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GE Medical Systems

Technical Publications

Direction 09610-0025
Revision B

CRS-PC / CRS-PC+ 1.3 CONFORMANCE STATEMENT for DICOM V3.0

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1 Introduction

1.0 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 (OEM Conformance Statement) is an attachment of the original OEM DICOM Conformance Statement.

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

Cardiac Review Station (CRS-PC/PC+) 1.3
Conformance Statement for DICOM v3.0
Direction ***09610-0025***

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

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Rosslyn, VA 22209
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1.1 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 that 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

1.2 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 this OEM DICOM implementation. 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.

If the user encounters unspecified private data elements while parsing a DICOM 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 these devices.

1.3 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 that 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. Failures 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.

1.4 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*.

1.5 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*.

1.6 SYMBOLS AND ABBREVIATIONS

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

2 Original Equipment Manufacturers DICOM Conformance Statement

The section that follows is a duplicate of the Original Equipment Manufacturer's DICOM Conformance Statement for this product.
Note: This document is provided as reference and is subject to change without notice.

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Cardiac Review Station (CRS-PC/PC+)

Last Updated: May 2, 2000

DICOM Conformance Statement

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Preface

The intent of any DICOM conformance statement is to provide a knowledgeable user with the information required to determine whether and to what extent independent DICOM implementations may be able to inter-operate. However, the information contained in a DICOM conformance statement is not sufficient to ensure if independent implementations will, in fact, be able to inter-operate.

The user or system integrator must be aware of the following potential issues related to inter-operation:

- Using only the information provided by this Conformance Statement does not guarantee interoperability of Camtronics equipment with non-Camtronics equipment. It is the user's (or system integrator's) responsibility to thoroughly analyze the application requirements and objectives to determine if they can be met by the connection of Camtronics equipment to non-Camtronics equipment.
- Camtronics equipment has been tested to assure that the actual implementation of the DICOM interface corresponds with this Conformance statement. It is the responsibility of the user (or system integrator) to specify and carry out additional validation testing, which covers a broad spectrum of potential interactions between the independent implementations.
- Camtronics reserves the right to make changes to its products or to discontinue their delivery. Therefore, the user (or system integrator) should ensure that any future versions of Camtronics or non-Camtronics equipment are regression tested to verify that new software releases have not adversely impacted the ability to inter-operate.

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Camtronics reserves the right to correct this publication and to make changes to its contents without the obligation of informing anyone of these revisions or changes.

1 Overview

This document covers the implementation of the Review Station with respect to DICOM inter-operability and conformance issues.

The document is broken into two parts to separately cover both Dicom Network and Media Storage related conformance. Section 2 of this document specifies DICOM Network conformance. Section 4 of this document specifies DICOM Media Storage conformance.

1.0 Audience

The reader of this document is assumed to be familiar with the terminology and concepts described in the DICOM standard.

1.1 Terminology

The following terms are defined for the remainder of this document:

Term	Definition
CD	Refers to both stamped CD-ROM media and CD-R media. A CD-ROM drive can read both CD-ROM and CD-R media
CD-R	Refers to 120mm recordable media as defined in Part II: CD-WO version 2.0 in the Orange Book
FSC	a File-Set Creator
FSR	a File-Set Reader
GUI	a Graphical User Interface
SOP	a Service-Object Pair

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2 Network Conformance Statement

2.0 Introduction

This document is the DICOM Conformance Statement for the Camtronics PC based Cardiac Review Station (CRS-PC, CRS-PC+) products.

The CRS-PC and CRS-PC+ are primarily intended for review of DICOM multi-frame X-Ray Angiographic (Sequence) images and other Secondary Capture (Photo) images. Images may be reviewed that reside on the local filesystem or directly from CD media. DICOM network functionality is supported which enables the user to find and retrieve studies from remote DICOM Archives or other DICOM Workstation devices. All types of X-Ray Images supported by the X-Ray Angiographic Image Storage SOP Class are supported, up to 1024 * 1024 (rows x columns). The CRS-PC and CRS-PC+ can generate Secondary Capture (Photo) images from an X-Ray frame. A detailed description of the Photo Image that is generated is found in section 3.

Some features and functions are separately purchasable licensed options for the CRS-PC. Description of functions does not indicate that the user is entitled to these functions on any given system. Refer to sales quotations and purchase agreement for availability of options.

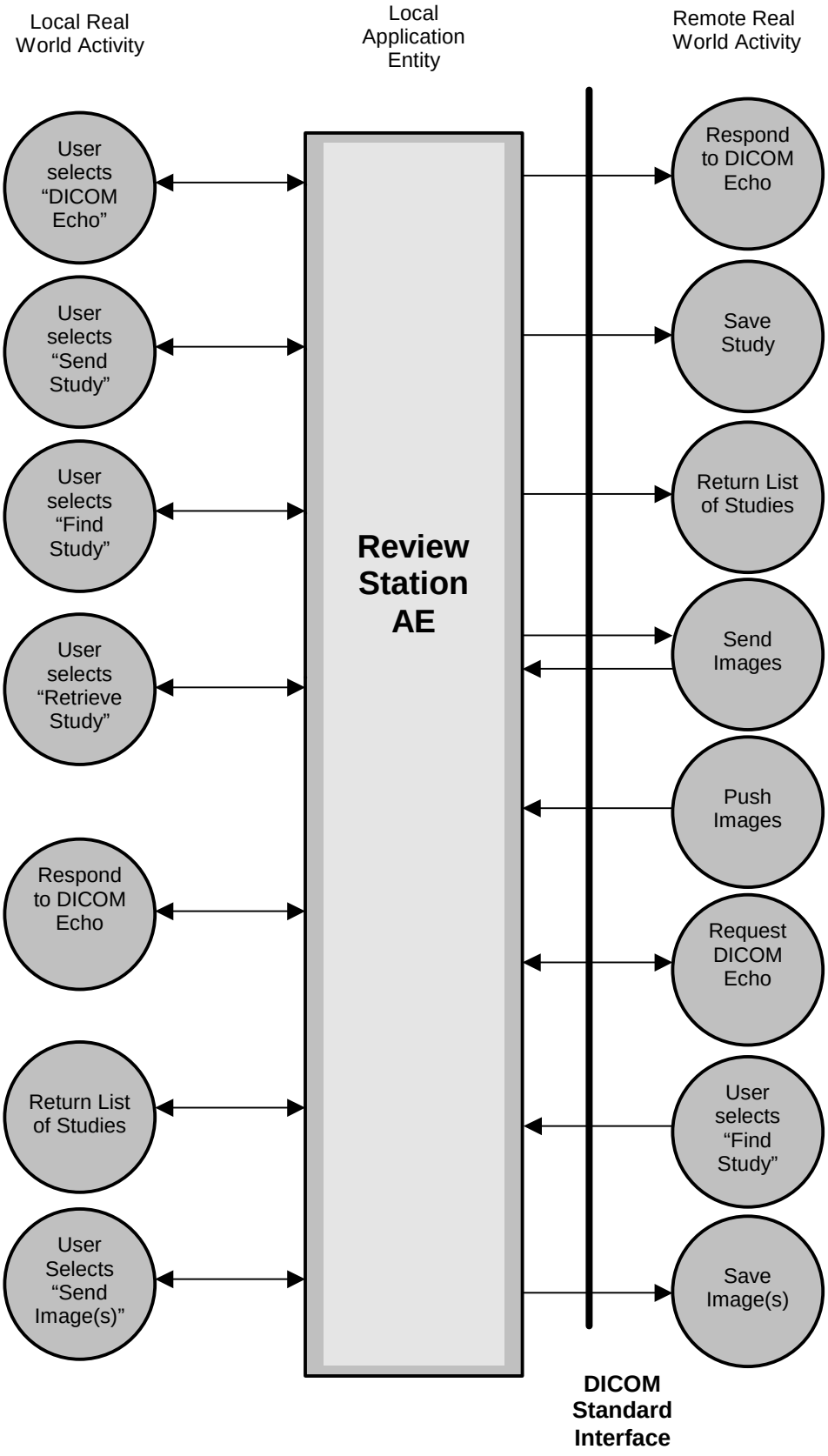
The CRS-PC and CRS-PC+ are simply referred to as the Review Station throughout the remainder of this document.

2.1 Implementation Model

2.1.1 Application Data Flow Diagram

As documented in the PS3.4-1998, the arrows in the diagram on the following page have the following meanings:

- A double-headed arrow indicates user interaction with the local application entity.
- An arrow pointing to the right indicates the local application entity initiates an association.
- An arrow pointing to the left indicates the local application entity accepts an association.



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2.1.2 Functional Definition of Application Entities

The DICOM echo functionality enables the user to verify the DICOM network communication/protocol stack is properly working. An association is established with the remote DICOM AE and a C-Echo operation is carried out as specified by the DICOM Verification service class.

The send study functionality enables the user to send a copy of the set of images belonging to a study that resides on the local filesystem to a remote DICOM AE. A single association is established to send a copy of each image belonging to the study to the remote DICOM AE as specified by the DICOM Storage service class.

The find study functionality enables the user to find a particular study on a remote DICOM AE. The review station forms a C-Find request that contains a set of search parameters as specified by the DICOM Query/Retrieve service class. The review station receives each matching C-Find response corresponding to a study and displays the information to the user.

The retrieve study functionality enables the user to retrieve a study from a remote DICOM AE. The review station forms a C-Move request as specified in the Query/Retrieve service class. The retrieve AE title and study UID that is required in the C-Move request is determined based on information returned in a previous C-Find response.

The review station accepts an association with a remote DICOM AE when the remote system requests network communication verification using the DICOM Verification service class. A message is logged that specifies the source AE title of the verification request. No other local real-world activity occurs.

The review station accepts an association with a remote DICOM AE when the remote system requests image storage using the DICOM Storage service class. The image copied is written to the local filesystem and added to the study database associated with the image. A message is logged pertaining to the new image added that specifies the remote AE title and file path.

2.1.3 Sequencing of Real-World Activities

The user must query for a list of studies prior to retrieving a study.

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2.2 Application Entity Specifications

2.2.1 Review Station DICOM AE Specification

The Review station provides standard conformance to the following DICOM V3.0 SOP classes as a Service Class User (SCU):

Service Class	SOP Class Name	SOP Class UID
Verification	Verification	1.2.840.10008.1.1
Storage	X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1
	Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Query/Retrieve	Study Root Q/R Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1
	Study Root Q/R Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2

The Review Station also provides standard conformance to the following DICOM V3.0 SOP classes as a Service Class Provider (SCP):

Service Class	SOP Class Name	SOP Class UID
Verification	Verification	1.2.840.10008.1.1
Storage	X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1
	Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Query/Retrieve	Study Root Q/R Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1
	Study Root Q/R Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2

2.2.1.1 Association Initiation Policies

2.2.1.1.1 General

The review station always proposes the following DICOM Application Context Name (ACN):

Application Context Name
1.2.840.10008.3.1.1.1

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The maximum length PDU negotiation is included in all association establishment requests. The default maximum length PDU for an association initiated by the review station is:

Maximum Length PDU
1,048,576 bytes

2.2.1.1.2 Number of Associations

The default number of associations that may be active simultaneously is 20.

2.2.1.1.3 Asynchronous Nature

DICOM asynchronous mode is not supported meaning that only one transaction may be outstanding over an association at any given point in time.

2.2.1.1.4 Implementation Identifying Information

The implementation class UID for the review station is the following:

Implementation Class UID
1.2.840.113697.6.8

The implementation version name has the following syntax.

Implementation Version Name
<major revision>.<minor revision>.<validation cycle>.<verification cycle>

2.2.1.2 Association Initiation Policy

The Review Station AE establishes an association for the following user requests.

- Verification (C-Echo) request to remote DICOM AE
- Send study to remote DICOM AE
- Find a study on a remote DICOM AE database
- Retrieve a study from a remote DICOM AE

2.2.1.2.1 Real-World Activity "User Selects DICOM Echo"

2.2.1.2.1.1 Associated Real-World Activity

A user who is a member of the Camtronics service group selects the DICOM preferences selection in the "Options" menu. The user may then select a remote DICOM application entity and press the "DICOM Echo" button. An association will be initiated with the selected remote DICOM application entity. Upon successful association establishment, the C-Echo request/response operation occurs over the association.

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2.2.1.2.1.2 Proposed Presentation Contexts

The following table illustrates the proposed presentation context for the DICOM Verification request.

Presentation Context Table - Proposed					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended**
Name	**UID**	**Name**	**UID**		**Negotiation**
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

2.2.1.2.1.3 SOP specific conformance

An appropriate error message is logged if the C-Echo request/response operation fails for any reason. The operator is notified of the success or failure of the DICOM Echo request.

2.2.1.2.1.4 Association Termination

The review station will release the association when the C-Echo Response from the remote DICOM AE is received.

2.2.1.2.2 Real-World Activity "User Selects Send Study"

2.2.1.2.2.1 Associated Real-World Activity

The user selects a study from the main study list view and then presses the Send Study icon. A list of remote DICOM AEs that support the storage service class is presented to the user. The user selects a remote DICOM AE and presses the Send Study button to queue the request. An association will be initiated with the selected remote DICOM AE. Upon successful association establishment, the C-Store request/response operation will occur for each image that belongs to the study at the time the association was initiated and that did not originally come from the destination AE.

All images belonging to the study will be sent with the same patient/study level demographics.

Progress information is displayed to the user in the send queue dialog that displays the number of pending, failed, and successful C-Store operations.

If required, the review station will perform the following transfer syntax conversion operation.

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Original Transfer Syntax UID	Destination Transfer Syntax UID
JPEG Lossless Process 14 1.2.840.10008.1.2.4.70	Explicit VR Little Endian 1.2.840.10008.1.2.1

2.2.1.2.2.2 Proposed Presentation Contexts

The following table illustrates the proposed presentation context for the association used to implement the Send Study user request.

Presentation Context Table – Proposed					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended**
Name	**UID**	**Name**	**UID**		**Negotiation**
Verification	1.2.840.10008.1.1	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 Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	JPEG Lossless Process 14 (Selection Value 1)	1.2.840.10008.1.2.4.70	SCU	None
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	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
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	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None

Selection of a transfer syntax for either abstract syntax is as follows (in this order):

a) Determine if the accepted context table has a transfer syntax that matches the native transfer syntax of the image. If yes, use that to send the image(s).

b) Determine if the accepted context table has a transfer syntax of Explicit VR Little Endian. If yes, use that to send the image(s).

c) Determine if the accepted context table has a transfer syntax of Implicit VR Little Endian. If yes, use that to send the image(s).

d) Abort the association and log an error message

2.2.1.2.2.3 SOP specific conformance

An appropriate error message is logged when a C-Store request/response operation fails for any reason. The operator is notified if the Send Study request fails for any reason.

A message containing the response value returned from the C-Store SCP is logged for all image transfers.

The user is informed in the send queue dialog of the number of successfully completed and failed image transfers. The following command response status codes are considered warnings and are represented to the user as successfully completed image transfers.

Status Code	Description
0xB000	Data Element Coercion Warning.
0xB006	Element Discarded
0xB007	SOP Class Mismatch
0xC111	Duplicate Image

All other non-zero response status values are represented to the user as a failed image transfer.

2.2.1.2.2.4 Association Termination

The review station will release the association when all images in the study have been sent to the remote DICOM AE. The association will be abnormally terminated if any error is encountered or the user cancels the Send Study request from the Send Queue dialog. The current image transfer in progress will be completed before the association is terminated.

2.2.1.2.3 Real-World Activity "User Selects Find Study"

2.2.1.2.3.1 Associated Real-World Activity

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The review station will initiate an association when the user presses the Find Study button from the Find Study dialog. Upon successful association establishment, a C-Find request is formed based on selection criteria entered by the user. Each C-Find response is displayed to the user as one line on the list of studies found.

2.2.1.2.3.2 Proposed Presentation Contexts

The following table illustrates the proposed presentation context for the Find Study user request.

Presentation Context Table – Proposed					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended**
Name	**UID**	**Name**	**UID**		**Negotiation**
Study Root Query Retrieve Information Model (C-Find)	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

2.2.1.2.3.3 SOP specific conformance

An appropriate error message is logged if the C-Find request/response operation fails for any reason. The operator is notified of the success or failure DICOM C-Find request.

The Query/Retrieve Level (0008,0052) always has a value of “STUDY”.

The relational query option is not supported.

The C-Find request for the Study Root Query Retrieve information model is composed of the following required and optional keys.

Tag	**Attribute Name**	**VR**	**VM**	**Req**	**Notes**
(0008,0005)	Specific Character Set	CS	1	O	value returned only
(0008,0020)	Study Date	DA	1	R	user may enter start and/or end date
(0008,0030)	Study Time	TM	1	R	value returned only
(0008,0050)	Accession Number	SH	1	R	user may specify
(0008,0052)	Query Level	CS	1	R	Value = “STUDY”
(0008,0054)	Retrieve AE Title	AE	1	O	value returned only
(0008,0061)	Modalities in Study	CS	1	O	Value = “XA”

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(0008,0090)	Referring Physician	PN	1	O	user may specify
(0008,1030)	Study Description	LO	1	O	value returned only
(0008,1048)	Physician(s) of Record	PN	1-n	O	value returned only
(0008,1050)	Performing Physician's Name	PN	1	O	user may specify
(0010,0010)	Patient Name	PN	1	R	user may specify
(0010,0020)	Patient ID	LO	1	R	user may specify
(0010,0030)	Patient DOB	DA	1	O	value returned only
(0010,0040)	Patient Sex	CS	1	O	value returned only
(0020,000D)	Study Instance UID	UI	1	U	value returned only
(0020,0010)	Study ID	SH	1	R	user may specify
(0020,1208)	Number of Study Related Images	IS	1	O	value returned only
(0032,000A)	Study Status ID	CS	1	O	value returned only
(0088,0130)	Storage Media File-Set ID	SH	1	O	value returned only
(0088,0140)	Storage Media File-Set UID	UI	1	O	value returned only
(0087,0010)	Private Creator	LO	1	O	value returned only
(0087,1010)	Media Type	CS	1	O	value returned only
(0087,1020)	Media Location	CS	1	O	value returned only
(0087,1040)	Size of Study	DS	1	O	value returned only
(0087,1050)	Estimated Retrieve Time	IS	1	O	value returned only

2.2.1.2.3.4 Association Termination

The review station will release the association when the final C-Find Response is received over the association. The association will be abnormally terminated if any errors are detected in the messages exchanged on the transport connection, the Q/R SCP aborts or cancels the transaction, or the user cancels the Find Study request.

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2.2.1.2.4 Real-World Activity "User Selects Retrieve Study"

2.2.1.2.4.1 Associated Real-World Activity

The user selects a study from the list of studies returned from the previous find study user request and then presses the Retrieve Study button to queue the retrieval request. The study selected for retrieval is associated with a previous C-Find response which contains a Retrieve AE title and Study UID. An association will be initiated with the Retrieve AE title associated with the user selected study. Upon successful association establishment, a C-Move request is formed which contains the study UID corresponding to the user selected study.

Progress information is displayed to the user in the retrieve queue dialog based on C-Move pending and final responses received from the remote Retrieval AE.

2.2.1.2.4.2 Proposed Presentation Contexts

The following table illustrates the proposed presentation context for the Retrieve Study user request.

Presentation Context Table – Proposed					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended**
Name	**UID**	**Name**	**UID**		**Negotiation**
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

2.2.1.2.4.3 SOP specific conformance

An appropriate error message is logged if the C-Move request/response operation fails for any reason. The operator is notified if the Move request fails for any reason. The following response status codes are considered errors:

Status Code	**Description**
A701	Out of resources – Unable to calculate number of matches
A702	Out of resources – Unable to perform suboperations
A801	Move Destination unknown
A900	Identifier does not match SOP Class
C000	Unable to process

2.2.1.2.4.4 Association Termination

The review station will release the association when the final C-Move Response from the remote DICOM Retrieve AE is received. A C-Cancel request is sent over the association if the user cancels the Retrieve Study request from the Retrieve Queue dialog.

2.2.1.3 Association Acceptance Policy

A new thread is created for each accepted transport connection. The new thread lives for the life of the association over the transport connection. Hence, the review station is able to process the following types of incoming DICOM requests simultaneously:

- Request for Verification (C-Echo)
- Request for Image Storage (C-Store)

2.2.1.3.1 Real World Activity "Verification Server"

2.2.1.3.1.1 Associated Real-World Activity

The review station is always ready to accept a new transport connection and create a thread to process the Verification request. The presentation context corresponding with the Verification request is accepted and a C-Echo response is sent over the established association.

2.2.1.3.1.2 Accepted Presentation Contexts

The following table illustrates the accepted presentation context for the DICOM Verification request.

Presentation Context Table – Accepted					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended**
Name	**UID**	**Name**	**UID**		**Negotiation**
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

2.2.1.3.1.3 SOP Specific Conformance

The review station provides standard conformance to the DICOM verification service class.

2.2.1.3.1.4 Presentation Context Acceptance Criterion

Not Applicable.

2.2.1.3.1.5 Transfer Syntax Selection Policies

Not Applicable.

2.2.1.3.2 Real World Activity "Image Storage Server"

2.2.1.3.2.1 Associated Real-World Activity

When a remote AE sends a C-Store request, the review station accepts the new transport connection and processes the Image Storage request. Multiple requests from different remote AE's can be accepted simultaneously. The review station accepts the presentation context associated with each Image Storage request and replies with a C-Store response when the complete image has been received on the established association.

2.2.1.3.2.2 Accepted Presentation Contexts

The following table illustrates the accepted presentation contexts for the Image Storage request.

Presentation Context Table – Accepted					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended**
Name	**UID**	**Name**	**UID**		**Negotiation**
Verification	1.2.840.10008.1.1	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
		JPEG Lossless Process 14 (Selection Value 1)	1.2.840.10008.1.2.4.70	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2	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
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None

2.2.1.3.2.3 SOP Specific Conformance

The review station conforms to the SOP's of the Storage Service Class at level 2 (full). No data elements are discarded or coerced by the review station.

Demographics for the first image received are represented to the user as demographics for the entire study. Demographics for subsequent images received for a study are ignored.

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The following status codes indicate the Review Station was unable to locally install the image file.

Status Code	Description
0xA700	Insufficient free space is available to install the image.
0xA701	Insufficient processing resources to install the image.
0xC001	Unable to parse the image file. The image is not installed.

A successful C-Store operation indicates the image was written to the Review Station's local filesystem. A patient and study level is created for the first image that belongs to a new study on the local filesystem. The new study will appear on the study list view when the first image for a new study is successfully installed on the local filesystem.

A series level is also created for the first image that belongs to a new series within the study. In addition, an icon image will be present for each image that locally resides in the study on the study information view.

2.2.1.3.2.4 Presentation Context Acceptance Criterion

Each abstract syntax provided in the incoming request is compared to the list of presentation context items in Section 2.2.1.3.2.2. If the abstract syntax matches an abstract syntax in the list, then the transfer syntax list is checked for a match. Each matching abstract syntax and transfer syntax pair is returned as one accepted presentation context to the requestor.

2.2.1.3.2.5 Transfer Syntax Selection Policies

The JPEG process 14 transfer syntax is preferred over the little endian implicit VR (baseline) transfer syntax for the X-Ray Image Storage Abstract Syntax. If offered a choice of Transfer Syntaxes in a Presentation Context, it will apply the following priority to the selection(s) of Transfer Syntax:

- JPEG lossless Process 14
- Implicit VR Little Endian
- Explicit VR Little Endian
- For Secondary Capture Image storage abstract syntax, if offered a choice of Transfer Syntaxes in a Presentation Context, it will apply the following priority to the selection(s) of Transfer Syntax:
- Implicit VR Little Endian
- Explicit VR Big Endian
- Explicit VR Little Endian

2.2.1.3.3 Real World Activity "Query Server"

2.2.1.3.3.1 Associated Real-World Activity

The review station is always ready to accept a new transport connection and create a thread to process the Query (C-Find) request. The review station will accept the presentation context associated with the Query request and send a response for each study, series or image that matches the keys provided in the Query request. The Query Server supports study, series and image level queries.

2.2.1.3.3.2 Accepted Presentation Contexts

The following table illustrates the proposed presentation context for the Find Study user request.

Abstract Syntax		Transfer Syntax		Role	Extended
Name	**UID**	**Name**	**UID**		**Negotiation**
Study Root Query Retrieve Information Model (C-Find)	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

The following table illustrates the proposed presentation context for the Retrieve user request.

Abstract Syntax		Transfer Syntax		Role	Extended
Name	**UID**	**Name**	**UID**		**Negotiation**
Study Root Query Retrieve Information Model (C-Move)	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

2.2.1.3.3.2.1 Specific Conformance for the Query (C-Find) SOP Class

The IWS conforms to the definition of an SCP of the Query (C-Find) Service in accordance with the DICOM standard. The IWS supports queries against the Study Root Information Model.

The IWS supports queries at the STUDY level in the Study Root FIND SOP class using the keys in Table 2.2-1.

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Table 2.2-1 Study Level Keys for Study Root Query

Tag	Attribute Name
(0008,0020)	Study Date
(0008,0030)	Study Time
(0008,0050)	Accession Number
(0008,0061)	Modalities in Study
(0008,0090)	Referring Physician
(0008,1050)	Performing Physician's Name
(0010,0010)	Patient Name
(0010,0020)	Patient ID
(0010,0030)	Patient DOB
(0010,0040)	Patient Sex
(0020,000D)	Study Instance UID
(0020,0010)	Study ID

The IWS supports queries at the SERIES level using the keys in Table 2.2-2.

Table 2.2-2 Series Level Keys for Query

Tag	Attribute Name
(0008,0060)	Modality
(0020,000e)	Series Instance UID
(0020,0011)	Series Number

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The IWS supports queries at the IMAGE level using the keys in Table 2.2-3.

Table 2.2-3 Image Level Keys for Query

Tag	Attribute Name
(0008,0018)	Image Instance UID
(0020,0013)	Image Number

2.2.1.3.3.2.2 Specific Conformance for the Retrieve (C-Move) SOP Class

The IWS conforms to the definition of an SCP of the Retrieve (C-Move) Service in accordance with the DICOM standard. The IWS supports retrievals against the Study Root Information Model.

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2.3 Communication Profiles

TCP/IP is the only protocol stack supported.

2.3.1 Supported Communication Stacks (parts 8,9)

2.3.1.1 TCP/IP Stack

The TCP/IP stack as supported by the Windows NT Operating System.

2.3.1.2 API

The API is the WinSock 2 interface as supported by the Windows NT Operating System.

2.3.1.3 Physical Media Support

Supported physical medium include:

- IEEE 802.3 100BASE-TX

2.4 Extensions/Specializations/Privatizations

2.4.1 Standard Extended/Specialized Private SOP

Not Applicable.

2.4.2 Private Transfer Syntaxes

Not Applicable.

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2.5 Configuration

The table below lists the DICOM related parameters that are configurable for each DICOM Application Entity (i.e. both Local and Remote).

Parameter	Parameter subtype	Notes
AE Alias		User visible name associated with the AE title.
AE Title		
IP Address		Dotted decimal format. An internet host name address is also allowed.
TCP Port		104 is the default.
Lab Name		Associate the configured lab name with the AE Title.
Query Service Provider		Boolean value.
	Default	Boolean value. Default query service provider displayed on Find Study dialog.
	StudyOnly	Boolean value. Query Server that only supports study level queries
Storage Service Provider		Boolean value.
	Default	Boolean value. Default storage service provider displayed on Send Study dialog.
	AutoForward	Boolean value. All received images are automatically forwarded to this destination
	BaselineOnly	Boolean value. Storage Server that does not support JPEG frame data
	Primary Archive	Boolean value.

2.6 Support of Extended Character Sets

The ISO-IR 100 (ISO 8859-1:1987 Latin alphabet N 1, supplementary set) is supported.

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3 SC Information Object Implementation

3.0 Introduction

This section specifies the use of the DICOM v3.0 Secondary Capture Image IOD to represent the information included in Secondary Capture Images produced by this implementation. Corresponding attributes are conveyed using the modules construct.

3.1 SC Image IOD Implementation

This section defines the implementation of the SC image information object. It refers to the DICOM V3.0 Standard, Part 3 (Information Object definition).

3.2 SC Image IOD Entities

3.2.1 Entities Description

Refer to DICOM Standard, Part 3 (Information Object Definitions) for a description of the entities contained within this information object.

3.3 SC Image IOD Module Table

Table 3.3-1 identifies the defined modules within the entities that compromise the DICOM v3.0 Secondary Capture Image Information Object Definition. Modules are defined by Module Name.

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

Table 3.3-1 Secondary Capture Image Object Definition

Information Entity	Module Name	Reference
Patient	Patient	3.4.1.1
Study	General Study	3.4.2.1
	Patient Study	3.4.2.2
Series	General Series	3.4.3.1
Equipment	General Equipment	3.4.4.1
	SC Equipment	3.4.4.2
Image	General Image	3.4.5.1
	Image Pixel	3.4.5.2
	SC Image	3.4.5.3

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	Overlay Plane	Not used
	Modality LUT	Not Used
	VOI LUT	3.4.5.4
	SOP Common	3.4.5.5

3.4 Information Module Definitions

Please refer to DICOM v3.0 Standard Part 3 for a description of each of the entities and modules contained within the Secondary Capture Information Object.

3.4.1 Patient Entity Module

3.4.1.1 Patient Module Attributes

Attribute Name	Tag	Type	Attribute Description
Patient Name	(0010,0010)	2	Use original image value
Patient ID	(0010,0020)	2	Use original image value
Patient Birthdate	(0010,0030)	2	Use original image value
Patient Sex	(0010,0040)	2	Use original image value
Referenced Patient Sequence	(0008,1120)	3	Not used
>Referenced SOP Class UID	(0008,1150)	1C	Not used
>Referenced SOP Instance UID	(0008,1155)	1C	Not used
Patient's Birth Time	(0010,0032)	3	Use original image value
Other Patient Ids	(0010,1001)	3	Use original image value
Ethnic Group	(0010,2160)	3	Not used
Patient Comments	(0010,4000)	3	Use original image value

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3.4.2 Study Entity Module

3.4.2.1 General Study Module Attributes

Attribute Name	Tag	Type	Attribute Description
Study Instance UID	(0020,000D)	1	Use original image value
Study Date	(0008,0020)	2	Use original image value
Study Time	(0008,0030)	2	Use original image value
Referring Physician's Name	(0008,0090)	2	Use original image value
Study ID	(0020,0010)	2	Use original image value
Accession Number	(0008,0050)	2	Use original image value
Study Description	(0008,1030)	3	Use original image value
Physician's of Record	(0008,1048)	3	Use original image value
Name of Physician Reading Study	(0008,1060)	3	Not used
Referenced Study Sequence	(0008,1110)	3	Not used
>Referenced SOP Class UID	(0008,1150)	1C	Not used
>Referenced SOP Instance UID	(0008,1155)	1C	Not used

3.4.2.2 Patient Study Module Attributes

Attribute Name	Tag	Type	Attribute Description
Admitting Diagnoses Description	(0008,1080)	3	Not used
Patient's Age	(0010,1010)	3	Not used
Patient's Size	(0010,1020)	3	Use original image value
Patient's Weight	(0010,1030)	3	Use original image value
Occupation	(0010,2180)	3	Not used
Additional Patient's History	(0010,21B0)	3	Not used

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3.4.3 Series Entity Module

3.4.3.1 General Series Module Attributes

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	1	Use original image value
Series Instance UID	(0020,000E)	1	Use original image value
Series Number	(0020,0011)	2	Use original image value
Laterality	(0020,0060)	2C	Not used
Series Date	(0008,0021)	3	Not used
Series Time	(0008,0031)	3	Not used
Performing Physician's Name	(0008,1050)	3	Use original image value
Protocol Name	(0018,1030)	3	Not used
Series Description	(0008,103E)	3	Not used
Operator's Name	(0008,1070)	3	Not used
Referenced Study Component Sequence	(0008,1111)	3	Not used
>Referenced SOP Class UID	(0008,1150)	1C	Not used
>Referenced SOP Instance UID	(0008,1155)	1C	Not used
Body Part Examined	(0018,0015)	3	Not used
Patient Position	(0018,5100)	2C	Not used
Smallest Pixel Value in Series	(0028,0108)	3	Not used
Largest Pixel Value in Series	(0028,0109)	3	Not used

3.4.4 Equipment Entity Module

3.4.4.1 General Equipment Module Attributes

Attribute Name	Tag	Type	Attribute Description
Manufacturer	(0008,0070)	2	Use original image value
Institution Name	(0008,0080)	3	Use original image value
Institution Address	(0008,0081)	3	Use original image value

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Station Name	(0008,1010)	3	Use original image value
Institutional Department Name	(0008,1040)	3	Not used
Manufacturer's Model Name	(0008,1090)	3	Use original image value
Device Serial Number	(0018,1000)	3	Not used
Software Version	(0018,1020)	3	Not used
Spatial Resolution	(0018,1050)	3	Not used
Date of Last Calibration	(0018,1200)	3	Not used
Time of Last Calibration	(0018,1201)	3	Not used
Pixel Padding Value	(0028,0120)	3	Not used

3.4.4.2 Secondary Capture Equipment Module Attributes

Attribute Name	Tag	Type	Attribute Description
Conversion Type	(0008,0064)	1	"WSD"
Modality	(0008,0060)	3	Use original image value
Secondary Capture Device ID	(0018,1010)	3	Not used
Secondary Capture Device Manufacturer	(0018,1016)	3	Not used
Secondary Capture Device Manufacturer's Model Name	(0018,1018)	3	Not used
Secondary Capture Device Software Version	(0018,1019)	3	Not used
Video Image Format Acquired	(0018,1022)	3	Not used
Digital Image Format Acquired	(0008,1023)	3	Not used

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3.4.5 Image Entity Module

3.4.5.1 General Image Module Attributes

Attribute Name	Tag	Type	Attribute Description
Image Number	(0020,0013)	2	Use original image value
Patient Orientation	(0020,0020)	2C	Zero Length
Image Date	(0008,0023)	2C	The date image captured
Image Time	(0008,0033)	2C	The time image captured
Image Type	(0008.0008)	3	DERIVED\SECONDARY\ SINGLE PLANE
Acquisition Number	(0020,0012)	3	Use original image value
Acquisition Date	(0008,0022)	3	Not used
Acquisition Time	(0008,0032)	3	Not used
Reference Image Sequence	(0008,1140)	3	Not used
>Referenced SOP Class UID	(0008,1150)	1C	Not used
>Referenced SOP Instance UID	(0008,1155)	1C	Not used
Derivation Description	(0008,2111)	3	Not used
Source Image Sequence	(0008,2112)	3	Not used
>Referenced SOP Class UID	(0008,1150)	1C	Not used
>Referenced SOP Instance UID	(0008,1155)	1C	Not used
Images in Acquisition	(0020,1002)	3	Not used
Image Comments	(0020,4000)	3	If Primary Image, Comment = "Created from Seq" or "Created from Sequence" + original frame number; If Secondary Image, comment = "Created from Photo" + original frame number
Lossy Image Compression	(0028,2110)	3	Use original image value

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3.4.5.2 Image Pixel Module Attributes

Attribute Name	Tag	Type	Attribute Description
Samples Per Pixel	(0028,0002)	1	1
Photometric Interpretation	(0028,0004)	1	Use original image value
Rows	(0028,0010)	1	1024
Columns	(0028,0011)	1	1024
Bits Allocated	(0028,0100)	1	8
Bits Stored	(0028,0101)	1	8
High Bit	(0028,0102)	1	7
Pixel Representation	(0028,0103)	1	0
Pixel Data	(7FE0,0010)	1	
Planar Configuration	(0028,0006)	1C	Not used
Pixel Aspect Ratio	(0028,0034)	1C	Use original image value
Smallest Image Pixel Value	(0028,0106)	3	Not used
Largest Image Pixel Value	(0028,0107)	3	Not used
Red Palette Color LUT Descriptor	(0028,1101)	1C	Not used
Blue Palette Color LUT Descriptor	(0028,1102)	1C	Not used
Green Palette Color LUT Descriptor	(0028,1103)	1C	Not used
Red Palette Color LUT Data	(0028,1201)	1C	Not used
Blue Palette Color LUT Data	(0028,1202)	1C	Not used
Green Palette Color LUT Data	(0028,1203)	1C	Not used

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3.4.5.3 SC Image Module Attributes

Attribute Name	Tag	Type	Attribute Description
Date of Secondary Capture	(0018,1012)	3	Date image is captured
Time of Secondary Capture	(0018,1014)	3	time image is captured

3.4.5.4 VOI LUT Module Attributes

Attribute Name	Tag	Type	Attribute Description
Window Center	(0028,1050)	3	Not used
Window Width	(0028,1051)	3	Not used

3.4.5.5 SOP Common Module Attributes

Attribute Name	Tag	Type	Attribute Description
Specific Character Set	(0008,0005)	3	Use original image value
SOP Class UID	(0008,0016)	1	1.2.840.10008.5.1.4.1.1.7
SOP Instance UID	(0008,0018)	1	1.2.840.113697.6.5 + machine serial number + time + series number + image number
Instance Creation Date	(0008,0012)	3	Not Used
Instance Creation Time	(0008,0013)	3	Not Used
Instance Creator UID	(0008,0014)	1	1.2.840.113697.6.3. + machine serial number

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3.5 Private Data Dictionary for Secondary Capture (QCA)

Attribute Name	Tag	Type	VR	VM	Attribute Description
Private Creator	(0009,0010)	1	LO	1	"QCA Results"
Analysis Type	(0009,1000)	2	CS	1	Number of views used for analysis. Enumerated type: • PRE • POST
Segment Name	(0009,1004)	2	LO	1	Acc Segment Name
Pre Catheter size	(0009,1012	1C	DS	1	Size of pre-procedure catheter in mm. Required if Analysis Type is "PRE" or "POST"
Pre Reference Diameter	(0009,1013)	1C	DS	1	Pre-procedure Reference Diameter in mm. Required if Analysis Type (0009,1000) is "PRE" or "POST"
Pre Minimum Lumen Diameter	(0009,1014)	1C	DS	1	Pre-procedure Minimum Lumen Diameter in mm. Required if Analysis Type is "PRE" or "POST"
Pre Average Diameter	(0009,1015)	2C	DS	1	Pre-procedure Average Diameter in mm. Required if Analysis Type (0009,1000) is "PRE" or "POST"
Pre Stenosis Length	(0009,1016)	2C	DS	1	Pre-procedure Stenosis Length in mm. Required if Analysis Type (0009,1000) is "PRE" or "POST"
Pre Stenosis %	(0009,1017)	2C	DS	1	Pre-procedure Stenosis as a percentage. Required if Analysis Type (0009,1000) is "PRE" or "POST"
Pre Geometric Area Reduction %	(0009,1018)	2C	DS	1	Pre-procedure Geometric Area Reduction as a percentage. Required if Analysis Type (0009,1000) is "PRE" or "POST"
Post Catheter Size	(0009,1022)	1C	DS	1	Size of post-procedure catheter in mm. Required if Analysis Type (0009,1000) is "POST"
Post Reference Diameter	(0009,1023)	1C	DS	1	Post-procedure Reference Diameter in mm. Required if Analysis Type

					(0009,1000) is “POST”
Post Minimum Lumen Diameter	(0009,1024)	1C	DS	1	Post-procedure Minimum Lumen Diameter in mm. Required if Analysis Type (0009,1000) is “POST”
Post Average Diameter	(0009,1025)	2C	DS	1	Post-procedure Average Diameter in mm. Required if Analysis Type (0009,1000) is “POST”
Post Stenosis Length	(0009,1026)	2C	DS	1	Post-procedure Stenosis Length in mm. Required if Analysis Type (0009,1000) is “POST”
Post Stenosis %	(0009,1027)	2C	DS	1	Post-procedure Stenosis as a percentage. Required if Analysis Type (0009,1000) is “POST”
Post Geometric Area Reduction %	(0009,1028)	2C	DS	1	Post-procedure Geometric Area Reduction as a percentage. Required if Analysis Type (0009,1000) is “POST”

3.6 Private Data Dictionary for Secondary Capture (QVA)

Attribute Name	Tag	Type	VR	VM	Attribute Description
Private Creator	(0009,0010)	1	LO	1	"Quantitative Results"
Calibration Frame	(0009,1040)	2	IS	1	
End Diastolic Frame	(0009,1041)		IS	1	Frame number of the end-diastolic frame used in the analysis
End Systolic Frame	(0009,1042)		IS	1	Frame number of the end- Systolic frame used in the analysis
End Diastolic Volume	(0009,1043)	3	DS	1	End Diastolic Volume, given in cubic centimeters
End Systolic Volume	(0009,1044)	3	DS	1	End Systolic Volume, given in cubic centimeters
Stroke Volume	(0009,1045)	3	DS	1	Stroke Volume, given in cubic centimeters
Cardiac Output	(0009,1046)	3	DS	1	Cardiac output, given in liters per minute
Ejection Fraction	(0009,1047)	3	DS	1	Ejection Fraction expressed as a percentage
Body Surface Area	(0009,1048)	3	DS	1	Body Surface Area, given in square meters
Artery Territory Region	(0009,1049)		SH	1	Region of interest as selected by the user. Defined Terms: RCA. LAD. CFX
Number of Diseased Vessels	(0009,1050)		IS	1	The number of diseased vessels in the region of interest, as selected by the user
Hypokinesis in Region	(0009,1051)		DS	1	The amount of hypokinetic wall motion in the region of interest, in standard deviations
Hyperkinesis in Region	(0009,1052)		DS	1	The amount of hyperkinetic wall motion in the region of interest, in standard deviations
percent of chords with hyperkinesis < -	(0009,1053)		IS	1	Percentage of chords in the total LV contour which are hypokinetic by

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2 SD					more than 2 standard deviations
percent of chords with alkinesis/dyskinesis	(0009,1054)		IS	1	Percentage of chords in the total LV contour with alkinesis/dyskinesis
Calibration Factor	(0009,1055)		DS	1	Millimeters per pixel +/- 0.01

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4 Media Storage Conformance Statement

4.0 Introduction

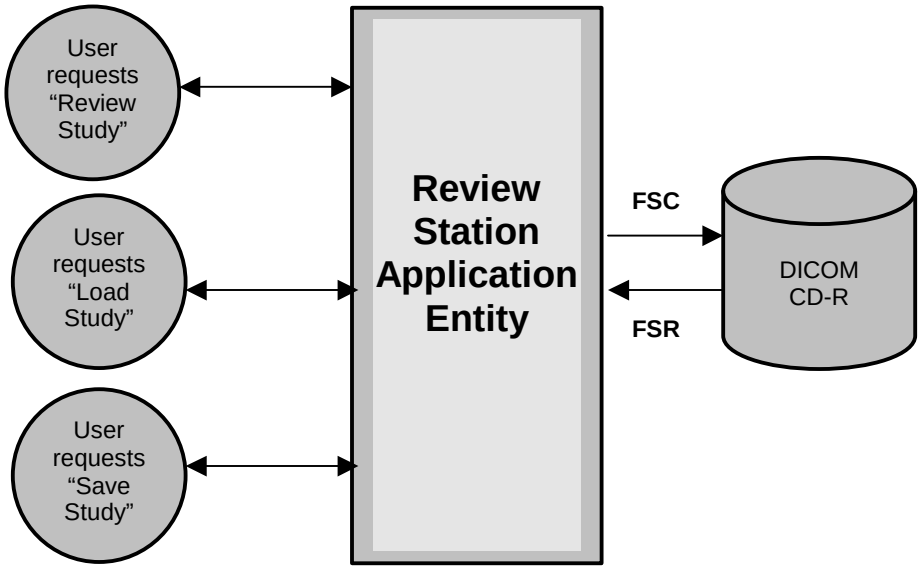
The remainder of this document specifies the Review Station compliance to DICOM media interchange. The Review Station provides the user with the ability to review and load DICOM compliant CD-R media.

Please refer to section 2.0 for a complete introduction to the Review Station.

4.1 Implementation Model

4.1.1 Application Data Flow Diagram

The media specific implementation model for the Review Station is shown below.



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4.1.2 Functional Definition of AE's

The Review Station application provides the following media related DICOM functionality to the user:

- Review a study directly from CD media.
- Load a study on CD media to local storage.
- Push a study on CD to remote storage.
- Save a study (STD-XA1K-CD profile) on the local filesystem to CD media.

Note: Saving a study to CD Media requires a CD Writer that is an option and requires a license.

4.1.3 Sequencing of Real-World Activities

Not Applicable.

4.1.4 File Meta Information for Implementation Class and Version

The following Meta information attributes pertain to the implementation class and version.

Tag	Name	Value
(0002,0001)	File Meta information version	1
(0002,0012)	implementation class UID	1.2.840.113697.6.8
(0002,0013)	implementation version name	Syntax: <major revision>.<minor revision>.<validation cycle>.<verification cycle>

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4.2 AE Specifications

4.2.1 Review Station AE Specification

The Review Station provides standard conformance to the DICOM Interchange Option of the Media Storage Service Class. The application profiles and roles are listed in the table below.

Supported Application Profile	Real-World Activity	Roles	SC Option
STD-XABC-CD	Review study from CD	FSR	Interchange with directory information module
	Load study from CD	FSR	Interchange with directory information module
AUG-SC-2-STD-XABC-CD	Review study from CD	FSR	Interchange with directory information module
	Load study from CD	FSR	Interchange with directory information module
AUG-SC-STD-XABC-CD	Review study from CD	FSR	Interchange with directory information module
	Load study from CD	FSR	Interchange with directory information module
STD-XA1K-CD	Review study from CD	FSR	Interchange with directory information module
	Load study from CD	FSR	Interchange with directory information module
	Save study to CD	FSC	Interchange with directory information module

The Review Station performs one or more of the following actions automatically when CD media is placed in the CD Reader drive:

- Displays one line on the study list screen for each supported study if a valid DICOMDIR file is found in the root directory.
- Displays a warning message if an invalid DICOMDIR file is found in the root directory.
- Performs no action if a DICOMDIR file is not detected in the root directory.

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4.2.1.1 File Meta Information for the Review Station AE

The following Meta information attributes applies to a particular Review Station AE:

Tag	Name	Value
(0002,0016)	source application entity title	<configurable on the review station>

4.2.1.2 Real World Activities

4.2.1.2.1 Real World Activity "Display Study Information from CD"

The review station AE implements the FSR role using the interchange option when requested to display study information for a study residing on CD media. A tree view is displayed representing the DICOMDIR file on the CD media.

4.2.1.2.1.1 Media Storage Application Profile

Study information may be displayed from CDs that conform to the STD-XABC-CD, AUG-SC-STD-XABC-CD, AUG-SC-2-STD-XABC-CD and STD-XA1K-CD application profiles.

4.2.1.2.2 Real World Activity "Review Study from CD"

The review station AE implements the FSR role using the interchange option when requested to review a study residing on CD media.

4.2.1.2.2.1 Media Storage Application Profile

Studies may be reviewed from CD that conform to the STD-XABC-CD, AUG-SC-STD-XABC-CD, AUG-SC-2-STD-XABC-CD CD and STD-XA1K-CD application profiles.

4.2.1.2.3 Real World Activity "Load Study from CD"

The review station AE implements the FSR role using the interchange option when requested to load a study from CD media. Any study on the CD that contains image SOP instances supported by the STD-XABC-CD, AUG-SC-STD-XABC-CD, AUG-SC-2-STD-XABC-CD CD and STD-XA1K-CD application profiles may be loaded to the local filesystem. Only supported images within the study are loaded.

4.2.1.2.3.1 Media Storage Application Profile

Studies may be pushed to a remote storage device from CD that conform to the STD-XABC-CD, AUG-SC-STD-XABC-CD,AUG-SC-2-STD-XABC-CD CD and STD-XA1K-CD application profiles.

4.2.1.2.4 Real World Activity "Push Study from CD"

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The review station AE implements the FSR role using the interchange option when requested to push a study from CD media. Any study on the CD that contains image SOP instances supported by the STD-XABC-CD, AUG-SC-STD-XABC-CD, AUG-SC-2-STD-XABC-CD CD and STD-XA1K-CD application profiles may be pushed to a remote storage device that supports the X-Ray Storage SOP Class. Only supported images within the study are pushed.

4.2.1.2.5 Real World Activity "Save Study to CD"

The Image Workstation AE implements the FSC role using the interchange option when requested to save a study on the local filesystem to CD media. The user is required to insert blank CD-R media into the CD recorder drive. Only one study may be recorded per CD media.

The images belonging to the study determine the application profile of the CD being recorded. Please reference DICOM V3.0 Part 11 for the detailed specifications of a particular application profile. The User Interface provides two "Save Study" icons– "Create Exchange CD" and "Create Archive CD". When the User selects the "Create Exchange CD" icon, a CD is created that conforms to the STD-XABC-CD profile.

Note: *Camtronics has defined a mechanism to record a study larger than the capacity of one CD to a set of CDs. A label is recorded on each CD indicating the order number and the total number of CDs that represent the complete study. When a multi-CD study is loaded, the user will be prompted to load all CDs representing the original study.*

4.2.1.2.5.1 Media Storage Application Profile

Studies may be saved to CD that conform to the STD-XA1K-CD application profile.

4.3 Augmented and Private Application Profiles

4.3.1 Augmented Application Profiles

The review station supports two augmented Application profiles: AUG-SC-STD-XABC-CD and AUG-SC-2-STD-XABC-CD.

4.3.1.1 AUG-SC-STD-XABC-CD/ AUG-SC-2-STD-XABC-CD

These application profiles are an augmentation of the STD-XABC-CD standard application profile. The augmentations add support for the SC SOP class.

4.3.1.1.1 SOP class Augmentation

The following SOPs are part of the AUG-SC-STD-XABC-CD application profile. There are no requirements or restrictions on SOP options beyond those in the standard definitions.

Service Object Pair		Transfer Syntax	
Name	**UID**	**Name**	**UID**
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Explicit VR Big Endian	1.2.840.10008.1.2.2

The following SOPs are part of the AUG-SC-2-STD-XABC-CD application profile. There are no requirements or restrictions on SOP options beyond those in the standard definitions.

Service Object Pair		Transfer Syntax	
Name	**UID**	**Name**	**UID**
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Explicit VR Little Endian	1.2.840.10008.1.2.1

4.3.1.1.2 Directory Augmentations

None.

4.3.1.1.3 Other Augmentations

None.

4.3.2 Private Application Profiles

Not Applicable.

4.4 Extensions, Specializations, Privatizations of SOP Classes and Transfer Syntaxes

4.4.1 Extensions, Specializations, and Privatizations of SOP Classes

4.4.1.1 SOP Specific Conformance Statement for "Media Storage Directory Storage"

The review station supports additional type 3 attributes at the patient, study, series, and image levels in the Basic Directory IOD. Please refer to DICOM V3.0 Part 3 for a complete description of the Basic Directory Information Object.

4.4.1.1.1 Basic Directory IOD – Optional Patient Keys

In addition to the required type 1 and type 2 keys, the following standard type 3 keys are supported at the patient level if the key has a data value.

Tag	Name
(0010,0030)	birth date
(0010,0040)	sex
(0010,4000)	patient comments

4.4.1.1.2 Basic Directory IOD – Optional Study Keys

In addition to the required type 1, type 1C and type 2 keys, the following standard type 3 keys are supported at the study level if the key has a data value.

Tag	Name
(0008,0090)	referring physician
(0010,1020)	patient's height
(0010,1030)	patient's weight
(0032,4000)	study comments

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4.4.1.1.3 Basic Directory IOD – Optional Series Keys

In addition to the required type 1, type 1C and type 2 keys, the following standard type 3 keys are supported at the series level if the key has a data value.

Tag	Name	Notes
(0008,0070)	manufacturer	
(0008,0080)	institution name	configurable on the Review Station
(0008,0081)	institution address	configurable on the Review Station
(0008,1010)	station name	
(0008,1050)	performing physician's name	

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4.4.1.1.4 Basic Directory IOD – Optional Image Keys

In addition to the required type 1, type 1C and type 2 keys, the following standard type 3 keys are supported at the image level if the key has a data value.

Tag	Name	Notes
(0008,0008)	image type	
(0008,0022)	acquisition date	
(0008,0023)	image date	
(0008,0032)	acquisition time	
(0008,0033)	image time	
(0008,1140)	referenced image sequence	if image type specifies BIPLANE A or BIPLANE B image
(0020,0012)	acquisition number	
(0020,4000)	image comments	
(0028,0004)	photometric interpretation	
(0028,0008)	number of frames	
(0028,0010)	number of rows	
(0028,0011)	number of columns	
(0028,0034)	pixel aspect ratio	
(0028,0100)	bits allocated	
(0028,0101)	bits stored	
(0028,1040)	pixel intensity relationship	
(0028,6010)	representative frame number	
(0050,0004)	calibration image	
(0088,0200)	icon image sequence	

4.4.2 Private Transfer Syntax Specification

Not Applicable.

4.5 Support of Extended Character Sets

The ISO-IR 100 (ISO 8859-1:1987 Latin alphabet N 1, supplementary set) is supported.

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