



GE Medical Systems

Technical Publications

Direction 2118781

Revision 0

CT ADVANTAGE CONFORMANCE STATEMENT for DICOM v3.0 (ID/Net v3.0)

- CT HiSpeed Advantage (1.1: 1Q'94 / 1.2: 2Q'94)**
- GEMS Advantage Independent Console (5.4.2: 4Q'94)**

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GE Medical Systems

REVISION HISTORY

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0	August 31, 1994	Initial release to Direction Stock.

LIST OF EFFECTIVE PAGES

SECTION	NUMBER	SECTION	NUMBER
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Revision History I thru II	0		
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Introduction 1-1 thru 1-6	0		
Conformance Statement 2-1 thru 2-10	0		
CT Advantage Information Object Definition 3-1 thru 3-18	0		
CT Advantage Secondary Capture Image Information Object Definition 4-1 thru 4-12	0		
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SECTION 1 – INTRODUCTION

1.0 OVERVIEW

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

Section A (2), *Conformance Statement*, is the DICOM v3.0 Conformance Statement related to this product. Conformance Statements define the subset of options selected from those offered by the DICOM v3.0 standard.

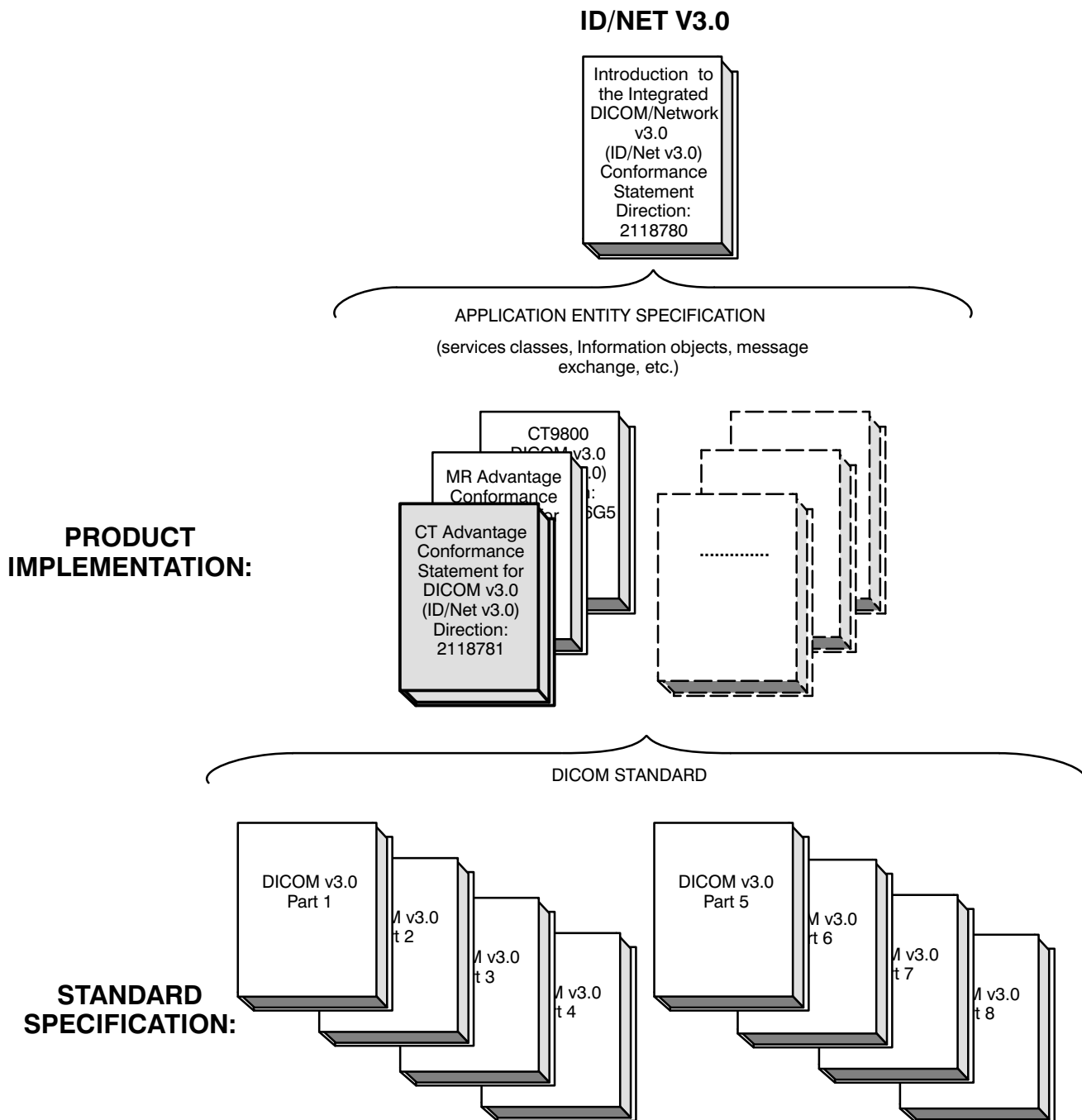
Section 3, *CT Advantage Information Object Definition*, **Section 4**, *Secondary Capture Image Information Object Definition*, and **Section 5**, *Stand-alone Overlay Information Object Definition*, define the technical specifications required to interoperate with a GE Medical Systems (GEMS) ID/Net v3.0 network interface. They define the technical details of the Information Object Definitions (IOD's) listed in the Conformance Statement.

Section 6, *CT Advantage Query/Retrieve Information Model Definition*, defines the information required to interoperate using the DICOM v3.0 Query/Retrieve models.

1.1 OVERALL CONFORMANCE STATEMENT DOCUMENTATION
STRUCTURE

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

ILLUSTRATION 1-1
DOCUMENTATION STRUCTURE



The Documentation Structure given in Illustration 1–1 shows the overall documentation structure for all of the GEMS ID/Net v3.0 Conformance Statements. ID/Net v2.0 documentation is also openly available, but the two documentation structures are independent of one another.

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

*CT Advantage
Conformance Statement for DICOM v3.0 (ID/Net v3.0)
Direction 2118781.*

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

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

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

The ID/Net v3.0 Conformance Statement, contained in this document, also specifies the Lower Layer communications which it supports (e.g., TCP/IP, OSI, etc.). 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 ID/Net v3.0 Product Conformance Statements will be received. The collector Direction is:

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

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

ACR–NEMA / DICOM Representative
NEMA
2101 L Street, N.W., Suite 300
Washington, DC 20037 USA
Phone: (202) 457–1965

1.2 INTENDED AUDIENCE

The reader of this document is concerned with software design and/or system integration issues. It is assumed that the reader of this document is familiar with the DICOM 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 Conformance Statement document.

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

1.3 SCOPE AND FIELD OF APPLICATION

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

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

Included in the Technical Specification of this Conformance Statement are the Module Definitions which define all data elements used by this GEMS ID/Net v3.0 implementation. If the user encounters unspecified private data elements while parsing a GEMS Data Set, the user is well advised to ignore those data elements (per the DICOM 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 retransmit all of the private data elements which are sent by GEMS devices.

1.4 IMPORTANT REMARKS

The use of these Conformance Statements, in conjunction with the DICOM 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 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. ID/Net v3.0 is based on DICOM v3.0 as specified in each ID/Net 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 ID/Net DICOM Conformance Statements.** The **user** should ensure that any non-GE provider, which connects with GE devices, also plans for the future evolution of the DICOM Standard. Failure to do so will likely result in the loss of function and/or connectivity as the DICOM Standard changes and GE Products are enhanced to support these changes.
- **Interaction** – It is the sole responsibility of the **non-GE provider** to ensure that communication with the interfaced equipment does not cause degradation of GE imaging equipment performance and/or function.

1.5 REFERENCES

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

1.6 DEFINITIONS

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

1.7 SYMBOLS AND ABBREVIATIONS

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

1.8 CONVENTIONS

Please refer to DICOM Standard Part 3 (Information Object Definitions) for the Attribute Type Definitions which are used in the Module Descriptions found in sections 3 through 6 of this conformance statement.

SECTION A (2) – CONFORMANCE STATEMENT

A.0 INTRODUCTION

This Conformance Statement (CS) specifies the GE CT Advantage scanner compliance to DICOM v3.0. It details the DICOM Service Classes and roles which are supported by this product. Other sections of this document describe the Information Object data elements which are used by this implementation.

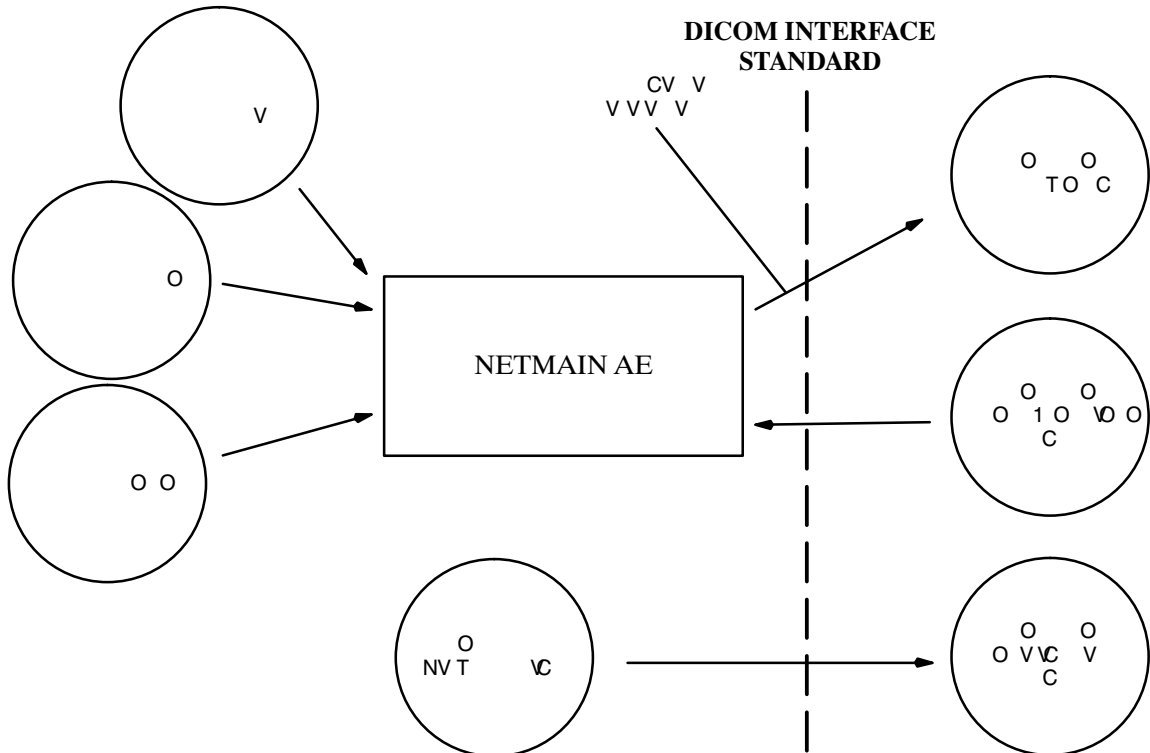
Note that the format of this section strictly follows the format of DICOM Standard Part 2 (Conformance) Appendix A. Please refer to that part of the standard while reading this section.

A.1 IMPLEMENTATION MODEL

A.1.1 Application Data Flow Diagram

The Basic and Specific Application models for this device are shown in Ill. 2-1 .

V V 807
T ECIFIC AE A LICAVION MODEL



The NetMain Application Entity (AE) is an application which handles all DICOM protocol communications. NetMain AE is automatically brought up when an Operator's Console (OC) or Independent Console (IC) is powered on.

All remote DICOM AE's must be manually configured on the OC/IC, usually at software installation time, by a GEMS Field Engineer.

There are three local real world activities, Manual Transmit (MT), AutoTransfer (AUT), and AutoQueue (AUQ), which can cause the NetMain AE to initiate a DICOM association to store an image.

MT consists of an operator selecting a Study, Series, or an Image from the Network screen of the console User Interface and choosing to send the image(s) to a selected destination.

AUT is only available on a scanner Operator Console (OC). If AUT is enabled, after the technologist prescribes a scan and begins acquiring the images, the OC will automatically (without operator intervention) initiate a DICOM association after every image is completed, and send the image to a preset destination [this includes localizer (Scout), and axial (prospective and retrospective) image types].

AUQ is only available on a scanner Operator Console (OC). If AUQ is enabled, after the technologist prescribes a scan and acquires the entire exam, the OC will automatically (without operator intervention) initiate a DICOM association and send the exam to a maximum of 3 preset destinations (this includes all image types present in the study).

There is no local real world event required for the NetMain AE to respond to a DICOM Query. The NetMain AE is always prepared to respond to a DICOM query by any remote DICOM AE which has been configured on the GEMS system. NetMain can then send (STORE) image(s) to the remote entity if requested by a retrieve (MOVE) request.

Aside from the 3 local real world activities already mentioned, another is defined, called Network Diagnostics, which exists for the purpose of performing basic communication checks between itself and other network nodes.

A.1.2 Functional Definition of AE's

Application Entity 1, NetMain

Supports the following functions:

- Has access to patient demographics and pixel data in the local database
- Manually (MT) or automatically (AUT/AUQ) initiates a DICOM association to send images

- Responds to DICOM associations containing a query request using the information in the console’s local database
- Moves images to any configured remote DICOM AE when requested to do so by the remote querying device

A.1.3 Sequencing of Real–World Activities

Image Send:

- The NetMain AE will initiate a DICOM association
- The AE will select the appropriate Abstract and Transfer Syntaxes from those accepted by the remote AE
- The AE will use the C–STORE command to send the image

Query/Retrieve:

- The NetMain AE will respond to a DICOM association initiation and accept only the Abstract and Transfer syntaxes specified in this document.
- At some later point, the NetMain AE will respond to a C–MOVE request and send the image(s) to a specified remote AE when (if) requested to do so.

A.2 AE SPECIFICATIONS

A.2.1 AE1 Specification

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

SOP Class Name	SOP Class UID
Verification (Echo) (see note)	1.2.840.10008.1.1
CT Image Information Storage	1.2.840.10008.5.1.4.1.1.2
MR Image Information Storage	1.2.840.10008.5.1.4.1.1.4
SC Image Information Storage	1.2.840.10008.5.1.4.1.1.7
Overlay Information Storage	1.2.840.10008.5.1.4.1.1.8

Note: Verification Service Class is an optional feature for an Advantage Console. This SOP Class only applies if the optional Network Diagnostics feature is included in the system as part of the Advanced Diagnostics feature.

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

SOP Class Name	SOP Class UID
Verification (Echo)	1.2.840.10008.1.1
Study Root Query/Retrieve Info. model – FIND	1.2.840.10008.5.1.4.1.2.2.1
Study Root Query/Retrieve Info. model – MOVE	1.2.840.10008.5.1.4.1.2.2.2

A.2.1.1 Association Establishment Policies

A.2.1.1.1 General

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

Application Context Name	1.2.840.10008.3.1.1.1
---------------------------------	------------------------------

The Maximum Length PDU negotiation is included in all association establishment requests. The maximum length PDU for an association initiated by the NetMain AE is:

Maximum Length PDU	30 Kbytes
---------------------------	------------------

The SOP class Extended Negotiation is not supported.

The maximum number of Presentation Contexts Items that will be proposed is 8. Note that the same Abstract Syntax may be offered multiple times with different Transfer Syntaxes.

The user info items sent by this product are:

- Maximum PDU Length and,
- Implementation UID

Note: Max PDU length is not configurable at run time.

A.2.1.1.2 Number of Associations

The NetMain AE will initiate only one DICOM association at a time to perform an image store.

The NetMain AE can have a maximum of 10 DICOM associations open simultaneously (one initiated and nine accepted). It should be noted, however, that system response time for the association will degrade with increasing simultaneous incoming associations. The slow response could trigger timers in remote systems. The system administrator should be aware of this situation.

A.2.1.1.3 Asynchronous Nature

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

A.2.1.1.4 Implementation Identifying Information

The Implementation UID allows unique identification of a set of products that share the same implementation.

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

Q/R & Storage Implementation UID	1.2.840.113619.6.7
---	---------------------------

This Implementation UID applies only to those ID/Net v3.0 Implementations that are available on GE CT/MR Advantage Consoles.

Note that a different Implementation UID is sent for the Verification Service Class, which is:

Verification SC Implementation UID	1.2.840.113619.6.1
---	---------------------------

A.2.1.2 Association Initiation by Real-World Activity

This AE attempts to initiate a new association due to four Real-World Activities:

- A. "Manual Transmit" initiated by the operator, and
- B. "AutoTransfer" where the image is sent to a single preset destination after image reconstruction with no operator intervention (this includes localizer and axial (prospective and retrospective) image types).
- C. "AutoQueue" where the completed exam is sent to a maximum of three preset destinations, with no operator intervention (this includes all image types present in the study).
- D. "Verification" which verifies application level communication between peer DICOM AE's for service purposes.

A.2.1.2.1 Real-World Activity A,B, and C

Although there are three different real world activities which can begin an image storage process, the DICOM association initiation and transfer process is identical.

A.2.1.2.1.1 Associated Real–World Activity

Upon request, either manual or automatic, an image and/or overlay plane will be sent to a DICOM Storage SCP.

A.2.1.2.1.2 Proposed Presentation Contexts

Presentation Context Table – Proposed					
Abstract Syntax		Transfer Syntax		Role	Expanded Negotiation
Name	UID	Name List	UID List		
CT Image Info Obj.	1.2.840.10008.5.1.4.1.1.2	Little Endian	1.2.840.10008.1.2	SCU	None
MR Image Info Obj.	1.2.840.10008.5.1.4.1.1.4	Little Endian	1.2.840.10008.1.2	SCU	None
Secondary Capture Info Obj.	1.2.840.10008.5.1.4.1.1.7	Little Endian	1.2.840.10008.1.2	SCU	None
Stand–alone Overlay Image Inf. Obj.	1.2.840.10008.5.1.4.1.1.8	Little Endian	1.2.840.10008.1.2	SCU	None

Note: Other Abstract Syntax and Transfer Syntax names may be offered when establishing an association. Their definitions are not a part of this profile.

Note: A software implementer should be aware that NetMain may package multiple Presentation Data Values (PDV’s) into a single Protocol Data Unit (PDU) as stated in the DICOM Standard Part 8, Appendix E.

A.2.1.2.1.2.1 SOP Specific Conformance Statement for Verification SOP Class

Verification Service Class is an optional feature for an Advantage Console. This section only applies if the optional Network Diagnostics feature is included in the system.

Associations will be released upon the receipt of each C–ECHO confirmation.

Each C-ECHO operation supports an Echo Timeout. This timeout starts once a C-ECHO request has been issued and stops once a C-ECHO confirmation has been received. This timeout is 20 seconds.

A.2.1.2.1.2.2 SOP Specific Conformance Statement for Image Storage SOP Classes

This implementation can perform multiple C-STORE operations over a single association.

Upon receiving a C-STORE confirmation containing a **Successful** status, this implementation will perform the next C-STORE operation. The association will be maintained if possible.

Upon receiving a **C-STORE** confirmation containing an **Error** or **Refused** status, this implementation will terminate the association. The current image is considered failed. If more images are left to be sent, they will be transmitted on a different association.

Upon receiving a **C-STORE** confirmation containing a **Warning** status, this implementation will treat it as an **Error** or **Refused** response (unless the **C-STORE** confirmation is B006 – elements discarded, which is treated as a **Successful** response).

In order to be backward compatible with ACR–NEMA v2.0, in addition to the fields listed in DICOM v3.0 – Part 7: Message Exchange for a C-STORE-RQ the following fields will also be sent in the command group:

- Length to End
- Recognition Code
- Initiator
- Receiver
- Priority

Each C-STORE operation supports a “Per Image” Store Timeout. This timeout starts once a C-STORE request has been issued and stops once a C-STORE confirmation has been received. This timeout is 2 minutes.

Each request made by a user will be broken down to groups of C-STORE operations containing, at most, 5 images. These groups will then be forwarded for transfer. The Image Group Timeout starts once the group is forwarded for transfer, and stops once a response has been received for each image in the Group. This timeout is 5 minutes.

Note: The association is not taken down between Image Groups if there are more than 5 images to be sent – the Image Group only applies to the timer.

The Image Group Timeout can be viewed as being more restrictive than the Store Timeout. The Image Group Timeout specifies that images must be transferred at an average rate (over these 5 images) of 1 image per minute.

A.2.1.2.2 Association Acceptance Policy

A.2.1.2.2.1 Real–World Activity

This AE accepts associations for the Query/Retrieve (Q/R) SC using the Study Root Query Model.

A.2.1.2.2.1.1 Associated Real–World Activity

This AE is indefinitely listening for Q/R associations.

A.2.1.2.2.1.2 Accepted Presentation Context Table

Presentation Context Table – Accepted					
Abstract Syntax		Transfer Syntax		Role	Expanded Negotiation
Name	UID	Name List	UID List		
Study Root Query/Retrieve Info. model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Little Endian	1.2.840.10008.1.2	SCP	None
Study Root Query/Retrieve Info. model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Little Endian	1.2.840.10008.1.2	SCP	None
Verification	1.2.840.10008.1.1	Little Endian	1.2.840.10008.1.2	SCP	None

A.2.1.2.2.1.2.1 SOP Specific Conformance for Query/Retrieve FIND SOP Class SCP

The C–FIND response status values are supported as defined in DICOM v3.0 Part 4.

All Required (R) and Unique (U) Study, Series, and Image Level Keys for the Study Root Query/Retrieve Information Model are supported. Some Optional (O) Keys are also supported, as described later in this document (see section 3).

A.2.1.2.2.1.2.2 SOP Specific Conformance for Query/Retrieve MOVE SOP Class SCP

Prioritization of C–FIND & C–MOVE requests are all set to normal.

All images requested in the C–MOVE will be sent over a single association (the association will not be established and torn down for each image).

A.2.1.2.2.1.3 Presentation Context Acceptance Criterion

No criterion.

A.2.1.2.2.1.4 Transfer Syntax Selection Policies

Only Little Endian transfer syntax is supported and there is no priority selection policy.

A.3 COMMUNICATION PROFILES

A.3.1 Supported Communication Stacks (parts 8,9)

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

A.3.2 OSI Stack

OSI stack not supported.

A.3.3 TCP/IP Stack

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

A.3.3.1 API

Not applicable to this product.

A.3.3.2 Physical Media Support

Ethernet v2.0, IEEE 802.3.

A.3.4 Point-to-Point Stack

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

A.4 EXTENSIONS / SPECIALIZATIONS / PRIVATIZATIONS

A.4.1 Standard Extended/Specialized/Private SOP's

ID/Net v2.0 GE Private IOD's are based upon the April 1993 draft version of DICOM v3.0. ID/Net v2.0 IOD's are supported for backward compatibility.

Note: See the "ID/Net v2.0 Implementation Profiles" for definitions of the Information Objects.

Presentation Context Table – Proposed					
Abstract Syntax		Transfer Syntax		Role	Expanded Negotiation
Name	UID	Name List	UID List		
GE Private DICOM MR Image Info Object (ID/Net v2.0 compatible)	1.2.840.113619.4.2	Little Endian	1.2.840.10008.1.2	SCU	None
GE Private DICOM CT Image Info Object (ID/Net v2.0 compatible)	1.2.840.113619.4.3	Little Endian	1.2.840.10008.1.2	SCU	None
GE Private DICOM Display Image Info Object (ID/Net v2.0 compatible)	1.2.840.113619.4.4	Little Endian	1.2.840.10008.1.2	SCU	None

A.5 CONFIGURATION

A.5.1 AE Title/Presentation Address Mapping

The Local AE Title is configurable. This must be configured by a GEMS Field Service Engineer during an installation.

A.5.2 Configurable Parameters

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

- Local AE Title
- Listening TCP/IP Port (port 104 is default port number)
- Local IP Address
- Local IP Netmask

The following fields are configurable for every remote DICOM AE:

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

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

A.6 SUPPORT OF EXTENDED CHARACTER SETS

No extended character sets are supported.

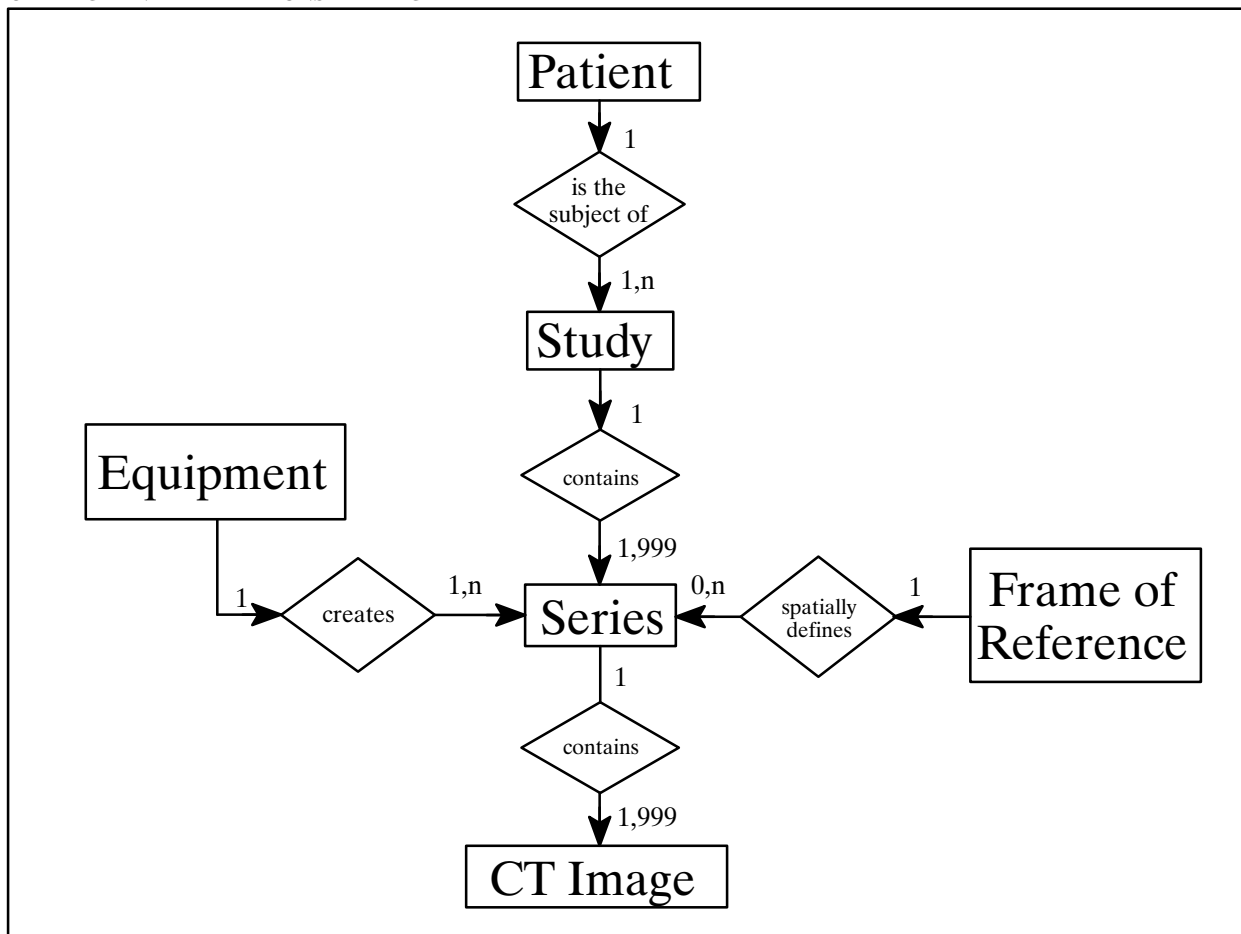
SECTION 3 – CT ADVANTAGE INFORMATION OBJECT DEFINITION

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

- 3.0 – Interoperability Schema
- 3.1 – Entity Descriptions
- 3.2 – Entity Module Table
- 3.3 – Entity Library

3.0 CT IMAGE INTEROPERABILITY SCHEMA

ILLUSTRATION 3-1
CT IMAGE ENTITY RELATIONSHIP DIAGRAM



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

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

The relationships are fully defined with the maximum number of possible entities in the relationship shown. In other words, the relationship between Series and Image can have up to 999 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).

3.1 ENTITY DESCRIPTIONS

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

3.1.1 Frame Of Reference Entity

The *Frame of Reference Entity* uniquely identifies the spatial coordinate system which has been used to produce a Series of Images.



It is possible for the operator of a CT Advantage system to change the table height while scanning a series of images. Therefore, implementations must use the Frame of Reference UID (0020,0052) in conjunction with the Table Height (0018,1130) to determine if two images are spatially related.

3.2 ENTITY MODULE TABLE

Within an entity of the DICOM v3.0 CT Image Information Object Definition, attributes are grouped into related set of attributes. A set of related attributes is termed a module. A module facilitates the understanding of the semantics concerning the attributes and how the attributes are related with each other. A module grouping does not infer any encoding of information into datasets.

Table 3–1 identifies the defined modules within the entities which comprise the DICOM v3.0 CT Image Information Object Definition. Modules are identified by Module Name.

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

TABLE 3–1
CT IMAGE INFORMATION OBJECT DEFINITION (IOD) MODULE TABLE

Entity Name	Module Name	Module Library Section
Patient	Patient	3.3.1.1
Study	General Study	3.3.2.1
	Patient Study	3.3.2.2
Series	General Series	3.3.3.1
Frame of Reference	Frame of Reference	3.3.4.1
Equipment	General Equipment	3.3.5.1
Image	General Image	3.3.6.1
	Image Plane	3.3.6.2
	Image Pixel	3.3.6.3
	Contrast/Bolus	3.3.6.4
	CT Image	3.3.6.5
	SOP Common	3.3.6.6

Note: 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 but it should be noted that they are the same ones as defined in DICOM Part 3.

3.3 ENTITY MODULE LIBRARY

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 CT Information Object.

3.3.1 Patient Entity Module

3.3.1.1 Patient Module

TABLE 3-2
PATIENT MODULE ATTRIBUTES

Attribute Name	Element Tag	Type	Notes
Revision 1:			
Patient Name	(0010,0010)	2	
Patient ID	(0010,0020)	2	
Patient Birth Date	(0010,0030)	2	(sent zero length)
Patient Sex	(0010,0040)	2	

3.3.2 Study Entity Modules

3.3.2.1 General Study Module

TABLE 3-3
GENERAL STUDY ATTRIBUTES

Attribute Name	Element Tag	Type	Notes
Revision 1:			
Study Instance UID	(0020,000D)	1	
Study Date	(0008,0020)	2	
Study Time	(0008,0030)	2	
Referring Physician's Name	(0008,0090)	2	
Study ID	(0020,0010)	2	
Accession Number	(0008,0050)	2	
Study Description	(0008,1030)	3	
Name of Physician(s) reading study	(0008,1060)	3	(previously Radiologist's Name)

3.3.2.2 Patient Study Module

TABLE 3-4
PATIENT STUDY ATTRIBUTES

Attribute Name	Element Tag	Type	Notes
Revision 1:			
Patient's Age	(0010,1010)	3	
Patient Weight	(0010,1030)	3	
Additional Patient History	(0010,21B0)	3	

3.3.3 Series Entity Module

3.3.3.1 General Series Module

TABLE 3-5
GENERAL SERIES MODULE ATTRIBUTES

Attribute Name	Element Tag	Type	Notes
Revision 1:			
Modality	(0008,0060)	1	Enumerated Value: "CT" – Computed Tomography
Series Instance UID	(0020,000E)	1	
Series Number	(0020,0011)	2	
Laterality	(0020,0060)	2C	(Sent zero length)
Series Date	(0008,0021)	3	
Series Time	(0008,0031)	3	
Protocol Name	(0018,1030)	3	
Series Description	(0008,103E)	3	
Operator's Name	(0008,1070)	3	
Patient Position	(0018,5100)	2C	

3.3.4 Frame Of Reference Entity Module

3.3.4.1 Frame Of Reference Module

This module contains attributes used to identify the Frame of Reference of a Series within a Study.



It is possible for the operator of a CT Advantage system to change the table height while scanning a series of images. Therefore, implementations must use the Frame of Reference UID (0020,0052) in conjunction with the Table Height (0018,1130) to determine if two images are spatially related.

TABLE 3-6
FRAME OF REFERENCE IDENTIFICATION ATTRIBUTES

Attribute Name	Element Tag	Type	Notes
Revision 1:			
Frame of Reference UID	(0020,0052)	1	
Position Reference Indicator	(0020,1040)	2	

3.3.5 Equipment Entity Module

3.3.5.1 General Equipment Module

TABLE 3-7
GENERAL EQUIPMENT MODULE ATTRIBUTES

Attribute Name	Element Tag	Type	Notes
Revision 1:			
Manufacturer	(0008,0070)	2	Defined Terms: "GE MEDICAL SYSTEMS"
Institution Name	(0008,0080)	3	
Station Name	(0008,1010)	3	
Manufacturer Model Name	(0008,1090)	3	Defined Terms: "GENESIS_FOREIGN" "GENESIS_IMAGE" "GENESIS_TECHNICARE_HPS1440" "GENESIS_TECHNICARE_DELTA_SCAN_2010" "GENESIS_TECHNICARE_DELTA_SCAN_2020" "GENESIS_TECHNICARE_DELTA_SCAN_2060" "GENESIS_SIGNA" "GENESIS_CT9800" "GENESIS_CT9800_Q" "GENESIS_CT9800_QHL" "GENESIS_EMI_9800" "GENESIS_CT_8800_9800" "GENESIS_CT_9600" "GENESIS_JUPITER" "GENESIS_ZEUS" "GENESIS_ZEUS_VX" "RESONA" "VECTRA" "MR MAX" "CT MAX" "CT PACE" "CT SYTEC 2000" (continued)

Manufacturer Model	(0008,1090)	3	Defined Terms: (continued) "CT SYTEC 3000" "CT SYTEC 4000" "CT SYTEC 6000" "CT SYTEC 8000" "GENESIS_HISPEED_RP" "SIGNA PERFORMANCE PLUS" "SIGNA ADVANTAGE" "RESONA PLUS" "MR MAX PLUS" "MR MAX COMPACT" "MRVECTRA" "SIERRA" "GENESIS_HISPEED_RP_SLOW"
Software Versions	(0018,1020)	3	
Spatial Resolution	(0018,1050)	3	
Pixel Padding Value	(0028,0120)	3	(Not applicable for Overlay)

3.3.6 Image Entity Modules

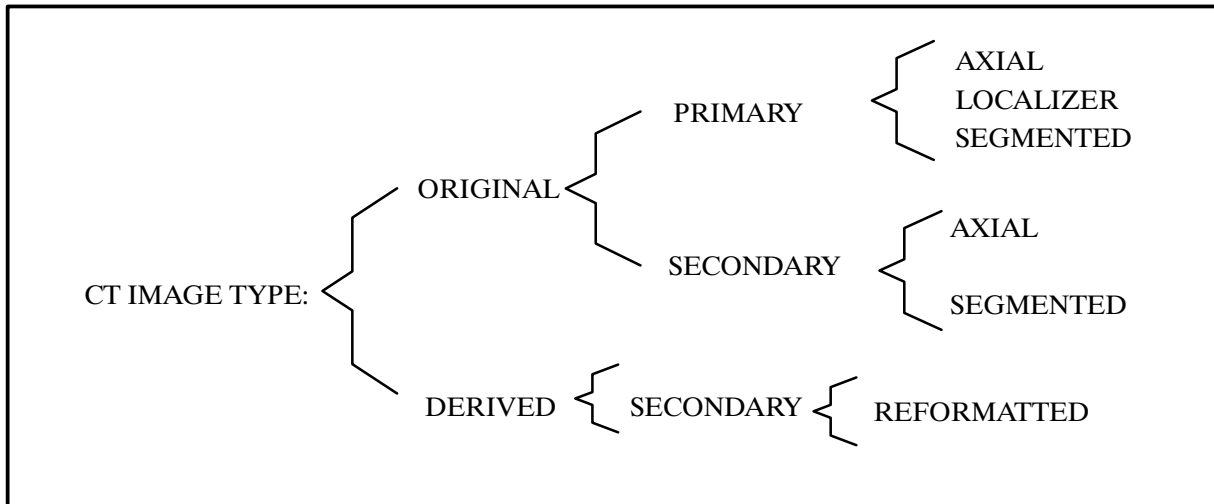
3.3.6.1 General Image Module

TABLE 3-8
GENERAL IMAGE MODULE ATTRIBUTES

Attribute Name	Element Tag	Type	Notes
Revision 1:			
Image Number	(0020,0013)	2	
Image Date	(0008,0023)	2C	
Image Time	(0008,0033)	2C	
Image Type	(0008,0008)	3	
Acquisition Number	(0020,0012)	3	

3.3.6.1.1 Attribute Image Type (0008, 0008)

ILLUSTRATION 3-2
CT IMAGE TYPE DECISION TREE



This information is used by applications to provide important identification characteristics. This attribute is a three valued element. Illustration 3-2 is a decision tree which provides the valid combinations of the three values which may be sent.

This attribute is multi-valued and is provided in the following manner:

Value 1: Identifies an image to be either an **ORIGINAL** image or a **DERIVED** image. An **ORIGINAL** image is an image whose pixel values represent original, non-transformed data. A **DERIVED** image is an image which has been created by combining two or more images together.

The string of either “ORIGINAL” or “DERIVED” is sent.

Value 2: Identifies the image to be created as either a **PRIMARY** or a **SECONDARY** image. A **PRIMARY** image is an image which has been created as part of the initial patient examination process. A **SECONDARY** image is an image which has been created as the result of some post processing activity.

The string of either “PRIMARY” or “SECONDARY” is sent.

Value 3: Identifies the type of processing which created the image. An **AXIAL** image is an image which was created as a result of axial CT scanning. A **LOCALIZER** is an image which was created with the intent of being used as a prescription image for **AXIAL** scanning. A **SEGMENTED** image is an **AXIAL** image whose reconstruction provides time segmented information. A **REFORMATTED** image is an image which represents a cut plane across a set of **AXIAL** images.

One of the following strings is sent: “AXIAL”, “LOCALIZER”, “SEGMENTED”, or “REFORMATTED”.

3.3.6.2 Image Plane Module

TABLE 3-9
IMAGE PLANE MODULE ATTRIBUTES

Attribute Name	Element Tag	Type	Notes
Revision 1:			
Pixel Spacing	(0028,0030)	1	
Image Orientation (patient)	(0020,0037)	1	NOTE: Be sure to read the DICOM v3.0 “Image Orientation/Position with respect to the patient” definitions.
Image Position (patient)	(0020,0032)	1	NOTE: Be sure to read the DICOM v3.0 “Image Orientation/Position with respect to the patient” definitions.
Slice Thickness	(0018,0050)	2	
Slice Location	(0020,1041)	3	

3.3.6.3 Image Pixel Module

TABLE 3-10
IMAGE PIXEL MODULE ATTRIBUTES

Attribute Name	Element Tag	Type	Notes
Revision 1:			
Samples per Pixel	(0028,0002)	1	
Photometric Interpretation	(0028,0004)	1	Defined Value: "MONOCHROME2"
Rows	(0028,0010)	1	
Columns	(0028,0011)	1	
Bits Allocated	(0028,0100)	1	Defined Value: 16
Bits Stored	(0028,0101)	1	Defined Value: 16
High Bit	(0028,0102)	1	Defined Value: 15
Pixel Representation	(0028,0103)	1	Defined Value: 1 (two's complement)
Smallest Pixel Value	(0028,0106)	3	
Pixel Data	(7FE0,0010)	1	

3.3.6.4 Contrast/Bolus Module

TABLE 3-11
CONTRAST/BOLUS MODULE ATTRIBUTES

Attribute Name	Element Tag	Type	
Revision 1:			
Contrast/Bolus Agent	(0018,0010)	2	Defined Term: "NONE"
Contrast/Bolus Route	(0018,1040)	3	

3.3.6.5 CT Image Module

TABLE 3-12
CT IMAGE MODULE ATTRIBUTES

Attribute Name	Element Tag	Type	Notes
Revision 0:			
Image Type	(0008,0008)	1	(see section 3.3.6.1.1)
Samples per Pixel	(0028,0002)	1	
Photometric Interpretation	(0028,0004)	1	(see section 3.3.6.3)
Bits Allocated	(0028,0100)	1	(see section 3.3.6.3)
Bits Stored	(0028,0101)	1	(see section 3.3.6.3)
High Bit	(0028,0102)	1	(see section 3.3.6.3)
Rescale Intercept	(0028,1052)	1	
Rescale Slope	(0028,1053)	1	
KVP	(0018,0060)	2	
Acquisition Number	(0020,0012)	2	
Scan Options	(0018,0022)	3	Defined Values: "AXIAL MODE" "DYNAMIC MODE" "SCOUT MODE" "AXIAL XRON MODE" "AXIAL XROFF MODE" "STATIC XRON MODE" "STATIC XROFF MODE" "TUBE HEAT MODE" "DAS MODE" "TUBE CAL MODE" "BIOPSY MODE" "CINE MODE" "HELICAL MODE" "ROTGENCAL MODE"
Data Collection Diameter	(0018,0090)	3	
Reconstruction Diameter	(0018,1100)	3	
Distance Source to Detector	(0018,1110)	3	
Distance Source to Patient	(0018,1111)	3	
Gantry/Detector Tilt	(0018,1120)	3	
Table Height	(0018,1130)	3	

Attribute Name	Element Tag	Type	Notes (continued from previous page)
Rotation Direction	(0018,1140)	3	
Exposure Time	(0018,1150)	3	
X-ray Tube Current	(0018,1151)	3	
Filter Type	(0018,1160)	3	
Focal Spot	(0018,1190)	3	
Convolution Kernel	(0018,1210)	3	

3.3.6.6 SOP Common Module

TABLE 3-13
SOP COMMON MODULE ATTRIBUTES

Attribute Name	Element Tag	Type	Notes
Revision 1:			
SOP Class UID	(0008,0016)	1	
SOP Instance UID	(0008,0018)	1	

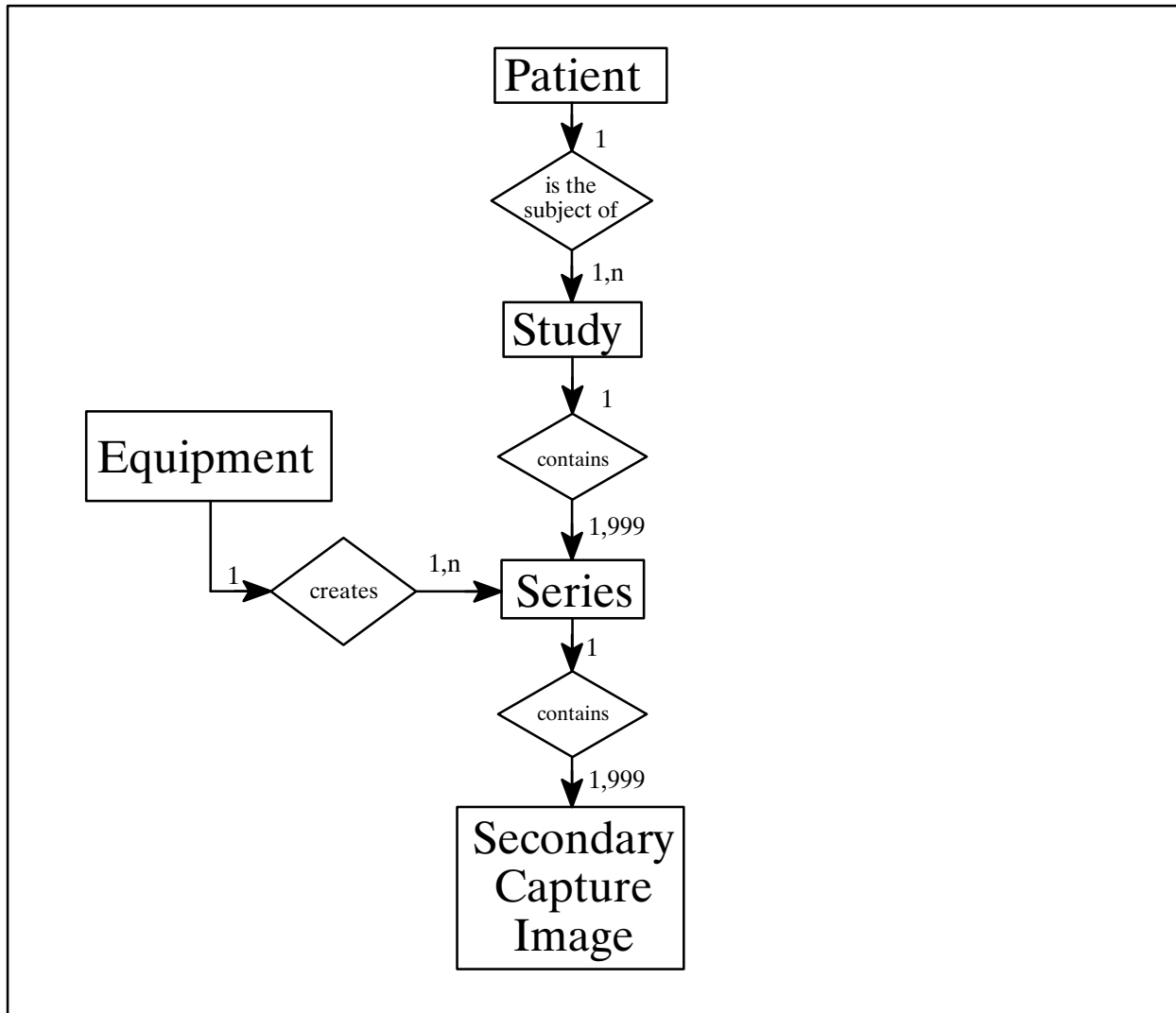
SECTION 4 – CT ADVANTAGE SECONDARY CAPTURE IMAGE INFORMATION OBJECT DEFINITION

This section specifies the subset of the DICOM v3.0 Secondary Capture Image Information Object Definition used to represent the information included in Secondary Captures produced by this implementation. Corresponding attributes are conveyed using the module construct. The contents of this section are:

- 4.0 – Interoperability Schema
- 4.1 – Entity Descriptions
- 4.2 – Entity Module Table
- 4.3 – Entity Module Library

4.0 SC IMAGE INTEROPERABILITY SCHEMA

ILLUSTRATION 4-1
SC IMAGE ENTITY RELATIONSHIP DIAGRAM



The Entity–Relationship diagram for the SC Image interoperability schema is shown in Illustration 4–1. In this illustration, 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.

4.1 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.

4.2 ENTITY MODULES

Within an entity, 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 does not infer any encoding of information into datasets.

Table 4–1 identifies the defined modules within the entities which comprise the DICOM v3.0 Secondary Capture Information Object Definition. Modules are identified by Module Name.

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

TABLE 4–1
SC IMAGE MODULE DEFINITION TABLE

Entity Name	Module Name	Module Library Section
Patient	Patient	(see Section 3)*
Study	General Study	(see Section 3)*
	Patient Study	(see Section 3)*
Series	General Series	(see Section 3)*
Equipment	General Equipment	(see Section 3)*
	SC Equipment	4.3.1.1
Image	General Image	4.3.2.1
	Image Pixel	4.3.2.2
	Overlay Plane	4.3.2.3
	Modality LUT	4.3.2.4
	VOI LUT	4.3.2.5
	SOP Common	4.3.2.6

(* Section 3, “CT Advantage Information Object Definition”, uses the same modules as Secondary Capture where the note “see Section 3” appears.)

Note: 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 but it should be noted that they are the same ones as defined in DICOM Part 3.

4.3 ENTITY MODULE LIBRARY

The Entity Module Library consists of a description of each module of the CT Advantage Secondary Capture Image Information Object Definition.

4.3.1 Equipment Entity Module

4.3.1.1 SC Equipment Module

TABLE 4-2
SC EQUIPMENT MODULE ATTRIBUTES

Attribute Name	Element Tag	Type	Notes
Revision 1:			
Conversion Type	(0008,0064)	1	Defined Value: "WSD"
Modality	(0008,0060)	3	Defined Value: "CT"

4.3.2 Image Entity Modules

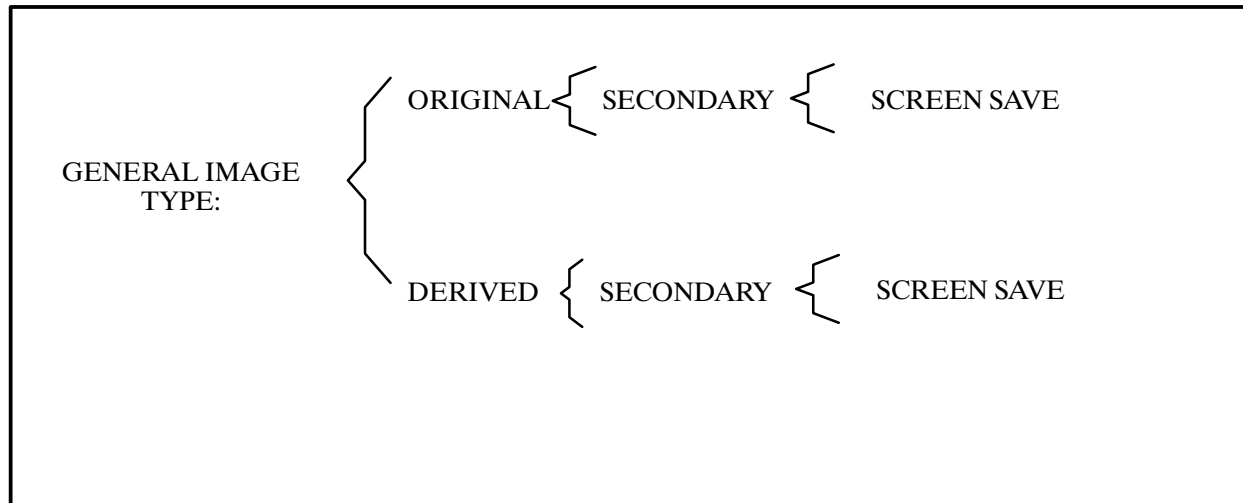
4.3.2.1 General Image Module

TABLE 4-3
GENERAL IMAGE MODULE ATTRIBUTES

Attribute Name	Element Tag	Type	Notes
Revision 1:			
Image Number	(0020,0013)	2	
Patient Orientation	(0020,0020)	2C	
Image Date	(0008,0023)	2C	
Image Time	(0008,0033)	2C	
Image Type	(0008,0008)	3	

4.3.2.1.1 Attribute Image Type (0008, 0008)

ILLUSTRATION 4-2
SC GENERAL IMAGE DECISION TREE



This information is used by applications to provide important identification characteristics. This attribute is a three valued element. Illustration 4-2 is a decision tree which provides the valid combinations of the three values which may be sent.

This attribute is multi-valued and should be provided in the following manner:

REV 0

DIRECTION 2118781

Value 1: Identifies an image to be either an **ORIGINAL** image or a **DERIVED** image. An **ORIGINAL** image is an image whose pixel values represent original, non-transformed data. A **DERIVED** image is an image which has been created by combining two or more images together.

The string of either “ORIGINAL” or “DERIVED” is sent.

Value 2: Identifies the image to be created as a **SECONDARY** image. A **SECONDARY** image is an image which has been created as the result of some post processing activity.

The string of “SECONDARY” is sent.

Value 3: Identifies the type of processing which created the image. This description is implementation specific.

The string of “SCREEN SAVE” is sent.

4.3.2.2 Image Pixel Module

TABLE 4-4
IMAGE PIXEL MODULE ATTRIBUTES

Attribute Name	Element Tag	Type	Notes
Revision 1:			
Samples per Pixel	(0028,0002)	1	
Photometric Interpretation	(0028,0004)	1	(see section 3.3.6.3)
Rows	(0028,0010)	1	
Columns	(0028,0011)	1	
Bits Allocated	(0028,0100)	1	(see section 3.3.6.3)
Bits Stored	(0028,0101)	1	(see section 3.3.6.3)
High Bit	(0028,0102)	1	(see section 3.3.6.3)
Pixel Representation	(0028,0103)	1	(see section 3.3.6.3)
Smallest Image Pixel Value	(0028,0106)	3	
Pixel Data	(7FE0,0010)	1	

4.3.2.3 Overlay Plane Module

Conditional Descriptions:

If only a text plane (Annotation Text Plane) is present, the text plane is provided in Group 6000.

If only a Graphics plane is present, the Graphics plane is provided in Group 6000.

If both Text and Graphics planes are present, the Text plane is provided in Group 6000 and the Graphics plane is provided in Group 6002.

All overlay planes are one bit overlay planes.

TABLE 4-5
OVERLAY PLANE MODULE ATTRIBUTES

Attribute Name	Element Tag	Type	Notes
Revision 1:			
Rows	(60xx, 0010)	1	
Columns	(60xx, 0011)	1	
Overlay Type	(60xx, 0040)	1	
Origin	(60xx, 0050)	1	Defined Multiple Value: 0001 0001
Bits Allocated	(60xx, 0100)	1	Defined Value: 0001
Bit Position	(60xx, 0102)	1	Defined Value: 0000
Overlay Data	(60xx, 3000)	1C	See note above.

4.3.2.4 Modality LUT Module

TABLE 4-6
MODALITY LUT MODULE ATTRIBUTES

Attribute Name	Element Tag	Type	Notes
Revision 1:			
Rescale Intercept	(0028,1052)	1C	
Rescale Slope	(0028,1053)	1C	
Rescale Type	(0028,1054)	1C	

REV 0

DIRECTION 2118781

4.3.2.5 VOI LUT Module

TABLE 4-7
VOI LUT MODULE ATTRIBUTES

Attribute Name	Element Tag	Type	Notes
Revision 1:			
Window Center	(0028,1050)	3	
Window Width	(0028,1051)	1C	

REV 0

DIRECTION 2118781

4.3.2.6 SOP Common Module

TABLE 4-8
SOP COMMON MODULE ATTRIBUTES

Attribute Name	Element Tag	Type	Notes
Revision 1:			
SOP Class UID	(0008,0016)	1	
SOP Instance UID	(0008,0018)	1	

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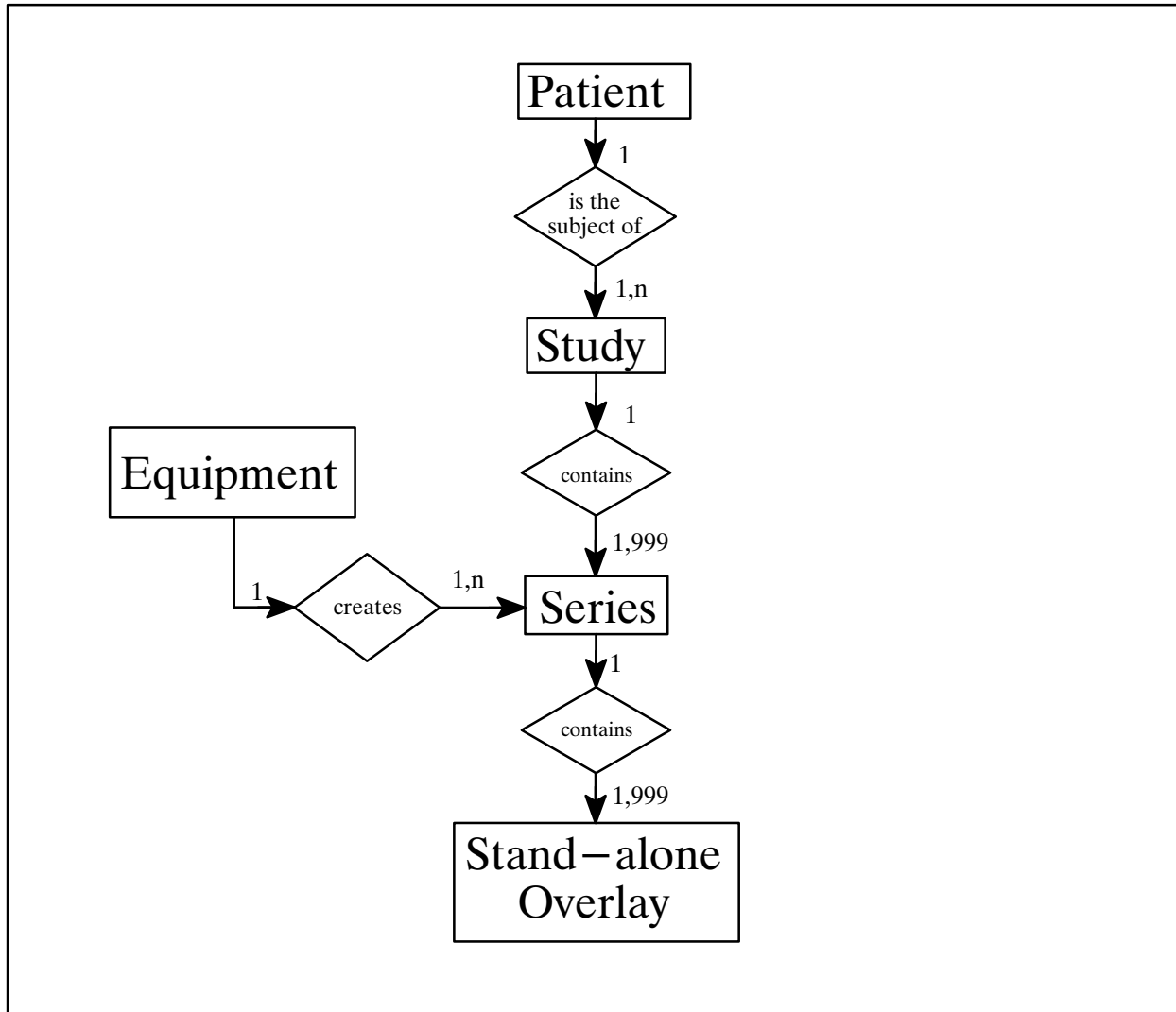
SECTION 5 – STAND–ALONE OVERLAY INFORMATION OBJECT DEFINITION

This section specifies the subset of the DICOM v3.0 Stand–alone Overlay Information Object Definition (IOD) used to represent the information included in Stand–alone Overlays produced by this implementation. Corresponding attributes are conveyed using the module construct. The contents of this section are:

- 5.0 – Interoperability Schema
- 5.1 – Entity Descriptions
- 5.2 – Entity Module Table
- 5.3 – Entity Module Library

5.0 STAND-ALONE OVERLAY
INTEROPERABILITY SCHEMA

ILLUSTRATION 5-1
STAND-ALONE OVERLAY ENTITY RELATIONSHIP DIAGRAM



The Entity-Relationship diagram for the Stand-alone Overlay interoperability schema is shown in Illustration 5-1. In this illustration, 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.

5.1 ENTITY DESCRIPTIONS

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

5.2 ENTITY MODULES

Within an entity, attributes are grouped into related sets 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 does not infer any encoding of information into datasets.

Table 5–1 identifies the defined modules within the entities which comprise the ID/Net v3.0 Stand–alone Overlay Information Object Definition. Modules are identified by Module Name.

TABLE 5–1
STAND–ALONE OVERLAY IOD MODULE TABLE

Entity Name	Module Name	Module Library Section
Patient	Patient	(see Section 4)
Study	General Study	(see Section 4)
	Patient Study	(see Section 4)
Series	General Series	(see Section 4)
Equipment	General Equipment	(see Section 4)
Overlay	Overlay Identification	5.3.1.1
	Overlay Plane	5.3.1.2
	SOP Common	5.3.1.3

Note: 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 but it should be noted that they are the same ones as defined in DICOM Part 3.

5.3 ENTITY MODULE LIBRARY

The Entity Module Library consists of a description of each module of the DICOM Stand-alone Overlay conformance statement.

5.3.1 Stand-alone Overlay IOD

A Stand-alone Overlay IOD is the specification of an overlay which may be related to an image, but also may have its own existence within a series.

5.3.1.1 Overlay Identification Module

TABLE 5-2
OVERLAY IDENTIFICATION MODULE ATTRIBUTES

Attribute Name	Element Tag	Type	Notes
Revision 1:			
Overlay Number	(0020,0022)	2	
Overlay Date	(0008,0024)	3	
Overlay Time	(0008,0034)	3	

5.3.1.2 Overlay Plane Module

Conditional Descriptions:

Only a Text plane (Annotation Text Plane) is present, and the text plane is provided in Group 6000.

All overlay planes are one bit overlay planes.

TABLE 5-3
OVERLAY PLANE MODULE ATTRIBUTES

Attribute Name	Element Tag	Type	Notes
Revision 1:			
Rows	(60xx, 0010)	1	
Columns	(60xx, 0011)	1	
Overlay Type	(60xx, 0040)	1	
Origin	(60xx, 0050)	1	Defined Multiple Value: 0001 0001
Bits Allocated	(60xx, 0100)	1	Defined Value: 0001
Bit Position	(60xx, 0102)	1	Defined Value: 0000
Overlay Data	(60xx, 3000)	1C	See note above.

5.3.1.3 SOP Common Module

TABLE 5-4
SOP COMMON MODULE ATTRIBUTES

Attribute Name	Element Tag	Type	Notes
Revision 1:			
SOP Class UID	(0008,0016)	1	
SOP Instance UID	(0008,0018)	1	

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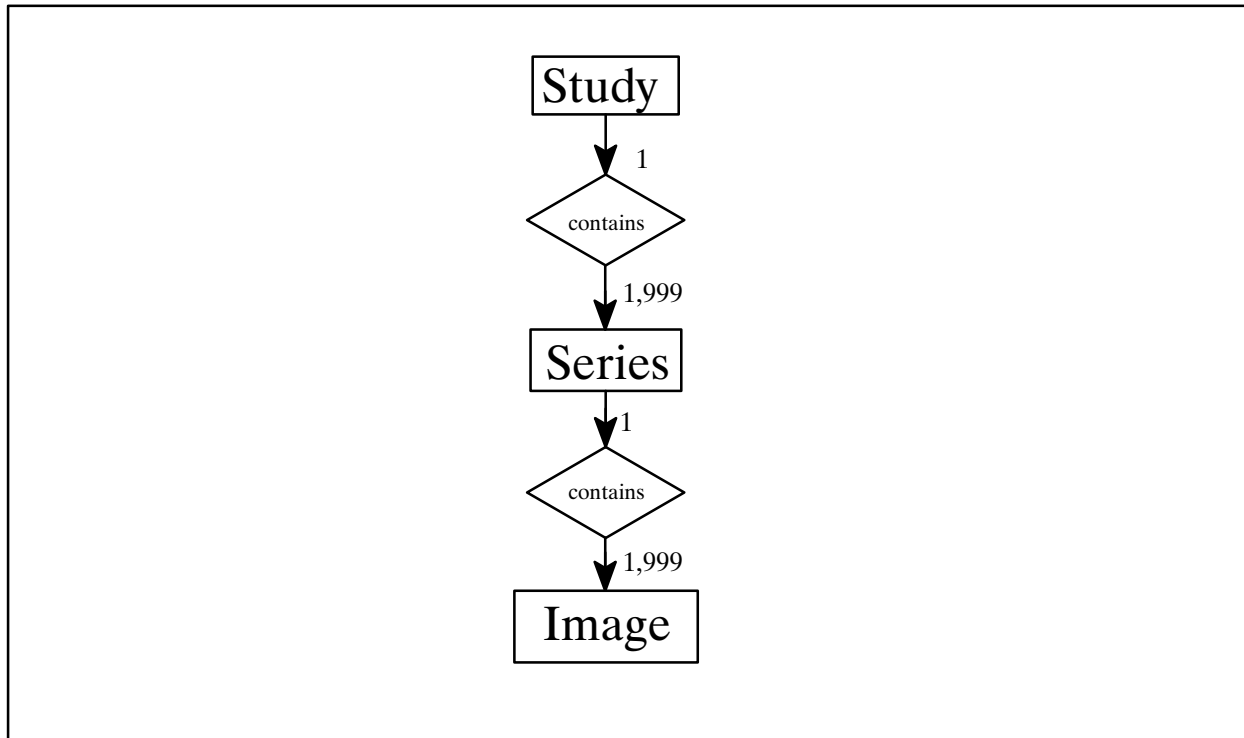
SECTION 6 – CT ADVANTAGE QUERY/RETRIEVE INFORMATION MODEL DEFINITION

This section specifies the subset of the DICOM v3.0 Study Root Query/Retrieve Information Model Definition used to represent the Study Root Q/R information produced by this implementation. The contents of this section are:

- 6.0 – Interoperability Schema
- 6.1 – Entity Descriptions
- 6.2 – Study Level
- 6.3 – Series Level
- 6.4 – Image Level

6.0 INTEROPERABILITY SCHEMA

ILLUSTRATION 6-1
STUDY ROOT QUERY/RETRIEVE ENTITY RELATIONSHIP DIAGRAM



The Entity–Relationship diagram for the Study Root Query/Retrieve Information Model interoperability schema is shown in Illustration 6–1. In this illustration, the following diagrammatic convention is established to represent the following 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.

6.1 ENTITY DESCRIPTIONS

Please refer to DICOM Standard Part 4 for a description of each of the entities contained within the Study Root Query/Retrieve Model.

6.2 STUDY LEVEL

6.2.1 Study Level Keys for the Study Root Query/Retrieve Information Model

Table 6–1 defines the keys supported at the Study level of the Study Root Query/Retrieve Information Model. Table 6–2 specifies the Query/Retrieve level and AE Title which are included in a C–FIND Response.

TABLE 6–1
STUDY LEVEL KEY ATTRIBUTES (NOTE: R=Required, O=Optional, U=Unique)

Attribute Name	Element Tag	Type	Notes: R=Required, O=Optional, U=Unique
Revision 0:			
Study Date	(0008,0020)	R	
Study Time	(0008,0030)	R	
Accession Number	(0008,0050)	R	
Patient Name	(0010,0010)	R	
Patient ID	(0010,0020)	R	
Study Instance UID	(0020,000D)	U	
Study Number	(0020,0010)	R	
Referring Physician	(0008,0090)	O	
Procedure Description	(0008,1030)	O	
Interpreting Physician's Name	(0008,1060)	O	
Patient Sex	(0010,0040)	O	
Patient Age	(0010,1010)	O	
Patient Weight	(0010,1030)	O	
Other Patient History	(0010,21B0)	O	

TABLE 6–2
Q/R LEVEL & AE TITLE SPECIFICATION – STUDY

Attribute Name	Element Tag	Type	Notes
Q/R Information Model Level	(0008,0052)	R	Defined Value: STUDY
Retrieve AE Title	(0008,0054)	R	Defined Value: Called AE Title

6.3 SERIES LEVEL

6.3.1 Series Level Keys for the Study Root Query/Retrieve Information Model

Table 6–3 defines the keys supported at the Series level of the Study Root Query/Retrieve Information Model. Table 6–4 specifies the Query/Retrieve level and AE Title which are included in the C–FIND Response.

TABLE 6–3
SERIES LEVEL KEY ATTRIBUTES (NOTE: R=Required, O=Optional, U=Unique)

Attribute Name	Element Tag	Type	Notes: R=Required, O=Optional, U=Unique
Revision 0:			
Modality	(0008,0060)	R	
Series Instance UID	(0020,000E)	U	
Series Number	(0020,0011)	R	
Series Date	(0008,0021)	O	
Series Time	(0008,0031)	O	
Study Description	(0008,1030)	O	
Series Description	(0008,103E)	O	
Patient Position	(0018,5100)	O	
Position Reference Indicator	(0020,1040)	O	

TABLE 6–4
Q/R LEVEL & AE TITLE SPECIFICATION – SERIES

Attribute Name	Element Tag	Type	Notes
Q/R Information Model Level	(0008,0052)	R	Defined Value: SERIES
Retrieve AE Title	(0008,0054)	R	Defined Value: Called AE Title

6.4 IMAGE LEVEL

6.4.1 Image Level Keys for the Study Root Query/Retrieve Information Model

Table 6–5 defines the keys supported at the Image level of the Study Root Query/Retrieve Information Model. Table 6–6 specifies the Query/Retrieve level and AE Title which are included in the C–FIND Response.

TABLE 6–5
CT IMAGE LEVEL KEY ATTRIBUTES (NOTE: R=Required, O=Optional, U=Unique)

Attribute Name	Element Tag	Type	Notes: R=Required, O=Optional, U=Unique
Revision 0:			
SOP Instance UID	(0008,0018)	U	
Image Number	(0020,0013)	R	
SOP Class UID	(0008,0016)	O	
Image Date	(0008,0023)	O	
Image Time	(0008,0033)	O	
Contrast/Bolus Agent	(0018,0010)	O	
KVP	(0018,0060)	O	
Data Collection Diameter	(0018,0090)	O	
Contrast/Bolus Route	(0018,1040)	O	
Reconstruction Diameter	(0018,1100)	O	
Gantry Tilt	(0018,1120)	O	
Table Height	(0018,1130)	O	
Exposure Rate	(0018,1151)	O	
Convolution Kernel	(0018,1210)	O	
Acquisition Number	(0020,0012)	O	
Slice Location	(0020,1041)	O	
Columns	(0028,0011)	O	

TABLE 6-6
Q/R LEVEL & AE TITLE SPECIFICATION – IMAGE

Attribute Name	Element Tag	Type	Notes
Q/R Information Model Level	(0008,0052)	R	Defined Value: IMAGE
Retrieve AE Title	(0008,0054)	R	Defined Value: Called AE Title