InteleViewer

4.11.1 and later | DICOM Conformance Statement
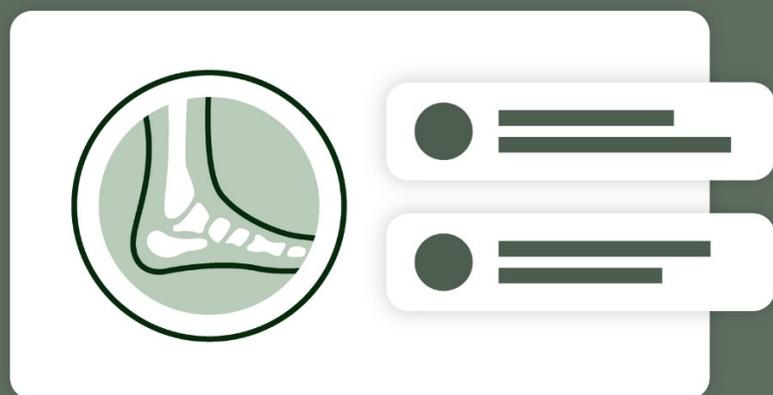
intelerad

Intelerad.com

PERFORMANCE CHARACTERISTICS

The main benefits of IntelePACS are the improved image accessibility and associated time savings. There is also some indication that IntelePACS can help data integrity and help reduce operating costs in radiology. There is no significant indication that it affects or improves diagnosis accuracy and image quality. There have been some reports of adverse events associated with IntelePACS and some recalls linked to possible patient safety issues, but no strong case of adverse effects of using IntelePACS technology. IntelePACS technology is a low-risk medical device that has been used successfully and undergone continual refinements.

INTENDED USE

IntelePACS is a software application that receives digital images and data from various sources (such as CT scanners, MR scanners, ultrasound systems, R/F units, computer and direct radiographic devices, secondary capture devices, scanners, imaging gateways, or other imaging sources). Images and data can be communicated, processed, manipulated, enhanced, stored, and displayed within the system and/or across computer networks at distributed locations. Post-processing of the images can be performed using Multi Planar Reconstruction (MPR).

Only preprocessed DICOM for presentation images can be interpreted for primary image diagnosis in mammography. Mammographic images with lossy compression and digitized film screen images must not be reviewed for primary image interpretations

Mammographic images may only be interpreted using a display that is cleared, and that meets technical specifications reviewed and accepted, by your regulatory authorities.

IntelePACS on mobile devices (applicable for IntelePACS 5.1.1 or later only):

For Canada, United States, Europe, Australia, New Zealand, and South Africa only: When used with a mobile device, IntelePACS is suitable for diagnostic image review only on tested devices as specified in your Intelerad product's documentation. IntelePACS is not intended for primary diagnostic image review on mobile devices. Mobile usage for Mammography is for reference and referral only.

For all other countries: IntelePACS is not intended for diagnostic image review on mobile devices. Mobile usage for Mammography is for reference and referral only.

CONTRAINDICATIONS—None.

Caution: Federal law restricts this device to sale by or on the order of a physician.

This system does not replace the education, skill, and judgment of properly trained medical practitioners. Only properly trained and qualified individuals shall have access to and use IntelePACS and must know of its functionality, capabilities and limitations. Typical users of this system are trained health professionals, physicians, nurses, and technologists.

Downloaded Images, Workstations and Isolated Installs: You and your users must maintain IntelePACS with the most current versions, including available updates and upgrades. Delaying or refusing updates or upgrades following a recall may result in a non-compliant IntelePACS.

SAFETY ISSUES: IntelePACS is a medical device, and as such, must meet medical device safety and effectiveness requirements imposed by national regulations. Any unmonitored or unconnected use of IntelePACS, or use of IntelePACS without a valid right may put the health and safety of patients at risk as you will not be advised of the availability of any software patch, bug fix, update or upgrade nor will be informed of Field Safety Notices, Medical Device Recalls or Advisory Notices related to IntelePACS. Client and authorized users must consult national regulatory site(s) to be informed of Field Safety Notices, Medical Device Recalls or Advisory Notices related to IntelePACS. Intelerad does not have access to authorized users systems to implement corrections to prevent (or correct) occurrences of patient safety issues. You are responsible to flow down recall and patient safety information to your users. The user of the medical device must report any serious incident that has occurred in relation to the medical device to the manufacturer (Intelerad) and the competent authority having jurisdiction in their locale.

Referring Physicians Use: Images for authorized referring physicians may not be of diagnosis quality and should not be used for diagnostic purposes.

InteleConnect: Images in InteleConnect are intended for review only and are not appropriate for diagnostic purposes. Please use InteleViewer for diagnostic viewing.

CD Burning and Nuage Patient Portal: Intelerad Clients remain responsible for collecting patient consents and accesses. Images on CD and on Nuage Patient Portal are intended for review only and are not appropriate for diagnostic purposes. Please use InteleViewer for diagnostic viewing.

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UDI

IntelePACS UDI is: **B228INTELEPACS0**

UK CA 0086

Title:	InteleViewer DICOM Conformance Statement
Software version:	4.11.1 and later (Multiple Patient Multiple Use)
Date:	2024-05-16
Part number:	IVDENCNF-O Issue 013

TABLE OF CONTENTS

DOCUMENT REVISIONS

Issue	Date	Author	Comments
001	December 20, 2013	Dacian Pitic, Irene Plokar	Initial creation of document.
002	July 4, 2014	Dacian Pitic, Irene Plokar	Added Breast Tomosynthesis Image Storage SOP class to section 4, "AE Specifications." Added section 8.1.1.3, "Breast Tomosynthesis."
003	May 11, 2015	Marc Paquette, Dacian Pitic	Added Deformable Spatial Registration Storage (1.2.840.10008.5.1.4.1.1.66.3) to Table 2: SOP Classes Supported by InteleViewer as an SCU.
004	July 29, 2016	Irene Plokar, Dalton Filho, Fouad Zaryouh, Mauricio Schoenfelder	Added the JPEG 2000 Image Compression (Lossless Only) (1.2.840.10008.1.2.4.90) and JPEG 2000 Image Compression (1.2.840.10008.1.2.4.91) to Table 23: Supported Transfer Syntaxes: DICOM Part 10 Import. Removed the Raw Data Storage SOP class for SCU. Added the Slice Location attribute to section 8.1.1.4 "Auto and Manual Linked Stacking." Added section 8.1.1.12, "Encapsulated PDF Storage."
005	March 17,	Irene Plokar,	Added the JPEG Lossless, Nonhierarchical

Issue	Date	Author	Comments
	2017	Peter Georgiakakis	(Processes 14) Transfer Syntax to Table 6: Transfer Syntax for Send to Remote System. Updated the cover page and headers with Intelerad's recent corporate logo.
006	September 26, 2018	Kathleen Jette, Jean-Francois Richard	Updated the first paragraph in section 8.1.1.1 "Pixel Spacing and Calibration for Projection Modalities". Updated the Imager Pixel Spacing attribute description in Table 38 from section 8.1.1.1 "Pixel Spacing and Calibration for Projection Modalities". Added Pixel Spacing (0028,0030), Pixel Spacing Calibration Type (0028,0A02), and Pixel Spacing Calibration Description (0028,0A04) to Table 38. Removed Table 39 and two paragraphs from section 8.1.1.1 "Pixel Spacing and Calibration for Projection Modalities".
007	October 28, 2019	Luca Cogliandro	Added a manufacturer icon, and changed the date format, in the Copyright page.
008	November 9, 2020	Janetta McCreery, Lukasz Kudra	Reviewed for 5.3.1 R1, no changes required

DOCUMENT CONVENTIONS

Several conventions are used throughout this document. A list of these and examples of their use are provided below.

Convention	Example
Text that you enter in a field, or on a command line are in `courier font`.	In the Date field, enter `2003/04/04`.
Keyboard commands are in **SMALL CAPS AND BOLD**.	Press **CTRL+C** to copy text.
New terminology or concepts are *italicized*.	The process of automatically distributing the images is referred to as *autorouting*.
Interface elements, such as menus, buttons, options, and preferences are **bold**.	From the **Font** list, choose the desired font.
Menu selections are separated by vertical lines.	Choose **File	Print** to print this page.
Information that is important for a user to know when performing a task, such as prerequisite information or restrictions, is represented with a note icon 📋.	📋 To view reports, you must have the Report privilege enabled in your user account.
Information that is helpful to a user, such as when describing an alternate or simpler way to perform a task, is represented with a tip icon 💡.	💡 You can also use the **CTRL+T** keyboard shortcut to show or hide thumbnail images.

Convention	Example
Information that warns users to potential problems in the outcome of what they are doing, such as data loss or data breach, is represented with a warning icon ⚠.	⚠ Image measurements are saved for the current application session only. If you exit the application, all measurements are lost.

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INTRODUCTION

This document contains DICOM conformance statements for the InteleViewer diagnostic imaging software from Intelerad Medical Systems Incorporated.

Scope and Field of Application

This document is the DICOM Conformance Statement for the InteleViewer imaging software application developed by Intelerad Medical Systems Incorporated. Contained in this statement are detailed descriptions of how InteleViewer collaborates with other medical imaging devices and applications that conform to the DICOM 3.0 standard.

The intended user of this document is involved with software design and system integration. It is assumed that this user is familiar with the concepts and terms used throughout this document. Those that are unfamiliar with the DICOM 3.0 standard can consult the standard documentation prior to examining this conformance statement.

References and Definitions

All necessary references and definitions have been taken from the Digital Imaging and Communications in Medicine (DICOM) standard, parts 1 through 13 (NEMA PS 3.1-13).

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ABBREVIATIONS AND ACRONYMS

All symbols and abbreviations used herein are described in the Digital Imaging and Communications in Medicine (DICOM) standard, parts 1 through 13 (NEMA PS 3.1-13).

The following abbreviations and acronyms appear in this document:

Abbreviation/ Acronym	Description
ACN	Application Content Name
ACR-NEMA	American College of Radiology and the National Electrical Manufacturers Association
AE	Application Entity
CR	Computed Radiography
CT	Computed Tomography
DICOM	Digital Imaging and Communications in Medicine
DX	Digital Radiography
ECG	Electrocardiogram
IOD	Image Object Definition
MR	Magnetic Resonance
NEMA	National Electrical Manufacturers Association
OSI	Open Systems Interconnection
PDU	Protocol Data Unit

Abbreviation/ Acronym	Description
PET	Positron Emission Tomography
RF	Radio Fluoroscopy
RIS	Radiology Information System
RT	Radio Therapy
SCP	Service Class Provider (server)
SCU	Service Class User (client)
SOP	Service Object Pair
SR	Structured Reporting
TCP/IP	Transmission Control Protocol/Internet Protocol
UID	Unique Identifier
VL	Visible Light
VM	Value Multiplicity
VR	Value Representation
XA	X-Ray Angiography
XRF	X-Ray Fluorescence

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IMPLEMENTATION MODEL

A number of InteleViewer DICOM services are provided by the DICOM Server, which runs as a Windows service. The InteleViewer DICOM Server starts when the workstation is started, and shuts down when the workstation is closed.

In addition, basic query/retrieve requests and print job submittals can be made by InteleViewer directly between SCU and SCP devices without being routed through the DICOM Server process. This structure means that data requests can be accepted at all times when the system is running, regardless of whether or not the application has been launched. In addition, if the DICOM Server should be interrupted or manually shut down for some reason, queries and print submittals can be made.

The InteleViewer DICOM Server supports image reception.

Application Data Flow Diagram

The Implementation Model for the InteleViewer services is illustrated below.
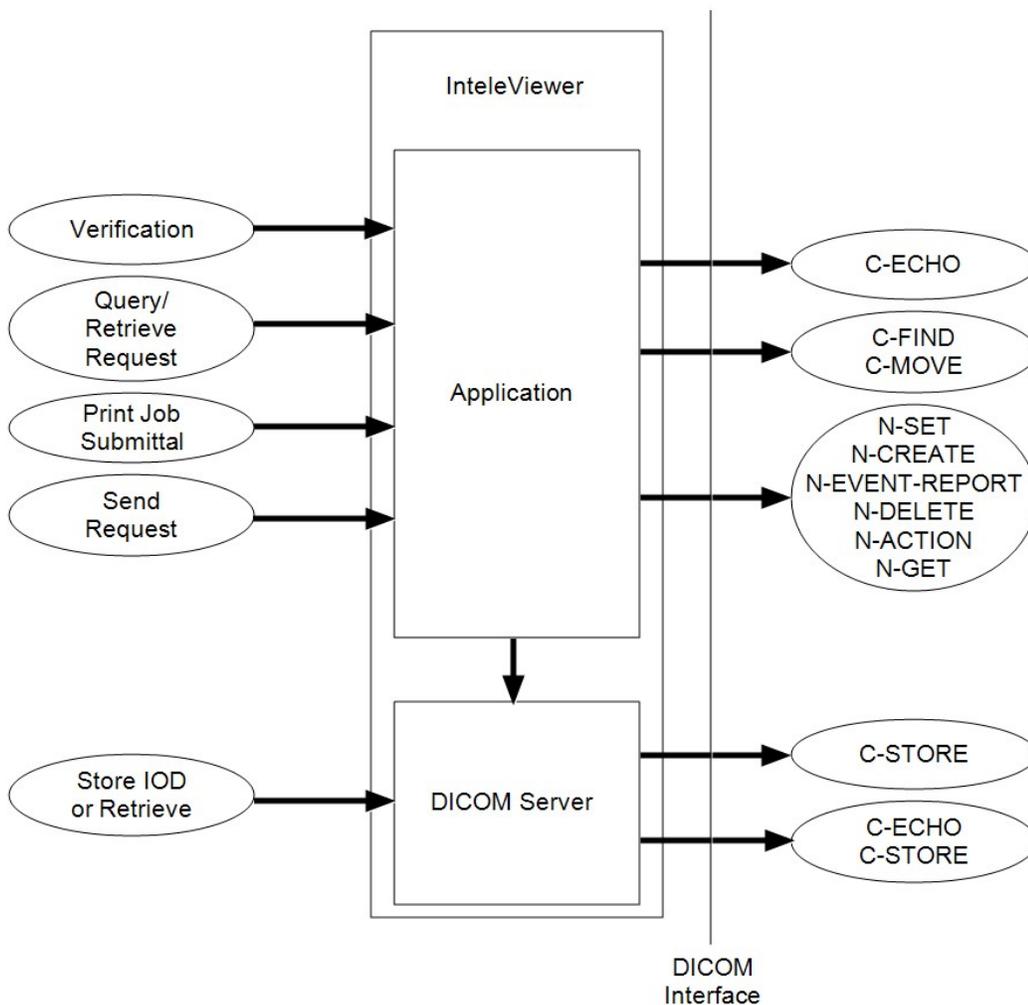
Functional Definition of Application Entities

All communications and image transfer with the remote application are accomplished utilizing the DICOM protocol over a network using the TCP/IP protocol stack.

Below is a table of the functions supported by InteleViewer application entities:

Functions Supported by InteleViewer Application Entities

SCU	SCP
Verification	Verification
Storage	Storage
Query/Retrieve	
Basic Grayscale Print Management	

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AE SPECIFICATIONS

InteleViewer provides Standard Conformance to the following DICOM 3.0 SOP Classes as an SCU.

SOP Classes Supported by InteleViewer as an SCU

SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3
Basic Text SR	1.2.840.10008.5.1.4.1.1.88.11
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1
Blending Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.4
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1
Chest CADSR	1.2.840.10008.5.1.4.1.1.88.65
Color Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.2
Comprehensive SR	1.2.840.10008.5.1.4.1.1.88.33
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1
CT Image Storage	1.2.840.10008.5.1.4.1.1.2
Digital Intra Oral XRay Image Storage For Presentation	1.2.840.10008.5.1.4.1.1.1.3
Digital Intra Oral XRay Image Storage For Processing	1.2.840.10008.5.1.4.1.1.1.3.1
Digital Mammography XRay Image Storage For Presentation	1.2.840.10008.5.1.4.1.1.1.2

SOP Class Name	SOP Class UID
Digital Mammography XRay Image Storage For Processing	1.2.840.10008.5.1.4.1.1.1.2.1
Digital XRay Image Storage For Presentation	1.2.840.10008.5.1.4.1.1.1.1
Digital XRay Image Storage For Processing	1.2.840.10008.5.1.4.1.1.1.1.1
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1
Enhanced SR	1.2.840.10008.5.1.4.1.1.88.22
Enhanced XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1.1
Enhanced XRF Image Storage	1.2.840.10008.5.1.4.1.1.12.2.1
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59
Mammography CADSR	1.2.840.10008.5.1.4.1.1.88.50
MR Image Storage	1.2.840.10008.5.1.4.1.1.4
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2
Multiframe Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2
Multiframe Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3
Multiframe Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1
Multiframe True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20
Ophthalmic Photography 16Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.2
Ophthalmic Photography 8Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1
PET Curve Storage	1.2.840.10008.5.1.4.1.1.129
PET Image Storage	1.2.840.10008.5.1.4.1.1.128
Procedure Log Storage	1.2.840.10008.5.1.4.1.1.88.40
Pseudo Color Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.3

SOP Class Name	SOP Class UID
Real World Value Mapping Storage	1.2.840.10008.5.1.4.1.1.67
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4
RT Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3
RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Spatial Fiducials Storage	1.2.840.10008.5.1.4.1.1.66.2
Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.1
Deformable Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.3
Stereometric Relationship Storage	1.2.840.10008.5.1.4.1.1.77.1.5.3
Twelve Lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Ultrasound Multiframe Image Storage	1.2.840.10008.5.1.4.1.1.3.1
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4
VL Slide Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3
XRay Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1
XRay Fluoroscopy Image Storage	1.2.840.10008.5.1.4.1.1.12.2
XRay Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67
Study Root Query Retrieve Information Model—FIND	1.2.840.10008.5.1.4.1.2.2.1
Study Root Query Retrieve Information Model—MOVE	1.2.840.10008.5.1.4.1.2.2.2
Basic Grayscale Print Management	1.2.840.10008.5.1.1.9

InteleViewer provides Standard Conformance to the following DICOM 3.0 SOP Classes as an SCP:

SOP Classes Supported by InteleViewer as an SCP

SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1
Basic Text SR Storage	1.2.840.10008.5.1.4.1.1.88.11
Breast Tomosynthesis Image Storage	1.2.840.10008.5.1.4.1.1.13.1.3
Breast Projection X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.13.1.4
Comprehensive SR Storage	1.2.840.10008.5.1.4.1.1.88.33
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1
CT Image Storage	1.2.840.10008.5.1.4.1.1.2
Digital Mammography XRay Image Storage Presentation	1.2.840.10008.5.1.4.1.1.1.2
Digital Mammography XRay Image Storage Processing	1.2.840.10008.5.1.4.1.1.1.2.1
Digital XRay Image Storage Presentation	1.2.840.10008.5.1.4.1.1.1.1
Digital XRay Image Storage Processing	1.2.840.10008.5.1.4.1.1.1.1.1
Enhanced SR Storage	1.2.840.10008.5.1.4.1.1.88.22
Grayscale Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.1
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59
Mammography CAD SR	1.2.840.10008.5.1.4.1.1.88.50
MR Image Storage	1.2.840.10008.5.1.4.1.1.4
Multiframe True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Ultrasound Image Storage (retired)	1.2.840.10008.5.1.4.1.1.3
Ultrasound Multiframe Image Storage	1.2.840.10008.5.1.4.1.1.3.1

SOP Class Name	SOP Class UID
Ultrasound Multiframe Image Storage (retired)	1.2.840.10008.5.1.4.1.1.3
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4
VL Slide Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3
XRay Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1
XRay Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2

Association Establishment Policies

General

The DICOM Application Content Name (ACN) that is always proposed by the InteleViewer services is 1.2.840.10008.3.1.1. The services shall offer a maximum PDU size of 16kB upon association initiation, and accept maximum PDU sizes up to 16kB on associations initiated by remote applications. There is no limit on the number of Presentation Context items proposed.

Number of Associations

InteleViewer can support multiple associations simultaneously, both as an SCP and as an SCU. As an SCP, the DICOM Server listens for incoming associations and spawn a new thread (a server "child") to manage each request. This ability means it is possible for InteleViewer to receive from multiple SCUs simultaneously.

As an SCU, InteleViewer can send print jobs to multiple SCPs simultaneously, spawning a new thread for each destination. For storing images, InteleViewer establishes associations serially.

Asynchronous Nature

InteleViewer does not support asynchronous operations. All operations will be performed synchronously.

Implementation Identifying Information

The Implementation Class UID is: 1.2.804.114202.5.3.

The Implementation Version String is: IMSM-m-r-Pp. For example, "IMS3-3-3-P37".

Association Initiation Policy

InteleViewer initiates associations for the following activities:

- Verifying DICOM communication between InteleViewer and a remote system.
- Sending images from the local InteleViewer database to a remote system.
- Querying remote database contents.
- Retrieving images from a remote database to the local InteleViewer database.
- Printing images.

Verify Communication with a Remote System

Associated Real World Activity

The user selects a server from the list of DICOM entities from the Utilities | User Preferences | DICOM page, and clicks Verify AE Title.

Proposed Presentation Contexts

Proposed Presentation Contexts for Real World Activity Configured AE Requests Verification

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

SOP Specific Conformance Statement for SOP Verification Class

InteleViewer provides standard conformance for DICOM communication verification.

Send Images to a Remote System

Associated Real World Activity

The user right-clicks one or more studies from the Search tool, selects Send To, and then chooses a DICOM entity from the list.

Proposed Presentation Contexts

SOP Classes as SCU

SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1
Basic Text SR Storage	1.2.840.10008.5.1.4.1.1.88.11
Comprehensive SR Storage	1.2.840.10008.5.1.4.1.1.88.33
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1
CT Image Storage	1.2.840.10008.5.1.4.1.1.2
Digital Mammography XRay Image Storage Presentation	1.2.840.10008.5.1.4.1.1.1.2
Digital Mammography XRay Image Storage Processing	1.2.840.10008.5.1.4.1.1.1.2.1
Digital XRay Image Storage Presentation	1.2.840.10008.5.1.4.1.1.1.1
Digital XRay Image Storage Processing	1.2.840.10008.5.1.4.1.1.1.1.1
Enhanced SR Storage	1.2.840.10008.5.1.4.1.1.88.22
Grayscale Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.1
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59
Mammography CAD SR	1.2.840.10008.5.1.4.1.1.88.50
MR Image Storage	1.2.840.10008.5.1.4.1.1.4
Multiframe True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5

SOP Class Name	SOP Class UID
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Ultrasound Image Storage (retired)	1.2.840.10008.5.1.4.1.1.3
Ultrasound Multiframe Image Storage	1.2.840.10008.5.1.4.1.1.3.1
Ultrasound Multiframe Image Storage (retired)	1.2.840.10008.5.1.4.1.1.3
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4
VL Slide Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3
XRay Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1
XRay Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2

Transfer Syntax for Send to Remote System

Name	UID
Little Endian Implicit Transfer Syntax	1.2.840.10008.1.2
Little Endian Explicit Transfer Syntax	1.2.840.10008.1.2.1
Big Endian Explicit Transfer Syntax	1.2.840.10008.1.2.2
JPEG Process 1 Transfer Syntax	1.2.840.10008.1.2.4.50
JPEG Lossless, Nonhierarchical (Processes 14) Transfer Syntax	1.2.840.10008.1.2.4.57
JPEG Process 14 SV1 Transfer Syntax	1.2.840.10008.1.2.4.70
JPEG LS Lossless Transfer Syntax	1.2.840.10008.1.2.4.80
JPEG LS Lossy Transfer Syntax	1.2.840.10008.1.2.4.81

SOP Specific Conformance Statement for SOP Image Storage Class

Images stored in the InteleViewer database that are to be sent to remote systems are converted to instances of the corresponding SOP Storage classes. Images are then sent sequentially to the remote systems. When sending multiple images to one remote system, a new association is negotiated for each series.

Query a Remote Database

Associated Real World Activity

In the Search tool, the user selects an AE from the list of data sources, enters the search criteria, and then clicks Search. For the Basic search, "Begins with" searching is used, allowing partial search criteria to be used.

Proposed Presentation Contexts

Proposed Presentation Contexts for Real World Activity Query a Remote Database

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Study Root Query Retrieve Information Model-FIND	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None

📋 Wild card matching on a value of "*" is equivalent to universal matching. The wild card matching method specified by DICOM might not be supported by some non-DICOM multi-byte character text processors.

SOP Specific Conformance Statement for SOP Query Class

InteleViewer supports C-FIND response values as defined in DICOM v3.0 Part 4. All Required (R) and Unique (U) Study, Series, and Image level keys are supported for the Study Root information models. In addition, certain Optional (O) keys are supported. For a Study Root Query/Retrieve the following keys are supported.

Study Root Query/Retrieve: Supported Keys

Data Level	Description	Tag	Type
Study	Study Date	(0008,0020)	R
Study	Study Time	(0008,0030)	R
Study	Study Accession Number	(0008,0050)	R
Study	Patient's Name	(0010,0010)	R

Data Level	Description	Tag	Type
Study	Patient ID	(0010,0020)	R
Study	Study Description	(0008,1030)	O
Series	Series Description	(0008,103E)	O
Series	Series Modality	(0008,0060)	R
Series	Series Number	(0020,0011)	R
Series	Number of Series Related Instances	(0020,1209)	O
Series	Series Date	(0008,0021)	O
Series	Series Time	(0008,0031)	O

Retrieve from a Remote System

Associated Real World Activity

The user double clicks a study in the Search tool.

Proposed Presentation Contexts

Proposed Presentation Contexts for Real World Activity Retrieve from a Remote System

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

SOP Specific Conformance Statement for SOP Retrieve Class

InteleViewer provides standard conformance.

Print to a Remote Laser Imager

Associated Real World Activity

The user selects the desired images by clicking the Add Image to Film button for each required image, and then selects Print Film from the Print menu. The user then clicks Print Images to Film.

Proposed Presentation Contexts

Proposed Presentation Contexts for Real World Activity Print to a Remote Laser Imager

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Basic Grayscale Print Management	1.2.840.1000.8.5.1.9	Implicit VR, Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None

SOP Specific Conformance Statement for the SOP Classes of the Basic Grayscale Print Management Meta SOP Class

The following mandatory print SOP classes are supported by InteleViewer for the Basic Grayscale Management Meta class:

Basic Grayscale Print Management Meta Class: Supported SOP Classes

SOP Class Name	SOP Class UID
Basic Film Session	1.2.840.10008.5.1.1.1
Basic Film Box	1.2.840.10008.5.1.1.2
Basic Grayscale Image Box	1.2.840.10008.5.1.1.4

Conformance for the SOP Class Basic Film Session

InteleViewer includes the following N-Create attributes for the Basic Film Session SOP class

Basic Film Session SOP Class N-CREATE: Attributes

Description	Tag	Supported Values
Number of Copies	(2000,0010)	Integer String
Print Priority	(2000,0020)	HIGH, MED, LOW
Medium Type	(2000,0030)	PAPER, CLEAR FILM, BLUE FILM, MAMMO BLUE FILM, MAMMO CLEAR FILM, CURRENT
Film Destination	(2000,0040)	MAGAZINE, PROCESSOR, BIN_i, CURRENT "i" indicates the bin number.

N-SET and N-ACTION are not used; however, N-DELETE is used to delete the complete Basic Film Session SOP instance hierarchy.

Conformance for the SOP Class Basic Film Box

The table below lists the N-Create attributes for the Basic Film Box SOP class, where "A" in the Usage column indicates the attribute is always sent and "C" indicates the attribute is only sent when not empty.

Basic Film Box SOP Class N-CREATE: Attributes

Description	Tag	Usage	Supported Values
Image Display Format	(2010,0010)	A	STANDARD, ROW, COL, SLIDE, SUPERSLIDE, CUSTOM
Referenced Film Session Sequence	(2010,0500)	A	Sequence of Items
> Referenced SOP Class UID	(0008,1150)	A	Unique Identifier (UID)
> Referenced SOP Instance UID	(0008,1155)	A	Unique Identifier (UID)
Film Orientation	(2010,0040)	A	PORTRAIT, LANDSCAPE
Film Size ID	(2010,0050)	A	8INX10IN, 8_5INX11IN, 10INX12IN, 10INX14IN, 11INX14IN, 11INX17IN, 14INX14IN, 14INX17IN, 24CMX24CM, 24CMX30CM, A4, A3

Description	Tag	Usage	Supported Values
			10INX14IN corresponds with 25.7CMX36.4CM; A4 corresponds with 210X297 millimeters; A3 corresponds with 297X420 millimeters.
Magnification Type	(2010,0060)	C	REPLICATE, BILINEAR, CUBIC, NONE
Maximum Density	(2010,0130)	C	Unsigned Short
Configuration Information	(2010,0150)	C	SCP Specific
Smoothing Type	(2010,0080)	C	SCP Specific
Border Density	(2010,0100)	C	BLACK, WHITE
Empty Image Density	(2010,0110)	C	BLACK, WHITE
Minimum Density	(2010,0120)	C	Unsigned Short
Trim	(2010,0140)	C	YES, NO
Requested Resolution ID	(2020,0050)	C	STANDARD, HIGH

The N-SET is currently unused; however, the N-ACTION is used to print a complete Basic Film Box SOP instance and N-DELETE is used to delete it after printing.

Conformance for the SOP Class Basic Grayscale Image Box

The following attributes are included in the InteleViewer N-SET for the Basic Grayscale Image Box SOP class. An "A" in the Usage column indicates attributes which are always sent to the printer, while "C" indicates attributes that are only sent when they contain data.

Basic Grayscale Image Box SOP Class: N-SET Attributes

Description	Tag	Usage	Supported Values
Image Box Position	(2020,0010)	A	Unsigned Short
Polarity	(2020,0020)	A	NORMAL, REVERSE
Basic Grayscale Image	(2020,0110)	A	Sequence of Items

Description	Tag	Usage	Supported Values
Sequence			
> Samples Per Pixel	(0028,0002)	C	1
> Photometric Interpretation	(0028,0004)	A	MONOCHROME1, MONOCHROME2
> Rows	(0028,0010)	A	Unsigned Short
> Columns	(0028,0011)	A	Unsigned Short
> Pixel Aspect Ratio	(0028,0034)	A	1/1
> Bits Allocated	(0028,0100)	A	8
> Bits Stored	(0028,0101)	A	8
> High Bit	(0028,0102)	A	7
> Pixel Representation	(0028,0103)	A	000H (Unsigned Integer)
> Pixel Data	(7FE0,0010)	A	Other Byte String
Requested Image Size	(2020,0030)	A	Unsigned Short
Requested Decimate/Crop Behavior	(2020,0040)	C	DECIMATE, CROP, FAIL

📋 InteleViewer supports 8-bit printing.

Verify the Committed Storage of Images on a Remote System

InteleViewer does not yet support this function.

Association Acceptance Policy

InteleViewer accepts associations for the activities listed below:

- DICOM communication verification between InteleViewer and a remote system.
- Image transfer from a remote system to InteleViewer.

Verify Communication with a Remote System

Associated Real World Activity

InteleViewer sends an echo response to verification requests made by remote systems.

Accepted Presentation Contexts

Accepted Presentation Contexts for Real World Activity Verify Communication with a Remote System

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

SOP Specific Conformance Statement for SOP Verification Class

InteleViewer provides standard conformance for DICOM communication verification.

Presentation Context Acceptance Criterion

InteleViewer accepts all presentation contexts which match those in "Accepted Presentation Contexts for Real World Activity Verify Communication with a Remote System" (page 32). No specific acceptance or prioritization rules are required.

Receive Images from a Remote System

Associated Real World Activity

A remote system pushes (sends) images to InteleViewer. Upon completion of the transfer, the images are available locally and can be selected for display.

Accepted Presentation Contexts

Accepted Presentation Contexts for Real World Activity Receive Images from a Remote System (as SCP)

SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1
Basic Text SR Storage	1.2.840.10008.5.1.4.1.1.88.11
Comprehensive SR Storage	1.2.840.10008.5.1.4.1.1.88.33
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1

SOP Class Name	SOP Class UID
CT Image Storage	1.2.840.10008.5.1.4.1.1.2
Digital Mammography XRay Image Storage Presentation	1.2.840.10008.5.1.4.1.1.1.2
Digital Mammography XRay Image Storage Processing	1.2.840.10008.5.1.4.1.1.1.2.1
Digital XRay Image Storage Presentation	1.2.840.10008.5.1.4.1.1.1.1
Digital XRay Image Storage Processing	1.2.840.10008.5.1.4.1.1.1.1.1
Enhanced SR Storage	1.2.840.10008.5.1.4.1.1.88.22
Grayscale Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.1
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59
Mammography CAD SR	1.2.840.10008.5.1.4.1.1.88.50
MR Image Storage	1.2.840.10008.5.1.4.1.1.4
Multiframe True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Ultrasound Image Storage (retired)	1.2.840.10008.5.1.4.1.1.3
Ultrasound Multiframe Image Storage	1.2.840.10008.5.1.4.1.1.3.1
Ultrasound Multiframe Image Storage (retired)	1.2.840.10008.5.1.4.1.1.3
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4
VL Slide Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3
XRay Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1
XRay Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2

Name	UID
Implicit VR, Little Endian	1.2.840.10008.1.2
JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50

SOP Specific Conformance Statement for SOP Storage Class

The InteleViewer AE conforms to the SOP's of the Storage SOP Class at Level 2 (full). In the case of a successful C-STORE operation the object has successfully been written to disk in the InteleViewer database. If an image is sent with the same SOP Instance UID (0008, 0018) as one that already exists on the InteleViewer AE, the new image will replace the old image and the database will be updated accordingly.

DICOM instances with Planar Configuration color-by-plane is converted to color-by-pixel. The Smallest Image Pixel Value and Largest Image Pixel Value elements are recomputed before being stored.

The InteleViewer AE responds to a C-STORE request with one of the response codes below:

C-STORE Response Codes

Service Status	Status Description	Status Code	Related Fields
Refused	Out of resources: the service was unable to process the request	A700	None
Success	Success	0000	None

Presentation Context Acceptance Criterion

None.

InteleViewer DICOM Media Services

InteleViewer conforms to DICOM Media Storage Service and File Format (PS 3.10) and the Media Storage Application Profiles (PS 3.11) for reading images on CD-Recordable media. The following application profile is supported by InteleViewer:

Supported Application Profile

Description	Identifier
General Purpose CD-R Image Interchange Profile	SD-GEN-CD

InteleViewer supports the real world activities listed below through the application profile indicated above. Please note that some additional flexibility is also available.

Real World Activities

Real World Activity	Role	SC Option
Display Directory of a CD-R disk	FSR	Interchange
Read Images from a CD-R disk	FSR	Interchange

Real World Activity Display Directory of CD-R Disk

InteleViewer assumes the role of FSR when reading the CD-R disk directory. Reading this directory displays an overview of the patients, studies, and series.

DICOMDIR Keys Displayed for InteleViewer

Level	Field	Tag
Study	Patient Name	(0010,0010)
Study	Patient ID	(0010,0020)
Series	Modality	(0008,0060)
Study	Study Description	(0008,1030)
Study	Study Date	(0008,0020)
Study	Study Time	(0008,0030)
Study	Accession Number	(0008,0050)
Series	Series Number	(0020,0011)

Real World Activity Read Images from CD-R Disk

When reading images from a CD-R, InteleViewer assumes the role of FSR. DICOM Part 10 Volume image import is standard.

In order for InteleViewer to store the images contained on a CD-R correctly, the following mandatory DICOM image attributes (DICOM Part 10) are required.

Mandatory Keys: DICOM Part 10 File Import

IOD	Field	Tag
Patient	Patient Name	(0010,0010)
Patient	Patient ID	(0010,0020)
Study	Study ID	(0020,0010)

IOD	Field	Tag
Study	Study UID	(0020,000D)
Series	Modality	(0008,0060)
Series	Series Number	(0020,0011)
Image	Reference SOP Class UID in File	(0004,1510)
Image	Referenced SOP Instance UID in File	(0004,1511)
Image	Reference Transfer Syntax UID in File	(0004,1512)
Image	Reference File ID	(0004,1500)
Image	Image Number	(0004,0013)

The following transfer syntaxes are supported by InteleViewer when importing and reading CD-R images.

Supported Transfer Syntaxes: DICOM Part 10 Import

Name	UID
Implicit VR, Little Endian Transfer Syntax	1.2.840.10008.1.2
Explicit VR, Little Endian Transfer Syntax	1.2.840.10008.1.2.1
Explicit VR, Big Endian Transfer Syntax	1.2.840.10008.1.2.2
JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50
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
JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91

📋 InteleViewer supports 8-bit color, 8-bit monochrome, and 16-bit monochrome JPEG 2000 images.

Image Export for CD-R Recording

InteleViewer fully supports the General Purpose CD-R Image Interchange Profile as a File Set Creator. Multi-session writes are supported.

The associated real world activity that initiates export of images for CD-R recording is as follows: The user right-clicks a study in the Search tool, then selects Burn to CD.

Grayscale Softcopy Presentation States

InteleViewer supports Grayscale Softcopy Presentation States as defined in DICOM 2003 Part 3, Section C.11.10.

InteleViewer includes the following modules for the Grayscale Softcopy Presentation State SOP class as an SCP.

Grayscale Softcopy Presentation State IOD Modules

Grayscale Softcopy Presentation State IOD Modules Table

IE	Module	Usage	Reference
Patient	Patient	M	4.5.2.1
Study	General Study	M	4.5.2.2
Series	General Series	M	4.5.2.3
	Presentation Series	M	4.5.2.4
Equipment	General Equipment	M	4.5.2.5
Presentation	Presentation State	M	4.5.2.6
	Display Shutter	C	4.5.2.7
	Displayed Area	M	4.5.2.8
	Spatial Transformation	C	4.5.2.9
	Modality LUT	C	4.5.2.10
	Softcopy VOI LUT	C	4.5.2.11
	Softcopy Presentation LUT	M	4.5.2.12
	SOP Common	M	4.5.2.13

Grayscale Softcopy Presentation State Module Descriptions

Patient Module

Patient Module Table

Attribute Name	Tag	Type	VR Value	VM Value	Comment
Patient's Name	(0010,0010)	2	PN	1	Copied from the referenced image object.

Attribute Name	Tag	Type	VR Value	VM Value	Comment
Patient ID	(0010,0020)	2	LO	1	Copied from the referenced image object.
Patient's Birth Date	(0010,0030)	2	DA	1	Copied from the referenced image object.
Patient's Sex	(0010,0040)	2	CS	1	Copied from the referenced image object.

General Study Module

General Study Module Table

Attribute Name	Tag	Type	VR Value	VM Value	Comment
Study Instance UID	(0020, 000D)	1	UI	1	Copied from the referenced image object.
Study Date	(0008,0020)	2	DA	1	Copied from the referenced image object.
Study Time	(0008,0030)	2	TM	1	Copied from the referenced image object.
Referring Physician's Name	(0008,0090)	2	PN	1	Copied from the referenced image object.
Study ID	(0020,0010)	2	SH	1	Copied from the referenced image object.
Accession Number	(0008,0050)	2	SH	1	Copied from the referenced image object.

General Series Module

General Series Module Table

Attribute Name	Tag	Type	VR Value	VM Value	Comment
Modality	(0008,0060)	1	CS	1	Enumerated value "PR".
Series Instance UID	(0020,000E)	1	UI	1	
Series Number	(0020,0011)	2	IS	1	
Laterality	(0020,0060)	2c	CS	1	Never sent; ignored when read.

Presentation Series Module

Presentation Series Module Table

Attribute Name	Tag	Type	VR Value	VM Value	Comment
Modality	(0008,0060)	1	CS	1	Enumerated value "PR".

General Equipment Module

General Equipment Module Table

Attribute Name	Tag	Type	VR Value	VM Value	Comment
Manufacturer	(0008,0070)	2	LO	1	Copied from the referenced image object.

Presentation State Module

Presentation State Module Table

Attribute Name	Tag	Type	VR Value	VM Value	Comment
Instance Number	(0020,0013)	1	IS	1	A number that identifies this presentation (SOP Instance). In previous versions of the DICOM Standard, this

Attribute Name	Tag	Type	VR Value	VM Value	Comment
					attribute was referred to as Image Number.
Presentation Label	(0070,0080)	1	CS	1	A label that is used to identify this presentation state. This value may be used by an application as a Defined Term in order to imply some grouping of different presentation states; i.e., it may have the same value for different presentation state instances that share some common concept.
Presentation Description	(0070,0081)	2	LO	1	User-defined description of this presentation state.
Presentation Creation Date	(0070,0082)	1	DA	1	Date of initial creation (not last modification) of the presentation state. This date may be different from the date that the DICOM SOP Instance was created, since the presentation state information contained may have been recorded earlier.
Presentation Creation Time	(0070,0083)	1	TM	1	Time of initial creation (not last modification) of the presentation state. This date may be different from the date that the DICOM SOP Instance was

Attribute Name	Tag	Type	VR Value	VM Value	Comment
					created, since the presentation state information contained may have been recorded earlier.
Presentation Creator's Name	(0070,0084)	2	PN	1	Name of operator saving the presentation state (such as a technologist/radiographer or physician).
Referenced Series Sequence	(0008,1115)	1	SQ	1	Sequence of Repeating Items where each Item includes the Attributes of one or more Series.
> Series Instance UID	(0020,000E)	1C	UI	1	Unique identifier of a Series that is part of this Study. Required if the sequence item is present.
> Retrieve AE Title	(0008,0054)	3	AE	1-n	Title of the DICOM Application Entity where the Images may be retrieved on the network.
> Storage Media File-Set ID	(0088,0130)	3	SH	1	The user or implementation specific human readable identifier that identifies the Storage Media on which the Images reside.
> Storage Media File-Set UID	(0088,0140)	3	UI	1	Uniquely identifies the Storage Media on which the Images reside.
> Referenced Image Sequence	(0008,1140)	1C	SQ	1	Sequence of Repeating Items where each Item provides reference to a selected set of Image SOP

Attribute Name	Tag	Type	VR Value	VM Value	Comment
					Class/SOP Instance pairs that are part of this Study and the Series defined by the Series Instance UID (0020,000E). Required if a sequence item is present.
>> Referenced SOP Class UID	(0008,1150)	1C	UI	1	Uniquely identifies the referenced SOP Class. Required if the sequence item is present. Shall be the same for all Images referenced by this presentation state.
>> Referenced SOP Instance UID	(0008,1155)	1C	UI	1	Uniquely identifies the referenced SOP Instance. Required if the sequence item is present.
>> Referenced Frame Number	(0008,1160)	1C	IS	1-n	Identifies the frame numbers within the referenced SOP Instance to which the presentation state applies. This attribute may be multi-valued. Required if the sequence item is present and the referenced SOP Instance is a multiframe image and the presentation state does not apply to all frames.
Shutter Presentation Value	(0018,1622)	1C	US	1	The value used to replace those parts of the image occluded by the shutter, in PValues.

Attribute Name	Tag	Type	VR Value	VM Value	Comment
					Required if the Display Shutter Module or Bitmap Display Shutter Module is present.
					The requirement in this module is type 1C which overrides the type 3 in the Display Shutter Module.
Mask Subtraction Sequence	(0028,6100)	1C	SQ	1	Required if Mask Module is present.
					Only one Item shall be present.
					This Sequence is replicated here in order to specify one Item, additional conditions on Mask Operation (0028,6101) and to forbid Applicable Frame Range (0028,6102).
					The role of Applicable Frame Range (0028,6102) is replaced by Referenced Frame Number (0008,1160).
> Mask Operation	(0028,6101)	1C	CS	1	Type of mask operation to be performed. Enumerated Values:
					• AVG_SUB
					• TID
					The requirement in this module is for Enumerated

Attribute Name	Tag	Type	VR Value	VM Value	Comment
					Values which override the requirements of the Mask Module.
> Contrast Frame Averaging	(0028,6112)	1C	US	1	Specifies the number of contrast frames to average together before performing the mask operation. Required if Mask Frame Numbers (0028,6110) specifies more than one frame (i.e. is multi-valued). The requirement in this module is conditional and overrides the optional requirements of the Mask Module.
Recommended Viewing Mode	(0028,1090)	1C	CS	1	Specifies the recommended viewing protocols. Enumerated Value: SUB = for subtraction with mask images. Required if Mask Subtraction Sequence (0028,6100) is present. The requirement in this module is type 1C and an Enumerated Value is specified which overrides the requirements of the Mask Module.

Display Shutter Module

This conditional module is sent if a non-bitmap display shutter is present in the Presentation State.

Display Shutter Module Table

Attribute Name	Tag	Type	VR Value	VM Value	Comment
Shutter Shape	(0018,1600)	1	CS	1-3	
Shutter Left Vertical Edge	(0018,1602)	1c	IS	1	Sent if one value of Shutter Shape is RECTANGULAR.
Shutter Right Vertical Edge	(0018,1604)	1c	IS	1	Sent if one value of Shutter Shape is RECTANGULAR.
Shutter Upper Horizontal Edge	(0018,1606)	1c	IS	1	Sent if one value of Shutter Shape is RECTANGULAR.
Shutter Lower Horizontal Edge	(0018,1608)	1c	IS	1	Sent if one value of Shutter Shape is RECTANGULAR.
Center of Circular Shutter	(0018,1610)	1c	IS	2	Sent if one value of Shutter Shape is CIRCULAR.
Radius of Circular Shutter	(0018,1612)	1c	IS	1	Sent if one value of Shutter Shape is CIRCULAR.
Vertices of the Polygonal Shutter	(0018,1620)	1c	IS	2-2n	Sent if one value of Shutter Shape is POLYGONAL.
Shutter Presentation Value	(0018,1622)	3	US	1	Always sent.

Displayed Area Module

Displayed Area Module Table

Attribute Name	Tag	Type	VR Value	VM Value	Comment
Displayed Area Selection SQ	(0070,005A)	1	SQ	1	
> Reference Image Sequence	(0008,1140)	1C	SQ	1	Sent if the displayed area selection in this item does not apply to all the images listed in the Presentation State Module.
>> Referenced SOP Class UID	(0008,1150)	1C	UI	1	Sent if sequence is present.
>> Referenced SOP Instance UID	(0008,1155)	1C	UI	1	Sent if sequence is present.
>> Referenced Frame Number	(0008,1160)	1C	IS	1-n	Sent if sequence item is present and the referenced image is a multi-frame image and the displayed area selection does not apply to all frames.
> Displayed Area Top Left Hand Corner	(0070,0052)	1	SL	2	
> Displayed Area Bottom Right Hand Corner	(0070,0053)	1	SL	2	
> Presentation Size Mode	(0070,0100)	1	CS	1	Enumerated values: SCALE TO FIT, TRUE SIZE, MAGNIFY.
> Presentation Pixel Spacing	(0070,0101)	1C	DS	2	Sent if the Presentation Size Mode (0070,0100) is TRUE SIZE. May be sent

Attribute Name	Tag	Type	VR Value	VM Value	Comment
					otherwise as well.
> Presentation Pixel Aspect Ratio	(0070,0102)	1C	IS	2	Sent if Presentation Pixel Spacing is not present.
> Presentation Pixel Magnification Ratio	(0070,0103)	1C	FL	1	Sent if Presentation Size Mode is MAGNIFY.

Spatial Transformation Module

This conditional module is sent if the Presentation State requires that the image be rotated or flipped.

Spatial Transformation Module

Attribute Name	Tag	Type	VR Value	VM Value	Comment
Image Rotation	(0070,0042)	1	US	1	Enumerated values: 0, 90, 180, 270.
Image Horizontal Flip	(0070,0041)	1	CS	1	Enumerated values: Y, N.

Modality LUT Module

This conditional module is sent if the Presentation State contains a modality transformation. When creating a Presentation State for an existing image object, a modality transformation that is present in the image is copied into the Presentation State.

Modality LUT Module Table

Attribute Name	Tag	Type	VR Value	VM Value	Comment
Modality LUT Sequence	(0028,3000)	1c	SQ	1	Copied from the referenced image object.
> LUT Descriptor	(0028,3002)	1c	US/SS	3	Copied from the referenced image object.

6 | Grayscale Softcopy Presentation States

Attribute Name	Tag	Type	VR Value	VM Value	Comment
> LUT Explanation	(0028,3003)	3	LO	1	Copied from the referenced image object.
> Modality LUT Type	(0028,3004)	1c	LO	1	Copied from the referenced image object.
> LUT Data	(0028,3006)	1c	OW/US/SS	1-n	Copied from the referenced image object.
Rescale Intercept	(0028,1052)	1c	DS	1	Copied from the referenced image object.
Rescale Slope	(0028,1053)	1c	DS	1	Copied from the referenced image object.
Rescale Type	(0028,1054)	1c	LO	1	Copied from the referenced image object if present. The default value is US (unspecified).

Softcopy VOI LUT Module

This conditional module is sent if the Presentation State contains a value of interest (VOI) transformation. When creating a Presentation State for an existing image object, VOI transformations present in the image object can be copied into the Presentation State (under user control).

Softcopy VOI LUT Module Table

Attribute Name	Tag	Type	VR Value	VM Value	Comment
Softcopy VOI LUT Sequence	(0028,3110)	1	SQ	1	
> Referenced Image	(0008,1140)	1C	SQ	1	Sent if the VOI LUT in this item does not apply

Attribute Name	Tag	Type	VR Value	VM Value	Comment
Sequence					to all the images listed in the Presentation State Module.
>> Referenced SOP Class UID	(0008,1150)	1C	UI	1	Sent if the sequence is present.
>> Referenced SOP Instance UID	(0008,1155)	1C	UI	1	Sent if the sequence is present.
>> Referenced Frame Number	(0008,1160)	1C	IS	1-n	Sent if the sequence item is present and the referenced image is a multi-frame image and the VOI LUT does not apply to all frames.
> VOI LUT Sequence	(0028,3010)	1c	SQ	1	Copied from the referenced image object.
>> LUT Descriptor	(0028,3002)	1c	US/SS	3	Copied from the referenced image object.
>> LUT Explanation	(0028,3003)	3	LO	1	Copied from the referenced image object.
>> LUT Data	(0028,3006)	1c	OW/US/SS	1-n	Copied from the referenced image object.
> Window Center	(0028,1050)	1c	DS	1-n	Copied from the referenced image object (first value, only if no VOI LUT SQ).
> Window Width	(0028,1051)	1c	DS	1-n	Copied from the referenced image

Attribute Name	Tag	Type	VR Value	VM Value	Comment
					object (first value, only if no VOI LUT SQ).
> Window Center & Width Explanation	(0028,				Copied from the referenced image object (first value, only if no VOI LUT SQ).

Softcopy Presentation LUT Module

Softcopy Presentation LUT Module Table

Attribute Name	Tag	Type	VR Value	VM Value	Comment
Presentation LUT Sequence	(2050,0010)	1C	sq	1	
> LUT Descriptor	(0028,3002)	1c	US/SS	3	
> LUT Explanation	(0028,3003)	3	LO	1	
> LUT Data	(0028,3006)	1c	OW/US	1-n	
Presentation LUT Shape	(2050,0020)	1c	CS	1	Enumerated values: NORMAL, INVERSE

SOP Common Module

SOP Common Module Table

Attribute Name	Tag	Type	VR Value	VM Value	Comment
SOP Class UID	(0008,0016)	1	UI	1	Grayscale Softcopy Presentation State Storage: 1.2.840.10008.5.1.4.1.1.11.1
SOP Instance UID	(0008,0018)	1	UI	1	
Specific Character Set	(0008,0005)	1c	CS	1-n	Sent if an extended character set is used in the presentation state.
Instance	(0008,0012)	3	DA	1	Date of creation (or last

Attribute Name	Tag	Type	VR Value	VM Value	Comment
Creation Date					modification) of the presentation state, always sent.
Instance Creation Time	(0008,0013)	3	TM	1	Time of creation (or last modification) of the presentation state, always sent.
Instance Creator UID	(0008,0014)	3	UI	1	Sent if previously read from the existing presentation state.

7
COMMUNICATION PROFILES

Supported Communication Stacks

DICOM Part 8 is supported by InteleViewer through TCP/IP.

OSI Stack

OSI stack is not supported by InteleViewer.

TCP_IPStack

The TCP/IP stack supported by InteleViewer is inherited from the host operating system (Windows 2000/XP Professional/Windows 7).

Physical Media Support

Any Windows operating system supported physical media.

Point-to-Point Stack

InteleViewer does not support 50-pin ACR-NEMA connection.

8
EXTENSIONS/SPECIALIZATIONS/PRIVATIZATIONS

Standard Extended/Specialized/Private SOPs

Not applicable.

Private Transfer Syntaxes

Not applicable.

9
CONFIGURATION

Local AE Titles are configurable.

AE Title/Presentation Address Mapping

The local AE Title can be configured by using the settings in the User Preferences.

Configuration Parameters

The Local AE Title field is configurable for the local AE:

The following fields are configurable for any remote AE:

- Remote AE
- Remote TCP/IP Port
- Remote IP Address

10
ANNEXES

IOD Contents

Usage of Attributes from Received IODs

Pixel Spacing and Calibration for Projection Modalities

InteleViewer requires DICOM attributes for projection modalities (CR, RF, XA, and DX) to correctly render images and measurements in true physical size. This requirement follows the policy described in DICOM Correction Item CP-586 (ftp://medical.nema.org/medical/dicom/final/cp586_ft.pdf), as well as the descriptions found in DICOM PS3.3 2018c - Information Object Definitions, section 10.7 (http://dicom.nema.org/medical/dicom/current/output/html/part03.html#sect_10.7).

Attributes Used by InteleViewer for Rendering True Physical Size

Attribute Name	Tag	VR Value	VM Value	Attribute Description
Estimated Radiographic Magnification Factor	(0018,1114)	DS	1	Ratio of Source Image Distance (SID) over Source Object Distance (SOD).
Imager Pixel Spacing	(0018,1164)	DS	2	Physical distance measured at the front plane of the Image Receptor housing between the center of each pixel specified by a numeric pair-row

Attribute Name	Tag	VR Value	VM Value	Attribute Description
				spacing value(delimiter) column spacing value in mm.
				The value of this Attribute shall never be adjusted to account for correction for the effect of geometric magnification or calibration against an object of known size; Pixel Spacing (0028,0030) is specified for that purpose.
Pixel Spacing	(0028,0030)	DS	2	Physical distance in the Patient between the center of each pixel, specified by a numeric pair-adjacent row spacing (delimiter) adjacent column spacing in mm. Required if the image has been calibrated. May be present otherwise.
Pixel Spacing Calibration Type	(0028,0A02)	CS	1	The type of correction for the effect of geometric magnification or calibration against an object of known size, if any.
Pixel Spacing Calibration Description	(0028,0A04)	LO	1	A free text description of the type of correction or calibration performed. Required if Pixel Spacing Calibration Type (0028,0A02) is present.

Attribute Name	Tag	VR Value	VM Value	Attribute Description
				📋 1. In the case of correction, the text might include description of the assumptions made about the body part and geometry and depth within the Patient. 2. In the case of calibration, the text might include a description of the fiducial and where it is located (e.g., "XYZ device applied to the skin over the greater trochanter"). 3. Though it is not required, the Device Module may be used to describe the specific characteristics and size of the calibration device.

DICOM Attributes for Mammography Modalities

Air Gap Suppression

InteleViewer requires DICOM attributes for mammography modalities to detect the breast skin line and separate the detector area that is covered by air from that covered by breast tissue. The mammography modality detects the breast tissue and chooses to either replace the non-breast image data areas with a specific pixel padding value or provide a pixel padding value range that defines non-breast image data. This requirement follows the policy described in the DICOM Correction Item CP-692 (ftp://medical.nema.org/medical/dicom/final/cp692_ft.pdf).

When one of the following DICOM attributes is present (), InteleViewer assumes that the image contains padding pixels.

Attributes Used by InteleViewer for Air Gap Suppression

Attribute Name	Tag	VR Value	VM Value	Attribute Description
Pixel Padding Value	(0028,0120)	US or SS	1	Value of pixels not present in the native image.
Pixel Padding Range Limit	(0028,0121)	US or SS	1	Represents one limit (inclusive) of a range of padding values used together with the pixel padding value. This attribute is required if the pixel padding value is to be defined as a range instead of a single value. This attribute is not present if the Pixel Padding Value attribute is missing.

If the image contains the Pixel Padding Value attribute only, then InteleViewer does not apply image contrast manipulations to those pixels with the value specified in this attribute.

If the image contains both the Pixel Padding Value and Pixel Padding Range Limit attributes, then InteleViewer does not apply image contrast manipulations to those pixels with values in the range between the values of the Pixel Padding Value attribute and the Pixel Padding Range Limit attribute, inclusive.

MQSA-Required Mammographic Image Identifiers

As per the MQSA (Mammography Quality Standards Act) mammographic image identification requirements, InteleViewer requires the following DICOM attributes () to define the default profile for the mammography modality. These DICOM attributes are displayed when opening an exported mammography study.

Attributes Used by InteleViewer for Mammography Profile

Attribute Name	Tag	VR Value	VM Value	Attribute Description
Content Date	(0008,0023)	DA	1	The date the image pixel data creation started. Required if the image is part of a series in which the images are temporally related.

Attribute Name	Tag	VR Value	VM Value	Attribute Description
Content Time	(0008,0033)	TM	1	The time the image pixel data creation started. Required if the image is part of a series in which the images are temporally related.
Detector Id	(0018,700A)	SH	1	The ID or serial number of the detector used to acquire this image.
Institution Address	(0008,0081)	ST	1	Mailing address of the institution to which the identified individual is responsible or accountable.
Institution Name	(0008,0080)	LO	1	Institution where the equipment that produced the composite instances is located. This requirement follows the policy described in DICOM Correction Item CP-247 (ftp://medical.nema.org/medical/dicom/final/cp247_ft2.pdf).
Laterality	(0020,0060)	CS	1	Laterality of (paired) body part examined. Required if the body part examined is a paired structure and Image Laterality (0020 0062) or Frame Laterality (0020 9072) are not sent. Enumerated values: R=right, L=left. Some IODs support Image Laterality (0020 0062) at the Image level or Frame Laterality (0020 9072) at the Frame level in the Frame Anatomy functional group macro, which can provide a more comprehensive mechanism for specifying the laterality of the body parts being examined.
Operator's Name	(0008,1070)	PN	1-n	Name of the operator acquiring or creating the mammography image.
Patient's Name	(0010,0010)	PN	1	The patient's surname and first name; delimited by a comma.

Attribute Name	Tag	VR Value	VM Value	Attribute Description
Patient ID	(0010,0020)	LO	1	The patient's user identification.
Plate ID	(0018,1004)	LO	1	The ID or serial number of the sensing plate upon which the image was acquired.
Station Name	(0008,1010)	SH	1	User-defined name identifying the machine that produced the composite instances. This requirement follows the policy described in DICOM Correction Item CP-270 (ftp://medical.nema.org/medical/dicom/final/cp270_ft.pdf).
Study Date	(0008,0020)	DA	1	The date the study was acquired.
View Position	(0018,5101)	CS	1	Radiographic view of the image relative to the imaging subject's orientation.

Required Additional DICOM Attributes in Mammography Images

InteleViewer requires the following additional DICOM attributes ("Additional Attributes Used by InteleViewer for Mammography" (page 60), "Mammo-CAD Related DICOM Attributes Used by InteleViewer for Mammography" (page 62), and "Sequence-Protocol Related DICOM Attributes Used by InteleViewer for Mammography" (page 63)) for mammography modalities.

Additional Attributes Used by InteleViewer for Mammography

Attribute Name	Tag	VR Value	VM Value	Attribute Description
Date of Last Detector Calibration	(0018,700C)	DA	1	Date on which the detector used to acquire this image as identified in Detector ID (0018,700A) was last calibrated.
Device Serial Number	(0018,1000)	LO	1	Manufacturer's serial number of the equipment that produced the composite instances.
Entrance Dose	(0040,0302)	US	1	Average entrance dose value measured in dGy at the surface of

Attribute Name	Tag	VR Value	VM Value	Attribute Description
				the patient during this Performed Procedure Step.
				This may be an estimated value based on assumptions about the patient's body size and habitus.
				This requirement follows the policy described in DICOM Correction Item CP-187 (ftp://medical.nema.org/ medical/dicom/final/cp187_ft.pdf).
Entrance Dose In Mgy	(0040,8302)	DS	1	Average entrance dose value measured in mGy at the surface of the patient during this Performed Procedure Step. This may be an estimated value based on assumptions about the patient's body size and habitus.
Gantry Angle	(300A,011E)	DS	1	Treatment machine gantry angle, i.e., orientation of IEC (International Electrotechnical Commission) GANTRY coordinate system with respect to IEC FIXED REFERENCE coordinate system (degrees).
Manufacturer's Model Name	(0008,1090)	LO	1	Manufacturer's model name of the equipment that produced the composite instances.
Organ Dose	(0040,0316)	DS	1	Average mammary gland absorption dose value measured in dGy during the acquisition of this image. This may be an estimated value based on assumptions about the patient's body size and habitus.

Attribute Name	Tag	VR Value	VM Value	Attribute Description
Positioner Primary Angle	(0018,1510)	DS	1	Position in degrees of the X-ray beam vector in the coronal anatomical plane as if the patient were standing where movement of the X-ray source from right to vertical is positive, and vertical is zero. This requirement follows the policy described in DICOM Correction Item CP-411 (ftp://medical.nema.org/medical/dicom/final/cp411_ft.pdf).
Software Versions	(0018,1020)	LO	1-n	Manufacturer's designation of software version of the equipment that produced the composite instances.
Source Image Sequence	(0008,2112)	SQ	1	Sequence which identifies the set of image SOP class/instance pairs of the images that were used to derive this image.
Time of Last Detector Calibration	(0018,700E)	TM	1	The time at which the detector used to acquire this image as identified in Detector ID (0018,700A) was last calibrated.

Mammo-CAD Related DICOM Attributes Used by InteleViewer for Mammography

Attribute Name	Tag	VR Value	VM Value	Level
Source Image Sequence	(0008,2112)	SQ	1	Image
> Referenced SOP Class UID	(0008,1150)	UI	1	
> Referenced SOP Instance UID	(0008,1155)	UI	1	
> Spatial Locations Preserved	(0028,135A)	CS	1	

Sequence-Protocol Related DICOM Attributes Used by InteleViewer for Mammography

Attribute Name	Tag	VR Value	VM Value	Attribute Description
Estimated Radiographic Magnification Factor	(0018,1114)	DS	1	Ratio of Source Image Receptor Distance (SID) over Source Object Distance (SOD).
Implant Present	(0028,1300)	CS	1	Indicates whether the imaged breast contains a breast implant regardless of the visibility of a breast implant in the pixel data.
Organ Exposed	(0040,0318)	CS	1	Organ to which OrganDose (0040, 0316) applies.
Partial View	(0028,1350)	CS	1	Indicates whether the image is a partial view that is a subset of a single view of the breast.
Partial View Description	(0028,1351)	ST	1	Text description of the portion of the breast captured in a partial view image.
Partial View Code Sequence	(0028,1352)	SQ	1	Sequence that describes the portion or section of the breast captured in a partial view image.
> Code Value	(0008,0100)	SH	1	A computer-readable and computer-searchable identifier that is unambiguous within the Coding Scheme denoted by Coding Scheme Designator (0008,0102) and Coding Scheme Version (0008,0103). The suggested Value Set, i.e. the Defined Terms, for a given instance of Code Value (0008,0100) may be defined by an external message/terminology Mapping Resource, such as the SNOMED DICOM Microglossary.
> Coding Scheme	(0008,0102)	SH	1	Identifies the coding scheme in which the code for a term is defined.

Attribute Name	Tag	VR Value	VM Value	Attribute Description
Designator				Standard coding scheme designators used in DICOM information interchange are listed in DICOM PS 3.16. Other coding scheme designators, for both private and public coding schemes, may be used. Further identification of the coding scheme designators used in an SOP Instance may be provided in the Coding Scheme Identification Sequence (0008,0110).
> Coding Scheme Version	(0008,0103)	SH	1	Identifies the version of a coding scheme if necessary to resolve the ambiguity in the Code Value (0008,0100) or Code Meaning (0008,0104).
> Code Meaning	(0008,0104)	LO	1	Human-readable text which is provided for the convenience of the readers of the Information Object. For a particular Coding Scheme Designator (0008,0102) and Code Value (0008, 0100), several alternative values for Code Meaning may be defined (i.e., synonyms), even for the same nomenclature language. Even when no synonyms are present within a single nomenclature, other nomenclatures might be in use. Therefore the value of Code Meaning shall never be used as a key, index, or decision value, rather the combination of Coding Scheme Designator and Code Value can be used. Code Meaning is a purely annotative,

Attribute Name	Tag	VR Value	VM Value	Attribute Description
				descriptive attribute.
				This does not imply that Code Meaning can be filled with arbitrary free text. Only values defined by the Coding Scheme will be used.
				Required if a sequence item is present.
> Mapping Resource	(0008,0105)	CS	1	A resource that defines context-dependent usage constraints (i.e. Value Set or Relationship Type restrictions) for Attributes. A resource that specifies the mapping of the content of an external controlled terminology to the components of a message standard.
> Context Group Version	(0008,0106)	DT	1	Conveys the version date/time of the Context Group identified by Context Identifier (0008,010F), as specified by the standards body that maintains the Mapping Resource in which the Context Group is defined.
> Context Group Local Version	(0008,0107)	DT	1	Conveys an implementation-specific private version date/time of a Context Group that contains private code set extensions.
				Required if the value of Code Set Extension Flag (0008,010B) is "Y."
				Can also be present if the Context Group denoted by Context Identifier (0008,010F) contains private code set extensions.
> Code Set Extension	(0008,010B)	CS	1	Indicates whether the Code Value/Code Meaning pair encoded

Attribute Name	Tag	VR Value	VM Value	Attribute Description
Flag				in Code Value (0008,0100) and Code Meaning (0008,0104) is a private extension of a Context Group or Coding Scheme. Enumerated values: Y, N If Context Identifier (0008,010F) is present, then "Y" means "The Code Value/Code Meaning pair is a private extension of the Context Group designated by Context Identifier (0008,010F)." If no value of Context Identifier (0008,010F) is present, then "Y" means "The Code Value/Code Meaning pair is a private extension of the Coding Scheme designated by Coding Scheme Designator (0008,0102) and Coding Scheme Version (0008,0103)."
> Code Set Extension Creator UID	(0008,010D)	UI	1	Identifies the person or organization who created an extension to a Coding Scheme or Context Group. Required if the value of Code Set Extension Flag (0008,010B) is "Y."
> Context Identifier	(0008,010F)	CS	1	Identifies the Context Group defined by Mapping Resource (0008,0105) from which the values of Code Value (0008,0100) and Code Meaning (0008,0104) were selected or the Context Group defined by Mapping Resource (0008,0105) to which the Code Value (0008,0100) and Code Meaning (0008,0104) have been added as a private

Attribute Name	Tag	VR Value	VM Value	Attribute Description
				Context Group extension by Context Group Creator UID (0008,010E).
View Code Sequence	(0054,0220)	SQ	1	Sequence that describes the projection of the anatomic region of interest on the image receptor. Only a single Item shall be permitted in this Sequence.
> View Modifier Code Sequence	(0054,0222)	SQ	1	View Modifier. Required if needed to fully specify the View. Only a single Item shall be permitted in this Sequence.

Breast Tomosynthesis

InteleViewer requires the following DICOM attributes (and) to support breast tomosynthesis.

Attributes Used by InteleViewer for Breast Tomosynthesis (Shared Functional Groups Sequence)

Attribute Name	Tag	VR Value	VM Value	Attribute Description
Shared Functional Groups Sequence	(5200,9229)	SQ	1	Sequence that contains the Functional Group Macros that are shared for all frames in this SOP Instance and Concatenation. The contents of this sequence are the same in all SOP Instances that comprise a Concatenation.

Attribute Name	Tag	VR Value	VM Value	Attribute Description
				Zero or one Item shall be included in this sequence.
> Include one or more Functional Group Macros that are shared by all frames. The selected Functional Group Macros shall not be present in the Per-frame Functional Groups Sequence (5200,9230)				For each IOD that includes this module, a table is defined in which the permitted Functional Group Macros and their usage is specified.
Frame Anatomy Sequence	(0020,9071)	SQ	1	Identifies anatomic characteristics of this frame. Only a single Item shall be permitted in this sequence.
> Frame Laterality	(0020,9072)	CS	1	Laterality of (possibly paired) body parts (as described in Anatomic Region Sequence (0008,2218)) examined. Enumerated Values: R = Right L = Left U = Unpaired B = Both left and right This attribute is mandatory, in order to ensure that frames can be positioned correctly relative to one another

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Attribute Name	Tag	VR Value	VM Value	Attribute Description
				for display. This attribute shall be consistent with any laterality information contained in Primary Anatomic Structure Modifier Sequence (0008,2230), if present.
Plane Orientation Sequence	(0020,9116)	SQ	1	Identifies orientation of the plane of this frame. Only a single Item shall be permitted in this sequence.
> Image Orientation Patient	(0020,0037)	DS	6	The direction cosines of the first row and the first column with respect to the patient. The Image Orientation Patient and Image Position Patient attributes shall be provided as a pair. Row value for the x, y, and z axes respectively followed by the Column value for the x, y, and z axes respectively.
Frame VOI LUT Sequence	(0028,9132)	SQ	1	Window Center and Window Width values applied to the frame. Zero or one Item may be included in this sequence.
> Window Center	(0028,1050)	DS	1-n	Window center for display.
> Window Width	(0028,1051)	DS	1-n	Window width for display.

Attribute Name	Tag	VR Value	VM Value	Attribute Description
Pixel Value Transformation Sequence	(0028,9145)	SQ	1	Contains the attributes involved in the transformation of stored pixel values. Only a single Item shall be permitted in this sequence.
> Rescale Intercept	(0028,1052)	DS	1	The value b in relationship between stored values (SV) and the output units. Output units = m*SV + b.
> Rescale Slope	(0028,1053)	DS	1	m in the equation specified by Rescale Intercept (0028,1052).
> Rescale Type	(0028,1054)	Lo	1	Specifies the output units of Rescale Slope (0028,1053) and Rescale Intercept (0028,1052).

Attributes Used by InteleViewer for Breast Tomosynthesis (Per-Frame Functional Groups Sequence)

Attribute Name	Tag	VR Value	VM Value	Attribute Description
Per Frame Functional Groups Sequence	(5200, 9230)	SQ	1	Sequence that contains the Functional Group Sequence Attributes corresponding to each frame of the Multi-frame Image. The first Item corresponds with the first frame, and so on. One or more Items shall be included in this sequence. The number of Items shall be the same as the number of frames in the Multi-frame Image.
> Include one or more				For each IOD that includes this module, a table is defined in which the permitted

Attribute Name	Tag	VR Value	VM Value	Attribute Description
Functional Group Macros				Functional Group Macros and their usage is specified.
Plane Position Sequence	(0020, 9113)	SQ	1	Identifies the position of the plane of this frame. Only a single Item shall be permitted in this sequence.
> Image Position Patient	(0020, 0032)	DS	3	The x, y, and z coordinates of the upper left-hand corner (center of the first voxel transmitted) of the frame, in mm.
Pixel Measures Sequence	(0028, 9110)	SQ	1	Identifies the physical characteristics of the pixels of this frame. Only a single Item shall be permitted in this sequence.
> Slice Thickness	(0018, 0050)	DS	1	Nominal reconstructed slice thickness, in mm.
> Pixel Spacing	(0028, 0030)	DS	2	Physical distance in the patient between the center of each pixel, specified by a numeric pair - adjacent row spacing (delimiter) adjacent column spacing in mm.

Auto and Manual Linked Stacking

To allow the use of the Auto Linked Stacking and Manual Linked Stacking tools, InteleViewer requires DICOM attributes to detect if all series are imaged on parallel planes and if all series share a unique coordinate system.

The following attributes () are preferred because they allow InteleViewer to scroll two or more series together as long as the series are part of the same study.

Attributes Used by InteleViewer for Auto Linked Stacking

Attribute Name	Tag	VR Value	VM Value	Attribute Description
Image Orientation Patient	(0020,0037)	DS	6	The direction cosines of the first row and the first column with respect to the patient. InteleViewer considers series to be

Attribute Name	Tag	VR Value	VM Value	Attribute Description
				on parallel planes if the value of this tag differs by 0.1 degrees or less for all the series being auto linked.
Frame Of Reference UID	(0020,0052)	UI	1	Uniquely identifies Frame of Reference within Structure Set. InteleViewer considers series to share a unique coordinate system if the value of this tag is identical for all the series being auto linked.
Image Position Patient	(0020,0032)	DS	3	The x, y, and z coordinates of the upper left-hand corner of the image (in mm). It is the center of the first voxel transmitted.
Pixel Spacing (or Imager Pixel Spacing (0018, 1164))	(0028,0030)	DS	2	The physical distance in the patient between the center of each pixel, specified by a numeric pair— adjacent row spacing (delimiter) adjacent column spacing in mm.
Slice Location	(0020, 1041)	DS	1	The relative position of the image plane expressed in mm. InteleViewer considers series to be on parallel planes if the value of this tag differs for different images in all the series being auto linked.

The following attributes ("Attributes Used by InteleViewer for Manual Linked Stacking" (page 72)) are preferred because they allow series of the current study and the series of a prior study to scroll together.

Attributes Used by InteleViewer for Manual Linked Stacking

Attribute Name	Tag	VR Value	VM Value	Attribute Description
Image Orientation Patient	(0020,0037)	DS	6	The direction cosines of the first row and the first column with respect to the patient.

Attribute Name	Tag	VR Value	VM Value	Attribute Description
Image Position Patient	(0020,0032)	DS	3	The x, y, and z coordinates of the upper left-hand corner of the image.
Pixel Spacing (or Imager Pixel Spacing (0018, 1164))	(0028,0030)	DS	2	The physical distance in the patient between the center of each pixel, specified by a numeric pair— adjacent row spacing (delimiter) adjacent column spacing in mm.
Slice Location	(0020, 1041)	DS	1	The relative position of the image plane expressed in mm.

Institutional Department Name

InteleViewer requires the following DICOM attribute () to detect the location of the equipment that produced the composite instances at your institution. This requirement follows the policy described in DICOM Correction Item CP-270 (ftp://medical.nema.org/medical/dicom/final/cp270_ft.pdf).

Attribute Used by InteleViewer for Institutional Department Name

Attribute Name	Tag	VR Value	VM Value	Level	Attribute Description
Institutional Department Name	(0008,1040)	LO	1	Series	The department in the institution where the equipment that produced the composite instances is located.

In-Plane Phase Encoding Direction

InteleViewer requires the following DICOM attribute () to correctly detect the phase encoding direction in MR images so that radiologists can improve their readings and acquisition protocols. This requirement follows the policy described in DICOM Correction Item CP-319 (ftp://medical.nema.org/medical/dicom/final/cp319_ft.pdf).

Attribute Used by InteleViewer for In-Plane Phase Encoding Direction

Attribute Name	Tag	VR Value	VM Value	Attribute Description
In-plane Phase Encoding Direction	(0018,1312)	CS	1	The axis of the phase encoding with respect to the image. Enumerated values: ROW = phase encoded in rows COL = phase encoded in columns

Acquisition Device Processing Code

InteleViewer requires the following DICOM attribute () to indicate the device-specific processing associated with an image such as, an overexposed or underexposed image.

Attribute Used by InteleViewer for Acquisition Device Processing Code

Attribute Name	Tag	VR Value	VM Value	Level	Attribute Description
Acquisition Device Processing Code	(0018,1401)	LO	1	Image	Code representing the device-specific processing associated with the image (for example, organ filtering code).

This code is manufacturer specific and provides useful annotation information. |

Pixel Data Encoding

InteleViewer requires the following DICOM attributes () to define the pixel structure.

Attributes Used by InteleViewer for Pixel Data Encoding

Attribute Name	Tag	VR Value	VM Value	Attribute Description
Bits Allocated	(0028,0100)	US	1	Size of the cell used to store a pixel sample and optionally additional bits.
Bits Stored	(0028,0101)	US	1	Total number of the allocated bits used to represent a Pixel Sample

Attribute Name	Tag	VR Value	VM Value	Attribute Description
				Value.
High Bit	(0028,0102)	US	1	Specifies where the high order bit of the Bits Stored is to be placed with respect to the Bits Allocated specification.
Pixel Representation	(0028,0103)	US	1	Data representation of the pixel samples.
Samples Per Pixel	(0028,0002)	US	1	Number of samples (planes) in this image.

📋 For US images, the SamplesPerPixel attribute is specified to use the following values for specific photometric interpretations:

Photometric Interpretation	Samples Per Pixel Value
MONOCHROME2	0001H
RGB	0003H
YBR_FULL	0003H
YBR_FUILL_422	0003H
YBR_PARTIAL_422	0003H
PALETTE COLOR	0001H

Sorting Images in a Stack

InteleViewer requires the following DICOM attributes () to allow the user to sort images by image number, image position, temporal position, and image time.

Attributes Used by InteleViewer for Sort Types

Attribute Name	Tag	VR Value	VM Value	Attribute Description
Content Date	(0008,0023)	DA	1	The date the image pixel data creation started. Required if image is part of a series in which the images are temporally related. Used in conjunction with Content Time.

Attribute Name	Tag	VR Value	VM Value	Attribute Description
Content Time	(0008,0033)	TM	1	The time the image pixel data creation started. Required if the image is part of a series in which the images are temporally related. Required so that you can sort images by image time. Used in conjunction with Content Date.
Instance Number	(0020,0013)	IS	1	A number that identifies this image. Required so that you can sort images by image number in InteleViewer.
Slice Location	(0020,1041)	DS	1	Relative position of exposure expressed in mm.
Temporal Position Identifier	(0020,0100)	IS	1	Temporal order of a dynamic or functional set of images. Required so that you can sort images by temporal position in InteleViewer.

Ultrasound Calibration

InteleViewer requires the PixelSpacing DICOM attribute to calibrate US images. If this attribute is missing, then InteleViewer checks for US regions and uses the pixel spacing from these regions as indicated by the SequenceOfUltrasoundRegions attribute.

Attributes Used by InteleViewer for US Calibration

Attribute Name	Tag	VR Value	VM Value	Attribute Description
Pixel Spacing	(0028,0030)	DS	2	Physical distance in the patient between the center of each pixel, specified by a numeric pair (adjacent row spacing, adjacent column spacing in mm).
Sequence Of Ultrasound Regions	(0018,6011)	SQ	1	Defines a sequence of ultrasound regions. One or more items may be included in this sequence.

DICOM Attributes for Image Fusion

InteleViewer requires the following DICOM attributes () for integrating with Image Fusion.

PET Data Attributes Used by InteleViewer for Image Fusion

Attribute Name	Tag	VR Value	VM Value	Attribute Description
Acquisition Time	(0008,0032)	TM	1	The time the acquisition of data that resulted in this image started.
Decay Correction	(0054,1102)	CS	1	The real-world event to which images in this Series were decay corrected. Defined terms: • NONE = no decay correction • START= acquisition start time • ADMIN = radiopharmaceutical administration time
Frame of Reference UID	(0020,0052)	UI	1	Uniquely identifies the frame of reference for a Series.
Patient's Weight	(0010,1030)	DS	1	Weight of the patient, in kilograms.
Radiopharmaceutical Information Sequence	(0054,0016)	SQ	1	Sequence of Items that describe isotope information. This sequence may contain one or more items.
> Radiopharmaceutical Start Time	(0018,1072)	TM	1	Time of start of administration. The actual time of radiopharmaceutical administration to the patient for imaging purposes, using the same time base as

Attribute Name	Tag	VR Value	VM Value	Attribute Description
				Series Time (0008,0031).
> Radiopharmaceutical Start Date Time	(0018,1078)	DT	1	Date and time of start of administration. The actual date and time of radiopharmaceutical administration to the patient for imaging purposes. Mapping is for an SUV unit type referring to PET data. The value is copied from the PET images referenced by this RWVM object or provided by the user. Even if the original images contained only Radiopharmaceutical Start Time (0018,1072), this value is stored as Radiopharmaceutical Start DateTime (0018,1078).
> Radionuclide Total Dose	(0018,1074)	DS	1	The radiopharmaceutical dose administered to the patient measured in Becquerels (Bq) at the Radiopharmaceutical Start Time (0018,1072).
> Radionuclide Half Life	(0018,1075)	DS	1	The radionuclide half life, in seconds, used in the correction of this image.
> Radiopharmaceutical	(0018,0031)	LO	1	Name of the radiopharmaceutical.
Series Time	(0008,0031)	TM	1	Time the Series started.
Units	(0054,1001)	CS	1	Pixel value units. Defined terms:

Attribute Name	Tag	VR Value	VM Value	Attribute Description
				- CNTS - NONE - CM2 - PCNT - CPS - BQML - MGMINML - UMOLMINML - MLMING - MLG 1CM - UMOLML - PROPCNTS - PROPCPS - MLMINML - MLML - GML - STDDEV

Encapsulated PDF Storage

InteleViewer requires the following modules and associated DICOM attributes ("Encapsulated PDF Storage SOP Class: Supported Modules" (page 80), "Patient Identification Module" (page 80), "Patient Demographic Module" (page 80), "General Study Module" (page 80), "Encapsulated Document Series Module" (page 81), "General Equipment Module" (page 81), "SC Equipment Module" (page 81), "Encapsulated Document Module" (page 82), and "SOP Common Module" (page 82)) to read/write DICOM encapsulated PDF series from/to DICOMDIR. Once InteleViewer retrieves the DICOM encapsulated PDF series stored on the DICOMDIR, you can display the series in a PDF viewer, such as Adobe Acrobat Reader.

Encapsulated PDF Storage SOP Class: Supported Modules

Information Entity	Module	Presence of Module
Patient	Patient Identification	Always
	Patient Demographic	Always
Study	General Study	Always
Series	Encapsulated Document Series	Always
Equipment	General Equipment	Always
	SC Equipment	Always
Encapsulated Document	Encapsulated Document	Always
	SOP Common	Always

Patient Identification Module

Attribute Name	Tag	VR Value	VM Value	Attribute Description
Patient Name	(0010,0010)	PN	2	Patient's full name.
Patient ID	(0010,0020)	LO	2	Primary hospital identification number or code for the patient.

Patient Demographic Module

Attribute Name	Tag	VR Value	VM Value	Attribute Description
Patient Birth Date	(0010,0030)	DA	2	Birth date of the patient.
Patient Sex	(0010,0040)	CS	2	Sex of the named patient. Enumerated Values: M = male F = female O = other

General Study Module

Attribute Name	Tag	VR Value	VM Value	Attribute Description
Study Instance UID	(0020,000D)	UI	1	Unique identifier for the Study that corresponds to the UID of the series associated with the report.
Study Date	(0008,0020)	DA	2	Date the Study started.

Attribute Name	Tag	VR Value	VM Value	Attribute Description
Study Time	(0008,0030)	TM	2	Time the Study started.
Referring Physician Name	(0008,0090)	PN	2	The value is always empty.
Study ID	(0020,0010)	SH	2	Unique identifier for the Study that corresponds to the UID of the series associated with the report.
Accession Number	(0008,0050)	SH	2	A RIS generated number that identifies the order for the Study.

Encapsulated Document Series Module

Attribute Name	Tag	VR Value	VM Value	Attribute Description
Modality	(0008,0060)	CS	1	The value is always "DOC".
Series Instance UID	(0020,000E)	UI	1	Generated with the following format: 1.2.840.114202.2.<current time>.<random number>
Series Number	(0020,0011)	IS	1	The value is always "1".
Series Description	(0008,103E)	LO	1	The value is always "REPORT PDF".

General Equipment Module

Attribute Name	Tag	VR Value	VM Value	Attribute Description
Manufacturer	(0008,0070)	LO	2	The value is always "INTELERAD MEDICAL SYSTEMS".

SC Equipment Module

Attribute Name	Tag	VR Value	VM Value	Attribute Description
Conversion Type	(0008,0064)	CS	1	The value is always "WSD" (for workstation).

Encapsulated Document Module

Attribute Name	Tag	VR Value	VM Value	Attribute Description
Instance Number	(0020,0013)	IS	1	The value is always "1".
Content Date	(0008,0023)	DA	2	The value is always empty.
Content Time	(0008,0033)	DA	2	The value is always empty.
Acquisition Date Time	(0008,002A)	DT	2	The value is always empty.
Burned In Annotation	(0028,0301)	CS	1	The value is always "Yes".
Document Title	(0042,0010)	ST	2	The value is always empty.
Concept Name Code Sequence	(0040,A043)	SQ	2	The value is always empty.
MIME Type of Encapsulated Document	(0042,0012)	LO	1	The value is always "application/pdf".
Encapsulated Document	(0042,0011)	OB	1	Encapsulated Document byte stream, containing a document encoded according to the MIME type.

SOP Common Module

Attribute Name	Tag	VR Value	VM Value	Attribute Description
SOP Class UID	(0008,0016)	UI	1	The value is always 1.2.840.10008.5.1.4.1.1.104.1
SOP Instance UID	(0008,0018)	UI	1	Generated with the following format: <Series Instance UID>.1

CONTACTING INTELERAD TECHNICAL SUPPORT

Your PACS administrator can assist you with any issues you may encounter. If you require additional assistance, you can contact Intelerad Technical Support, 24 hours a day, seven days a week.

To contact us:	Use:
On the Internet	https://serviceportal.intelerad.com/csm
By telephone	Toll-free North America: 1-866-951-6222
	Sans frais Amérique du Nord (français): 1 844-467-7227
	Toll-free Australia: 1-800-286-418
	Toll-free New Zealand: 0800-467-723
	United Kingdom: 0113-360-2615
	Other: +1-514-931-7127

These coordinates and a wealth of other information are also available on the Intelerad Service Portal.

https://serviceportal.intelerad.com/csm

You should regularly check the Intelerad knowledge base for the latest version of the documentation, as well as other product-specific resources such as TechNotes, downloads, and videos.

When you contact Intelerad Technical Support to report a problem, please have at hand the following information, as applicable:

- client code and location of your IntelePACS installation
- full error message and the steps required to reproduce the problem
- AE Titles of the affected devices
- operating systems of any affected machines
- description of the problem and when it first occurred

If the problem affects a particular study, please also provide the following:

- patient ID or patient number (M.R.N.)
- accession number/requisition number
- modality type and name

OBTAINING PRINTED DOCUMENTATION

Intelerad offers printed and bound versions of product documentation free of charge. To request printed copies of Intelerad documentation, contact your Client Success manager. The printed documents will be provided within 7 days or less.