



**GE Medical Systems**

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# **Technical Publications**

**Direction 2199311-100  
Revision 1**

## **Advantage Paste 1.0 CONFORMANCE STATEMENT for DICOM V3.0**

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# 1. INTRODUCTION

## 1.1 OVERVIEW

This DICOM Conformance Statement is divided into Sections as described below:

**Section 1 (Introduction)**, which describes the overall structure, intent, and references for this Conformance Statement

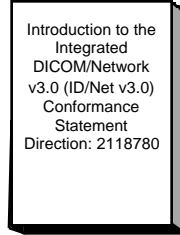
**Section 2 (Network Conformance Statement)**, which specifies the GEMS equipment compliance to the DICOM requirements for the implementation of Networking features.

**Section 3 (X-Ray Angiography Information Object Implementation)**, which specifies the GEMS equipment compliance to DICOM requirements for the implementation of a X-Ray Angiography Information Object.

**1.2 OVERALL DICOM CONFORMANCE STATEMENT DOCUMENT  
STRUCTURE**

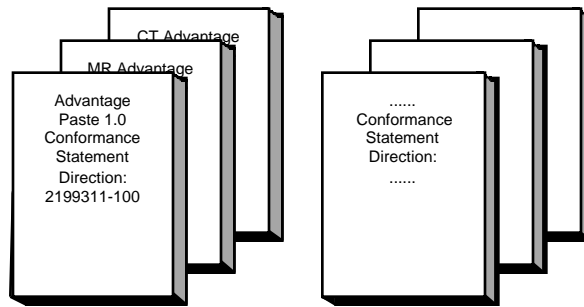
The Documentation Structure of the GEMS Conformance Statements and their relationship with the DICOM v3.0 Conformance Statements is shown in the Illustration below.

**ID/Net v3.0**



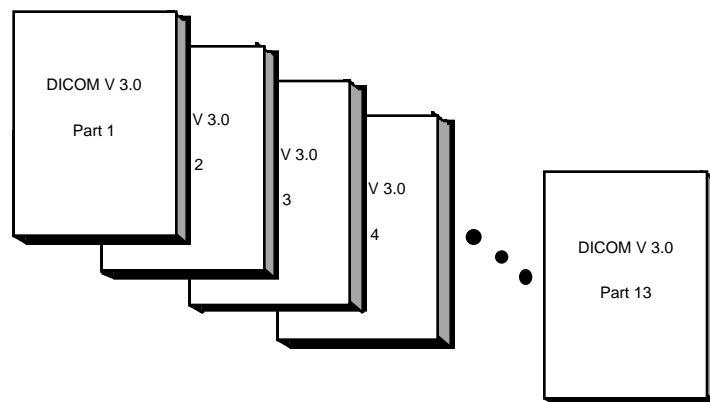
**APPLICATION ENTITY SPECIFICATION**  
(SERVICE CLASSES, INFORMATION OBJECTS, MESSAGE EXCHANGES, ETC.)

**Product  
Implementation:**



**DICOM STANDARD**

**Standard  
Specification:**





This document specifies the DICOM v3.0 implementation. It is entitled:

*Advantage Paste 1.0  
Conformance Statement for DICOM v3.0  
Direction 2199311-100*

This DICOM Conformance Statement documents the DICOM v3.0 Conformance Statement and Technical Specification required to interoperate with the GEMS network interface. Introductory information, which is applicable to all GEMS 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' GEMS Conformance Statements.

The GEMS 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 v3.0 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 GEMS Product Conformance Statements will be received. The collector Direction is:

*ID/Net v3.0 Conformance Statements  
Direction: 2117016*

For more information regarding DICOM v3.0, copies of the Standard may be obtained by written request or phone by contacting:

NEMA Publication  
1300 North 17th Street  
Suite 1847  
Rosslyn, VA 22209  
USA  
Phone: (703) 841-3200

### **1.3 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 v3.0 Standards and with the terminology and concepts which are used in those Standards.

If readers are unfamiliar with DICOM v3.0 terminology they should first refer to the document listed below, then read the DICOM v3.0 Standard itself, prior to reading this DICOM Conformance Statement document.

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

#### 1.4 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 implementations. This specification, called a Conformance Statement, includes a DICOM v3.0 Conformance Statement and is necessary to ensure proper processing and interpretation of GEMS medical data exchanged using DICOM v3.0. The GEMS Conformance Statements are available to the public.

The reader of this DICOM 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 DICOM Conformance Statement are the Module Definitions which define all data elements used by this GEMS 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 v3.0 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.

#### 1.5 IMPORTANT REMARKS

The use of these DICOM Conformance Statements, in conjunction with the DICOM v3.0 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 v3.0), and of this introduction and associated DICOM 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 v3.0 Standard. DICOM v3.0 will incorporate new features and technologies

and GE may follow the evolution of the Standard. The GEMS protocol is based on DICOM v3.0 as specified in each DICOM Conformance Statement. Evolution of the Standard may require changes to devices which have implemented DICOM v3.0. **In addition, GE reserves the right to discontinue or make changes to the support of communications features (on its products) reflected on by these 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 informed of the evolution of the implementation described in this document, the User is advised to regularly check the GE Internet Server, accessible via anonymous ftp (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.

## 1.6 REFERENCES

A list of references which is applicable to all GEMS 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 DICOM PS 3.3 (Information Object Definition), and DICOM supplement 4 (X-Ray Angiography Objects).

## 1.7 DEFINITIONS

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

## 1.8 SYMBOLS AND ABBREVIATIONS

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

## 2. NETWORK CONFORMANCE STATEMENT EXTENSION

### 2.1 INTRODUCTION

This conformance statement extension describes additional functionality of feature Advantage Paste, above and beyond the DICOM Conformance with Standard Storage SOP Classes provided by product Advantage Workstation 3.1 described in :

*Advantage Workstation 3.1 DICOM Conformance Statement  
Direction 2201403-100*

This additional functionality is only available if the stored images meet the additional requirements described here. Since conformance with this additional functionality is beyond the scope of the DICOM Standard to define, the Standard SOP Classes are used, rather than defining Private SOP Classes, to promote interoperability. The DICOM Standard only specifies the requirements to store an image, not how the image should be used in an application.

If images are supplied by an Storage SCU without this additional information, then the additional functionality described herein will not be available. The Storage SCU may however, still be fully conformant to the DICOM Standard, and failure to interoperate with this application cannot be construed as non-conformance to the Standard.

Advantage Paste is a X-Ray angiography application which is installed on the same hardware platform as the base application, Advantage Workstation 3.1. It provides a high quality full leg display for digital acquisitions on lower limbs arteries.

It is applicable to images acquired with the LCA/LCV+/LCN+ Bolus Chasing protocol, with masks first, which are X-Ray multi-frames images. Any such image transferred from DLX (see DLX DICOM V3.0 Conformance Statement, direction 2142506-100) to the Advantage Workstation 3.1 is automatically processed and provide one X-Ray multi-frames image. Once this image has been computed, it is stored into the Advantage Workstation 3.1 database and can be displayed, filmed and exported to other venders using Advantage Workstation 3.1. Any transfer syntax supported by Advantage Workstation 3.1 is also supported by Advantage Paste.

### 2.2 APPLICATION SPECIFICATIONS

#### 2.2.1 Networking Specifications

The Advantage Workstation 3.1 Application, using the DICOM SERVER Application Entity specified in the Advantage Workstation 3.1 DICOM Conformance Statement, provides Standard Conformance to the following DICOM V3.0 SOP Classes as an SCU as well as an SCP:

SOP Class Name	SOP Class UID
----------------	---------------

X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1
----------------------------------	------------------------------

In addition to the above SOP Classes, the DICOM SERVER Application Entity also provides Standard Conformance to the SOP Classes described in Section 2.2 of the Advantage Workstation 3.1 Dicom Conformance Statement.

**2.2.2 Media Interchange Specifications**

The Advantage Workstation 3.1 Application, using the CDR/CDROM DICOM Media Server Application Entity specified in the Advantage Workstation 3.1 DICOM Conformance Statement, provides Standard Conformance to the following DICOM V3.0 Application Profiles as an **FSR** as well as an **FSC**:

Media Storage Application Profile	SOP Class Name	SOP Class UID
STD-GEN-CD	X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1

In addition to the above Media Storage Application Profile and SOP Classes, the CDR/CDROM DICOM Media Server Application Entity also provides Standard Conformance to the SOP Classes described in Section 3.3 of the Advantage Workstation 3.1 Dicom Conformance Statement.

**2.2.3 Implementation Identifying Information**

The Implementation UID for this Application is:

<b>Advantage Paste Implementation UID</b>	<b>1.2.840.113619.6.60</b>
-------------------------------------------	----------------------------

**2.3 SUPPORT OF EXTENDED CHARACTER SETS**

The Advantage Paste will support only the ISO\_IR 100 (ISO 8859-1:1987 Latin alphabet N 1. supplementary set) as extended character sets. Any incoming SOP instance that is encoded using another extended character set will not be supported by the Application.

### **3. X-RAY ANGIOGRAPHY (XA) INFORMATION OBJECT IMPLEMENTATION**

#### **3.1 INTRODUCTION**

This section specifies the use of the DICOM XA Image IOD to represent the information included in X-Ray Angiography images produced by this implementation. Corresponding attributes are conveyed using the module construct. The contents of this section are:

3.2 - IOD Description

3.3 - IOD Entity-Relationship Model

3.4 - IOD Module Table

3.5 - IOD Module Definition

#### **3.2 XA IOD IMPLEMENTATION**

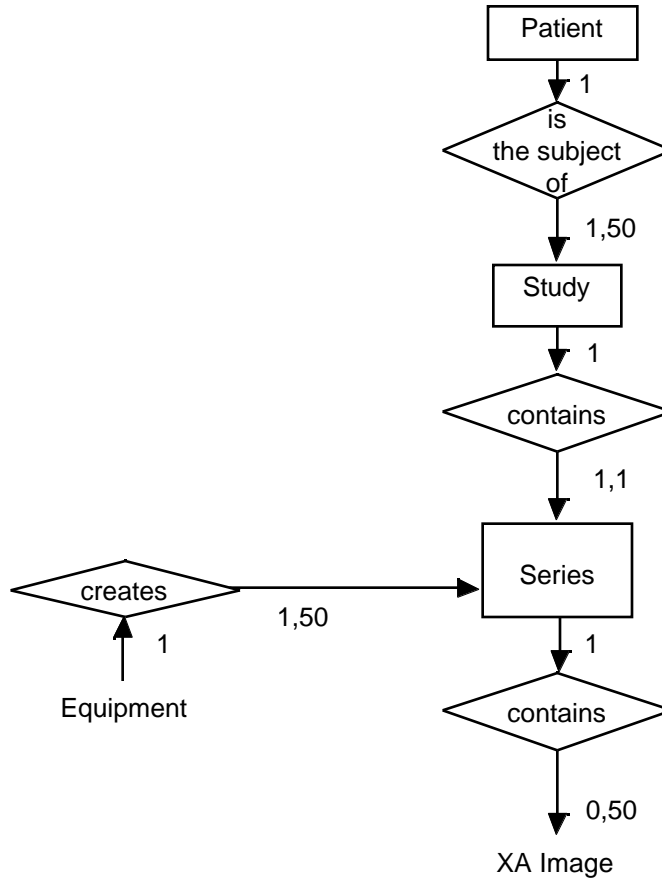
#### **3.3 XA ENTITY-RELATIONSHIP MODEL**

The Entity-Relationship diagram for the XA Image interoperability schema is shown in Illustration 3.3-1. 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. In other words, the relationship between Series and Image can have up to 50 Images per Series, but the Patient to Study relationship has 1 Study for each Patient (a Patient can have more than one Study on the system, however each Study will contain all of the information pertaining to that Patient).

ILLUSTRATION 3.3-1  
 XA IMAGE ENTITY RELATIONSHIP DIAGRAM



**3.3.1 ENTITY DESCRIPTIONS**

Please refer to DICOM Standard Part 3 (Information Object Definitions) for a description of each of the entities contained within the XA Information Object.

**3.3.2 Advantage Patse Mapping of DICOM entities**

TABLE 3.3-1  
 MAPPING OF DICOM ENTITIES TO ADVANTAGE PASTE ENTITIES

DICOM	Advantage Paste Entity
Patient	Patient Entity (Advantage Workstation)
Study	Exam Entity (Advantage Workstation)
Series	Exam Entity (Advantage Workstation)
Image	Series Entity (Advantage Workstation)

Frame	Image Entity (Advantage Workstation)
-------	--------------------------------------

**3.4 IOD MODULE TABLE**

Within an entity of the DICOM v3.0 XA IOD, 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 3.4-1 identifies the defined modules within the entities which comprise the DICOM v3.0 XA IOD. Modules are identified by Module Name.

See DICOM v3.0 Part 3 for a complete definition of the entities, modules, and attributes.

**TABLE 3.4-1  
XA IMAGE IOD MODULES**

<b>Entity Name</b>	<b>Module Name</b>	<b>Reference</b>
Patient	Patient	3.5.1.1
Study	General Study	3.5.2.1
	Patient Study	3.5.2.2
Series	General Series	3.5.3.1
Equipment	General Equipment	3.5.4.1
Image	General Image	3.5.5.1
	Image Pixel	3.5.5.2
	Contrast/Bolus	3.5.5.3
	Cine	3.5.5.4
	Multi-frame	3.5.5.5
	Frame Pointers	3.5.5.6
	Display Shutter	3.5.5.7
	Modality LUT	3.5.5.8
General	SOP Common	3.5.6.1
X-Ray	X-Ray Image	3.5.7.1
	X-Ray Acquisition	3.5.7.2
	X-Ray table	3.5.7.3
	X-Ray Positioner	3.5.7.4

**3.5 INFORMATION MODULE DEFINITIONS**

Please refer to DICOM v3.0 Standard Part 3 (Information Object Definitions) for a description of each of the entities and modules contained within the XA Information Object.



The following modules are included to convey Enumerated Values, Defined Terms, and Optional Attributes supported. Type 1 & Type 2 Attributes are also included for completeness and to define what values they may take and where these values are obtained from. It should be noted that they are the same ones as defined in the DICOM v3.0 Standard Part 3 (Information Object Definitions).

**Important Note :** Advantage Paste is an X-Ray angiography application which computes new XA DICOM Object from an original XA DICOM Object found on Advantage windows 3.1. In order to explain how the new XA DICOM Object is created, for each module **two tables are displayed :**

- One to describe the original XA DICOM Object (INPUT).
- One to describe the new XA DICOM Object (OUTPUT).

**3.5.1 Common Patient Entity Modules**

**3.5.1.1 Patient Module**

This section specifies the Attributes of the Patient that describe and identify the Patient who is the subject of a diagnostic Study. This Module contains Attributes of the patient that are needed for diagnostic interpretation of the Image and are common for all studies performed on the patient.

**TABLE 3.5-1.1  
PATIENT MODULE ATTRIBUTES (INPUT)**

<b>Attribute Name</b>	<b>Tag</b>	<b>Type</b>	<b>Attribute Description</b>
Patient's Name	(0010,0010)	2	Required with any non null string (for safety reason)
Patient ID	(0010,0020)	2	Required with any value (including no value, zero length data element)
Patient's Birth Date	(0010,0030)	2	Required with any value (including no value, zero length data element)
Patient's Sex	(0010,0040)	2	Required with any value (including no value, zero length data element)

**TABLE 3.5-1.2  
PATIENT MODULE ATTRIBUTES (OUTPUT)**

<b>Attribute Name</b>	<b>Tag</b>	<b>Type</b>	<b>Attribute Description</b>
Patient's Name	(0010,0010)	2	Duplicated from original object.
Patient ID	(0010,0020)	2	Duplicated from original object.
Patient's Birth Date	(0010,0030)	2	Duplicated from original object.
Patient's Sex	(0010,0040)	2	Duplicated from original object.

**3.5.2 Common Study Entity Modules**

The following Study IE Modules are common to all Composite Image IODs which reference the Study IE. These Module contain Attributes of the patient and study that are needed for diagnostic interpretation of the image.

**3.5.2.1 General Study Module**

This section specifies the Attributes which describe and identify the Study performed upon the Patient.

**TABLE 3.5-2 .1  
GENERAL STUDY MODULE ATTRIBUTES(INPUT)**

<b>Attribute Name</b>	<b>Tag</b>	<b>Type</b>	<b>Attribute Description</b>
Study Instance UID	(0020,000D)	1	Required with any not null value.
Study Date	(0008,0020)	2	Required with any value (including no value, zero length data element)
Study Time	(0008,0030)	2	Required with any value (including no value, zero length data element)
Referring Physician's Name	(0008,0090)	2	Required with any value (including no value, zero length data element)
Study ID	(0020,0010)	2	Required with any value (including no value, zero length data element)
Accession Number	(0008,0050)	2	Required with any value (including no value, zero length data element)

**TABLE 3.5-2 .2  
GENERAL STUDY MODULE ATTRIBUTES(OUTPUT)**

<b>Attribute Name</b>	<b>Tag</b>	<b>Type</b>	<b>Attribute Description</b>
Study Instance UID	(0020,000D)	1	Duplicated from original object.
Study Date	(0008,0020)	2	Duplicated from original object.
Study Time	(0008,0030)	2	Duplicated from original object.
Referring Physician's Name	(0008,0090)	2	Duplicated from original object.
Study ID	(0020,0010)	2	Duplicated from original object.
Accession Number	(0008,0050)	2	Duplicated from original object.
Study Description	(0008,1030)	3	Duplicated from original object if present.
Name of Physician(s) Reading Study	(0008,1060)	3	Duplicated from original object if present.
Referenced Study Sequence	(0008,1110)	3	Duplicated from original object if present.
>Referenced SOP Class UID	(0008,1150)	1C	Duplicated from original object if (0008,1110) present.
>Referenced SOP Instance UID	(0008,1155)	1C	Duplicated from original object if (0008,1110) present.

**3.5.2.2 Patient Study Module**

This section defines Attributes that provide information about the Patient at the time the Study was performed.

**TABLE 3.5-3.1**  
**PATIENT STUDY MODULE ATTRIBUTES (INPUT)**

No attribute is required for this module.

**TABLE 3.5-3.2**  
**PATIENT STUDY MODULE ATTRIBUTES (OUTPUT)**

<b>Attribute Name</b>	<b>Tag</b>	<b>Type</b>	<b>Attribute Description</b>
Patient's Age	(0010,1010)	3	Duplicated from original object if present.
Patient's Size	(0010,1020)	3	Duplicated from original object if present.
Patient's Weight	(0010,1030)	3	Duplicated from original object if present.

**3.5.3 Common Series Entity Modules**

The following Series IE Modules are common to all Composite Image IODs which reference the Series IE.

**3.5.3.1 General Series Module**

This section specifies the Attributes which identify and describe general information about the Series within a Study.

**TABLE 3.5-4.1  
GENERAL SERIES MODULE ATTRIBUTES (INPUT)**

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	1	XA
Series Instance UID	(0020,000E)	1	Required with any not null value
Series Number	(0020,0011)	2	Required with any value (including no value, zero length data element)

**TABLE 3.5-4.2  
GENERAL SERIES MODULE ATTRIBUTES (OUTPUT)**

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	1	Duplicated from original object.
Series Instance UID	(0020,000E)	1	Provided by Advantage Workstation
Series Number	(0020,0011)	2	Duplicated from original object.
Laterality	(0020,0060)	2C	Duplicated from original object if present.
Series Description	(0008,103E)	3	Duplicated from original object if present.
Patient Position	(0018,5100)	2C	Duplicated from original object if present.
Series Date	(0008,0021)	3	Duplicated from original object if present.
Series Time	(0008,0031)	3	Duplicated from original object if present.
Performing Physicians' Name	(0008,1050)	3	Duplicated from original object if present.
Protocol Name	(0018,1030)	3	Duplicated from original object if present.
Operators' Name	(0008,1070)	3	Duplicated from original object if present.
Referenced Study Component Sequence	(0008,1111)	3	Duplicated from original object if present.
>Referenced SOP Class UID	(0008,1150)	1C	Duplicated from original object if (0008,1111) present.
>Referenced SOP Instance UID	(0008,1155)	1C	Duplicated from original object if (0008,1111) present.

**3.5.4 Common Equipment Entity Modules**

The following Equipment IE Module is common to all Composite Image IODs which reference the Equipment IE.

**3.5.4.1 General Equipment Module**

This section specifies the Attributes which identify and describe the piece of equipment which produced a Series of Images.

**TABLE 3.5-5.1  
GENERAL EQUIPMENT MODULE ATTRIBUTES (INPUT)**

Attribute Name	Tag	Type	Attribute Description
Manufacturer	(0008,0070)	2	GE MEDICAL SYSTEMS
Manufacturer's Model Name	(0008,1090)	3	DLX

**TABLE 3.5-5.2  
GENERAL EQUIPMENT MODULE ATTRIBUTES (OUTPUT)**

Attribute Name	Tag	Type	Attribute Description
Manufacturer	(0008,0070)	2	Duplicated from original object.
Institution Name	(0008,0080)	3	Duplicated from original object if present.
Institution Address	(0008,0081)	3	Duplicated from original object if present.
Station Name	(0008,1010)	3	Duplicated from original object if present.
Institutional Department Name	(0008,1040)	3	Duplicated from original object if present.
Manufacturer's Model Name	(0008,1090)	3	Duplicated from original object.
Software Versions	(0018,1020)	3	Advantage Paste AP_1.4

**3.5.4.1.1 General Equipment Attribute Descriptions**

**3.5.5 Common Image Entity Modules**

The following Image IE Modules are common to all Composite Image IODs which reference the Image IE.

**3.5.5.1 General Image Module**

This section specifies the Attributes which identify and describe an image within a particular series.

**TABLE 3.5-6.1  
GENERAL IMAGE MODULE ATTRIBUTES (INPUT)**

Attribute Name	Tag	Type	Attribute Description
Image Number	(0020,0013)	2	Required with any value (including no value, zero length data element)
Image Type	(0008,0008)	3	ORIGINAL\PRIMARY\SINGLE PLANE

**TABLE 3.5-6.2  
GENERAL IMAGE MODULE ATTRIBUTES (OUTPUT)**

Attribute Name	Tag	Type	Attribute Description
Image Number	(0020,0013)	2	Duplicated from original object.
Patient Orientation	(0020,0020)	2C	Duplicated from original object.
Image Date	(0008,0023)	2C	Duplicated from original object if present.
Image Time	(0008,0033)	2C	Duplicated from original object if present.
Image Type	(0008,0008)	3	See 3.5.5.1.1.1.

Acquisition Date	(0008,0022)	3	Duplicated from original object if present.
Acquisition Time	(0008,0032)	3	Duplicated from original object if present.
Derivation Description	(0008,2111)	3	Duplicated from original object if present.
Source Image Sequence	(0008,2112)	3	Duplicated from original object if present.
>Referenced SOP Class UID	(0008,1150)	1C	Duplicated from original object if (0008,2112) present.
>Referenced SOP Instance UID	(0008,1155)	1C	Duplicated from original object if (0008,2112) present.
Image Comments	(0020,4000)	3	Duplicated from original object if present.

**3.5.5.1.1 General Image Attribute Descriptions**

**3.5.5.1.1.1 Image Type**

The Attribute Image Type (0008,0008) will always be :

DERIVED\SECONDARY\SINGLE PLANE\IMAGE PASTING

**3.5.5.2 Image Pixel Module**

This section specifies the Attributes that describe the pixel data of the image.

**TABLE 3.5-7.1  
IMAGE PIXEL MODULE ATTRIBUTES (INPUT)**

Attribute Name	Tag	Type	Attribute Description
Samples per Pixel	(0028,0002)	1	1
Photometric Interpretation	(0028,0004)	1	MONOCHROME2
Rows	(0028,0010)	1	512 or 1024.
Columns	(0028,0011)	1	512 or 1024.
Bits Allocated	(0028,0100)	1	8 or 16
Bits Stored	(0028,0101)	1	8 or 10
High Bit	(0028,0102)	1	7 or 9
Pixel Representation	(0028,0103)	1	0
Pixel Data	(7FE0,0010)	1	Required with any value (including no value, zero length data element)

**TABLE 3.5-7.2  
IMAGE PIXEL MODULE ATTRIBUTES (OUTPUT)**

Attribute Name	Tag	Type	Attribute Description
Samples per Pixel	(0028,0002)	1	1
Photometric Interpretation	(0028,0004)	1	MONOCHROME2
Rows	(0028,0010)	1	Duplicated from original object.
Columns	(0028,0011)	1	Computed by Advantage Paste algorithm. Will be greater than Rows Attribute.
Bits Allocated	(0028,0100)	1	Duplicated from original object.
Bits Stored	(0028,0101)	1	Duplicated from original object.
High Bit	(0028,0102)	1	Duplicated from original object.
Pixel Representation	(0028,0103)	1	Duplicated from original object.
Pixel Data	(7FE0,0010)	1	Duplicated from original object.

**3.5.5.3 Contrast/Bolus Module**

This section specifies the Attributes that describe the contrast /bolus used in the acquisition of the Image.

**TABLE 3.5-8.1  
CONTRAST/BOLUS MODULE ATTRIBUTES(INPUT)**

No attribute is required for this module.

**TABLE 3.5-8.2  
CONTRAST/BOLUS MODULE ATTRIBUTES(OUTPUT)**

Attribute Name	Tag	Type	Attribute Description
Contrast/Bolus Agent	(0018,0010)	2	Duplicated from original object if present.

**3.5.5.4 Cine Module**

The table in this section specifies the Attributes of a Multi-frame Cine Image.

**TABLE 3.5-9.1  
CINE MODULE ATTRIBUTES (INPUT)**

Attribute Name	Tag	Type	Attribute Description
Frame Time Vector	(0018,1065)	1C	Required with an array [Nb Of Frame]
Start Trim	(0008,2142)	3	1 to Number Of Frame (0028,0008)
Stop Trim	(0008,2143)	3	Start Trim (0008,2142) to Number Of Frame (0028,0008)

**TABLE 3.5-9.2  
CINE MODULE ATTRIBUTES (OUTPUT)**

Attribute Name	Tag	Type	Attribute Description
Frame Time	(0018,1063)	1C	0.0 (not relevant)
Start Trim	(0008,2142)	3	2
Stop Trim	(0008,2143)	3	2

**3.5.5.5 Multi-Frame Module**

This section specifies the Attributes of a Multi-frame pixel data Image.

**TABLE 3.5-10.1  
MULTI-FRAME MODULE ATTRIBUTES (INPUT)**

Attribute Name	Tag	Type	Attribute Description
Number of Frames	(0028,0008)	1	from 2 to 120
Frame Increment Pointer	(0028,0009)	1	00181065H = Frame Time Vector

**TABLE 3.5-10.2  
MULTI-FRAME MODULE ATTRIBUTES (OUTPUT)**

Attribute Name	Tag	Type	Attribute Description
Number of Frames	(0028,0008)	1	2
Frame Increment Pointer	(0028,0009)	1	See 3.5.5.4.1 for further explanation.



**3.5.5.5.1 Multi-Frame Attribute Descriptions**

**3.5.5.5.1.1 Number Of Frames And Frame Increment Pointer**

Number of frames is always equal to two : one frame for pasted mask and one frame for pasted opacified image.

Frame Increment Pointer = 00181063H. As the pasted image is not an acquired image a computed image, fields “Frame Time” or “Frame Time Pointer” are not really significant but “Frame Time” is more significant than “Frame Time Pointer”.

**3.5.5.6 Frame Pointers Module**

This section specifies the attributes of a Frame Pointer Module.

**TABLE 3.5-11.1  
FRAME POINTERS MODULE ATTRIBUTES (INPUT)**

No attributes is required for this module.

**TABLE 3.5-11.2  
FRAME POINTERS MODULE ATTRIBUTES (OUTPUT)**

Attribute Name	Tag	Type	Attribute Description
Representative Frame Number	(0028,6010)	3	2
Frame Numbers Of Interest (FOI)	(0028,6020)	3	1,2

**3.5.5.7 Display Shutter Module**

**TABLE 3.5-12.1  
DISPLAY SHUTTER MODULE (INPUT)**

No attribute is required for this module

**TABLE 3.5-12.2  
DISPLAY SHUTTER MODULE (OUTPUT)**

Attribute Name	Tag	Type	Attribute Description
Shutter Shape	(0018,1600)	1	RECTANGULAR
Shutter Left Vertical Edge	(0018,1602)	1C	0
Shutter Right Vertical Edge	(0018,1604)	1C	Columns attribute (0028,0011) -1
Shutter Upper Horizontal Edge	(0018,1606)	1C	0
Shutter Lower Horizontal Edge	(0018,1608)	1C	Rows attribute (0028,0010) -1

**3.5.5.8 Modality LUT module**

This section specifies the Attributes that describe the Modality LUT.

**TABLE 3.5-13.1  
MODALITY LUT MODULE ATTRIBUTES (INPUT)**

No attributes is required for this module.

**TABLE 3.5-13.2  
MODALITY LUT MODULE ATTRIBUTES (OUTPUT)**

<b>Attribute Name</b>	<b>Tag</b>	<b>Type</b>	<b>Attribute Description</b>
Rescale Intercept	(0028,1052)	1C	0
Rescale Slope	(0028,1053)	1C	1
Rescale Type	(0028,1054)	1C	US

**3.5.6 General Modules**

The SOP Common Module is mandatory for all DICOM IODs.

**3.5.6.1 SOP Common Module**

This section defines the Attributes which are required for proper functioning and identification of the associated SOP Instances. They do not specify any semantics about the Real-World Object represented by the IOD.

**TABLE 3.5-14.1  
SOP COMMON MODULE ATTRIBUTES (INPUT)**

<b>Attribute Name</b>	<b>Tag</b>	<b>Type</b>	<b>Attribute Description</b>
SOP Class UID	(0008,0016)	1	1.2.840.10008.5.1.4.1.1.12.1
SOP Instance UID	(0008,0018)	1	Required with any not null value
Specific Character Set	(0008,0005)	1C	ISO_IR 100 = Latin Alphabet No. 1 or not sent (means default characters set)

**TABLE 3.5-14.2  
SOP COMMON MODULE ATTRIBUTES (OUTPUT)**

<b>Attribute Name</b>	<b>Tag</b>	<b>Type</b>	<b>Attribute Description</b>
SOP Class UID	(0008,0016)	1	Duplicated from original object.
SOP Instance UID	(0008,0018)	1	see 3.5.6.1.1 for further information
Specific Character Set	(0008,0005)	1C	Duplicated from original object if present.

**3.5.6.1.1 SOP Common Attributes Descriptions**

**3.5.6.1.1.1 SOP Instance UID**

The SOP instance UID = 1.2.840.113619.2.60.H.P.E.C where :  
 H = hostid of the AW3.1 station,  
 P = pid of Advantage Paste process,  
 E = elapse time (in milisecond) where Advantage Paste process is launched,  
 C = number given by Advantage Paste process (counter).

**3.5.7 X-Ray Modules**

This Section describes Modules used in one or more X-Ray IODs. These Modules contain Attributes that are specific to X-Ray images.

**3.5.7.1 X-Ray Image Module**

**TABLE 3.5-15.1  
X-RAY IMAGE MODULE ATTRIBUTES (INPUT)**

<b>Attribute Name</b>	<b>Tag</b>	<b>Type</b>	<b>Attribute Description</b>
Frame Increment Pointer	(0028,0009)	1C	00181065H
Image Type	(0008,0008)	1	ORIGINAL\PRIMARY\SINGLE PLANE
Pixel Intensity Relationship	(0028,1040)	1	LIN or LOG or DISP
Samples per Pixel	(0028,0002)	1	1
Photometric Interpretation	(0028,0004)	1	MONOCHROME2
Bits Allocated	(0028,0100)	1	8 or 16.
Bits Stored	(0028,0101)	1	8 or 10
High Bit	(0028,0102)	1	7 or 9
Pixel Representation	(0028, 0103)	1	0
Scan Options	(0018,0022)	3	CHASE

**TABLE 3.5-15.2  
X-RAY IMAGE MODULE ATTRIBUTES (OUTPUT)**

Attribute Name	Tag	Type	Attribute Description
Frame Increment Pointer	(0028,0009)	1C	See 3.5.5.4.1.
Image Type	(0008,0008)	1	See 3.5.5.1.1.2.
Pixel Intensity Relationship	(0028,1040)	1	Duplicated from original object.
Samples per Pixel	(0028,0002)	1	1
Photometric Interpretation	(0028,0004)	1	MONOCHROME2
Bits Allocated	(0028,0100)	1	Duplicated from original object.
Bits Stored	(0028,0101)	1	Duplicated from original object.
High Bit	(0028,0102)	1	Duplicated from original object.
Pixel Representation	(0028, 0103)	1	Duplicated from original object.

**3.5.7.2 X-Ray Acquisition Module**

**TABLE 3.5-16.1  
X-RAY ACQUISITION MODULE (INPUT)**

Attribute Name	Tag	Type	Attribute Description
Radiation Setting	(0018,1155)	1	GR
Field of View Shape	(0018,1147)	3	ROUND
Field of View Dimension(s)	(0018,1149)	3	between 300 and 420

**TABLE 3.5-16.2  
X-RAY ACQUISITION MODULE (OUTPUT)**

Attribute Name	Tag	Type	Attribute Description
Radiation Setting	(0018,1155)	1	GR
Field of View Shape	(0018,1147)	3	Duplicated from original object.
Field of View Dimension(s)	(0018,1149)	3	Duplicated from original object.

**3.5.7.3 X-Ray Table Module**

**TABLE 1.5-17.1  
X-RAY TABLE MODULE (INPUT)**

Attribute Name	Tag	Type	Attribute Description
Table Motion	(0018,1134)	2	DYNAMIC

**TABLE 1.5-17.2  
X-RAY TABLE MODULE (OUTPUT)**

No attribute for this module.

**3.5.7.4 X-Ray Positioner Module**

**TABLE 1.5-18.1  
X-RAY POSITIONER MODULE (INPUT)**

<b>Attribute Name</b>	<b>Tag</b>	<b>Type</b>	<b>Attribute Description</b>
Distance Source to Patient	(0018,1111)	3	between 860 and 1260

**TABLE 1.5-18.2  
X-RAY POSITIONER MODULE (OUTPUT)**

<b>Attribute Name</b>	<b>Tag</b>	<b>Type</b>	<b>Attribute Description</b>
Distance Source to Patient	(0018,1111)	3	Duplicated from original object
Angle Value 1	(0019,xx01)	3	Duplicated from original object if present
Angle Value 2	(0019,xx02)	3	Duplicated from original object if present
Angle Value 3	(0019,xx03)	3	Duplicated from original object if present