GE Medical Systems

Technical Publications

Direction 2150453–100

Revision 0

Advantage Windows 2.0 Analysis Station

DICOM (ID/Net V3.0)

DICOM Conformance Statement

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REVISION HISTORY

REV	DATE	REASON FOR CHANGE
0	June 10, 1996	Initial Release

LIST OF EFFECTIVE PAGES

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SECTION 1 – INTRODUCTION

1–0 OVERVIEW

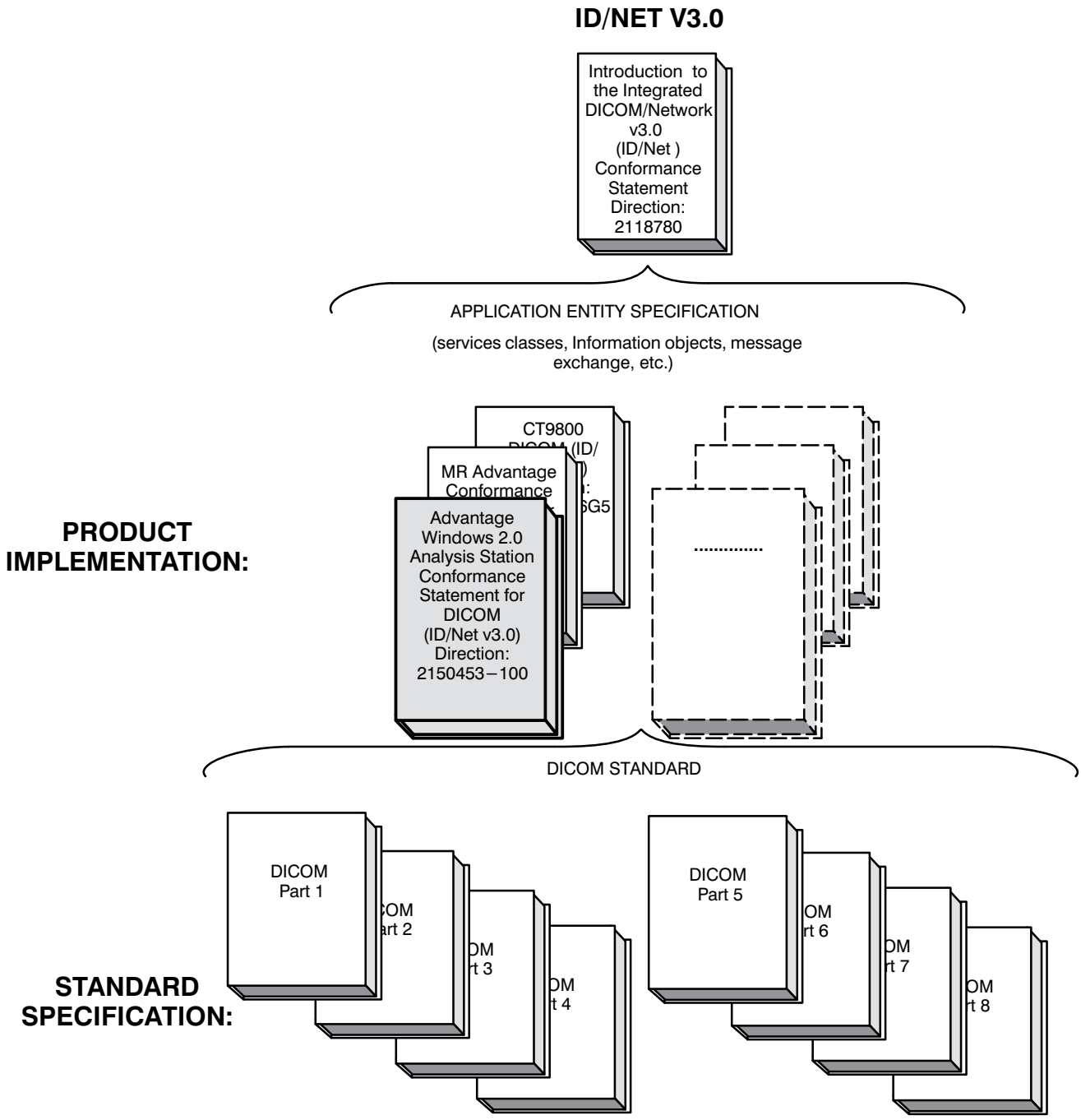
Section 1, *Introduction*, provides general information about the content and scope of this document.

Section 2, *Conformance Statement*, is the DICOM Conformance Statement related to this product. Conformance Statements defines the subset of options selected from those offered by the DICOM standard.

1–1 OVERALL CONFORMANCE STATEMENT DOCUMENT STRUCTURE

The Documentation Structure of the ID/Net v3.0 Conformance Statements and their relationship with the DICOM Conformance Statements is shown in Illustration 1–1.

ILLUSTRATION 1–1
DOCUMENTATION STRUCTURE



This document specifies the DICOM implementation. It is entitled:

Advantage Windows 2.0 Analysis Station
Conformance Statement for DICOM (ID/Net v3.0)
Direction 2150453–100

This Conformance Statement documents the DICOM Conformance Statement and Technical Specification required to interoperate with the GEMS ID/Net v3.0 network interface. Introductory information, which is applicable to all GEMS ID/Net v3.0 Conformance Statements, is described in the document:

Introduction to the Integrated DICOM/Network v3.0 (ID/Net v3.0)
Conformance Statement
Direction: 2118780.

This Introduction familiarizes the reader with DICOM terminology and general concepts. It should be read prior to reading the individual products' ID/Net v3.0 Conformance Statements.

The ID/Net v3.0 Conformance Statement, contained in this document, also specifies the Lower Layer communications which it supports (e.g., TCP/IP). However, the Technical Specifications are defined in the DICOM Part 8 standard.

For more information including Network Architecture and basic DICOM concepts, please refer to the *Introduction.*

For the convenience of software developers, there is "collector" Direction available. By ordering the collector, the Introduction described above and all of the currently published ID/Net v3.0 Product Conformance Statements will be received. The collector Direction is:

ID/Net v3.0 Conformance Statements
Direction: 2117016

For more information regarding DICOM, copies of the Standard may be obtained by written request or phone by contacting:

NEMA Publication
2101 L Street, N.W., Suite 300
Washington, DC 20037 USA
Phone: (202) 457–8474

1–2 INTENDED AUDIENCE

The reader of this document is concerned with software design and/or system integration issues. It is assumed that the reader of this document is familiar with the DICOM Standards and with the terminology and concepts which are used in those Standards.

If readers are unfamiliar with DICOM terminology they should first refer to the document listed below, then read the DICOM Standard itself, prior to reading this Conformance Statement document.

Introduction to the Integrated DICOM/Network v3.0 (ID/Net v3.0)
Conformance Statement
Direction: 2118780

1–3 SCOPE AND FIELD OF APPLICATION

It is the intent of this document, in conjunction with the *Introduction to the Integrated DICOM/Network v3.0 (ID/Net v3.0) Conformance Statement, Direction: 2118780*, to provide an unambiguous specification for GEMS ID/Net v3.0 implementations. This specification, called a Conformance Statement, includes a DICOM Conformance Statement and is necessary to ensure proper processing and interpretation of GEMS medical image data exchanged using DICOM. The GEMS ID/Net v3.0 Conformance Statements are available to the public.

The reader of this Conformance Statement should be aware that different GEMS devices are capable of using different Information Object Definitions. For example, a GEMS CT Scanner may send images using the CT Information Object, MR Information Object, Secondary Capture Object, etc.

Included in this Conformance Statement are the Module Definitions which define all data elements used by this GEMS ID/Net v3.0 implementation. If the user encounters unspecified private data elements while parsing a GEMS Data Set, the user is well advised to ignore those data elements (per the DICOM standard). Unspecified private data element information is subject to change without notice. If, however, the device is acting as a ”full fidelity storage device”, it should retain and re-transmit all of the private data elements which are sent by GEMS devices.

1–4 IMPORTANT REMARKS

The use of these Conformance Statements, in conjunction with the DICOM Standards, is intended to facilitate communication with GE imaging equipment. However, **by itself, it is not sufficient to ensure that inter–operation will be successful.** The **user (or user's agent)** needs to proceed with caution and address at least four issues:

- **Integration** – The integration of any device into an overall system of interconnected devices goes beyond the scope of standards (DICOM), and of this introduction and associated Conformance Statements when interoperability with non–GE equipment is desired. The responsibility to analyze the applications requirements and to design a solution that integrates GE imaging equipment with non-GE systems is the **user's** responsibility and should not be underestimated. The **user** is strongly advised to ensure that such an integration analysis is correctly performed.
- **Validation** – Testing the complete range of possible interactions between any GE device and non-GE devices, before the connection is declared operational, should not be overlooked. Therefore, the **user** should ensure that any non-GE provider accepts full responsibility for all validation required for their connection with GE devices. This includes the accuracy of the image data once it has crossed the interface between the GE imaging equipment and the non-GE device and the stability of the image data for the intended applications.
  Such a validation is required before any clinical use (diagnosis and/or treatment) is performed. It applies when images acquired on GE imaging equipment are processed/displayed on a non–GE device, as well as when images acquired on non–GE equipment is processed/displayed on a GE console or workstation.

- **Future Evolution** – GE understands that the DICOM Standard will evolve to meet the user's growing requirements. GE is actively involved in the development of the DICOM Standard. DICOM will incorporate new features and technologies and GE may follow the evolution of the Standard. ID/Net v3.0 is based on DICOM as specified in each ID/Net DICOM Conformance Statement. Evolution of the Standard may require changes to devices which have implemented DICOM. **In addition, GE reserves the right to discontinue or make changes to the support of communications features (on its products) reflected on by these ID/Net DICOM Conformance Statements.** The **user** should ensure that any non-GE provider, which connects with GE devices, also plans for the future evolution of the DICOM Standard. Failure to do so will likely result in the loss of function and/or connectivity as the DICOM Standard changes and GE Products are enhanced to support these changes.
- To be kept informed of the evolution of the implementation described in this document, the User should register on the GE Internet Server, accessible via anonymous ftp, by entering his e–mail address (GE Internet Server Address: ftp.med.ge.com, 192.88.230.11)
- **Interaction** – It is the sole responsibility of the **non-GE provider** to ensure that communication with the interfaced equipment does not cause degradation of GE imaging equipment performance and/or function.

1–5 REFERENCES

A list of references which is applicable to all ID/Net v3.0 Conformance Statements is included in the *Introduction to the Integrated DICOM/Network v3.0 (ID/Net v3.0) Conformance Statement, Direction: 2118780.*

The information object implementation refers to the X_Ray Radiofluoroscopic Image Object Definition (DICOM Standard Supplement 6) to Part 3 (Information Object Definition)

1–6 DEFINITIONS

A set of definitions which is applicable to all ID/Net v3.0 Conformance Statements is included in the *Introduction to the Integrated DICOM/Network v3.0 (ID/Net v3.0) Conformance Statement, Direction: 2118780.*

1–7 SYMBOLS AND ABBREVIATIONS

A list of symbols and abbreviations which is applicable to all ID/Net v3.0 Conformance Statements is included in the *Introduction to the Integrated DICOM/Network v3.0 (ID/Net v3.0) Conformance Statement, Direction: 2118780.*

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SECTION 2 – CONFORMANCE STATEMENT

2–0 INTRODUCTION

The Advantage Windows 2.0 Analysis Station is a medical image analysis workstation with the capability to work with CT, MR, XRay Angiographic (XA) and XRay Radiofluoroscopic (RF) images. In addition to providing DICOM interchange on CD–R to support the cine replacement standard, Advantage Windows 2.0 uses DICOM networking throughout the system to provide future upgrade paths and connectivity.

This conformance statement (CS) specifies the GE Advantage Windows 2.0 Analysis Station compliance to DICOM. It details the DICOM Service Classes and roles which are supported by this product.

Note that the format of this section strictly follows the format of DICOM Standard Part 2 (Conformance) Annex A. Please refer to that part of the standard while reading this section.

2–1 IMPLEMENTATION MODEL

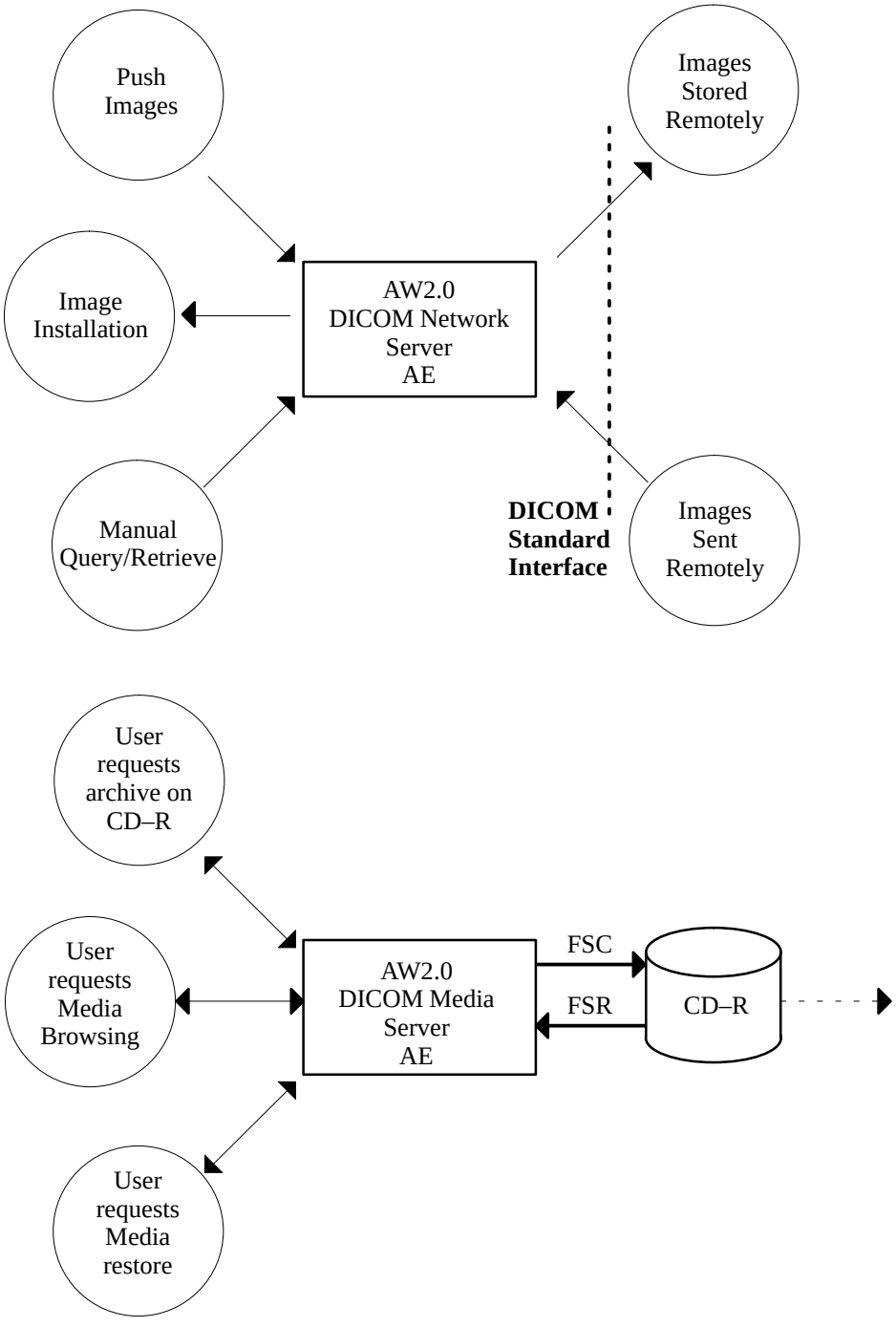
2–1–1 Application Data Flow Diagram

The DICOM network functionality on the Advantage Windows 2.0 Analysis Station system is handled by the DICOM Network Server Application Entity (AE). The DICOM Network Server AE is permanently listening to a predefined port for incoming connections. When the connection is established, images are transferred through the physical link and are installed on the Advantage Windows 2.0 Analysis Station local disks. No user action is required for the DICOM Network Server Application Entity to respond to an incoming DICOM Store request. The DICOM Network Server Application Entity will perform image installation after the remote AE has sent an image to the Advantage Windows 2.0 Analysis Station.

The DICOM ARCHIVE/RESTORE functionality is handled by the DICOM Media Server Application Entity (AE). This DICOM ARCHIVE/RESTORE functionality is only available for the Xray Angiographic (XA) and Xray Radiofluoroscopic (RF) data types. The DICOM Media Server Application Entity (AE) is commanded by the user to perform DICOM services operating on the DICOM media through the use of buttons and menu selections on the graphical user interface of the Advantage Windows 2.0 Analysis Station. The user requests the creation of a DICOM file set and the writing of this DICOM File Set on a blank CD–R by selecting images in the local browser, selecting the ”archive” drop down menu and choosing the CD–R as being the archive device (if this archive option is available on the system). Images are saved on a mono–session disk in a one shot operation. The user can request the reading of a DICOM file set written on a CD–R by selecting the CD–R as the active archive device, and browsing the CD–R using the Archive drop down menu, and then ”restore selected items” in the CD–R Browser restore menu.

The Application models are shown in Illustration 2–1 .

ILLUSTRATION 2–1
SPECIFIC AE APPLICATION MODEL



2−1−2 Functional Definition of AE's

2−1−2−1 AW2.0 DICOM Network Server AE

The AW2.0 DICOM Network Server Application Entity supports the following functions:

- Demand a DICOM association to query and retrieve data from a remote DICOM query provider. Note, the query retrieve is not selective.
- Respond to DICOM associations containing images to be stored.
- Push images to a remote system where a DICOM association has been made such that the remote system is capable of receiving the data.

2−1−2−2 AW2.0 DICOM Media Server AE

The AW2.0 DICOM Media Server Application Entity supports the following functions:

- Has access to patient demographics and pixel data in the local database.
- Can generate a DICOM File Set (FSC) for Xray Angiographic (XA), Xray Radiofluoroscopic (RF) datatypes, and secondary capture.
- Can write a DICOM File Set on a CD–R.
- Can read a DICOM File Set (FSR) on a CD–R

2−1−3 Sequencing of Real−World Activities

Not Applicable

2−1−4 File Meta Information for implementation Class and Version

– File Meta Information Version is set to 1.
– Implementation Class UID is set to "1.2.840.113619.6.36"
– Implementation version Name "1"

2−2 AE SPECIFICATIONS

2−2−1 AW2.0 DICOM Network Server AE Specification

This Application Entity provides Standard Conformance to the following DICOM SOP Classes as an **SCU:**

SOP Class Name	SOP Class UID
CT Image Storage	1.2.840.10008.5.1.4.1.1.2
MR Image Storage	1.2.840.10008.5.1.4.1.1.4
X−Ray Radiofluoroscopic Image storage	1.2.840.10008.5.1.4.1.1.12.2
X−Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Study Root Query/Retrieve information model− FIND	1.2.840.10008.5.1.4.1.2.2.1
Study Root Query/Retrieve information model−MOVE	1.2.840.10008.5.1.4.1.2.2.2
Stand alone Overlay Image Storage	1.2.840.10008.5.1.4.1.1.8

This Application Entity provides Standard Conformance to the following DICOM SOP Class as an **SCP** :

SOP Class Name	SOP Class UID
Verification Service Class	1.2.840.10008.1.1
CT Image Storage	1.2.840.10008.5.1.4.1.1.2
MR Image Storage	1.2.840.10008.5.1.4.1.1.4
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Stand alone Overlay Image Storage	1.2.840.10008.5.1.4.1.1.8
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

2−2−1−1 Association Establishment Policies

2−2−1−1−1 General

The DICOM Application Context Name (ACN), which is always proposed, is:

Application Context Name	1.2.840.10008.3.1.1.1

The Maximum Length PDU negotiation is included in all association establishment requests.

The Maximum Length PDU for an association initiated by the AW2.0 DICOM Network Server AE can not be greater than :

Maximum Length PDU	16 Kbytes

The SOP class Extended Negotiation is not supported.

The maximum number of Presentation Contexts Items that will be proposed is 1.

The user info items sent by this product are:

- Maximum PDU Length
- Implementation UID

Note: Maximum PDU length can be configured at installation time.
0 as PDU length is not supported

2−2−1−1−2 Number of Associations

The AW2.0 DICOM Network Server AE supports :

one DICOM association at a time to perform an image storage operation as a SCU to a Remote Host AE.

one DICOM association at a time to perform an image storage operation as a SCU to a Remote Host AE.

a maximum of 4 DICOM associations opened at the same time to receive image store or to answer to an echo as a SCP.

2−2−1−1−3 Asynchronous Nature

Asynchronous mode is not supported. All operations will be performed synchronously.

2−2−1−1−4 Implementation Identifying Information

The Implementation UID for this ID/Net v3.0 Implementation is:

AW2.0 DICOM Network Server Implementation UID	1.2.840.113619.6.36

2−2−1−2 Association Initiation Policy

THE AW2.0 DICOM Network Server AE initiates a new association on demand of the operator in case of Push or Query/Retrieve or on demand of Remote Host AE.

Note: The tag (0000, 0001) is sent in this implementation. This corresponds to Length To End Field.

2−2−1−2−1 Real−World Activity “Push Images”

2−2−1−2−1−1 Associated Real−World activity

The operator selects a Remote Host AE to send images to.

The operator then chooses several studies, several series or images and push the selected studies, series or images to the selected Remote Host AE.

This operation causes :

the workstation to build a DICOM image from its data.
the initiation of a DICOM negotiation with the Remote Host AE.
the emission of a C−STORE command if negotiation is successful.

2−2−1−2−1−2 Proposed Presentation Context

Presentation Context Table − Accepted			
Abstract Syntax	Transfer Syntax	Role	Expanded

Name	UID	Name List	UID List		Negotiation
CT Image Storage	1.2.840.10008.5.1.4.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	none
MR Image Storage	1.2.840.10008.5.1.4.1.4	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	none
Secondary Capture Image storage	1.2.840.10008.5.1.4.1.7	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	none
Stand Alone Overlay Image Storage	1.2.840.10008.5.1.4.1.8	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	none
X−Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	none
X−Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	none

2−2−1−2−1−2−1 SOP Specific conformance statement for Image Storage SOP class

This implementation can perform multiple C–STORE operations in a single operation.

While the Remote Host AE sends Successful C–STORE confirmation status, the implementation will go on performing C–STORE operations.

Upon receiving a C–Store confirmation status containing an error or a refused status, the association is aborted. The association will be maintained if possible if the confirmation C–STORE status is a warning status.

Each C–STORE operation supports an “Association Establishment Timer”. This timer starts when the association requests is sent and stops when the association is established. This timer is set to 60 seconds by default.

Each C–STORE operation also supports a “Store Timer”. This timer starts once a C–STORE request has been emitted by the DICOM Server AE and stops once a C–STORE confirmation, sent by the Remote Host AE, has been received. This timer is set to 60 minutes by default.

Each C–STORE operation also supports an “Inactivity Timer”. This timer detects any network inactivity during a C–STORE operation (ie. no packets received from the Remote Host AE). This timeout is set to 180 seconds by default.

If any of the three timers expires, the connection is closed and the operation is considered as failed.

2−2−1−2−2 Real−World Activity “Manual Query/Retrieve”

2−2−1−2−2−1 Associated Real−World activity

The operator selects a Remote Host AE to query.

The operator then initiates the query and upon successful operation a remote browser containing the studies, of the Remote Host AE appears. For a single selected study, the series of the study are shown, and for a single selected series, the images that composed the series are shown.

The operator can then select in the remote browser one or several studies, series, or images to be sent to the local station.

This operation causes :

the DICOM Server AE to initiate a DICOM association.

the DICOM Server AE to emit a C–FIND request to get the list of studies of the Remote Host AE. (and the list of series for a single selected study, as well as the underlying images for a single selected series).

a C–MOVE request is emitted if the operator asks to retrieve study, series or images.

2−2−1−2−2−2 Proposed Presentation Context

Presentation Context Table − Proposed					
Abstract Syntax		Transfer Syntax		Role	Expanded
Name	UID	Name List	UID List		Negotiation
Study Root FIND	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	none
Study Root MOVE	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	none

2−2−1−2−2−2−1 SOP Specific conformance statement for related SOP class

This implementation performs a C–FIND operation over an association (note: there is no selective Query for each C–FIND operation performed).

Each C–FIND operation supports an “Association Establishment Timer”. This timer starts when the association requests is sent and stops when the association is established. This timer is set to 60 seconds by default.

Each C–FIND operation also supports a “Store Timer”. This timer starts once a C–STORE request has been emitted by the DICOM Server AE and stops once a C–STORE confirmation, sent by the Remote Host AE, has been received. This timer is set to 60 minutes by default.

Each C–FIND operation also supports an “Inactivity Timer”. This timer detects any network inactivity during a C–STORE operation (ie. no packets received from the Remote Host AE). This timeout is set to 90 seconds by default.

If any of the three timers expires, the connection is closed and the operation is considered as failed.

2−2−1−2−2−2−2 SOP Specific Conformance Statement for MOVE SOP Class

Each C–MOVE operation supports an “Association Establishment Timer”. This timer starts when the association requests is sent and stops when the association is established. This timer is set to 60 seconds by default.

Each C–MOVE operation also supports a “Store Timer”. This timer starts once a C–STORE request has been emitted by the DICOM Server AE and stops once a C–STORE confirmation, sent by the Remote Host AE, has been received. This timer is set to 60 minutes by default.

Each C–MOVE operation also supports an “Inactivity Timer”. This timer detects any network inactivity during a C–STORE operation (ie. no packets received from the Remote Host AE). This timeout is set to 300 seconds by default.

2−2−1−3 Association Acceptance Policy

When the AW2.0 DICOM Network Server AE accepts an association, it receives any images transmitted on that association and stores the images on disk. The AW2.0 DICOM Network Server AE places no limitations on who may connect to it.

2−2−1−3−1 Real−World Activity ”Image Installation”

This AE is indefinitely listening for associations. No operator action is required to receive an image.

2−2−1−3−1−1 Associated Real−World Activity

The associated Real–World Activity associated with the C–STORE operation is the storage of the image on the disk of the AW2.0 .

2−2−1−3−1−2 Accepted Presentation Contexts

Any of the presentation Context shown in the following table is accepted by the DICOM Network Server AE.

TABLE 2–1
PRESENTATION CONTEXT

Presentation Context Table − Accepted					
Abstract Syntax		Transfer Syntax		Role	Expanded
Name	UID	Name List	UID List		Negotiation
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	none
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	none
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	none
Secondary Capture Image storage	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	none
Stand Alone Overlay Image Storage	1.2.840.10008.5.1.4.1.1.8	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	none
X−Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	none
X−Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	none

2−2−1−3−1−2−1 SOP Specific Conformance Statement for Verification SOP Class

The AW2.0 DICOM Network Server AE provides standard conformance to the DICOM Verification Service Class.

2−2−1−3−1−2−2 SOP Specific Conformance Statement for Storage SOP Classes

The AW2.0 DICOM Network Server AE conforms to the SOP's of the Storage Service Class at Level 2 (full).

Image reception

If the AW2.0 DICOM Network Server AE returns one of the following status codes, when the C–STORE operation was unsuccessful and no image will be installed:

- 0110 (Processing failure) Indicates that an internal system call has failed while processing the image.
- A700 (Out of resources) Indicates that there was not enough disk space or some other internal resource (such as memory) to store the image. The user should attempt recovery by removing some images from the AW2.0 DICOM Network Server AE.

In the event of a successful C–STORE operation, the image has successfully been written to disk and declared into local database. The image will then be accessed in the same manner as any other image by the applications on the AW2.0 .

Image may be deleted when instructed to do so by the user or when the image data is found to be not in conformance with the DICOM standard. Thus the duration of the storage of the image is determined by users of the AW2.0 .

Image installation

If the image installation process finds that an element is not encoded according to the DICOM standard, it will fail to install the image and the file will be removed.

If the image installation is unsuccessful, the image will not appear in the Local data base browser. A message is logged on the AW2.0.

The overlay planes (groups 60xx) are burnt into the pixel data and deleted from the original image. A Stand–Alone Overlay image will have pixel data created from the overlay data which will be stored with the image.
An Image containing overlay planes must fulfil the following conditions in order to be accepted by this implementation:

- Overlay planes are encoded in groups 6000 and 6002 (not embedded into pixel data),
- Overlays planes have the same size as the image,
- Bits Allocated (0028, 0100)of the image is 16.

Modifiable Timeouts.

It is possible to modify the association time out values in a resource file on the system. See section 2–6–2 for details.

2–2–1–3–1–3 Presentation context acceptance criterion

no criterion.

2–2–1–3–1–4 Transfer syntax selection policies

The Implicit Little Endian is the only accepted transfer syntax for networking.

2–2–2 AW2.0 DICOM Media Server AE

The AW2.0 DICOM Media Server AE provides standard conformance to DICOM Interchange Option of the Media Storage Service Class. The application Profiles and roles are listed in table 2–2.

TABLE 2–2
AW2.0 DICOM Media Server AE Related Application Profiles, Real−World activities, and roles.

Supported Application profiles	Real−World activity	Roles	SC Option
STD−XABC−CD	BROWSE CD	FSR	Interchange
	RESTORE CD	FSR	Interchange
	ARCHIVE CD	FSC	Interchange
AUG−RF−STD−XABC−CD	BROWSE CD	FSR	Interchange
	RESTORE CD	FSR	Interchange
	ARCHIVE CD	FSC	Interchange
AUG−XA−STD−XABC−CD	BROWSE CD	FSR	Interchange
	RESTORE CD	FSR	Interchange
	ARCHIVE CD	FSC	Interchange
AUG−SC−STD−XABC−CD	BROWSE CD	FSR	Interchange
	RESTORE CD	FSR	Interchange
	ARCHIVE CD	FSC	Interchange

2−2−2−1 File Meta Information for the AW2.0 DICOM Media Server AE

Source Application Entity Title element is set to AW2.0 in the files meta information.

2−2−2−2 Real World activities for the AW2.0 DICOM Media Server AE

2−2−2−2−1 Real World Activity ”Browse CD”

The AW2.0 DICOM Media Server AE acts as an FSR using the interchange option when requested to Browse the CD.

When the AW2.0 DICOM Media Server AE is requested to provide a directory listing it reads the File−set and displays the whole DICOMDIR directory entries.

If the DICOMDIR file is not found in the File–set the CD is ejected of the drive.

2−2−2−2−1−1 Media Storage Application Profile for the RWA : Browse CD

For the list of application profiles that invoke this AE for the Browse CD Real World Activity, see table 2–2. There are no extensions or specializations.

2−2−2−2−2 Real World Activity ”Restore CD”

The AW2.0 DICOM Media Server AE acts as an FSR using the interchange option when requested to copy SOP instances from the CD to the local data base.

The user selects the SOP instances that he wants the AW2.0 DICOM Media Server AE to copy on the local data base using the ”Query Archive” (on the CD) Real World Activity and clicking on the corresponding entries. Once selected, the SOP instances are all copied from the media to the local data base.

All of the selected SOP instances are set to the Implicit Vr Little Endian transfer syntax before being installed in the local data base.

If the SOP instance does not match the application profile (see Table 2–2), an error is displayed indicating the non restored SOP instances or the corresponding entries.

2−2−2−2−2−1 Media Storage Application Profile for the RWA : Restore CD

For the list of application profiles that invoke this AE for the Browse CD Real World Activity, see table 2–2. There are no extensions or specializations.

2−2−2−2−3 Real World Activity "Archive CD"

The AW2.0 DICOM Media Server AE acts as an FSC using the interchange option when requested to copy SOP instances from the local data base to the CD.

The user has to insert a blank writable CD into the drive. Then the user selects the entries in the local database that he wants the AW2.0 DICOM Media Server AE to copy onto the CD.

Before writing the CD, the AW2.0 DICOM Media Server AE checks for the following conditions :

- The inserted media is blank and writable. If the condition is not met, an error is displayed and the CD is ejected.
- The corresponding SOP instances, once set according to the transfer syntax defined by the application profile, may fit on one or more CD's.

The corresponding SOP instances are set to the transfer syntax defined by the application profile and copied to the CD.

2−2−2−2−3−1 Media Storage Application Profile for the RWA : Archive CD

For the list of application profiles that invoke this AE for the Browse CD RWA, see table 2–2. There are no extensions or specializations.

2−3 AUGMENTED AND PRIVATE PROFILES

2−3−1 Augmented Profiles

AW2.0 DICOM Media Server AE supports the following augmented Application profiles:
AUG−SC−STD−XABC−CD,
AUG−XA−STD−XABC−CD,
AUG−RF−STD−XABC−CD

2−3−1−1 AUG−SC−STD−XABC−CD.

This Application Profile is an augmentation of the STD–XABC–CD Standard application profile. The augmentation add support for SC SOP Class.

2−3−1−1−1 SOP Class Augmentations

The following IODs are part of the AUG−SC−STD−XABC−CD. There are no requirements or restrictions on SOP options for these IODs beyond those in their standard definitions.

TABLE 2–3
IODS AND TRANSFER SYNTAXES FOR AUG−SC−STD−XABC−CD

Information Object Definition	SOP Class UID	Transfer Syntax	Transfer Syntax UID
Secondary Capture Image Storage.	1.2.840.10008.5.1.4.1.1.7	Explicit VR Little Endian	1.2.840.10008.1.2.1

This application profile does not place any further restrictions on options or extensions for any of these SOP classes. Any otherwise permissible SOP instance is acceptable for the AUG−SC−STD−XABC−CD profile.

2−3−1−1−2 Directory Augmentations

There are no additional directory keys, records, or options as part of this profile. None are required to be written using either FSU or FSC.

2−3−1−1−3 Other augmentations

None.

2−3−1−2 AUG−XA−STD−XABC−CD.

This Application Profile is an augmentation of the STD–XABC–CD Standard application profile. The augmentation add support for SC SOP Class.

2−3−1−2−1 SOP Class Augmentations

The following IODs are part of the AUG−XA−STD−XABC−CD. There are no requirements or restrictions on SOP options for these IODs beyond those in their standard definitions.

TABLE 2–4
IODS AND TRANSFER SYNTAXES FOR AUG−XA−STD−XABC−CD

Information Object Definition	SOP Class UID	Transfer Syntax	Transfer Syntax UID
X−Ray Angiographic Image Storage.	1.2.840.10008.5.1.4.1.1.12.1	Explicit VR Little Endian	1.2.840.10008.1.2.1

This application profile does not place any further restrictions on options or extensions for any of these SOP classes. Any otherwise permissible SOP instance is acceptable for the AUG−XA−STD−XABC−CD profile.

Note: 512 x 512, 8 bits, images are saved using JPEG lossless compression.

2−3−1−2−2 Directory Augmentations

There are no additional directory keys, records, or options as part of this profile. None are required to be written using either FSU or FSC.

2−3−1−2−3 Other augmentations

None.

2−3−1−3 AUG−RF−STD−XABC−CD.

This Application Profile is an augmentation of the STD–XABC–CD Standard application profile. The augmentation add support for SC SOP Class.

2−3−1−3−1 SOP Class Augmentations

The following IODs are part of the AUG−RF−STD−XABC−CD. There are no requirements or restrictions on SOP options for these IODs beyond those in their standard definitions.

TABLE 2–5
IODS AND TRANSFER SYNTAXES FOR AUG−RF−STD−XABC−CD

Information Object Definition	SOP Class UID	Transfer Syntax	Transfer Syntax UID
X−ray Radiofluoroscopic Image Storage.	1.2.840.10008.5.1.4.1.1.12.2	Explicit VR Little Endian	1.2.840.10008.1.2.1

This application profile does not place any further restrictions on options or extensions for any of these SOP classes. Any otherwise permissible SOP instance is acceptable for the AUG−RF−STD−XABC−CD profile.

2−3−1−3−2 Directory Augmentations

There are no additional directory keys, records, or options as part of this profile. None are required to be written using either FSU or FSC.

2−3−1−3−3 Other augmentations

None.

2−4 COMMUNICATION PROFILES

2−4−1 Supported Communication Stacks (parts 8,9)

DICOM Upper Layer (Part 8) is supported using TCP/IP.

2−4−2 TCP/IP Stack

The TCP/IP stack is inherited from a UNIX Operating System.

2−4−2−1 API

Not applicable to this product.

2−4−2−2 Physical Media Support

ATM Fiber Channel dual port SC connector.

2−4−3 Point−to−Point Stack

A 50–pin ACR–NEMA connection is not applicable to this product.

2−5 EXTENSIONS / SPECIALIZATIONS / PRIVATIZATIONS

None

2−6 CONFIGURATION

2−6−1 AE Title/Presentation Address Mapping

The local AE Title is configurable. This must be configured by a GE Field Engineer during installation.

2−6−2 Configurable Parameters

Changing the working parameters of the system can cause the system to function incorrectly. In all cases, do not change these parameters without consulting your local GE Service Engineer.

The following fields are configurable for this AE (local):

- Local AE Title
- local IP Address

Note: For all connections, The AW2.0 DICOM Network Server AE Title is TCP/IP Port 4006

The following fields are configurable for every remote DICOM AE :

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

The following parameters are configurable:

- Association Timers
- PDU Length

Notes on AW2.0 DICOM Configuration File.

The DICOM configuration file is stored in the AW2.0 system account (sdc) in the file

~sdc/app–defaults/network/dcs.cfg

In particular, the timer time out default values are set through the following variables.

Variable Name	Time Out (secs)	DICOM Activity
bi_session_tio	3600	Move/Retrieve association time out
bi_assoc_tio	60	Establish Association time out
bi_find_tio	90	find inactivity time out
bi_move_tio	300	move inactivity time out

2−7

2−8 SUPPORT OF EXTENDED CHARACTER SETS

The AW2.0 AE's will support only the ISO_IR 100 (ISO 8859–1:1987 Latin alphabet N 1. supplementary set). Any incoming SOP instance that is encoded using another extended character set will not be installed in the local database.

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SECTION 3 − SECONDARY CAPTURE IMPLEMENTATION

3−0 INTRODUCTION

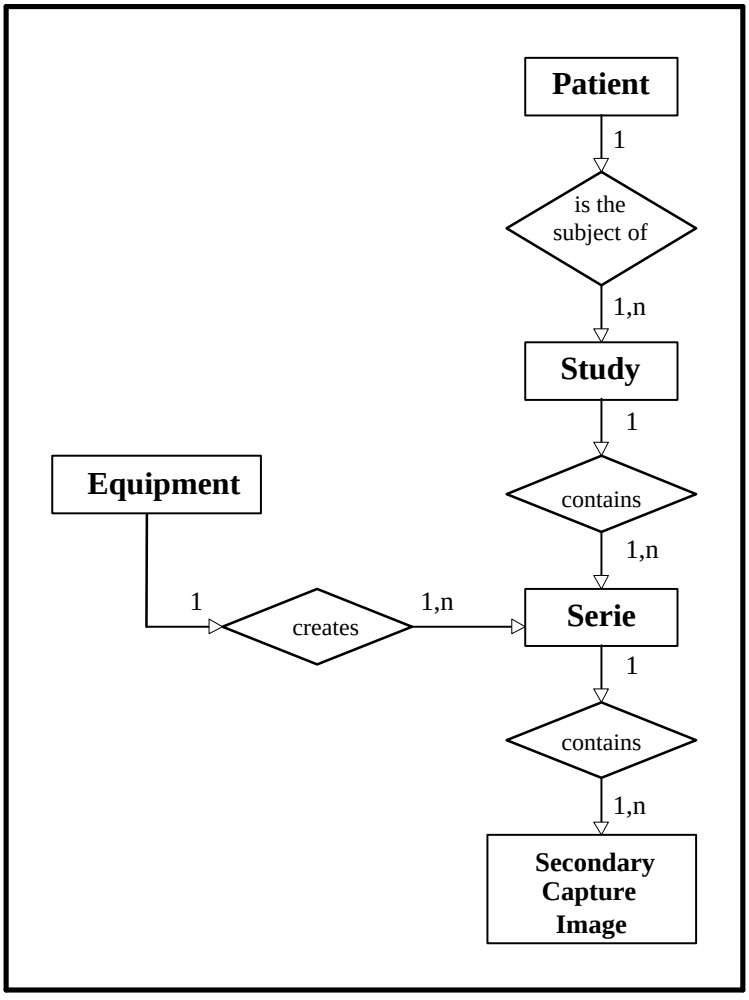
This section specifies the use of the DICOM Secondary Capture Image IOD to represent the information included in Secondary Capture images produced by this implementation. Corresponding attributes are conveyed using the module construct.

3−1 SC IMAGE IOD IMPLEMENTATION

This section defines the implementation of SC image information object. It refers to the DICOM Standard, Part 3 (Information Object definition).

3−2 SC IMAGE IOD ENTITY−RELATIONSHIP MODEL

Illustration 3–1
SC Image Entity Relationship Diagram



The Entity–Relationship diagram for the SC Image interoperability schema is shown in Illustration 3–1. In this figure, the following diagrammatic convention is established to represent the information organization :

- each entity is represented by a rectangular box
- each relationship is represented by a diamond shaped box.
- the fact that a relationship exists between two entities is depicted by lines connecting the corresponding entity boxes to the relationship boxes.

The relationships are fully defined with the maximum number of possible entities in the relationship shown.

3–2–1 Entities Description

Refer to DICOM Standard Part 3 (Information Object Definitions) for a description of each of the entities contained within the Secondary Capture Image Information object.

3–2–2 Advantage Windows 2.0 Analysis Station Mapping of DICOM entities

DICOM entities map to the Advantage Windows 2.0 Analysis Station entities in respect to the following :

DICOM	Advantage Windows 2.0 Analysis Station
Patient Entity	Patient Entity
Study Entity	Examination Entity
Serie Entity	Series Entity
Secondary Capture Image Entity	Screen Save Image, Scrapbook Image

Note: Advantage Windows 2.0 Analysis Station can create one type of Secondary Capture Images:

- a Screen Save Image is a image created by a user from a original image received by the Advantage Windows 2.0 Analysis Station

3–3 SC IMAGE IOD MODULE TABLE

Within an entity of the DICOM SC Image Information Object Definition, attributes are grouped into related set of attributes. A set of related attributes is termed a module. A module facilitates the understanding of the semantics concerning the attributes and how the attributes are related with each other. A module grouping does not infer any encoding of information into datasets.

Table 2 identifies the defined modules within the entities which comprise the DICOM SC Image Information object Definition. Modules are identified by Module Name.

See DICOM Part 3 for a complete definition of the entities, modules, and attributes.

Table 3.2
SC Image Information Object Definition (IOD) Module Table

Entity Name	Module Name	Reference
Patient	Patient	3.4.1.1
Study	General Study	3.4.2.1
	Patient Study	3.4.2.2
Series	General Series	3.4.3.1
Equipment	General Equipment	3.4.4.1
	SC Equipment	3.4.4.2
Image	General Image	3.4.5.1
	VOI LUT	3.4.5.2
	Modality LUT	3.4.5.2
	Overlay Plane	3.4.5.3
	Image Pixel	3.4.5.4
	SOP Common	3.4.5.6
	SC Image	3.4.5.7

Entity Name	Module Name	Usage	Reference
Patient	Patient	M	3.4.1.1
Study	General Study	M	3.4.2.1
	Patient Study	U	3.4.2.2
Series	General Series	M	3.4.3.1
Equipment	General Equipment	U	3.4.4.1
	SC Equipment	M	3.4.4.2
Image	General Image	M	3.4.5.1
	VOI LUT	M	3.4.5.2
	Modality LUT	U	3.4.5.3
	Image Pixel	U	3.4.5.4
	SOP Common	M	3.4.5.5
	SC Image	M	3.4.5.6

3–4 INFORMATION MODULE DEFINITIONS

Please refer to DICOM Standard Part 3 (Information Object Definition) for a description of each of the entities and modules contained within the SC Information Object.

3–4–1 Patient Entity Module

3–4–1–1 Patient Module

Attribute Name	Element Tag	TP	Notes
Patient's Name	0010, 0010	2	
Patient ID	0010, 0020	2	
Patient's Birth Date	0010, 0030	2	
Patient's Sex	0010, 0040	2	

3–4–2 Study Entity Module

3–4–2–1 General Study

Attribute Name	Element Tag	TP	Notes
Study Instance UID	0020, 000D	1	
Study Date	0008, 0020	2	
Study Time	0008, 0030	2	
Referring Physicians' Name	0008, 0090	2	
Study ID	0020, 0010	2	
Accession number	0008, 0050	2	
Study Description	0008, 1030	3	

3–4–2–2 Patient Study

Attribute Name	Element Tag	TP	Notes
Patient's Age	0010, 1010	3	
Patient's Size	0010, 1020	3	
Patient's Weight	0010, 1030	3	

3–4–3 Series Entity Module

3–4–3–1 General Series

Attribute Name	Element Tag	TP	Notes
Modality	0008, 0060	1	OTHER
Series Instance UID	0020, 000E	1	
Series Number	0020, 0011	2	
Laterality	0020, 0060	2C	
Protocol Name	0018, 1030	3	
Series Description	0008, 103E	3	

3–4–4 General Equipment Module

3–4–4–1 General Equipment

Attribute Name	Element Tag	TP	Notes
Manufacturer	0008, 0070	3	GE MEDICAL SYSTEMS
Institution Name	0008, 0080	3	
Manufacturer Model Name	0008, 1090	3	AWA2.0

3–4–4–2 SC Equipment

Attribute Name	Element Tag	TP	Notes
Conversion Type	0008, 0064	3	WSD

3−4−5 Image Entity Module

3−4−5−1 General Image

Attribute Name	Element Tag	TP	Notes
Image Number	0020,0013	2	
Image Date	0008,0023	2C	
Image Time	0008,0033	2C	
Image Type	0008,0008	3	DERIVED\SECONDARY\
Patient Orientation	0020,0020	2	

3−4−5−2 VOI LUT

Attribute Name	Element Tag	TP	Notes
Window Center	0028, 1050	1C	
Window Width	0028, 1051	1C	

3−4−5−3 Modality LUT

Attribute Name	Element Tag	TP	Notes
Rescale Intercept	0028, 1052	1C	
Rescale Slope	0028, 1053	1C	
Rescale Type	0028, 1054	1C	

3−4−5−4 Image Pixel

Attribute Name	Element Tag	TP	Notes
Samples per Pixel	0028, 0002	1	1
Photometric Interpretation	0028, 0004	1	MONOCHROME 1 or 2
Rows	0028, 0010	1	
Columns	0028, 0011	1	
Bits Allocated	0028, 0100	1	
Bits Stored	0028, 0101	1	
High Bit	0028, 0102	1	
Pixel Representation	0028, 0103	1	
Pixel Data	7FE0, 0010	1	
Pixel Aspect Ratio	0028, 0034	1C	

3−4−5−5 SOP Common

Attribute Name	Element Tag	TP	Notes
SOP Class UID	0008, 0016	1	1.2.840.10008.5.1.4.1.1.7
SOP Instance UID	0008, 0018	1	
Specific Character	0008, 0005	1C	ISO−IR 100

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