

Document DOC3148396

Revision 2

Centricity Universal Viewer Zero Footprint (ZFP) 6.1.0.0

DICOM CONFORMANCE STATEMENT

INTEROPERABILITY DOCUMENTATION

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1 Overview

This DICOM Conformance Statement documents capabilities of product(s) identified below:

Product Name	Product Model Name(s)	Software Product Version(s)
Centricity Universal Viewer Zero Footprint (ZFP)	Universal Viewer ZFP	6.1.0.0

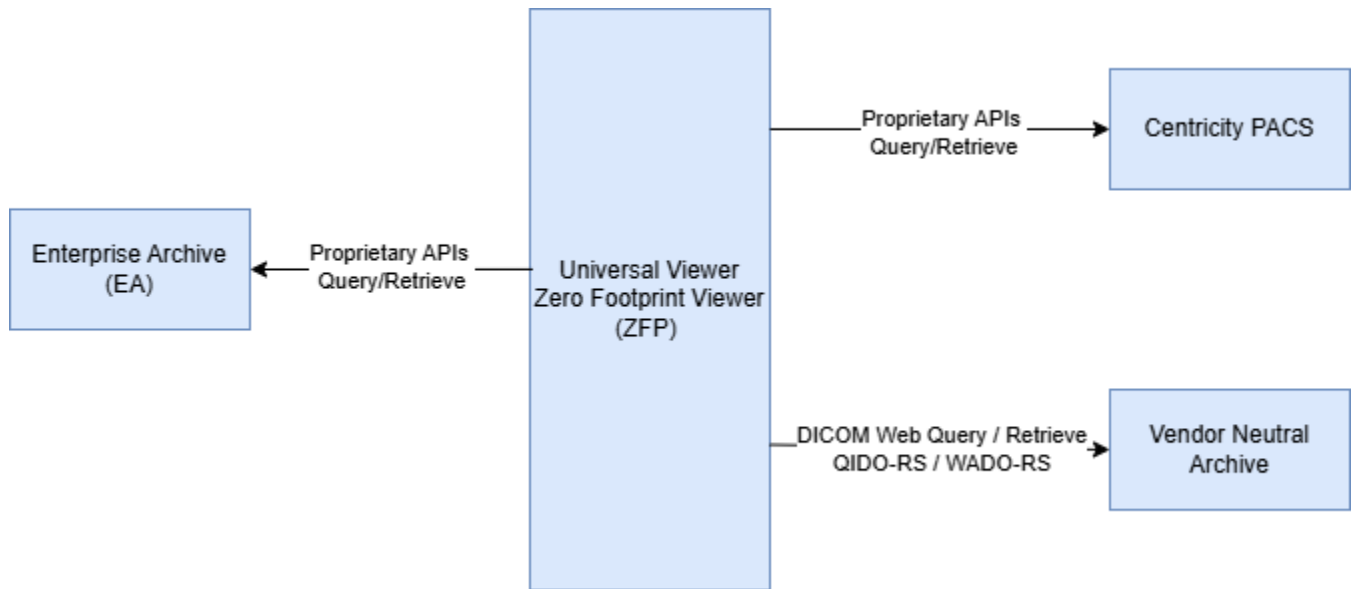


Figure 1-1 Overview of Implemented Services

1.1 Content and Transfer

Table 1-1 lists all Storage SOP Classes and the supported transfer mechanisms as well as the usage scenarios for those instances.

The "Transfer Syntax Set" column lists the sets of Transfer Syntaxes defined in Table 1-2 that are applicable to each SOP Class. The "DIMSE", "DICOM Web" and "Media Services" columns indicate the roles supported for each SOP Class.

The "Function" columns indicate how the instances are used by the system:

- Create: The system creates instances of the SOP Class. The type of the created SOP Class is indicated by one of the following abbreviations:
 - S: Standard SOP Class
 - SE: Standard Extended SOP Class
 - SP: Specialized SOP Class
 - P: Private SOP Class
- Display: The system displays the instances of the SOP Class to the user, either by displaying the SOP Instances natively or by applying instances of another suitable SOP Class to the image instances (e.g., a Presentation State or CAD SR).
- Process: The system processes the instances of the SOP Class to derive some further information that is made available to the user (e.g., a CAD processing algorithm, or a 3D Rendering).

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- Archive: The system stores the instances of the SOP Class and makes them available again.

Table 1-1 Storage SOP Classes

SOP Classes		Transfer Syntax Set	DIMSE Services		DICOM Web Services		Media Services			Function			
			SCU	SCP	UA	OS	FSC	FSU	FSR	Create	Display	Process	Archive
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	LL; L; U	N	N	Y	N	N	N	N	N	Y	N	N
Basic Text SR Storage	1.2.840.10008.5.1.4.1.1.88.11	LL; L; U	N	N	Y	N	N	N	N	N	Y	N	N
Breast Tomosynthesis Image Storage	1.2.840.10008.5.1.4.1.1.13.1.3	LL; L; U	N	N	Y	N	N	N	N	N	Y	N	N
Chest CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.65	LL; L; U	N	N	Y	N	N	N	N	N	Y	N	N
Comprehensive SR Storage	1.2.840.10008.5.1.4.1.1.88.33	LL; L; U	N	N	Y	N	N	N	N	N	Y	N	N
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	LL; L; U	N	N	Y	N	N	N	N	N	Y	N	N
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	LL; L; U	N	N	Y	N	N	N	N	N	Y	Y	N
Digital Mammography X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.2	LL; L; U	N	N	Y	N	N	N	N	N	Y	N	N
Digital Mammography X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	LL; L; U	N	N	Y	N	N	N	N	N	Y	N	N

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SOP Classes		Transfer Syntax Set	DIMSE Services		DICOM Web Services		Media Services			Function			
			SCU	SCP	UA	OS	FSC	FSU	FSR	Create	Display	Process	Archive
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	LL; L; U	N	N	Y	N	N	N	N	N	Y	N	N
Digital X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	LL; L; U	N	N	Y	N	N	N	N	N	Y	N	N
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	LL; L; U	N	N	Y	N	N	N	N	N	Y	N	N
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	LL; L; U	N	N	Y	N	N	N	N	N	Y	N	N
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	LL; L; U	N	N	Y	N	N	N	N	N	Y	N	N
Enhanced SR Storage	1.2.840.10008.5.1.4.1.1.88.22	LL; L; U	N	N	Y	N	N	N	N	N	Y	N	N
Key Object Selection Document Storage	1.2.840.10008.5.1.4.1.1.88.59	LL; L; U	N	N	Y	N	N	N	N	N	Y	N	N
Mammography CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.50	LL; L; U	N	N	Y	N	N	N	N	N	Y	N	N
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	LL; L; U	N	N	Y	N	N	N	N	N	Y	Y	N
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	LL; L; U	N	N	Y	N	N	N	N	N	Y	N	N

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SOP Classes		Transfer Syntax Set	DIMSE Services		DICOM Web Services		Media Services			Function			
			SCU	SCP	UA	OS	FSC	FSU	FSR	Create	Display	Process	Archive
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	LL; L; U	N	N	Y	N	N	N	N	N	Y	N	N
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	LL; L; U	N	N	Y	N	N	N	N	N	Y	N	N
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	LL; L; U	N	N	Y	N	N	N	N	N	Y	N	N
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	LL; L; U	N	N	Y	N	N	N	N	N	Y	N	N
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	LL; L; U	N	N	Y	N	N	N	N	N	Y	N	N
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	LL; L; U	N	N	Y	N	N	N	N	N	Y	N	N
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	LL; L; U	N	N	Y	N	N	N	N	N	Y	N	N
VL Whole Slide Microscopy Image Storage	1.2.840.10008.5.1.4.1.1.77.1.6	LL; L; U	N	N	Y	N	N	N	N	N	N	N	N
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	LL; L; U	N	N	Y	N	N	N	N	N	Y	N	N
X-Ray Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.67	LL; L; U	N	N	Y	N	N	N	N	N	Y	N	N

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SOP Classes		Transfer Syntax Set	DIMSE Services		DICOM Web Services		Media Services			Function			
			SCU	SCP	UA	OS	FSC	FSU	FSR	Create	Display	Process	Archive
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	LL; L; U	N	N	Y	N	N	N	N	N	Y	N	N
Digital Intra-Oral X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.3	LL; L; U	N	N	Y	N	N	N	N	N	Y	N	N
Digital Intra-Oral X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.3.1	LL; L; U	N	N	Y	N	N	N	N	N	Y	N	N
Ophthalmic Tomography Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.4	LL; L; U	N	N	Y	N	N	N	N	N	Y	N	N
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	V	N	N	Y	N	N	N	N	N	Y	N	N
Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1	V	N	N	Y	N	N	N	N	N	Y	N	N
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	LL; L; U	N	N	Y	N	N	N	N	N	Y	N	N
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	LL; L; U	N	N	Y	N	N	N	N	N	Y	N	N
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	LL; L; U	N	N	Y	N	N	N	N	N	Y	N	N
VL Slide-Coordinates	1.2.840.10008.5.1.4.1.1.77.1.3	LL; L; U	N	N	Y	N	N	N	N	N	Y	N	N

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SOP Classes		Transfer Syntax Set	DIMSE Services		DICOM Web Services		Media Services			Function			
			SCU	SCP	UA	OS	FSC	FSU	FSR	Create	Display	Process	Archive
Microscopic Image Storage													
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	LL; L; U	N	N	Y	N	N	N	N	N	Y	N	N
NM Image (Retired)	1.2.840.10008.5.1.4.1.1.5	LL; L; U	N	N	Y	N	N	N	N	N	Y	N	N

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Table 1-2 Supported Transfer Syntaxes

Transfer Syntax Set	Transfer Syntax Name	Transfer Syntax UID	DICOM Web Service Bulkdata Media Type
Lossless Compressed Transfer Syntax Set (LL)	JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14 [Selection Value 1])	1.2.840.10008.1.2.4.70	image/jpeg
Lossless Compressed Transfer Syntax Set (LL)	JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90	image/jp2
Lossless Compressed Transfer Syntax Set (LL)	RLE Lossless	1.2.840.10008.1.2.5	image/x-dicom-rle
Lossy Compressed Transfer Syntax Set (L)	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	image/jpeg
Lossy Compressed Transfer Syntax Set (L)	JPEG Extended (Process 2 & 4)	1.2.840.10008.1.2.4.51	image/jpeg
Lossy Compressed Transfer Syntax Set (L)	JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91	image/jp2
Lossy Compressed Transfer Syntax Set (L)	GE Compress Express	2.16.840.1.113709.1.2.2	N/A
Non-Image Transfer Syntax Set (NI)	Implicit VR Little Endian	1.2.840.10008.1.2	N/A
Non-Image Transfer Syntax Set (NI)	Explicit VR Little Endian	1.2.840.10008.1.2.1	application/octet-stream
Non-Image Transfer Syntax Set (NI)	Explicit VR Big Endian (Retired)	1.2.840.10008.1.2.2	N/A
Uncompressed Transfer Syntax Set (U)	Implicit VR Little Endian	1.2.840.10008.1.2	N/A
Uncompressed Transfer Syntax Set (U)	Explicit VR Little Endian	1.2.840.10008.1.2.1	application/octet-stream
Uncompressed Transfer Syntax Set (U)	Explicit VR Big Endian (Retired)	1.2.840.10008.1.2.2	N/A
Video Transfer Syntax Set (V)	MPEG-4 AVC/H.264 High Profile / Level 4.1	1.2.840.10008.1.2.4.102	video/mp4
Video Transfer Syntax Set (V)	MPEG-4 AVC/H.264 BD-compatible High Profile / Level 4.1	1.2.840.10008.1.2.4.103	video/mp4

1.1.1 Structured Reporting Root Template IDs - N/A

N/A

1.2 DIMSE Services - N/A

N/A

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1.3 DICOM Web Services

1.3.1 URI Service (WADO-URI)

Table 1- lists details on the support of the URI Service.

Table 1-3 URI Service

Service	Transaction	User Agent	Origin Server
URI Web Service (WADO-URI)	Retrieve DICOM Instances	Y	N

For resources supported see Table 1-1 in Section 1.1

1.3.2 Studies Service

Table 1-9 lists details on the support of the Studies Service.

Table 1-9 Study Service

Service	Transaction	Resource	User Agent	Origin Server
Studies Web Service	Retrieve Capabilities			
	Retrieve (WADO-RS)	Instance	Y	N
	Search (QIDO-RS)	All Studies	Y	N
	Search (QIDO-RS)	Study's Series	Y	N
	Search (QIDO-RS)	Study's Instances	Y	N
	Search (QIDO-RS)	All Series	Y	N
	Search (QIDO-RS)	Study's Series Instances	Y	N
	Search (QIDO-RS)	All Instances	Y	N

1.3.3 Worklist Service - N/A

N/A

1.3.4 Non-Patient Instance Service - N/A

N/A

1.3.5 Storage Commitment Service - N/A

N/A

1.4 Media Services - N/A

N/A

1.5 Real-Time Video Service - N/A

N/A

1.6 De-identification Profiles - N/A

N/A

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1.7 Specific Character Sets

Table 1-5 Supported Specific Character Sets

Defined Term	IANA	Description
Single-Byte Character Sets without Code Extensions		
ISO_IR 6	ISO-646	Default Repertoire (ASCII)
ISO_IR 100	ISO-8859-1	Latin Alphabet No.1 (Western Europe)
ISO_IR 101	ISO-8859-2	Latin alphabet No. 2 (Eastern Europe)
ISO_IR 144	ISO-8859-5	Cyrillic
ISO_IR 138	ISO-8859-8	Hebrew
ISO_IR 13		Japanese
Multi-Byte Character Sets without Code Extensions		
ISO_IR 192	UTF-8	Unicode in UTF-8
GB18030	GB18030	Chinese (GB18030-2000 - P.R China Norm GB18030)
Multi-Byte Character Sets with Code Extensions		
ISO 2022 IR 87	ISO-2022-JP	Japanese
ISO 2022 IR 149	ISO-2022-KR	Korean

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3 Introduction

3.1 Audience

This document is intended for the audience listed below. It is assumed that the reader has a working knowledge of the DICOM Standard.

The document structure was designed for easier access to relevant information for different user groups:

- Clinical Users, who want to get an overview of the implemented interoperability features of the system can see Section 4 Implementation Model.
- Personnel involved in Sales can use the information in Section 1 to assess the compatibility between different systems involved in a sales situation.
- System Integrators can use information in Section 6 during system installation and also information from Section 5 Service and Interoperability Description for details regarding the implemented services.
- Field Service Engineers can use the details from Section 5 Service and Interoperability Description and from Section 7 Network and Media Communication Details for troubleshooting.
- Hospital IT staff focusing on security can use the details provided in Section 8 Security regarding implemented Security features.
- Research Personnel may be interested in using information provided in Annex A Information Object Definitions (IODs) or Annex B Structured Report Content Encoding to get detailed imaging and measurement information.

3.2 Remarks

The scope of this DICOM Conformance Statement is to facilitate integration between ZFP and other DICOM products. The Conformance Statement should be read and understood in conjunction with the DICOM Standard [1] . 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 should not replace validation with other DICOM equipment to ensure proper exchange of intended information. In fact, it is the user's responsibility to perform the following validation activities:
 - The comparison of Conformance Statements from ZFP and other DICOM conformant equipment is the first step towards assessing interconnectivity and interoperability between those systems.
 - Test procedures should be defined and executed to validate the required level of interoperability with specific DICOM conformant equipment, as established by the healthcare facility.

ZFP has participated in an industry-wide testing program sponsored by Integrating the Healthcare Enterprise (IHE). The IHE Integration Statement of ZFP together with the IHE Technical Framework may facilitate the process of validation testing.

3.3 Trademarks

All products and their name brands are trademarks of their respective holders.

3.4 Omissions and Errors

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3.5 Copyrights

GE is a trademark of General Electric Company used under trademark license.

3.6 Terms and Definitions

The following list includes DICOM Terms, that are used throughout this Conformance Statement:

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)	A representation of the external behavior of an application process in terms of DICOM Network Services, Web Services and/or media exchange capabilities implemented in one or more roles. A single device may have multiple Application Entities.
Application Entity Title (AET)	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 Information 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).
Data Element	A unit of information as defined by a single entry in the data dictionary. An encoded Information Object Definition (IOD) Attribute that is composed of, at a minimum, three fields: a Data Element Tag, a Value Length, and a Value Field. For some specific Transfer Syntaxes, a Data Element also contains a VR Field where the Value Representation of that Data Element is specified explicitly
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. Examples: MR Image IOD, CT Image IOD, Print Job IOD. The Attributes within an IOD 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).
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's Name, Patient ID, Patient's Birth Date, and Patient's 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.
Origin Server	Refers to the program that can originate authoritative responses to HTTP requests for a given Target Resource. The term "server" refers to any implementation that receives a web service request message from a user agent.

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Presentation Context	The set of DICOM Network Services used over an Association, as negotiated between Application Entities; includes Abstract Syntaxes and Transfer Syntaxes.
Private SOP Class	A SOP Class that is not defined in the DICOM Standard but is published in an implementation's Conformance Statement.
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 Class (SOP Class)	The specification of the network or media transfer (service) of a particular type of data (object) ; the fundamental unit of a DICOM interoperability specification. Examples: Ultrasound Image Storage Service, Basic Grayscale Print Management.
Service/Object Pair Instance (SOP Instance)	An information object; a specific occurrence of information exchanged in a SOP Class. E.g., a specific X-ray image.
Specialized SOP Class	A SOP Class that is derived from the Standard that is specialized by additional type 1, 1C, 2, 2C, or 3 Attributes, by enumeration of specific permitted Values for Attributes, or by enumeration of specific permitted Templates. The additional Attributes may either be drawn from the Data Dictionary in PS3.6 or may be Private Attributes.
Standard SOP Class	A SOP Class defined in the Standard, and that is implemented and used without any modifications.
Standard Extended SOP Class	A SOP Class that is defined in the standard, and that is extended by additional type 3 Attributes. The additional Attributes may either be drawn from the DICOM Data Dictionary in PS3.6 or may be Private Attributes.
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.
TLS-Secured Port	TCP port on which an implementation accepts TLS connections to exchange DICOM information.
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.
User Agent	A client in a network protocol used in communications within a client-server distributed computing system. In particular, the Hypertext Transfer Protocol (HTTP) identifies the client software originating the request, using a user-agent header, even when the client is not operated by a user.
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.

3.7 Abbreviations

Abbreviations that are used in this DICOM Conformance Statement are listed here.

AE	Application Entity
AET	Application Entity Title
CAD	Computer Aided Detection
CDA	Clinical Document Architecture
CID	Context Identifier
DCS	DICOM Conformance Statement
DHCP	Dynamic Host Configuration Protocol
DICOM	Digital Imaging and Communications in Medicine
ELE	Explicit VR Little Endian
FSC	File-Set Creator
FSU	File-Set Updater
FSR	File-Set Reader
IANA	Internet Assigned Numbers Authority
IHE	Integrating the Healthcare Enterprise
ILE	Implicit VR Little Endian
IOD	Information Object Definition
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
ISO	International Organization for Standardization
MPPS	Modality Performed Procedure Step
MWL	Modality Worklist
NEMA	National Electrical Manufacturers Association
NTP	Network Time Protocol
OID	Object Identifier
OS	Origin Server
PDU	Protocol Data Unit
PHI	Protected Health Information
PPS	Performed Procedure Step
QIDO-RS	Query based on ID for DICOM Objects by RESTful Services
RTV	Real-Time Video
SCP	Service Class Provider
SCU	Service Class User
SDP	Service Description Protocol
SOP	Service-Object Pair
SPS	Scheduled Procedure Step

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SR	Structured Reporting
STOW-RS	STore Over the Web by RESTful Services
TCP/IP	Transmission Control Protocol/Internet Protocol
TID	Template Identifier
UA	User Agent
UI	User Interface
UID	Unique Identifier
UL	Upper Layer
UPS	Unified Procedure Step
UPS-RS	Unified Procedure Step by RESTful Services
VR	Value Representation
WADO-RS	Web Access to DICOM Objects by RESTful Services
WADO-URI	Web Access to DICOM Objects by URI
ERMF	Estimated Radiographic Magnification Factor

3.8 References

- [1] National Electrical Manufacturers Association (NEMA), Rosslyn, VA USA. PS3 / ISO 12052 Digital Imaging and Communications in Medicine (DICOM) Standard. <http://www.dicomstandard.org>.
- [2] Integrating the Healthcare Enterprise (IHE). IHE Radiology Technical Framework. http://www.ihe.net/Resources/technical_frameworks/#radiology.

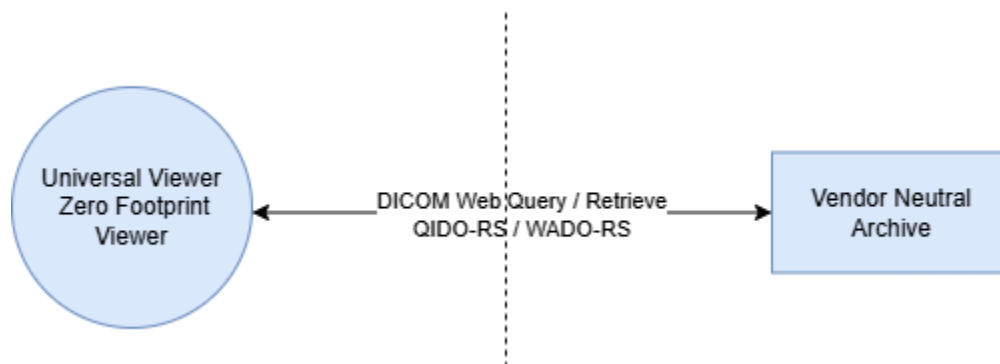
4 Implementation Model

This section of the DICOM Conformance Statement specifies the Universal Viewer ZFP compliance to DICOM requirements for **Networking** features.

The Universal Viewer ZFP is a viewing application. This section will define the DICOM objects supported by the application and any limitations dictated by DICOM defined content within the objects.

4.1 Application Entities and Data Flow

The network and media interchange application model for the ZFP is shown in **Error! Reference source not found.** ZFP Application Data Flow Diagram.



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There is one local real-world activity that occurs in Universal Viewer ZFP in which queries and retrieves the DICOM metadata and images from Vendor Neutral Archive (VNA).

This section describes the organization of the supported Services into Application Entities based on the default configuration of the system. This may change based on the actual setup at the customer site.

4.1.1 Functional Definition of Universal Viewer ZFP

The Universal Viewer ZFP Application entity supports DICOM Web QIDO-RS request for querying and retrieving DICOM metadata for worklist display and WADO-RS for receiving images from Vendor Neutral Archive (VNA)

5 Service and Interoperability Description

5.1 Mapping of Services to Application Entities – N/A

N/A

5.2 DIMSE Services

5.2.1 Basic Worklist Management Service - N/A

N/A

5.2.2 Modality Performed Procedure Step Service - N/A

N/A

5.2.3 Unified Worklist and Procedure Step Service - N/A

N/A

5.2.4 Instance Availability Notification Service - N/A

N/A

5.2.5 Storage Service

5.2.5.1 SCU of the Storage SOP Classes - N/A

N/A

5.2.5.2 SCP of the Storage SOP Classes

Error! Reference source not found. lists any limitations on displaying or processing instances, e.g., display or processing of the respective SOP Instances is prevented by an unsupported Value for an Attribute or the absence of that Attribute.

The "Effect" column describes what happens if the limitation is encountered. The following Values are used:

- ND: Display is not possible
- LD: Display is limited
- NP: Processing is not possible
- LP: Processing is limited
- OT: Other effects described in the "Comments" column

Table 5-1 Display and Processing Limitations for Storage SCP

Limitation Case			Effect	Comments
Attribute Name	Tag	Value		
12-lead ECG Waveform Storage (1.2.840.10008.5.1.4.1.1.9.1.1)				
Waveform Sequence	(5400, 0100)	More than one sequence value for original or derived waveforms	ND	ORIGINAL (Only one sequence should be present) DERIVED (Only one sequence should be present)
>Waveform Originality	(003A, 0004)	ORIGINAL or DERIVED	OT	Only one sequence of original or derived is allowed
>Number of Waveform Channels	(003A, 0005)	<=13 (including all standard 12 leads + “-aVR”)	OT	All standard 12 leads is allowed
>Channel Definition Sequence	(003A, 0200)		ND	
>>Channel Baseline	(003A, 0213)	Absent or non zero value	ND	Value must be 0
>>Channel Time Skew	(003A, 0214)	Absent or non zero value	ND	Value must be 0
>>Channel Sample Skew	(003A, 0215)	Absent or non zero value	ND	Value must be 0
>>Channel Offset	(003A, 0218)	Absent or non zero value	ND	Value must be 0
>>Channel Sensitivity	(003A, 0210)	Zero or absent	ND	Must be present with a Nonzero value. Although DICOM says it’s optional, ZFP mandates it.
>>Channel Sensitivity Units Sequence	(003A, 0211)	Millivolt or Microvolts DICOM says its optional, but ZFP mandates it.	ND	Must be present with a Millivolt or Microvolts value. Although DICOM says it’s optional, ZFP mandates it.
>>Waveform Bits Stored	(003A, 021A)	16	OT	Waveform is stored in 16 bits format.
>Waveform Bits Allocated	(5400, 1004)	16	OT	16 bits allocated
>Waveform Sample Interpretation	(5400, 10006)	SS	OT	Value can be Sign shorted
>Waveform Padding Value	(5400, 100A)	Values other than 0	ND	Padding value must be 0
>Channel Definition Sequence	(003A, 0200)	Absent	ND	Value must be present
>>Channel Sensitivity Unit sequence	(003A, 0211)	Absent	ND	Value must be present
>>>Coding Scheme Designator	(0008, 0102)	UCUM	ND	Must be present with Value UCUM otherwise will throw error
>>Channel Source Sequence	(003A, 0208)	SPECG	ND	Must be present with Value SPECG Otherwise, will throw error
>>>Coding Scheme Designator	(0008, 0102)	SPECG	ND	Must be present with Value SPECG Otherwise, will throw error

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Limitation Case			Effect	Comments
Attribute Name	Tag	Value		
Manufacturer	(0008, 0070)	Manufacturer of the equipment that produced the instance. ZFP mandates this value to be present.	ND	Must be present with value as Manufacturer of the equipment that produced the instance. Although DICOM says it’s optional, ZFP mandates it.
Waveform Annotation Sequence	(0040, B020)	Absent	OT	Value must be present
>Referenced Waveform Channels	(0040, A0B0)	1\0	OT	Apply to all the channels within the multiplex group
>Temporal Range Type	(0040, A130)	POINT	LD	Value must be POINT
>Referenced Sample Positions	(0040, A132)	“TimeValue” (GE modality specific) – NonDICOM, or “SamplePosition”	OT	GE modality specific TAG. Will have value as TimeValue.
>Concept Code Sequence	(0040, A168)	Absent	LD	Value must be present
>>Code Value	(0008, 0100)	Absent	LD	Must have value as 5.10.1.2. ZFP will display the waveform
>>Coding Scheme Designator	(0008, 0102)	Absent	LD	Must have value as SCPECG
>>Code Scheme Version	(0008, 0103)	Absent	LD	Must have value as 1.3
>>Code Meaning	(0008, 0104)	Absent	LD	Must have value as Pacemaker Spike
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) 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)				
Pixel Spacing	(0028,0030)	Present	OT	Geometric measurement for CR/DX/XA/RF modality will be in unit (cm)
Imager Pixel Spacing	(0018,1164)	Absent		
ERMF	(0018,1114)	Absent		
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) 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)				
Pixel Spacing	(0028,0030)	Absent	OT	Geometric measurement for CR/DX modality will be in unit (cm). And geometric measurement for XA/RF modality will be in unit (pixels)
Imager Pixel Spacing	(0018,1164)	Present		
ERMF	(0018,1114)	Absent		

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Limitation Case			Effect	Comments
Attribute Name	Tag	Value		
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) 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)				
Pixel Spacing	(0028,0030)	Present	OT	Geometric measurement for CR/DX modality if Pixel Spacing = Imager Pixel Spacing, then in unit (Cm) If Pixel Spacing ≠ Imager Pixel Spacing, then in unit (cm) using Pixel Spacing Geometric measurement for XA/RF modality if Pixel Spacing = Imager Pixel Spacing, then pixels If Pixel Spacing ≠ Imager Pixel Spacing, then in unit (cm) using Pixel Spacing
Imager Pixel Spacing	(0018,1164)	Present		
ERMF	(0018,1114)	Absent		
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) 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)				
Pixel Spacing	(0028,0030)	Absent	OT	Geometric measurement for CR/DX/XA/RF modality will be in unit pixels
Imager Pixel Spacing	(0018,1164)	Absent		
ERMF (Estimated Radiographic Magnification Factor)	(0018,1114)	Absent		
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) 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)				
Pixel Spacing	(0028,0030)	Present	OT	Geometric measurement for CR/DX/XA/RF modality will be in unit (cm) using pixels spacing
Imager Pixel Spacing	(0018,1164)	Absent		
ERMF (Estimated Radiographic Magnification Factor)	(0018,1114)	Present		
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) 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)				
Pixel Spacing	(0028,0030)	Absent	OT	

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Limitation Case			Effect	Comments
Attribute Name	Tag	Value		
				Geometric measurement for CR/DX/XA/RF modality will be in unit (cm) using IPS/ERMF
Imager Pixel Spacing	(0018,1164)	Present		
ERMF (Estimated Radiographic Magnification Factor)	(0018,1114)	Present		
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) 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)				
Pixel Spacing	(0028,0030)	Present	OT	Geometric measurement for CR/DX will be as below if Pixel Spacing = Imager Pixel Spacing, then in unit (cm) using Imager Pixel Spacing / ERMF If Pixel Spacing ≠ Imager Pixel Spacing, then in unit (cm) using PS Geometric measurement for XA/RF modality if Pixel Spacing = Imager Pixel Spacing, then in unit (cm) using Imager Pixel Spacing / ERMF If Pixel Spacing ≠ Imager Pixel Spacing, then in unit (cm) using PS
Imager Pixel Spacing	(0018,1164)	Present		
ERMF (Estimated Radiographic Magnification Factor)	(0018,1114)	Present		
Breast Tomosynthesis converted to CT Image Storage (1.2.840.10008.5.1.4.1.1.2)				
Pixel Spacing	(0028,0030)	Absent	OT	Geometric measurement for Breast Tomosynthesis Image which is converted to CT Object is in unit pixels
Pixel Spacing	(0028,0030)	Present	OT	Geometric measurement for Breast Tomosynthesis Image which is converted to CT Object is in unit (cm)
Digital Mammography X-Ray Image Storage - For Presentation (1.2.840.10008.5.1.4.1.1.1.2)				
Imager Pixel Spacing	(0018,1164)	Absent	OT	Geometric measurement for Digital Mammography X-Ray Image Storage - For Presentation is in units pixels
ERMF (Estimated Radiographic Magnification Factor)	(0018,1114)	Absent	OT	Geometric measurement for Digital Mammography X-Ray Image Storage - For Presentation is in units pixels
Digital Mammography X-Ray Image Storage - For Presentation (1.2.840.10008.5.1.4.1.1.1.2)				
Imager Pixel Spacing	(0018,1164)	Present	OT	Geometric measurement for Digital Mammography X-Ray Image Storage - For Presentation is in units (cm) using Imager Pixel Spacing /ERMF
ERMF (Estimated Radiographic Magnification Factor)	(0018,1114)	Present	OT	
CT Image Storage (1.2.840.10008.5.1.4.1.1.2)				

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Limitation Case			Effect	Comments
Attribute Name	Tag	Value		
Multi-energy CT Acquisition	(0018,9361)	YES	LD	Measured Region of Interest pixel values are reported in Hounsfield Units (HU). Real World Value transformations are ignored for display and measurement reporting.

5.2.6 Storage Commitment Service - N/A

N/A

5.2.7 Query/Retrieve Service Class - N/A

N/A

5.2.8 Print Management Service - N/A

N/A

5.3 DICOM Web Services

5.3.1 URI Web Service (WADO URI)

This section provides details regarding the URI Web Service. For an overview of the supported transactions see Table 1-3 URI Service.

5.3.1.1 Supported Web Media Types

5.3.1.1.1 DICOM Media Types

The supported Transfer Syntaxes are listed in Section 1.1 of this document.

5.3.1.1.2 Rendered Media Types

Table 5-2 lists the supported rendered Media types depending on the Media Type category.

Table 5-2 Supported Rendered Media Types

Category	Media Type	URI User Agent	URI Origin Server
Single Frame Image	image/jpeg	Y	N
	image/x-dicom-rle	Y	N
	image/jp2	Y	N
Multi-Frame Image	image/jpeg	Y	N
	image/x-dicom-rle	Y	N
	image/jp2	Y	N
Video	video/mp4	Y	N

5.3.1.2 Retrieve DICOM Instance Transaction - URI Web Service

To display or process DICOM instances retrieved via URI Web Service, see Section 5.2.5.2.

5.3.1.2.1 User Agent

The URI Web Service user agent supports the Query Parameters listed in Table 5-3.

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Table 5-3 Query Parameters for Retrieve DICOM Instance URI Web Service - User Agent

Query Parameter	Supported Values	Comments
requestType	WADO	
studyUID	Study Instance UID	Study instance UID parameter
seriesUID	Series Instance UID	Series Instance UID parameter
objectUID	SOP Instance UID	SOP Instance UID parameter
contentType	application/dicom	See in the Overview section Table 1-1 the supported DICOM SOP Classes / Transfer Syntaxes. Look for "Y" in the "UA" column
charset	UTF-8, ISO-646, ISO-8859-1, ISO-8859-2, ISO-8859-5, GB18030, ISO-8859-8, ISO-2022-JP, ISO-2022-KR	
anonymize	yes	
transferSyntax	JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14 [Selection Value 1]) 1.2.840.10008.1.2.4.70, JPEG 2000 Image Compression (Lossless Only) 1.2.840.10008.1.2.4.90, RLE Lossless 1.2.840.10008.1.2.5, JPEG Baseline (Process 1) 1.2.840.10008.1.2.4.50, JPEG Extended (Process 2 & 4) 1.2.840.10008.1.2.4.51, JPEG 2000 Image Compression 1.2.840.10008.1.2.4.91, GE Compress Express 2.16.840.1.113709.1.2.2, Implicit VR Little Endian 1.2.840.10008.1.2, Explicit VR Little Endian 1.2.840.10008.1.2.1, Explicit VR Big Endian (Retired) 1.2.840.10008.1.2.2, Implicit VR Little Endian 1.2.840.10008.1.2, Explicit VR Little Endian 1.2.840.10008.1.2.1, Explicit VR Big Endian (Retired) 1.2.840.10008.1.2.2, MPEG-4 AVC/H.264 High Profile / Level 4.1 1.2.840.10008.1.2.4.102, MPEG-4 AVC/H.264 BD-compatible High Profile / Level 4.1 1.2.840.10008.1.2.4.103	

The URI Web Service User Agent supports the Header Fields listed in Table 5-4:

Table 5-4 Header Fields for Retrieve DICOM Instance URI Web Service - User Agent

Header Field	Supported Values	Comments
Accept	application/dicom	See in the Overview section Table 1-1 the supported DICOM SOP Classes / Transfer Syntaxes. Look for "Y" in the "UA" column
Accept-charset	UTF-8, ISO-646, ISO-8859-1, ISO-8859-2, ISO-8859-5, GB18030, ISO-8859-8, ISO-2022-JP, ISO-2022-KR	

5.3.1.2.2 Origin Server - N/A

N/A

5.3.1.3 Retrieve Rendered Instance Transaction - URI Web Service - N/A

N/A

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5.3.2 Studies Web Service

This section provides details regarding the Studies Web Service. For an overview of supported transactions and resources see Table 1- Study Service.

5.3.2.1 Supported Web Media Types

5.3.2.1.1 DICOM Media Types

The supported DICOM Storage SOP Classes / Transfer Syntaxes are listed in Section 1.1 of this document.

5.3.2.1.2 DICOM Bulkdata Media Type – N/A

N/A

5.3.2.1.3 Supported Rendered Media Types – N/A

N/A

5.3.2.2 Retrieve supported transaction (WADO-RS)

The Studies Web Service Retrieve Transaction is also known as WADO-RS.

5.3.2.2.1 User Agent

The Retrieve Transaction user agent can request resources listed in Table 5-5:

Table 5-5 Resources Retrieve Transaction - User Agent

Resource	Comments
DICOM Instance Resources - See Resources path in <i>Table 10.4.1-1 in PS3.18</i>	
Study Instances	The implementation follows the standard URI pattern “{SERVICE}/studies/{StudyInstanceUID} Within the {SERVICE} part consumers can provide the AE title if the VNA supports the handling of multiple AETs
Series Instances	The implementation follows the standard URI pattern “{SERVICE}/studies/{StudyInstanceUID}/series/{SeriesInstanceUID } Within the {SERVICE} part consumers can provide the AE title if the VNA supports the handling of multiple AETs
Individual Instance	The implementation follows the standard URI pattern “{SERVICE}/studies/{StudyInstanceUID}/series/{SeriesInstanceUID}/instances/{SOPInstanceUID} Within the {SERVICE} part consumers can provide the AE title if the VNA supports the handling of multiple AETs

The Retrieve Transaction user agent supports the Query Parameters listed in Table 5-6.

Table 5-6 Query Parameters for Retrieve Transaction - User Agent

Query Parameter	Supported Values	Comments
Accept	multipart/related; type="application/dicom"; transfer- syntax={uid}	

The Retrieve Transaction user agent supports Header Fields listed in Table 5-7.

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Table 5-7 Header Fields for Retrieve Transaction - User Agent

Header Field	Supported Values	Comments
Instance resource		
Accept	multipart/related; type="application/dicom"; transfer-syntax={uid}	See in the Overview section Table 1-1 the supported DICOM SOP Classes / Transfer Syntaxes. Look for "Y" in the "UA" column.

5.3.2.2.2 Origin Server - N/A

N/A

5.3.2.3 Store Transaction (STOW-RS) - N/A

N/A

5.3.2.4 Search Transaction (QIDO-RS)
5.3.2.4.1 User Agent

The Search Transaction user agent can request resources listed in Table 5-8.

Table 5-8 Resources Search Transaction - User Agent

Resource	Comments
	See resource path in Table 10.6.1-1 in PS3.18
All studies	
All series	
All instances	
Study's Series	
Study's instances	
Study Series's Instances	

The Search Transaction user agent supports query parameters listed in Table 5-9.

Table 5-9 Query Parameters for Search Transaction - User Agent

Query Parameter	Supported Values	Comments
match	Attribute Values to address the search (matching key). See the supported DICOM Attribute in the Table 5-10	
includefield	Attributes to be included in the response (return key). See the supported DICOM Attributes in the Table 5-10	
fuzzymatching	true or false	
emptyvaluematching	true or false	
multiplevaluematching	true or false	
Limit	201	

Table 5-10 lists the DICOM query Attributes supported by the Search Transaction user agent.

Table 5-10 Supported Query Attributes User Agent

Attribute Name	Tag	Matching Key	Return Key	Comments
Study Level (May be used for All studies, All series, All instance resource query)				

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Attribute Name	Tag	Matching Key	Return Key	Comments
SpecificCharacterSet	(0008,0005)	N	Y	
StudyDate	(0008,0020)	N	Y	
StudyTime	(0008,0030)	N	Y	
AccessionNumber	(0008,0050)	N	Y	
ModalitiesInStudy	(0008,0061)	N	Y	
ReferringPhysicianName	(0008,0090)	N	Y	
TimezoneOffsetFromUTC	(0008,0201)	N	Y	
PatientName	(0010,0010)	N	Y	
PatientID	(0010,0020)	N	Y	
PatientBirthDate	(0010,0030)	N	Y	
PatientSex	(0010,0040)	N	Y	
StudyInstanceUID	(0020,000D)	Y	Y	
StudyID	(0020,0010)	N	Y	
NumberOfStudyRelatedSeries	(0020,1206)	N	Y	
NumberOfStudyRelatedInstances	(0020,1208)	N	Y	
Series Level (May be used for All Series, Study's Series, Study's Instances, All Instances resource query)				
SpecificCharacterSet	(0008,0005)	N	Y	
Modality	(0008,0060)	N	Y	
TimezoneOffsetFromUTC	(0008,0201)	N	Y	
SeriesDescription	(0008,103E)	N	Y	
SeriesInstanceUID	(0020,000E)	Y	Y	
SeriesNumber	(0020,0011)	N	Y	
NumberOfSeriesRelatedInstances	(0020,1209)	N	Y	
PerformedProcedureStepStartDate	(0040,0244)	N	Y	
PerformedProcedureStepStartTime	(0040,0245)	N	Y	
RequestAttributeSequence	(0040,0275)	N	Y	
> RequestedProcedureID	(0040,1001)	N	Y	
> ScheduledProcedureStepID	(0040,0009)	N	Y	
Instance Level (May be used for All instances, Study's instance, Study Series's instance resource query)				
SpecificCharacterSet	(0008,0005)	N	Y	
SOPClassUID	(0008,0016)	N	Y	
SOPInstanceUID	(0008,0018)	Y	Y	
InstanceAvailability	(0008,0056)	N	Y	
TimezoneOffsetFromUTC	(0008,0201)	N	Y	
RetrieveURL	(0008,1190)	N	Y	
InstanceNumber	(0020,0013)	N	Y	
Rows	(0028,0010)	N	Y	
Columns	(0028,0011)	N	Y	
BitsAllocated	(0028,0100)	N	Y	
NumberOfFrames	(0028,0008)	N	Y	

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The Search Transaction user agent supports Header Fields listed in Table 5-11.

Table 5-11 Header Fields for Search Transaction - User Agent

Header Field	Supported Values	Comments
Accept	multipart/related; type=application/dicom+json	
Accept-charset	See Section 5.7 for supported Values	

5.3.2.4.2 Origin Server - N/A
N/A

5.3.3 Worklist Web Service - N/A
N/A

5.3.4 Non-Patient Instance Web Service - N/A
N/A

5.3.5 Notification Web Service - N/A
N/A

5.3.6 Storage Commitment Web Service - N/A
N/A

5.4 Media Services - N/A
N/A

5.5 Real-Time Video Services - N/A
N/A

5.6 Cross Service Considerations - N/A
N/A

5.7 Specific Character Sets

See Section 1.7 for supported Values for Specific Character Set (0008,0005).

Generic configuration for Specific Character Sets is covered in section General Configuration Parameters - N/A

N/A

. Service specific configuration for Specific Character Sets is addressed in respective subsections of Section 6.2 or Section 6.3.

ZFP supports displaying character sets beyond the default character repertoire (ISO-IR 6) for all displayed attributes.

ZFP fallbacks to default character repertoire (ISO-IR 6) in case of unsupported character sets for all displayed attributes.

ZFP supports editing character sets beyond the default character repertoire (ISO-IR 6) for the attributes listed in Table 5-12.

Table 5-12 Specific Character Set - Supported Attributes

Attribute Name	Tag	VR
Referring Physician's Name	(0008,0090)	PN
Study Description	(0008,1030)	LO

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Attribute Name	Tag	VR
Series Description	(0008,103E)	LO
Operators' Name	(0008,1070)	PN
Patient's Name	(0010,0010)	PN
Other Patient Names	(0010,1001)	PN
Patient's Address	(0010,1040)	LO
Allergies	(0010,2110)	LO
Patient Comments	(0010,4000)	LT

ZFP supports mapping/conversion of Character Sets as listed in

Table 5-13.

Table 5-13 Conversion/Mapping of Non-Default Specific Character Sets

Incoming Specific Character Set			Outgoing Specific Character Set			Mapping Situation
Defined Term	IANA	Description	Defined Term	IANA	Description	
ISO 2022 IR 87	ISO-2022-JP	Japanese	ISO_IR 192	UTF-8	Unicode in UTF-8	When mapping Attribute Values from MWL to instances created

6 Configuration

Throughout all subsections the following Values can be used in the "Configurable" column:

- USER: The parameter is configurable by the user.
- SERVICE: The parameter is configurable by service personnel.
- FIXED: The parameter is not configurable (it has a fixed Value). The Value is required for the configuration of the remote system.
- N/A: The parameter is not applicable for the local or the remote system.

6.1 General Configuration Parameters – N/A

N/A

6.2 Configuration of DIMSE Services – N/A

N/A

6.2.1 Basic Worklist Management Service Configuration - N/A

N/A

6.2.2 Modality Performed Procedure Step Service Configuration - N/A

N/A

6.2.3 Unified Worklist and Procedure Step Service Configuration - N/A

N/A

6.2.4 Instance Availability Notification Service Configuration - N/A

N/A

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6.2.5 Storage Service Configuration – N/A

N/A

6.2.6 Storage Commitment Service Configuration - N/A

N/A

6.2.7 Query/Retrieve Service Configuration - N/A

N/A

6.2.8 Print Management Service Configuration - N/A

N/A

6.3 Configuration of DICOM Web Services

The tables in the following subsections show the configuration parameters required for DICOM Web Services.

To identify whether ZFP is an origin server and/or a user agent, the following applies:

- Origin server: The (Secured) Local Transaction Name URL is present at the local configuration parameters.
- User agent: The (Secured) Remote Transaction Name URL is present at the Remote configuration parameters.

6.3.1 URI Web Service Configuration

Table 6-1 lists the configuration parameters required for URI Web Service.

Table 6-1 URI Web Service Parameters

Remote Configuration Parameters - URI Web Service			
Parameter	Configurable	Default Value	Comments
Remote Retrieve Imaging Doc Set URL	SERVICE		
Port	SERVICE		
Secured Remote Retrieve Imaging Doc Set URL	SERVICE		
Secured Port	SERVICE		

6.3.2 Studies Web Service Configuration

6.3.2.1 Retrieve Transaction (WADO-RS) Configuration

The Retrieve Transaction is also known as WADO-RS. Table 6-2 lists configuration parameters for the Retrieve Transaction of the Studies Web Service:

Table 6-2 Retrieve Transaction Parameters

Remote Configuration Parameters - Retrieve Transaction			
Parameter	Configurable	Default Value	Comments
Remote Retrieve Imaging Doc Set URL	SERVICE		
Port	SERVICE		
Secured Remote Retrieve Imaging Doc Set URL	SERVICE		
Secured Port	SERVICE		

6.3.2.2 Store Transaction (STOW-RS) Configuration - N/A

N/A

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6.3.2.3 Search Transaction (QIDO-RS) Configuration

The Search Transaction service is also known as QIDO-RS. Table 6-3 lists configuration parameters for the Search Transaction of the Studies Web Service:

Table 6-3 Search Transaction Parameters

Remote Configuration Parameters - Search Transaction			
Parameter	Configurable	Default Value	Comments
Search remote Origin Server URL	SERVICE		
Port	SERVICE		
Secured Search remote Origin Server URL	SERVICE		
Secured Port	SERVICE		

6.3.3 Worklist Web Service Configuration - N/A

N/A

6.3.4 Non-Patient Instances (NPI) Web Service Configuration - N/A

N/A

6.3.5 Storage Commitment Service Configuration - N/A

N/A

6.4 Configuration of Media Storage Service - N/A

N/A

6.5 Configuration of Real-Time Video Service - N/A

N/A

6.6 Configuration of Audit Trail - Syslog

Table 6-4 lists configuration parameters for the Audit Trail Originator.

Table 6-4 Audit Trail Originator Parameters

Originator Audit Trail Message Transmission - SYSLOG Parameters			
Parameter	Configurable	Default Value	Comments
Remote Port number	SERVICE	514	Can configure multiple remote syslog repository
Remote secured port number	SERVICE	6514	
Remote Host name/IP	SERVICE		
UDP Protocol	N/A		
TLS Protocol	FIXED	TLS	only TLS is supported
Maximum Size sent	N/A		

Table 6-5 lists configuration parameters for the Audit Trail Collector.

Table 6-5 Audit Trail Collector Parameters

Collector Audit Trail Message Transmission - SYSLOG Parameters			
Parameter	Configurable	Default Value	Comments
Local Listening Port Number	SERVICE	514	
Local Listening Secured port number	FIXED	6514	
Local Host Name/IP	SERVICE		
UDP Protocol	N/A		UDP not supported
TLS Protocol	FIXED	TLS	only TLS is supported
Maximum Size Received	N/A		

7 Network and Media Communication Details

7.1 General – N/A

N/A

7.2 Specifications

7.2.1 Universal Viewer Zero Footprint Application Entity

7.2.1.1 Sequencing Real-World Activities for Universal Viewer Zero Footprint

The user can load any supported DICOM object into the Universal Viewer ZFP for viewing.

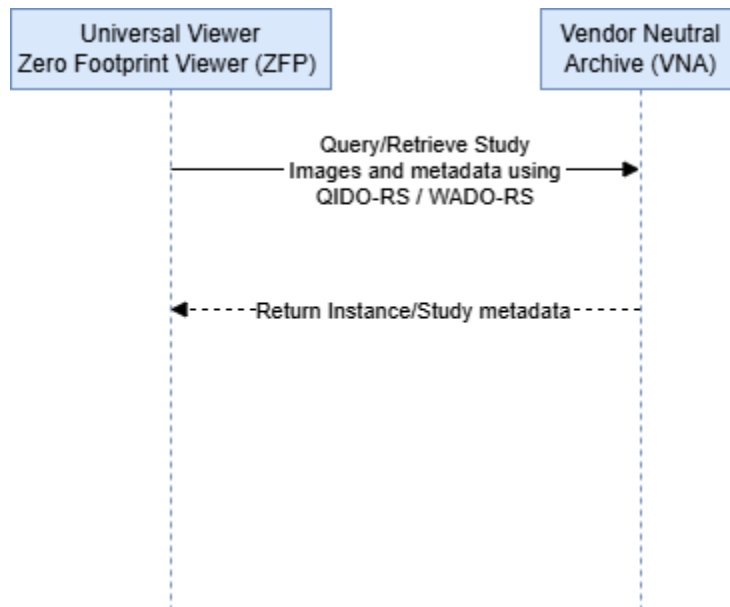


Figure 7-1 Sequencing of Real-World Activities for DICOM Web services

7.2.1.2 Association Parameters of <AE1> - N/A

N/A

7.2.1.3 Association Initiation - N/A

N/A

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7.2.1.4 Association Acceptance - N/A

N/A

7.3 Status Codes – N/A

The following sections describe the Status Codes supported by the system for each implemented service as well as the reason for issuing specific Status Codes or the associated behavior when receiving it.

7.3.1 General AE Communication and Failure Behavior and Handling – N/A

N/A

7.3.2 DIMSE Services – N/A

N/A

7.3.3 DICOM Web Services

7.3.3.1 General Status Codes

This section describes the common Status Code behavior and handling all the supported transaction.

7.3.3.1.1 Common Transaction as Origin Server - N/A

N/A

7.3.3.1.2 Common Transaction as User Agent

Table 7-1 lists the Status Codes that a user agent supports for all transactions and defines the application behavior when encountering the listed Status Codes:

Table 7-1 Status Codes of User Agent for all Transactions

Status	Code	Behavior
Success	200 (Success)	DICOM web service will log – Successfully retrieved search records
	201 (Created)	DICOM web service will log – No search result is retrieved.
	206 (Partial Content)	Status code is 200, Partial flag is sent from DICOM web service application
	303 (See Other)	
	304 (Not Modified)	
Client Error	400 (Bad Request)	DICOM web service will log the actual error.
	401 (Unauthorized)	DICOM web service will log the actual error
	403 (Forbidden)	DICOM web service will log the actual error
	404 (Not Found)	DICOM web service will log the actual error
	405 (Method Not Allowed)	DICOM web service will log the actual error
	406 (Not Acceptable)	DICOM web service will log the actual error
	409 (Conflict)	DICOM web service will log – Unable to process search request.
	410 (Gone)	DICOM web service will log the actual error
	411 (Length Required)	DICOM web service will log – Unable to process search request.
	413 (Payload Too Large)	DICOM web service will log the actual error
	414 (URI Too Long)	DICOM web service will log – Unable to process search request.
	415 (Unsupported Media Type)	DICOM web service will log the actual error

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Status	Code	Behavior
Server Error	500 (Internal Server Error)	DICOM web service will log – Unable to process search request.
	501 (Not Implemented)	DICOM web service will log the actual error
	503 (Service Unavailable)	DICOM web service will log – Unable to process search request.
	505 (HTTP Version Not Supported)	DICOM web service will log the actual error

7.3.3.2 URI Web Service

7.3.3.2.1 URI Web Service as Origin Server - N/A

N/A

7.3.3.2.2 URI Web Service as User Agent

Table 7-2 lists the Status Codes that a user agent supports for the URI Web Service and defines the application behavior when encountering the listed Status Codes.

Table 7-2 Status Codes of User Agent for URI Service

Status	Code	Behavior
Success	200 (OK)	DICOM web service will log – Successfully retrieved search records
Failure	400 (Bad)	DICOM web service will log the actual error
	404 (Not Found)	DICOM web service will log the actual error
	410 (Gone)	DICOM web service will log the actual error

7.3.3.3 Studies Web Service

7.3.3.3.1 Retrieve Transaction as Origin Server - N/A

N/A

7.3.3.3.2 Retrieve Transaction as User Agent

Table 7-3 lists the Status Codes that a user agent supports for the Retrieve Transaction of the Studies Web Service and defines the application behavior when encountering the listed Status Codes:

Table 7-3 Status Codes of User Agent for Retrieve Transaction

Status	Code	Behavior
Success	200 (OK)	DICOM web service will log – Successfully retrieved search records
	206 (Partial Content)	Status code is 200, Partial flag is sent from DICOM web service application
Failure	400 (Bad Request)	DICOM web service will log the actual error
	404 (Not Found)	DICOM web service will log the actual error
	406 (Not Acceptable)	DICOM web service will log the actual error
	410 (Gone)	DICOM web service will log the actual error
	413 (Payload Too Large)	DICOM web service will log the actual error

7.3.3.3.3 Store Transaction as Origin Server - N/A

N/A

7.3.3.3.4 Store Transaction as User Agent - N/A

N/A

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7.3.3.3.5 Search Transaction as Origin Server - N/A

N/A

7.3.3.3.6 Search Transaction as User Agent

Table 7-4 lists the Status Codes that a user agent supports for the Search Transaction of the Studies Web Service and defines the application behavior when encountering the listed Status Codes:

Table 7-4 Status Codes of User Agent for Search Transaction

Status	Code	Behavior
Success	200 (OK)	DICOM web service will log – Successfully retrieved search records
	204 (No Content)	DICOM web service will log – No search result is retrieved.
Failure	400 (Bad Request)	DICOM web service will log the actual error
	413 (Payload Too Large)	DICOM web service will log the actual error

7.3.3.4 Worklist Web Service - N/A

N/A

7.3.3.5 Non-Patient Instance Web Service - N/A

N/A

7.3.3.6 Storage Commitment Service - N/A

N/A

8 Security

8.1 Introduction

It is assumed that the product is used within a secure environment. It is assumed that a secure environment includes at a minimum:

Firewall or router protection to ensure that only approved external hosts have network access to the product.

Firewall or router protections to ensure that the product only has network access to approved external hosts and services.

Any communication with external hosts and services outside the locally secured environment use appropriate secure network channels (such as a Virtual Private Network (VPN))

8.2 External Network Requirements – N/A

N/A

8.3 TCP Port Configuration

See Section 6 Configuration for information on the usage of ports for DICOM and other protocols. This section contains helpful information for product administrators to configure firewalls, application whitelists, etc.

8.4 DICOM Security Profiles Support

8.4.1 Secure Use and User Identity Profiles

Table 8-1 lists the Secure Use and User Identity Profiles:

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Table 8-1 Secure Use and User Identity Profiles

Profile	Creator/Sender	Consumer/Receiver	Reference
Online Electronic Storage Secure Use	N	N	C.2.1
Audit Trail Message Format	N	N	C.2.2
Audit Trail Message Transmission Profile - SYSLOG-TLS	Y	Y	C.2.3
Audit Trail Message Transmission Profile - SYSLOG-UDP	N	N	C.2.4
Basic User Identity Association	N	N	8.5
User Identity Plus Passcode Association	N	N	8.5
Kerberos Identity Negotiation Association	N	N	8.5
Generic SAML Assertion Identity Negotiation Association	Y	Y	8.5

8.4.2 Secure Transport Connection Profiles – N/A

N/A

8.4.3 Media Storage Security Profiles – N/A

N/A

8.4.4 Attribute Confidentiality Profiles - N/A

N/A

8.4.5 Digital Signature Profiles – N/A

N/A

8.4.6 Additional DICOM Security Profiles -N/A

N/A

8.5 User Identity Negotiation Support – N/A

N/A

8.6 Web Services Security Features

Refer to ZFP Privacy and Security Manual v6.1.0.0 (DOC3073415)

8.7 Other Security Features -N/A

N/A

Annexes

A Information Object Definitions (IODs) – N/A

N/A

B Structured Report Content Encoding - N/A

N/A

C Security Details

This section provides additional details about security features that are formally described in Section 8.

C.1 External Network Requirement Details

C.1.1 Basic Time Synchronization – N/A

N/A

C.1.2 Basic Network Address Management – N/A

N/A

C.1.3 Application Configuration Management – N/A

N/A

C.1.4 DNS Service Discovery

Find DICOM Service QIDO -RS / WADO-RS end points based on domain name system discovery.

C.2 DICOM Security Profile Details

C.2.1 Online Electronic Storage Secure Use – N/A

N/A

C.2.2 Audit Trail Messages

Error! Reference source not found.3 specifies the DICOM Audit Messages that ZFP can detect and report. It defines the list of triggers that will cause the Audit Message to be generated and if these triggers can be configured or not. It also specifies whether the content of the Audit Message can be configured or not.

Table C-3 DICOM Specific Audit Messages

Audit Message	Used	Supported Triggers	Configurable Triggers	Configurable Message	Comments
Application Activity	Y	Logging in or out of the application, Launching external application	N	N	
Audit Log Used	N				
Begin Transferring DICOM Instances	N				
Data Export	Y	Update document set	N	N	
Data Import	Y	Retrieve document set, Download document	N	N	
DICOM Instance Accessed	Y	Viewing data in the system	N	N	

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Audit Message	Used	Supported Triggers	Configurable Triggers	Configurable Message	Comments
DICOM Instance Transferred	N				
DICOM Study Deleted	N				
Network Entry	N				
Query	Y	Query being issued or received such as Patient Demographics query (PDQ query) , Patient Identifier (PIX) query, ITI-18 Registered Stored query	N	N	It includes the following IHE transactions: RAD-14 / RAD-15 / RAD-26 / RAD-30 / RAD-44/RAD-68
Security Alert	Y	Reporting a security alert	N	N	
User Authentication	Y	Logging in or out of the application, launching an external application	N	N	
Order Record	N				
Patient Record	N				
Procedure Record	N				

The Universal Viewer ZFP supports the Audit Trail Message Format Profile. The following subsections define message details and specializations used by this product.

Error! Reference source not found. specifies the implementation details of each audit message supported by this product.

Table C-2 Audit Message Details

Real-World Entities	Field Name	Supported	Value Constraints
Application Activity Message			
Event	EventID	Y	EV (110114, DCM, " UserAuthentication")
	EventActionCode	Y	Enumerated Value E = Execute
	EventDateTime	Y	System Current Date
	EventOutcomeIndicator	Y	0
	EventTypeCode	Y	DT (110122, DCM, "Login") DT (110123, DCM, "Logout")
Active Participant: Process Accepting the Login/Logout (1)	UserID	Y	ZFP Server URL
	UserName	Y	Name of the ZFP server
	UserIsRequestor	Y	False
	RoleIDCode	Y	EV (110150, DCM, "Application")
	NetworkAccessPointTypeCode	Y	2
	NetworkAccessPointID	Y	IP Address
Active Participant: User Logging Into/Logging out from Application (1)	UserID	Y	Logged in User Account ID
	UserIsRequestor	Y	True when user logs in/out
	RoleIDCode	Y	EV (110151, DCM, "Application Launcher")
	NetworkAccessPointTypeCode	Y	2
	NetworkAccessPointID	Y	ZFP Client Node IP Address
Audit Source Identification	AuditSourceID	Y	ZFP AuditSourceID (Configurable)
	Code	Y	4
Application Activity Message			
Event	EventID	Y	EV (110100, DCM, " Application Activity ")

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	EventActionCode	Y	Enumerated Value E = Execute
	EventDateTime	Y	System Current Date
	EventOutcomeIndicator	Y	0
	EventTypeCode	Y	DT (110120, DCM, "Application Start")
Active Participant: Process Accepting the Request (1)	UserID	Y	ZFP Server URL
	AlternativeUserID	Y	ZFP Server Node IP Address
	UserIsRequestor	Y	True if launched by external application.
	RoleIDCode	Y	EV (110153, DCM, "Source")
	NetworkAccessPointTypeCode	Y	2
	NetworkAccessPointID	Y	IP Address
Active Participant: User Launching Application (0..1)	UserID	Y	Logged in User Account ID
	UserIsRequestor	Y	True if ZFP client is a user.
	RoleIDCode	Y	EV(121007,DCM,Person)
	NetworkAccessPointTypeCode	Y	2
	NetworkAccessPointID	Y	ZFP Client Node IP Address
Active Participant: External Application Launched (0..1)	UserID	Y	URL Launched
	UserIsRequestor	Y	false
	RoleIDCode	Y	EV (110151, DCM, "Application Launcher")
Audit Source Identification	AuditSourceID	Y	ZFP AuditSourceID (Configurable)
	Code	Y	4
Application Activity Message - MsTeams study App			
Event	EventID	Y	EV (110100, DCM, " Application Activity ")
	EventActionCode	Y	Enumerated Value E = Execute
	EventDateTime	Y	System Current Date
	EventOutcomeIndicator	Y	0
	EventTypeCode	Y	DT (110120, DCM, "Application Start")
Active Participant: Process Accepting the Request (1)	UserID	Y	ZFP Server URL
	AlternativeUserID	Y	ZFP Server Node IP Address
	UserIsRequestor	Y	FALSE
	RoleIDCode	Y	EV (110153, DCM, "Source")
	NetworkAccessPointTypeCode	Y	1/2
	NetworkAccessPointID	Y	ZFP Server Node Machine Name / IP Address
Active Participant: User Launching Application (0..1)	UserID	Y	Logged in MStTeams User Account
	UserIsRequestor	Y	TRUE
	RoleIDCode	Y	EV (110151, DCM, "Application Launcher")
	NetworkAccessPointTypeCode	Y	2
	NetworkAccessPointID	Y	ZFP Client Node IP Address
Active Participant: External Application Launched (0..1)	UserID	Y	Channel URL
	AlternativeUserID	Y	Channel Name
	UserIsRequestor	Y	FALSE
	RoleIDCode	Y	EV (110150, DCM, "Application")
Audit Source Identification	AuditSourceID	Y	ZFP AuditSourceID (Configurable)
	Code	Y	4
Data Export			

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Event	EventID	Y	EV (110106, DCM, "Export")
	EventActionCode	Y	Enumerated Value: U = Update
	EventDateTime	Y	System Current Date
	EventOutcomeIndicator	Y	0
	EventTypeCode	Y	EV("ITI-57", IHE Transactions, "Update Document Set")
Active Participant: User updating document (1)	UserID	Y	Logged in User Account ID
	AlternativeUserID	Y	ZFP Process ID
	UserIsRequestor	Y	True
	RoleIDCode	Y	EV (110153, DCM, "Source")
	NetworkAccessPointTypeCode	Y	1
	NetworkAccessPointID	Y	ZFP Server Machine Name
Active Participant: Registry System (1)	UserID	Y	Registry Update URL
	AlternativeUserID	Y	Registry Update URL
	UserIsRequestor	Y	False
	RoleIDCode	Y	EV (110152, DCM, "Destination")
	NetworkAccessPointTypeCode	Y	1
	NetworkAccessPointID	Y	XDS Registry FQDN IP Address
Audit Source Identification	Audit Source ID	Y	ZFP AuditSourceID (Configurable)
	Code	Y	4
Participating Object: Patient with document to be updated (1)	ParticipantObjectTypeCode	Y	1
	ParticipantObjectTypeCodeRole	Y	1
	ParticipantObjectIDTypeCode	Y	EV(2, DCM, "Patient Number")
	ParticipantObjectID	Y	Patient Identifier and Affinity Domain values for document
	ParticipantObjectName	Y	Patient Name
Participating Object: Document to be updated	ParticipantObjectTypeCode	Y	2
	ParticipantObjectTypeCodeRole	Y	20
	ParticipantObjectIDTypeCode	Y	EV(Document UUID, "IHE XDS Metadata", Submission Set ClassificationNode")
	ParticipantObjectID	Y	SubmissionSet Unique ID
Data Export – Update Document Set			
Event	EventID	Y	EV (110106, DCM, "Export")
	EventActionCode	Y	Enumerated Value: U = Update
	EventDateTime	Y	System Current Date
	EventOutcomeIndicator	Y	0
	EventTypeCode	Y	EV("ITI-57", IHE Transactions, "Update Document Set")
Active Participant: User updating document (1)	UserID	Y	Logged in User Account ID
	AlternativeUserID	Y	ZFP Process ID
	UserIsRequestor	Y	True
	RoleIDCode	Y	EV (110153, DCM, "Source")
	NetworkAccessPointTypeCode	Y	1
	NetworkAccessPointID	Y	ZFP Server Machine Name
Active Participant: Registry System (1)	UserID	Y	Registry Update URL
	AlternativeUserID	Y	Registry Update URL
	UserIsRequestor	Y	False
	RoleIDCode	Y	EV (110152, DCM, "Destination")
	NetworkAccessPointTypeCode	Y	1
	NetworkAccessPointID	Y	XDS Registry FQDN IP Address
Audit Source Identification	Audit Source ID	Y	ZFP AuditSourceID (Configurable)

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	Code	Y	4
Participating Object: Patient with document to be updated (1)	ParticipantObjectTypeCode	Y	1
	ParticipantObjectTypeCodeRole	Y	1
	ParticipantObjectIDTypeCode	Y	EV(2, DCM, "Patient Number")
	ParticipantObjectID	Y	Patient Identifier and Affinity Domain values for document
	ParticipantObjectName	Y	Patient Name
Participating Object: Document to be updated	ParticipantObjectTypeCode	Y	2
	ParticipantObjectTypeCodeRole	Y	20
	ParticipantObjectIDTypeCode	Y	EV(Document UUID, "IHE XDS Metadata", Submission Set ClassificationNode")
	ParticipantObjectID	Y	Submissionset Unique ID
Data Import - Document Download			
Event	EventID	Y	EV (110107, DCM, "Import")
	EventActionCode	Y	Enumerated Value: C = Create
	EventDateTime	Y	System Current Date
	EventOutcomeIndicator	Y	0
	EventTypeCode	Y	EV("DocumentDownload", ZFP-XDS Transactions, "Document Download")
Active Participant (1):	UserID	Y	Logged in User Account ID
	UserIsRequestor	Y	True
	RoleIDCode	Y	EV (110151, DCM, "Person")
	NetworkAccessPointTypeCode	Y	2
	NetworkAccessPointID	Y	ZFP Client Node IP Address
Active Participant (1):	UserID	Y	ZFP Server URL
	UserIsRequestor	Y	False
	RoleIDCode	Y	EV (110152, DCM, "Destination")
	NetworkAccessPointID	Y	ZFP Server Machine Name
Active Participant (1):	UserID	Y	Logged in User Account ID
	UserIsRequestor	Y	False
	RoleIDCode	Y	EV (110155, DCM, "Source Media")
	NetworkAccessPointTypeCode	Y	1
	NetworkAccessPointID	Y	ZFP Server Machine Name
Audit Source Identification	Audit Source ID	Y	ZFP AuditSourceId (Configurable)
	Code	Y	4
Participating Object: Document Downloaded (1)	ParticipantObjectTypeCode	Y	2
	ParticipantObjectTypeCodeRole	Y	3
	ParticipantObjectIDTypeCode	Y	EV(110180, DCM, "DocumentUniqueId")
	ParticipantObjectID	Y	Document Unique ID
Participating Object: Patient Information for Document Downloaded (2)	ParticipantObjectTypeCode	Y	1
	ParticipantObjectTypeCodeRole	Y	1
	ParticipantObjectIDTypeCode	Y	EV(2, DCM, "Patient Number")
	ParticipantObjectID	Y	Patient Identifier and Affinity Domain values for document
	ParticipantObjectName	Y	Patient Name
Data Import - Retrieve Document Set			
Event	EventID	Y	EV (110107, DCM, "Import")
	EventActionCode	Y	Enumerated Value: C = Create
	EventDateTime	Y	System Current Date
	EventOutcomeIndicator	Y	0

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	EventTypeCode	Y	EV("ITI-43", IHE Transactions, "Retrieve Document Set")
Active Participant (1): Repository System	UserID	Y	Repository URL (for XDS profile, XDS-i profile) Initiating Gateway URL (For XCA-I profile)
	AlternativeUserID	Y	"Repository"
	UserIsRequestor	Y	False
	RoleIDCode	Y	EV (110153, DCM, "Source")
	NetworkAccessPointTypeCode	Y	2
	NetworkAccessPointID	Y	FQDN of XDS Repository (for XDS , XDS-i profile), FQDN of Initiating Gateway (For XCA-I profile)
Active Participant (1): System requesting document set	UserID	Y	Logged in User Account ID
	AlternativeUserID	Y	ZFP AuditSourceId (Configurable)
	UserIsRequestor	Y	False
	RoleIDCode	Y	EV (110152, DCM, "Destination")
	NetworkAccessPointTypeCode	Y	1/2
	NetworkAccessPointID	Y	ZFP Server Node Machine Name/ IP Address
Active Participant (1): User requesting document set	UserID	Y	Logged in User Account ID
	UserIsRequestor	Y	True
	RoleIDCode	Y	EV (110151, DCM, "Person")
	NetworkAccessPointTypeCode	Y	2
	NetworkAccessPointID	Y	ZFP Client Node IP Address
Audit Source Identification	Audit Source ID	Y	ZFP AuditSourceId (Configurable)
	Code	Y	4
Participating Object (1): Requested Document	ParticipantObjectTypeCode	Y	2
	ParticipantObjectTypeCodeRole	Y	3
	ParticipantObjectIDTypeCode	Y	EV(9, DCM, "Report Number")
	ParticipantObjectDetail	Y	Type="Repository Unique Id"; Value=<Repository OID>, xs:base64Binary encoded.
Participating Object (0..1): Patient Information	ParticipantObjectTypeCode	Y	1
	ParticipantObjectTypeCodeRole	Y	1
	ParticipantObjectIDTypeCode	Y	EV(2, DCM, "Patient Number")
	ParticipantObjectID	Y	Patient Identifier and Affinity Domain values to be queried
	ParticipantObjectName	Y	Patient Name
DICOM Instance Accessed			
Event	EventID	Y	EV (110103, DCM, "DICOM Instances Accessed")
	EventActionCode	Y	Enumerated Value R = Read C = Create (for SaveGSPS)
	EventDateTime	Y	System Current Date
	EventOutcomeIndicator	Y	0
Active Participant: User sharing Study (0..1)	UserID	Y	Logged in User Account ID
	UserIsRequestor	Y	True
	RoleIDCode	Y	EV(121007,DCM,Person)
Active Participant: User observing the study (0..n)	UserID	Y	Third party login user id.
	UserIsRequestor	Y	False
	RoleIDCode	Y	EV(121007,DCM,Person)

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Participating Object: Studies being accessed (1)	ParticipantObjectTypeCode	Y	2
	ParticipantObjectTypeCodeRole	Y	3
	ParticipantObjectIDTypeCode	Y	EV (110180, DCM, "Study Instance UID")
	ParticipantObjectID	Y	Study Instance UID
	SOPClass	Y	SOPClassUID
	Accession	Y	Study Accession number
	NumberOfInstances	Y	SopClass number of instances
Participating Object: Patient being accessed (2)	ParticipantObjectTypeCode	Y	1
	ParticipantObjectTypeCodeRole	Y	1
	ParticipantObjectIDTypeCode	Y	EV(2, DCM, "Patient Number")
	ParticipantObjectID	Y	Patient Identifier
	ParticipantObjectName	Y	PatientName
Audit Source Identification	Audit Source ID	Y	ZFP AuditSourceId (Configurable)
	Code	Y	4
DICOM Instance Accessed – Document Viewed			
Event	EventID	Y	EV (110103, DCM, "Instances Accessed")
	EventActionCode	Y	Enumerated Value: R = Read
	EventDateTime	Y	System Current Date
	EventOutcomeIndicator	Y	0
	EventTypeCode	Y	EV("DocumentViewed", ZFP-XDS Transactions, "Document Viewed")
Active Participant (1): System	UserID	Y	ZFP Server URL
	UserIsRequestor	Y	False
	RoleIDCode	Y	EV (110153, DCM, "Source")
	NetworkAccessPointTypeCode	Y	1
	NetworkAccessPointID	Y	ZFP Server Machine Name
Active Participant (1): User viewing document.	UserID	Y	Logged in User Account ID
	UserIsRequestor	Y	True
	RoleIDCode	Y	EV (110151, DCM, "Person")
	NetworkAccessPointTypeCode	Y	2
	NetworkAccessPointID	Y	ZFP Client Node IP Address
Participating Object: Document being Viewed (1..n)	ParticipantObjectTypeCode	Y	2
	ParticipantObjectTypeCodeRole	Y	3
	ParticipantObjectIDTypeCode	Y	EV(9, DCM, "Report Number") or EV(110180, DCM, "Study Instance UID")
	ParticipantObjectID	Y	Document Unique ID
Participating Object: Patient Information Viewed (1)	ParticipantObjectTypeCode	Y	1
	ParticipantObjectTypeCodeRole	Y	1
	ParticipantObjectIDTypeCode	Y	EV(2, DCM, "Patient Number")
	ParticipantObjectID	Y	Patient Identifier and Affinity Domain values for document
	ParticipantObjectName	Y	Patient Name
Audit Source Identification	Audit Source ID	Y	ZFP AuditSourceId (Configurable)
	Code	Y	4
DICOM Instance Transferred			
Event	EventID	Y	EV (110104, DCM, "DICOM Instances Transferred")
	EventActionCode	Y	Enumerated Value C = Create
	EventDateTime	Y	System Current Date
	EventOutcomeIndicator	Y	0

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Active Participant (1):	UserID	Y	CPACS AE Title (depending on where the study is coming from)
	UserIsRequestor	Y	False
	RoleIDCode	Y	EV (110153, DCM, "Source")
	NetworkAccessPointTypeCode	Y	1
	NetworkAccessPointID	Y	ZFP Server Machine Name
Active Participant (1):	UserID	Y	AE Title (depending on where the study is transferred to)
	UserIsRequestor	Y	False
	RoleIDCode	Y	EV (110152, DCM, "Destination")
Active Participant (1):	UserID	Y	Logged in User Account ID
	UserIsRequestor	Y	True
	RoleIDCode	Y	EV (1, DCM, "Person")
	NetworkAccessPointTypeCode	Y	2
	NetworkAccessPointID	Y	ZFP Client Node / IP Address
Audit Source Identification	Audit Source ID	Y	ZFP AuditSourceID (Configurable)
	Code	Y	4
Participating Object: Document Downloaded (1..n)	ParticipantObjectTypeCode	Y	2
	ParticipantObjectTypeCodeRole	Y	3
	ParticipantObjectIDTypeCode	Y	EV(110180, DCM, "Study Instance UID")
	ParticipantObjectID	Y	<Study Instance UID>
	ParticipantObjectDescription	Y	Contains Accession and SOPClasses
	SOPClass	Y	SOPClass UIDs
	Accession	Y	Accession Number
	NumberOfInstances	Y	Number of instances per SOPClass
Participating Object: Patient Information for Document Downloaded (1)	ParticipantObjectTypeCode	Y	1
	ParticipantObjectTypeCodeRole	Y	1
	ParticipantObjectIDTypeCode	Y	EV(2, DCM, "Patient Number")
	ParticipantObjectID	Y	Patient Identifier
	ParticipantObjectName	Y	Patient Name
Query			
Event	EventID	Y	EV (110112, DCM, "Query")
	EventActionCode	Y	Enumerated Value: E = Execute
	EventDateTime	Y	System Current Date
	EventOutcomeIndicator	Y	0
Active Participant: User requesting Query (1)	UserID	Y	Logged in User Account ID
	UserIsRequestor	Y	True
	RoleIDCode	Y	EV (110153, DCM, "Source Role ID")
	NetworkAccessPointID	Y	ZFP Server Node IP Address
Active Participant: System requesting Query (0..1)	UserID	Y	Image streaming URL
	UserIsRequestor	Y	False
	RoleIDCode	Y	EV (110153, DCM, "Source Role ID")
	NetworkAccessPointTypeCode	Y	2
	NetworkAccessPointID	Y	EA/CPACS IP Address of archives to search
System responding to query (1)	UserID	Y	AETitle
	UserIsRequestor	Y	False
	RoleIDCode	Y	EV (110152, DCM, "Destination Role ID")
	NetworkAccessPointTypeCode	Y	2
	NetworkAccessPointID	Y	IP Address of archives to search
Audit Source Identification	Audit Source ID	Y	ZFP AuditSourceID (Configurable)
	Code	Y	4

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Participating Object: SOP Queried and the Query (1)	ParticipantObjectTypeCode	Y	Enumerated Value: 4
	ParticipantObjectTypeCodeRole	Y	Enumerated Value: 3 = report
	ParticipantObjectIDTypeCode	Y	EV (110181, DCM, "SOP Class UID")
	ParticipantObjectID	Y	UID of the SOP Class being query.
	ParticipantObjectDetail	Y	Type value = "Detail" and the Value of the attribute is the Patient/Study details being queried. The element content is an xs:base64Binary encoding.
Query – PDQ Query			
Event	EventID	Y	EV (110112, DCM, "Query")
	EventActionCode	Y	Enumerated Value: E = Execute
	EventDateTime	Y	System Current Date
	EventOutcomeIndicator	Y	0
	EventTypeCode	Y	EV ("ITI-21", IHE Transactions, "Patient Demographics Query")
Active Participant: System requesting Query (1)	UserID	Y	ZFP Server URL
	AlternativeUserID	Y	Logged in User Account ID
	UserIsRequestor	Y	False
	RoleIDCode	Y	EV (110153, DCM, "Source")
	NetworkAccessPointTypeCode	Y	1/2
	NetworkAccessPointID	Y	ZFP Server Node Machine Name /IP Address
Active Participant: Human Requestor (1)	UserID	Y	Logged in User Account ID
	UserIsRequestor	Y	True
	RoleIDCode	Y	EV (110151, DCM, "Person")
	NetworkAccessPointTypeCode	Y	2
	NetworkAccessPointID	Y	ZFP Client Node IP Address
Active Participant: System responding to Query (1)	UserID	Y	PdqSupplierApplicationName PdqSupplierFacilityName (Configurable)
	UserIsRequestor	Y	False
	RoleIDCode	Y	EV (110152, DCM, "Destination")
	NetworkAccessPointTypeCode	Y	2
	NetworkAccessPointID	Y	MPI, FQDN, IP Address
Audit Source Identification	Audit Source ID	Y	ZFP AuditSourceId (Configurable)
	Code	Y	4
Participating Object: Patient Queried (optional – only used with enterprise patient identifier query)(0..1)	ParticipantObjectTypeCode	Y	Enumerated Value: 1
	ParticipantObjectTypeCodeRole	Y	Enumerated Value: 1
	ParticipantObjectIDTypeCode	Y	EV ("2", DCM, "Patient Number")
	ParticipantObjectID	Y	Patient Identifier and Affinity Domain values to be queried
Participating Object: Patient Queried and the Query (1)	ParticipantObjectTypeCode	Y	Enumerated Value: 2 = system
	ParticipantObjectTypeCodeRole	Y	Enumerated Value: 24
	ParticipantObjectIDTypeCode	Y	EV ("ITI-21", IHE Transactions, "Patient Demographics Query")
	ParticipantObjectQuery	Y	This field holds the PDQ query details as xs:base64Binary encoded.

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	ParticipantObjectDetail	Y	The Type = "MSH-10" and the value of this attribute is the double encoded timestamp of the request. The element content is an xs:base64Binary encoding.
Query – PIX Query			
Event	EventID	Y	EV (110112, DCM, "Query")
	EventActionCode	Y	Enumerated Value: E = Execute
	EventDateTime	Y	System Current Date
	EventOutcomeIndicator	Y	0
	EventTypeCode	Y	EV ("ITI-9", IHE Transactions, "PIX Query")
Active Participant: System requesting Query (1)	UserID	Y	ZFP Server URL
	AlternativeUserID	Y	Logged in User Account ID
	UserIsRequestor	Y	False
	RoleIDCode	Y	EV (110153, DCM, "Source")
	NetworkAccessPointTypeCode	Y	2
	NetworkAccessPointID	Y	ZFP Server Node Machine Name / IP Address
Active Participant: Human Requestor (1)	UserID	Y	Logged in User Account ID
	UserIsRequestor	Y	True
	RoleIDCode	Y	EV (110151, DCM, "Person")
	NetworkAccessPointTypeCode	Y	2
	NetworkAccessPointID	Y	ZFP Client Node IP Address
Active Participant: System responding to Query (1)	UserID	Y	PixManagerApplicationName PixManagerFacilityName (Configurable)
	UserIsRequestor	Y	False
	RoleIDCode	Y	EV (110152, DCM, "Destination")
	NetworkAccessPointTypeCode	Y	2
	NetworkAccessPointID	Y	MPI FQDN IP Address
Audit Source Identification	Audit Source ID	Y	ZFP AuditSourceId (Configurable)
	Code	Y	4
Participating Object: Patient Queried (1)	ParticipantObjectTypeCode	Y	Enumerated Value: 1
	ParticipantObjectTypeCodeRole	Y	Enumerated Value: 1
	ParticipantObjectIDTypeCode	Y	EV ("2", DCM, "Patient Number")
	ParticipantObjectID	Y	Patient Identifier and Assigning Authority values to be queried
Participating Object: Patient Query (1)	ParticipantObjectTypeCode	Y	Enumerated Value: 2 = system
	ParticipantObjectTypeCodeRole	Y	Enumerated Value: 24
	ParticipantObjectIDTypeCode	Y	EV ("ITI-9", IHE Transactions, "PIX Query")
	ParticipantObjectQuery	Y	This field holds the PIX query details as xs:base64Binary encoded.
	ParticipantObjectDetail	Y	The Type = "MSH-10" and the value of this attribute is the double encoded timestamp of the request. The element content is an xs:base64Binary encoding.
Query – Registry Stored Query			
Event	EventID	Y	EV (110112, DCM, "Query")
	EventActionCode	Y	Enumerated Value: E = Execute

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	EventDateTime	Y	System Current Date
	EventOutcomeIndicator	Y	0
	EventTypeCode	Y	EV ("ITI-18", IHE Transactions, "Registry Stored Query")
Active Participant (1): System processing request.	UserID	Y	ZFP Server URL
	AlternativeUserID	Y	ZFP Server Node Machine name / IP Address
	UserIsRequestor	Y	True
	RoleIDCode	Y	EV (110153, DCM, "Source")
	NetworkAccessPointTypeCode	Y	2
	NetworkAccessPointID	Y	IP Address
Active Participant (1): User processing request.	UserID	Y	Logged in User Account ID
	UserIsRequestor	Y	True
	RoleIDCode	Y	EV (110151, DCM, "Person")
	NetworkAccessPointTypeCode	Y	2
	NetworkAccessPointID	Y	ZFP Client Node IP Address
Active Participant (1): System to receive request.	UserID	Y	Registry URL for Registry Stored Query (for XDS, XDS-I profile), Initiating Gateway URL for Registry Stored Query (For XCA-I profile)
	AlternativeUserID	Y	Registry URL for Registry Stored Query
	UserIsRequestor	Y	False
	RoleIDCode	Y	EV (110152, DCM, "Destination")
	NetworkAccessPointTypeCode	Y	2
	NetworkAccessPointID	Y	FQDN of XDS Registry (for XDS , XDS-i profile), FQDN of Initiating Gateway (For XCA-I profile)
Audit Source Identification	Audit Source ID	Y	ZFP AuditSourceId (Configurable)
	Code	Y	4
Participating Object: Patient to query (0..1)	ParticipantObjectTypeCode	Y	1
	ParticipantObjectTypeCodeRole	Y	1
	ParticipantObjectIDTypeCode	Y	EV(2, DCM, "Patient Number")
	ParticipantObjectSensitivity	Y	Patient Name
	ParticipantObjectID	Y	Patient Identifier and Affinity Domain values to be queried
Participating Object: Registry query (1)	ParticipantObjectTypeCode	Y	2
	ParticipantObjectTypeCodeRole	Y	24
	ParticipantObjectIDTypeCode	Y	EV ("ITI-18", IHE Transactions, "Registry Stored Query")
	ParticipantObjectID	Y	Urn:uuid for Registry Stored Query
	ParticipantObjectDescription	Y	This field holds the dataset of the registry stored query, xs:base64 binary encoded.
Security Alert			
Event	EventID	Y	EV (110113, DCM, "Security Alert")
	EventActionCode	Y	Enumerated Value E = Execute
	EventDateTime	Y	System Current Date
	EventOutcomeIndicator	Y	0
	EventTypeCode	Y	EV (110127, DCM, "Emergency Override")
Active Participant: User performing override (1)	UserID	Y	Logged in User Account ID
	UserIsRequestor	Y	False
	RoleIDCode	Y	EV (110150, DCM, "Application")

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Active Participant: Process executing override (1)	NetworkAccessPointTypeCode	Y	1
	NetworkAccessPointID	Y	ZFP Server Machine Name
	UserID	Y	ZFP Server URL
	UserIsRequestor	Y	True
	RoleIDCode	Y	EV (110153, DCM, "Source")
	NetworkAccessPointTypeCode	Y	2
Participating Object: Studies being transferred (1..n)	NetworkAccessPointID	Y	ZFP Client Node IP Address
	ParticipantObjectTypeCode	Y	2
	ParticipantObjectTypeCodeRole	Y	13
	ParticipantObjectIDTypeCode	Y	EV(12, DCM,"URI")
	ParticipantObjectID	Y	Patient Identifier and Affinity Domain values for document
	ParticipantObjectName	Y	Patient Name
Audit Source Identification	ParticipantObjectDetail	Y	Type="Alert Description"; Value=<User Reason Comment>
	SOP Class	Y	UIDs of SOP classes
	Audit Source ID	Y	ZFP AuditSourceID (Configurable)
User Authentication			
Event	Code	Y	4
	EventID	Y	EV (110114, DCM, " UserAuthentication")
	EventActionCode	Y	Enumerated Value E = Execute
	EventDateTime	Y	System Current Date
	EventOutcomeIndicator	Y	0
Active Participant: Process Accepting the Login/Logout (1)	EventTypeCode	Y	DT (110122, DCM, "Login") DT (110123, DCM, "Logout")
	UserID	Y	ZFP Server URL
	UserName	Y	Name of the ZFP server
	UserIsRequestor	Y	False
	RoleIDCode	Y	EV (110150, DCM, "Application")
	NetworkAccessPointTypeCode	Y	2
Active Participant: User Logging Into/Logging out from Application (1)	NetworkAccessPointID	Y	IP Address
	UserID	Y	Logged in User Account ID
	UserIsRequestor	Y	True when user logs in/out
	RoleIDCode	Y	EV (110151, DCM, "Application Launcher")
	NetworkAccessPointTypeCode	Y	2
Audit Source Identification	NetworkAccessPointID	Y	ZFP Client Node IP Address
	AuditSourceID	Y	ZFP AuditSourceID (Configurable)
	Code	Y	4

C.2.3 Audit Trail Message Transmission Profile - SYSLOG - TLS

See Section 6.6 Audit Trail Syslog Configuration for information about Syslog-TLS parameters.

C.2.4 Audit Trail Message Transmission Profile - SYSLOG – UDP – N/A

N/A

C.2.5 Secure Transport Connection Details – N/A

N/A

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C.2.6 Attribute Confidentiality Details - N/A

N/A

C.2.7 Digital Signature Details – N/A

N/A

C.2.8 Additional DICOM Security Profile Details – N/A

N/A

D Mapping of Attributes - N/A

N/A

E Code Set Usage – N/A

N/A