 IOD MODULE TABLE

The Grayscale Softcopy Presentation State Information Object Definition comprises the modules of the following table, plus Standard Extended and Private attributes. Standard Extended and Private attributes are described in Section 4.5.

Table 3-2
GSPS IOD MODULES

Entity Name	Module Name	Usage	Reference
Patient	Patient	Used	3.3.1.1
	Clinical Trial Subject	Not Used	
Study	General Study	Used	3.3.2.1
	Patient Study	Not Used	
	Clinical Trial Study	Not Used	
Series	General Series	Used	3.3.3.1
	Clinical Trial Series	Not Used	
	Presentation Series	Used	3.3.3.2
Equipment	General Equipment	Used	3.3.4.1
Presentation State	Presentation State Identification	Used	3.3.5.1
	Presentation State Relationship	Used	3.3.5.2
	Presentation State Shutter	Used	3.3.5.3

Entity Name	Module Name	Usage	Reference
	Presentation State Mask	Used	3.3.5.4
	Mask	Not Used	
	Display Shutter	Not Used	
	Bitmap Display Shutter	Not Used	
	Overlay Plane	Not used	
	Overlay Activation	Not used	
	Displayed Area	Used	3.3.5.5
	Graphic Annotation	Used when measurements or graphic/text labels are present	3.3.5.6
	Spatial Transformation	Used when Image is zoomed/rotated	3.3.5.7
	Graphic Layer	Used	3.3.5.8
	Modality LUT	Used if referenced image includes Modality LUT	3.3.5.9
	Softcopy VOI LUT	Used	3.3.5.10
	Softcopy Presentation LUT	Used	3.3.5.11
	SOP Common	Used	3.3.5.12

3.3 INFORMATION MODULE DEFINITIONS

Please refer to DICOM Part 3 (Information Object Definitions) for a description of each of the entities, modules, and attributes contained within the GSPS Information Object.

The following modules are included to convey Enumerated Values, Defined Terms, and Optional Attributes supported. Type 1 & Type 2 Attributes are also included for completeness and to define what values they may take and where these values are obtained from when generating the instance. It should be noted that they are the same ones as defined in the DICOM Standard Part 3 (Information Object Definitions). Also note that Attributes not present in tables are not supported.

3.3.1 Patient Entity Modules

3.3.1.1 PATIENT MODULE

Table 3-3
PATIENT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Patient's Name	(0010,0010)	2	Taken from the images of the study
Patient ID	(0010,0020)	2	Taken from images of the study
Issuer of Patient ID	(0010,0021)	3	Not Used
Patient's Birth Date	(0010,0030)	2	Taken from images of the study
Patient's Sex	(0010,0040)	2	Taken from images of the study
Referenced Patient Sequence	(0008,1120)	3	Not Used
Patient's Birth Time	(0010,0032)	3	Not Used
Other Patient IDs	(0010,1000)	3	Not Used
Other Patient IDs Sequence	(0010,1002)	3	Not Used
Other Patient Names	(0010,1001)	3	Not Used
Ethnic Group	(0010,2160)	3	Not Used
Patient Comments	(0010,4000)	3	Not Used

3.3.2 Study Entity Modules

3.3.2.1 GENERAL STUDY MODULE

Table 3-4
GENERAL STUDY MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Study Instance UID	(0020,000D)	1	Taken from images of the study
Study Date	(0008,0020)	2	Taken from Images of the study
Study Time	(0008,0030)	2	Taken from Images of the study
Referring Physician's Name	(0008,0090)	2	Always empty
Referring Physician Identification Sequence	(0008,0096)	3	Not Used
Study ID	(0020,0010)	2	Taken from Images of the Study
Accession Number	(0008,0050)	2	Taken from Images of the Study
Study Description	(0008,1030)	3	Taken from Images of the Study

3.3.3 Series Entity Modules

3.3.3.1 GENERAL SERIES MODULE

Table 3-5
GENERAL SERIES MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	1	Value = PR
Series Instance UID	(0020,000E)	1	New value is assigned for the set of GSPS objects created at the same time
Series Number	(0020,0011)	2	Always 1
Laterality	(0020,0060)	2C	Not Used
Series Date	(0008,0021)	3	Date of series creation
Series Time	(0008,0031)	3	Time of series creation

3.3.3.2 PRESENTATION SERIES MODULE

Table 3-6
PRESENTATION SERIES MODULE ATTRIBUTES

Attribute Name	Tag	Type	Use
Modality	(0008,0060)	1	Value = PR

3.3.4 Equipment Entity Modules

3.3.4.1 GENERAL EQUIPMENT MODULE

Table 3-7
GENERAL EQUIPMENT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Manufacturer	(0008,0070)	2	Value = GE Healthcare IT Radiology
Institution Name	(0008,0080)	3	Not Used
Institution Address	(0008,0081)	3	Not Used
Station Name	(0008,1010)	3	Value = name of workstation computer
Institutional Department Name	(0008,1040)	3	Not Used
Manufacturer's Model Name	(0008,1090)	3	Not Used
Device Serial Number	(0018,1000)	3	Not Used
Software Versions	(0018,1020)	3	Not Used
Gantry ID	(0018,1008)	3	Not Used
Spatial Resolution	(0018,1050)	3	Not Used

Attribute Name	Tag	Type	Attribute Description
Date of Last Calibration	(0018,1200)	3	Not Used
Time of Last Calibration	(0018,1201)	3	Not Used
Pixel Padding Value	(0028,0120)	1C	Not Used

3.3.5 Presentation State Entity Modules

3.3.5.1 PRESENTATION STATE IDENTIFICATION MODULE

Table 3-8
PRESENTATION STATE IDENTIFICATION MODULE ATTRIBUTES

Attribute Name	Tag	Type	Use
Presentation Creation Date	(0070,0082)	1	Date of instance creation
Presentation Creation Time	(0070,0083)	1	Time of instance creation
Instance Number	(0020,0013)	1	Always 1
Content Label	(0070,0080)	1	Entered by user or generated automatically
Content Description	(0070,0081)	2	Generated automatically
Content Creator's Name	(0070,0084)	2	Name of the user who created Presentation State
Content Creator's Identification Code Sequence	(0070,0086)	3	Not Used

3.3.5.2 PRESENTATION STATE RELATIONSHIP MODULE

Table 3-9
PRESENTATION STATE RELATIONSHIP MODULE ATTRIBUTES

Attribute Name	Tag	Type	Use
Referenced Series Sequence	(0008,1115)	1	
>Series Instance UID	(0020,000E)	1	
>Referenced Image Sequence	(0008,1140)	1	
>>Referenced SOP Class UID	(0008,1150)	1	
>>Referenced SOP Instance UID	(0008,1155)	1	
>>Referenced Frame Number	(0008,1160)	1C	Used if Presentation State related to the frame of multi-frame image
>>Referenced Segment Number	(0062,000B)	1C	Not Used

3.3.5.3 PRESENTATION STATE SHUTTER MODULE

Table 3-10
PRESENTATION STATE SHUTTER MODULE ATTRIBUTES

Attribute Name	Tag	Type	Use
Shutter Presentation Value	(0018,1622)	1C	Not Used
Shutter Presentation Color CIELab Value	(0018,1624)	1C	Not Used

3.3.5.4 PRESENTATION STATE MASK MODULE

Table 3-11
PRESENTATION STATE MASK MODULE ATTRIBUTES

Attribute Name	Tag	Type	Use
Mask Subtraction Sequence	(0028,6100)	1C	Not Used
>Mask Operation	(0028,6101)	1	
>Contrast Frame Averaging	(0028,6112)	1C	Not Used
Recommended Viewing Mode	(0028,1090)	1C	Not Used

3.3.5.5 DISPLAYED AREA MODULE

Table 3-12
DISPLAYED AREA MODULE ATTRIBUTES

Attribute Name	Tag	Type	Use
Displayed Area Selection Sequence	(0070,005A)	1	
>Referenced Image Sequence	(0008,1140)	1C	Used
>>Referenced SOP Class UID	(0008,1150)	1	
>>Referenced SOP Instance UID	(0008,1155)	1	
>>Referenced Frame Number	(0008,1160)	1C	Used if applied to subset of frames of multi-frame image
>>Referenced Segment Number	(0062,000B)	1C	Not Used
>Displayed Area Top Left Hand Corner	(0070,0052)	1	
>Displayed Area Bottom Right Hand Corner	(0070,0053)	1	
>Presentation Size Mode	(0070,0100)	1	Enumerated Values used: SCALE TO FIT TRUE SIZE MAGNIFY
>Presentation Pixel Spacing	(0070,0101)	1C	Used
>Presentation Pixel Aspect Ratio	(0070,0102)	1C	Used
>Presentation Pixel Magnification Ratio	(0070,0103)	1C	Used if Presentation Size Mode is MAGNIFY

3.3.5.6 GRAPHIC ANNOTATION MODULE

Table 3-13
GRAPHIC ANNOTATION MODULE ATTRIBUTES

Attribute Name	Tag	Type	Use
Graphic Annotation Sequence	(0070,0001)	1	
>Referenced Image Sequence	(0008,1140)	1C	Used
>>Referenced SOP Class UID	(0008,1150)	1	
>>Referenced SOP Instance UID	(0008,1155)	1	
>>Referenced Frame Number	(0008,1160)	1C	Used if annotation is applied to subset of frames of multi-frame image
>>Referenced Segment Number	(0062,000B)	1C	Not Used
>Graphic Layer	(0070,0002)	1	
>Text Object Sequence	(0070,0008)	1C	
>>Bounding Box Annotation Units	(0070,0003)	1C	Enumerated Values used: PIXEL
>>Anchor Point Annotation Units	(0070,0004)	1C	Enumerated Values used: PIXEL
>>Unformatted Text Value	(0070,0006)	1	
>>Bounding Box Top Left Hand Corner	(0070,0010)	1C	Used
>>Bounding Box Bottom Right Hand Corner	(0070,0011)	1C	Used
>>Bounding Box Text Horizontal Justification	(0070,0012)	1C	Enumerated Values used: CENTER
>>Anchor Point	(0070,0014)	1C	Used
>>Anchor Point Visibility	(0070,0015)	1C	Not Used
>Graphic Object Sequence	(0070,0009)	1C	Used
>>Graphic Annotation Units	(0070,0005)	1	Enumerated Values used: PIXEL
>>Graphic Dimensions	(0070,0020)	1	
>>Number of Graphic Points	(0070,0021)	1	
>> Graphic Data	(0070,0022)	1	
>>Graphic Type	(0070,0023)	1	Enumerated Values used: POINT POLYLINE

Attribute Name	Tag	Type	Use
			CIRCLE ELLIPSE
>>Graphic Filled	(0070,0024)	1C	Enumerated Values used: N = no

3.3.5.7 SPATIAL TRANSFORMATION MODULE

Table 3-14
SPATIAL TRANSFORMATION MODULE ATTRIBUTES

Attribute Name	Tag	Type	Use
Image Rotation	(0070,0042)	1	Enumerated Values used: 0 90 180 270
Image Horizontal Flip	(0070,0041)	1	Enumerated Values used: Y = yes N = no

3.3.5.8 GRAPHIC LAYER MODULE

Table 3-15
GRAPHIC LAYER MODULE ATTRIBUTES

Attribute Name	Tag	Type	Use
Graphic Layer Sequence	(0070,0060)	1	
>Graphic Layer	(0070,0002)	1	
>Graphic Layer Order	(0070,0062)	1	
>Graphic Layer Recommended Display Grayscale Value	(0070,0066)	3	Not Used
>Graphic Layer Recommended Display RGB Value	(0070,0067)	3	Not Used
>Graphic Layer Recommended Display CIELab Value	(0070,0401)	3	Not Used
>Graphic Layer Description	(0070,0068)	3	Not Used

3.3.5.9 MODALITY LUT MODULE

Table 3-16
MODALITY LUT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Modality LUT Sequence	(0028,3000)	1C	Copied from the referenced image, if present
>LUT Descriptor	(0028,3002)	1	
>LUT Explanation	(0028,3003)	3	
>Modality LUT Type	(0028,3004)	1C	
>LUT Data	(0028,3006)	1	
Rescale Slope	(0028,1052)	1C	Copied from the referenced image, if present
Rescale Intercept	(0028,1053)	1C	Copied from the referenced image, if present
Rescale Type	(0028,1054)	1C	Used

3.3.5.10 SOFTCOPY VOI LUT MODULE

Table 3-17
SOFTCOPY VOI LUT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Use
Softcopy VOI LUT Sequence	(0028,3110)	1	
>Referenced Image Sequence	(0008,1140)	1C	Used
>>Referenced SOP Class UID	(0008,1150)	1C	
>>Referenced SOP Instance UID	(0008,1155)	1C	
>>Referenced Frame Number	(0008,1160)	1C	Used if referencing a frame in multi-frame image
>VOI LUT Sequence	(0028,3010)	1C	Used if applied to the referenced image
>>LUT Descriptor	(0028,3002)	1	
>>LUT Explanation	(0028,3003)	3	
>>LUT Data	(0028,3006)	1	
>Window Center	(0028,1050)	1C	A single Value is provided
>Window Width	(0028,1051)	1C	A single Value is provided
>Window Center & Width Explanation	(0028,1055)	3	Not Used
>VOI LUT Function	(0028,1056)	3	Not Used

3.3.5.11 SOFTCOPY PRESENTATION LUT MODULE

Table 3-18
SOFTCOPY PRESENTATION LUT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Use
Presentation LUT Sequence	(2050,0010)	1C	Not Used
>LUT Descriptor	(0028,3002)	1	
>LUT Explanation	(0028,3003)	3	
>LUT Data	(0028,3006)	1	
Presentation LUT Shape	(2050,0020)	1C	Enumerated Values used: IDENTITY INVERSE

3.3.5.12 SOP COMMON MODULE

Table 3-19
SOP COMMON MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
SOP Class UID	(0008,0016)	1	
SOP Instance UID	(0008,0018)	1	Generated using the internal computer clock
Specific Character Set	(0008,0005)	1C	Set according to the system configuration. Defined terms shown in Table 2.7-1
Instance Creation Date	(0008,0012)	3	Used
Instance Creation Time	(0008,0013)	3	Used
Instance Creator UID	(0008,0014)	3	Not Used

3.4 PRIVATE DATA ATTRIBUTES

The Product supports the Standard and Private Attributes defined in the following sections in Standard Extended GSPS SOP Instances as Type 3 data elements.

3.4.1 Private Group GEIIS_IW

Private Group GEIIS_IW is modeled as part of the Presentation State Information Entity.

Table 3-20
Private Group GEIIS_IW

Attribute Name	Tag	VR	VM	Use
Private Creator Identification	(0075,00xx)	LO	1	GEIIS_IW
COUNT_IN_SET	(0075,xx02)	US	1	
GSPS_DISPLAY_ONLY	(0075,xx05)	CS	1	
PRIMITIVE_ID	(0075,xx10)	US	1	
STUDY_PART_INFO	(0075,xx15)	LO	1	
STUDY_LAYOUT_DATA	(0075,xx16)	LO	1	
LAYOUT_SEQUENCE	(0075,xx17)	SQ	1	
>GROUP_ID	(0075,xx18)	US	1	
>LAY_PAGE_FORMAT	(0075,xx19)	CS	1	
>LAY_ACTIVE_PAGE	(0075,xx1A)	US	1	
DEPENDENT_PS_SEQUENCE	(0075,xx20)	SQ	1	
>DEPENDENT_PS_STUDY_NCD	(0075,xx21)	UL	1	
>DEPENDENT_PS_OBJECT_ID	(0075,xx22)	US	1	
>DEPENDENT_PS_STUDY_CBP	(0075,xx23)	CS	1	
>DEPENDENT_PS_GSPS_LABEL	(0075,xx24)	CS	1	
FONT_NAME	(0075,xx60)	CS	1	
FONT_STYLE	(0075,xx61)	US	1	
FONT_SIZE	(0075,xx62)	US	1	
FONT_COLOR	(0075,xx63)	UL	1	
GFT_SEQUENCE	(0075,xx69)	SQ	1	
GFT_TYPESTYLEMODE	(0075,xx70)	CS	N	
GFT_GRAFFITY_ID	(0075,xx71)	SS	1	
GFT_SPINE_LABEL	(0075,xx72)	SS	1	
GFT_INTER_VERTEBRAL_SPACE	(0075,xx73)	CS	1	
GFT_SHOW_SPINE_LETTER	(0075,xx74)	CS	1	
GFT_IS_SUV_ROI	(0075,xx75)	CS	1	
GFT_VOI_TYPE	(0075,xx76)	US	1	
GFT_CALC_TYPE	(0075,xx77)	US	1	
GFT_VOI_SLICE_INDEXES	(0075,xx78)	US	N	
GFT_IS_PRIMARY_SLICE	(0075,xx79)	US	N	
GFT_DIAMETER	(0075,xx7A)	US	N	
GFT_SLICES_NUM	(0075,xx7B)	US	N	
GFT_WHOLE_SEQUENCE	(0075,xx7C)	US	N	
GFT_UNITS_TYPE	(0075,xx7D)	US	1	
GFT_POINTS	(0075,xx7E)	FL	N	
GFT_QPOINTS	(0075,xx7F)	FL	N	
GFT_SPLINE	(0075,xx80)	FL	N	
GFT_TEXT_LOCATION	(0075,xx81)	FL	2	
GFT_AUX_TEXT_LOCATION_1	(0075,xx82)	FL	2	
GFT_AUX_TEXT_LOCATION_2	(0075,xx83)	FL	2	
GFT_COLOR	(0075,xx84)	UL	1	
GFT_COLOR_BW	(0075,xx85)	UL	1	
GFT_TEXT	(0075,xx86)	LO	1	
GFT_AUX_TEXT_1	(0075,xx87)	LO	1	
GFT_AUX_TEXT_2	(0075,xx88)	LO	1	
GFT_FROM_ANCHOR	(0075,xx89)	SL	1	
GFT_TO_ANCHOR	(0075,xx8A)	SL	1	
GFT_SEED_SLICE	(0075,xx8B)	UL	1	
GFT_SEED_POS	(0075,xx8C)	UL	2	
GFT_THRESHOLD	(0075,xx8D)	US	1	
GFT_VALUES_RANGE	(0075,xx8E)	UL	2	
GFT_NEEDS_RECALC	(0075,xx8F)	CS	1	
GFT_FONT_ALIGN	(0075,xx90)	CS	1	
GFT_FIT_TEXT	(0075,xx91)	LO	1	

Attribute Name	Tag	VR	VM	Use
COPY_INDEX	(0075,xx92)	US	1	
GFT_GSPS_RECALC	(0075,xx93)	CS	1	
PS_OVERLAY_STATE	(0075,xx1B)	CS	1	
GFT_OID_SEQID	(0075,xxC0)	UI	1	
GFT_OID_IMAGEID	(0075,xxC1)	UI	1	
GFT_OID_COPY_INDEX	(0075,xxC2)	SS	1	

3.4.2 Private Group GEIIS_RA1000

Private Group GEIIS_RA1000 is modeled as part of the Presentation State Information Entity.

Table 3-21
Private Group GEIIS_RA1000

Attribute Name	Tag	VR	VM	Use
Private Creator Identification	(0071,00xx)	LO	1	GEIIS_RA1000
Private GSPS Type	(0071,xx10)	CS	1	2 possible values: DISPLAYLIST and NONDISPLAYLIST
Private Font Name	(0071,xx20)	ST	1	Font used for Text Annotation
Private Font Style	(0071,xx21)	US	1	Style code of the font used for Text Annotation
Private Font Size	(0071,xx22)	US	1	Point Size of the font used for Text Annotation
Annotation State View	(0071,xx23)	US	1	Index for an annotation that corresponds to the order it should appear in the statistics view display of the workstation

4. KEY OBJECT SELECTION IOD IMPLEMENTATION

4.1 INTRODUCTION

This section specifies the use of the DICOM Key Object Selection Document IOD to represent results produced by the Universal Viewer implementation. Corresponding attributes are conveyed using the module construct.

Universal Viewer can create Key Object Selection instances explicitly or they may be created automatically when a user selects to export the internal set of key images (print pages). The images that are referenced by the KOS object are selected by placing them into the placeholders of the Print Page template. In addition, a set of GSPS objects are created to reflect the presentation state of each of the images.

Note: The print page template information as well as annotations placed on the page and not on a particular image are not recorded in the KOS object.

The Key Object Selection Document is rendered in the form of Universal Viewer Print Page Key Image Set, where images are displayed in the placeholders of the default Print Page Template.

Universal Viewer supports rendering of instances of the Storage SOP Classes as defined in Table 2-1 referenced in Key Object Selection Document provided the referenced instances are locally stored. If the referenced instances are not locally stored, the application will display an error message in the corresponding placeholder.

4.2 MAPPING OF DICOM ENTITIES

Universal Viewer maps DICOM Information Entities to local information entities in the product's database and user interface.

Table 4-1
Mapping of Dicom Entities to Local Entities

DICOM IE	Local Entity
Patient	Patient
Study	Study
Series	Series
Presentation State	Presentation State

4.3 IOD MODULE TABLE

The Key Object Selection Definition comprises the modules of the following table, plus Standard Extended and Private attributes. Standard Extended and Private attributes are described in Section 5.4.

Table 4-2
GSPS IOD MODULES

Entity Name	Module Name	Usage	Reference
Patient	Patient	Used	3.3.1.1
	Clinical Trial Subject	Not Used	
Study	General Study	Used	3.3.2.1
	Patient Study	Not Used	
	Clinical Trial Study	Not Used	
Series	Key Object Document Series	Used	4.4.1.1
	Clinical Trial Series	Not Used	
Equipment	General Equipment	Used	3.3.4.1

Entity Name	Module Name	Usage	Reference
Document	Key Object Document	Used	4.4.2.1
	SR Document Content	Used	4.4.2.2
	SOP Common	Used	3.3.5.12

4.4 INFORMATION MODULE DEFINITIONS

Please refer to DICOM Part 3 (Information Object Definitions) for a description of each of the entities, modules, and attributes contained within the Key Object Selection Document Information Object.

The following modules are included to convey Enumerated Values, Defined Terms, and Optional Attributes supported. Type 1 & Type 2 Attributes are also included for completeness and to define what values they may take and where these values are obtained from when generating the instance. It should be noted that they are the same ones as defined in the DICOM Standard Part 3 (Information Object Definitions). Also note that Attributes not present in tables are not supported.

4.4.1 Series Entity Modules

4.4.1.1 KEY OBJECT DOCUMENT SERIES MODULE

Table 4-3
KEY OBJECT DOCUMENT SERIES MODULEATTRIBUTES

Attribute Name	Tag	Type	Use
Modality	(0008,0060)	1	Value = KO
Series Instance UID	(0020,000E)	1	
Series Number	(0020,0011)	1	
Series Date	(0008,0021)	3	Used
Series Time	(0008,0031)	3	Used
Series Description	(0008,103E)	3	Used
Referenced Performed Procedure Step Sequence	(0008,1111)	2	Not Used– Set as empty

4.4.2 Document Entity Modules

4.4.2.1 KEY OBJECT DOCUMENT MODULE

Table 4-4
KEY OBJECT DOCUMENT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Use
Instance Number	(0020,0013)	1	
Content Date	(0008,0023)	1	
Content Time	(0008,0033)	1	
Referenced Request Sequence	(0040,A370)	1C	
>Study Instance UID	(0020,000D)	1	
>Referenced Study Sequence	(0008,1110)	2	
>>Include 'SOP Instance Reference Macro'			
>Accession Number	(0008,0050)	2	
>Placer Order Number/Imaging Service Request	(0040,2016)	2	
>Filler Order Number/Imaging Service Request	(0040,2017)	2	
>Requested Procedure ID	(0040,1001)	2	
>Requested Procedure Description	(0032,1060)	2	
>Requested Procedure Code Sequence	(0032,1064)	2	
>>Include 'Code Sequence Macro'			
Current Requested Procedure Evidence Sequence	(0040,A375)	1	
>Include 'Hierarchical SOP Instance Reference Macro'			

Attribute Name	Tag	Type	Use
Identical Documents Sequence	(0040,A525)	1C	Not used
>Include 'Hierarchical SOP Instance Reference Macro'			

4.4.2.2 SR DOCUMENT CONTENT MODULE

Table 4-5
SR DOCUMENT CONTENT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Use
Observation DateTime	(0040,A032)	1C	
Content Template Sequence	(0040,A504)	1C	
>Mapping Resource	(0008,0105)	1	
>Template Identifier	(0040,DB00)	1	
Value Type	(0040,A040)	1	
Continuity of Content	(0040,A050)	1C	
Concept Name Code Sequence	(0040,A043)	1C	
>Include 'Code Sequence Macro'			
Insert Concept Value attribute(s)			
Content Sequence	(0040,A730)	1C	
> Relationship Type	(0040,A010)	1	
> Referenced Content Item Identifier	(0040,DB73)	1C	Not used
> Insert SR Document Content Module Recursive inclusion to create document content tree.			

See section 4.4.2.2.1 for the list of supported templates

4.4.2.2.1 SR DOCUMENT CONTENT DESCRIPTIONS

4.4.2.2.1.1 CONTENT TEMPLATE

The product supports the following root Templates for SR SOP Instances created, processed, or displayed by the product.

Table 4-6
SR Root Templates

SOP Class	Template ID	Template Name	Use
Key Object Selection Document	2010	Key Object Selection	Create/Display

4.4.2.2.1.2 STANDARD TEMPLATES

Universal Viewer supports the following standard templates for KOS SOP Instances created by this product.

4.4.2.2.1.3 TEMPLATE ID 2010 KEY OBJECT SELECTION

TABLE 4-7
TID 2010 – KEY OBJECT SELECTION TEMPLATE

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Usage
1			CONTAINER	CID(7010) Key Object Selection Document Titles	1	M	Used

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Usage
2	>	HAS CONCEPT MOD	CODE	(113011, DCM, "Document Title Modifier")	1-n	U	Used
3	>	HAS CONCEPT MOD	CODE	(113011, DCM, "Document Title Modifier")	1	UC	Used When Concept Name is (113001, DCM, "Rejected for Quality Reasons") or (113010, DCM," Quality Issue")
4	>	HAS CONCEPT MOD	CODE	(113011, DCM, "Document Title Modifier")	1	MC	Used When Concept Name is (113013, DCM, "Best In Set")
5	>	HAS CONCEPT MOD	INCLUDE	TID(1204) Language of Content Item and Descendants	1	U	Used
6	>	HAS OBS CONTEXT	INCLUDE	TID(1002) Observer Context	1-n	U	Used Only one instance is supported
7	>	CONTAINS	TEXT	(113012, DCM, "Key Object Description")	1	U	Used
8	>	CONTAINS	IMAGE	Purpose of Reference shall not be present	1-n	MC	Used
9	>	CONTAINS	WAVEFORM	Purpose of Reference shall not be present	1-n	MC	Not Supported
10	>	CONTAINS	COMPOSITE	Purpose of Reference shall not be present	1-n	MC	Not Supported

TABLE 4-8
TID 1204 – LANGUAGE OF CONTENT ITEM AND DESCENDANTS

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Usage
1		HAS CONCEPT MOD	CODE	(121049,DCM,"Language of Content Item and Descendants")	1	M	Used
2	>	HAS CONCEPT MOD	CODE	(121046,DCM,"Country of Language")	1	U	Not Used

TABLE 4-9
TID 1002 – OBSERVER CONTEXT

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Usage
1		HAS OBS CONTEXT	CODE	(121005,DCM, "Observer Type")	1	MC	Used Observer Type is always (121006,DCM, "Person")
2		HAS OBS CONTEXT	INCLUDE	TID (1003) Person observer identifying attributes	1	MC	Used
3		HAS OBS CONTEXT	INCLUDE	TID (1004) Device observer identifying attributes	1	MC	Not Supported

TABLE 4-10
TID 1003 – PERSON OBSERVER IDENTIFYING ATTRIBUTES

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Usage
1			PNAME	(121008,DCM, "Person Observer Name")	1	M	Used
2			TEXT	(121009,DCM, "Person Observer's Organization Name")	1	U	Not Used
3			CODE	(121010,DCM, "Person Observer's Role in the Organization")	1	U	Not Used
4			CODE	(121011,DCM, "Person Observer's Role in this Procedure")	1	U	Not Used

4.5 PRIVATE DATA ATTRIBUTES

The Product supports the Standard and Private Attributes defined in the following sections in Standard Extended KOS SOP Instances as Type 3 data elements.

4.5.1 Private Group GEIIS_IW

Private Group GEIIS_IW is modeled as part of the SR Document Information Entity.

Table 4-11
Private Group GEIIS_IW

Attribute Name	Tag	VR	VM	Use
Private Creator Identification	(0075,00xx)	LO	1	GEIIS_IW
GFT_OID_PP_PP	(0075,xxA0)	US	1	
GFT_OID_PP_CELL_ID	(0075,xxA1)	US	1	
GFT_OID_PETCT_PETCT	(0075,xxA5)	US	1	
GFT_OID_PETCT_PLACEHOLER	(0075,xxA6)	US	1	
GFT_OID_PETCT_ROWVECTOR	(0075,xxA7)	UL	2	
GFT_OID_PETCT_COLVECTOR	(0075,xxA8)	UL	2	
GFT_OID_PETCT_ORIGIN	(0075,xxA9)	UL	2	
GFT_OID_PETCT_SLICETHICKNESS	(0075,xxAA)	US	1	
GFT_OID_PETCT_SCALEX	(0075,xxAB)	FL	1	
GFT_OID_PETCT_SCALEY	(0075,xxAC)	FL	1	
GFT_OID_PETCT_SLICESIZE	(0075,xxAD)	UL	1	
GFT_OID_PETCT_SEQID_1	(0075,xxAE)	US	1	
GFT_OID_PETCT_SEQID_2	(0075,xxAF)	US	1	
PP_GFT_SEQUENCE	(0075,xxC5)	SQ	1	
>PP_START_END_CELL	(0075,xxC7)	US	2	
>PP_CATEGORY	(0075,xxC8)	CS	1	
>PP_PAGE_COUNT	(0075,xxC9)	US	1	
>PP_CURRENT_PAGE	(0075,xxCA)	US	1	
>PP_PAGE_BREAKS	(0075,xxCC)	CS	1	
>PP_FILM_BREAKS	(0075,xxCD)	CS	N	
>PP_SCOUT_CELLS	(0075,xxCE)	US	2	
>PP_LAYOUT	(0075,xxCF)	OB	1	
>PP_CELL_SEQUENCE	(0075,xxB0)	SQ	1	
>>PP_CELL_SHARPEN	(0075,xxB1)	CS	1	
>>PP_CELL_CRV	(0075,xxB3)	CS	1	
>>PP_CELL_OVERLAY_LOCK	(0075,xxB4)	CS	1	
>>PALETTE	(0075,xxB5)	US	1	
>>PALETTE_SEQ	(0075,xxB6)	US	1	
>> 3DA_SEQUENCE	(0075,xxDE)	SQ	1	
>>>3DA_MEAS_SEQUENCE	(0075,xxDF)	SQ	1	
>>>>3DA_ID	(0075,xxE0)	US	1	
>>>>3DA_COLOR	(0075,xxE1)	UL	1	
>>>>3DA_LABEL	(0075,xxE2)	LO	1	
>>>>3DA_LABEL_OFFSET	(0075,xxE3)	SL	1	
>>>>3DA_LOCATION	(0075,xxE4)	US	2	
>>>>3DA_IS_ACTIVE	(0075,xxE5)	CS	1	
>>>>3DA_MEAS_ENABLED	(0075,xxE6)	CS	1	
>>>>3DA_MEAS_DIAMETER IW_MAKETAG(0x)	(0075,xxE7)	US	1	
>>>>3DA_MEAS_SHOW	(0075,xxE8)	CS	1	
>>>>3DA_ANCHOR_FROM	(0075,xxE9)	UL	2	
>>>>3DA_ANCHOR_TO	(0075,xxEA)	UL	2	