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GE Medical Systems

Technical Publications

Direction 2201403-100
Revision 3

Advantage Workstation 3.1

CONFORMANCE STATEMENT for DICOM V3.0

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REVISION HISTORY

Rev	Date	Reason for change
0	November 13, 1997	Creation
1	February 4, 1998	Update to conform to AW3.1 M4 Soft release
2	September 23, 1998	Update after printing verification
3	March 15, 1999	Update after printing verification

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TABLE OF CONTENTS

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 (Media Storage Conformance Statement), which. specifies the GEMS equipment compliance to the DICOM requirements for the implementation of Media Storage features

Section 4 (Study Root Query/Retrieve Information Model), which specifies the GEMS equipment compliance to the DICOM requirements for the Study Root Query/Retrieve Information Model feature.

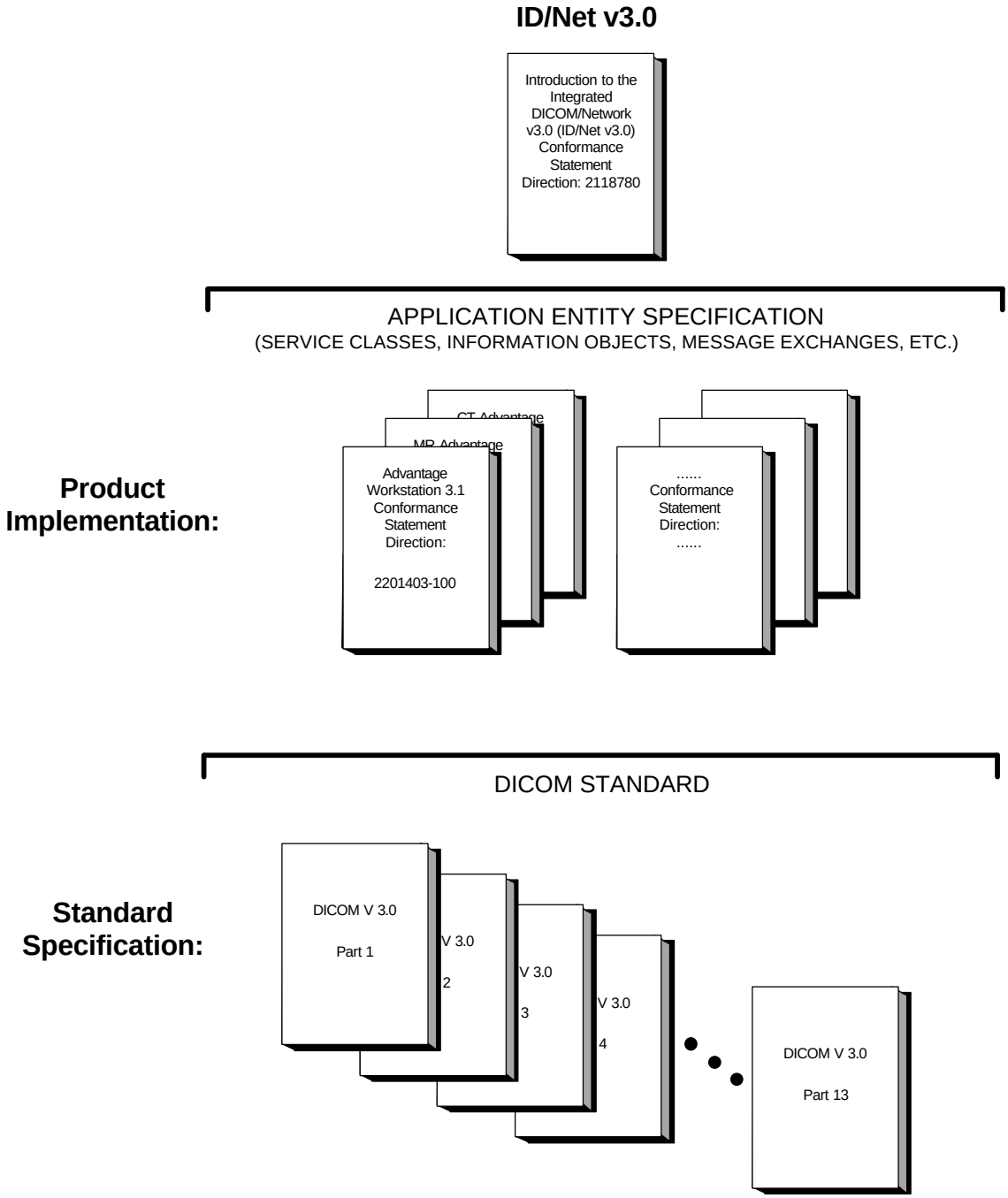
Section 5 (Network Print SCU Conformance Statement), which specifies the GEMS equipment compliance to the DICOM requirements for the implementation of Network Print features.

Section 6 (Network Print Management SOP Class definition) which specifies the GEMS equipment compliance to the DICOM requirements for the implementation of Network Print Management SOP Class.

Section 7 (SC Information Object Implementation), which specifies the GEMS equipment compliance to the DICOM requirements for the implementation of SC Information Object Implementation feature.

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.



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

Advantage Workstation 3.1
Conformance Statement for DICOM v3.0
*Direction **2201403-100***

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).

The media storage implementation refers to DICOM supplement 14 which describes the "General Purpose Profile" for writing CD-Rs and to supplement 18 which describes the DICOM CT/MR profile.

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.*

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2. NETWORK CONFORMANCE STATEMENT

2.1 INTRODUCTION

This section of the DICOM Conformance Statement specifies the compliance to DICOM conformance requirements for the relevant **Networking** features on this GEMS product. Note that the format of this section strictly follows the format defined in DICOM Standard PS 3.2 (Conformance). Please refer to that part of the standard while reading this section.

The Advantage Workstation 3.1 is a Networked Medical Imaging Console dedicated to Examination Review and Diagnosis. The workstation uses DICOM services to import images for possible further analysis or processing and to export images to other vendors.

The station provides a basis for applications built on top of it. These applications can create specific Information Object Definitions that will be described in the conformance statement of the added applications. The added applications can benefit the network facilities provided by the station.

This DICOM conformance statement refers to DICOM Supplement 4, 6, 11 for the description of standard IODs.

This DICOM conformance statement refers to other DICOM conformance statements for formal descriptions of IODs created by added applications :

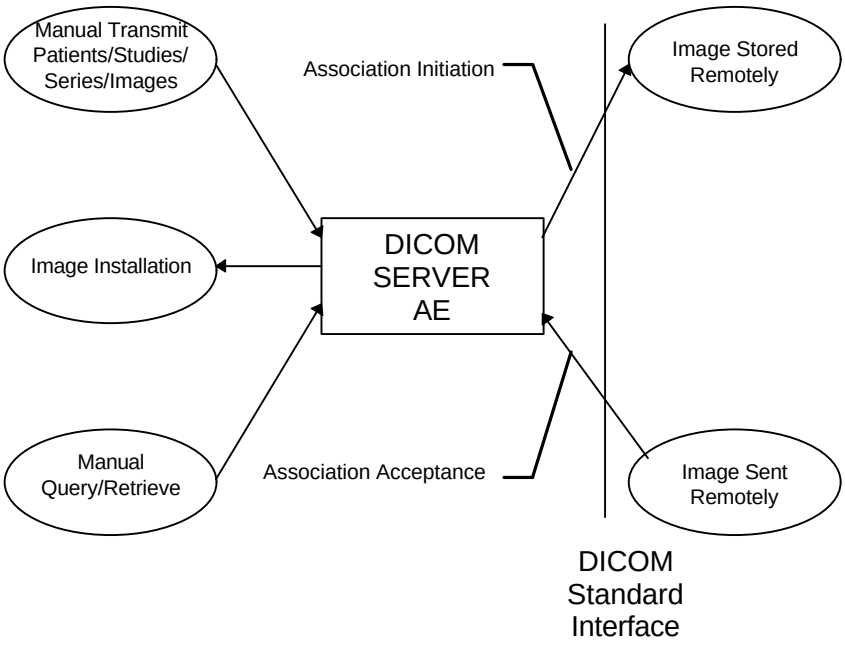
- GE Private 3D Model Objects are described in the Advantage Windows Voxtool 2.0 DICOM Conformance Statement (Direction Number : 2198583-100)
- GE Private DICOM RT Plan are described in the Advantage SIM 2.0 DICOM Conformance Statement (Direction Number : 2180316-100)
- GE Private DICOM Saturn TDS (STDS) Objects are not described in any Conformance Statement.

2.2 IMPLEMENTATION MODEL

2.2.1 Application Data Flow Diagram

The Basic and Specific Application models for this station are shown in the following Illustration :

DICOM SERVER AE APPLICATION MODEL



Note: Please also refer to sections 3 and 6 of the current document for Media Storage and Network Print Management SCU Conformance Statement.

The DICOM SERVER Application Entity (AE) is an application which handles DICOM protocol communication. DICOM SERVER AE is automatically brought up when the Advantage Workstation 3.1 is powered on.

All remote DICOM AE must be manually configured on the Advantage Workstation 3.1 by an operator or by a field engineer.

The DICOM SERVER AE is invoked by the following Real World Activities :

- Manual Transmit Patients/Studies/Series/Images from the Advantage Workstation 3.1 to a Remote Host.

For this operation, the operator selects patients, studies, series or images on the console browser and then sends the selected patients, studies, series or images on one or several remote DICOM AE by a drag and drop on the icon that represents the wanted remote DICOM AE.

The declaration of remote DICOM AE is done through a specific menu (known as NETWORK MANAGEMENT menu).

The visualization of the transfer status is done on a specific message window.

- Images Sent Remotely from a Remote DICOM AE to the Advantage Workstation 3.1.

When images are installed in the local database, they are displayed in the Advantage Workstation 3.1 local database.

- Manual Query/Retrieve

For this operation, the operator queries a remote database to obtain a list of data at Patient/Study/Series/Image by clicking on the icon that represents the wanted remote DICOM AE. Once the remote browser is displayed, the operator can retrieve the SOP Classes supported by the Advantage Workstation 3.1 from the remote DICOM AE.

The query is selective based on criteria described below in the document.

2.2.2 Functional Definition of AE's

The DICOM SERVER AE initiates the following operations :

- Access to patient demographics and pixel data in the local database.
- Build a DICOM format data set.
- Initiate a DICOM association to send DICOM SOP Classes to a remote DICOM AE.
- Initiate a DICOM association to ask for remote patient demographics.
- Initiate a DICOM association to ask for transmit images from a remote DICOM AE to Advantage Workstation 3.1.

The DICOM SERVER AE waits for association requests from Remote AE :

- Answer to DICOM associations transmitting DICOM SOP Classes to be stored on the Advantage Workstation 3.1.
- Answer to DICOM associations transmitting Verification SOP Class to the Advantage Workstation 3.1.

2.2.3 Sequencing of Real-World Activities

Not applicable.

2.3 AE SPECIFICATIONS

2.3.1 DICOM SERVER AE Specification

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

SOP Class Name	SOP Class UID
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1
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
Standalone Overlay 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
RT Image Information Storage	1.2.840.10008.5.1.4.1.1.481.1
RT Structure Set Information Storage	1.2.840.10008.5.1.4.1.1.481.3
RT Plan Information Storage	1.2.840.10008.5.1.4.1.1.481.5
Patient Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2
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
GE Private 3D Model Object	1.2.840.113619.4.26
GE Private DICOM RT Plan	1.2.840.113619.4.5.249
GE Private DICOM Saturn TDS Object	1.2.840.113619.4.5.253

Note: C-FIND is done using Study Root Information Model.

Note: C-MOVE is done either using Patient Root Information Model when the operator asks for retrieving different patient folders all together at a time or Study Root Information Model in other cases.

Note: Please also refer to sections 6 for Network Print Management SCU Conformance Statement.

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

SOP Class Name	SOP Class UID
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1
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
Standalone Overlay 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
RT Image Information Storage	1.2.840.10008.5.1.4.1.1.481.1
RT Structure Set Information Storage	1.2.840.10008.5.1.4.1.1.481.3
RT Plan Information Storage	1.2.840.10008.5.1.4.1.1.481.5
Verification SOP Class	1.2.840.10008.1.1
GE Private 3D Model Object	1.2.840.113619.4.26
GE Private DICOM RT Plan	1.2.840.113619.4.5.249
GE Private DICOM Saturn TDS Object	1.2.840.113619.4.5.253

2.3.1.1 Association Establishment Policies

2.3.1.1.1 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 DICOM SERVER AE is:

Maximum Length PDU	16 Kbytes

Note: 0 as PDU length is not supported in this implementation.

Note: Maximum length PDU can be configured at installation time.

The SOP Class Extended Negotiation is not supported.

The maximum number of Presentation Context Items that will be proposed is 14.

Note: This number can evolve when applications are added on top of Advantage Workstation 3.1, or in particular configurations.

The user information Items sent by this product are :

- Maximum PDU Length
- Implementation UID

2.3.1.1.2 Number of Associations

The DICOM SERVER AE will initiate only one DICOM association at a time to perform a DICOM store operation as a SCU to a Remote Host AE.

The DICOM SERVER AE can have a maximum of 4 open DICOM associations at a time to perform a DICOM store operation as a SCP or respond to an echo.

The DICOM SERVER AE will initiate only one DICOM association at a time to perform a Query/Retrieve with a Remote Host AE.

2.3.1.1.3 Asynchronous Nature

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

2.3.1.1.4 Implementation Identifying Information

The Implementation UID for this DICOM v3.0 Implementation is :

Advantage Workstation 3.1 Implementation UID	1.2.840.113619.6.59

2.3.1.1.5 Real-World Activity : Manual Transmit Patients/Studies/Series/images

2.3.1.1.5.1 Associated Real-World Activity

The operator selects in the BROWSER one or several Patient Folders (or Studies/Series/Images) to be sent. Then, the user can either drag and drop the selection on the icon representing then Remote DICOM AE, or click on the “Push” icon and select a Remote DICOM AE in the LIST OF REMOTE HOST.

This operation will cause :

- The Advantage Workstation 3.1 to build a DICOM image from its data.
- The DICOM SERVER AE to initiate a DICOM association, negotiate with the Remote AE an appropriate Abstract and Transfer Syntax.
- To emit C-STORE command to send the image, if the negotiation is successful.

2.3.1.1.5.2 Association Initiation Policy

The DICOM SERVER AE initiates a new association for pushing Patient Folders (or Studies/Series/Images) selected by the operator to a remote DICOM AE. This association corresponds to one Real World Activity :

- Manual Transmit Patients/Studies/Series/images

Note: The length to End field (0000, 0001) is sent in this implementation.

2.3.1.1.5.3 Proposed Presentation Context Table

Presentation Context Table - Proposed

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	**UID**	**Name List**	**UID List**		
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Standalone Overlay Storage	1.2.840.10008.5.1.4.1.1.8	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
RT Image Information Storage	1.2.840.10008.5.1.4.1.1.481.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
RT Structure Set Information Storage	1.2.840.10008.5.1.4.1.1.481.3	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
RT Plan Information Storage	1.2.840.10008.5.1.4.1.1.481.5	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
GE Private 3D Model Object	1.2.840.113619.4.26	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
GE Private DICOM RT Plan	1.2.840.113619.4.5.249	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
GE Private DICOM Saturn TDS	1.2.840.113619.4.5.253	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

2.3.1.1.5.3.1 SOP Specific DICOM Conformance Statement for Image Storage SOP Classes

Following are the status codes that are more specifically processed when receiving messages from a **Storage** SCP equipment :

Service Status	Status Codes	Further Meaning	Application Behavior When receiving Status Codes	Related Fields Processed if received
Refused	A7xx	Out of resources	Association is closed with Remote AE. Appropriate message is displayed to the user.	(0000,0902)
	0122	SOP Class not Supported	General Warning message is logged. Association is not closed with Remote AE. Appropriate message is displayed to the user.	(0000,0902)
Error	Cxxx	Cannot Understand	General Warning message is logged. Association is not closed with Remote AE. Error message is displayed to the user.	(0000,0901) (0000,0902)
	A9xx	Data Set does not match SOP Class	General Warning message is logged. Association is not closed with Remote AE. Error message is displayed to the user.	(0000,0901) (0000,0902)
Warning	B000	Coercion of Data Elements	General Warning message is logged. Association is not closed.	(0000,0901) (0000,0902)
	B007	Data Set does not match SOP Class	General Warning message is logged. Association is not closed.	(0000,0901) (0000,0902)
	B006	Elements Discarded	General Warning message is logged. Association is not closed.	(0000,0901) (0000,0902)
Success	0000			None

Each C-STORE operation supports an “Association Timer”. This timer starts when the association request is sent and stops when the association is established. This time-out is configurable at installation time and defaults to 60 seconds.

Each C-STORE operation supports an “Operation Inactivity Timer”. This timer starts when a C-STORE request is emitted and is reset each time a C-STORE response has been received,

or when subsequent C-STORE are received. This time-out is configurable at installation time and defaults to 180 seconds.

Each C-STORE operation supports an "Session Timer". This timer starts when the association is established and stops when the association is ended. This time-out is configurable at installation time and defaults to 3600 seconds.

If any of the three timers mentioned above expires, the connection is aborted and the operation is considered to be failed.

2.3.1.1.6 Real-World Activity : Manual Query/Retrieve

2.3.1.1.6.1 Associated Real-World Activity

The operator queries a Remote database by clicking on the icon representing the DICOM Remote AE. A new BROWSER (known as the REMOTE BROWSER) appears on the screen(s) upon successful query.

Then, the operator can select one or several Patient Folders/Studies/Series/Images and can either drag on drop the selection on the icon representing the Advantage Workstation 3.1 or click on the "Pull" icon to retrieve the selection on the Advantage Workstation 3.1 database.

- These operation will cause :
- the DICOM SERVER AE to initiate a DICOM association.
- the DICOM SERVER AE to emit a C-FIND request to get a list of patients regarding the criteria listed below, then to get the selected studies, series or images.
- the DICOM SERVER AE to emit a C-MOVE request to specify a selected list of Patient Folders/Studies/Series/Images to be sent by the Remote Host to the Advantage Workstation 3.1.

Note: An option available on the Advantage Workstation 3.1 known as the "REMOTE VIEWER" allows to view images stored remotely. The same operations are performed than in the previous step except that images are not declared physically in the Advantage Workstation 3.1 database but stored temporarily.

2.3.1.1.6.2 Association Initiation Policy

The DICOM SERVER AE initiates a new association for querying Patient Folders (or Studies/Series/Images) on a remote DICOM AE. This association corresponds to one Real World Activity :

- Manual Query/Retrieve

Note: The length to End field (0000, 0001) is sent in this implementation.

2.3.1.1.6.3 Proposed Presentation Context Table

Presentation Context Table - Proposed					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Patient Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Study Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Study Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

2.3.1.1.6.3.1 SOP Specific DICOM Conformance Statement for the Model, Study Root Query/Retrieve Information Model -FIND SOP Class

Following are the status codes that are more specifically processed when receiving messages from a **Query** SCP equipment :

Service Status	Status Codes	Further Meaning	Application Behavior When receiving Status Codes	Related Fields Processed if received
Refused	A700	Out of resources	Association is closed. Appropriate message is displayed to the user.	(0000,0902)
	0122	SOP Class not Supported	Association is closed. Appropriate message is displayed to the user.	(0000,0902)
Failed	A900	Identifier does not match SOP Class	Association is closed. Error message is displayed to the user.	(0000,0901) (0000,0902)
	Cxxx	Unable to process	Association is closed. Error message is displayed to the user.	(0000,0901) (0000,0902)
Cancel	FE00	Matching terminated due to cancel	Association is closed. Error message is displayed to the user.	None
Success	0000	Matching is complete - No final identifier is supplied		None
Pending	FF00	Matches are continuing - Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys.		Identifier
	FF01	Matches are continuing - Warning that one or more Optional Keys were not supported for existence and/or matching for this Identifier		Identifier

The C-FIND SCU will only perform hierarchical query (No extended negotiation supported)

Each C-FIND SCU supports an “Association Timer, “Operation Timer”, “Session Timer” that can be configured at installation time. These timers are defaulted to 60, 90, 3600 seconds.

The DICOM SERVER AE will parse each matching C-FIND-RSP reply and will abort the association if an entry does not contain a valid dataset.

2.3.1.1.6.3.2 SOP Specific DICOM Conformance Statement for the Patient Root Query/Retrieve Information Model - MOVE , Study Root Query/Retrieve Information Model - MOVE SOP Classes

Each C-MOVE operation supports an "Association Establishment Timer". This timer starts when the association request is sent and stops when the association is established. This timer is set to 60 seconds by default.

Following are the status codes that are more specifically processed when receiving messages from a **Retrieve** SCP equipment :

Service Status	Status Codes	Further Meaning	Application Behavior When receiving Status Codes	Related Fields Processed if received
Refused	A701	Out of resources - Unable to calculate number of matches	The association is aborted. Error message is returned to the user.	(0000,0902)
	A702	Out of resources - Unable to perform sub-operations	The association is aborted. Error message is returned to the user.	(0000,1021) (0000,1022) (0000,1023)
	A801	Move Destination Unknown	The association is aborted. Error message is returned to the user.	(0000,0902)
	0122	SOP Class not Supported	The association is aborted. Error message is returned to the user.	(0000,0902)
Failed	A900	Identifier does not match SOP Class	The association is aborted. Error message is returned to the user.	(0000,0901) (0000,0902)
	Cxxx	Unable to process	The association is aborted. Error message is returned to the user.	(0000,0901) (0000,0902)
Cancel	FE00	Sub-operations terminated due to a Cancel indication	The association is aborted. Error message is returned to the user.	(0000,1020) (0000,1021) (0000,1022) (0000,1023)
Warning	B000	Sub-operations Complete - One or more Failures.	The association is not aborted. No error message is returned to the user.	(0000,1021) (0000,1022) (0000,1023)
Success	0000	Sub-operations Complete - No Failure.		(0000,1021) (0000,1022) (0000,1023)
Pending	FF00	Sub-operations are continuing -		(0000,1020) (0000,1021) (0000,1022) (0000,1023)

Each C-MOVE SCU supports an “Association Timer, “Operation Timer”, “Session Timer” that can be configured at installation time. These timers are defaulted to 60, 300, 3600 seconds.

2.3.1.1.7 Real-World Activity “Image Installation”

The DICOM SERVER AE accepts an association when it receives a valid association request from a DICOM Storage SCU.

2.3.1.1.7.1 Associated Real-World Activity

The DICOM SERVER AE waits for any association. No operator action is required to receive an image.

2.3.1.1.7.2 Association Acceptance Policy

When the DICOM SERVER AE accepts an association, it will receive any images transmitted on that association and store the supported SOP Classes on disk. Any Remote DICOM AE can send images to the DICOM SERVER AE.

2.3.1.1.7.3 Accepted Presentation Context Table

Presentation Context Table - Accepted					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	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
Standalone Overlay 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
RT Image Information Storage	1.2.840.10008.5.1.4.1.1.481.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
RT Structure Set Information Storage	1.2.840.10008.5.1.4.1.1.481.3	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
RT Plan Information Storage	1.2.840.10008.5.1.4.1.1.481.5	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
GE Private 3D Model Object	1.2.840.113619.4.26	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
GE Private DICOM RT Plan	1.2.840.113619.4.5.249	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
GE Private DICOM STDS	1.2.840.113619.4.5.253	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Verification SOP Class	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

2.3.1.1.7.3.1 SOP Specific DICOM Conformance Statement for all Storage SOP Classes

Following are the status codes the Application may send back to the SCU Equipment after performing the requested Storage :

Service Status	Status Codes	Further Meaning	Status Code sending explanation	Related Fields sent back to the SCU
Refused	A7xx	Out of resources	indicates that there was not enough space or some other internal resource (such as memory) to store the image. The user should attempt recovery by removing some images from the Advantage Workstation 3.1.	(0000,0902)
Error	0110	Processing Failure	indicates that an internal system call has failed while processing the image.	(0000,0902)
Success	0000			None

Each C-STORE SCP supports an “Association Timer, “Operation Timer”, “Session Timer” that can be configured at installation time. These timers are defaulted to 60, 180, 3600 seconds.

The DICOM Server AE conforms to the SOP’s of the Storage Service Class at Level 2 (Full) as described in Section B4.1 of PS 3.4 of the DICOM Standard Document.

Image Reception phase :

- If the DICOM Server AE fails to parse the received image, the error 110 (Processing Failure) is returned to the C-STORE SCU.
- If the DICOM Server AE fails to install the received image into the local database, the error A700 (Out of Resources) is returned to the C-STORE SCU.

When a C-STORE operation is returned Successful to the C-STORE SCU, the image has been written to the disk and declared into the local database. The image will then be accessed in the same manner as any other image by the applications on the Advantage Workstation 3.1.

When a C-STORE operation is returned Error to the C-STORE SCU, the image will be removed and a message will appear in the browser message log informing the user of a failure. A physical disk area may be specified by a GE field engineer to keep the image files not installed.

Image Declaration phase :

The overlay planes (group 6000 and 6002) 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 fulfill the following conditions :

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

Note: Images that have the fields Patient's Name (0010,0010) and Patient ID (0010,0020) empty are accepted into the local database.

Note: The rescale slope (0028,1053) is ignored. The system defaults this value to 1.

Note: Measurement algorithm use only Pixel Spacing (0028,3000). If optional image Pixel Spacing (0018,1164) is filled instead, measurement will not be reported in mms but in pixels.

Note: All the images will be installed with the same elements in which it was received except Window Center (0028, 1050), Window Width (0028, 1051) which may be modified at installation time.

Note: Standalone Overlay Storage SOP Class instances will be formatted into Secondary Capture SOP Class instances when installed on the Advantage Workstation 3.1.

Note: Only grayscale images will be supported by the Advantage Workstation 3.1.

Note: Modality LUT and VOI LUT will be ignored by the Advantage Workstation 3.1.

Note: Images with non square pixels are not handled correctly by the Advantage Workstation 3.1.

Note: No optional data elements (Type 3) or filled data elements (Type 2) are required to be declared on the Advantage Workstation 3.1.

2.3.1.1.7.4 Presentation Context Acceptance Criterion

Only known SOP Classes are accepted.

2.3.1.1.7.5 Transfer Syntax Selection Policies

The default transfer syntax for SOP Classes is always chosen (Implicit VR Little Endian : 1.2.840.10008.1.2).

2.4 COMMUNICATION PROFILES

2.4.1 Supported Communication Stacks (PS 3.8, PS 3.9)

DICOM Upper Layer (PS 3.8) is supported using TCP/IP.

2.4.2 OSI Stack

OSI stack not supported

2.4.3 TCP/IP Stack

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

2.4.3.1 API

Not applicable to this product.

2.4.3.2 Physical Media Support

DICOM is indifferent to the Physical medium over which TCP/IP executes (e.g. Ethernet V2.0,IEEE 802.3, ATM, FDDI, Ethernet 100Mb)

Note: For more information about the Physical Media available for Advantage Workstation 3.1, please refer to the Product Data Sheet.

2.4.4 Point-to-Point Stack

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

2.5 EXTENSIONS / SPECIALIZATIONS / PRIVATIZATIONS

2.5.1 Standard Extended /Specialized/Private SOPs

Some Private SOP Classes are used by this product but are not exported outside of the station and so are not described below.

2.5.1.1 Private SOP Class GE DICOM Private 3D object

This SOP Class is described in document with Direction Number : 2198583-100

2.5.1.2 Private SOP Class GE DICOM RT Plan

- This SOP Class is described. in document with Direction Number 2180316-100.

2.5.1.3 Private SOP Class GE DICOM STDS

This SOP Class is not described.

2.5.2 Private Transfer Syntaxes

No private Transfer Syntax are negotiated.

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

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

- Local AE Title
- Local IP Address
- Local IP Netmask

The Local Listening Port Number is not configurable and set to **4006**.

The following fields are configurable for every remote DICOM AE:

- Remote AE Title
- Remote IP Address
- Listening TCP/IP Port Number

A **default router** IP Address for **all remote nodes** can be configured.

The following fields are configurable:

- Association Establishment Timer
- Store, Find, Move, Timers
- Inactivity Timers
- Maximum Length PDU

Note: All configurations must be performed by a GE Field Engineer.

2.7 SUPPORT OF EXTENDED CHARACTER SETS

The Advantage Workstation 3.1 will support only the ISO_IR 100 (ISO 8859-1:1987 Latin alphabet N 1. supplementary set) as extended character sets.

3. MEDIA STORAGE CONFORMANCE STATEMENT

3.1 INTRODUCTION

This section of the conformance statement (CS) specifies the Advantage Workstation 3.1 compliance to DICOM Media Interchange. It details the DICOM Media Storage Application Profiles and roles which are supported by this product.

This station provides capabilities to DICOM interchange on CD-Rs (Compact Disc-Recordable), on CDROMs (Compact Disc Read Only Memory) and on MODs (Magneto Optical Disc) with different application profiles supported for each media. Basically, the AW3.1 station works with Computed Tomography (CT), Magnetic Resonance (MR), Computed Radiography (CR), XRay Angiographic (XA) , XRay Fluoroscopic (RF) images and Secondary Captures (SC). Other applications may be used on the AW3.1 basis and may use or create other types of objects. Please, refer to the DICOM conformance statement of each added applications for a complete description of their compliance to DICOM media interchange.

Note that the format of this section strictly follows the format defined in DICOM Standard PS 3.2 (Conformance). Please refer to that part of the standard while reading this section.

3.2 IMPLEMENTATION MODEL

3.2.1 Application Data Flow Diagram

The Basic and Specific Application models for the CDR device, the CDROM device and the MOD device are shown in the following Illustrations :

SPECIFIC AE APPLICATION MODEL FOR THE CDR DEVICE

- Description of the data Flow Diagram for the CD-R device.

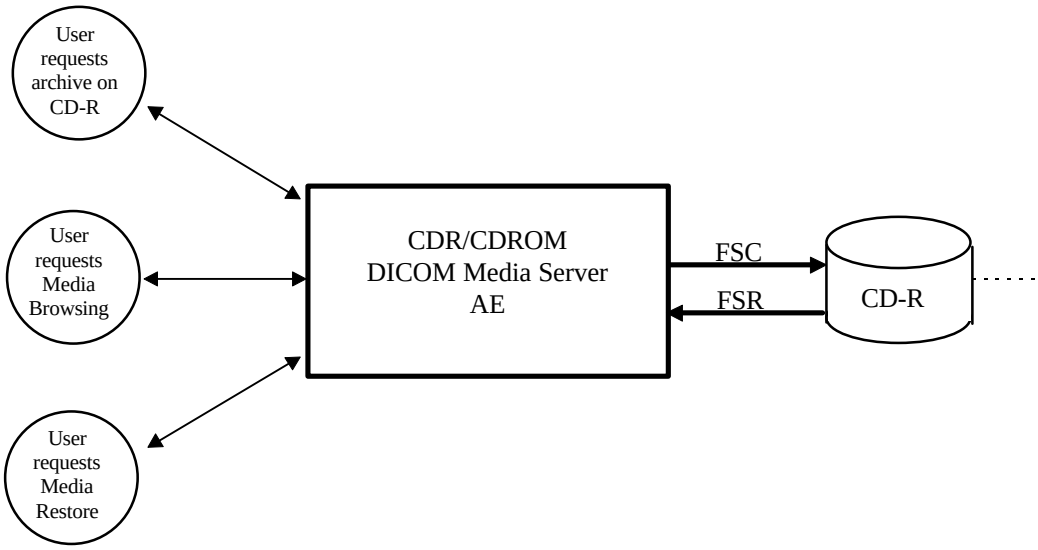
The DICOM ARCHIVE/RESTORE functionality for the CD-R device is handled by the CD-R/CDROM DICOM Media Server Application Entity (AE). The CD-R/CDROM DICOM Media Server Application Entity (AE) is commanded by the user to perform DICOM services operating on the DICOM media through the use of buttons and menu selections on the graphical user interface of the 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 CD-R as being the archive device (if this application 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 CDROM by selecting the CD-R drive as the active archive device, and browsing the archive using the “Query” Item of the Archive drop down menu, and then restore the selected items by a drag and drop on the local browser icon or by clicking on the suitable restore buttons.

The Application models for the CDR device are shown in Illustration 3–1.

ILLUSTRATION 3–1



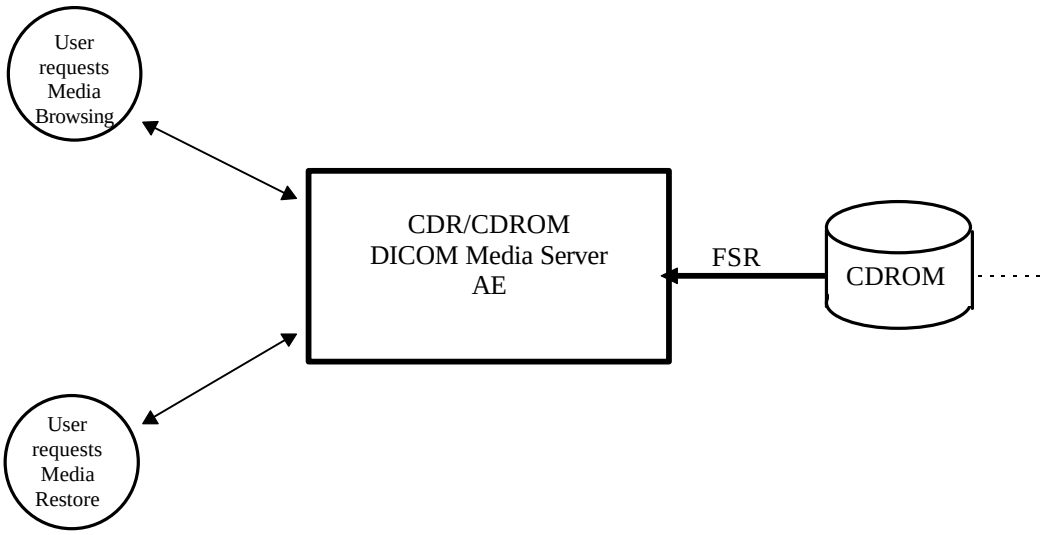
- Description of the data Flow Diagram for the CDROM device.

The DICOM ARCHIVE/RESTORE functionality for the CDROM device is handled by the CD-R/CDROM DICOM Media Server Application Entity (AE). The CD-R/CDROM 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 station.

The user can request the reading of a DICOM file set written on a CDROM by selecting the CD-R drive as the active archive device, and browsing the archive using the “Query” Item of the Archive drop down menu, and then restore the selected items by a drag and drop on the local browser icon or by clicking on the suitable restore buttons.

The Application model for the CDROM device are shown in Illustration 3-2

ILLUSTRATION 3-2



- Description of the data Flow Diagram for the MOD device.

The DICOM ARCHIVE/RESTORE functionality is handled by the MOD DICOM Media Server Application Entity (AE). The MOD 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 station.

The user can request the label of a MOD to create an empty DICOM File Set on the MOD. This operation enables the user to format a brand new MOD or to erase information previously stored.

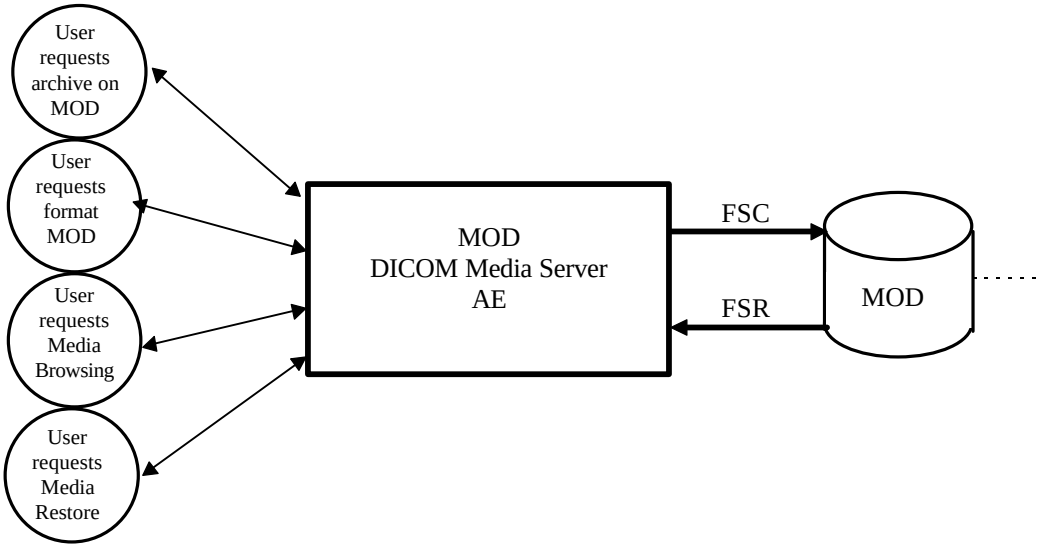
The user can archive the selected items in the local database by a drag and drop on the MOD icon or by clicking on the suitable archive buttons. Images belonging to the selected items are saved one by one on the MOD.

The user can request the reading of a DICOM file set written on a MOD by selecting the MOD drive and browsing the archive using the “Query” Item of the Archive drop down menu, and then restore the selected items by a drag and drop on the local browser icon or by clicking on the suitable restore buttons

.

The Application models for the MOD device are shown in Illustration 3-3.

ILLUSTRATION 3-3
SPECIFIC AE APPLICATION MODEL FOR MOD ARCHIVE



3.2.2 Functional Definition of AE's

3.2.3 Functional Definition of the DICOM Media Server AE

3.2.3.1 Functional definition of the CDR/CDROM DICOM Media Server AE

The CDR/CDROM 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 Computed Radiography (CR), Computed Tomography (CT), Magnetic Resonance (MR), X-ray Angiographic (XA), X-ray Radiofluoroscopic (RF) data types and secondary Capture in a one shot activity.
- Can write a DICOM File Set (FSC) on a CD-R in mono-session.
- Can read a DICOM File Set (FSR) on a CDROM.

3.2.3.2 Functional definition of the MOD DICOM Media Server AE

The MOD 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 CT, MR and secondary Capture that has the CT or MR modality.
- Can write a DICOM File Set (FSC) on a MOD. The write can empty the DICOM File Set which corresponds to a format of the MOD media or can add new Patient Folders/Studies/Series/Images.
- Can read a DICOM File Set (FSR) on a MOD.

3.2.4 Sequencing Requirements

For writing on new MODs, it is necessary to format the MOD before the user can request for an archive.

3.2.5 File Meta Information Options (See PS3.10)

The File Meta-Information for this implementation is :

File Meta-Information Version	1
Implementation Class UID	1.2.840.113619.6.59
Implementation Version Name	The Implementation Version Name is set dynamically through an environment variable

3.3 AE SPECIFICATIONS

3.3.1 DICOM CDR/CDROM SERVER AE Specification

The DICOM CDR/CDROM SERVER Application Entity provides standard conformance to DICOM Interchange Option of the Media Storage Service Class. The application Profiles and roles are listed below.

Supported Application Profile	Real World Activity	Role	Description
STD-GEN-CD AUG-XABC-CD, STD-XABC-CD	Browse CD	FSR	Interchange
STD-GEN-CD AUG-XABC-CD, STD-XABC-CD	Restore CD	FSR	Interchange
STD-GEN-CD AUG-XABC-CD	Archive CD	FSC See Note	Interchange

Note: Archive is available only on blank CD-Rs.

3.3.1.1 File Meta Information for the DICOM CDR/CDROM Application Entity

Following are the values set in the File Meta Information for this AE Title :

Source Application Entity Title	DICOMCDR

3.3.1.2 Real-World Activities for the DICOM CDR/CDROM Application Entity

3.3.1.2.1 Real-World Activity (RWA) "Browse CD"

The CD-R/CDROM DICOM Media Server AE acts as an FSR using the interchange option when requested to browse the CD.

When the CD-R/CDROM DICOM Media Server AE is requested to provide a directory listing, it reads the File-set and displays the DICOMDIR directory entries, according to the PATIENT, STUDY, SERIES, IMAGE paradigm.

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

3.3.1.2.1.1 Media Storage Application Profile for the RWA "Browse CD" :

For the list of Application Profiles that invoke this AE for the Browse CD RWA, see the Table in Section 3.3.1

3.3.1.2.1.1.1 Options :

Following are the SOP Classes supported by the RWA "Browse CD" :

Information Object Definition	SOP Class UID	Transfer Syntax	Transfer Syntax UID
Media Storage Directory Storage	1.2.840.10008.1.3.10	Explicit VR Little Endian	1.2.840.10008.1.2.1

3.3.1.2.2 Real-World Activity (RWA) "Restore CD"

The CD-R/CDROM DICOM Media Server AE acts as an FSR using the interchange option when requested to copy SOP instances from the CD to the local database.

The user selects the SOP instances that he wants the DICOM Media Server AE to copy on the local data base by a drag and drop on the local browser icon or or by clicking on the suitable restore buttons. Once selected, the SOP instances are copied from the media to the local database.

Only, the SOP classes supported by the station are declared to the database in a transfer syntax supported by the station.

3.3.1.2.2.1 Media Storage Application Profile for the RWA "Restore CD" :

For the list of Application Profiles that invoke this AE for the Restore CD RWA, see the Table in Section 3.3.1.

3.3.1.2.2.1.1 Options :

Following are the SOP Classes supported by the RWA "Restore CD" :

Information Object Definition	SOP Class UID	Transfer Syntax	Transfer Syntax UID
Media Storage Directory Storage	1.2.840.10008.1.3.10	Explicit VR Little Endian	1.2.840.10008.1.2.1
Computed Radiographic Image Storage	1.2.840.10008.5.1.4.1.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Explicit VR Little Endian	1.2.840.10008.1.2.1
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Explicit VR Little Endian	1.2.840.10008.1.2.1
Xray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Explicit VR Little Endian JPEG lossless Process 14 (selection value 1) for images 512x512 (8bits).	1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.70 for images 512x512 (8bits).
Xray 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

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
GE Private DICOM 3D object	1.2.840.113619.4.26	Explicit VR Little Endian	1.2.840.10008.1.2.1

3.3.1.2.3 Real-World Activity (RWA) "Archive CD"

The CD-R/CDROM DICOM Media Server acts as an FSC using the interchange option when requested to copy SOP Instances from the local data base to the CD-R.

The user has to insert a blank CD into the CD-R drive. Then, the user selects the entries in the local database that he wants the CD-R/CDROM DICOM Media Server to copy onto the CD.

The user has the opportunity to choose some options before archiving items :

- Display of a confirmation pop-up that indicates what can be archived on the CD-R.
- Read after write mode to check the binary integrity of what is written on the CD-R.
- the DICOM profile used for writing the CD-R. The user has the opportunity to choose :
  - the "General Purpose Profile" (STD-GEN-CD) : All the selected items will be archived using the STD-GEN-CD profile.
  - the "XA Augmented Cardiac Profile" (AUG-XABC-CD) : The selected XA 512x512 (8 bits) images will be archived using the STD-XABC-CD and all the other items will be archived using the STD-GEN-CD profile.

Before writing the CD, the DICOM Media Server 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 have been encoded with the ISO_IR 100 Specific Character Set or DICOM Default Character Set.

The corresponding SOP instances are set to the transfer syntax defined by the application and copied to the CD. Unknown Private Data Elements are removed from the dataset associated to the SOP Instance to be copied.

3.3.1.2.3.1 Media Storage Application Profile for the RWA "Archive CD" :

This AE can use the STD-GEN-CD or the AUG-XABC-CD profiles for the Archive CD RWA.

Please refer to the Table in Section 3.3.1.

3.3.1.2.3.1.1 Options :

Following are the SOP Classes supported by the RWA "Archive CD" :

Information Object Definition	SOP Class UID	Transfer Syntax	Transfer Syntax UID
Media Storage Directory Storage	1.2.840.10008.1.3.10	Explicit VR Little Endian	1.2.840.10008.1.2.1
Computed Radiographic Image Storage	1.2.840.10008.5.1.4.1.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Explicit VR Little Endian	1.2.840.10008.1.2.1
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Explicit VR Little Endian	1.2.840.10008.1.2.1

Xray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Explicit VR Little Endian JPEG lossless Process 14 (selection value 1) for images 512x512 (8bits).	1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.70 for images 512x512 (8bits).
Xray 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
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
GE Private DICOM 3D object	1.2.840.113619.4.26	Explicit VR Little Endian	1.2.840.10008.1.2.1

3.3.2 DICOM MOD SERVER AE Specification

The DICOM MOD SERVER Application Entity provides standard conformance to DICOM Interchange Option of the Media Storage Service Class. The application Profiles and roles are listed below.

Supported Application Profile	Real World Activity	Role	Description
STD-CTMR-MOD12 STD-CTMR-MOD23 PRI-CTMR-MOD12	Browse MOD	FSR	Interchange
STD-CTMR-MOD12 STD-CTMR-MOD23 PRI-CTMR-MOD12	Restore MOD	FSR	Interchange
STD-CTMR-MOD12 STD-CTMR-MOD23	Archive MOD	FSC	Interchange
STD-CTMR-MOD12 STD-CTMR-MOD23	Format	FSC	Interchange

3.3.2.1 File Meta Information for the DICOM MOD Application Entity

Following are the values set in the File Meta Information for this AE Title :

Source Application Entity Title	DICOMMOD

3.3.2.2 Real-World Activities for the DICOM MOD Application Entity

3.3.2.2.1 Real-World Activity (RWA) ”Browse MOD”

The MOD DICOM Media Server AE acts as an FSR using the interchange option when requested to browse the MOD.

When the MOD DICOM Media Server AE is requested to provide a directory listing, it reads the File-set and displays the DICOMDIR directory entries, according to the PATIENT, STUDY, SERIES, IMAGE paradigm.

If the DICOMDIR file is not found in the File-set, the MOD is considered as not formatted.

Only a DICOMDIR that conforms strictly to the DICOM Standard Supplement 18 or the GE Private Profile (PRI-CTMR-MOD12) will be considered as readable.

3.3.2.2.1.1 Media Storage Application Profile for the RWA "Browse MOD" :

For the list of Application Profiles that invoke this AE for the Browse MOD RWA, see the Table in Section 3.3.2.

3.3.2.2.1.1.1 Options :

Following are the SOP Classes supported by the RWA "Browse MOD" :

Information Object Definition	SOP Class UID	Transfer Syntax	Transfer Syntax UID
Media Storage Directory Storage	1.2.840.10008.1.3.10	Explicit VR Little Endian	1.2.840.10008.1.2.1

3.3.2.2.2 Real-World Activity (RWA) "Restore MOD"

The MOD DICOM Media Server AE acts as an FSR using the interchange option when requested to copy SOP instances from the MOD to the local database.

The user selects the SOP instances that he wants the DICOM Media Server AE to copy on the local data base by a drag and drop on the local browser icon or or by clicking on the suitable restore buttons. Once selected, the SOP instances are copied from the media to the local database.

Only, the SOP classes supported by the station are declared to the database in a transfer syntax supported by the station.

3.3.2.2.2.1 Media Storage Application Profile for the RWA "Restore MOD" :

For the list of Application Profiles that invoke this AE for the Restore CD RWA, see the Table in Section 3.3.2.

3.3.2.2.2.1.1 Options :

Following are the SOP Classes supported by the RWA "Restore MOD" :

Information Object Definition	SOP Class UID	Transfer Syntax	Transfer Syntax UID
Media Storage Directory Storage	1.2.840.10008.1.3.10	Explicit VR Little Endian	1.2.840.10008.1.2.1
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Explicit VR Little Endian	1.2.840.10008.1.2.1
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	JPEG Lossless Process 14 (selection value 1)	1.2.840.10008.1.2.4.70
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Explicit VR Little Endian	1.2.840.10008.1.2.1
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	JPEG Lossless Process 14 (selection value 1)	1.2.840.10008.1.2.4.70
Secondary Capture Image Storage (CT or MR modality)	1.2.840.10008.5.1.4.1.1.7	Explicit VR Little Endian	1.2.840.10008.1.2.1
Secondary Capture Image Storage (CT or MR modality)	1.2.840.10008.5.1.4.1.1.7	JPEG Lossless Process 14 (selection value 1)	1.2.840.10008.1.2.4.70

3.3.2.2.3 Real-World Activity (RWA) "Archive MOD"

The MOD DICOM Media Server acts as an FSC using the interchange option when requested to copy SOP Instances from the local data base to the MOD.

The user has to insert a formatted MOD into the MOD drive. Then, the user selects the entries in the local database that he wants the MOD DICOM Media Server to copy onto the MOD.

Before writing the MOD, the MOD DICOM Media Server checks for the following conditions :

- The selected SOP Classes can be saved on the media. If the condition is not met, an error is displayed.
- The corresponding SOP instances have been encoded with the ISO_IR 100 Specific Character Set or the DICOM Default Character Set.

The corresponding SOP instances are set to the transfer syntax defined by the application and copied to the MOD. Unknown Private Data Elements are removed from the dataset associated to the SOP Instance to be copied.

3.3.2.2.3.1 Media Storage Application Profile for the RWA "Archive MOD" :

This AE will use the STD-CTMR-MOD12 or STD-CTMR-MOD23 profiles for the RWA "Archive MOD".

The JPEG Lossless Process 14 (selection value 1) is chosen as the Transfer Syntax UID of objects stored on MODs.

Please refer to the Table in Section 3.3.2.

3.3.2.2.3.1.1 Options :

Following are the SOP Classes supported by the RWA "Archive MOD" :

Information Object Definition	SOP Class UID	Transfer Syntax	Transfer Syntax UID
Media Storage Directory Storage	1.2.840.10008.1.3.10	Explicit VR Little Endian	1.2.840.10008.1.2.1
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	JPEG Lossless Process 14 (selection value 1)	1.2.840.10008.1.2.4.70
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	JPEG Lossless Process 14 (selection value 1)	1.2.840.10008.1.2.4.70
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	JPEG Lossless Process 14 (selection value 1)	1.2.840.10008.1.2.4.70

3.3.2.2.4 Real-World Activity (RWA) "Format MOD"

The MOD DICOM Media Server acts as an FSC using the interchange option when requested to format (operation known as LABEL) MOD.

The user has to insert a blank or an already formatted MOD into the MOD drive. Then, the user clicks on the icon representing the MOD drive and selects the "Label" entry in the drop down menu.

The MOD DICOM Media Server AE then returns the current parameters of the MOD, and the user can confirm the LABEL.

Before erasing the data on the MOD, the MOD DICOM Media Server AE checks for the following conditions :

- The media is not "write protected".

The Format RWA will format a DOS file system on the MOD and an empty dicomdir.

3.3.2.2.4.1 Media Storage Application Profile for the RWA "Format MOD" :

This AE will use the STD-CTMR-MOD12 or STD-CTMR-MOD23 profiles for the RWA "Format MOD".

Please refer to the Table in Section 3.3.2.

3.3.2.2.4.1.1 Options :

Following are the SOP Classes supported by the RWA "Format MOD" :

Information Object Definition	SOP Class UID	Transfer Syntax	Transfer Syntax UID
Media Storage Directory Storage	1.2.840.10008.1.3.10	Explicit VR Little Endian	1.2.840.10008.1.2.1

Note: After the DOS format of the MOD, an empty DICOMDIR will be written on the MOD.

3.4 AUGMENTED AND PRIVATE APPLICATION PROFILES

One augmented profile is defined to archive XA 512x512 (8bits) images along with other SOP Classes. This profile is defined as the AUG-XA-CD Application Profile.

3.4.1 Augmented Application Profiles

3.4.1.1 Augmented Application Profile AUG-XA-CD

The AE defines the augmented profile AUG-XA-CD derived from the STD-XA-CD profile.

3.4.1.1.1 SOP Class Augmentations

Information Object Definition	SOP Class UID	Transfer Syntax	Transfer Syntax UID
Computed Radiographic Image Storage	1.2.840.10008.5.1.4.1.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Explicit VR Little Endian	1.2.840.10008.1.2.1
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Explicit VR Little Endian	1.2.840.10008.1.2.1
XRay Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	JPEG lossless Process 14 (selection value 1) for images 512x512 (8bits). Explicit VR Little Endian for other XA images	1.2.840.10008.1.2.4.70 for images 512x512 (8bits). 1.2.840.10008.1.2.1 for other XA images
Xray 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
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
GE Private DICOM 3D object	1.2.840.113619.4.26	Explicit VR Little Endian	1.2.840.10008.1.2.1

3.4.1.1.2 Directory Augmentations

No Directory Augmentation is implemented.

3.4.1.1.3 Other Augmentations

No Other Augmentations are implemented.

3.4.2 Private Application Profiles

GE Private DICOM Profile PRI-CTMR-MOD12 is implemented for the “Browse RWA” and “Restore RWA”.

The description of this private DICOM Profile can be found in the SIGNA HORIZON LX8.1 CONFORMANCE STATEMENT (Direction Number : 2171143-100).

3.5 EXTENSIONS, SPECIALIZATIONS, PRIVATIZATIONS OF SOP CLASSES AND TRANSFER SYNTAXES

This section describes the extension of SOP Classes used in the scope of the STD-GEN-CD and AUG-XA-CD Application Profiles.

3.5.1 Extensions, Specializations, and Privatizations of SOP Classes

3.5.1.1 SOP Specific Conformance Statement for SOP Media Storage Directory

The following keys are added as Type 3 data elements in the Basic Directory IOD :

Key Attribute	Tag	Directory Record Type
Patient's Birth Date	(0010,0030)	PATIENT
Patient's Sex	(0028,0011)	PATIENT
Series Description	(0008,103E)	SERIES
Manufacturer	(0008,1090)	SERIES
Institution Name	(0008,0080)	SERIES
Institution Address	(0008,0081)	SERIES
Attending Physician's Name	(0008,1050)	SERIES
Image Type	(0008,0008)	IMAGE
Recommended Display Frame Rate	(0008,2144)	IMAGE
Radiation Settings	(0018,1155)	IMAGE (See Note 1)
Image Comments	(0020,4000)	IMAGE
Number Of Frames	(0028,0008)	IMAGE
Rows	(0028,0010)	IMAGE
Columns	(0028,0011)	IMAGE
Angle Value 1	(0019,xx01)	IMAGE (See Note 2)
Angle Value 2	(0019,xx02)	IMAGE (See Note 2)
Angle Value 3	(0019,xx03)	IMAGE (See Note 2)
Angle Label 1	(0019,xx04)	IMAGE (See Note 2)
Angle Label 2	(0019,xx05)	IMAGE (See Note 2)
Angle Label 3	(0019,xx06)	IMAGE (See Note 2)

Note: Radiation Settings can be valued for XA and RF images only.

Note: Private group 19 is written in the IMAGE record of the SOP Media Storage Directory if it is present in the original image from the GEMS DLX acquisition machine and Private Creator Identification is DLX_SERIE_01.

3.5.1.2 Private data dictionary

TABLE 3.5-1
PRIVATE CREATOR IDENTIFICATION (DLX_SERIE_01)

Attribute Name	Tag	VR	VM
Angle Value 1	(0019,xx01)	DS	1
Angle Value 2	(0019,xx02)	DS	1
Angle Value 3	(0019,xx03)	DS	1
Angle Label 1	(0019,xx04)	CS	1
Angle Label 2	(0019,xx05)	CS	1
Angle Label 3	(0019,xx06)	CS	1

3.5.2 Private Transfer Syntax Specification

No private Transfer Syntax is written on media by the described DICOM CDR/CDROM SERVER AE or DICOM MOD SERVER AE of Advantage Workstation 3.1.

3.6 CONFIGURATION

The source AE Title encoded in the File Meta-Information can not be modified.

3.7 SUPPORT OF EXTENDED CHARACTER SETS

The Advantage Workstation 3.1 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 installed in the local database.

4. STUDY ROOT QUERY/RETRIEVE INFORMATION MODEL DEFINITION

4.1 INTRODUCTION

This section specifies the use of the DICOM Study Root Query/Retrieve Model used to organize data and against which a Query/Retrieve will be performed. The contents of this section are:

4.2 - Information Model Description

4.3 - Information Model Entity-Relationship Model

4.4 - Information Model Keys

4.2 STUDY ROOT INFORMATION MODEL DESCRIPTION

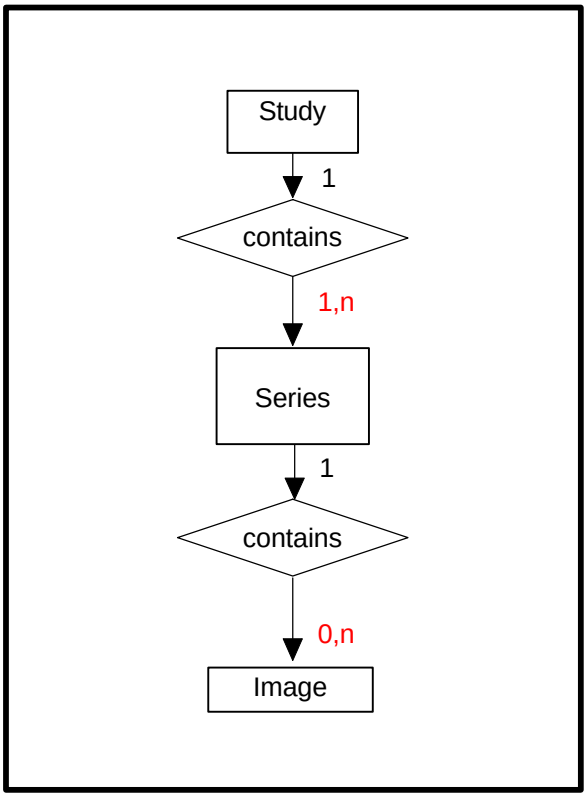
4.3 STUDY ROOT INFORMATION MODEL ENTITY-RELATIONSHIP MODEL

The Entity-Relationship diagram for the Study Root Information Model schema is shown in Illustration 4.3-1**.** 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 n Images per Series.

ILLUSTRATION 4.3-1
STUDY ROOT QUERY/RETRIEVE INFORMATION MODEL E/R DIAGRAM



4.3.1 Entity Descriptions

Please refer to DICOM Standard PS 3.4 (Service Class Specifications) for a description of each of the levels contained within the Study Root Query/Retrieve Information Model.

4.3.2 Advantage Workstation 3.1 Mapping of DICOM entities

TABLE 4.3-1
MAPPING OF DICOM ENTITIES TO ADVANTAGE WORKSTATION 3.1 ENTITIES

DICOM	Advantage Workstation 3.1 Entity
Study	Exam
Series	Series
Image	Image

4.4 INFORMATION MODEL KEYS

Please refer to DICOM Standard PS 3.4 (Service Class Specifications) for a description of each of the levels contained within the Study Root Query/Retrieve Information Model.

The following Level descriptions are included to specify what data elements are supported and what type of matching can be applied. It should be noted that they are the same ones as defined in the DICOM v3.0 Standard PS 3.4 (Service Class Specifications).

4.4.1 Supported Matching

Following are the types of matching that can be request by the implementation :

- Single Value Matching
- List of UID Matching
- Universal Matching
- Wild Card Matching
- Range of date, Range of Time Matching

4.4.2 Study Level

This section defines the keys at the Study Level of the Study Root Query/Retrieve Information Model that are supported by this implementation.

TABLE 4.4-2
STUDY LEVEL ATTRIBUTES FOR THE STUDY ROOT QUERY/RETRIEVE INFORMATION MODEL

Attribute Name	Tag	Type	Attribute Description
Study Date	(0008,0020)	R	filtering is possible
Study Time	(0008,0030)	R	filtering is possible
Accession Number	(0008,0050)	R	
Patient's Name	(0010,0010)	R	filtering is possible
Patient ID	(0010,0020)	R	filtering is possible
Study ID	(0020,0010)	R	
Study Instance UID	(0020,000D)	U	filtering is possible
Study Description	(0008,1030)	O	
Name of Physician reading study	(0008,1060)	O	

TABLE 4.4-3
Q/R STUDY LEVEL AND LOCATION FOR RETRIEVE ATTRIBUTES

Attribute Name	Tag	Type	Note
Query Retrieve Level	(0008,0052)	-	Value = STUDY

4.4.3 Series Level

This section defines the keys at the Series Level of the Study Root Query/Retrieve Information Model that are supported by this implementation.

TABLE 4.4-4
SERIES LEVEL ATTRIBUTES FOR THE STUDY ROOT QUERY/RETRIEVE INFORMATION MODEL

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	R	filtering is possible
Series Number	(0020,0011)	R	
Series Instance UID	(0020,000E)	U	filtering is possible
Series Description	(0008,103E)	O	
Manufacturer	(0008,0070)	O	

TABLE 4.4-5
Q/R SERIES LEVEL AND LOCATION FOR RETRIEVE ATTRIBUTES

Attribute Name	Tag	Type	Note
Query Retrieve Level	(0008,0052)	-	Value = SERIES

4.4.4 Image Level

This section defines the keys at the Image Level of the Study Root Query/Retrieve Information Model that are supported by this implementation.

TABLE 4.4-6
IMAGE LEVEL ATTRIBUTES FOR THE STUDY ROOT QUERY/RETRIEVE INFORMATION MODEL

Attribute Name	Tag	Type	Attribute Description
Image Number	(0020,0013)	R	
SOP Instance UID	(0008,0018)	U	filtering is possible
Image Date	(0008,0023)	O	
Image Time	(0008,0033)	O	
Contrast/Bolus Agent	(0018,0010)	O	
Sequence Variant	(0018,0021)	O	
Slice Thickness	(0018,0050)	O	
Repetition Time	(0018,0080)	O	
Echo Time	(0018,0081)	O	
Inversion Time	(0018,0082)	O	
Number of Averages	(0018,0083)	O	
Echo Numbers	(0018,0086)	O	
Spacing Between Slices	(0018,0088)	O	
Data Collection Diameter	(0018,0090)	O	
Percent Phase Field of View	(0018,0094)	O	
Trigger Time	(0018,1060)	O	
Gantry/Detector Tilt	(0018,1120)	O	
Convolution Kernel	(0018,1210)	O	
Acquisition Matrix	(0018,1310)	O	
Flip Angle	(0018,1314)	O	
Image Position Patient	(0020,0032)	O	
Image Orientation Patient	(0020,0037)	O	
Slice Location	(0020,1041)	O	
Number of Frames	(0028,0008)	O	
Rows	(0028,0010)	O	
Columns	(0028,0011)	O	
Recommended Display Frame Rate	(0028,2144)	O	

TABLE 4.4-7
Q/R IMAGE LEVEL AND LOCATION FOR RETRIEVE ATTRIBUTES

Attribute Name	Tag	Type	Note
Query Retrieve Level	(0008,0052)	-	Value = IMAGE

4.5 PRIVATE DATA DICTIONARY

No private data dictionary is defined.

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5. NETWORK PRINT SCU CONFORMANCE STATEMENT

5.1 INTRODUCTION

This section of the DICOM Conformance Statement specifies the compliance to DICOM conformance requirements for the relevant Grayscale **Network Printing** features on this GEMS product. Note that the format of this section strictly follows the format defined in DICOM Standard PS 3.2 (Conformance). Please refer to that part of the standard while reading this section.

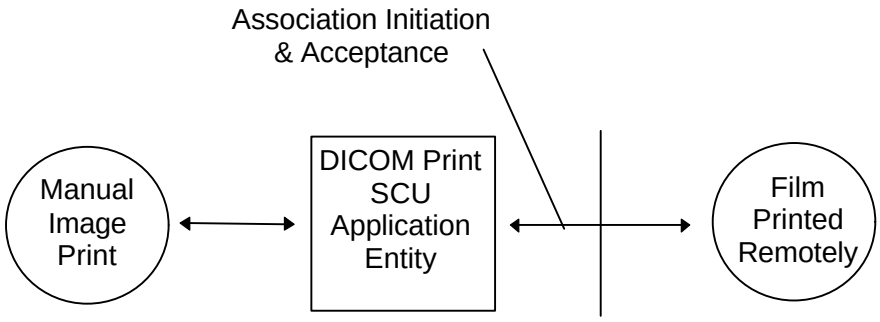
The Advantage Workstation 3.1 has the ability to compose films through the use of 2 applications known as SCRAPBOOK and FILM COMPOSER. The Advantage Workstation 3.1 uses DICOM Print Management Service Class to send images to hard copy printers. The films can then be used for possible further analysis.

5.2 IMPLEMENTATION MODEL

5.2.1 Application Data Flow Diagram

The Basic and Specific Application models for this device are shown in the following Illustration :

DICOM Print SCU Application Entity Model



The DICOM Print SCU Application Entity (AE) is an application which handles DICOM protocol communication with Remote DICOM Printers. The DICOM Print SCU AE is activated when the user requests for a print.

The DICOM Print SCU AE is invoked by the following Real World Activity :

- Manual Image Print.

For this operation, the operator uses the SCRAPBOOK or the FILM COMPOSER applications to prepare a layout of images and then send the result to a selected Remote DICOM Printer.

5.2.2 Functional Definition of AE's

The DICOM Print SCU AE supports the following functions :

- Access to pixel data in the local database.

- Initiate a DICOM association to send DICOM SOP Classes (corresponding to the DICOM Print Management service class) to a remote DICOM Printer.

5.2.3 Sequencing of Real-World Activities

5.2.3.1 Manual Image Print

1. The user selects the remote DICOM Printer from FILM COMPOSER or SCRAPBOOK Graphical User Interface
2. The images to be printed shall be dragged and drop into FILM COMPOSER or SCRAPBOOK applications either manually or automatically.
3. The user starts the print and activates the DICOM Print SCU AE that initiate the following actions.
4. Initiates a DICOM association and selects a Presentation Context
5. N-GETs printer status from the Printer SOP Instance
6. N-CREATEs a Basic Film Session SOP Instance
7. N-CREATEs a Basic Film Box SOP Instance for the current film
8. N-SETs the Basic Film Box SOP Instance with the Image Box SOP Instance for each image on the film
9. N-ACTIONs on the Basic Film Box SOP Instance
10. N-DELETEs on the Basic Film Box SOP Instance
11. Receives N-EVENT-REPORTs of the Printer SOP Instance indicating printer status
12. If no N-EVENT-REPORT has been received after a configurable timeout performs an NGET to obtain the printer status from the Printer SOP Instance
13. Releases the DICOM association after printing is successful or failure has been signaled to the user

5.3 AE SPECIFICATIONS

5.3.1 DICOM Print SCU AE Specification

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

SOP Class Name	SOP Class UID
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9

Note: Support of the Basic Grayscale Print Management Meta SOP Class as an SCU mandates support for the Basic Film Session, Basic Film Box, Basic Grayscale Image Box and Printer SOP Classes as an SCU.

5.3.1.1 Association Establishment Policies

5.3.1.1.1 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 DICOM Print SCU is :

Maximum Length PDU	16384

The Print Management Service Class does not support extended negotiation.

The maximum number of Presentation Context Items that will be proposed is : 6

The user information Items sent by this product are :

- Maximum PDU Length
- Implementation UID
- Implementation Version Name

Note: The maximum PDU length can be modified at installation time. 0 as PDU length is not supported by this implementation.

5.3.1.1.2 Number of Associations

The DICOM Print SCU AE supports only one association at a time. Request are internally queued.

5.3.1.1.3 Asynchronous Nature

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

5.3.1.1.4 Implementation Identifying Information

The Implementation UID for this DICOM v3.0 Implementation is:

Advantage Workstation 3.1 Implementation UID	1.2.840.113619.6.59

The Implementation Version Name for this DICOM v3.0 Implementation is:

Advantage Workstation 3.1 Implementation Version Name	1_2_9

5.3.1.2 Association Initiation Policy

The DICOM Print SCU AE initiates one association with the selected REMOTE DICOM Printer. No other association can be opened by the DICOM Print SCU AE while the current association is active.

5.3.1.2.1 Real-World Activity "Manual Image Print"

5.3.1.2.1.1 Associated Real-World Activity

The user has the possibility to drag and drop images from the VIEWER to the FILM COMPOSER or the SCRAPBOOK applications. The FILM COMPOSER or the SCRAPBOOK applications also allows to define, suppress and select different REMOTE DICOM printers and to manipulate some print parameters like the number of copies. When the user requests for a print by pushing the "Print" button, the DICOM Print SCU tries to establish the association with the requested printer and sends the images for printing.

5.3.1.2.1.2 Proposed Presentation Context Table

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

5.3.1.2.1.2.1 SOP Specific DICOM Conformance Statement for Print Management SOP Classes

For each of the supported Print Management SOP and Meta SOP Classes, the optional attributes and service elements supported, the valid range of values for mandatory and optional attributes, and the status code behavior are described in Annex.

5.4 COMMUNICATION PROFILES

5.4.1 Supported Communication Stacks (PS 3.8, PS 3.9)

DICOM Upper Layer (PS 3.8) is supported using TCP/IP.

5.4.2 OSI Stack

OSI stack not supported

5.4.3 TCP/IP Stack

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

5.4.3.1 API

Not applicable to this product.

5.4.3.2 Physical Media Support

DICOM is indifferent to the Physical medium over which TCP/IP executes (e.g. Ethernet V2.0,IEEE 802.3, ATM, FDDI)

Note: For more information about the Physical Media available on Advantage Workstation 3.1, please refer to the Product Data Sheet.

5.4.4 Point-to-Point Stack

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

5.5 EXTENSIONS / SPECIALIZATIONS / PRIVATIZATIONS

5.5.1 Standard Extended /Specialized/Private SOP Classes

No Standard Extended, no Specialized, no Private SOP Classes are managed by this application.

5.5.2 Private Transfer Syntaxes

No Private Transfer Syntaxes are managed by this product.

5.6 CONFIGURATION

5.6.1 AE Title/Presentation Address Mapping

The local DICOM Print SCU AE Title is : “Print_SCU”.

The FILM COMPOSER and the SCRAPBOOK applications allow the user to add, delete, or update the following Remote DICOM Printers parameters :

- AE Title
- DICOM Port Number
- IP address

5.6.2 Configurable Parameters

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

- Local AE Title
- Local IP Address
- Local IP Netmask

Note: The local Port Number may be not applicable because the product is never responding to an association request.

The following fields are configurable for every remote DICOM AE:

- Remote AE Title
- Remote IP Address
- Listening TCP/IP Port Number

Only one default router IP Address can be configured for all DICOM remote nodes (including printers, Storage SCP Workstations, ...)

The following fields are configurable:

- Association Establishment Timer (default set to 600s)
- N-SET timer (default set to 300s)
- N-ACTION timer (default set to 300s)
- N-GET timer (default set to 300s)

- N-DELETE timer (default set to 300s)
- Inactivity Timers (default set to 3000s)
- Maximum Length PDU

Note: All configurations must be performed by a GE Field Engineer.

Note: Only one association can be performed at a time by this implementation.

5.7 SUPPORT OF EXTENDED CHARACTER SETS

The Advantage Workstation 3.1 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 installed in the local database.

6. PRINT MANAGEMENT SOP CLASS DEFINITION

6.1 INTRODUCTION

This section of the DICOM Conformance Statement specifies the supported Print Management SOP and Meta SOP Classes, the optional attributes and service elements supported, the valid range of values for mandatory and optional attributes, and the status code behavior.

This section contains:

6.2.1- Basic Film Session SOP Class

6.2.2 - Basic Film Box SOP Class

6.2.3 - Image Box SOP Classes

6.2.4 - Printer SOP Class

6.2.5 - Print Job SOP Class

6.2.6- Basic Annotation Box SOP Class

6.2.7 - Image Overlay Box SOP Class

6.2 PRINT MANAGEMENT SOP CLASS DEFINITIONS

6.2.1 Basic Film Session SOP Class

The DICOM Print SCU AE supports the N-CREATE DIMSE Service Element for the Basic Film Session SOP Class.

- The N-CREATE DIMSE Service element sent by the DICOM Print SCU AE requests the Remote DICOM Print SCP to create an instance of Basic Film Session.

6.2.1.1 IOD Description

6.2.1.1.1 IOD modules

Module	Reference	Module Description
SOP Common		Contains SOP Common information
Basic Film Session Presentation Module	6.2.1.1.2	Contains Film Session presentations information
Basic Film Session Relationship	6.2.1.1.3	References to related SOPs

6.2.1.1.2 Basic Film Session Presentation Module

Attribute name	Tag	Attribute Description
Number of Copies	(2000,0010)	1 to 10.
Print Priority	(2000,0020)	HIGH or MED or LOW depending of configuration
Medium Type	(2000,0030)	PAPER or CLEAR FILM or BLUE FILM depending of configuration of associated Remote DICOM printer
Film Destination	(2000,0040)	MAGAZINE or PROCESSOR depending of configuration of associated Remote DICOM printer

6.2.1.1.3 Basic Film Session Relationship Module

Attribute Name	Tag	Attribute Description
Referenced Film Box Sequence	(2000,0500)	Empty
>Referenced SOP Class UID	(0008,1150)	Empty
>Referenced SOP Instance UID	(0008,1155)	Empty

6.2.1.2 DIMSE Service Group

DIMSE Service Element	Usage SCU
N-CREATE	M
N-SET	Not used
N-DELETE	Not used
N-ACTION	Not used

6.2.1.2.1 N-CREATE

6.2.1.2.1.1 Attributes

Attribute Name	Tag	Usage SCU
Number of Copies	(2000,0010)	Used
Print Priority	(2000,0020)	Used
Medium Type	(2000,0030)	Used
Film Destination	(2000,0040)	Used

6.2.1.2.1.2 Status

Service Status	Status Codes	Further Meaning	Application Behavior When receiving Status Codes
Warning	B600	Memory allocation not supported	Association is aborted
Success	0000	Film session successfully created	Next step describe in the sequencing of Real-World Activities paragraph is performed

6.2.1.2.1.3 Behavior

No specific behavior.

6.2.1.2.2 N-SET

This service is not used.

6.2.1.2.3 N-DELETE

This service is not used.

6.2.1.2.4 N-ACTION

This service is not used.

6.2.2 Basic Film Box SOP Class

The DICOM Print SCU AE supports the following DIMSE Service Element for the Basic Film Box SOP Class.

- The N-CREATE DIMSE Service element sent by the DICOM Print SCU AE requests the Remote DICOM Print SCP to create an instance of Basic Film Box
- The N-ACTION DIMSE Service element sent by the DICOM Print SCU AE requests the Remote DICOM Print SCP to print the Basic Film Box onto the hard copy printer.
- The N-DELETE DIMSE Service element sent by the DICOM Print SCU AE requests the Remote DICOM Print SCP to release the Basic Film Box instance.

6.2.2.1 IOD Description

6.2.2.1.1 IOD modules

Module	Reference	Module Descripion
SOP Common		Contains SOP Common information
Basic Film Box Presentation Module	6.2.2.1.2	Contains Film Box presentation information
Basic Film Box Relationship	6.2.2.1.3	References to related SOPs

6.2.2.1.2 Basic Film Box Presentation Module

Attribute Name	Tag	Attribute Description
Image Display Format	(2010,0010)	STANDARD\C,R [C 1 to 5] and [R 1 to 4] SLIDE SUPERSLIDE
Annotation Display Format ID	(2010,0030)	Not sent.
Film Orientation	(2010,0040)	PORTRAIT LANDSCAPE
Film Size ID	(2010,0050)	8INX10IN 10INX12IN 10INX14IN 11INX14IN 14INX14IN 14INX17IN 24CMX24CM 24CMX30CM
Magnification Type	(2010,0060)	One of the following defined term is sent : REPLICATE BILINEAR CUBIC NONE

Note: Smoothing Type (2010,0080) is not sent.

6.2.2.1.3 Basic Film Box Relationship Module

Attribute Name	Tag	Attribute Description
Referenced Film Session Sequence	(2010,0500)	Empty
>Referenced SOP Class UID	(0008,1150)	Empty
>Referenced SOP Instance UID	(0008,1155)	Empty
Referenced Image Box Sequence	(2010,0510)	Empty
>Referenced SOP Class UID	(0008,1150)	Empty
>Referenced SOP Instance UID	(0008,1155)	Empty
Referenced Basic Annotation Box Sequence	(2010,0520)	Empty
>Referenced SOP Class UID	(0008,1150)	Empty
>Referenced SOP Instance UID	(0008,1155)	Empty

6.2.2.2 DIMSE Service Group

DIMSE Service Element	Usage SCU
N-CREATE	M
N-ACTION	M
N-DELETE	Used

6.2.2.2.1 N-CREATE

6.2.2.2.1.1 Attributes

Attribute Name	Tag	Usage SCU
Image Display Format	(2010,0010)	M
Referenced Film Session Sequence	(2010,0500)	M
>Referenced SOP Class UID	(0008,1150)	M
>Referenced SOP Instance UID	(0008,1155)	M
Referenced Image Box Sequence	(2010,0510)	Not used
>Referenced SOP Class UID	(0008,1150)	Not used
>Referenced SOP Instance UID	(0008,1155)	Not used
Referenced Basic Annotation Box Sequence	(2010,0520)	Not used
>Referenced SOP Class UID	(0008,1150)	Not used
>Referenced SOP Instance UID	(0008,1155)	Not used
Film Orientation	(2010,0040)	Used
Film Size ID	(2010,0050)	Used
Magnification Type	(2010,0060)	Used
Max Density	(2010,0130)	Not Used
Configuration Information	(2010,0150)	Not used
Annotation Display Format ID	(2010,0030)	Not used
Smoothing Type	(2010,0080)	Not Used
Border Density	(2010,0100)	Not Used
Empty Image Density	(2010,0110)	Not Used
Min Density	(2010,0120)	Not Used
Trim	(2010,0140)	Not Used

6.2.2.2.1.2 Status

There are no specific status codes.

6.2.2.2.1.3 Behavior

There is no specific behavior.

6.2.2.2.2 N-DELETE

6.2.2.2.2.1 Behavior

The SCU uses the N-DELETE to request the SCP to delete the Basic Film Box SOP Instance hierarchy.

6.2.2.2.3 N-ACTION

N-ACTION is used to print the current film of the film session.

6.2.2.2.3.1 Attributes

Action Type Name	Action Type ID	Attribute	Tag	Usage SCU
Print	1	Referenced Print Job Sequence	(2100,0500)	Not used
		>Referenced SOP Class UID	(0008,1150)	Not used
		>Referenced SOP Instance UID	(0008,1155)	Not used

6.2.2.2.3.2 Status

Service Status	Status Codes	Further Meaning	Application Behavior When receiving Status Codes
Success	0000	Film accepted for printing.	Next step describe in the sequencing of Real-World Activities paragraph is performed
Warning	B603	Film Box SOP Instance hierarchy does not contain Image Box SOP Instances (empty page)	This case should not happen. This warning is considered as an error. Association is aborted.
Failure	C602	Unable to create Print Job SOP Instance; print queue is full	Appropriate message is returned to the user. Association is aborted.
	C604	Image position collision : multiple images assigned to single image position	Appropriate message is returned to the user. Association is aborted.
	C603	Image size is larger than image box size (by using the specified magnification value)	Appropriate message is returned to the user. Association is aborted.

6.2.2.2.3.3 Behavior

SCU uses the N-ACTION to request the SCP to print one or more copies of a single film of the film session.

6.2.3 Image Box SOP Classes

6.2.3.1 Basic Grayscale Image Box SOP Class

The DICOM Print SCU AE supports the following DIMSE Service Element for the Basic Grayscale Image Box SOP Class.

- The N-SET DIMSE Service element sent by the DICOM Print SCU AE requests the Remote DICOM Print SCP to set the attributes of the Basic Grayscale Image Box Instance.

6.2.3.1.1 IOD description

6.2.3.1.1.1 IOD modules

Module	Reference	Module Description
SOP Common		Contains SOP Common information
Image Box Presentation Module	6.2.3.1.1.2	Contains Image Box presentation information
Image Box Relationship Module	6.2.3.1.1.3	References to related SOPs

6.2.3.1.1.2 Image Box Pixel Presentation Module

Attribute Name	Tag	Attribute Description
Image Position	(2020,0010)	1 to N (where N < 20)
Polarity	(2020,0020)	NORMAL = pixels shall be printed as specified by the Photometric Interpretation (0028,0004) REVERSE = pixels shall be printed with the opposite polarity as specified by the Photometric Interpretation (0028,0004)
Magnification Type	(2010,0060)	One of the following defined term is sent : REPLICATE BILINEAR CUBIC NONE
Smoothing Type	(2010,0080)	Not Sent
Requested Image Size	(2020,0030)	Not Sent
Preformatted Grayscale Image Sequence	(2020,0110)	This sequence is always included if the Image Box is a Basic Grayscale Image Box
>Samples Per Pixel	(0028,0002)	1
>Photometric Interpretation	(0028,0004)	MONOCHROME1 or MONOCHROME2 depending of the original image.
>Rows	(0028,0010)	512 Standard, 1024 High Resol. 2048 Very high res.
>Columns	(0028,0011)	512 Standard, 1024 High Resol. 2048 Very high res
>Pixel Aspect Ratio	(0028,0034)	1\1
>Bits Allocated	(0028,0100)	8
>Bits Stored	(0028,0101)	8
>High Bit	(0028,0102)	7
>Pixel Representation	(0028,0103)	0 (Unsigned Integer)
>Pixel Data	(7FE0,0010)	

6.2.3.1.1.3 Image Box Relationship Module

Attribute Name	Tag	Attribute Description
Referenced Image Sequence	(0008,1140)	Not used
>Referenced SOP Class UID	(0008,1150)	Not used
>Referenced SOP Instance UID	(0008,1155)	Not used
>Referenced Frame Number	(0008,1160)	Not used
Referenced Image Overlay Box Sequence	(2020,0130)	Not used
>Referenced SOP Class UID	(0008,1150)	Not used
>Referenced SOP Instance UID	(0008,1155)	Not used
>Referenced Frame Number	(0008,1160)	Not used
Referenced VOI LUT Sequence	(2020,0140)	Not used
>Referenced SOP Class UID	(0008,1150)	Not used
>Referenced SOP Instance UID	(0008,1155)	Not used

6.2.3.1.2 DIMSE Service Group

DIMSE Service Element	Usage SCU
N-SET	M

6.2.3.1.2.1 N-SET

6.2.3.1.2.1.1 Attributes

Attribute Name	Tag	Usage SCU
Image Position	(2020,0010)	M
Preformatted Grayscale Image Sequence	(2020,0110)	M
>Samples Per Pixel	(0028,0002)	M
>Photometric Interpretation	(0028,0004)	M
>Rows	(0028,0010)	M
>Columns	(0028,0011)	M
>Pixel Aspect Ratio	(0028,0034)	1\1
>Bits Allocated	(0028,0100)	M
>Bits Stored	(0028,0101)	M
>High Bit	(0028,0102)	M
>Pixel Representation	(0028,0103)	M
>Pixel Data	(7FE0,0010)	M
Polarity	(2020,0020)	Used
Referenced Overlay Sequence	(0008,1130)	Not used
>SOP Class UID	(0008,1150)	Not used
>SOP Instance UID	(0008,1155)	Not used
Magnification Type	(2010,0060)	Used
Smoothing Type	(2010,0080)	Not Used
Requested Image Size	(2020,0030)	Not used

6.2.3.1.2.1.2 Status

Service Status	Status Codes	Further Meaning	Application Behavior When receiving Status Codes
Failure	C605	Insufficient memory in printer to store the image	Appropriate message is returned to the user. Association is aborted.

6.2.3.1.2.1.3 Behavior

There is no specific behavior.

The SCU does not instruct the SCP to erase the image in the image position by setting a zero length and no value in the Attribute Preformatted Grayscale Image Sequence (2020,0110) or Preformatted Grayscale Image Sequence (2020,0111)

6.2.4 Printer SOP Class

The DICOM Print SCU AE supports the following DIMSE Service Element for the Basic Printer SOP Class.

The N-EVENT_REPORT DIMSE Service element sent by the DICOM Print SCP to the local DICOM Print SCU AE. The DICOM Print SCU handles the Printer Status and Printer Status Info fields. All other received data are ignored.

The N-GET DIMSE Service element sent by the DICOM Print SCU AE requests the Remote DICOM Print SCP to give information on the Remote DICOM Printer.

6.2.4.1 IOD Description

6.2.4.1.1 IOD modules

Module	Reference	Module Description
SOP Common		Contains SOP Common information
Printer Module	6.2.4.1.2	Contains status information to monitor the printer

6.2.4.1.2 Printer Module

Attribute Name	Tag	Attribute Description
Printer Status	(2110,0010)	The behaviour defined for the following term NORMAL : Association goes on. WARNING : Association is released except if Printer Status Info is SUPPLY LOW. FAILURE : Association is aborted.
Printer Status Info	(2110,0020)	The behaviour is defined for SUPPLY LOW. (See upwards)
Printer Name	(2110,0030)	Printer shall return value
Manufacturer	(0008,0070)	Printer shall return value
Manufacturer Model Name	(0008,1090)	Printer shall return value
Device Serial Number	(0018,1000)	Printer shall return value
Software Versions	(0018,1020)	Printer shall return value
Date Of Last Calibration	(0018,1200)	Printer shall return value
Time Of Last Calibration	(0018,1201)	Printer shall return value

6.2.4.2 DIMSE Service Group

DIMSE Service Element	Usage SCU
N-EVENT-REPORT	M
N-GET	U

6.2.4.2.1 N-EVENT-REPORT

6.2.4.2.1.1 Attributes

Event Type Name	Event Type ID	Attribute	Tag	Usage SCU
Normal	1			
Warning	2	Printer Name	(2110,0030)	
		Printer Status Info	(2110,0020)	
Failure	3	Printer Name	(2110,0030)	
		Printer Status Info	(2110,0020)	

6.2.4.2.1.2 Behavior

On reception of Warning or Failure status, the Print SCU aborts the association.

6.2.4.2.2 N-GET

6.2.4.2.2.1 Attributes

Attribute name	Tag	Usage SCU
Printer Status	(2110,0010)	Used
Printer Status Info	(2110,0020)	Used
Printer Name	(2110,0030)	Used
Manufacturer	(0008,0070)	Used
Manufacturer Model Name	(0008,1090)	Used
Device Serial Number	(0018,1000)	Used
Software Versions	(0018,1020)	Used
Date Last Calibration	(0018,1200)	Used
Last Calibration	(0018,1201)	Used

6.2.4.2.2.2 Behavior

If Printer Status is FAILURE, the association is aborted. If Printer Status is WARNING, the association is released except if Printer Status Info is “SUPPLY LOW”.

6.2.5 Print Job SOP Class

This SOP Class is not supported by this implementation.

6.2.6 Basic Annotation Box SOP Class

This SOP Class is not supported by this implementation.

6.2.7 Image Overlay Box SOP Class

This SOP Class is not supported by this implementation.

7. SC INFORMATION OBJECT IMPLEMENTATION

7.1 INTRODUCTION

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

7.2- SC Entity-Relationship Model

7.3- SC-IOD MODULE TABLE

7.4- IOD Module Definition

7.5- PRIvate data dictionary

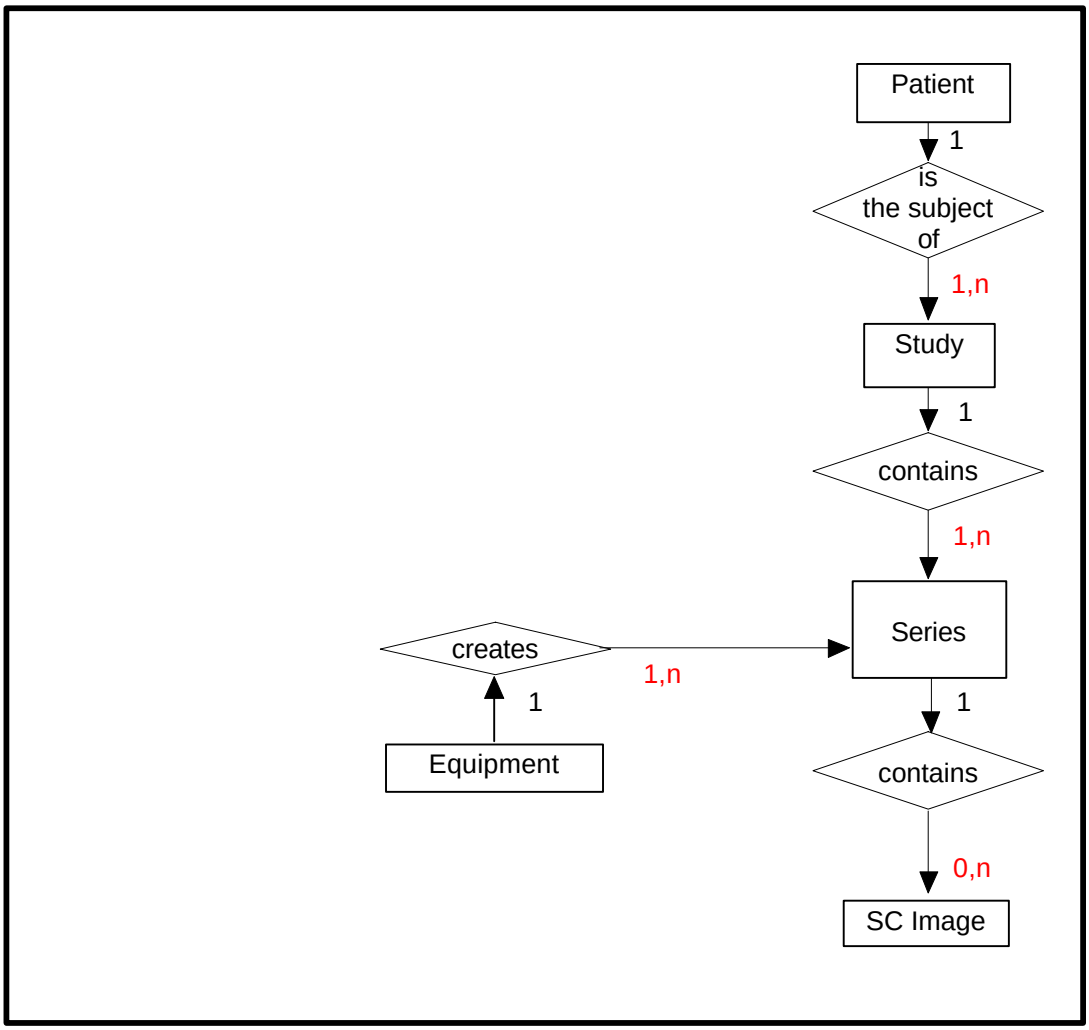
7.2 SC ENTITY-RELATIONSHIP MODEL

The Entity-Relationship diagram for the SC Image interoperability schema is shown in **Illustration 7.2.1.** 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 n 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 7.2-1
SC IMAGE ENTITY RELATIONSHIP DIAGRAM



7.2.1 ENTITY DESCRIPTIONS

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

7.2.1.1 Patient Entity Description

7.2.1.2 Study Entity Description

7.2.1.3 Series Entity Description

7.2.1.4 Equipment Entity Description

7.2.1.5 SC Image Entity Description

7.2.1.6 Overlay Entity Description

7.2.1.7 VOI Lookup Table Entity Description

7.2.2 Advantage Workstation 3.1 Mapping of DICOM entities

TABLE 7.2-1
MAPPING OF DICOM ENTITIES TO ADVANTAGE WORKSTATION 3.1 ENTITIES

DICOM	Advantage Workstation 3.1 Entity
Patient	Patient
Study	Exam
Series	Series
Image	Image

7.3 SC-IOD MODULE TABLE

Within an entity of the DICOM v3.0 SC 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 7.3.1 identifies the defined modules within the entities which comprise the DICOM v3.0 SC IOD. Modules are identified by Module Name.

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

TABLE 7.3.1
SC IMAGE IOD MODULES

Entity Name	Module Name	Reference
Patient	Patient	**7.4.1.1**
Study	General Study	**7.4.1.2**
	Patient Study	**7.4.2.2**
Series	General Series	**7.4.3.1**
Equipment	General Equipment	**7.4.4.1**
	SC Equipment	
Image	General Image	**7.4.5.1**
	Image Pixel	**7.4.5.2**
	SC Image	
	Overlay Plane	
	Modality LUT	**7.4.7.2**
	VOI LUT	**7.4.7.1**
	SOP Common	**7.4.8.1**

7.4 SC-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 SC 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).

7.4.1 Common Patient Entity Modules

7.4.1.1 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 7.4-1
PATIENT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Patient's Name	(0010,0010)	2	Original if Screen Save image. Original if patients are not mixed in Scrapbook image. User defined if patients are mixed in Scrapbook image.
Patient ID	(0010,0020)	2	Original if Screen Save image. Original if patients are not mixed in Scrapbook image. function of pid and time if patients are mixed in Scrapbook image
Patient's Birth Date	(0010,0030)	2	Original if Screen Save image. Original if patients are not mixed in Scrapbook image. Empty if patients are mixed in Scrapbook image.
Patient's Sex	(0010,0040)	2	Original if Screen Save image. Original if patients are not mixed in Scrapbook image. Empty if patients are mixed in Scrapbook image.

7.4.2 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.

7.4.2.1 General Study Module

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

TABLE 7.4-2
GENERAL STUDY MODULE ATTRIBUTES

Attribute Name	Tag	Type	Notes
Study Instance UID	(0020,000D	1	Original if Screen Save Image Original if patients are not mixed in Scrapbook images Generated if patients are mixed in Scrapbook images
Study Date	(0008,0020	2	Original if Screen Save Image Original if patients are not mixed in Scrapbook images Generated if patients are mixed in Scrapbook images
Study Time	(0008,0030	2	Original if Screen Save Image Original if patients are not mixed in Scrapbook images Generated if patients are mixed in Scrapbook images
Referring Physician's Name	(0008,0090	2	Empty
Study ID	(0020,0010	2	Original if Screen Save Image Original if patients are not mixed in Scrapbook images Generated if patients are mixed in Scrapbook images
Accession Number	(0008,0050	2	Empty
Study Description	(0008,1030)	3	Original if Screen Save Image Original if patients are not mixed in Scrapbook images Generated if patients are mixed in Scrapbook images

7.4.2.2 Patient Study Module

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

TABLE 7.4-3
PATIENT STUDY MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Patient's Age	(0010,1010)	3	Original if Screen Save Image Original if patients are not mixed in Scrapbook images Empty if patients are mixed in Scrapbook images
Patient's Size	(0010,1020)	3	Original if Screen Save Image Original if patients are not mixed in Scrapbook images Empty if patients are mixed in Scrapbook images
Patient's Weight	(0010,1030	3	Original if Screen Save Image Original if patients are not mixed in Scrapbook images Empty if patients are mixed in Scrapbook images

7.4.3 Common Series Entity Modules

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

7.4.3.1 General Series Module

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

TABLE 7.4-4
GENERAL SERIES MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	1	Original if Screen Save Image. OT (Other) if Scrapbook Image.
Series Instance UID	(0020,000E)	1	Generated
Series Number	(0020,0011)	2	Generated
Laterality	(0020,0060	2C	
Series Description	(0008,103E)	3	SCRAPBOOK ARS3_0 if Scrapbook Image. Screen Save if Screen Save Image.
Patient Position	(0018,5100	2C	Not present in some Scrapbook images

7.4.4 Common Equipment Entity Modules

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

7.4.4.1 General Equipment Module

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

TABLE 7.4-5
GENERAL EQUIPMENT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Manufacturer	(0008,0070)	2	derived from original image
Institution Name	(0008,0080	3	Empty
Institution Address	(0008,0081)	3	Empty
Station Name	(0008,1010)	3	real station host name
Manufacturer's Model Name	(0008,1090)	3	Empty
Software Versions	(0018,1020)	3	Empty

7.4.4.1.1 General Equipment Attribute Descriptions

7.4.4.1.1.1 **Pixel Padding Value**

Not used

7.4.5 Common Image Entity Modules

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

7.4.5.1 General Image Module

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

TABLE 7.4-6
GENERAL IMAGE MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Image Number	(0020,0013)	2	Generated
Patient Orientation	(0020,0020)	2C	See 7.4.5.1.1.1.
Image Date	(0008,0023)	2C	derived from original
Image Time	(0008,0033)	2C	derived from original
Image Type	(0008,0008)	3	See 7.4.5.1.1.2.

7.4.5.1.1 General Image Attribute Descriptions

7.4.5.1.1.1 Patient Orientation

derived from original if Screen Save.

Empty if Scrapbook.

7.4.5.1.1.2 Image Type

This type is set to :

DERIVED\SECONDARY\<Originaltype>\SCREEN SAVE in case of Screen Save

DERIVED\SECONDARY\OTHER\SCRAPBOOK ARS3_0 in case of Scrapbook

7.4.5.1.1.3 Derivation Description and Source Image Sequence

This sequence is not encoded

7.4.5.1.1.4 Lossy Image Compression

Not Supported

7.4.5.2 Image Pixel Module

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

TABLE 7.4-7
IMAGE PIXEL MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Samples per Pixel	(0028,0002	1	1
Photometric Interpretation	(0028,0004)	1	Set to MONOCHROME1 or MONOCHROME2 according to Original Image.
Rows	(0028,0010)	1	1024 if rows and columns are both 1024 in original image. 512 in all other cases (including images having more than 1024 columns)
Columns	(0028,0011)	1	1024 if rows and columns are both 1024 in original image. 512 in all other cases (including images having more than 1024 columns)
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	

7.4.6 Common Overlay Modules

This module is not implemented for this IOD.

7.4.7 Common Lookup Table Modules

7.4.7.1 VOI LUT module

This section specifies the Attributes that describe the VOI LUT.

TABLE 7.4-8
VOI LUT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Window Center	(0028,1050)	3	One value is set. This value is derived from the Window Center present in the image when the operator asked for the Screen Save.
Window Width	(0028,1051)	1C	One value is set. This value is derived from the Window Width present in the image when the operator asked for the Screen Save.

7.4.7.2 Modality LUT module

This section specifies the Attributes that describe the Modality LUT.

TABLE 7.4-9
MODALITY LUT MODULE ATTRIBUTES

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

7.4.8 General Modules

The SOP Common Module is mandatory for all DICOM IODs.

7.4.8.1 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 7.4-10
SOP COMMON MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
SOP Class UID	(0008,0016)	1	1.2.840.10008.5.1.4.7
SOP Instance UID	(0008,0018)	1	Generated from GE Based UID; <station configuration> and timestamp.
Specific Character Set	(0008,0005)	1C	ISO_IR 100

7.4.9 SC Modules

This Section describes SC Equipment, and Image Modules. These Modules contain Attributes that are specific to SC Image IOD.

7.4.9.1 SC Equipment Module

This Module describes equipment used to convert images into a DICOM format.

TABLE 7.4-11
SC IMAGE EQUIPMENT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Conversion Type	(0008,0064)	1	WSD
Modality	(0008,0060)	3	Original if Screen Save Image OT if Scrapbook Image
Secondary Capture Device ID	(0018,1010)	3	real UNIX station host name
Secondary Capture Device Manufacturer	(0018,1016)	3	GE MEDICAL SYSTEMS
Secondary Capture Device Manufacturer's Model Name	(0018,1018)	3	ADW3.1
Secondary Capture Device Software Version	(0018,1019)	3	build: <date and time of software creation>

7.4.9.2 SC Image Module

The table in this Section contains IOD Attributes that describe SC images.

TABLE 7.4-12
SC IMAGE MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Date of Secondary Capture	(0018,1012)	3	Creation date of the Secondary Capture
Time of Secondary Capture	(0018,1014)	3	Creation time of the Secondary Capture

7.5 PRIVATE DATA DICTIONARY

No private elements are being used for this IOD.