

AGFA HEALTHCARE DICOM Conformance Statement



IMPAX EE R20

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Conformance Statement Overview

This DICOM Conformance Statement document refers to IMPAX EE R20 versions V and VI.

IMPAX EE conforms to DICOM 3.0 2008 standard.

IMPAX EE supports Standard Conformance to the SOP classes of Table 1.1-1. These SOP classes are included in DICOM Supplement 64.

Table 1.1-1: Network Services Supported

SOP Classes	User of Service (SCU)	Provider of Service (SCP)	Display
Verification			
Verification	Yes	Yes	N/A
Transfer			
CT Image Storage	Yes	Yes	Yes
US Image Storage	Yes	Yes	Yes
VOI LUT Box SOP Class	Yes	No	Yes
Hardcopy Grayscale Image Storage SOP Class	No	No	Yes
Hardcopy Color Image Storage SOP Class	No	No	Yes
Computed Radiography Image Storage	Yes	Yes	Yes
Digital X-Ray Image Storage – For Presentation	Yes	Yes	Yes
Digital X-Ray Image Storage – For Processing	Yes	Yes	Yes
Digital Mammography X-Ray Image Storage – For Presentation	Yes	Yes	Yes
Digital Mammography X-Ray Image Storage – For Processing	Yes	Yes	Yes
Digital Intra-oral X-Ray Image Storage – For Presentation	Yes	Yes	Yes
Digital Intra-oral X-Ray Image Storage – For Processing	Yes	Yes	Yes
Ultrasound Multi-frame Image Storage	Yes	Yes	Yes
MR Image Storage	Yes	Yes	Yes
Enhanced CT Image Storage	Yes	Yes	Yes
Enhanced MR Image Storage	Yes	Yes	Yes
MR Spectroscopy Storage	Yes	No	No
Secondary Capture Image Storage	Yes	No	Yes
Multi-frame Single Bit Secondary Capture Image Storage	Yes	Yes	Yes
Multi-frame Grayscale Byte Secondary Capture Image Storage	Yes	Yes	Yes
Multi-frame Grayscale Word Secondary Capture Image Storage	Yes	Yes	Yes
Multi-frame True Color Secondary Capture Image Storage	Yes	Yes	Yes
12-lead ECG Waveform Storage	Yes	Yes	No
General ECG Waveform Storage	Yes	Yes	No
Ambulatory ECG Waveform Storage	Yes	Yes	No
Hemodynamic Waveform Storage	Yes	Yes	No
Cardiac Electrophysiology Waveform Storage	Yes	Yes	No
Basic Voice Audio Waveform Storage	Yes	Yes	No
Grayscale Softcopy Presentation State Storage SOP Class	Yes	Yes	Yes
X-Ray Radiofluoroscopic Image Storage	Yes	Yes	Yes
Nuclear Medicine Image Storage	Yes	Yes	Yes
Raw Data Storage	Yes	Yes	No
VL Endoscopic Image Storage	Yes	Yes	Yes

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VL Microscopic Image Storage	Yes	Yes	Yes
VL Slide-Coordinates Microscopic Image Storage	Yes	Yes	Yes
VL Photographic Image Storage	Yes	Yes	Yes
Basic Text SR Storage	Yes	Yes	Yes
Enhanced SR Storage	Yes	Yes	Yes
Comprehensive SR Storage	Yes	Yes	Yes
Mammography CAD SR	Yes	Yes	No
Key Object Selection Document Storage	Yes	Yes	Yes
Chest CAD SR	Yes	Yes	No
Positron Emission Tomography Image Storage	Yes	Yes	Yes
RT Image Storage	Yes	Yes	Yes
Query/Retrieve			
Patient Root Query/Retrieve Information Model – FIND	Yes	No	N/A
Patient Root Query/Retrieve Information Model – MOVE	Yes	No	N/A
Study Root Query/Retrieve Information Model – FIND	Yes	No	N/A
Study Root Query/Retrieve Information Model – MOVE	Yes	No	N/A
Study Root Query/Retrieve Information Model – GET	No	Yes	N/A
Workflow Management			
Modality Worklist Information Model – FIND	Yes	No	N/A
General Purpose Worklist Information Model – FIND	Yes	No	N/A
General Purpose Scheduled Procedure Step SOP Class	Yes	No	N/A
General Purpose Performed Procedure Step SOP Class	Yes	No	N/A
Storage Commitment Push Model SOP Class	Yes	No	N/A
Modality Performed Procedure Step SOP Class	Yes	No	N/A
Modality Performed Procedure Step Retrieve SOP Class	Yes	No	N/A
Print Management			
Basic Grayscale Print Management Meta SOP Class	Yes	No	N/A
Basic Film Session SOP Class	Yes	No	N/A
Basic Film Box SOP Class	Yes	No	N/A
Basic Grayscale Image Box SOP Class	Yes	No	N/A
Basic Color Image Box SOP Class	Yes	No	N/A
Print Job SOP Class	Yes	No	N/A
Basic Annotation Box SOP Class	Yes	No	N/A
Printer SOP Class	Yes	No	N/A
Basic Color Print Management Meta SOP Class	Yes	No	N/A
Presentation LUT SOP Class	Yes	No	N/A

Table 1.1-2: Media Services Supported

Media Storage Application Profile	Write Files (FSC or FSU)	Read Files (FSR)
Compact Disk - Recordable		
General Purpose CD-R	Yes	Yes
Email		
General Purpose MIME Interchange	Yes	No

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1 INTRODUCTION

1.1 Revision Record

Dicom Conformance Statement IMPAX EE		
Revision Number	Date	Reason for Change
1.0	19/01/2010	Initial version (based on document NodeID 29157254)

1.2 Purpose and Intended Audience of this Document

This document is a DICOM Conformance Statement for the DICOM Services of the IMPAX EE product.

The user of this document is involved with system integration and/or software design. We assume that the reader is familiar with the terminology and concepts that are used in the DICOM 3.0 standard and the IHE Technical Framework.

Readers not familiar with DICOM 3.0 terminology should first read the appropriate parts of the DICOM standard itself, prior to reading this conformance statement.

Although the use of this conformance statement in conjunction with the DICOM 3.0 standard is intended to facilitate communication with Agfa IMPAX EE, it is not sufficient to guarantee, by itself, the inter-operation of the connection. The following issues need to be considered:

1.3 General Remarks

1.3.1 Integration and Validation Activities

The integration of any device into a system of interconnected devices goes beyond the scope of the DICOM 3.0 standard and this conformance statement when *interoperability* is desired. The responsibility for analyzing the applications requirements and developing a solution that integrates the Agfa equipment with other vendors' systems is the user's responsibility and should not be underestimated.

In some circumstances it might be necessary to perform a validation to make sure that functional interoperability between the Agfa equipment and non-Agfa devices works as expected. The user should ensure that any non-Agfa provider accepts responsibility for any validation required for their connection with the Agfa equipment.

1.3.2 Future Evolution

As the DICOM 3.0 standard evolves to meet the user's growing requirements and to incorporate new features and technologies, Agfa will follow the evolution of the standard. This evolution of the standard may require changes to devices that have implemented DICOM 3.0. The user should ensure that any non-Agfa provider, who connects with Agfa devices, also plans for future evolution of the DICOM standard. A refusal to do so may result in the loss of functionality and/or connectivity between the different products.

1.4 Acronyms and Abbreviations

Definitions, terms and abbreviations used in this document are defined within the different parts of the DICOM standard. Abbreviations and terms are as follows:

AE	DICOM Application Entity
CD-R	Compact Disk Recordable
DICOM	Digital Imaging and Communications in Medicine
DIMSE	DICOM Message Service Element
DVD	Digital Versatile Disc or Digital Video Disc
FSC	File-Set Creator
FSR	File-Set Reader
FSU	File-Set Updater
GSPS	Grayscale Softcopy Presentation State
IE	Information Entity
IOD	(DICOM) Information Object Definition
IP	Internet Protocol
ISO	International Standard Organization
KO	Key Object
MPPS	Modality Performed Procedure Step
PDU	DICOM Protocol Data Unit
SCP	DICOM Service Class Provider (DICOM server)
SCU	DICOM Service Class User (DICOM client)
SMTP	Simple Mail Transfer Protocol
SOP	DICOM Service-Object Pair
SR	Structure Report
S/MIME	Secure/Multipurpose Internet Mail Extensions
TCP	Transmission Control Protocol
UID	Unique Identifier
VR	Value Representation

1.5 Related Documents

- ACR-NEMA Digital Imaging and Communications in Medicine (DICOM) V3.0.
- IHE Radiology Technical Framework Revision 7 – Final Text, May 2006

2 NETWORKING

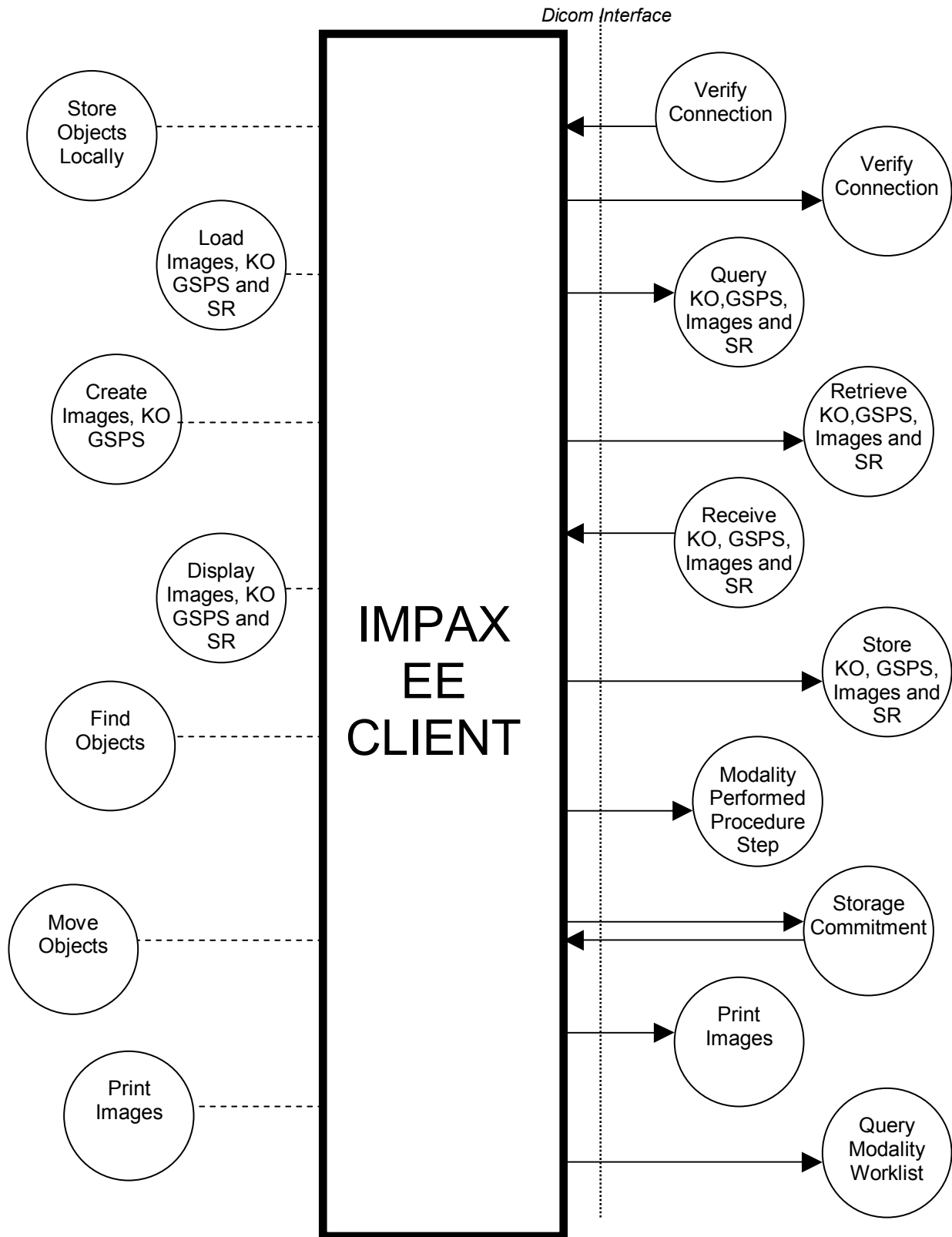
2.1 Implementation Model

All DICOM Services provided by IMPAX EE are implemented in one process, which is launched and terminated by the user.

This process hosts a DICOM server listening on different ports that requires the assignment of an Application Entity Title to the application. That motivates to describe the DICOM functionality of IMPAX EE as provided an Application Entity:

- **IMPAX EE CLIENT** provides DICOM Services related with images and DICOM Structured Report Documents that includes Storage Services to receive and send images of multiple modalities, Grayscale Presentation States (GSPS), Key Object (KO) and Structured Report (SR) Documents. Selection Documents, but also the Storage Commitment Push Model Service as Service Class User (SCU), and Query/Retrieve Services, to query archives for available images, GSPS and KO objects and repositories for available SR documents. These Services also retrieve such DICOM information objects triggered by user interactions.

2.1.1 Application Data Flow Diagram



2.1.2 Functional Definitions of AE's

2.1.2.1 Functional Capability of IMPAX EE CLIENT

- Verify the connection to DICOM peer Application Entities (AEs) by acting as DICOM Verification SCU and SCP.
- Query and retrieve images, SR, GSPS and KO from DICOM peer AEs by acting as DICOM Query/Retrieve SCU.
- Receive images, GSPS, KO and SR from DICOM peer AEs by acting as SCP for various Image Storage SOP Classes, DICOM Grayscale Presentation State Storage SOP Class, and KO Selection Document Storage SOP Class.
- Store – received or new created – images, GSPS and KO to DICOM peer AEs by acting as SCU for various Image Storage SOP classes, Grayscale Presentation State Storage SOP Class and KO Selection Document Storage SOP Class. Additionally are stored the received SR objects by acting as SCU for various SR SOP classes.
- Request storage commitment of image, KO, SR and GSPS Information Entities (IEs) to DICOM peer AEs by acting as DICOM Storage Commitment Push Model SCU.
- Print grayscale and color images – with optional Presentation LUT and Basic Annotation – at DICOM peer AEs by acting as SCU for Grayscale/Color Print Management, DICOM Presentation LUT and Basic Annotation Box SOP Classes.
- Send query to a Modality Worklist by acting as SCU and then send a Modality Performed Procedure Step (MPPS) message to a remote AE.

2.1.3 Sequencing of Real World Activities

Any retrieval of images by the IMPAX EE AE from a peer AE has been preceded by – one or several – query requests to the peer AE, to get information about available images and values of study/series/image identifiers necessary for creating retrieve requests.

Typically the receipt of images by the IMPAX EE AE from a peer AE is caused by an Image Retrieve Request to this peer AE by the IMPAX EE AE.

The IMPAX EE AE creates derived images from source images.

Image IEs have to be received by the IMPAX EE AE, before they can be stored to or printed at peer AEs.

Grayscale Presentation State IEs can only be created and stored in context with – created or received – images.

Grayscale Presentation State IEs have to be created by the IMPAX EE AE, before they can be stored to peer AEs.

Before the storage of Image/GSPS IEs can be confirmed by a Storage Commitment Request to a peer AE, Image/GSPS IEs have to be stored to the same or another peer AE.

2.2 AE Specifications

2.2.1 IMPAX EE CLIENT Specification

2.2.1.1 SOP Classes Supported

IMPAX EE implements DICOM Verification Service, Query/Retrieve Services, Storage, Services for Image, Key Objects, SR Documents, Grayscale Presentation State IEs, the Storage Commitment Push Model SOP Class as well as DICOM Print Management Service Classes for Grayscale and Color Print, including the DICOM Presentation LUT SOP Class.

Table 2.2-1: SOP Class(es) for IMPAX EE CLIENT

SOP Class Name	SOP Class UID	SCU	SCP
Verification			
Verification SOP Class	1.2.840.10008.1.1	Yes	Yes
Transfer			
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Yes	Yes
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Yes	Yes
Digital X-ray Image Storage For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Yes	Yes
Digital X-ray Image Storage For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Yes	Yes
Digital Mammography X-ray Image Storage For Presentation	1.2.840.10008.5.1.4.1.1.1.2	Yes	Yes
Digital Mammography X-ray Image Storage For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	Yes	Yes
Digital Intra Oral X-ray Image Storage For Presentation	1.2.840.10008.5.1.4.1.1.1.3	Yes	Yes
Digital Intra Oral X-ray Image Storage For Processing	1.2.840.10008.5.1.4.1.1.1.3.1	Yes	Yes
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	Yes	Yes
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	Yes	Yes
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Yes	Yes
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	Yes	Yes
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	Yes	Yes
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	Yes	Yes
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Yes	Yes
Multi-frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	Yes	Yes
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	Yes	Yes
Multi-frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	Yes	Yes
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Yes	Yes
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	Yes	Yes
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	Yes	Yes
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	Yes	Yes
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1	Yes	Yes
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1	Yes	Yes
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1	Yes	Yes
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Yes	Yes
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Yes	Yes
Visible Light Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	Yes	Yes
Visible Light Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	Yes	Yes
Visible Light Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3	Yes	Yes
Visible Light Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	Yes	Yes
X-ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Yes	Yes

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SOP Class Name	SOP Class UID	SCU	SCP
X-ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	Yes	Yes
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1	Yes	Yes
Key Object Selection Document Storage	1.2.840.10008.5.1.4.1.1.88.59	Yes	Yes
Basic Text SR Storage	1.2.840.10008.5.1.4.1.1.88.11	Yes	Yes
Enhanced SR Storage	1.2.840.10008.5.1.4.1.1.88.22	Yes	Yes
Comprehensive SR Storage	1.2.840.10008.5.1.4.1.1.88.33	Yes	Yes
Chest CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.65	Yes	Yes
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	Yes	Yes
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	Yes	Yes
Workflow Management			
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Yes	No
General Purpose Worklist Information Model - FIND	1.2.840.10008.5.1.4.32.1	Yes	No
General Purpose Scheduled Procedure Step SOP Class	1.2.840.10008.5.1.4.32.2	Yes	No
General Purpose Performed Procedure Step SOP Class	1.2.840.10008.5.1.4.32.3	Yes	No
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3	Yes	No
Modality Performed Procedure Step Retrieve SOP Class	1.2.840.10008.3.1.2.3.4	Yes	No
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	No	Yes
Query Retrieve			
Patient Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	Yes	No
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	Yes	No
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Yes	No
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Yes	No
Study Root Query/Retrieve Information Model - GET	1.2.840.10008.5.1.4.1.2.2.3	No	Yes
Print Management			
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	Yes	No
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18	Yes	No
Basic Annotation Box SOP Class	1.2.840.10008.5.1.1.15	Yes	No
Print Job SOP Class	1.2.840.10008.5.1.1.14	Yes	No
Presentation LUT SOP Class	1.2.840.10008.5.1.1.23	Yes	No
Basic Film Box SOP Class	1.2.840.10008.5.1.1.2	Yes	No
Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4	Yes	No
Basic Color Image Box SOP Class	1.2.840.10008.5.1.1.4.1	Yes	No
Printer SOP Class	1.2.840.10008.5.1.1.16	Yes	No

2.2.1.2 Association Establishment Policies

2.2.1.2.1 General

The DICOM standard application context name, which is always proposed, is listed in next Table 2.2-2.

Table 2.2-2: DICOM Application context

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

The maximum PDU length is 16384 bytes.
SOP Class extended negotiation is not supported.

2.2.1.2.2 Number of Associations

Typically the IMPAX EE AE initiates only one DICOM Association concurrently, but potentiality the number of parallel associations is only limited by the resources of the underlying operating system.

Several DICOM Associations will be initiated concurrently, if the user launches a new Query/Retrieve, Storage or Print Request, before an already performing Query/Retrieve, Storage or Print operation was finished.

Several open DICOM Associations may also occur during Storage Commitment, if the Storage Commitment SCP peer AE sends the Commitment Result in a separate Association – initiated by the peer AE and accepted by the IMPAX EE AE.

2.2.1.2.3 Asynchronous Nature

Configurable via configurations file. At default, asynchronous mode is disabled.

2.2.1.2.4 Implementation Identifying Information

Table 2.2-3: DICOM implementation Class and Version for IMPAX CLIENT

Implementation Class UID	1.2.840.10008.1.1.1
Implementation Version Name	dcm4che-2.0

2.2.1.3 Association Initiation Policies

2.2.1.3.1 Verify Connection (SCU)

2.2.1.3.1.1 Description and Sequencing of Activity

The user of the IMPAX EE Application initiates a Verification Request by selecting the corresponding button in the AE Configuration Panel on the user interface.

2.2.1.3.1.2 Proposed Presentation Contexts

Table 2.2-4: Presentation Contexts Proposed by IMPAX EE CLIENT

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Verification SOP Class	1.2.840.10008.1.1	Implicit VR, Little Endian	1.2.840.10008.1.1	SCU	None

2.2.1.3.1.3 SOP Specific Conformance – Verification

IMPAX EE CLIENT provides standard conformance to the DICOM Verification SOP CLASS as SCU.

2.2.1.3.2 Query images, KO, GSPS and SR

2.2.1.3.2.1 Description and Sequencing of Activity

The user of the IMPAX EE Application initiates the Query Request by selecting the corresponding button or expanding a node in the Patient/Study Folder on the user interface. Wild card or specific information can be specified for various Patient, Study, Series and/or Image attributes.

If user triggers a query in sequence level, than he also triggered a retrieve and a receive for KO and GSPS (if existing).

The user of IMPAX EE Application initiates the Query Request by selecting an entry representing one Study in the Patient Folder.

2.2.1.3.2.2 Proposed Presentation Contexts

The default behavior of IMPAX EE is to propose as SCU both Presentation Contexts.

Table 2.2-5: Proposed Presentation Contexts

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Query/Retrieve Patient Root Info. 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
Query/Retrieve Study Root Info. 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

If both presentation contexts are accepted by the peer AE, IMPAX EE will use the Query/Retrieve Study Root Info. Model – FIND SOP class for query requests.

The used query level depends on the selection or the type of node at the Patient/Study Folder on the user interface which was expanded:

Table 2.2-6: Expanded item for used query level

selected/expanded item corresponds	used Query Level
None	PATIENT / STUDY (SOP specific)
Patient	STUDY
Study	STUDY
Series	SERIES
Image	IMAGE

Following keys are supported by the SCU of both SOP classes:

Table 2.2-7: Attributes for FIND

Level	Attributes Name	Tag	Matching
Patient rsp. Study	Patient Name	(0010,0010)	*
	Patient ID	(0010,0020)	S, *
	Issuer of Patient ID	(0010,0021)	S
	Patient's Birth Date	(0010,0030)	R, S
	Patient's Sex	(0010,0040)	S
Study	Study Date	(0008,0020)	R, S
	Study Time	(0008,0030)	
	Study Description	(0008,1030)	S, *
	Accession Number	(0008,0050)	S, *
	Study ID	(0020,0010)	S, *
	Study Instance UID	(0020,000D)	L
	Modalities in Study	(0008,0061)	S
	Referring Physician's Name	(0008,0090)	*
Series	Modality	(0008,0060)	S
	Body Part examined	(0018,0015)	S, *
	Requesting physician	(0032,1032)	*
	Requesting service	(0032,1033)	S, *
	Institution name	(0008,0080)	S, *
	Station Name	(0008,1010)	S, *
	Series Number	(0020,0011)	S, *
	Series Instance UID	(0020,000E)	L
	Request Attribute Sequence	(0040,0275)	Sequence
	>Requested Procedure ID	(0040,1001)	S
	>Scheduled Procedure Step ID	(0040,0009)	S
	Performed Procedure Step Start Date	(0040,0244)	R, S
	Performed Procedure Step Start Time	(0040,0245)	
	Institutional Department Name	(0008,1040)	S, *
Image	Instance Number	(0020,0013)	S, *
	Content Date	(0008,0023)	R, S
	Verification Flag	(0040,A493)	S
	SOP Instance UID	(0008,0018)	L

The types of matching are: "*" is Wild Card matching, "R" is Range matching, "L" is List of UID Matching and Sequence matching, "S" is Single Value matching.

2.2.1.3.2.3 SOP Specific Conformance Statement for Q/R Study Root Information Model – FIND

Queries initiated by the user without selection of any Patient/Study entry are performed with query level STUDY.

When querying SR objects, queries are initiated by the user selection of the Study entry (as indicated in Table 2.2-6 are performed with query level SERIES) and matching key Modality (0008,0060) = SR. If the Query Response contains entries for matching Series, a Retrieve for the SR Objects of this Series will be initiated.

2.2.1.3.2.4 SOP Specific Conformance Statement for Q/R Patient Root Information Model – FIND

By default, IMPAX EE Application uses Query/Retrieve Study Root Info. Model – FIND. In case that server does not support this SOP Class, IMPAX EE uses Query/Retrieve Patient Root Info. Model – FIND.

Queries initiated by the user without selection of any Patient/Study entry are performed with query level STUDY.

When querying SR objects, queries are initiated by the user selection of the Study entry (as indicated in Table 2.2-6 are performed with query level SERIES) and matching key Modality (0008,0060) = SR. If the Query Response contains entries for matching Series, a Retrieve for the SR Objects of this Series will be initiated.

2.2.1.3.3 Retrieve images, KO, GSPS and SR

2.2.1.3.3.1 Description and Sequencing of Activity

The user of the IMPAX EE Application initiates the Retrieve Images, KO and GSPS Request by selecting the corresponding button in the Patient/Study Folder on the user interface, after selecting KO, studies/sequences with GSPS, single images, series or whole studies which shall be retrieved. The reception of images is reflected by a status change of the corresponding item in the Patient/Study Folder.

Retrieve SR will be triggered by a preceding Query SR, with non empty Response.

2.2.1.3.3.2 Proposed Presentation Contexts

The default behavior of IMPAX EE is to propose as SCU both Presentation Contexts.

Table 2.2-8: Proposed Presentation Contexts

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Query/Retrieve Study Root Info. 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

If the presentation context is accepted by the peer AE, IMPAX EE will use the Query/Retrieve Study Root Info. Model – MOVE SOP class for retrieve requests. The used retrieve level depends on the selection at the Patient/Study Folder on the user:

Table 2.2-9: Selected item for used Retrieve Level

Selected item corresponds	Used Retrieve Level
None	Retrieve disabled
Patient	Retrieve disabled
Study	STUDY
Series	SERIES
Image	IMAGE

2.2.1.3.4 Store images, GSPS, KO and SR

2.2.1.3.4.1 Description and Sequencing of Activity

The user of the IMPAX EE Application selects single images, series or complete studies and the destination AE in the local Patient/Study Folder before initiating the Image Storage by selecting the corresponding button on the user interface. At default, all Grayscale Presentation State Objects associated with selected images will be automatically stored to the same destination. Also the selected Key Objects will be stored. Alternatively the user can explicit select which GSPS IEs shall be stored together with the images or to store a GSPS IE without the images, which it is referencing. The storage of images is reflected by a status change of the corresponding item in the Patient/Study Folder.

Also it is possible to save GSPS, KO or SC (Secondary Capture) from the work space. If the destination AE also supports the Storage Commitment Push Model service - or a separate AE is associated with the destination AE to perform the Storage Commitment operation -, at default configuration, IMPAX EE sends a Storage Commitment request for the transmitted images and GSPS objects immediately after the storage operation was finished. For storing SR, the user selects a study/sequence, creates a Structured Report and saves that with the corresponding button on the user interface.

2.2.1.3.4.2 Proposed Presentation Contexts

The default behavior of IMPAX EE is to propose as SCU both Presentation Contexts

Table 2.2-10: Proposed Presentation Contexts

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
All Storage SOP Classes	listed in Table 2.2-1	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None

2.2.1.3.5 Storage Commitment (Request)

2.2.1.3.5.1 Description and Sequencing of Activity

At default configuration, IMPAX EE sends a Storage Commitment request for the transmitted images and GSPS objects immediate after the storage operation was finished to the destination AE - or to an associated AE responsible for performing the Storage Commitment operation. The commitment result is reflected by a status change of the corresponding item in the Patient/Study Folder.

2.2.1.3.5.2 Proposed Presentation Contexts

IMPAX EE will propose the single Presentation Context of next Table 2.2-11.

Table 2.2-11: Proposed Presentation Contexts

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None

The following elements are sent as part of the N-ACTION request:

Table 2.2-12: Attributes for N-ACTION

Attribute	Tag
Transaction UID	(0008,1195)
Referenced SOP Sequence	(0008,1199)
>Referenced SOP Class UID	(0008,1150)
>Referenced SOP Instance UID	(0008,1155)

At default, IMPAX EE releases the association immediately after it receives the N-ACTION RSP to the initial Storage Commitment N-ACTION Request. That forces the peer AE to send the N-EVENT-REPORT request containing the commitment result in a separate association, which has to be initiated – and released – by the peer AE.

The default behavior can be changed, that IMPAX EE keeps the initial association open until the corresponding N-EVENT-REPORT request was received and immediately confirmed by IMPAX EE – no matter if in the same or in a separate association.

If a complete success of the requested Storage Commitment is notified by the N-EVENT-REPORT, the status of the concerned image and presentation state objects changes to “committed”, which enables the user to delete the objects.

If existing failures of the requested Storage Commitment is notified by the N-EVENT-REPORT, the user will be asked if the status of image and presentation state objects for which a successful commitment was reported, shall be changed to “committed”.

2.2.1.3.6 Print Images

2.2.1.3.6.1 Description and Sequencing of Activity

The user of the IMPAX EE Application initiates a Print Request by selecting the corresponding button in the Print Composer on the user interface, after selecting the images to print, film format, orientation, layout and a particular Presentation Profile. The Presentation Profile determines if a particular Presentation LUT shall be applied, and specifies values for other presentation related parameters.

2.2.1.3.6.2 Proposed Presentation Contexts

If all images selected by the user are gray scaled (“Grayscale Print”), IMPAX EE proposes following Presentation Contexts in the association request:

Table 2.2-13: Proposed Presentation Contexts

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None
Presentation LUT SOP Class	1.2.840.10008.5.1.1.23	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None

If at least one of the images selected is a color image (“Color Print”), IMPAX EE proposes following Presentation Contexts in the association request:

Table 2.2-14: Proposed Presentation Contexts

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None

In this case, IMPAX EE renders gray scale pixel data according the selected Presentation Profile to 3x8 bit RGB pixel data.

2.2.1.3.6.3 SOP Specific Conformance for Printing

2.2.1.3.6.3.1 Specific Conformance for Printer SOP Class

Immediately after successful association negotiation, IMPAX EE issues an N-GET-RQ message with an empty attribute identifier list element in order to retrieve all attributes of the well-known Printer SOP Instance. If this request fails, the connection with the printer is released.

IMPAX EE is able to accept N-EVENT-REPORT requests from the well-known Printer SOP instance at any time and immediately confirms with an N-EVENT-REPORT response message. Event reports may or may not be used to notify the user of the software of the event.

2.2.1.3.6.3.2 Specific Conformance for Basic Film Session SOP Class

After retrieval of the well-known Printer SOP instance and (optionally) the creation of a Presentation LUT SOP instance, IMPAX EE creates a Basic Film Session. If creation of the Basic Film Session fails, IMPAX EE releases the association with the printer.

The following elements may be sent as part of the N-CREATE request:

Table 2.2-15: Supported Attributes for Basic Film Session

Attribute	Tag	Comment
Number of Copies	(2000,0010)	Sent only if specified by user
Print Priority	(2000,0020)	Sent only if specified by user
Medium Type	(2000,0030)	Sent only if specified by user
Film Destination	(2000,0040)	Sent only if specified by Presentation Profile

IMPAX EE does not send N-SET requests on Basic Film Session level.

The print action request is performed on Film Box level.

IMPAX EE uses an N-DELETE request to delete the Basic Film Session SOP instance before releasing the association.

2.2.1.3.6.3.3 Specific Conformance for Basic Film Box SOP Class

After successful creation of the Basic Film Session SOP instance, IMPAX EE creates a Basic Film Box. If creation of the Basic Film Box fails, IMPAX EE releases the association with the printer.

The following elements may be sent as part of the N-CREATE request:

Table 2.2-16: Supported Attributes for Basic Film Box

Attribute	Tag	Comment
Image Display Format	(2010,0010)	Possible values: "STANDARD\x,y"
Referenced Film Session Sequence	(2010,0500)	Referenced Film Session Sequence
>Referenced SOP Class UID	(0008,1150)	
>Referenced SOP Instance UID	(0008,1155)	
Referenced Presentation LUT Sequence	(2050,0500)	Sent only, if support for the Presentation LUT SOP Class has been negotiated and specified by Presentation Profile
>Referenced SOP Class UID	(0008,1150)	Sent if sequence is present
>Referenced SOP Instance UID	(0008,1155)	Sent if sequence is present
Film Orientation	(2010,0040)	Sent only if specified by user
Film Size ID	(2010,0050)	Sent only if specified by user
Magnification Type	(2010,0060)	Sent only if specified by Presentation Profile
Smoothing Type	(2010,0080)	Sent only if specified by Presentation Profile
Border Density	(2010,0100)	Sent only if specified by Presentation Profile
Empty Image Density	(2010,0110)	Sent only if specified by Presentation Profile
Trim	(2010,0140)	Sent only if specified by Presentation Profile
Configuration Information	(2010,0150)	Sent only if specified by Presentation Profile
Annotation Display Format ID	(2010,0030)	Sent only if specified by Presentation Profile and support for the Basic Annotation Box SOP Class was successfully negotiated.

IMPAX EE does not send N-SET requests on Basic Film Box level.

IMPAX EE uses an N-ACTION request on Basic Film Box level, on each created Basic Film Box instance, to initiate the print job at the Print SCP. If the action request fails, IMPAX EE releases the association with the printer.

IMPAX EE uses an N-DELETE request to delete the Basic Film Box SOP instance after receiving the response to the print action request and – in the case that more images as fitting in one film box are printed – before creating a new Basic Film Box SOP instance.

2.2.1.3.6.3.4 Specific Conformance for Basic Grayscale Image Box SOP Class

For each Basic Grayscale Image Box created as part of each Basic Film Box (“Grayscale Print”), IMPAX EE issues a single N-SET request for each image box unless there are more image boxes than images to print, in which no N-SET request is sent for the unused image boxes as part of the N-SET request.

If one of the N-SET operations fails, IMPAX EE releases the association with the printer.

The following elements may be sent as part of the N-SET request:

Table 2.2-17: Supported Attributes for Basic Grayscale Image Box

Attribute	Tag	Comment
Image Position	(2020,0010)	
Basic Grayscale Image Sequence	(2020,0110)	
>Samples Per Pixel	(0028,0002)	Value is 1
>Photometric Interpretation	(0028,0004)	“MONOCHROME2”
>Rows	(0028,0010)	
>Columns	(0028,0011)	
>Pixel Aspect Ratio	(0028,0034)	Sent if pixel aspect ratio is not 1\1
>Bits Allocated	(0028,0100)	Value is 8
>Bits Stored	(0028,0101)	Value is 8
>High Bit	(0028,0102)	Value is 7
>Pixel Representation	(0028,0103)	Value is 0
>Pixel Data	(7FE0,0010)	If no Presentation LUT is specified by the Presentation Profile, than pixel data will be sent in P-values.
Requested Image Size	(2020,0030)	Sent if 1:1 print was selected by User
Requested Decimate/Crop Behavior	(2020,0040)	Sent if 1:1 print was selected by User

2.2.1.3.6.3.5 Specific Conformance for Color Image Box SOP Class

For each Basic Color Image Box created as part of each Basic Film Box (“Color Print”), IMPAX EE issues a single N-SET request for each image box unless there are more image boxes than images to print, in which no N-SET request is sent for the unused image boxes as part of the N-SET request.

If one of the N-SET operations fails, IMPAX EE releases the association with the printer.

The following elements may be sent as part of the N-SET request:

Table 2.2-18: Supported Attributes Color Image Box

Attribute	Tag	Comment
Image Position	(2020,0010)	
Basic Color Image Sequence	(2020,0111)	
>Samples Per Pixel	(0028,0002)	Value is 3
>Photometric Interpretation	(0028,0004)	Value is "RGB"
>Planar Configuration	(0028,0006)	0
>Rows	(0028,0010)	
>Columns	(0028,0011)	
>Pixel Aspect Ratio	(0028,0034)	Sent if pixel aspect ratio is not 1\1
>Bits Allocated	(0028,0100)	Value is 8
>Bits Stored	(0028,0101)	Value is 8
>High Bit	(0028,0102)	Value is 7
>Pixel Representation	(0028,0103)	Value is 0
>Pixel Data	(7FE0,0010)	
Requested Image Size	(2020,0030)	Sent if 1:1 print was selected by User
Requested Decimate/Crop Behavior	(2020,0040)	Sent if 1:1 print was selected by User

2.2.1.3.6.3.6 Specific Conformance for Presentation LUT Box SOP Class

If support for the Presentation LUT SOP Class has been negotiated and the selected Presentation Profile specifies a Presentation LUT, IMPAX EE creates a Presentation LUT SOP instance after the retrieval of the well-known Printer SOP Instance.

If creation of the Presentation LUT SOP instance fails, IMPAX EE renders the pixel data according the requested Presentation LUT and sends P-values as pixel data in the N-SET requests for each Basic Grayscale Image Box.

The following elements may be sent as part of the N-CREATE request:

Table 2.2-19: Supported Attributes Presentation LUT Box

Attribute	Tag	Comment
Presentation LUT Shape	(2050,0020)	Sent if Presentation LUT Sequence is not present

Only one Presentation LUT SOP instance will be created within one association. IMPAX EE uses an N-DELETE request to delete the Presentation LUT SOP instance before releasing the association.

2.2.1.3.6.3.7 Specific Conformance for Basic Annotation Box SOP Class

If support for the Basic Annotation Box SOP Class has been negotiated and the selected Presentation Profile specifies Annotation Boxes, IMPAX EE issues a single N-SET request for each Basic Annotation Box SOP instance, which were implicitly created as part of each Basic Film Box.

The following elements may be sent as part of the N-CREATE request:

Table 2.2-20: Supported Attributes for Basic Annotation Box

Attribute	Tag	Comment
Annotation position	(2030,0010)	
Text String	(2030,0020)	Specified by Presentation Profile

2.2.1.3.7 Query Modality Worklist

2.2.1.3.7.1 Description and Sequencing of Activity

The user of IMPAX EE Application initiates a Query request to a modality worklist when selecting in the import dialog the option “import via modality worklist”.
Wild card or specific information can be specified for the searched attributes.

2.2.1.3.7.2 Proposed Presentation Contexts

Table 2.2-21: Presentation Contexts Proposed by IMPAX EE CLIENT

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None

2.2.1.3.7.3 SOP Specific Conformance – Modality Worklist Information Model – FIND

DICOM Message Service Element (DIMSE) Service N-GET Attributes:

Table 2.2-22: Supported Attributes from Modality Worklist Information Model

Attribute	Tag
Accession Number	(0008,0050)
Admission ID	(0038,0010)
Admitting Date	(0038,0020)
Admitting Diagnoses Description	(0008,1080)
Current Patient Location	(0038,0300)
Institution Name	(0008,0080)
Issuer of patient ID	(0010,0021)
Modality	(0008,0060)
Patient's Birth Date	(0010,0030)
Patient's Name	(0010,0010)
Patient's Sex	(0010,0040)
Patient ID	(0010,0020)
Performing Physician's Name	(0008,1050)
Referring Physician's Name	(0008,0090)
Requested Contrast Agent	(0032,1070)
Requested Procedure Description	(0032,1060)
Requested Procedure ID	(0040,1001)

Attribute	Tag
Requested Procedure Priority	(0040,1003)
Requesting Physician	(0032,1032)
Scheduled Procedure Step Start Date	(0040,0002)
Scheduled Procedure Step Description	(0040,0007)
Scheduled Procedure Step Status	(0040,0020)
Scheduled Station AE Title	(0040,0001)
Scheduled Procedure Step ID	(0040,0009)
Station name	(0008,1010)
Study Instance UID	(0020,000D)
Visit Status ID	(0038,0008)

2.2.1.3.8 Modality Performed Procedure Step (SCU)

2.2.1.3.8.1 Description and Sequencing of Activity

IMPAX EE sends a DICOM MPPS message to the server after importing via Modality worklist if this option is in the configuration panel of the user interface active.

2.2.1.3.8.2 Proposed Presentation Contexts

Table 2.2-23: Presentation Contexts Proposed by IMPAX EE CLIENT

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None

2.2.1.3.8.3 SOP Specific Conformance – MPPS

IMPAX EE supports the next DIMSE Service N-CREATE MPPS Attributes:

Table 2.2-24: Supported Attributes for MPPS N-CREATE

Attribute	Tag
Specific Character Set	(0008,0005)
SOP Class UID	(0008,0016)
SOP Instance UID	(0008,0018)
Modality	(0008,0060)
Procedure Code Sequence	(0008,1032)
>Code Value	(0008,0100)
>Coding Scheme Designator	(0008,0102)
>Code Meaning	(0008,0104)
Patient's Name	(0010,0010)
Patient ID	(0010,0020)
Issuer of Patient ID	(0010,0021)
Patient's Birth Date	(0010,0030)
Patient's Sex	(0010,0040)
Patient's Mother's Birth Name	(0010,1060)

Attribute	Tag
Study ID	(0020,0010)
Admission ID	(0038,0010)
Performed Station AE Title	(0040,0241)
Performed Station Name	(0040,0242)
Performed Location	(0040,0243)
Performed Procedure Step Start Date	(0040,0244)
Performed Procedure Step Start Time	(0040,0245)
Performed Procedure Step End Date	(0040,0250)
Performed Procedure Step End Time	(0040,0251)
Performed Procedure Step Status	(0040,0252)
Performed Procedure Step ID	(0040,0253)
Performed Procedure Step Description	(0040,0254)
Performed Procedure Type Description	(0040,0255)
Performed Protocol Code Sequence	(0040,0260)
>Code Value	(0008,0100)
>Coding Scheme Designator	(0008,0102)
>Code Meaning	(0008,0104)
Scheduled Step Attributes Sequence	(0040,0270)
>Accession Number	(0008,0050)
>Referenced Study Sequence	(0008,1110)
>>Referenced SOP Class UID	(0008,1150)
>>Referenced SOP Class UID	(0008,1155)
>Study Instance UID	(0020,000D)
>Requested Procedure Description	(0032,1060)
>Requested Procedure Code Sequence	(0032,1064)
>>Code Value	(0008,0100)
>>Coding Scheme Designator	(0008,0102)
>>Code Meaning	(0008,0104)
>Scheduled Procedure Step Description	(0040,0007)
>Scheduled Protocol Code Sequence	(0040,0008)
>>Code Value	(0008,0100)
>>Coding Scheme Designator	(0008,0102)
>>Code Meaning	(0008,0104)
>Scheduled Procedure Step ID	(0040,0009)
>Requested Procedure ID	(0040,1001)
Performed Procedure Step Discontinuation Reason Code Sequence	(0040,0281)
>Code Value	(0008,0100)
>Coding Scheme Designator	(0008,0102)
>Code Meaning	(0008,0104)
Performed Series Sequence	(0040,0340)
>Retrieve AE Title	(0008,0054)
>Series Description	(0008,103E)
>Performing Physician's Name	(0008,1050)
>Operator's Name	(0008,1070)
>Referenced Image Sequence	(0008,1140)
>>Referenced SOP Class UID	(0008,1150)
>>Referenced SOP Class UID	(0008,1155)
>Protocol Name	(0018,1030)

Attribute	Tag
>Series Instance UID	(0020,000E)
>Referenced Non-Image Composite SOP Instance Sequence	(0040,0220)
>>Referenced SOP Class UID	(0008,1150)
>>Referenced SOP Class UID	(0008,1155)

IMPAX EE supports the next DIMSE Service N-SET MPPS Attributes:

Table 2.2-25: Supported Attributes for MPPS N-SET

Attribute	Tag
Procedure Code Sequence	(0008,1032)
>Code Value	(0008,0100)
>Coding Scheme Designator	(0008,0102)
>Code Meaning	(0008,0104)
Performed Procedure Step Start Date	(0040,0244)
Performed Procedure Step Start Time	(0040,0245)
Performed Procedure Step End Date	(0040,0250)
Performed Procedure Step End Time	(0040,0251)
Performed Procedure Step Status	(0040,0252)
Performed Procedure Step Description	(0040,0254)
Performed Procedure Type Description	(0040,0255)
Performed Procedure Step Discontinuation Reason Code Sequence	(0040,0281)
>Code Value	(0008,0100)
>Coding Scheme Designator	(0008,0102)
>Code Meaning	(0008,0104)
Performed Series Sequence	(0040,0340)
>Retrieve AE Title	(0008,0054)
>Series Description	(0008,103E)
>Performing Physician's Name	(0008,1050)
>Operator's Name	(0008,1070)
>Referenced Image Sequence	(0008,1140)
>>Referenced SOP Class UID	(0008,1150)
>>Referenced SOP Class UID	(0008,1155)
>Protocol Name	(0018,1030)
>Series Instance UID	(0020,000E)
>Referenced Non-Image Composite SOP Instance Sequence	(0040,0220)
>>Referenced SOP Class UID	(0008,1150)
>>Referenced SOP Class UID	(0008,1155)

2.2.1.4 Association Acceptance Policies

The accepted calling and the called application entity titles – as the single TCP port number on which the application is listening for incoming association requests – can be configured in the AE configuration panel of the user interface. It accepts any association for which at least one presentation context is accepted.

2.2.1.4.1 Verify Connection

2.2.1.4.1.1 Description and Sequencing of Activity

IMPAX EE CLIENT responds to a Verification request from a DICOM SCU.

2.2.1.4.1.2 Accepted Presentation Contexts

Table 2.2-26: Acceptable Presentation Contexts for IMPAX EE CLIENT

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Verification SOP Class	1.2.840.10008.1.1	Implicit VR, Little Endian	1.2.840.10008.1.1	SCP	None

2.2.1.4.2 Receive images, GSPS, KO and SR

IMPAX EE CLIENT accepts an association when it receives an association request from a DICOM Storage SCU.

2.2.1.4.2.1 Description and Sequencing of Activity

The receipt of an Image Storage Request is typically caused by a Retrieve Images Request issued by the IMPAX EE application entity to the remote system.

When IMPAX EE accepts an association, it will receive any image, GSPS, KO or SR transmitted on that association and store the image locally and registered it in the local database. The IMPAX EE application entity informs the user of the receipt of new objects.

2.2.1.4.2.2 Accepted Presentation Contexts

IMPAX EE accepts only presentation contexts for supported SOP classes containing the DICOM default transfer syntax:

Table 2.2-27: Acceptable Presentation Contexts for IMPAX EE CLIENT

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
All supported storage SOP classes listed in table 2.2-1		Implicit VR, Little Endian	1.2.840.10008.1.2	SCP	no

2.2.1.4.2.3 SOP Specific Conformance Statement for Storage SOP classes

IMPAX EE implements Level2 (Full) conformance for the Storage SOP Class. IMPAX EE will issue a failure status if it is unable to store a DICOM object on disk. If the database contains already an entry referencing an image with the equal SOP Instance UID as the new received image, the image will not be stored. IMPAX EE will issue also a storage success status in this case.

The following error/warning status codes can be sent by IMPAX EE in the context of a C-STORE- RSP message:

Table 2.2-28: Response Status for Storage

Service Status	Further Meaning	Error Code	Reason
Refused	Out of Resources	A700	Out of Resources
Error	Data Set does not match SOP Class	A900	Data Set does not match SOP Class
Error	Cannot understand	C000	
Success		0000	
Warning	Data Set does not match SOP Class	B007	Data Set does not match SOP Class

2.2.1.4.3 Storage Commitment (Report)

2.2.1.4.3.1 Description and Sequencing of Activity

A Storage Commitment Report is caused by a former Storage Commitment Request issued by the IMPAX EE application entity to the remote system.

At default, IMPAX EE releases the association immediately after it receives the N-ACTION RSP to the initial Storage Commitment N-ACTION Request. That forces the peer AE, to send the N-EVENT-REPORT request containing the commitment result in a separate association, which has to be initiated – and released – by the peer AE.

The default behavior can be changed, that IMPAX EE keeps the initial association open until the corresponding N-EVENT-REPORT request was received and immediately confirmed by IMPAX EE – no matter if in the same or in a separate association.

2.2.1.4.3.2 Accepted Presentation Contexts

Table 2.2-29: Acceptable Presentation Contexts for IMPAX EE CLIENT

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Verification SOP Class	1.2.840.10008.1.1	Implicit VR, Little Endian	1.2.840.10008.1.1	SCP	None
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	Implicit VR, Little Endian	1.2.840.10008.1.1	SCU	None

2.2.1.4.3.3 SOP Specific Conformance Statement for Storage Commitment (Report)

If a complete success of the requested Storage Commitment is notified by the N-EVENT-REPORT, the status of the concerned image and presentation state objects changes to “committed”, which enables the user to delete these objects.

If existing failures of the requested Storage Commitment is notified by the N-EVENT-REPORT, the user will be asked if the status of image and presentation state objects for which a successful commitment was reported, shall be changed to “committed”.

2.3 Network Interfaces

IMPAX EE provides DICOM V3.0 TCP/IP (Transmission Control Protocol / Internet Protocol) Network Communication Support as defined in PS 3.8 of the DICOM Standard. IMPAX EE inherits its TCP/IP stack from the computer system upon which it executes.

2.3.1 Physical Medium Support

IMPAX EE is indifferent to the physical medium over which TCP/IP executes; it inherits the medium from the computer system upon which it is being executed.

2.4 Configuration

2.4.1 AE Title/ Presentation Mapping

The mapping of application entity titles to presentation addresses is configurable from IMPAX EE's user interface in the configuration database.

2.4.1.1 Local AE Titles

Table 2.4-1: AE Title Configuration Table

Application Entity	Default AE Title	Default TCP/IP Port
IMPAX EE Client	Hostname of computer	

2.4.1.2 Remote AE Titles

2.4.2 Configuration Parameters

Table 2.4-2: Configuration Parameter Table

Parameter	Configurable (Yes/No)	Default Value
General Parameters		
Calling AE Title	Yes	Hostname of computer
Port	Yes	
Read Timeout	Yes	
Default character Encoding	Yes	Latin 1
Packet Size	No	16384
Modality Performed Procedure Step Specific Parameters		
Remote host	Yes	
Remote port	Yes	
MPPS called AE Title	Yes	

3 MEDIA INTERCHANGE

3.1 Implementation Model

3.1.1 Application Data Flow Diagram

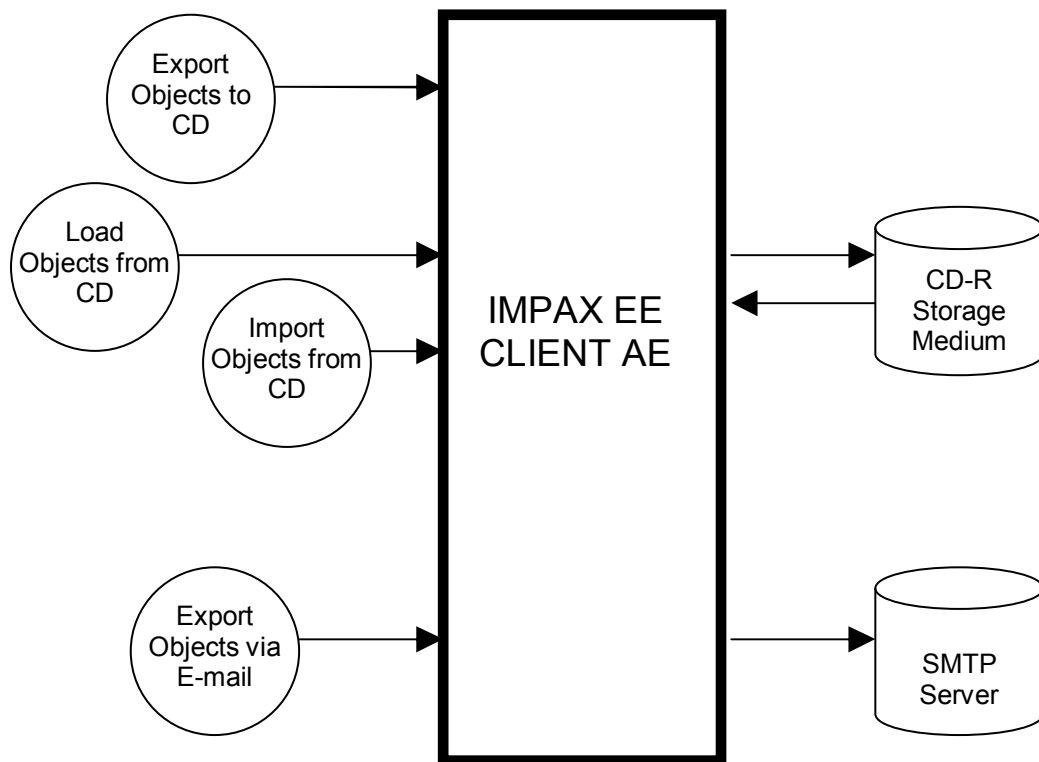


Figure3.1-1: Application Data Flow Diagram

3.1.2 Functional Definition of IMPAX EE CLIENT AE

The selection of the option “Import CD/DVD” or “Import from CD” gives the possibility to import the selected patients and studies. These selected instances are transmitted to CLIENT AE.

The selection of the option “Export CD/DVD” gives the possibility to export the selected DICOM objects. These selected DICOM objects are written in one CD-R or in more than one when the quantity of information is larger than the size of one single CD-R.

Choosing as search node the CD drive or the path of the DICOMDIR object of the media the user has the possibility to select any patient DICOM object contained in the CD and visualize it.

The selection of the option “Export Send Email” gives the possibility to export the selected DICOM objects via e-mail. These selected instances are sent to a Simple Mail Transfer Protocol (SMTP) server.

3.1.3 Sequencing of Real World Activities

When exporting, the desired DICOM objects are selected to export. These objects can belong to different studies and different patients. The option exists to export anonymized. Then, IMPAX EE CLIENT Application Entity generates the corresponding DICOMDIR from these data and exports it.

If exporting to CD it is optional to include a web representation in the stored data.

If exporting data via e-mail, sender and receiver of e-mail are specified and optionally select to compress the DICOM data into a zip file. The exported DICOM objects are attached to the e-mail using encoded MIME format.

When importing from CD, IMPAX EE CLIENT search in the DICOM DIR the desired patient and study. Then, an import is executed via C-Store.

3.1.4 File Meta Information for Implementation Class and Version

Table 3.1-2: File Meta Information for Implementation Class and Version

File Meta Information Version	00x01
Implementation Class UID	1.2.40.0.13.1.1
Implementation Version Name	dcm4che-2.0

3.2 AE Specifications

3.2.1 IMPAX EE CLIENT AE Specification

Table 3.2-1: AE Related Application Profiles, Real World Activities and Roles

Supported Application Profile	Real-World Activity	Role	SC Option
STD-GEN-CD	Export DICOM Objects to CD	FSC	Interchange
	Import DICOM Objects to CD	FSR,FSU	Interchange
	Load DICOM Objects to CD	FSR	Interchange
STD-GEN-MIME	Export Objects Via mail	FSC	Interchange

3.2.1.1 File Meta Information for Implementation IMPAX EE CLIENT

There is no File Meta Information that pertains to Application Entity IMPAX EE CLIENT.

3.2.1.2 Real World Activities

3.2.1.2.1 Real World Activity – Import DICOM objects from CD

IMPAX EE CLIENT AE works as FSR during the import from CD. It obtains the CD information data from the DICOMDIR structure and once selected the desired patient and study/s it imports via DICOM C-Store. Optionally, it can act as FSU when user chooses the option to change some DICOM attributes of the imported data.

3.2.1.2.1.1 Media Storage Application Profile

IMPAX EE CLIENT AE supports STD-GEN-CD Application Profile. The SOP classes supported are listed in Table 1.1-1. The used Transfer Syntax is Explicit VR Little Endian with Transfer Syntax UID 1.2.840.10008.1.2.1.

3.2.1.2.1.1.1 Options

User of IMPAX EE has three options to import: Direct Import, Ad Hoc and Import via Modality Worklist. When user chooses Ad Hoc or Via Modality Worklist some DICOM attributes from the imported image are changed, then, IMPAX EE is working as FSU.

3.2.1.2.1.1.1.1 *Direct Import:*

All DICOM Attributes will remain as original data from CD.

3.2.1.2.1.1.1.2 *Ad Hoc:*

Some DICOM Attributes will be substituted by the User of IMPAX EE.

This attributes are:

Table 3.2-2: Attributes modified by the user

Attribute Name	Tag
Patient Name	(0010,0010)
Patient ID	(0010,0020)
Patient's Birth Date	(0010,0030)
Patient's Sex	(0010,0040)
Accession Number	(0008,0050)

3.2.1.2.1.1.1.3 *Import via Modality Worklist:*

DICOM Attributes will be substituted by the obtained attributes from a modality worklist query. These attributes are listed in chapter 2.2.1.4.7 in table 2.2-22 Supported Attributes from Modality Worklist Information Model.

3.2.1.2.2 Real World Activity – Load DICOM objects from CD

IMPAX EE CLIENT AE works as when loading data from a CD. It obtains the CD information data from the DICOMDIR structure and the user can choose which of the information wants to load.

3.2.1.2.2.1 Media Storage Application Profile

IMPAX EE CLIENT AE supports STD-GEN-CD Application Profile. The SOP classes supported are listed in Table 1.1-1. The used Transfer Syntax is Explicit VR Little Endian with Transfer Syntax UID 1.2.840.10008.1.2.1.

3.2.1.2.3 Real World Activity – Export DICOM objects to CD

IMPAX EE CLIENT AE exports DICOM object to CD acting as FSR. From the selected objects, it is created a DICOMDIR object and sent to the remote AE.

3.2.1.2.3.1 Media Storage Application Profile

IMPAX EE CLIENT AE supports STD-GEN-CD Application Profile.

The supported SOP classes are the storage classes listed in Table 1.1-1. The used Transfer Syntax is Explicit VR Little Endian with Transfer Syntax UID 1.2.840.10008.1.2.1.

3.2.1.2.3.1.1 Options

The User of IMPAX EE has the option to export anonymized.

Export anonymized has the following effect in the original DICOM attributes:

- Attributes in next table (Table 3.2-3) are modified by the value of the user

Table 3.2-3: Anonymized Attributes modified by the user

Attribute Name	Tag
Patient's Name	(0010,0010)
Patient ID	(0010,0020)

- Attributes in next table (Table 3.2-4) are optionally preserved

Table 3.2-4: Anonymized Attributes optional to preserve

Attribute Name	Tag
Patient's Sex	(0010,0040)
Patient ID	(0010,0020)

- Attributes in next table (Table 3.2-5) are removed from the data set

Table 3.2-5: Anonymized Attributes removed from the data set

Attribute Name	Tag
Admitting Diagnoses Description	(0008,1080)
Derivation Description	(0008,2111)
Patient's Name	(0010,0010)
Patient's Birth Name	(0010,1005)
Patient's Mother's Birth Name	(0010,1060)
Patient's Sex	(0010,0040)
Other Patient IDs	(0010,1000)
Other Patient Names	(0010,1001)
Patient's Age	(0010,1010)
Patient's Size	(0010,1020)
Patient's Weight	(0010,1030)
Medical Record Locator	(0010,1090)
Patient's Name	(0010,0010)
Patient ID	(0010,0020)
Ethnic Group	(0010,2160)
Occupation	(0010,2180)
Additional Patient History	(0010,21B0)
Patient Comments	(0010,4000)
Device Serial Number	(0018,1000)
Request Attributes Sequence	(0040,0275)

- Attributes in next table (Table 3.2-6) are cleared to zero value

Table 3.2-6: Anonymized Attributes cleared to zero value

Attribute Name	Tag
Accession Number	(0008,0050)
Patient ID	(0010,0020)
Issuer of Patient ID	(0010,0021)

- Attributes in next table (Table 3.2-7) are replaced with random data

Table 3.2-7: Anonymized Attributes replaced with random data

Attribute Name	Tag
Series Number	(0020,0011)
Study ID	(0020,0010)

- Attributes in next table (Table 3.2-8) are regenerated and replaced consistently in the whole data set

Table 3.2-8: Anonymized Attributes replaced consistently

Attribute Name	Tag
Instance Creator UID	(0008,0014)
SOP Instance UID	(0008,0018)
Study Instance UID	(0020,000D)
Series Instance UID	(0020,000E)
Frame of Reference UID	(0020,0052)
Synchronization Frame of Reference UID	(0018,106A)
Storage Media File-Set UID	(0088,0140)
Referenced Frame of Reference UID	(3006,0024)
Related Frame of Reference UID	(3006,00C2)
Referenced SOP Instance UID	(0008,1155)

3.2.1.2.4 Real World Activity – Export DICOM objects via e-mail

IMPAX EE CLIENT AE works as FSR when exporting DICOM objects via e-mail. The user selects the desired objects and a DICOM DIR is generated and sent via e-mail to an SMTP server.

IMPAX EE uses S/MIME (Secure/Multipurpose Internet Mail Extensions) encryption. The user introduces the private or public key for secure communication.

3.2.1.2.4.1 Media Storage Application Profile

IMPAX EE CLIENT AE supports STD-GEN-MIME Application Profile.

The used Transfer Syntax is Explicit VR Little Endian with Transfer Syntax UID 1.2.840.10008.1.2.1.

All storage classes listed in table 1.1-1 are supported.

3.2.1.2.4.1.1 Options

The User of IMPAX EE has the option to anonymize the exported data.

Export anonymized has the same effect in the original DICOM attributes as described in chapter *Export DICOM objects to CD* (chapter 3.2.1.2.3.1.1).

4 SUPPORT FOR EXTENDED CHARACTER SETS

IMPAX EE supports the following character sets:

Character Set Description	Defined Term
Latin alphabet No. 1	ISO-IR 100
Thai	ISO-IR 166
Cyrillic	ISO-IR 144
Arabic	ISO-IR 127
Korean	ISO-IR 149
Greek	ISO-IR 126
Hebrew	ISO-IR 138
UTF-8	ISO-IR 192
JIS X 0208 Japanese Kanji	ISO-IR 87
JIS X 0201 Japanese Katakana	ISO-IR 13
Chinese	GB18030

5 SECURITY

5.1 Security Profiles

IMPAX EE supports secure DICOM communication in conformance with the Secure Profiles:

- Basic TLS Secure Transport Connection Profile

User of IMPAX EE can activate the use of TLS security.

- AES TLS Secure Transport Connection Profile

User of IMPAX EE can activate the use of AET TLS security complying with TLS_RSA_WITH_AES_128_CBC_SHA profile.

- Basic User Identity Association Profile

IMPAX EE can be configured to use Basic User Identity Association Profile.

- User Identity plus Pass code Association Profile

IMPAX EE can be configured to use User Identity plus Pass code Association Profile.

- Basic Network Address Management Profile

IMPAX EE supports Basic Network Address Management Profile acting as DNS Client and DHCP Client

- Basic Time Synchronization Profile

IMPAX EE supports Basic Time Synchronization Profile acting as NTP client.

5.2 Association Level Security

IMPAX EE does not support any Association Level Security

5.3 Application Level Security

IMPAX EE application access requires a valid user and password in order to login.

6 ANNEXES

6.1 IOD Contents

6.1.1 Created SOP Instance(s)

IMPAX EE creates GSPS as PR modality, Secondary Captures as OT and Sessions and Flags as KO modality.

The following tables use a number of abbreviations. The abbreviations used in the “Presence of Module” and “Presence of Value” columns are:

VNAP	Value Not Always Present (attribute sent zero length if no value is present)
ANAP	Attribute Not Always Present
ALWAYS	Always Present with a value
EMPTY	Attribute is sent without a value

The abbreviations used for the source of the data values in the tables are:

USER	the attribute value source is from User input
AUTO	the attribute value is generated automatically
CONFIG	the attribute value source is a configurable parameter

6.1.1.1 Secondary Capture IOD

Table 6.1-1: IOD of Created Secondary Capture SOP Instances

IE	Module	Reference	Presence of Module
Patient	Patient	Table 6.1-4	ALWAYS
Study	General Study	Table 6.1-5	ALWAYS
	Patient Study	Table 6.1-6	ALWAYS
Series	General Series	Table 6.1-7	ALWAYS
Equipment	General Equipment	Table 6.1-8	ALWAYS
	SC Equipment	Table 6.1-10	ALWAYS
Image	General Image	Table 6.1-11	ALWAYS
	Image Pixel	Table 6.1-12	ALWAYS
	Overlay Plane	Table 6.1-13	ALWAYS
	SOP Common	Table 6.1-9	ALWAYS

6.1.1.2 GSPS IOD

Table 6.1-2: IOD of GSPS SOP Instances

IE	Module	Reference	Presence of Module
Patient	Patient	Table 6.1-4	ALWAYS
Study	General Study	Table 6.1-5	ALWAYS

IE	Module	Reference	Presence of Module
	Patient Study	Table 6.1-6	ALWAYS
Series	General Series	Table 6.1-7	ALWAYS
	Presentation Series	Table 6.1-14	ALWAYS
Equipment	General Equipment	Table 6.1-8	ALWAYS
Presentation State	Presentation State Identification	Table 6.1-15	ALWAYS
	Displayed Area	Table 6.1-16	ALWAYS
	Graphic Annotation	Table 6.1-17	Required if Graphic Annotations are to be applied to referenced image(s)
	Spatial Transformation	Table 6.1-18	Required if rotation or flipping are to be applied to referenced image(s)
	Graphic Layer	Table 6.1-19	Required if Graphic Annotations or Overlays or Curves are to be applied to referenced image(s)
	Softcopy VOI LUT	Table 6.1-20	Required if a VOI LUT is to be applied to referenced image(s)
	Softcopy Presentation LUT	Table 6.1-21	ALWAYS
	SOP Common	Table 6.1-9	ALWAYS

6.1.1.3 Flags and Sessions IOD

Table 6.1-3: IOD of KO SOP Instances

IE	Module	Reference	Presence of Module
Patient	Patient	Table 6.1-4	ALWAYS
Study	General Study	Table 6.1-5	ALWAYS
	Patient Study	Table 6.1-6	ALWAYS
Series	General Series	Table 6.1-7	ALWAYS
Equipment	General Equipment	Table 6.1-8	ALWAYS
Document	Key Object Document	Table 6.1-22	ALWAYS
	Document Content	Table 6.1-23	ALWAYS
	SOP Common	Table 6.1-9	ALWAYS
	Private Application	Table 6.1-24	Only when KO is a session

6.1.1.4 Common Modules

Table 6.1-4: Patient Module of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Patient's Name	(0010,0010)	PN	Obtained directly from referenced image	ALWAYS	AUTO
Patient ID	(0010,0020)	LO	Obtained directly from referenced image	ALWAYS	AUTO
Issuer of Patient ID	(0010,0021)	LO	Obtained directly from referenced image	VNAP	AUTO
Patient's Birth Date	(0010,0030)	DA	Obtained directly from referenced image	VNAP	AUTO
Patient's Sex	(0010,0040)	CS	Obtained directly from referenced image	VNAP	AUTO
Other Patient IDs	(0010,1000)	LO	Obtained directly from referenced image	VNAP	AUTO
Other Patient Names	(0010,1001)	PN	Obtained directly from referenced image	ANAP	AUTO
Ethnic Group	(0010,2160)	SH	Obtained directly from referenced image	VNAP	AUTO
Patient Comments	(0010,4000)	LT	Obtained directly from referenced image	VNAP	AUTO

Table 6.1-5: General Study Module of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Study Instance UID	(0020,000D)	UI	For Secondary Captures , GSPS and Flags : Obtained directly from referenced image For Sessions : Generated by application	ALWAYS	AUTO
Study Date	(0008,0020)	DA	For Secondary Captures , GSPS and Flags : Obtained directly from referenced image For Sessions : <yyyymmdd>	ALWAYS	AUTO
Study Time	(0008,0030)	TM	For Secondary Captures , GSPS and Flags : Obtained directly from referenced image For Sessions : <hhmmss>	ALWAYS	AUTO
Referring Physician's Name	(0008,0090)	PN	Obtained directly from referenced image	VNAP	AUTO
Study ID	(0020,0010)	SH	For Secondary Captures , GSPS and Flags : Obtained directly from referenced image For Sessions : empty	VNAP	AUTO
Accession Number	(0008,0050)	SH	For Secondary Captures , GSPS and Flags : Obtained directly from referenced image For Sessions : empty	VNAP	AUTO
Study Description	(0008,1030)	LO	For Secondary Captures , GSPS and Flags : Obtained directly from referenced image For Sessions : introduced by user	ANAP	PR and OT : AUTO KO: USER

Table 6.1-6: Patient Study Module of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Patient's Age	(0010,1010)	AS	For Secondary Captures and GSPS : Obtained directly from referenced image For Sessions and Flags : empty	ANAP	AUTO
Patient's Size	(0010,1020)	DS	For Secondary Captures and GSPS : Obtained directly from referenced image For Sessions and Flags : empty	ANAP	AUTO
Patient's Weight	(0010,1030)	DS	For Secondary Captures and GSPS : Obtained directly from referenced image For Sessions and Flags : empty	ANAP	AUTO

Table 6.1-7: General Series Module of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Modality	(0008,0060)	CS	PR for Presentation States OT for Secondary captures KO for Flags and Sessions	ALWAYS	AUTO
Series Instance UID	(0020,000E)	UI	Generated by application	ALWAYS	AUTO
Series Number	(0020,0011)	IS	Generated by application	ALWAYS	AUTO
Series Date	(0008,0021)	DA	<yyyymmdd> Sessions : Attribute not present	ANAP	AUTO
Series Time	(0008,0031)	TM	<hhmmss> Sessions : Attribute not present	ANAP	AUTO
Series Description	(0008,103E)	LO	Presentation State: Introduced by the user Secondary capture : Obtained directly from referenced image Flags and Sessions: Attribute not present	ANAP	PS: USER OT: AUTO
Referenced Performed Procedure Step Sequence	(0008,1111)	SQ	Obtained directly from referenced image	ANAP	AUTO
>Referenced SOP Class UID	(0008,1150)	UI	Obtained directly from referenced image	ANAP	AUTO
>Referenced SOP Instance UID	(0008,1155)	UI	Obtained directly from referenced image	ANAP	AUTO
Body Part Examined	(0018,0015)	CS	Obtained directly from referenced image Sessions : Attribute not present	ANAP	AUTO

Table 6.1-8: General Equipment Module of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Manufacturer	(0008,0070)	LO	PR, Flags and Sessions: Empty OT: Agfa Healthcare N.V.	VNAP	AUTO
Software Versions	(0018,1020)	LO	Secondary Capture and GSPS : Obtained directly from referenced image Flags and Sessions : Attribute not present	ANAP	AUTO

Table 6.1-9: SOP Common Module of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
SOP Class UID	(0008,0016)	UI	Presentation State = 1.2.840.10008.5.1.4.1.1.11.1 Secondary Capture = 1.2.840.10008.5.1.4.1.1.7.4 Flags and Sessions = 1.2.840.10008.5.1.4.1.1.88.59	ALWAYS	AUTO
SOP Instance UID	(0008,0018)	UI	Created by application	ALWAYS	AUTO

Attribute Name	Tag	VR	Value	Presence of Value	Source
Specific Character Set	(0008,0005)	CS	Supported Character Sets listed in Chapter 4	ALWAYS	CONFIG
Instance Creation Date	(0008,0012)	DA	<yyyymmdd>	ALWAYS	AUTO
Instance Creation Time	(0008,0013)	TM	<hhmmss>	ALWAYS	AUTO
Instance Number	(0020,0013)	IS	Created by application	ALWAYS	AUTO

6.1.1.5 Secondary Capture Modules

Table 6.1-10: Secondary Capture Equipment Module of Created Secondary Capture SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Conversion Type	(0008,0064)	CS	WSD	ALWAYS	AUTO
Modality	(0008,0060)	CS	OT	ALWAYS	AUTO
Secondary Capture Device Manufacturer	(0018,1016)	LO	Agfa Healthcare N.V	ALWAYS	AUTO
Secondary Capture Device Manufacturer's Model Name	(0018,1018)	LO	IMPAX EE	ALWAYS	AUTO
Secondary Capture Device Software Version	(0018,1019)	LO	R20 VI	ALWAYS	AUTO

Table 6.1-11: General Image Module of Created SOP Secondary Capture Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Instance Number	(0020,0013)	IS	Generated by Application	ALWAYS	AUTO
Patient Orientation	(0020,0020)	CS	From referenced image	ALWAYS	AUTO
Image Type	(0008,0008)	CS	From referenced image	ALWAYS	AUTO
Acquisition Date	(0008,0022)	DA	From referenced image	ALWAYS	AUTO
Acquisition Time	(0008,0032)	DA	From referenced image	ALWAYS	AUTO
Acquisition DateTime	(0008,002A)	DA	From referenced image	ALWAYS	AUTO
Quality Control Image	(0028,0300)	CS	From referenced image	ANAP	AUTO
Burned In Annotation	(0028,0301)	CS	From referenced image	ANAP	AUTO
Lossy Image Compression	(0028,2110)	CS	From referenced image	ANAP	AUTO
Presentation LUT Shape	(2050,0020)	CS	INVERSE	ALWAYS	AUTO

Table 6.1-12: Image Pixel Module of Created SOP Secondary Capture Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Samples per Pixel	(0028,0002)	US	Generated by application	ALWAYS	AUTO
Photometric Interpretation	(0028,0004)	CS	RGB	ALWAYS	AUTO
Rows	(0028,0010)	US	Generated by application	ALWAYS	AUTO
Columns	(0028,0011)	US	Generated by application	ALWAYS	AUTO
Bits Allocated	(0028,0100)	US	Generated by application	ALWAYS	AUTO
Bits Stored	(0028,0101)	US	Generated by application	ALWAYS	AUTO
High Bit	(0028,0102)	US	Generated by application	ALWAYS	AUTO
Pixel Representation	(0028,0103)	US	Generated by application	ALWAYS	AUTO
Pixel Data	(7FE0,0010)	OW OB	Generated by application	ALWAYS	AUTO
Planar Configuration	(0028,0006)	US	Generated by application	VNAP	AUTO

Table 6.1-13 Overlay Plane Module of Created Secondary Capture SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Overlay Rows	(60xx,0010)	US	Generated by application	ALWAYS	AUTO
Overlay Columns	(60xx,0011)	US	Generated by application	ALWAYS	AUTO
Overlay Type	(60xx,0040)	CS	Generated by application	ALWAYS	AUTO
Overlay Origin	(60xx,0050)	SS	Generated by application	ALWAYS	AUTO
Overlay Bits Allocated	(60xx,0100)	US	Generated by application	ANAP	AUTO
Overlay Bit Position	(60xx,0102)	US	Generated by application	ANAP	AUTO
Overlay Data	(60xx,3000)	OW	Generated by application	ANAP	AUTO
Overlay Description	(60xx,0022)	LO	Generated by application	ANAP	AUTO
Overlay Subtype	(60xx,0045)	LO	For screen mappings : AUTOMATED For Annotations : USER	ALWAYS	AUTO
Overlay Label	(60xx,1500)	LO	For screen mappings : JV_SCRMAP For Annotations : JV_OBJECTS	ALWAYS	AUTO

6.1.1.6 GSPS Modules

Table 6.1-14: Presentation Series Module of Created GSPS SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Modality	(0008,0060)	CS	PR	ALWAYS	AUTO
Softcopy VOI LUT Sequence	(0028,3110)	SQ	One or more items.	VNAP	AUTO
>Referenced Image Sequence	(0008,1140)	SQ	Obtained directly from referenced image	ALWAYS	AUTO
>>Referenced SOP Class UID	(0008,1150)	UI	From referenced image	ALWAYS	AUTO
>>Referenced SOP Instance UID	(0008,1155)	UI	From referenced image	ALWAYS	AUTO
>>Referenced Frame Number	(0008,1160)	IS	If referenced image is a multiframe image	ANAP	AUTO

Table 6.1-15: Presentation State Identification Module of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Presentation Creation Date	(0070,0082)	DA	<yyyymmdd>	ALWAYS	AUTO
Presentation Creation Time	(0070,0083)	TM	<hhmmss>	ALWAYS	AUTO
Instance Number	(0020,0013)	IS	Generated by application	ALWAYS	AUTO
Presentation Label	(0070,0080)	CS	From user input.	ALWAYS	USER
Presentation Description	(0070,0081)	LO	From user input.	VNAP	USER
Presentation Creator's Name	(0070,0084)	PN	Generated by device according to currently active user.	ALWAYS	AUTO
Referenced Series Sequence	(0008,1115)	SQ	One or more items.	ALWAYS	AUTO
>Series Instance UID	(0020,000E)	UI	From referenced image	ALWAYS	AUTO
>Referenced Image Sequence	(0008,1140)	SQ	From referenced image	ALWAYS	AUTO
>>Referenced SOP Class UID	(0008,1150)	UI	From referenced image	ALWAYS	AUTO
>>Referenced SOP Instance UID	(0008,1155)	UI	From referenced image	ALWAYS	AUTO
>>Referenced Frame Number	(0008,1160)	IS	If referenced image is a multiframe image	ANAP	AUTO
Shutter Presentation Value	(0018,1622)	US	Generated by device if shutter present	ANAP	AUTO

Table 6.1-16: Displayed Area Module of Created GSPS SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Displayed Area Selection Sequence	(0070,005A)	SQ	One or more items.	ALWAYS	AUTO
>Referenced Image Sequence	(0008,1140)	SQ	One or more items.	ALWAYS	AUTO
>>Referenced SOP Class UID	(0008,1150)	UI	Obtained directly from referenced image	ALWAYS	AUTO
>>Referenced SOP Instance UID	(0008,1155)	UI	Obtained directly from referenced image	ALWAYS	AUTO
>>Referenced Frame Number	(0008,1160)	IS	If referenced image is a multiframe image	VNAP	AUTO
>Displayed Area Top Left Hand Corner	(0070,0052)	SL	From current display setting	ALWAYS	AUTO
>Displayed Area Bottom Right Hand Corner	(0070,0053)	SL	From current display setting	ALWAYS	AUTO
>Presentation Size Mode	(0070,0100)	CS	From current display setting	ALWAYS	AUTO
>Presentation Pixel Spacing	(0070,0101)	DS	From current display setting	ANAP	AUTO

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Attribute Name	Tag	VR	Value	Presence of Value	Source
>Presentation Pixel Aspect Ratio	(0070,0102)	IS	From current display setting	ANAP	AUTO
>Presentation Pixel Magnification Ratio	(0070,0103)	FL	From current display setting	ANAP	AUTO

Table 6.1-17: Graphic Annotation Module of Created GSPS SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Graphic Annotation Sequence	(0070,0001)	SQ	One or more items	ANAP	AUTO
>Referenced Image Sequence	(0008,1140)	SQ	One or more items	ALWAYS	AUTO
>>Referenced SOP Class UID	(0008,1150)	UI	From referenced image	ALWAYS	AUTO
>>Referenced SOP Instance UID	(0008,1155)	UI	From referenced image	ALWAYS	AUTO
>>Referenced Frame Number	(0008,1160)	IS	If referenced image is a multiframe image	ANAP	AUTO
>Graphic Layer	(0070,0002)	CS	ROI	ALWAYS	AUTO
>Text Object Sequence	(0070,0008)	SQ	One or more Items	ANAP	AUTO
>>Anchor Point Annotation Units	(0070,0004)	CS	PIXEL	ALWAYS	AUTO
>>Unformatted Text Value	(0070,0006)	ST	From user Input or automatic generated from graphic object properties	ALWAYS	AUTO or USER
>>Bounding Box Text Horizontal Justification	(0070,0012)	CS	Input from the user	ALWAYS	USER
>>Anchor Point	(0070,0014)	FL	Input from the user	ALWAYS	USER
>>Anchor Point Visibility	(0070,0015)	CS	Input from the user	ALWAYS	USER
>Graphic Object Sequence	(0070,0009)	SQ	One or more Items	ANAP	AUTO
>>Graphic Annotation Units	(0070,0005)	CS	PIXEL	ALWAYS	AUTO
>>Graphic Dimensions	(0070,0020)	US	2	ALWAYS	AUTO
>>Number of Graphic Points	(0070,0021)	US	Input from the user	ALWAYS	USER
>> Graphic Data	(0070,0022)	FL	Input from the user	ALWAYS	USER
>>Graphic Type	(0070,0023)	CS	CIRCLE, POLYLINE or INTERPOLATED	ALWAYS	USER
>>Graphic Filled	(0070,0024)	CS	Y or N	ALWAYS	USER

Table 6.1-18: Spatial Transformation Module of Created GSPS SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Image Rotation	(0070,0042)	US	From current display setting	ALWAYS	AUTO
Image Horizontal Flip	(0070,0041)	CS	From current display setting	ALWAYS	AUTO

Table 6.1-19: Graphic Layer Module of Created GSPS SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Graphic Layer Sequence	(0070,0060)	SQ	One or more items	ANAP	AUTO
>Graphic Layer	(0070,0002)	CS	ROI	ALWAYS	AUTO
>Graphic Layer Order	(0070,0062)	IS	From current display setting	ALWAYS	AUTO
>Graphic Layer Recommended Display Grayscale Value	(0070,0066)	US	<xxxxx> From 0000H(black) to FFFFH(white)	ANAP	AUTO
>Graphic Layer Recommended Display CIELab Value	(0070,0401)	US	<xxxxx\xxxxx\xxxxx> From 0000H(black) to FFFFH(white)	ANAP	AUTO

Table 6.1-20: Softcopy VOI LUT Module of Created GSPS SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Softcopy VOI LUT Sequence	(0028,3110)	SQ	One or more items	ALWAYS	AUTO
>Referenced Image Sequence	(0008,1140)	SQ	One or more items	ALWAYS	AUTO
>>Referenced SOP Class UID	(0008,1150)	UI	From referenced image	ALWAYS	AUTO
>>Referenced SOP Instance UID	(0008,1155)	UI	From referenced image	ALWAYS	AUTO
>>Referenced Frame Number	(0008,1160)	IS	If referenced image is a multiframe image	ANAP	AUTO
>Window Center	(0028,1050)	DS	From current display setting	ALWAYS	AUTO
>Window Width	(0028,1051)	DS	From current display setting	ALWAYS	AUTO
> WindowCenter WidthExplanation	(0028,1055)	LO	From current display settings	ALWAYS	AUTO
VOI LUT Sequence	(0028,3010)	SQ	One or more Items	ANAP	AUTO
>LUT Descriptor	(0028,3002)	US/SS	From current display settings	ANAP	AUTO
>LUT Data	(0028,3006)	OW	From current display settings	ANAP	AUTO

Table 6.1-21: Softcopy Presentation LUT Module of Created GSPS SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Presentation LUT Shape	(2050,0020)	CS	INVERSE, IDENTITY	ALWAYS	AUTO

6.1.1.7 Flags and Sessions Modules

Table 6.1-22: Key Object Document Module of Created Sessions and Flags SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Instance Number	(0020,0013)	IS	Generated by application	ALWAYS	AUTO
Content Date	(0008,0023)	DA	<yyyymmdd>	ANAP	AUTO
Content Time	(0008,0033)	TM	<hhmmss>	ANAP	AUTO
Current Requested Procedure Evidence Sequence	(0040,A375)	SQ	One or more items	ALWAYS	AUTO
>Study Instance UID	(0020,000D)	UI	Obtained from referenced image/s	ALWAYS	AUTO
>Referenced Series Sequence	(0008,1115)	SQ	One or more items	ALWAYS	AUTO
>>Series Instance UID	(0020,000E)	UI	Obtained from referenced image/s	ALWAYS	AUTO
>>Referenced SOP Sequence	(0008,1199)	SQ	One or more items	ALWAYS	AUTO
>>>Referenced SOP Class UID	(0008,1150)	UI	Obtained from referenced image/s	ALWAYS	AUTO
>>>Referenced SOP Instance UID	(0008,1155)	UI	Obtained from referenced image/s	ALWAYS	AUTO

Table 6.1-23 : Key Object Document Content Module of Created Sessions and Flags SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Specific Character Set	(0008,0005)	CS	Generated by Application	ALWAYS	AUTO
Instance Number	(0020,0013)	IS	Generated by application	ALWAYS	AUTO
Content Date	(0008,0023)	DA	<yyyymmdd>	ANAP	AUTO
Content Time	(0008,0033)	TM	<hhmmss>	ANAP	AUTO
Concept Name Code Sequence	(0040,A043)	SQ	One or more Items	ALWAYS	AUTO
> Code Value	(0008,0100)	SH	Generated by Application	ALWAYS	AUTO
>Coding Scheme Designator	(0008,0102)	SH	Generated by Application	ALWAYS	AUTO
>Code Meaning	(0008,0104)	LO	For Sessions : Key Object Description	ANAP	AUTO
Content Sequence	(0040,A730)	SQ	Some Items	ALWAYS	AUTO
>Relationship Type	(0040,A010)	CS	CONTAINS	ALWAYS	AUTO
>Value Type	(0040,A040)	CS	TEXT or IMAGE	ALWAYS	AUTO

Attribute Name	Tag	VR	Value	Presence of Value	Source
Text Value	(0040,A160)	UT	For Sessions : Introduced by the user For Flags: Attribute not present	ANAP	USER
>Referenced SOP Sequence	(0008,1199)	SQ	Two or more items	ALWAYS	AUTO
>Referenced SOP Class UID	(0008,1150)	UI	Obtained from referenced image/s	ALWAYS	AUTO
>Referenced SOP Instance UID	(0008,1155)	UI	Obtained from referenced image/s	ALWAYS	AUTO

Table 6.1-24 : Private Application Module of Created Sessions SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Session	(0029,xx52)	UN	Generated by Application	ALWAYS	AUTO

6.1.2 Coerced/ Modified Fields

As specified in Chapter 3.2 IMPAX EE acting as SCU can modify attribute when importing. These attributes are listed in Table 3.2-2.

As specified in Chapter 3.2, IMPAX EE can modify attributes of an original object exporting acting as SCP and exporting anonymized. These attributes are listed in Tables 3.2-3, 3.2-4, 3.2-5, 3.2-7 and 3.2-8.

The attributes are modified only when user chooses this option.

6.2 Data Dictionary of Private Attributes

Table 6.2-1: Data Dictionary of Private Attributes

Tag	Attribute Name	VR	VM
(0029,xx52)	Session	UN	1



Details as of PDF Creation Date

Document Metadata

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