



DICOM Client Conformance Statement



IMPROMED®

TABLE OF CONTENTS

- Overview..... 3**
- Remarks..... 3**
- Revision History..... 3**
- Definitions and Abbreviations 4**
- Implementation Model 6**
 - Application Data Flow Diagram.....6
 - Functional Definitions of AEs.....6
- AE Specifications..... 7**
 - Impromed Client AE SOP Classes as SCU and SCP.....7
 - SOP Classes as SCU9
- Association Acceptance and Establishment Policies 9**
 - General.....9
 - Number of Associations9
 - Asynchronous Nature.....9
 - Implementation Identifying Information9
- Association Acceptance and Association Initiation..... 10**
- Query/Retrieve 13**
- Communication Profiles 15**
 - Supported Communication Stacks 15
 - API..... 15
- Configuration 15**

DICOM CLIENT CONFORMANCE STATEMENT

Overview

This Conformance Statement specifies Impromed's compliance to the DICOM 3.0 Standard.

Remarks

The fact that a product has a DICOM Conformance Statement that is complementary to that of the Impromed DICOM Client does not in and of itself guarantee interoperability between said product and the Impromed DICOM Client. The comparison of Conformance Statements is a step to determining interoperability but other steps are required including:

- Analysis of interoperability requirements of communicating applications
- Creation of a Test Plan to verify interoperability
- Execution of the Test Plan

DICOM is an evolving standard, constantly being amended and augmented. In consideration of this fact, Covetrus reserves the right to make changes to the Impromed DICOM Client as it sees fit to keep abreast of these changes.

Revision History

Document Version	Date of Issue	Author	Description
1.0	September 25, 2007	Ryan Anauo	Initial Release
2.0	September 27, 2010	Karen Nowicki	Layout Changes
3.0	February 15, 2011	Karen Olson	Layout Changes
4.0	October 20, 2012	Karen Olson	Layout Changes
5.0	June 28, 2016	Karen Olson	Layout Changes
6.0	June 28, 2017	Gwen Grosskopf	Layout Changes
7.0	March 6, 2019	Gwen Grosskopf	Corporate Re-branding

Definitions and Abbreviations

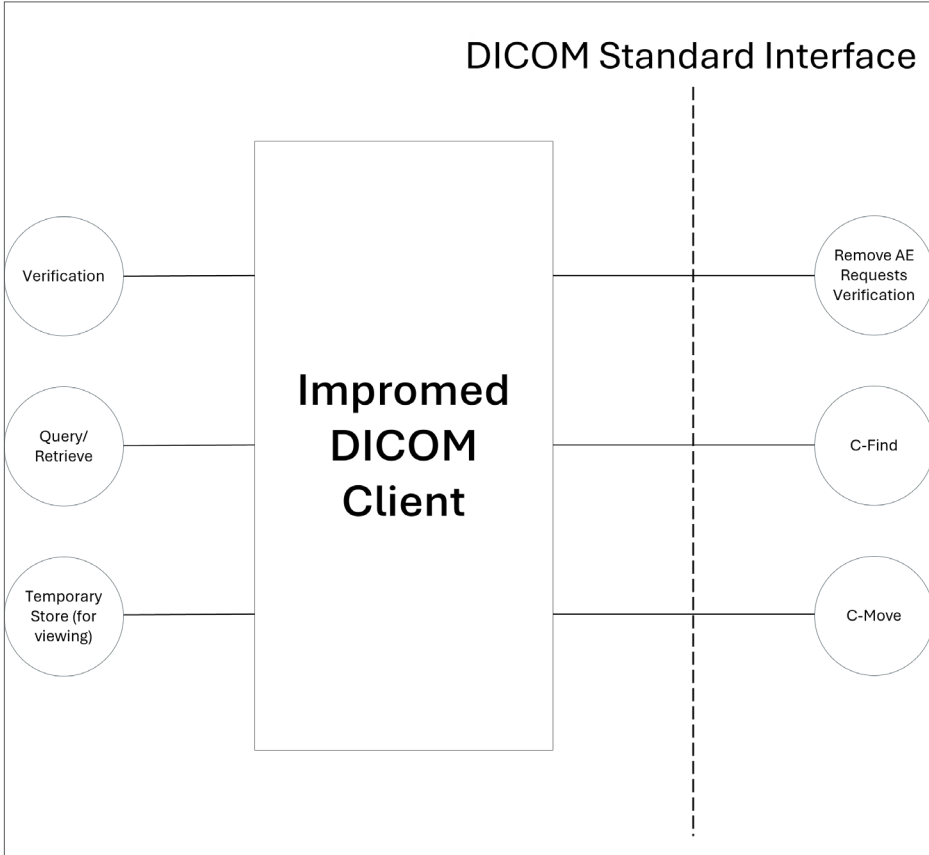
ACR	American College of Radiology
ASCII	American Standard Code for Information Interchange
AE	Application Entity
ANSI	American National Standards Institute
BEV	Beam's-eye view
Brachy	Brachytherapy
BRHC	Bottom Right Hand Corner
CC	Counter-clockwise
CDA	Clinical Document Architecture (HL7)
CEN TC251	Comite European de Normalisation-Technical Committee 251-Medical Informatics
CCIR	Consultative Committee, International Radio
Chest CAD	Computer-Aided Detection and/or Computer-Aided Diagnosis for chest radiography
CTV	Clinical target volume
CW	Clockwise
DICOM	Digital Imaging and Communications in Medicine
DIMSE	DICOM Message Service Element
DIMSE-C	DICOM Message Service Element-Composite
DIMSE-N	DICOM Message Service Element-Normalized
DRR	Digitally-reconstructed radiograph
DVH	Dose-volume histogram
EPI	Electronic Portal Image
EPID	Electronic Portal Imaging Device
GTV	Gross tumor volume
Gy	Gray
HISPP	Healthcare Information Standards Planning Panel
HL7	Health Level 7
HMD	Hierarchical Message Description (HL7)
ICRU	International Commission on Radiation Units
IE	Information Entity
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IHE	Integrating the Healthcare Enterprise
II	Instance Identifier (HL7)
IOD	Information Object Definition
ISO	International Standards Organization

DICOM CLIENT CONFORMANCE STATEMENT

ITU-T	International Telecommunications Union - Telecommunications Standardization Sector
JIRA	Japan Industries Association of Radiation Apparatus
JPIP	JPEG 2000 Interactive Protocol
LUT	Lookup Table
MAC	Message Authentication Code
Mammography CAD	Computer-Aided Detection and/or Computer-Aided Diagnosis for Mammography
MeV	Mega electron Volt
MLC	Multileaf (multi-element) collimator
MSDS	Healthcare Message Standard Developers Sub-Committee
MU	Monitor unit
MV	Megavolt
NaN	Not a Number (See IEEE 754)
NEMA	National Electrical Manufacturers Association
OID	Object Identifier (ISO 8824)
OSI	Open Systems Interconnection
PDF	Portable Document Format
PTV	Planning target volume
R&V	Record and verify
RCS	Reference Coordinate System
ROI	Region of interest
RT	Radiotherapy
SAD	Source-axis distance
SCP	Service Class Provider
SCTP	Structured Clinical Trial Protocol (HL7)
SCU	Service Class User
SD	Structured Documents (HL7)
SID	Source Image Receptor Distance
SOD	Source Object Distance
SOP	Service-Object Pair
SPL	Structured Product Labeling (HL7)
SR	Structured Reporting
SSD	Source-skin distance
TLHC	Top Left Hand Corner
UID	Unique Identifier
UUID	Universal Unique Identifier (ISO/IEC 11578)
XDS	Cross-Enterprise Document Sharing Profile (IHE)
XML	Extensible Markup Language

Implementation Model

Application Data Flow Diagram



Functional Definitions of AEs

SCU	SCP
Verification	Verification
Storage	Storage
Query/Retrieve	

DICOM CLIENT CONFORMANCE STATEMENT

AE Specifications

Impromed Client AE SOP Classes as SCU and SCP

Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1
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 IntraOral XRay Image Storage Presentation	1.2.840.10008.5.1.4.1.1.1.3
Digital IntraOral XRay Image Storage Processing	1.2.840.10008.5.1.4.1.1.1.3.1
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
ECG 12 Lead Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1
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
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
Hardcopy Color Image Storage	1.2.840.10008.5.1.1.30
Hardcopy Grayscale Image Storage	1.2.840.10008.5.1.1.29
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
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
Nuclear Medicine Image Storage Retired	1.2.840.10008.5.1.4.1.1.5
Ophthalmic Photography 16 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.2
Ophthalmic Photography 8 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66

DICOM CLIENT CONFORMANCE STATEMENT

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
Standalone Curve Storage	1.2.840.10008.5.1.4.1.1.9
Standalone Modality LUT Storage	1.2.840.10008.5.1.4.1.1.10
Standalone Overlay Storage	1.2.840.10008.5.1.4.1.1.8
Standalone PET Curve Storage	1.2.840.10008.5.1.4.1.1.129
Standalone VOI LUT Storage	1.2.840.10008.5.1.4.1.1.11
Stereometric Relationship Storage	1.2.840.10008.5.1.4.1.1.77.1.5.3
Stored Print Storage	1.2.840.10008.5.1.1.27
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Ultrasound Image Storage Retired	1.2.840.10008.5.1.4.1.1.6
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
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1
Video Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2.1
Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1
VL Image Storage Retired	1.2.840.10008.5.1.4.1.1.77.1
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2
VL Multiframe Image Storage Retired	1.2.840.10008.5.1.4.1.1.77.2
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
XRy Angiographic BiPlane Image Storage Retired	1.2.840.10008.5.1.4.1.1.12.3
XRy Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1
XRy Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2

DICOM CLIENT CONFORMANCE STATEMENT

SOP Classes as SCU

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
Patient Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2

Association Acceptance and Establishment Policies

General

The SCP listens on a configurable port for association requests.

Application Context Name	1.2.840.10008.3.1.1.1
--------------------------	-----------------------

Number of Associations

The Improved DICOM Client can accept as many associations as the operation system can support (limited by CPU, RAM, network interfaces, etc.).

Asynchronous Nature

All operations are performed synchronously.

Implementation Identifying Information

Implementation Class UID	1.2.826.0.1.3680043.8.226
Implementation Version Name	InfinityDS 1.0

Association Acceptance and Association Initiation

Communication Verification

Association Acceptance Policy

A SCU may verify the existence of the Improved DICOM Client by initiating an association with the Verification Service Class and sending a C-ECHO request.

Accepted Presentation Contexts

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

Proposed Presentation Contexts

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

Image Storage

Associated Real-World Activity

When the user selects the DICOM Image they wish to view, the Improved Client sends a move request to the DICOM server on which that image resides.

Presentation Context Acceptance

Transfer Syntax	
Name	UID
Implicit VR Little Endian	1.2.840.10008.1.2

Proposed Presentation Contexts

Abstract Syntax		Role	Ext. Negotiation
Name	UID		
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	SCU/SCP	None
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1	SCU/SCP	None
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1	SCU/SCP	None
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	SCU/SCP	None

DICOM CLIENT CONFORMANCE STATEMENT

CT Image Storage	1.2.840.10008.5.1.4.1.1.2	SCU/SCP	None
Digital IntraOral XRay Image Storage Presentation	1.2.840.10008.5.1.4.1.1.1.3	SCU/SCP	None
Digital IntraOral XRay Image Storage Processing	1.2.840.10008.5.1.4.1.1.1.3.1	SCU/SCP	None
Digital Mammography XRay Image Storage Presentation	1.2.840.10008.5.1.4.1.1.1.2	SCU/SCP	None
Digital Mammography XRay Image Storage Processing	1.2.840.10008.5.1.4.1.1.1.2.1	SCU/SCP	None
Digital XRay Image Storage Presentation	1.2.840.10008.5.1.4.1.1.1.1	SCU/SCP	None
Digital XRay Image Storage Processing	1.2.840.10008.5.1.4.1.1.1.1.1	SCU/SCP	None
ECG 12 Lead Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	SCU/SCP	None
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	SCU/SCP	None
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	SCU/SCP	None
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	SCU/SCP	None
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	SCU/SCP	None
Hardcopy Color Image Storage	1.2.840.10008.5.1.1.30	SCU/SCP	None
Hardcopy Grayscale Image Storage	1.2.840.10008.5.1.1.29	SCU/SCP	None
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1	SCU/SCP	None
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59	SCU/SCP	None
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	SCU/SCP	None
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2	SCU/SCP	None
Multiframe Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	SCU/SCP	None
Multiframe Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	SCU/SCP	None
Multiframe Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	SCU/SCP	None
Multiframe True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	SCU/SCP	None
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	SCU/SCP	None
Nuclear Medicine Image Storage Retired	1.2.840.10008.5.1.4.1.1.5	SCU/SCP	None
Ophthalmic Photography 16 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.2	SCU/SCP	None
Ophthalmic Photography 8 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	SCU/SCP	None
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	SCU/SCP	None
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66	SCU/SCP	None
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4	SCU/SCP	None
RT Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6	SCU/SCP	None
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	SCU/SCP	None

DICOM CLIENT CONFORMANCE STATEMENT

RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	SCU/SCP	None
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	SCU/SCP	None
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	SCU/SCP	None
RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7	SCU/SCP	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	SCU/SCP	None
Spatial Fiducials Storage	1.2.840.10008.5.1.4.1.1.66.2	SCU/SCP	None
Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.1	SCU/SCP	None
Standalone Curve Storage	1.2.840.10008.5.1.4.1.1.9	SCU/SCP	None
Standalone Modality LUT Storage	1.2.840.10008.5.1.4.1.1.10	SCU/SCP	None
Standalone Overlay Storage	1.2.840.10008.5.1.4.1.1.8	SCU/SCP	None
Standalone PET Curve Storage	1.2.840.10008.5.1.4.1.1.129	SCU/SCP	None
Standalone VOI LUT Storage	1.2.840.10008.5.1.4.1.1.11	SCU/SCP	None
Stereometric Relationship Storage	1.2.840.10008.5.1.4.1.1.77.1.5.3	SCU/SCP	None
Stored Print Storage	1.2.840.10008.5.1.1.27	SCU/SCP	None
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	SCU/SCP	None
Ultrasound Image Storage Retired	1.2.840.10008.5.1.4.1.1.6	SCU/SCP	None
Ultrasound Multiframe Image Storage	1.2.840.10008.5.1.4.1.1.3.1	SCU/SCP	None
Ultrasound Multiframe Image Storage Retired	1.2.840.10008.5.1.4.1.1.3	SCU/SCP	None
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	SCU/SCP	None
Video Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2.1	SCU/SCP	None
Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1	SCU/SCP	None
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	SCU/SCP	None
VL Image Storage Retired	1.2.840.10008.5.1.4.1.1.77.1	SCU/SCP	None
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	SCU/SCP	None
VL Multiframe Image Storage Retired	1.2.840.10008.5.1.4.1.1.77.2	SCU/SCP	None
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	SCU/SCP	None
VL Slide Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3	SCU/SCP	None
XRy Angiographic BiPlane Image Storage Retired	1.2.840.10008.5.1.4.1.1.12.3	SCU/SCP	None
XRy Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	SCU/SCP	None
XRy Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	SCU/SCP	None

Proposed Transfer Syntax

Transfer Syntax	
Name	UID
Implicit VR Endian	1.2.840.10008.1.2

DICOM CLIENT CONFORMANCE STATEMENT

Query/Retrieve

Associated Real-World Activity

The user selects the patient for whom they wish to view DICOM data from one or more DICOM AEs, the Impromed Client sends a find request to each, searching by Patient ID.

Proposed Presentation Contexts

Abstract Syntax		Transfer Syntax		Role	Extended
Name	UID	Name	UID		Negotiation
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Study Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Patient Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

SOP Specific Conformance for the Query Class

Data Level	Description	Tag	VR
Study	StudyInstanceUid	(0020,000D)	UI
Study	StudyDate	(0008,0020)	DA
Study	StudyTime	(0008,0030)	TM
Study	PatientId	(0010,0020)	LO
Study	StudyDescription	(0008,1030)	LO
Study	ReferringPhysiciansName	(0008,0090)	PN
Study	PatientsWeight	(0010,1030)	DS
Study	AccessionNumber	(0008,0050)	SH
Series	SeriesInstanceUid	(0020,000E)	UI
Series	SeriesNumber	(0020,0011)	IS

DICOM CLIENT CONFORMANCE STATEMENT

Series	SeriesTime	(0008,0031)	TM
Series	SeriesDate	(0008,0021)	DA
Series	BodyPartExamined	(0018,0015)	CS
Series	ProtocolName	(0018,1030)	LO
Series	PatientPosition	(0018,5100)	CS
Series	SeriesDescription	(0008,103E)	LO
Series	Modality	(0008,0060)	CS
Image	SopInstanceUid	(0008,0018)	UI
Image	SopClassUid	(0008,0016)	UI
Image	InstanceAvailability	(0008,0056)	CS
Image	InstanceNumber	(0020,0013)	IS
Image	ContentDate	(0008,0023)	DA
Image	ContentTime	(0008,0033)	TM
Image	ImageType	(0008,0008)	CS
Image	SliceLocation	(0020,1041)	DS
Image	Imageld	(0054,0400)	SH
Image	AcquisitionDate	(0008,0022)	DA
Image	AcquisitionTime	(0008,0032)	TM
Image	AcquisitionNumber	(0008,0050)	IS
Image	Rows	(0028,0010)	US
Image	Columns	(0028,0011)	US

Communication Profiles

Supported Communication Stacks

The Impromed Worklist Server SCP inherits the TCP/IP stack from the operating system it is running on.

API

Not applicable.

Configuration

Configure using the SetupAEs program installed with the Impromed Worklist Server software. The user may set up as many remote DICOM AEs by specifying AE Title, Host IP and Port.