

Ambra Gateway
DICOM Conformance
Statement

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Introduction

Purpose

This is the DICOM 3.0 Conformance Statement for Ambra Gateway software produced by Ambra. The solution is in direct compliance with the DICOM Standard.

Ambra Gateway is a Microsoft® Windows® based DICOM solution that runs automatically as a Microsoft Windows service and is easily configured to support all DICOM reports and image types, using any compression type. The system supports all DICOM Storage services to include: Store, Query Retrieve and Storage Commitment. It is ideally suited as a plug-in to any server or workstation environment, and the open architecture allows for extension through the use of a DICOM SDK.

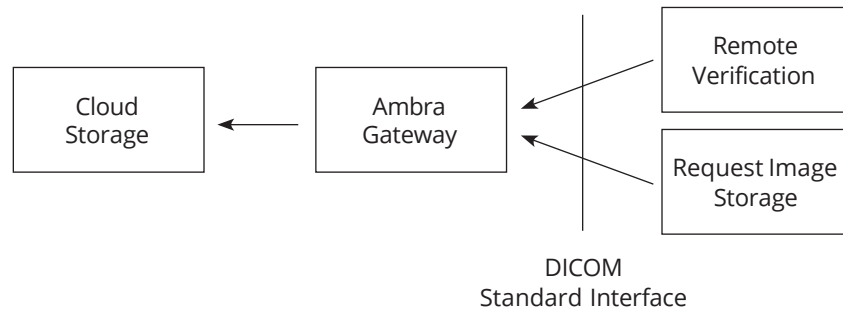
Symbols and Abbreviations

AE	Application Entity
DICOM	Digital Imaging and Communication in Medicine
IOD	Information Object Definition
IP	Internet Protocol
PDU	Protocol Data Unit
RQ	Request
SCU	Service Class User
SOP	Service Object Pair
TCIP/IP	Transmission Control Protocol/ Internet Protocol
UID	Unique Identifier

Implementation Model

Application Data Flow Diagram

The specific application models for this Application Entity (AE) are shown below:



Ambra Gateway is a Microsoft Windows® (Windows 2000®, Windows XP®, Windows 2003® and Windows 2008®) application for the transfer of DICOM images to Ambra’s cloud archive. It is executed on OS startup as a “Service” for all Microsoft Windows operating systems.

Functional Definitions of AE’s

Ambra Gateway waits for other Application Entities (AE’s) to initiate DICOM storage requests, according to the presentation contexts stated below, and then persists the transferred images to the local hard drive as a DICOM Part 10 file for a brief amount of time while it processes the backlog transport queue. Once the DICOM files have been transferred to the Ambra cloud, the Gateway then deletes the file from the disk. Ambra Gateway can be configured so that delete happens after a successful store commitment communication for that IOD.

Sequencing of Real-World Activities

Not applicable.

AE Specifications

Ambra Gateway AE Specifications

Ambra Gateway provides Standard Conformance to the following DICOM SOP classes as an SCP.

SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1
Digital X-Ray Image Storage Presentation	1.2.840.10008.5.1.4.1.1.1.1
Digital X-Ray Image Storage Processing	1.2.840.10008.5.1.4.1.1.1.1.1
Digital Mammography X-Ray Image Storage Presentation	1.2.840.10008.5.1.4.1.1.1.2
Digital Mammography X-Ray Image Storage Processing	1.2.840.10008.5.1.4.1.1.1.2.1
Digital Intra-Oral X-Ray Image Storage Presentation	1.2.840.10008.5.1.4.1.1.1.3
Digital Intra-Oral X-Ray Image Storage Processing	1.2.840.10008.5.1.4.1.1.1.3.1
CT Image Storage	1.2.840.10008.5.1.4.1.1.2
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1
MR Image Storage	1.2.840.10008.5.1.4.1.1.4
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2
Nuclear Medicine Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.5
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Multi-frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2
Multi-frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4
Standalone Overlay Storage	1.2.840.10008.5.1.4.1.1.8
Standalone Curve Storage	1.2.840.10008.5.1.4.1.1.9
ECG 12 Lead Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1
Standalone Modality LUT Storage	1.2.840.10008.5.1.4.1.1.10
Standalone VOI LUT Storage	1.2.840.10008.5.1.4.1.1.11
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1

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SOP Class Name	SOP Class UID
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2
X-Ray Angiographic BiPlane Image Storage Retired	1.2.840.10008.5.1.4.1.1.12.3
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66
Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.1
Spatial Fiducials Storage	1.2.840.10008.5.1.4.1.1.66.2
VL Image Storage Retired	1.2.840.10008.5.1.4.1.1.77.1
VL Multi-frame Image Storage Retired	1.2.840.10008.5.1.4.1.1.77.2
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2
Video Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2.1
VL Slide Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4
Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1
Ophthalmic Photography 8 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1
Ophthalmic Photography 16 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.2
Stereometric Relationship Storage	1.2.840.10008.5.1.4.1.1.77.1.5.3
Basic Text Structured Report	1.2.840.10008.5.1.4.1.1.88.11
Enhanced Structured Report	1.2.840.10008.5.1.4.1.1.88.22
Comprehensive Structured Report	1.2.840.10008.5.1.4.1.1.88.33
Procedure Log	1.2.840.10008.5.1.4.1.1.88.40
Mammography CAD Structured Report	1.2.840.10008.5.1.4.1.1.88.50
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59
Chest CAD Structured Report	1.2.840.10008.5.1.4.1.1.88.65
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128
Standalone PET Curve Storage	1.2.840.10008.5.1.4.1.1.129
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5
RT Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6
RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7
Hardcopy Color Image Storage	1.2.840.10008.5.1.1.30
Hardcopy Grayscale Image Storage	1.2.840.10008.5.1.1.29
Stored Print Storage	1.2.840.10008.5.1.1.27

Association Establishment Policies

General

Ambra Gateway when installed will use the configurable AE Title as its default AE Title, with a maximum PDU size of 256/Kbytes and “listen” for new clients on the configurable port (104 is the default DICOM port). Ambra Gateway also supports arbitrary AE Title connections, which may be linked in the cloud to routing rules that run after the files have been uploaded. This is further defined in the application documentation.

Number of Simultaneous Associations

The number of simultaneous associations is configurable with a default of 20.

Asynchronous Nature

Ambra Gateway, can handle any number of asynchronous operations that can be achieved through a network TCP/IP stack.

Implementation Identifying Information

The implementation UID uniquely identifies Ambra Gateway, and the current set of functionality. This value will only change when major functionality warrants. The version name shall reflect minor changes to Ambra Gateway,.

Implementation UID	Implementation Version Name
1.2.840.10008.114368.1.1	“Ambra Gateway X.X”
1.2.840.10008.5.1.4.1.2.1.1	Patient Root Query/Retrieve Information Model - FIND
1.2.840.10008.5.1.4.1.2.1.2	Patient Root Query/Retrieve Information Model - MOVE
1.2.840.10008.5.1.4.1.2.1.3	Patient Root Query/Retrieve Information Model - GET
1.2.840.10008.5.1.4.1.2.2.1	Study Root Query/Retrieve Information Model - FIND
1.2.840.10008.5.1.4.1.2.2.2	Study Root Query/Retrieve Information Model - MOVE
1.2.840.10008.5.1.4.1.2.2.3	Study Root Query/Retrieve Information Model - GET
1.2.840.10008.5.1.4.1.2.3.1	Patient/Study Only Query/Retrieve Information Model - FIND
1.2.840.10008.5.1.4.1.2.3.2	Patient/Study Only Query/Retrieve Information Model - MOVE
1.2.840.10008.5.1.4.1.2.3.3	Patient/Study Only Query/Retrieve Information Model - GET

Association Initiation by Real-World Activity

Ambra Gateway also makes associations for the following real-world activities.

Real-World Activity

On the Ambra website, the user “DICOM Sends” a DICOM Study to a pre-configured DICOM device on the network.

Associated Real-World Activity

The associated real-world activity associated with the C-Store operation is the storage of the DICOM image to the “Inbox” on local disk. Ambra Gateway will issue a failure status if it is unable to store the image to disk.

Proposed Presentation Contexts

Proposed Presentation Context Tables

Ambra Gateway supports all known DICOM Storage Types using the following Transfer Syntax.

Name	UID
Implicit Vr Little Endian	1.2.840.10008.1.2
Explicit Vr Little Endian	1.2.840.10008.1.2.1
Explicit Vr Big Endian	1.2.840.10008.1.2.2
RLE Lossless	1.2.840.10008.1.2.5
JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50
JPEG Extended (Process 2 & 4)	1.2.840.10008.1.2.4.51
JPEG Lossless, Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57
JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14 [Selection Value 1])	1.2.840.10008.1.2.4.70
JPEG-LS Lossless Image Compression	1.2.840.10008.1.2.4.80
JPEG-LS Lossy (Near-Lossless) Image Compression	1.2.840.10008.1.2.4.81
JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90
JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91
MPEG2 Main Profile @ Main Level	1.2.840.10008.1.2.4.100
JPEG Extended (Process 3 & 5) RETIRED	1.2.840.10008.1.2.4.52
JPEG Spectral Selection, Non-Hierarchical (Process 6 & 8) RETIRED	1.2.840.10008.1.2.4.53
JPEG Spectral Selection, Non-Hierarchical (Process 7 & 9) RETIRED	1.2.840.10008.1.2.4.54
JPEG Full Progression, Non-Hierarchical (Process 10 & 12) RETIRED	1.2.840.10008.1.2.4.55
JPEG Full Progression, Non-Hierarchical (Process 11 & 13) RETIRED	1.2.840.10008.1.2.4.56
JPEG Lossless, Non-Hierarchical (Process 15) RETIRED	1.2.840.10008.1.2.4.58
JPEG Extended, Hierarchical (Process 16 & 18) RETIRED	1.2.840.10008.1.2.4.59
JPEG Extended, Hierarchical (Process 17 & 19) RETIRED	1.2.840.10008.1.2.4.60
JPEG Spectral Selection, Hierarchical (Process 20 & 22) RETIRED	1.2.840.10008.1.2.4.61
JPEG Spectral Selection, Hierarchical (Process 21 & 23) RETIRED	1.2.840.10008.1.2.4.62
JPEG Full Progression, Hierarchical (Process 24 & 26) RETIRED	1.2.840.10008.1.2.4.63
JPEG Full Progression, Hierarchical (Process 25 & 27) RETIRED	1.2.840.10008.1.2.4.64
JPEG Lossless, Hierarchical (Process 28) RETIRED	1.2.840.10008.1.2.4.65
JPEG Lossless, Hierarchical (Process 29) RETIRED	1.2.840.10008.1.2.4.66

SOP Specific Conformance for Verification (C-ECHO)

Ambra Gateway provides standard conformance to the DICOM Verification Service class.

SOP Specific Conformance for Storage (C-STORE)

Ambra Gateway conforms to the SOP's of the Storage Service Class as s Level 2 (Full) SCP. In the event of a successful C-Store operation, the image has been successfully stored to disk as a DICOM part 10 file to the installed/configured "inbox". Once the image has been stored, the image can be accessed as any other file system file. If Ambra Gateway returns A700 (out of resources) or C000 (processing failure) then the C-STORE operations were not successful.

Presentation Context Acceptance Criteria

Ambra Gateway will always accept any of the presentation context items stated above and when given the choice, by multiple transfer syntaxes proposed in a single presentation context item, will use the first Transfer Syntax proposed. It is therefore recommend that requestors propose all of their preferred ASN/TSN as separate presentation context items up to the maximum that DICOM allows. With this policy it is also recommend that the use of retired Transfer Syntaxes should be discouraged.

Association Acceptance Policy

When Ambra Gateway accepts an association it will receive any DICOM image transmitted on that association and store the image to the default upload queue directory. The Gateway will then try to upload the file to the Ambra cloud, and after a successful and verified upload, will delete the file from the disk. This may happen in seconds or minutes, correlated by Gateway's load and bandwidth allowance.

Communication Profiles

TCP/IP Stack

Ambra Gateway inherits its TCP/IP stack from the Microsoft Windows operating system on which it resides.

Configuration

All configuration items for Ambra Gateway can be configured through the cloud configuration page. See Ambra Gateway and Cloud Users Guide for more details.

Configurable Association Acceptance Criteria

Calling AE Title Enforcement which will require the caller to know the called AE Title of Ambra Gateway.

Calling AE Title Filter which can be used to include/exclude based on the Calling Title of the AE of the association requestor.

IP Address Filter which can be used to include/exclude certain IP addresses.

Implementation UID Filter which can be used to include/exclude based on the Implementation UID of the association requestor.

Support of Extended Character Sets

Ambra Gateway is indifferent to Extended Character Sets and will therefore accept all DICOM C-STORE requests using any character set, without modification to the text being sent.

Extensions/Specializations/Privatizations

None at this time.

Codes and Controlled Terminology

None at this time.

Name and Place of Business

DICOM Grid, Inc. dba Ambra Health
450 Park Avenue S.
10-111 New York, NY 10016, USA.

Browser Requirements

Microsoft Internet Explorer 9 or later, Microsoft Edge,
Apple Safari, Google Chrome, Firefox.

LBL0025 v5.0 2021-07-07