



DICOM Conformance Statement
for
OPHTHALMIC DATA SYSTEM
IMAGEnet 6 US

Ver.G

TOPCON Corporation

ALL RIGHT RESERVED

Document Version History

DOCUMENT VERSION	DATE	AUTHOR	DESCRIPTION
Rev. 1.0	November 1, 2018	Karthik Dharmarajan	Document created.
Rev. A	December 7, 2018	Sean Royama	IODs updated.
Rev. B	April 11, 2019	Jay Singer	Formatting updates
Rev C	June 4 th 2020	Jay Singer	New part number for 2.3 release: 1026000-U7
Rev D	August 25, 2022	Sean Royama	Update IMAGEnet 6 version from 2.3 to 2.51.
Rev E	December 22 2023	Takumi Kumagai	Update for IMAGEnet 6 version 2.52.1
Rev F	March 1 2024	Takumi Kumagai	Update for IMAGEnet 6 version 4.00
Rev G	August 2, 2024	Takumi Kumagai	Update for IMAGEnet 6 version 4.02

EXECUTIVE OVERVIEW

This document is the DICOM Conformance Statement for IMAGEnet6 system to perform DICOM export and DICOM storage of acquired images through Topcon Image acquisition subsystems. It accommodates reading information from HIS using the DICOM Modality Worklist as a Storage Class User (SCU), storing images to the hospital PACS server using the DICOM Ophthalmic Photography Image Storage (OP SOP Class) or DICOM Ophthalmic Tomography Image Storage (OPT) or DICOM Encapsulated pdf (ePDF) as a SCU.

Supported DICOM SOP Classes Table 1.1

SOP Class Name (see note)	SOP Class UID	Service Class Role
Verification	1.2.840.10008.1.1	SCU
Modality Worklist Information Model Find	1.2.840.10008.5.1.4.31	SCU
OP Ophthalmic 8-bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	SCU
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	SCU
OPT Ophthalmic Tomography 8-bit Storage	1.2.840.10008.5.1.4.1.1.77.1.5.4	SCU
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	SCU

[REFERENCES]

NEMA PS3 Digital Imaging and Communications in Medicine (DICOM) Standard, available free at <http://medical.nema.org/> (Including "NEMA PS 3.1 - 3.20 2022d")

Table of Contents

1. INTRODUCTION	6
2. IMPLEMENTATION MODEL	7
2.1. Application Data Flow Diagram	7
2.2. Functional definitions of AE	7
2.3. Sequencing of Real-World Activities	8
2.3.1 MWL is available while acquiring images	8
2.3.2 MWL is not available while acquiring images (Unscheduled)	8
3. AE SPECIFICATIONS	9
3.1. Worklist AE	9
3.2. Storage AE	12
4. COMMUNICATION PROFILES	17
4.1. Supported Communication Stacks	17
4.2. Physical Media Support	17
5. EXTENSIONS/SPECIALIZATIONS/PRIVATIZATIONS	18
6. CONFIGURATION	19
6.1 Configuration for Remote MWL	19
6.2 Configuration for Remote Storage	19
6.3 Configuration for Local AE	19
6.4. AE Title/Presentation Address Mapping	19
7. Security	20
8. SUPPORT OF EXTENDED CHARACTER SETS	21
9. IOD DESCRIPTION:	22
9.1. IOD List	22
9.1.1 Ophthalmic Photography (OP) IOD	22
9.1.2. Ophthalmic Tomography (OPT) IOD	23
9.1.3. Encapsulated PDF (EPDF) IOD	23
9.1.4. Secondary Capture Image IOD	24
9.1.5. Raw Data IOD	24
9.2. Module Lists	25
9.2.1 Patient Module	25
9.2.2 General Study Module	25
9.2.3. General Series Module	26
9.2.4 Ophthalmic Photography Series Module	26
9.2.5 Ophthalmic Tomography Series Module	26
9.2.6 Frame of Reference Module	26
9.2.7 Synchronization Module	27
9.2.8 General Equipment Module	28
9.2.9 General Image Module	28
9.2.10 Image Pixel Module	29
9.2.11 SOP Common Module	29
9.2.11 SC Equipment Module	29
9.2.12 SC Image Module	29
9.2.13 Cine	29
9.2.14 Multi Frame Module	30
9.2.15 Ophthalmic Photography Image Module	30
9.2.16 Ocular Region Imaged Module	30

9.2.17	Ophthalmic Photography Acquisition Parameters Module	30
9.2.18	Ophthalmic Photographic Parameters Module.....	31
9.2.19	Enhanced Contrast / Bolus	31
9.2.20	Multi-frame functional groups	32
9.2.21	Multi-frame Dimension	34
9.2.22	Ophthalmic Tomography Image	35
9.2.23	Ophthalmic Tomography Acquisition Parameters	35
9.2.24	Ophthalmic Tomography Parameters	36
9.2.25	Acquisition Context Module	36
9.2.26	Encapsulated Document Series	37
9.2.27	Encapsulated Document.....	37
9.2.28	Raw Data.....	38
10.	ABBREVIATIONS.....	39

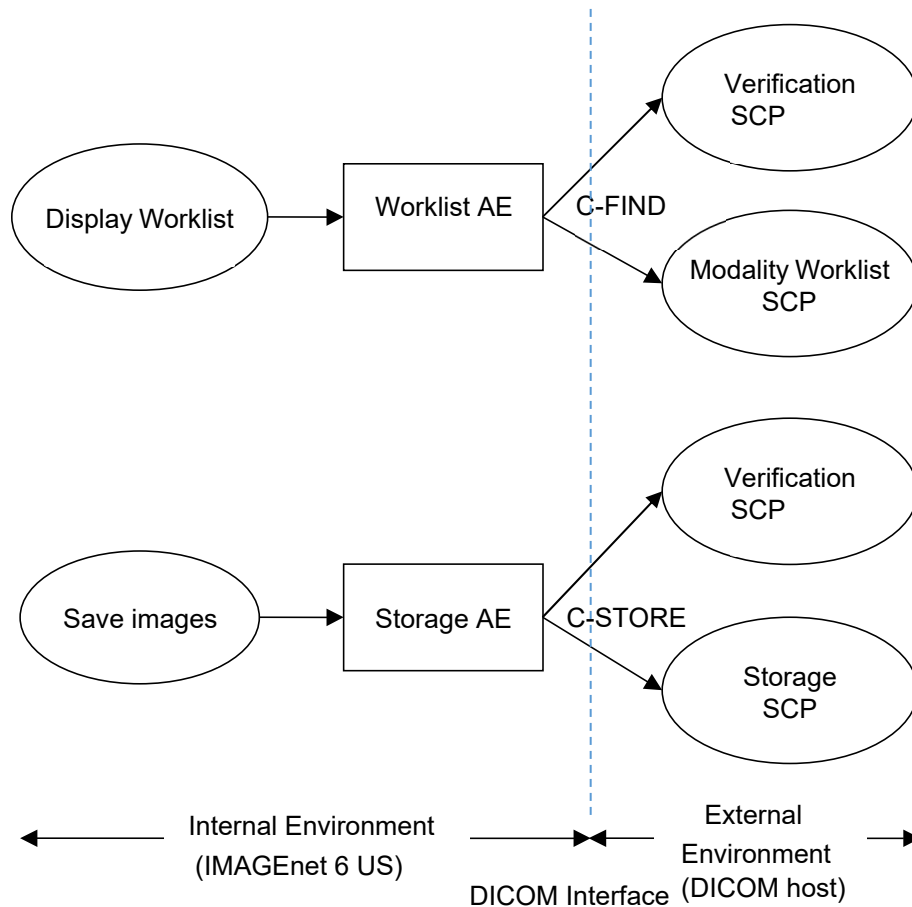
1. INTRODUCTION

This document is the DICOM 3.0 Conformance Statement for the IMAGEnet 6 v4.02 or later DICOM services Module. The IMAGEnet 6 v4.02 or later DICOM used to perform DICOM Auto Storage, copy and export of diagnostic and medical images. This component conforms to the DICOM 3.0 standard to allow the sharing of medical information and images with other Electronic Medical Record (EMR) systems that support DICOM standards.

2. IMPLEMENTATION MODEL

2.1. Application Data Flow Diagram

Figure 1 – The IMAGEnet 6 US DICOM Connection Module – Data Flow Model



2.2. Functional definitions of AE

- After a user requests to query worklist, the Worklist AE reads the Hospital Worklist information and displays it on IMAGEnet screen.
- After a user captures retina images or OCT images are captures, the AE sends them to the Hospital Remote Storage using the Storage Services.
- After a user requests to store images to hospital System the Storage interface AE sends images to the Hospital Remote Storage using the Storage Services.
- The Verification Service is initiated manually by user interface.

2.3. Sequencing of Real-World Activities

The DICOM functionality is implemented in a Web Service self-hosted in a Windows Service program. The Web Service provides APIs for the IMAGEnet 6 main module to carry out DICOM functions including MWL C-Find, C-Store, and C-Echo.

2.3.1 MWL is available while acquiring images

- Send worklist query to the Hospital MWL SCP.
- Receive results of worklist and display them on screen.
- A user chooses a worklist item and start acquiring images.
- Complete acquisition.
- Store acquired images to remote storage AE by using storage service (C-Store).

2.3.2 MWL is not available while acquiring images (Unscheduled)

- Enter patient information into the local database.
- Start acquiring images.
- Complete acquisition.
- Store acquired images to local storage.
- Send worklist query to the Hospital MWL SCP. (When MWL becomes available)
- Receive results of worklist and display them on screen.
- A user selects a worklist item and associate it with a locally stored study that matches the selected worklist.
- Store the chosen local study to remote storage AE by using storage service (C-Store).

3. AE SPECIFICATIONS

3.1. Worklist AE

This AE provides standard conformance to the following DICOM V3.0 SOP Classes:

SOP Class Name	SOP Class UID	Usage
Verification	1.2.840.10008.1.1	SCU
Modality Worklist Information Model Find	1.2.840.10008.5.1.4.31	SCU

3.1.1. Association Establishment Policies

3.1.1.1. General

For the Verification SOP Class, the Worklist AE initiates an Association when acting as a SCU. For the Modality Worklist Information Model Find SOP Class the Worklist AE initiates an Association to the Modality Worklist Provider.

3.1.1.2. Number of Associations

The AE will attempt only one association establishment at a time for each SOP Class.

3.1.1.3. Asynchronous Nature

Asynchronous operation is not supported.

3.1.1.4. Implementation Identifying Information

The Implementation Class UID is "1.2.392.200106.1651.6.1".

The implementation version name is "TP_MWL_IM6_100".

3.1.2. Association Initiation Policy

The AE initiates an association for Modality Worklist Information by using Model Find SOP Class when the user requests the Modality Worklist. There is one real world activity that initiate an association for Verification SOP Class:

- Manual request by the Operator

3.1.2.1. Real World Activity Verify Availability of Destination

3.1.2.1.1. Associated Real-World Activity

The associated Real-World Activity is the verification of the availability of the destination. The AE uses the DIMSE C-ECHO command to verify whether the receiving AE is able to negotiate an association and respond.

3.1.2.1.2. Proposed Presentation Contexts

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

3.1.2.1.2.1. Specific Conformance

The AE provides Standard Conformance to the DICOM Verification Service class.

3.1.2.1.2.2. Association length and duration

The association is released immediately after the response has been received. If the response duration exceeds the specified timeout value, the association will be terminated.

3.1.2.1.2.3. Implementation Specific Behavior

Not applicable.

3.1.2.1.2.4. Transfer Syntax Selection Policies

Not applicable.

3.1.2.1.2.5. Error and Status handling

Process will be terminated if critical error has occurred and description is displayed in the information message box and messages are stored in log file. Status of message processing is also displayed.

3.1.2.2. Real World Activity Request Worklist

3.1.2.2.1. Associated Real-World Activity

The associated Real-World Activity is the attempt to display a Worklist on the application window.

3.1.2.2.2. Proposed Presentation Contexts

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Worklist	1.2.840.10008.5.1.4.31	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

3.1.2.2.2.1. SOP Specific Conformance

- The AE is able to issue a C-FIND Request to the Basic Modality Worklist SCP using the Accession Number (0008, 0050) as a Matching Key attribute.
- The AE is able to issue a C-FIND Request to the Basic Modality Worklist SCP using the Patient's Name (0010, 0010) as a Matching Key attribute.
- The AE is able to issue a C-FIND Request to the Basic Modality Worklist SCP using the Patient ID (0010, 0020) as a Matching Key attribute.
- The AE is able to issue a C-FIND Request to the Basic Modality Worklist SCP using Scheduled Procedure Step Start Date (0040, 0002) as a Matching Key attribute.
- The AE is able to issue a C-FIND Request to the Basic Modality Worklist SCP using the Requested Procedure ID (0040, 1001) as a Matching Key attribute.
- The Accession Number or Requested Procedure ID is retrieved with Single Value Matching.
- The AE is able to issue a C-FIND Request to the Basic Modality Worklist SCP using the Modality (0008, 0060) as a Matching Key attribute.
- The AE is able to issue a C-FIND Request to the Basic Modality Worklist SCP using the Scheduled Station AE Title (0040, 0001) as a Matching Key attribute.

3.1.2.2.2.1.1. Association length and duration

The association is released after all data are transmitted to satisfy the actual request. If the response duration exceeds the specified timeout value, the association will be terminated.

3.1.2.2.2.1.2. Error and Status handling

Process will be terminated if critical error has occurred and description is displayed in information message box as well as is stored in log file.

3.1.2.2.1.3 Attributes displayed for MWL Query Results

Displayed attribute	Tag
Accession Number	(0008,0050)
Scheduled Procedure Step Description	(0040,0007)
Patient ID	(0010,0020)
Patient's Name	(0010,0010)
Patient's Birth Date	(0010,0030)
Patient's Sex	(0010,0040)
Scheduled Date	(0040,0002)
Scheduled Station AE Title	(0004,0001)
Scheduled Procedure Step Start Time	(0040,0003)
Modality	(0008,0060)
Requested Procedure ID	(0040,1001)
Requested Procedure Description	(0032,1060)
Study Instance UID	(0020,000D)
Requesting Physician	(0032,1032)
Requesting Service	(0032,1033)
Referring Physician's Name	(0008,0090)
Other Patient IDs	(0010,1000)
Ethnic Group	(0010,2160)

3.1.2.2.1.4 Transfer Syntax Selection Policies

Not applicable.

3.2. Storage AE

This Application Entity provides Standard Conformance to the following DICOM V3.0 SOP Classes:

SOP Class Name	SOP Class UID	Usage
Verification	1.2.840.10008.1.1	SCU
OP Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	SCU
OPT Ophthalmic Tomography Storage	1.2.840.10008.5.1.4.1.1.77.1.5.4	SCU
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	SCU
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	SCU

3.2.1. Association Establishment Policies

3.2.1.1. General

For the Verification SOP Class, the Worklist AE initiates an Association when acting as a SCU, it accepts an Association when acting as a SCP.

3.2.1.2. Number of Associations

The AE will attempt only one association establishment at a time for each SOP Class.

3.2.1.3. Asynchronous Nature

Asynchronous operation is not supported.

3.2.1.4. Implementation Identifying Information

The Implementation Class UID is "1.2.392.200106.1651.6.2".

The implementation version name is "TP_STO_IM6_100".

3.2.2. Association Initiation Policy

The AE initiates an association as a SCU for OP Photographic Image Storage SOP Class or OPT Ophthalmic Tomographic 8-bit Image Storage SOP class or Encapsulated pdf or Secondary storage depending on the user request, when the user requests to send one image or a collection of images.

3.2.2.1. Real World Activity Verify Availability of Destination

3.2.2.1.1. Associated Real-World Activity

The associated Real-World Activity is the verification of the availability of the destination. The AE will attempt to use the DIMSE C-ECHO command to verify whether the receiving AE is able to negotiate an Association and respond. This service is initiated manually by a user.

3.2.2.1.2. Proposed Presentation Contexts

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

3.2.2.1.2.1. Specific Conformance

The AE provides Standard Conformance to the DICOM Verification Service class.

3.2.2.1.2.2. Association length and duration

The association is released immediately after the response has been received. If the response duration exceeds the specified timeout value, the association will be terminated.

3.2.2.1.2.3. Implementation Specific Behavior

Not applicable.

3.2.2.1.2.4. Presentation Context Acceptance Criterion

The AE will always accept a Presentation Context for the Verification SOP class with the DICOM Default Transfer Syntax.

3.2.2.1.2.5. Transfer Syntax Selection Policies

Not applicable.

3.2.2.2. Real World Activity Stores Images

3.2.2.2.1. Associated Real-World Activity

The associated Real-World Activity is the attempt to store images in the Hospital System.

3.2.2.2.2. Proposed Presentation Contexts

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Ophthalmic Photography image storage (OCT)	1.2.840.10008.5.1.4. 1.1.77.1.5.1	Explicit VR Little Endian	1.2.840.10008.1.2 .1	SCU	None
Ophthalmic Tomography image storage (OCT)	1.2.840.10008.5.1.4. 1.1.77.1.5.1	Explicit VR Little Endian	1.2.840.10008.1.2 .1	SCU	None
Ophthalmic Photography image storage (Image)	1.2.840.10008.5.1.4. 1.1.77.1.5.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Ophthalmic Photography image storage (Image)	1.2.840.10008.5.1.4. 1.1.77.1.5.1	Explicit VR Little Endian	1.2.840.10008.1.2 .1	SCU	None
Ophthalmic Photography image storage (Image)	1.2.840.10008.5.1.4. 1.1.77.1.5.1	JPEG Baseline Lossy Compression	1.2.840.10008.1.2 .4.50	SCU	None
Secondary Capture Image Storage (Image)	1.2.840.10008.5.1.4. 1.1.7	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Secondary Capture Image Storage (Image)	1.2.840.10008.5.1.4. 1.1.7	Explicit VR Little Endian	1.2.840.10008.1.2 .1	SCU	None
Secondary Capture Image Storage (Image)	1.2.840.10008.5.1.4. 1.1.7	JPEG Baseline Lossy Compression	1.2.840.10008.1.2 .4.50	SCU	None
Encapsulated PDF Storage (EPDF)	1.2.840.10008.5.1.4. 1.1.104.1	Explicit VR Little Endian	1.2.840.10008.1.2 .1	SCU	None
Raw Data Storage (FDA)	1.2.840.10008.5.1.4. 1.1.66	Explicit VR Little Endian	1.2.840.10008.1.2 .1	SCU	None

3.2.2.2.2.1. Specific Conformance

See Chapter 9.

3.2.2.2.2.1.1. Association length and duration

The association is released after all data are transmitted to satisfy the actual request. If the response duration exceeds the specified timeout value, the association will be terminated.

3.2.2.2.1.2. Error and Status handling

Process will be terminated if critical error is occurred and description is displayed in information message box. Status of message processing is also displayed.

3.2.2.2.1.3. Presentation Context Acceptance Criterion

The Storage AE will only accept Presentation Contexts specified in the above table.

3.2.2.2.1.4. Transfer Syntax Selection Policies

This AE decides the transfer syntaxes to be included in presentation context using one of methods (determined by configuration parameters) at below.

Include the transfer syntax selected in configuration as well as the default transfer syntax.

4. COMMUNICATION PROFILES

4.1. Supported Communication Stacks

The TCP/IP stack is the only supported protocol.

4.1.1. TCP/IP Stack

The AE inherits the TCP/IP stack from the MS-WINDOWS system upon which they execute.

4.2. Physical Media Support

The AE's are only software components, therefore they are indifferent to the physical medium over which TCP/IP executes. The AE's can use any network adapters that MS-WINDOWS can bind the TCP/IP protocol.

5. EXENTIONS/SPECIALIZATIONS/PRIVATIZATIONS

Not applicable.

6. CONFIGURATION

6.1 Configuration for Remote MWL

The following parameters are configurable for Remote MWL SCP:

- MWL SCP AE Title
- MWL SCP IP address
- MWL SCP IP Port Number
- Time out.

6.2 Configuration for Remote Storage

For a remote storage SCP, the following parameters are configurable:

- Storage SCP AE Title
- Storage SCP IP address
- Storage SCP IP Port Number
- Maximum PDU size (min.: 4Kb, default: 32Kb, max.: 512Kb)
- Timeout values
- Transfer Syntax

6.3 Configuration for Local AE

The following parameters are configurable for the local AE:

- Station Name
- AE Title
- Institution
- Department
- Manufacturer of device

6.4. AE Title/Presentation Address Mapping

- The AE titles for SCP and SCU are configurable
- Node IP address, subnet mask, hostname, hostname aliases are configured by the local system administrator
- TCP/IP port is configurable.

7. Security

IMAGEnet 6 does not support any specific security measures. IMAGEnet 6 is supposed to be used within a secured environment.

8. SUPPORT OF EXTENDED CHARACTER SETS

No extended character sets are supported.

9. IOD DESCRIPTION:

9.1. IOD List

9.1.1 Ophthalmic Photography (OP) IOD

Information Entity	Module	Reference	Usage* ¹
Patient	Patient	9.2.1	M
Study	General Study	9.2.2	M
Series	General Series	9.2.3	M
	Ophthalmic Photography Series	9.2.4	M
Frame of Reference	Synchronization	9.2.7	M
Equipment	General Equipment	9.2.8	M
Image	General Image	9.2.9	M
	Image Pixel	9.2.10	M
	Enhanced Contrast / Bolus	9.2.19	C
	Cine	9.2.13	C
	Multi Frame	9.2.14	M
	Ophthalmic Photography Image	9.2.15	M
	Ocular Region Imaged	9.2.16	M
	Ophthalmic Photography Acquisition Parameters	9.2.17	M
	Ophthalmic Photographic Parameters	9.2.18	M
SOP Common	9.2.11	M	

*1: M=Mandatory, C=Conditional, U=User option

9.1.2. Ophthalmic Tomography (OPT) IOD

Information Entity	Module	Reference	Usage ^{*1}
Patient	Patient	9.2.1	M
Study	General Study	9.2.2	M
Series	General Series	9.2.3	M
	Ophthalmic Tomography Series	9.2.5	M
Frame of Reference	Frame of Reference	9.2.6	C
	Synchronization	9.2.7	C
Equipment	General Equipment	9.2.8	M
Image	Image Pixel	9.2.10	M
	Multi-frame Functional Groups	9.2.20	M
	Multi-frame Dimension	9.2.21	M
	Acquisition Context	9.2.25	M
	Ophthalmic Tomography Image	9.2.22	M
	Ophthalmic Tomography Acquisition Parameters	9.2.23	M
	Ophthalmic Tomography Parameters	9.2.24	M
	Ocular Region Imaged	9.2.16	M
	SOP Common	9.2.11	M

*1: M=Mandatory, C=Conditional, U=User option

9.1.3. Encapsulated PDF (EPDF) IOD^{*2}

Information Entity	Module	Reference	Usage ^{*1}
Patient	Patient	9.2.1	M
Study	General Study	9.2.2	M
Series	Encapsulated Document Series	9.2.26	M
Equipment	General Equipment	9.2.8	M
	SC Equipment	9.2.2	M
Encapsulated Document	Encapsulated Document	9.2.27	M
	SOP Common	9.2.11	M

*1: M=Mandatory, C=Conditional, U=User option

*2: For OU Report, use the left eye information. (Comparison and Trend reports cannot be output.)

9.1.4. Secondary Capture Image IOD

Information Entity	Module	Reference	Usage ^{*1}
Patient	Patient	9.2.1	M
Study	General Study	9.2.2	M
Series	General Series	9.2.3	M
Equipment	General Equipment	9.2.8	U
	SC Equipment	9.2.11	M
Image	General Image	9.2.9	M
	Image Pixel	9.2.10	M
	SOP Common	9.2.11	M
	SC Image	9.2.12	M

*1: M=Mandatory, C=Conditional, U=User option

9.1.5. Raw Data IOD

Information Entity	Module	Reference	Usage ^{*1}
Patient	Patient	9.2.1	M
Study	General Study	9.2.2	M
Series	General Series	9.2.3	M
Frame of Reference	Frame of Reference	9.2.6	U
	Synchronization	9.2.7	C
Equipment	General Equipment	9.2.8	M
Raw Data	Acquisition Context	9.2.25	M
	Raw Data	9.2.28	M
	SOP Common	9.2.11	M

*1: M=Mandatory, C=Conditional, U=User option

9.2. Module Lists

9.2.1 Patient Module

Attribute Name	Tag	Type	Attribute Description
Patient's Name	(0010,0010)	2	A value obtained from a modality worklist or a value of the IMAGEnet database.
Patient ID	(0010,0020)	2	A value obtained from a modality worklist or a value of the IMAGEnet database.
Patient's Birth Date	(0010,0030)	2	A value obtained from a modality worklist or a value of the IMAGEnet database.
Patient's Sex	(0010,0040)	2	A value obtained from a modality worklist or a value of the IMAGEnet database.
Other Patient IDs	(0010,1000)	3	A value obtained from a modality worklist.
Ethnic Group	(0010,2160)	3	A value obtained from a modality worklist or a value of the IMAGEnet database.

9.2.2 General Study Module

Attribute Name	Tag	Type	Attribute Description
Study Instance UID	(0020,000D)	1	A value obtained from a modality worklist or a value created by IMAGEnet.
Study Date	(0008,0020)	2	A value created by IMAGEnet
Study Time	(0008,0030)	2	A value created by IMAGEnet
Referring Physician's Name	(0008,0090)	2	A value obtained from a modality worklist
Study ID	(0020,0010)	2	A value created by IMAGEnet.
Accession Number	(0008,0050)	2	A value obtained from a modality worklist. No value if does not exist.
Study Description	(0008,1030)	3	No data

9.2.3. General Series Module

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	1	A value created by IMAGEnet
Series Instance UID	(0020,000E)	1	A value created by modality.
Series Number	(0020,0011)	2	A value created by modality
Laterality	(0020,0060)	2C	R, L or B (OP/OPT/RAW does not have this tag as OP/OPT/ RAW use Image Laterality (0020,0062)
Series Description	(0008,103E)	3	A value created by modality.
>Scheduled Procedure Step Description	(0040,0007)	3	No value if does not exist.
Series Date	(0008,0021)	3	Capture Date
Series Time	(0008,0031)	3	Capture Time

9.2.4 Ophthalmic Photography Series Module

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	1	OP (Fixed)
Private Data Elements			
Private identification code	(3F91,0010)	2	TOPCON_FILE_CONTAINER (Fixed)
DatasetID	(3F91,1002)	1	Dataset ID
Fda file name	(3F91,1003)	1	Fda file number (extension included)

9.2.5 Ophthalmic Tomography Series Module

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	1	OPT (Fixed)
Series Number	(0020,0011)	1	A value created by IMAGEnet
Private Data Elements			
Private identification code	(3F91,0010)	2	TOPCON_FILE_CONTAINER (Fixed)
DatasetID	(3F91,1002)	1	Dataset ID
Fda file name	(3F91,1003)	1	Fda file number (extension included)

9.2.6 Frame of Reference Module

Attribute Name	Tag	Type	Attribute Description
Frame of Reference UID	(0020,0052)	1	A Value created by IMAGEnet
Position Reference Indicator	(0020,1040)	2	No Value

9.2.7 Synchronization Module

Attribute Name	Tag	Type	Attribute Description
Synchronization Frame of Reference UID	(0020,0200)	1	A value created by IMAGEnet
Synchronization Trigger	(0018,106A)	1	NO TRIGGER (Fixed)
Acquisition Time Synchronized	(0018,1800)	1	N (Fixed)

9.2.8 General Equipment Module

Attribute Name	Tag	Type	Attribute Description
Manufacturer	(0008,0070)	2	Configured value
Institution Name	(0008,0080)	3	Configured value
Station Name	(0008,1010)	3	Configured value
Institutional Department Name	(0008,1040)	3	Configured value
Manufacturer's Model Name	(0008,1090)	3	Model name of device. No value if unknown
Software Versions	(0018,1020)	3	IMAGEnet software version, read from system or Configured value.
Device Serial Number	(0018,1000)	3	A value got from device.
Operators' Name	(0008,1070)	3	Registered IMAGEnet6 user name.

9.2.9 General Image Module

Attribute Name	Tag	Type	Attribute Description
Instance Number	(0020,0013)	2	A value created by IMAGEnet
Content Date	(0008,0023)	2C	Date of Capture
Content Time	(0008,0033)	2C	Time of Capture
Acquisition Date	(0008,0022)	3	Same as Content Date
Acquisition Time	(0008,0032)	3	Same as Content Time
Image Type	(0008,0008)	3	ORIGINAL\PRIMARY\Procedure Name.
Patient Orientation	(0020,0020)	2C	L/F (No value with SC)
Lossy Image Compression	(0028,2110)	3	00 = The image has never been lossy compression 01 = The image has been lossy compression
Lossy Image Compression Ratio	(0028,2112)	3	Compression ratio. (Only for JPEG Baseline(Process 1) transfer syntax)
Lossy Image Compression Method	(0028,2114)	3	ISO_10918_1 (Fixed) (Only for JPEG Baseline(Process 1)transfer syntax)

9.2.10 Image Pixel Module

Attribute Name	Tag	Type	Attribute Description
Samples per Pixel	(0028,0002)	1	1 (BW) or 3 (color)
Photometric Interpretation	(0028,0004)	1	MONOCHROME2, YBR_FULL_422 (lossy JPEG) or RGB (lossless JPEG)
Rows	(0028,0010)	1	A value created by IMAGEnet
Columns	(0028,0011)	1	A value created by IMAGEnet
Bits Allocated	(0028,0100)	1	A value created by IMAGEnet
Bits Stored	(0028,0101)	1	A value created by IMAGEnet
High Bit	(0028,0102)	1	A value created by IMAGEnet
Pixel Representation	(0028,0103)	1	A value created by IMAGEnet
Pixel Data	(7FE0,0010)	1	A value created by IMAGEnet
Planar Configuration	(0028,0006)	1C	0(Fixed) : only with OP No tag with the others.

9.2.11 SOP Common Module

Attribute Name	Tag	Type	Attribute Description
SOP Class UID	(0008,0016)	1	Generated by Modality
SOP Instance UID	(0008,0018)	1	A value created by IMAGEnet
Specific Character Set	(0008,0005)	1C	ISO_IR 100

9.2.11 SC Equipment Module

Attribute Name	Tag	Type	Attribute Description
Conversion Type	(0008,0064)	1	WSD (Fixed)

9.2.12 SC Image Module

This module is not used in IMAGEnet 6.

9.2.13 Cine

Attribute Name	Tag	Type	Attribute Description
Frame Time	(0018,1063)	1C	0 (Fixed)

9.2.14 Multi Frame Module

Attribute Name	Tag	Type	Attribute Description
Number of Frames	(0028,0008)	1	1 (Fixed)
Frame Increment Pointer	(0028,0009)	1	0018,1063 (Fixed)

9.2.15 Ophthalmic Photography Image Module

Attribute Name	Tag	Type	Attribute Description
Image Type	(0008,0008)	1	ORIGINAL\PRIMARY\Procedure Name
Lossy Image Compression	(0028,2110)	1	Defined for JPEG compressed images
Burned in Annotation	(0028,0301)	1	No
Pixel Spacing	(0028,0030)	1C	A pair of values created by IMAGEnet
Acquisition DateTime	(0008,002A)	1C	Session Date Time

9.2.16 Ocular Region Imaged Module

Attribute Name	Tag	Type	Attribute Description
Image Laterality	(0020,0062)	1	R, L or B
Anatomic Region Sequence	(0008,2218)	1	—
>Code Value	(0008,0100)	1C	T-AA610 (Fixed)
>Coding Scheme Designator	(0008,0102)	1C	SRT (Fixed)
>Code Meaning	(0008,0104)	1	Retina (Fixed)

9.2.17 Ophthalmic Photography Acquisition Parameters Module

Attribute Name	Tag	Type	Attribute Description
Patient Eye Movement Commanded	(0022,0005)	2	Empty
Refractive State Sequence	(0022,001B)	2	Empty
Emmetropic Magnification	(0022,000A)	2	Empty
Intra Ocular Pressure	(0022,000B)	2	Empty
Horizontal Field of View	(0022,000C)	2	Empty
Pupil Dilated	(0022,000D)	2	Empty

9.2.18 Ophthalmic Photographic Parameters Module

Attribute Name	Tag	Type	Attribute Description
Acquisition Device Type Code Sequence	(0022,0015)	1	—
> Code Value	(0008,0100)	2	A value created by IMAGEnet
> Coding Scheme Designator	(0008,0102)	2	A value created by IMAGEnet
> Code Meaning	(0008,0104)	2	A value created by IMAGEnet
Illumination Type Code Sequence	(0022,0016)	2	—
Light Path Filter Type Stack Code Sequence	(0022,0017)	2	—
Image Path Filter Type Stack Code Sequence	(0022,0018)	2	—
Lenses Code Sequence	(0022,0019)	2	—

9.2.19 Enhanced Contrast / Bolus

Attribute Name	Tag	Type	Attribute Description
Contrast/Bolus Agent Sequence	(0018,0012)	1	A value created by IMAGEnet
>Code Value	(0008,0100)	1	A value created by IMAGEnet
>Coding Scheme Designator	(0008,0102)	1	A value created by IMAGEnet
>Code Meaning	(0008,0104)	1	A value created by IMAGEnet
>Contrast/Bolus Administration Route Sequence	(0018,0014)	1	A value created by IMAGEnet
>>Code Value	(0008,0100)	1	A value created by IMAGEnet
>>Coding Scheme Designator	(0008,0102)	1	A value created by IMAGEnet
>>Code Meaning	(0008,0104)	1	A value created by IMAGEnet
>Contrast/Bolus Volume	(0018,1041)	1	A value created by IMAGEnet
>Contrast/Bolus Ingredient Concentration	(0018,1049)	2	A value created by IMAGEnet
>Contrast/Bolus Agent Number	(0018,9337)	2	A value created by IMAGEnet
>Contrast/Bolus Ingredient Code Sequence	(0018,9338)	3	A value created by IMAGEnet
>Contrast Administration Profile Sequence	(0018,9340)	2	A value created by IMAGEnet
>>Contrast/Bolus Volume	(0018,1041)	2	A value created by IMAGEnet
>>Contrast/Bolus Start Time	(0018,1042)	3	A value created by IMAGEnet
>>Contrast/Bolus Stop Time	(0018,1043)	3	A value created by IMAGEnet
>>Contrast Flow Duration	(0018,1047)	3	A value created by IMAGEnet

9.2.20 Multi-frame functional groups

Attribute Name	Tag	Type	Attribute Description
Shared Functional Groups Sequence	(5200,9229)	1	—
>C.8.17.10 Ophthalmic Tomography Functional Group Macros			
>C.7.6.16.2.1 Pixel Measures Macro			
>Pixel Measures Sequence	(0028,9110)	1	—
>>Pixel Spacing	(0028,0030)	1C	Pixel spacing *If there is no value "0\0"
>>Slice Thickness	(0018,0050)	1C	Slice thickness *If there is no value "0"
>C.7.6.16.2.4 Plane Orientation (Patient) Macro			
>Plane Orientation Sequence	(0020,9116)	1	—
>>Image Orientation (Patient)	(0020,0037)	1C	1.000000\0.000000\0.000000\0.000000\1.000000\0.000000 (Fixed)
>C.7.6.16.2.5 Referenced Image Macro			
>Referenced Image Sequence	(0008,1140)	2	—
>>Referenced SOP Class UID	(0008,1150)	1	1.2.840.10008.5.1.4.1.1.77.1.5.1 (Fixed)
>>Referenced SOP Instance UID	(0008,1155)	1	Instance UID of OP which is created by same procedure
>>Purpose of Reference Code Sequence	(0040,A170)	1	—
>>>Code Value	(0008,0100)	1C	121311(Fixed)
>>>Coding Scheme Designator	(0008,0102)	1C	DCM(Fixed)
>>>Code Meaning	(0008,0104)	1	Localizer(Fixed)
>C.7.6.16.2.6 Derivation Image Macro			
>Derivation Image Sequence	(0008,9124)	2	—
>>Derivation Description	(0008,2111)	3	Lossy compression with JPEG baseline, IJG quality factor 90, compression ratio * **** (Only JPEG Baseline (Process 1) transfer syntax)
>>>Derivation Code Sequence	(0008,9215)	1	— (Only JPEG Baseline (Process 1) transfer syntax)
>>>Code Value	(0008,0100)	1C	113040 (Only JPEG Baseline (Process 1) transfer syntax)
>>>Coding Scheme Designator	(0008,0102)	1C	DCM (Only JPEG Baseline (Process 1) transfer syntax)
>>>Code Meaning	(0008,0104)	1	Lossy Compression (Only JPEG Baseline (Process 1) transfer syntax)

>C.7.6.16.2.8 Frame Anatomy Macro			
>Frame Anatomy Sequence	(0020,9071)	1	—
>>Frame Laterality	(0020,9072)	1	Measured eye
>>General Anatomy Mandatory Macro			
>>Anatomic Region Sequence	(0008,2218)	2	—
>>>Code Value	(0008,0100)	1C	T-AA610(Fixed)
>>>Coding Scheme Designator	(0008,0102)	1C	SRT(Fixed)
>>>Code Meaning	(0008,0104)	1	Retina(Fixed)
Per-frame Functional Groups Sequence	(5200,9230)	1	—
>C.8.17.10 Ophthalmic Tomography Functional Group Macros			
>C.7.6.16.2.2 Frame Content Macro			
>Frame Content Sequence	(0020,9111)	1	—
>>Frame Reference Date time	(0018,9151)	1C	No Value
>>Frame Acquisition Date time	(0018,9074)	1C	No Value
>>Frame Acquisition Duration	(0018,9220)	1C	No Value
>>Dimension Index Values	(0020,9157)	1C	1 , Flame number
>>Stack ID	(0020,9056)	1C	1(Fixed)
>>In-Stack Position Number	(0020,9057)	1C	Flame number
>C.7.6.16.2.3 Plane Position (Patient) Macro			
>Plane Position Sequence	(0020,9113)	1	—
>>Image Position (Patient)	(0020,0032)	1C	No Value
>>Purpose of Reference Code Sequence	(0040, A170)	1	—
>>>Code Value	(0008,0100)	1C	121311(Fixed)
>>>Coding Scheme Designator	(0008,0102)	1C	DCM(Fixed)
>>>Code Meaning	(0008,0104)	1	Localizer(Fixed)
>C.8.17.10.1 Ophthalmic Frame Location Macro			
>Ophthalmic Frame Location Sequence	(0022,0031)	1	—
>>Referenced SOP Class UID	(0008,1150)	1	1.2.840.10008.5.1.4.1.1.77.1.5.1(Fixed)
>>Referenced SOP Instance UID	(0008,1155)	1	Instance UID of OP which is created by same procedure
>>Reference Coordinates	(0022,0032)	1	The value calculated from scan position information
>>Ophthalmic Image Orientation	(0022,0039)	1	LINEAR(Fixed)
Instance Number	(0020,0013)	1	A value created by IMAGEnet
Content Date	(0008,0023)	1	Capture Date
Content Time	(0008,0033)	1	Capture Time
Number of Frames	(0028,0008)	1	Number of Frames
Concatenation Frame Offset Number	(0020,9228)	1C	0(Fixed)

Representative Frame Number	(0028,6010)	3	1(Fixed)
Concatenation UID	(0020,9161)	1C	A value created by IMAGEnet
SOP Instance UID of Concatenation Source	(0020,0242)	1C	A value created by IMAGEnet
In-concatenation Number	(0020,9162)	1C	1(Fixed)
In-concatenation Total Number	(0020,9163)	3	1(Fixed)

9.2.21 Multi-frame Dimension

Attribute Name	Tag	Type	Attribute Description
Dimension Organization Sequence	(0020,9221)	1	—
>Dimension Organization UID	(0020,9164)	1	A value created by IMAGEnet
Dimension Organization Type	(0020,9311)	3	3D(Fixed)
Dimension Index Sequence	(0020,9222)	1	—
>Dimension Index Pointer	(0020,9165)	1	(0020,9056) (Fixed)
>Functional Group Pointer	(0020,9167)	1C	(0020,9111) (Fixed)
>Dimension Index Pointer	(0020,9165)	1	(0020,9057) (Fixed)
>Functional Group Pointer	(0020,9167)	1C	(0020,9111) (Fixed)

9.2.22 Ophthalmic Tomography Image

Attribute Name	Tag	Type	Attribute Description
Image Type	(0008,0008)	1	ORIGINAL\PRIMARY\
Samples per Pixel	(0028,0002)	1	1(Fixed)
Acquisition Date Time	(0008,002A)	1	Capture date time
Acquisition Duration	(0018,9073)	1C	0(Fixed)
Acquisition Number	(0020,0012)	1	1(Fixed)
Photometric Interpretation	(0028,0004)	1	MONOCHROME2(Fixed)
Pixel Representation	(0028,0103)	1	0(Fixed)
Bits Allocated	(0028,0100)	1	8(Fixed)
Bits Stored	(0028,0101)	1	8(Fixed)
High Bit	(0028,0102)	1	7(Fixed)
Presentation LUT Shape	(2050,0020)	1	IDENTITY(Fixed)
Lossy Image Compression	(0028,2110)	1	00 = The image has never been lossy compression 01 = The image has been lossy compression
Lossy Image Compression Ratio	(0028,2112)	1C	Compression ratio (Only for JPEG Baseline (Process 1) transfer syntax)
Lossy Image Compression Method	(0028,2114)	1C	ISO_10918_1 (Only for JPEG Baseline (Process 1) transfer syntax)
Burned In Annotation	(0028,0301)	1	NO(Fixed)
Concatenation Frame Offset Number	(0020,9228)	1	0(Fixed)
In-concatenation Number	(0020,9162)	1	1(Fixed)
In-concatenation Total Number	(0020,9163)	1	1(Fixed)

9.2.23 Ophthalmic Tomography Acquisition Parameters

Attribute Name	Tag	Type	Attribute Description
Axial Length of the Eye	(0022,0030)	2	No Value
Horizontal Field of View	(0022,000C)	2	No Value
C.8.17.8-2 Ophthalmic Acquisition Parameters Macro			
Refractive State Sequence	(0022,001B)	2	—
Emmetropic Magnification	(0022,000A)	2	No Value
Intra Ocular Pressure	(0022,000B)	2	No Value
Pupil Dilated	(0022,000D)	2	No Value

9.2.24 Ophthalmic Tomography Parameters

Attribute Name	Tag	Type	Attribute Description
Acquisition Device Type Code Sequence	(0022,0015)	1	—
>Code Value	(0008,0100)	1C	A-00FBE(Fixed)
> Coding Scheme Designator	(0008,0102)	1C	SRT(Fixed)
>Code Meaning	(0008,0104)	1	Optical Coherence Tomography Scanner(Fixed)
Light Path Filter Type Stack Code Sequence	(0022,0017)	2	—
Detector Type	(0018,7004)	1	CCD(Fixed)
Illumination Wave Length	(0022,0055)	1C	840 or 1050 (Depend on Model)
Illumination Power	(0022,0056)	1C	650 or 1050 (Depend on Model)
Illumination Bandwidth	(0022,0057)	1C	50 or 60 (Depend on Model)
Depth Spatial Resolution	(0022,0035)	1C	6 or 8 (Depend on Model)
Maximum Depth Distortion	(0022,0036)	1C	0.5(Fixed)
Along-scan Spatial Resolution	(0022,0037)	1C	20(Fixed)
Maximum Along-scan Distortion	(0022,0038)	1C	0.5(Fixed)
Across-scan Spatial Resolution	(0022,0048)	1C	20(Fixed)
Maximum Across-scan Distortion	(0022,0049)	1C	0.5(Fixed)

9.2.25 Acquisition Context Module

Attribute Name	Tag	Type	Attribute Description
Acquisition Context Sequence	(0040,0555)	2	—

9.2.26 Encapsulated Document Series

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	1	A value generated by modality
Series Instance UID	(0020,000E)	1	A value generated by modality
Series Number	(0020,0011)	1	A value generated by modality

9.2.27 Encapsulated Document

Attribute Name	Tag	Type	Attribute Description
Instance Number	(0020,0013)	1	A value generated by modality
Content Date	(0008,0023)	2	Date of acquisition
Content Time	(0008,0033)	2	Time of acquisition
Acquisition Date	(0008,0022)	3	Same as Content Date
Acquisition Time	(0008,0032)	3	Same as Content Time
Image Laterality	(0020,0062)	1	R, L or B
Burned in Annotation	(0028,0301)	1	Yes
Referenced Image Sequence	(0008,1140)	3	—
>Referenced SOP Class UID	(0008,1150)	1	Set data already output 1.2.840.10008.5.1.4.1.1.77.1.5.1 (OP) or 1.2.840.10008.5.1.4.1.1.77.1.5.4 (OPT)
>Referenced SOP Instance UID	(0008,1155)	1	Instance UID of OP or OPT which is created by same procedure
Document Title	(0042,0010)	2	OCT Report Title.
Concept Name Code Sequence	(0040, A043)	2	No Value
MIME Type of Encapsulated Document	(0042,0012)	1	Application/pdf (Fixed)
Encapsulated Document	(0042,0011)	1	Encapsulated PDF stream of OCT Report.
Private Data Elements			
Private identification code	(3F91,0010)	2	TOPCON_FILE_CONTAINER (Fixed)
DatasetID	(3F91,1002)	1	Dataset ID
Fda file name	(3F91,1003)	1	Fda file number (extension included)

9.2.28 Raw Data

Attribute Name	Tag	Type	Attribute Description
Instance Number	(0020,0013)	2	A value generated by modality
Content Date	(0008,0023)	1	Date of acquisition
Content Time	(0008,0033)	1	Time of acquisition
Creator-Version UID	(0008,9123)	1	A value created by IMAGEnet
Referenced Instance Sequence	(0008,114A)	3	—
>Referenced SOP Class UID	(0008,1150)	1	Set data already output 1.2.840.10008.5.1.4.1.1.77.1.5.1 (OP) or 1.2.840.10008.5.1.4.1.1.77.1.5.4 (OPT)
>Referenced SOP Instance UID	(0008,1155)	1	Instance UID of OP or OPT which is created by same procedure
>Purpose of Reference Code Sequence	(0040,A170)	1	—
>> Code Value	(0008,0100)	2	OP: 121311 (Fixed) OPT: 121338 (Fixed)
>> Coding Scheme Designator	(0008,0102)	2	OP: DCM (Fixed) OPT: DCM (Fixed)
>> Code Meaning	(0008,0104)	2	OP: Localizer (Fixed) OPT: Anatomic image (Fixed)
Private Data Elements			
Private identification code	(3F91,0010)	2	TOPCON_FILE_CONTAINER (Fixed)
DatasetID	(3F91,1002)	1	Dataset ID
Fda file name	(3F91,1003)	1	Fda file number (extension included)
File Size	(3F91,1004)	3	File size
File checksum	(3F91,1005)	3	MD5 checksum
File Type	(3F91,1006)	3	FDA or FDS
File created datetime	(3F91,1007)	3	Create datetime. (YYYYMMDDHHMMSS.FFFFFFF)
Raw Data	(3F91,10A0)	1	FDA file
Data Type	(3F91,10A1)	1	Image/fda (Fixed)

10. ABBREVIATIONS

ASCII	American Standard Code for Information Interchange
AE	Application Entity
ANSI	American National Standards Institute
CR	Computed Radiography
CT	Computed Tomography
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
DOD	Department Of Defense
DX	Digital Radiography
FTP	File Transfer Protocol (part of the TCP/IP protocol suite)
HL7	Health Level 7
HIS/RIS	Hospital Information System/ Radiology Information System
ID	Identifier
IE	Information Entity
IHE	Integrating the Healthcare Enterprise
HIS	Indian Health Services
HIMSS	Healthcare Information and Management Systems Society
IS	Information System
IOD	Information Object Definition
ISO	International Standards Organization
MPPS	Modality Performed Procedure Step
NEMA	National Electrical Manufacturers Association
MR	Magnetic Resonance
OSI	Open Systems Interconnection
PACS	Picture Archiving and Communication System
PDU	Protocol Data Unit
PN	Person Name
RFC	Request For Comments
RIS	Radiology Information System
RSNA	Radiological Society of North America
SCP	Service Class Provider
SCU	Service Class User
SOP	Service-Object Pair
TCP/IP	Transmission Control Protocol/Internet Protocol
UID	Unique Identifier
VA	Department of Veterans Affairs
VR	Value Representation
XA	X-Ray Angiography

1026000-U7