



**DICOM Conformance Statement
For
Cardiac Information Manager
Version 1.1.1**

**Document Number: 2003-00838
Revision: 2.0
Revision date: March 24, 2003
Status: Approved**

(This Page Is Intentionally Blanked)

(This Page Is Intentionally Blanked)

Table of Contents

| | |
|--|-----------|
| ACRONYMS, ABBREVIATIONS AND SYMBOLS | 8 |
| 1 INTRODUCTION | 9 |
| 1.1 OVERVIEW | 9 |
| 1.2 REFERENCES | 10 |
| 1.3 DEFINITIONS | 11 |
| 2 IMPLEMENTATION MODEL | 12 |
| 2.1 APPLICATION DATA FLOW DIAGRAM | 12 |
| 2.1.1 Legend | 12 |
| 2.1.2 Basic Profile | 12 |
| 2.1.3 Extended Profile | 13 |
| 2.1.4 Patient Schedule/Procedure Status Profile | 14 |
| 2.1.5 Basic Print Profile | 14 |
| 2.2 FUNCTIONAL DEFINITIONS OF AE'S | 15 |
| 2.2.1 CIM AE | 15 |
| 2.2.1.1 Verification Request | 15 |
| 2.2.1.2 Remote ECHO Request | 15 |
| 2.2.1.3 Storage Request | 15 |
| 2.2.1.4 Remote Storage Request | 16 |
| 2.2.1.5 Storage Commitment Request | 16 |
| 2.2.1.6 Remote Storage Commitment Response | 16 |
| 2.2.1.7 Query Request | 16 |
| 2.2.1.8 Retrieval Request | 16 |
| 2.2.1.9 Modality Worklist Retrieval Request | 17 |
| 2.2.1.10 Print Images | 17 |
| 2.3 SEQUENCE OF REAL WORLD ACTIVITIES | 18 |
| 2.3.1 Storage and Storage Commitment | 18 |
| 2.3.2 Retrieval of Information Objects | 18 |
| 3 CIM AE SPECIFICATION | 19 |
| 3.1 ASSOCIATION ESTABLISHMENT POLICY | 20 |
| 3.1.1 General | 20 |
| 3.1.2 Number of Association | 20 |
| 3.1.3 Asynchronous Nature | 20 |
| 3.1.4 Implementation Identifying Information | 20 |
| 3.2 ASSOCIATION INITIATION BY REAL-WORLD ACTIVITY | 21 |
| 3.2.1 Verification Request | 21 |
| 3.2.1.1 Associated Real World Activity | 21 |
| 3.2.1.2 Proposed Presentation Contexts | 21 |
| 3.2.2 Storage Request | 22 |
| 3.2.2.1 Associated Real World Activity | 22 |
| 3.2.2.2 Proposed Presentation Contexts | 22 |
| 3.2.2.3 SOP Specific Conformance - Storage | 23 |
| 3.2.3 Storage Commitment Request | 24 |
| 3.2.3.1 Associated Real World Activity | 24 |
| 3.2.3.2 Proposed Presentation Contexts | 24 |
| 3.2.3.3 SOP Specific Conformance | 24 |
| 3.2.3.4 Operation Policy | 24 |
| 3.2.4 Query Request | 25 |
| 3.2.4.1 Associated Real World Activity | 25 |
| 3.2.4.2 Proposed Presentation Contexts | 25 |
| 3.2.4.3 SOP Specific Conformance for Patient Root Query/Retrieve Model – FIND | 25 |
| 3.2.4.4 Sequence of Query Operations | 25 |

| | | |
|-----------|--|----|
| 3.2.5 | Retrieval Request | 26 |
| 3.2.5.1 | Associated Real World Activity | 26 |
| 3.2.5.2 | Proposed Presentation Contexts | 26 |
| 3.2.5.3 | SOP Specific Conformance for Patient Root Query/Retrieve Model – MOVE | 26 |
| 3.2.5.4 | Sequence of Retrieval Operations | 26 |
| 3.2.6 | Modality Worklist (MWL) | 27 |
| 3.2.6.1 | Associated Real World Activity | 27 |
| 3.2.6.2 | Proposed Presentation Contexts | 27 |
| 3.2.6.3 | SOP Specific Conformance | 27 |
| 3.2.7 | Print Images | 28 |
| 3.2.7.1 | Associated Real World Activity | 28 |
| 3.2.7.2 | Proposed Presentation Contexts | 28 |
| 3.2.7.3 | SOP Specific Conformance | 28 |
| 3.2.7.3.1 | SOP Specific Conformance to Basic Film Session SOP Class | 28 |
| 3.2.7.3.2 | SOP Specific Conformance to Basic Film Box SOP Class | 28 |
| 3.2.7.3.3 | SOP Specific Conformance to Basic Grayscale Image Box SOP Class | 29 |
| 3.2.7.3.4 | SOP Specific Conformance to Basic Color Image Box SOP Class | 29 |
| 3.2.7.3.5 | SOP Specific Conformance to Printer SOP Class | 29 |
| 3.2.7.3.6 | SOP Specific Conformance to Basic Grayscale Print Management Meta SOP Class | 29 |
| 3.3 | ASSOCIATION ACCEPTANCE POLICY | 30 |
| 3.3.1 | Remote ECHO Request | 30 |
| 3.3.1.1 | Associated Real World Activity | 30 |
| 3.3.1.2 | Presentation Context Table | 30 |
| 3.3.2 | Remote Storage Request | 31 |
| 3.3.2.1 | Associated Real World Activity | 31 |
| 3.3.2.2 | Presentation Contexts | 31 |
| 3.3.2.3 | SOP Specific Conformance | 33 |
| 3.3.3 | Remote Storage Commitment Response | 33 |
| 3.3.3.1 | Associated Real World Activity | 33 |
| 3.3.3.2 | Proposed Presentation Contexts | 33 |
| 3.3.3.3 | SOP Specific Conformance | 33 |
| 4 | COMMUNICATIONS PROFILES | 35 |
| 4.1 | SUPPORTED COMMUNICATION STACKS | 35 |
| 4.2 | OSI STACK | 35 |
| 4.3 | TCP/IP STACK | 35 |
| 4.3.1 | API | 35 |
| 4.3.2 | Physical Media Support | 35 |
| 4.4 | POINT TO POINT STACK | 35 |
| 5 | CONFIGURATION | 36 |
| 6 | SUPPORT OF EXTENDED CHARACTER SETS | 37 |
| 7 | CODES AND CONTROLLED TERMINOLOGY | 37 |
| 8 | INFORMATION OBJECT DEFINITIONS | 38 |
| 8.1 | SECONDARY CAPTURE INFORMATION OBJECT DEFINITION | 38 |
| 8.1.1 | Entity Module Definitions | 38 |
| 8.1.1.1 | Secondary Capture IOD Modules | 38 |
| 8.1.2 | Information Object Definitions | 38 |
| 8.1.2.1 | Patient Module | 38 |
| 8.1.2.2 | General Study Module | 39 |
| 8.1.2.3 | Patient Study Module | 39 |
| 8.1.2.4 | General Series Module | 40 |

| | | |
|------------|---|-----------|
| 8.1.2.5 | General Equipment Module | 41 |
| 8.1.2.6 | SC Equipment Module | 41 |
| 8.1.2.7 | General Image Module | 41 |
| 8.1.2.8 | Image Pixel Module | 41 |
| 8.1.2.9 | SC Image Module | 42 |
| 8.1.2.10 | SOP Common Module | 42 |
| 8.2 | ULTRASOUND IMAGE INFORMATION OBJECT DEFINITION | 43 |
| 8.2.1 | Entity Module Definitions | 43 |
| 8.2.1.1 | Ultrasound Image IOD Modules | 43 |
| 8.2.2 | Information Object Definitions | 44 |
| 8.2.2.1 | Patient Module | 44 |
| 8.2.2.2 | General Study Module | 44 |
| 8.2.2.3 | Patient Study Module | 45 |
| 8.2.2.4 | General Series Module | 45 |
| 8.2.2.5 | General Equipment Module | 46 |
| 8.2.2.6 | General Image Module | 46 |
| 8.2.2.7 | Image Pixel Module | 46 |
| 8.2.2.8 | US Image Module | 47 |
| 8.2.2.9 | SOP Common Module | 47 |
| 8.3 | ULTRASOUND MULTI-FRAME IMAGE INFORMATION OBJECT DEFINITION | 48 |
| 8.3.1 | Entity Module Definitions | 48 |
| 8.3.1.1 | Ultrasound Multi-frame Image IOD Modules | 48 |
| 8.3.2 | Information Object Definitions | 49 |
| 8.3.2.1 | Patient Module | 49 |
| 8.3.2.2 | General Study Module | 49 |
| 8.3.2.3 | Patient Study Module | 50 |
| 8.3.2.4 | General Series Module | 50 |
| 8.3.2.5 | Synchronization Module | 51 |
| 8.3.2.6 | General Equipment Module | 51 |
| 8.3.2.7 | General Image Module | 51 |
| 8.3.2.8 | Image Pixel Module | 52 |
| 8.3.2.9 | Cine Module | 52 |
| 8.3.2.10 | Multi-frame Module | 52 |
| 8.3.2.11 | US Image Module | 53 |
| 8.3.2.12 | SOP Common Module | 53 |
| 8.4 | BASIC VOICE AUDIO INFORMATION OBJECT DEFINITION | 54 |
| 8.4.1 | Entity Module Definitions | 54 |
| 8.4.1.1 | Basic Voice Audio IOD Modules | 54 |
| 8.4.2 | Information Object Definitions | 54 |
| 8.4.2.1 | Patient Module | 54 |
| 8.4.2.2 | General Study Module | 55 |
| 8.4.2.3 | Patient Study Module | 55 |
| 8.4.2.4 | General Series Module | 56 |
| 8.4.2.5 | Synchronization Module | 57 |
| 8.4.2.6 | General Equipment Module | 57 |
| 8.4.2.7 | Waveform Identification Module | 57 |
| 8.4.2.8 | Waveform Module | 57 |
| 8.4.2.9 | SOP Common Module | 58 |
| 9 | DIMSE-SERVICES AND ATTRIBUTES | 59 |
| 9.1 | STORAGE COMMITMENT | 59 |
| 9.1.1 | DIMSE-Service Class | 59 |
| 9.1.2 | STORAGE COMMITMENT PUSH MODEL SOP CLASS | 59 |
| 9.1.2.1 | N-ACTION Attributes | 59 |
| 9.1.2.2 | N-EVENT-REPORT Attributes | 59 |
| 9.2 | QUERY/RETRIEVE SCU | 60 |
| 9.2.1 | DIMSE-Services | 60 |
| 9.2.2 | Patient Root Q/R Information Model - Find | 60 |
| 9.2.2.1 | Patient Level SCU Request | 60 |
| 9.2.2.2 | Study Level SCU Request | 61 |

| | | |
|------------|--|-----------|
| 9.2.2.3 | Query Attributes and Constraints | 61 |
| 9.3 | MODALITY WORKLIST | 62 |
| 9.3.1 | DIMSE-Service | 62 |
| 9.3.2 | DIMSE Attributes | 62 |
| 9.3.2.1 | Matching Key Attributes | 62 |
| 9.3.2.1.1 | Scheduled Procedure Step Module | 62 |
| 9.3.2.1.2 | Patient Identification Step Module | 63 |
| 9.3.2.1.3 | Visit Admission Module | 63 |
| 9.3.2.1.4 | Study Scheduling Module | 63 |
| 9.3.2.2 | Return Key Attributes | 63 |
| 9.3.2.2.1 | Scheduled Procedure Step Module | 63 |
| 9.3.2.2.2 | Requested Procedure Module | 64 |
| 9.3.2.2.3 | Imaging Service Request Module | 64 |
| 9.3.2.2.4 | Patient Identification Module | 64 |
| 9.3.2.2.5 | Patient Demographic Module | 64 |
| 9.3.2.2.6 | Visit Identification Module | 64 |
| 9.3.2.2.7 | Visit Status Module | 64 |
| 9.3.2.2.8 | Visit Admission Module | 64 |
| 9.3.2.2.9 | Study Scheduling Module | 64 |
| 9.4 | PRINT | 65 |
| 9.4.1 | DIMSE-Services | 65 |
| 9.4.2 | Basic Film Session SOP Class | 65 |
| 9.4.2.1 | N-CREATE Attributes | 65 |
| 9.4.3 | Basic Film Box SOP Class | 66 |
| 9.4.3.1 | N-CREATE Attributes | 66 |
| 9.4.4 | Basic Grayscale Image Box SOP Class | 67 |
| 9.4.4.1 | N-SET Attributes | 67 |
| 9.4.5 | Basic Color Image Box SOP Class | 68 |
| 9.4.5.1 | N-SET Attributes | 68 |
| 9.4.6 | Printer SOP Class | 69 |
| 9.4.6.1 | N-GET Attributes | 69 |
| 9.5 | DIMSE-SERVICE AND ATTRIBUTES - STORAGE (ACCEPTANCE) | 70 |
| 9.5.1 | DIMSE-Services | 70 |
| 9.5.2 | C-STORE Attribute | 70 |

Acronyms, Abbreviations and Symbols

- ACC American College of Cardiology
- ACR American College of Radiology
- ASCII American Standard Code for Information Interchange
- AE Application Entity
- ANSI American National Standards Institute
- CIM Cardiac Information Manager
- DICOM Digital Imaging and COmmunications in Medicine
- DIMSE DICOM Message Service Element
- DIMSE-C DICOM Message Service Element-Composite
- DIMSE-N DICOM Message Service Element-Normalized
- HIS Hospital Information System
- HL7 Health Level 7
- IE Information Entity
- IOD Information Object Definition
- ISO International Standard Organization
- NEMA National Electrical Manufacturers Association
- PDU Protocol Data Unit
- RIS Radiology Information System
- SC Secondary Capture
- SCP Service Class Provider
- SCU Service Class User
- SOP Service Object Pair
- TCP/IP Transmission Control Protocol/Internet Protocol
- UID Unique Identifier
- US Ultrasound

1 Introduction

This document is a DICOM Conformance Statement for Cardiac Information Manager (CIM) system.

This document is intended to provide the reader with the knowledge of how to integrate this product within a DICOM compliant hospital network. It details DICOM Service Classes and Communication Protocols that are supported by CIM.

Supported DICOM Service Classes:

- Verification Service Class (SCU/SCP)
- Storage Service Class (SCU/SCP)
- Query/Retrieve Service Class (SCU)
- Storage Commitment Service Class (SCU)
- Modality Worklist (MWL) management Service Class (SCU)
- Print Management Service Class (SCU)

If reader is unfamiliar with DICOM, it is recommended to read the DICOM Specification (referenced in section 1.2) prior to reading this conformance statement.

1.1 Overview

This document contains 9 sections, including this Section 1 – Introduction.

Section 2 presents the DICOM implementation model of CIM, supported by detailed application data flow diagrams.

Section 3 provides definition of the Application Entity (AE) for CIM. Details are given in the AE Specifications.

Communication Profiles are discussed in section 4, and configuration required by CIM is provided in Section 5. Section 6 gives support for Extended Character Sets.

Section 7 discusses codes and controlled terminology.

Section 8 provides Information Object Definitions for Secondary Capture IOD, Ultrasound Image IOD, Ultrasound Multi-frame Image IOD, and Basic Voice Audio IOD.

Section 9 provides details on DIMSE-services and attributes for Storage Commitment, Query/Retrieve, Modality Worklist, Print and C-Store.

1.2 References

- [1] Digital Imaging and Communications in Medicine, DICOM V3.0, 1999-2001. ACR-NEMA.

1.3 Definitions

- **Association Establishment** - An Association Establishment is the first phase of communication between two DICOM Application Entities. The AEs use the Association Establishment to negotiate how data will be encoded and the type of data to be exchanged.
- **Called Application Entity Title** - The Called AE Title defines the intended receiver of an Association.
- **Calling Application Entity Title** - The Calling AE Title defines the requestor of an Association.
- **Cardiac Information Manager** - Acquisition console for cardiac ultrasound modality.
- **DICOM Message Service Element (DIMSE)** - A DIMSE defines the services and protocols utilized by an Application Entity to exchange messages.
- **Information Object Definition (IOD)** - An IOD is a data model, which is an abstraction of real-world information. This data model defines the nature and attributes relevant to the class of real-world objects represented.
- **Service Class Provider (SCP)** - A Service Class Provider plays the "server" role to perform operations and invoke notifications during an Association. An example of a Storage Service Class Provider would be an image storage device. In this case, the image storage device is storing the image that was sent by a Service Class User.
- **Service Class User (SCU)** - A Service Class User plays the "client" role to invoke operations and perform notifications during an Association. An example of a Storage Service Class User would be an image acquisition device. In this case, the image acquisition device will create and send a DICOM image by requesting that a Service Class Provider store that image.
- **Service/Object Pair (SOP) Class** - A SOP Class is defined by the union of an Information Object Definition and a set of DIMSE Services. A DICOM Application Entity may support one or more SOP Classes. Each SOP Class is uniquely identified by a SOP Class UID.
- **SOP Instance** - A specific occurrence of an Information Object.
- **Transfer Syntax** - The Transfer Syntax is a set of encoding rules that allow DICOM Application Entities to negotiate the encoding techniques (e.g. data element structure, byte ordering, compression) they are able to support. The Transfer Syntax is negotiated during Association Negotiation.
- **Unique Identifier (UID)** - A Unique Identifier is a globally unique, ISO compliant, ASCII-numeric string. It guarantees uniqueness across multiple countries, sites, vendors and equipment.

2 Implementation Model

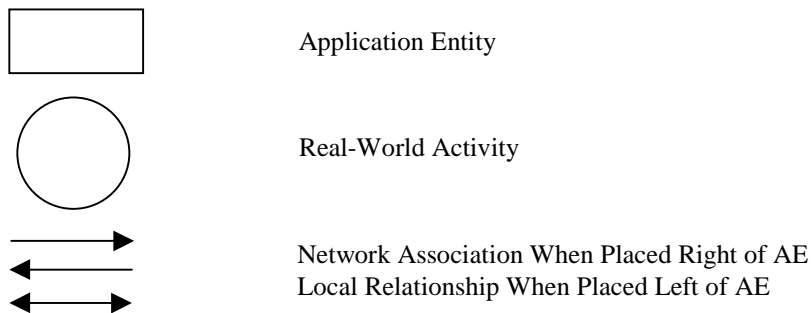
CIM is an acquisition console that supports cardiac ultrasound modality. It is interfaced with ultrasound machines.

2.1 Application Data Flow Diagram

Application data flow of Cardiac Information Manager is described in this section.

2.1.1 Legend

Throughout this section, the following legends are used:



2.1.2 Basic Profile

Basic profile includes Service Class User and Service Class Provider for DICOM storage. Figure 1 shows CIM application data flow for sending and receiving DICOM objects:

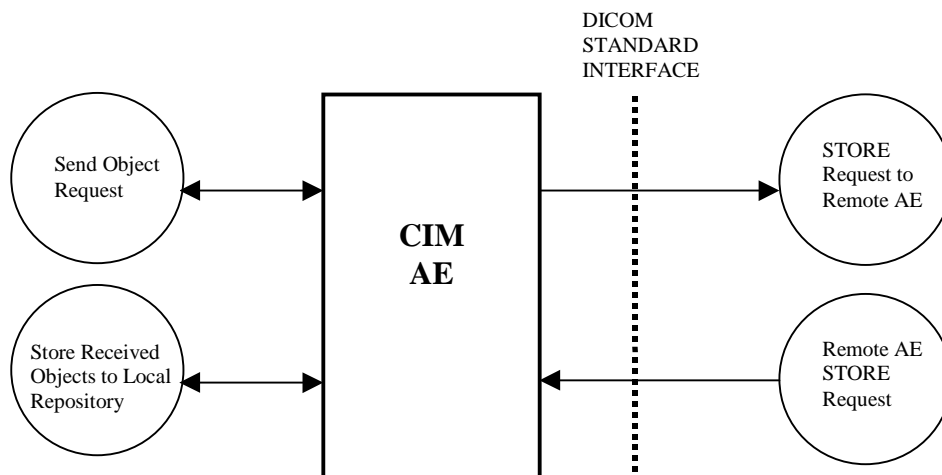


Figure 1 Application data flow of Cardiac Information Manager: DICOM Storage.

2.1.3 Extended Profile

Extended profile includes DICOM Verification, Storage Commitment and Query/Retrieve. Following Application data flow shows various scenarios:

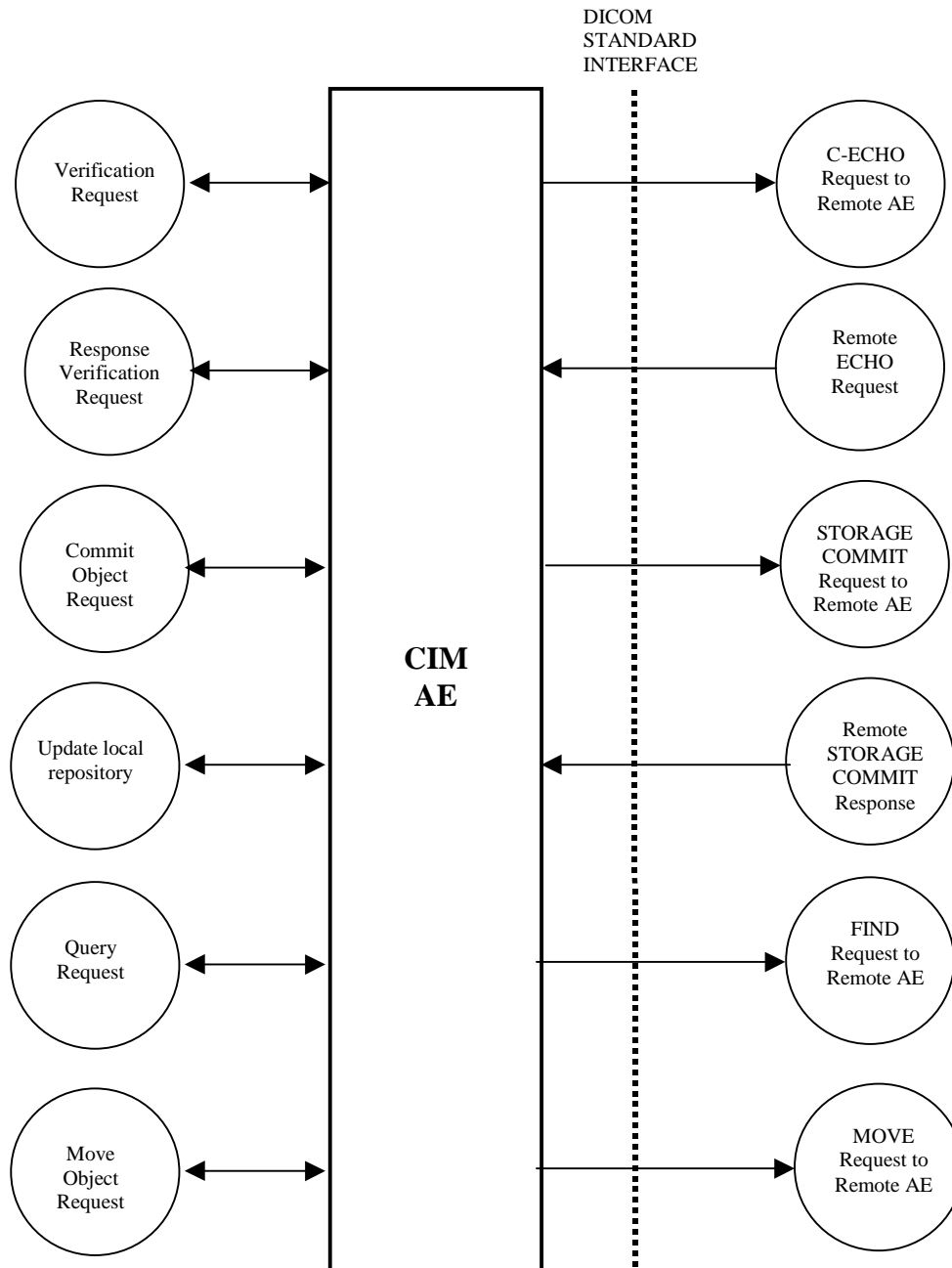


Figure 2 Application data flow of Cardiac Information Manager: Verification, Storage Commitment and Query/Retrieve.

2.1.4 Patient Schedule/Procedure Status Profile

Patient Schedule/Procedure profile includes Modality Worklist.

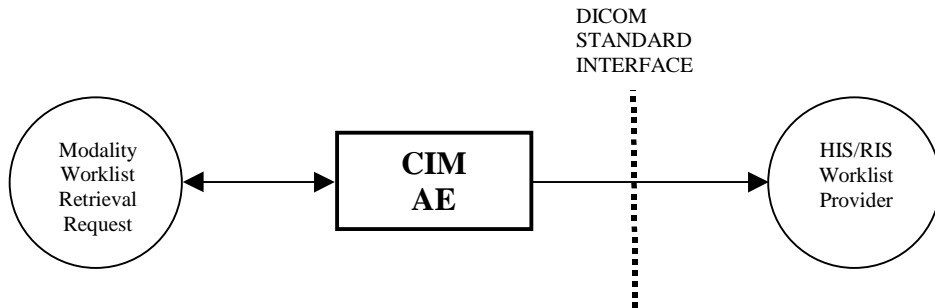


Figure 3 Application data flow of Cardiac Information Manager: Modality Worklist.

2.1.5 Basic Print Profile

Basic Print profile includes DICOM Print.

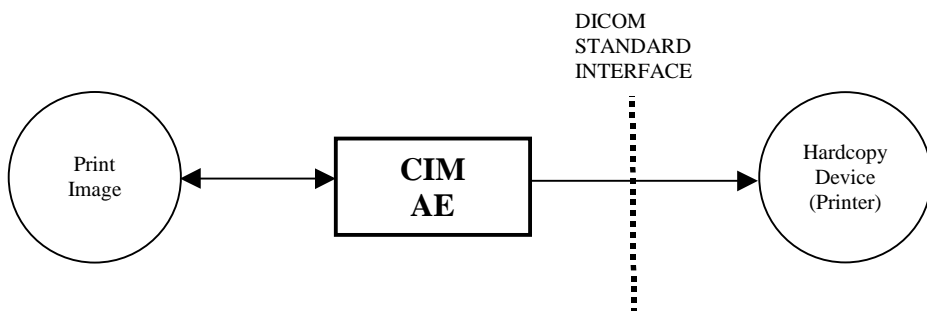


Figure 4 Application data flow of Cardiac Information Manager: DICOM Print.

2.2 Functional Definitions of AE's

2.2.1 CIM AE

The operations of CIM AE are carried out via a set of agent applications. The startup sequence of the CIM system initiates their executions. Agent applications are closed when the CIM application is terminated.

CIM AE uses configuration file that contains information used to describe both local as well as remote Application Entities. After the configuration is loaded CIM AE is ready to perform requested DICOM operations.

CIM AE logs its operations, errors and warning indications to log files.

2.2.1.1 Verification Request

CIM AE is used to send a C-ECHO message to a remote DICOM device. It therefore performs the following tasks:

- Establishes a DICOM Association with a remote DICOM device.
- Sends C-ECHO message to a remote DICOM device.

CIM AE is a service class user (SCU) for verification.

2.2.1.2 Remote ECHO Request

CIM AE is used to receive C-ECHO message from a remote DICOM device. It therefore performs the following tasks:

- Accepts a request to establish a DICOM Association from a remote DICOM device.
- Receives a C-ECHO message.
- Responds back with a success status code.

CIM AE is a service class provider (SCP) for verification.

2.2.1.3 Storage Request

CIM AE is used to send/transfer objects to a remote DICOM device. It therefore performs the following tasks:

- Establishes a DICOM Association with a remote DICOM device.
- Performs storage of DICOM SC, US, US Multi-frame, and AU Information Objects to a remote DICOM device.

CIM AE is a service class user (SCU) for storage.

2.2.1.4 Remote Storage Request

CIM AE is used to receive objects or messages from a remote DICOM device. It therefore performs the following tasks:

- Accepts a request to establish a DICOM Association from a remote DICOM device.
- Receives DICOM SC, US, US Multi-frame, and AU Information Objects.

CIM AE is a service class provider (SCP) for storage.

2.2.1.5 Storage Commitment Request

CIM AE is used to commit transmission of studies/objects to a remote DICOM device. It therefore performs the following tasks:

- Establishes a DICOM Association with a remote DICOM device.
- Performs Storage Commitment of DICOM SC, US, US Multi-frame, AU Information Objects to a remote DICOM device.
- Accepts indication of commitment.

CIM AE is a service class user (SCU) for storage commitment.

2.2.1.6 Remote Storage Commitment Response

CIM AE is used to receive storage commitment response sent from a remote DICOM device. It therefore performs the following tasks:

- Accept a DICOM Association from a remote DICOM device.
- Receives N-EVENT-REPORT Information Objects for indication of commitment.

CIM AE is a service class user (SCU) for storage commitment.

2.2.1.7 Query Request

CIM AE is used to query patient study information from a remote DICOM device. It therefore performs the following tasks:

- Establishes a DICOM Association with a remote DICOM device.
- Performs a Query of Patient Study Information from a remote DICOM device.

CIM AE is a service class user (SCU) for query/retrieve.

2.2.1.8 Retrieval Request

CIM AE is used to retrieve (MOVE) study objects from a remote DICOM device. It therefore performs the following tasks:

- Establishes a DICOM Association with a remote DICOM device.
- Performs retrieval (MOVE) of DICOM SC, US, US Multi-frame, AU Information Objects from a remote DICOM device.

CIM AE is a service class user (SCU) for query/retrieve.

2.2.1.9 Modality Worklist Retrieval Request

CIM AE is used to request querying the Modality Worklist information from a remote DICOM device. It therefore performs the following tasks:

- Establishes a DICOM Association with a remote DICOM device.
- Performs querying MWM Information from a remote DICOM device.

CIM AE is a service class user (SCU) for modality worklist management.

2.2.1.10 Print Images

CIM AE is used to request to Print studies/images to a remote DICOM print device. It therefore performs the following tasks:

- Establishes a DICOM Association with a remote DICOM device.
- Builds DICOM Basic Grayscale or Color Print Objects.
- Performs transmit of DICOM Basic Grayscale or Color Print Objects to a remote DICOM Print device.

CIM AE is a service class user (SCU) for Print.

2.3 Sequence of Real World Activities

2.3.1 Storage and Storage Commitment

It is expected that requests for Storage Commitment will only be made by the CIM application after successful Sending Object Request of the related SOP Instances to a remote AE.

It is expected that CIM receive Storage Commitment Response from a remote DICOM device after successful request of Storage Commitment made to a remote AE.

2.3.2 Retrieval of Information Objects

It is expected that CIM receive study objects from a remote DICOM device after the application-issuing MOVE of Information Objects to the remote DICOM device.

3 CIM AE Specification

CIM AE provides Standard Conformance to the following DICOM SOP Classes as a SCU:

Table 1

| SOP Class Name | SOP Class UID |
|--|-------------------------------|
| Verification | 1.2.840.10008.1.1 |
| Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7 |
| Ultrasound Image Storage (retired) | 1.2.840.10008.5.1.4.1.1.6 |
| Ultrasound Image Storage | 1.2.840.10008.5.1.4.1.1.6.1 |
| Ultrasound Multi-frame Image Storage (retired) | 1.2.840.10008.5.1.4.1.1.3 |
| Ultrasound Multi-frame Image Storage | 1.2.840.10008.5.1.4.1.1.3.1 |
| Basic Voice Audio Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.4.1 |
| Storage Commitment - Push Model | 1.2.840.10008.1.20.1 |
| Patient Root Query/Retrieve information Model – FIND | 1.2.840.10008.5.1.4.1.2.1.1 |
| Patient Root Query/Retrieve information Model – MOVE | 1.2.840.10008.5.1.4.1.2.1.2 |
| Modality Worklist Information Model – FIND | 1.2.840.10008.5.1.4.31 |
| Basic Grayscale Print Management | 1.2.840.10008.5.1.1.9 |
| Basic Color Print Management | 1.2.840.10008.5.1.1.18 |

CIM AE provides Standard Conformance to the following DICOM SOP Classes as a SCP:

Table 2

| SOP Class Name | SOP Class UID |
|--|-------------------------------|
| Verification | 1.2.840.10008.1.1 |
| Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7 |
| Ultrasound Image Storage (retired) | 1.2.840.10008.5.1.4.1.1.6 |
| Ultrasound Image Storage | 1.2.840.10008.5.1.4.1.1.6.1 |
| Ultrasound Multi-frame Image Storage (retired) | 1.2.840.10008.5.1.4.1.1.3 |
| Ultrasound Multi-frame Image Storage | 1.2.840.10008.5.1.4.1.1.3.1 |
| Basic Voice Audio Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.4.1 |

3.1 Association Establishment Policy

3.1.1 General

CIM AE will utilize and understand the following Application Context Name:

Table 3

| | |
|--------------------------------|-----------------------|
| DICOM V3.0 Application Context | 1.2.840.10008.3.1.1.1 |
|--------------------------------|-----------------------|

CIM AE contains a limitation of 100Kbytes for maximum PDU size.

3.1.2 Number of Association

CIM AE can initiate several service associations at a time with only one association is allowed for each service (except Storage SCP) at any given time.

Storage SCP allows simultaneous associations. There is no limitation to the number of simultaneous associations, but due to limitation of system resources, any extra association opened will have an impact on overall system performance. It is recommended to limit the number of associations to be opened at any given time to maintain adequate system performance.

3.1.3 Asynchronous Nature

CIM AE allows a single outstanding operation on any association. Therefore, CIM AE does not support asynchronous operations window negotiation.

3.1.4 Implementation Identifying Information

CIM AE will specify the following Implementation Identifying Information:

Table 4

| System | Implementation Class UID | Implementation Version Name |
|--------|--------------------------|-----------------------------|
| CIM | 2.16.124.113531.1.1.1 | DICOMIT+<Software version> |

The implementation version name policies are the following: name “**DICOMIT**” followed by version of the product.

3.2 Association Initiation by Real-World Activity

CIM AE initiates an association when the following activity is activated:

- **Verification Request**
Issue a C-Echo to a remote DICOM device.
- **Storage Request**
Create and store objects of SC, US, US Multi-frame, and AU to a remote DICOM device.
- **Storage Commitment Request**
Create and send commitment request to a remote DICOM device regarding SC, US, US Multi-frame, and AU object storage at a remote DICOM device.
- **Query Request**
Send C-FIND information to a remote DICOM device.
- **Retrieval Request**
Send C-MOVE information to a remote DICOM device.
- **Modality Worklist Request**
Create and send C-FIND information to a remote DICOM device.
- **Print Images**
Print images to a remote DICOM Print device.

3.2.1 Verification Request

3.2.1.1 Associated Real World Activity

CIM initiates verification to a remote DICOM device to verify the availability of the remote DICOM device.

3.2.1.2 Proposed Presentation Contexts

CIM AE supports following Presentation Contexts for **Verification**.

Table 5

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

3.2.2 Storage Request

3.2.2.1 Associated Real World Activity

CIM AE will issue a Storage request when CIM AE wishes to send studies/objects to a remote DICOM SCP.

3.2.2.2 Proposed Presentation Contexts

CIM AE supports the following Presentation Contexts for **Storage**.

Table 6

| Presentation Context Table | | | | | |
|------------------------------------|-----------------------------|--|------------------------|------|----------------------|
| Abstract Syntax | | Transfer Syntax | | Role | Extended Negotiation |
| Name | UID | Name List | UID List | | |
| Ultrasound Image Storage (retired) | 1.2.840.10008.5.1.4.1.1.6 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| Ultrasound Image Storage (retired) | 1.2.840.10008.5.1.4.1.1.6 | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCU | None |
| Ultrasound Image Storage (retired) | 1.2.840.10008.5.1.4.1.1.6 | RLE Lossless Image Compression | 1.2.840.10008.1.2.5 | SCU | None |
| Ultrasound Image Storage (retired) | 1.2.840.10008.5.1.4.1.1.6 | JPEG Lossy, Baseline Sequential with Huffman Coding (Process1) | 1.2.840.10008.1.2.4.50 | SCU | None |
| Ultrasound Image Storage | 1.2.840.10008.5.1.4.1.1.6.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| Ultrasound Image Storage | 1.2.840.10008.5.1.4.1.1.6.1 | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCU | None |
| Ultrasound Image Storage | 1.2.840.10008.5.1.4.1.1.6.1 | RLE Lossless Image Compression | 1.2.840.10008.1.2.5 | SCU | None |
| Ultrasound Image Storage | 1.2.840.10008.5.1.4.1.1.6.1 | JPEG Lossy, Baseline Sequential with Huffman Coding (Process1) | 1.2.840.10008.1.2.4.50 | 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 | 1.2.840.10008.5.1.4.1.1.7 | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCU | None |

| | | | | | |
|--|-------------------------------|--|------------------------|-----|------|
| Storage | | | | | |
| Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7 | RLE Lossless Image Compression | 1.2.840.10008.1.2.5 | SCU | None |
| Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7 | JPEG Lossy, Baseline Sequential with Huffman Coding (Process1) | 1.2.840.10008.1.2.4.50 | SCU | None |
| Ultrasound Multi-frame Image Storage (retired) | 1.2.840.10008.5.1.4.1.1.3 | JPEG Lossy, Baseline Sequential with Huffman Coding (Process1) | 1.2.840.10008.1.2.4.50 | SCU | None |
| Ultrasound Multi-frame Image Storage | 1.2.840.10008.5.1.4.1.1.3.1 | JPEG Lossy, Baseline Sequential with Huffman Coding (Process1) | 1.2.840.10008.1.2.4.50 | SCU | None |
| Basic Voice Audio Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.4.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| Basic Voice Audio Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.4.1 | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCU | None |

3.2.2.3 SOP Specific Conformance - Storage

CIM AE involves the following sequence of steps for transferring of a set of objects:

- (1) Association establishment (requestor only)
- (2) Data transfer (SCU)
- (3) Association release

3.2.3 Storage Commitment Request

3.2.3.1 Associated Real World Activity

CIM AE will issue a Storage Commitment request when CIM AE wishes to commit study/object storage to a remote DICOM SCP.

3.2.3.2 Proposed Presentation Contexts

CIM AE supports the following Presentation Contexts for **Storage Commitment**.

Table 7

| Presentation Context Table | | | | | |
|---------------------------------|----------------------|------------------------------|-------------------|------|----------------------|
| Abstract Syntax | | Transfer Syntax | | Role | Extended Negotiation |
| Name | UID | Name List | UID List | | |
| Storage Commitment - Push Model | 1.2.840.10008.1.20.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |

3.2.3.3 SOP Specific Conformance

CIM AE operation involves the following sequence:

Option-1 Performed on object basis:

- (1) CIM (requestor) establishes Association.
- (2) Send storage commitment request (N-ACTION) for related object.
- (3) CIM (requestor) releases Association.

Option-2 Performed on study basis:

- (1) CIM (requestor) establishes Association.
- (2) Send storage commitment request (N-ACTION) for related study objects.
- (3) CIM (requestor) releases Association.

3.2.3.4 Operation Policy

If a storage commitment response N-EVENT-REPORT is not received by CIM AE within a specified period of time, CIM AE will issue another storage commitment request (with different transaction UID) to a remote DICOM device. The process repeats a specified number of times.

3.2.4 Query Request

3.2.4.1 Associated Real World Activity

CIM AE will issue a Query request when a user of CIM AE wishes to query and retrieve information from a remote DICOM SCP.

3.2.4.2 Proposed Presentation Contexts

CIMAE supports the following Presentation Contexts for Query/Retrieve.

Table 8

| Presentation Context Table | | | | | |
|--|-----------------------------|---------------------------|-------------------|------|----------------------|
| Abstract Syntax | | Transfer Syntax | | Role | Extended Negotiation |
| Name | UID | Name List | UID List | | |
| Patient Root Query/Retrieve information Model - FIND | 1.2.840.10008.5.1.4.1.2.1.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |

3.2.4.3 SOP Specific Conformance for Patient Root Query/Retrieve Model – FIND

CIMAE provides standard conformance of Patient Root Query/Retrieve Information Model with the C-FIND SCU behavior.

The Keys supported for C-FIND are listed in section 9.2.2.

3.2.4.4 Sequence of Query Operations

CIMAE involves the following sequence of steps for query operation:

- (1) Association establishment (requestor only).
- (2) Transfer query request (SCU only).
- (3) Wait for Query result.
- (4) Receive Query result.
- (5) Association release (requestor only).

CIMAE judges that query has succeeded when the result of step (4) is "Success" even if the result of step (5) "Association release" is "Failure".

3.2.5 Retrieval Request

3.2.5.1 Associated Real World Activity

CIM AE will issue a retrieval information object request to a remote DICOM SCP.

3.2.5.2 Proposed Presentation Contexts

CIMAE supports the following Presentation Contexts for Retrieve.

Table 9

| Presentation Context Table | | | | | |
|--|-----------------------------|---------------------------|-------------------|------|----------------------|
| Abstract Syntax | | Transfer Syntax | | Role | Extended Negotiation |
| Name | UID | Name List | UID List | | |
| Patient Root Query/Retrieve information Model - MOVE | 1.2.840.10008.5.1.4.1.2.1.2 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |

3.2.5.3 SOP Specific Conformance for Patient Root Query/Retrieve Model – MOVE

CIMAE provides standard conformance of Patient Root Query/Retrieve Information Model with the C-MOVE SCU behavior.

3.2.5.4 Sequence of Retrieval Operations

CIMAE involves the following sequence of steps for retrieval operation:

- (1) Association establishment (requestor only).
- (2) Issue C-MOVE of studies.
- (3) Receive study objects.
- (4) Association release (requestor only).

3.2.6 Modality Worklist (MWL)

3.2.6.1 Associated Real World Activity

CIM AE will issue request to query modality worklist information from a remote DICOM SCP.

3.2.6.2 Proposed Presentation Contexts

CIM AE supports the following Presentation Contexts for a **MWL**.

Table 10

| Presentation Context Table | | | | | |
|--|------------------------|------------------------------|-------------------|------|----------------------|
| Abstract Syntax | | Transfer Syntax | | Role | Extended Negotiation |
| Name | UID | Name List | UID List | | |
| Modality Worklist Information Model - FIND | 1.2.840.10008.5.1.4.31 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |

3.2.6.3 SOP Specific Conformance

CIMAE provides standard conformance of MWM Information Model with the C-FIND SCU behavior.

All DICOM attributes associated with the Modality Worklist may be retrieved and specific attributes are dependent on configuration. Details of query attributes are listed in section 9.3

3.2.7 Print Images

3.2.7.1 Associated Real World Activity

CIM AE will issue Print Image requests to a printer, in order to produce hard copy representations of DICOM images.

3.2.7.2 Proposed Presentation Contexts

CIM AE supports the following Presentation Contexts for **Print**.

Table 11

| Presentation Context Table | | | | | |
|---------------------------------------|------------------------|------------------------------|-------------------|------|----------------------|
| Abstract Syntax | | Transfer Syntax | | Role | Extended Negotiation |
| Name | UID | Name List | UID List | | |
| Verification | 1.2.840.10008.1.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| Basic Grayscale Print Management Meta | 1.2.840.10008.5.1.1.9 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| Basic Color Print Management Meta | 1.2.840.10008.5.1.1.18 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| Printer SOP Class | 1.2.840.10008.5.1.1.16 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |

3.2.7.3 SOP Specific Conformance

CIM AE provides standard conformance to the DICOM Print Service Class by supporting a number of distinct SOP classes described below.

3.2.7.3.1 SOP Specific Conformance to Basic Film Session SOP Class

CIM AE issues the following DIMSE-N commands for the Basic Film Session SOP Class:

N-CREATE

3.2.7.3.2 SOP Specific Conformance to Basic Film Box SOP Class

CIM AE issues the following DIMSE-N commands for the Basic Film Box SOP Class:

N-CREATE

N-ACTION

CIM AE supports only STANDARD formats (STANDARD\1,1; STANDARD\2,2, etc.) with details dependent upon the resolution and capabilities of printer.

3.2.7.3.3 SOP Specific Conformance to Basic Grayscale Image Box SOP Class

CIM AE issues the following DIMSE-N command for the Basic Grayscale Image Box SOP Class:

N-SET.

3.2.7.3.4 SOP Specific Conformance to Basic Color Image Box SOP Class

CIM AE issues the following DIMSE-N command for the Basic Color Image Box SOP Class:

N-SET.

3.2.7.3.5 SOP Specific Conformance to Printer SOP Class

CIM AE issues the following DIMSE-N command for the Printer SOP Class:

N-GET.

3.2.7.3.6 SOP Specific Conformance to Basic Grayscale Print Management Meta SOP Class

The Meta SOP class is supported at negotiation, but is not implemented as the individual SOP classes defined by the DICOM specification.

3.3 Association Acceptance Policy

CIM AE accepts associations at any activated time for

- Remote ECHO Request
CIM AE accepts a verification request from a remote DICOM device.
- Remote Storage Request
CIM AE accepts storage of US, US Multi-frame, SC, and AU objects from a remote DICOM device.
- Remote Storage Commitment Response
CIM AE accepts storage commitment response from a remote DICOM device.

3.3.1 Remote ECHO Request

3.3.1.1 Associated Real World Activity

CIM AE will respond to a verification request when a Remote Real-World DICOM SCU wishes to send C-Echo verification to CIM AE.

3.3.1.2 Presentation Context Table

CIM AE supports the following Presentation Contexts for **Acceptance Verification**.

Table 12

| Presentation Context Table | | | | | |
|----------------------------|-------------------|---------------------------|-------------------|------|----------------------|
| Abstract Syntax | | Transfer Syntax | | Role | Extended Negotiation |
| Name | UID | Name List | UID List | | |
| Verification | 1.2.840.10008.1.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | None |

3.3.2 Remote Storage Request

3.3.2.1 Associated Real World Activity

CIM AE will respond to a Storage request when a Remote Real-World DICOM SCU wishes to send studies/objects to CIM AE.

3.3.2.2 Presentation Contexts

CIM AE supports the following Presentation Contexts for **Acceptance Storage**.

Table 13

| Presentation Context Table | | | | | |
|------------------------------------|-----------------------------|--|------------------------|------|----------------------|
| Abstract Syntax | | Transfer Syntax | | Role | Extended Negotiation |
| Name | UID | Name List | UID List | | |
| Ultrasound Image Storage (Retired) | 1.2.840.10008.5.1.4.1.1.6 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | None |
| Ultrasound Image Storage (Retired) | 1.2.840.10008.5.1.4.1.1.6 | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCP | None |
| Ultrasound Image Storage (Retired) | 1.2.840.10008.5.1.4.1.1.6 | RLE Lossless Image Compression | 1.2.840.10008.1.2.5 | SCP | None |
| Ultrasound Image Storage (Retired) | 1.2.840.10008.5.1.4.1.1.6 | JPEG Lossy, Baseline Sequential with Huffman Coding (Process1) | 1.2.840.10008.1.2.4.50 | SCP | None |
| Ultrasound Image Storage | 1.2.840.10008.5.1.4.1.1.6.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | None |
| Ultrasound Image Storage | 1.2.840.10008.5.1.4.1.1.6.1 | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCP | None |
| Ultrasound Image Storage | 1.2.840.10008.5.1.4.1.1.6.1 | RLE Lossless Image Compression | 1.2.840.10008.1.2.5 | SCP | None |
| Ultrasound Image Storage | 1.2.840.10008.5.1.4.1.1.6.1 | JPEG Lossy, Baseline Sequential with Huffman Coding (Process1) | 1.2.840.10008.1.2.4.50 | 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 |
| 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 | SCP | None |
| Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7 | RLE Lossless Image | 1.2.840.10008.1.2.5 | SCP | None |

| Storage | | Compression | | | |
|--|-------------------------------|--|------------------------|-----|------|
| Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7 | JPEG Lossy, Baseline Sequential with Huffman Coding (Process1) | 1.2.840.10008.1.2.4.50 | SCP | None |
| Ultrasound Multi-frame Image Storage (retired) | 1.2.840.10008.5.1.4.1.1.3 | JPEG Lossy, Baseline Sequential with Huffman Coding (Process1) | 1.2.840.10008.1.2.4.50 | SCP | None |
| Ultrasound Multi-frame Image Storage | 1.2.840.10008.5.1.4.1.1.3.1 | JPEG Lossy, Baseline Sequential with Huffman Coding (Process1) | 1.2.840.10008.1.2.4.50 | SCP | None |
| Basic Voice Audio Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.4.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | None |
| Basic Voice Audio Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.4.1 | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCP | None |

3.3.2.3 SOP Specific Conformance

CIM AE conforms to the DICOM Storage Service Class at Level 2 (FULL). No elements are generated by CIM AE. In the event of a successful C-STORE operation, the image is stored in internal storage.

CIM AE returns one of the following status codes.

Table 14

| Service Status | Further Meaning | Protocol Codes | Description |
|----------------|-----------------------------------|----------------|---|
| Refused | Out of Resources | 0xA700 | Indicates that there was not enough storage space to store the image. |
| Error | Data Set does not match SOP Class | 0xA900 | Indicates that the Data Set does not encode an instance of the SOP Class specified. |
| | Failed | 0xC000 | The operation was not successful. |
| Warning | Data set does not match SOP Class | 0xB007 | Indicates that the Data Set does not match the SOP Class. |
| | Duplicate SOP Instance UID | 0xD000 | |
| Success | Success | 0x0000 | Operation performed properly. |

3.3.3 Remote Storage Commitment Response

3.3.3.1 Associated Real World Activity

When a Storage Commitment SCP wishes to send Storage Commitment Response to CIM AE, the CIM AE will response and accept the Storage Commitment response information.

3.3.3.2 Proposed Presentation Contexts

CIM AE supports the following Presentation Contexts for **Storage Commitment**.

Table 15

| Presentation Context Table | | | | | |
|---------------------------------|----------------------|---------------------------|-------------------|------|----------------------|
| Abstract Syntax | | Transfer Syntax | | Role | Extended Negotiation |
| Name | UID | Name List | UID List | | |
| Storage Commitment - Push Model | 1.2.840.10008.1.20.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |

3.3.3.3 SOP Specific Conformance

CIM AE receives a storage commitment N-EVENT-REPORT on a different association than the one on which the storage commitment N-ACTION operation was performed. CIMAE involves the following sequence of operations:

- (1) Association of CIM (acceptor) is established.
- (2) CIM (acceptor) waits for storage commitment N-EVENT-REPORT to confirm commitment of object storage.
- (3) CIM (acceptor) receives storage commitment N-EVENT-REPORT.
- (4) Association of CIM (acceptor) is released.

4 Communications Profiles

4.1 Supported Communication Stacks

CIM provides DICOM V3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard.

4.2 OSI Stack

Not applicable to this product.

4.3 TCP/IP Stack

CIM inherits its TCP/IP stack from the computer system upon which it executes.

4.3.1 API

The CIM AE implementations use Berkeley style sockets.

4.3.2 Physical Media Support

CIM is indifferent to the physical medium over which TCP/IP executes; it inherits the medium from the computer system upon which it executes.

4.4 Point to Point Stack

Not applicable to this product.

5 Configuration

The CIM requires user to pre-set and to maintain configuration parameters of local and remote DICOM application entities. The parameters are as follows:

- Application Entity Title (AE Title)
- Host Name for the AE Title
- Port Number for the AE Title
- Alias for the AE Title
- Packet Size (PDU) for the AE Title
- IP Address for the AE Title
- Print Parameters
- Query Parameters
- Worklist Query Parameters
- Other parameters used for configuration

The configuration contains values that are stored during real world activities when the corresponding optional attribute is missing.

6 Support of Extended Character Sets

CIM supports the following character sets:

- ISO-IR 100 (Latin alphabet No.1) Supplementary set of ISO 8859

7 Codes And Controlled Terminology

CIM makes use of the Baseline Context Groups as specified in the IODs for the SOP Classes supported, and uses the DICOM Controlled Codes and Terminology Definitions Version “01” as a Mapping Resource.

No Private Mapping Resources and Coding Schemes are used by default. However, they may be introduced through a separate configuration file if required.

8 Information Object Definitions

8.1 Secondary Capture Information Object Definition

CIM AE supports to store and to accept secondary capture (SC) IODs.

8.1.1 Entity Module Definitions

The information modules that CIM AE supports are defined below.

8.1.1.1 Secondary Capture IOD Modules

Table 16

| Information Entity | Module | Reference | Usage ¹ |
|--------------------|-------------------|-----------|--------------------|
| Patient | Patient | 8.1.2.1 | M |
| Study | General Study | 8.1.2.2 | M |
| | Patient Study | 8.1.2.3 | U |
| Series | General Series | 8.1.2.4 | M |
| Equipment | General Equipment | 8.1.2.5 | U |
| | SC Equipment | 8.1.2.6 | M |
| Image | General Image | 8.1.2.7 | M |
| | Image Pixel | 8.1.2.8 | M |
| | SC Image | 8.1.2.9 | M |
| | Overlay Plane | Not Used | U |
| | Modality LUT | Not Used | U |
| | VOI LUT | Not Used | U |
| | SOP Common | 8.1.2.10 | M |

1) M = Mandatory, C = Conditional, U = User option

8.1.2 Information Object Definitions

8.1.2.1 Patient Module

Table 17

| Attribute Name | Tag | Type | Attribute Assignment |
|------------------------------------|--------------|------|--|
| Patient's Name | (0010, 0010) | 2 | Always set |
| Patient ID | (0010, 0020) | 2 | Always set |
| Patient's Birth Date | (0010, 0030) | 2 | Length=0 when no entry is made |
| Patient's Sex | (0010, 0040) | 2 | Length=0 when no entry is made |
| Referenced Patient Sequence | (0008,1120) | 3 | Not set when no entry is made |
| >Referenced SOP Class UID | (0008,1150) | 1C | Required if Referenced Patient Sequence is set |
| >Referenced SOP Class Instance UID | (0008,1155) | 1C | Required if Referenced Patient Sequence is set |

8.1.2.2 General Study Module

Table 18

| Attribute Name | Tag | Type | Attribute Assignment |
|------------------------------------|--------------|------|--|
| Study Instance UID | (0020, 000D) | 1 | Always set |
| Study Date | (0008, 0020) | 2 | Always set |
| Study Time | (0008, 0030) | 2 | Always set |
| Referring Physician's Name | (0008, 0090) | 2 | Length=0 when no entry is made |
| Study ID | (0020, 0010) | 2 | Always set |
| Accession Number | (0008, 0050) | 2 | Length=0 when no entry is made |
| Study Description | (0008,1030) | 3 | Not set when no entry is made |
| Physician(s) of Record | (0008,1048) | 3 | Not set when no entry is made |
| Name of Physician(s) Reading Study | (0008,1060) | 3 | Not set when no entry is made |
| Referenced Study Sequence | (0008,1110) | 3 | Not set when no entry is made |
| >Referenced SOP Class UID | (0008,1150) | 1C | Required Referenced Study Sequence is set |
| >Referenced SOP Class Instance UID | (0008,1155) | 1C | Required Referenced Study Sequence is set |
| Procedure Code Sequence | (0008,1032) | 3 | Not set when no entry is made |
| >Code Value | (0008,0100) | 1C | Required if Procedure Code Sequence present |
| >Coding Scheme Designator | (0008,0102) | 1C | Required if Procedure Code Sequence present |
| >Coding Scheme Version | (0008,0103) | 1C | Required if Procedure Code Sequence present and its value is available |
| >Code Meaning | (0008,0104) | 1C | Required if Procedure Code Sequence present |

8.1.2.3 Patient Study Module

Table 19

| Attribute Name | Tag | Type | Attribute Assignment |
|---------------------------------|--------------|------|-------------------------------|
| Admitting Diagnoses Description | (0008,1080) | 3 | Not set when no entry is made |
| Patient's Age | (0010, 1010) | 3 | Not set when no entry is made |
| Patient's Size | (0010,1020) | 3 | Not set when no entry is made |
| Patient's Weight | (0010,1030) | 3 | Not set when no entry is made |
| Occupation | (0010,2180) | 3 | Not set when no entry is made |
| Additional Patient's History | (0010,21B0) | 3 | Not set when no entry is made |

8.1.2.4 General Series Module

Table 20

| Attribute Name | Tag | Type | Attribute Assignment |
|---------------------------------------|--------------|------|--|
| Modality | (0008, 0060) | 1 | Always set |
| Series Instance UID | (0020, 000E) | 1 | Always set |
| Series Number | (0020, 0011) | 2 | Always set |
| Series Date | (0008,0021) | 3 | Not set |
| Series Time | (0008,0031) | 3 | Not set |
| Performing Physician's Name | (0008,1050) | 3 | Not set when no entry is made |
| Protocol Name | (0018,1030) | 3 | Not set when no entry is made |
| Operator's Name | (0008,1070) | 3 | Not set when no entry is made |
| Request Attributes Sequence | (0040,0275) | 3 | Not set when no entry is made |
| >Requested Procedure ID | (0040,1001) | 1C | Set if Request Attributes Sequence is present |
| >Scheduled Procedure Step ID | (0040,0009) | 1C | Set if Request Attributes Sequence is present |
| >Scheduled Procedure Step Description | (0040,0007) | 1C | Set if Request Attributes Sequence is present and the value is available |
| >Scheduled Action Item Code Sequence | (0040,0008) | 3 | Not set when no entry is made |
| >>Code Value | (0008,0100) | 1C | Required if Scheduled Action Item Code Sequence is present |
| >>Coding Scheme Designator | (0008,0102) | 1C | Required if Scheduled Action Item Code Sequence is present |
| >>Coding Scheme Version | (0008,0103) | 1C | Required if Scheduled Action Item Code Sequence is present and its value is available |
| >>Code Meaning | (0008,0104) | 1C | Required if Scheduled Action Item Code Sequence is present |
| Performed Procedure Step ID | (0040,0253) | 3 | Set with Identification value of that part of a Procedure that has been carried out within this step. |
| Performed Procedure Step Start Date | (0040,0244) | 3 | Set with Date on which the Performed Procedure Step started. |
| Performed Procedure Step Start Time | (0040,0245) | 3 | Set with Time on which the Performed Procedure Step started. |
| Performed Procedure Step Description | (0040,0254) | 3 | Set if Institution-generated description of classification of the Procedure Step that was performed is available |

8.1.2.5 General Equipment Module

Table 21

| Attribute Name | Tag | Type | Attribute Assignment |
|-------------------------------|--------------|------|----------------------|
| Manufacturer | (0008, 0070) | 2 | Always set |
| Institution Name | (0008, 0080) | 3 | Always set |
| Station Name | (0008,1010) | 3 | Always set |
| Institutional Department Name | (0008,1040) | 3 | Always set |
| Manufacturer's Model Name | (0008,1090) | 3 | Set if available |
| Device Serial Number | (0018,1000) | 3 | Set if available |
| Software Versions | (0018,1020) | 3 | Set if available |

8.1.2.6 SC Equipment Module

Table 22

| Attribute Name | Tag | Type | Attribute Assignment |
|--------------------------------------|--------------|------|----------------------|
| Conversion Type | (0008, 0064) | 1 | Always set to "DV" |
| Secondary Capture Device ID | (0018,1010) | 3 | Always set |
| Secondary Capture Device Manufacture | (0018,1016) | 3 | Always set |

8.1.2.7 General Image Module

Table 23

| Attribute Name | Tag | Type | Attribute Assignment |
|-------------------------|--------------|------|----------------------------|
| Instance Number | (0020, 0013) | 2 | Always set |
| Content Date | (0008, 0023) | 2C | Always set by CIM |
| Acquisition Datetime | (0008,002a) | 3 | Always set |
| Content Time | (0008, 0033) | 2C | Always set by CIM |
| Image Type | (0008, 0008) | 3 | Always set |
| Image Comments | (0020,4000) | 3 | Always set |
| Lossy Image Compression | (0028, 2110) | 3 | Set if it is lossy |
| Derivation Description | (0028, 2111) | 3 | Always set if it is lossy. |

8.1.2.8 Image Pixel Module

Table 24

| Attribute Name | Tag | Type | Attribute Assignment |
|----------------------------|--------------|------|--|
| Samples per Pixel | (0028, 0002) | 1 | 1 or 3 |
| Photometric Interpretation | (0028, 0004) | 1 | MONOCHROME2, RGB, YBR_FULL, YBR_FULL_422 |

| | | | |
|----------------------|--------------|----|-------------------------------|
| Rows | (0028, 0010) | 1 | Always set |
| Columns | (0028, 0011) | 1 | Always set |
| Bits Allocated | (0028, 0100) | 1 | Always set (8) |
| Bits Stored | (0028, 0101) | 1 | Always set (8) |
| High Bit | (0028, 0102) | 1 | Always set (7) |
| Pixel Representation | (0028, 0103) | 1 | Always set (0 or 1) |
| Pixel Data | (7FE0, 0010) | 1 | Always set |
| Planar Configuration | (0028, 0006) | 1C | set if Samples per Pixel is 3 |
| Pixel Aspect Ratio | (0028, 0034) | 1C | Set if ratio is not "1\1" |

8.1.2.9 SC Image Module

Table 25

| Attribute Name | Tag | Type | Attribute Assignment |
|---------------------------|--------------|------|----------------------|
| Date of Secondary Capture | (0018, 1012) | 3 | Not set |
| Time of Secondary Capture | (0018, 1014) | 3 | Not set |

8.1.2.10 SOP Common Module

Table 26

| Attribute Name | Tag | Type | Attribute Assignment |
|------------------------|--------------|------|-----------------------------|
| SOP Class UID | (0008, 0016) | 1 | Always set |
| SOP Instance UID | (0008, 0018) | 1 | Always set |
| Specific Character Set | (0008, 0005) | 1C | Always set ("ISO_IR 100") |

8.2 Ultrasound Image Information Object Definition

CIM AE supports to store and to accept ultrasound image IODs.

8.2.1 Entity Module Definitions

The information modules that CIM AE supports are defined below.

8.2.1.1 Ultrasound Image IOD Modules

Table 27

| Information Entity | Module | Reference | Usage ¹ |
|--------------------|----------------------------|-----------|--------------------|
| Patient | Patient | 8.2.2.1 | M |
| Study | General Study | 8.2.2.2 | M |
| | Patient Study | 8.2.2.3 | U |
| Series | General Series | 8.2.2.4 | M |
| Frame of Reference | Frame of Reference | Not Used | U |
| | US Frame of Reference | Not Used | C |
| Equipment | General Equipment | 8.2.2.5 | M |
| Image ² | General Image | 8.2.2.6 | M |
| Image | Image Pixel | 8.2.2.7 | M |
| Image | Contrast / bolus | Not Used | C |
| Image | Palette Color Lookup Table | Not Used | C |
| Image | US Region Calibration | Not Used | U |
| Image | US Image | 8.2.2.8 | M |
| Image | Overlay Plane | Not Used | U |
| Image | VOI LUT | Not Used | U |
| Image | SOP Common | 8.2.2.9 | M |
| Curve ² | Curve Identification | Not Used | M |
| Curve | Curve | Not Used | M |
| Curve | Audio | Not Used | U |
| Curve | SOP Common | Not Used | M |

¹ M = Mandatory, C = Conditional, U = User option

² The Image and Curve IEs are mutually exclusive

8.2.2 Information Object Definitions

8.2.2.1 Patient Module

Table 28

| Attribute Name | Tag | Type | Attribute Assignment |
|------------------------------------|--------------|------|--|
| Patient's Name | (0010, 0010) | 2 | Always set |
| Patient ID | (0010, 0020) | 2 | Always set |
| Patient's Birth Date | (0010, 0030) | 2 | Length=0 when no entry is made |
| Patient's Sex | (0010, 0040) | 2 | Length=0 when no entry is made |
| Referenced Patient Sequence | (0008,1120) | 3 | Not set when no entry is made |
| >Referenced SOP Class UID | (0008,1150) | 1C | Required if Referenced Patient Sequence is set |
| >Referenced SOP Class Instance UID | (0008,1155) | 1C | Required if Referenced Patient Sequence is set |

8.2.2.2 General Study Module

Table 29

| Attribute Name | Tag | Type | Attribute Assignment |
|------------------------------------|--------------|------|--|
| Study Instance UID | (0020, 000D) | 1 | Always set |
| Study Date | (0008, 0020) | 2 | Always set |
| Study Time | (0008, 0030) | 2 | Always set |
| Referring Physician's Name | (0008, 0090) | 2 | Length=0 when no entry is made |
| Study ID | (0020, 0010) | 2 | Always set |
| Accession Number | (0008, 0050) | 2 | Length=0 when no entry is made |
| Study Description | (0008,1030) | 3 | Not set when no entry is made |
| Physician(s) of Record | (0008,1048) | 3 | Not set when no entry is made |
| Name of Physician(s) Reading Study | (0008,1060) | 3 | Not set when no entry is made |
| Referenced Study Sequence | (0008,1110) | 3 | Not set when no entry is made |
| >Referenced SOP Class UID | (0008,1150) | 1C | Required Referenced Study Sequence is set |
| >Referenced SOP Class Instance UID | (0008,1155) | 1C | Required Referenced Study Sequence is set |
| Procedure Code Sequence | (0008,1032) | 3 | Not set when no entry is made |
| >Code Value | (0008,0100) | 1C | Required if Procedure Code Sequence present |
| >Coding Scheme Designator | (0008,0102) | 1C | Required if Procedure Code Sequence present |
| >Coding Scheme Version | (0008,0103) | 1C | Required if Procedure Code Sequence present and its value is available |
| >Code Meaning | (0008,0104) | 1C | Required if Procedure Code Sequence present |

8.2.2.3 Patient Study Module

Table 30

| Attribute Name | Tag | Type | Attribute Assignment |
|---------------------------------|--------------|------|-------------------------------|
| Admitting Diagnoses Description | (0008,1080) | 3 | Not set when no entry is made |
| Patient's Age | (0010, 1010) | 3 | Not set when no entry is made |
| Patient's Size | (0010,1020) | 3 | Not set when no entry is made |
| Patient's Weight | (0010,1030) | 3 | Not set when no entry is made |
| Occupation | (0010,2180) | 3 | Not set when no entry is made |
| Additional Patient's History | (0010,21B0) | 3 | Not set when no entry is made |

8.2.2.4 General Series Module

Table 31

| Attribute Name | Tag | Type | Attribute Assignment |
|---------------------------------------|--------------|------|---|
| Modality | (0008, 0060) | 1 | Always set |
| Series Instance UID | (0020, 000E) | 1 | Always set |
| Series Number | (0020, 0011) | 2 | Always set |
| Series Date | (0008,0021) | 3 | Not set |
| Series Time | (0008,0031) | 3 | Not set |
| Performing Physician's Name | (0008,1050) | 3 | Not set when no entry is made |
| Protocol Name | (0018,1030) | 3 | Not set when no entry is made |
| Operator's Name | (0008,1070) | 3 | Not set when no entry is made |
| Request Attributes Sequence | (0040,0275) | 3 | Not set when no entry is made |
| >Requested Procedure ID | (0040,1001) | 1C | Set if Request Attributes Sequence is present |
| >Scheduled Procedure Step ID | (0040,0009) | 1C | Set if Request Attributes Sequence is present |
| >Scheduled Procedure Step Description | (0040,0007) | 1C | Set if Request Attributes Sequence is present and the value is available |
| >Scheduled Action Item Code Sequence | (0040,0008) | 3 | Not set when no entry is made |
| >>Code Value | (0008,0100) | 1C | Required if Scheduled Action Item Code Sequence is present |
| >>Coding Scheme Designator | (0008,0102) | 1C | Required if Scheduled Action Item Code Sequence is present |
| >>Coding Scheme Version | (0008,0103) | 1C | Required if Scheduled Action Item Code Sequence is present and its value is available |
| >>Code Meaning | (0008,0104) | 1C | Required if Scheduled Action Item Code Sequence is present |
| Performed Procedure Step ID | (0040,0253) | 3 | Set with Identification value of that part of a Procedure that has been carried out within this step. |

| | | | |
|--------------------------------------|-------------|---|--|
| Performed Procedure Step Start Date | (0040,0244) | 3 | Set with Date on which the Performed Procedure Step started. |
| Performed Procedure Step Start Time | (0040,0245) | 3 | Set with Time on which the Performed Procedure Step started. |
| Performed Procedure Step Description | (0040,0254) | 3 | Set if Institution-generated description of classification of the Procedure Step that was performed is available |

8.2.2.5 General Equipment Module

Table 32

| Attribute Name | Tag | Type | Attribute Assignment |
|-------------------------------|--------------|------|----------------------|
| Manufacturer | (0008, 0070) | 2 | Always set |
| Institution Name | (0008, 0080) | 3 | Always set |
| Station Name | (0008,1010) | 3 | Always set |
| Institutional Department Name | (0008,1040) | 3 | Always set |
| Manufacturer's Model Name | (0008,1090) | 3 | Set if available |
| Device Serial Number | (0018,1000) | 3 | Set if available |
| Software Versions | (0018,1020) | 3 | Set if available |

8.2.2.6 General Image Module

Table 33

| Attribute Name | Tag | Type | Attribute Assignment |
|-------------------------|--------------|------|----------------------------|
| Instance Number | (0020, 0013) | 2 | Always set |
| Content Date | (0008, 0023) | 2C | Always set |
| Acquisition Datetime | (0008,002a) | 3 | Always set |
| Content Time | (0008, 0033) | 2C | Always set |
| Image Type | (0008, 0008) | 3 | Always set |
| Image Comments | (0020,4000) | 3 | Always set |
| Lossy Image Compression | (0028, 2110) | 3 | Set if it is lossy |
| Derivation Description | (0028, 2111) | 3 | Always set if it is lossy. |

8.2.2.7 Image Pixel Module

Table 34

| Attribute Name | Tag | Type | Attribute Assignment |
|----------------------------|--------------|------|--|
| Samples per Pixel | (0028, 0002) | 1 | 1 or 3 |
| Photometric Interpretation | (0028, 0004) | 1 | MONOCHROME2, RGB, YBR_FULL, YBR_FULL_422 |
| Rows | (0028, 0010) | 1 | Always set |
| Columns | (0028, 0011) | 1 | Always set |

| | | | |
|----------------------|--------------|----|-------------------------------|
| Bits Allocated | (0028, 0100) | 1 | Always set (8) |
| Bits Stored | (0028, 0101) | 1 | Always set (8) |
| High Bit | (0028, 0102) | 1 | Always set (7) |
| Pixel Representation | (0028, 0103) | 1 | Always set (0 or 1) |
| Pixel Data | (7FE0, 0010) | 1 | Always set |
| Planar Configuration | (0028, 0006) | 1C | Set if Samples per Pixel is 3 |
| Pixel Aspect Ratio | (0028, 0034) | 1C | Set if ratio is not "1\1" |

8.2.2.8 US Image Module

Table 35

| Attribute Name | Tag | Type | Attribute Assignment |
|-------------------------------|--------------|------|--------------------------------|
| Sample Per Pixel | (0028, 0002) | 1 | Always set (1,3) |
| Photometric Interpretation | (0028, 0004) | 1 | Always set |
| Bits Allocated | (0028,0100) | 1 | Always set (8) |
| Bits Stored | (0028, 0101) | 1 | Always set (8) |
| High Bit | (0028, 0102) | 1 | Always set (7) |
| Planar Configuration | (0028, 0006) | 1C | Set if Samples per Pixel is 3 |
| Pixel Representation | (0028, 0103) | 1 | Always set |
| Image Type | (0008, 0008) | 2 | Always set |
| Lossy Image Compression | (0028, 2110) | 1C | Set if it is lossy |
| Ultrasound Color Data Present | (0028, 0014) | 3 | Not set when entry is not made |
| Transducer Type | (0018, 6031) | 3 | Not set when entry is not made |

8.2.2.9 SOP Common Module

Table 36

| Attribute Name | Tag | Type | Attribute Assignment |
|------------------------|--------------|------|-----------------------------|
| SOP Class UID | (0008, 0016) | 1 | Always set |
| SOP Instance UID | (0008, 0018) | 1 | Always set |
| Specific Character Set | (0008, 0005) | 1C | Always set ("ISO_IR 100") |

8.3 Ultrasound Multi-frame Image Information Object Definition

CIM AE supports to store and to accept multi-frame ultrasound image IODs.

8.3.1 Entity Module Definitions

The information modules that CIM AE supports are defined below.

8.3.1.1 Ultrasound Multi-frame Image IOD Modules

Table 37

| Information Entity | Module | Reference | Usage ¹ |
|--------------------|----------------------------|-----------|--------------------|
| Patient | Patient | 8.3.2.1 | M |
| Study | General Study | 8.3.2.2 | M |
| | Patient Study | 8.3.2.3 | U |
| Series | General Series | 8.3.2.4 | M |
| Frame of Reference | Frame of Reference | Not Used | U |
| | US Frame of Reference | Not Used | C |
| | Synchronization | 8.3.2.5 | C |
| Equipment | General Equipment | 8.3.2.6 | M |
| Image ² | General Image | 8.3.2.7 | M |
| Image | Image Pixel | 8.3.2.8 | M |
| Image | Contrast / bolus | Not Used | C |
| Image | Cine Module | 8.3.2.9 | M |
| Image | Multi-frame | 8.3.2.10 | M |
| Image | Palette Color Lookup Table | Not Used | C |
| Image | US Region Calibration | Not Used | U |
| Image | US Image | 8.3.2.11 | M |
| Image | VOI LUT Module | Not Used | U |
| Image | SOP Common | 8.3.2.12 | M |
| Curve ² | Curve Identification | Not Used | M |
| Curve | Curve | Not Used | M |
| Curve | Audio | Not Used | U |
| Curve | SOP Common | Not Used | M |

¹ M = Mandatory, C = Conditional, U = User option

² The Image and Curve IEs are mutually exclusive

8.3.2 Information Object Definitions

8.3.2.1 Patient Module

Table 38

| Attribute Name | Tag | Type | Attribute Assignment |
|------------------------------------|--------------|------|--|
| Patient's Name | (0010, 0010) | 2 | Always set |
| Patient ID | (0010, 0020) | 2 | Always set |
| Patient's Birth Date | (0010, 0030) | 2 | Length=0 when no entry is made |
| Patient's Sex | (0010, 0040) | 2 | Length=0 when no entry is made |
| Referenced Patient Sequence | (0008,1120) | 3 | Not set when no entry is made |
| >Referenced SOP Class UID | (0008,1150) | 1C | Required if Referenced Patient Sequence is set |
| >Referenced SOP Class Instance UID | (0008,1155) | 1C | Required if Referenced Patient Sequence is set |

8.3.2.2 General Study Module

Table 39

| Attribute Name | Tag | Type | Attribute Assignment |
|------------------------------------|--------------|------|--|
| Study Instance UID | (0020, 000D) | 1 | Always set |
| Study Date | (0008, 0020) | 2 | Always set |
| Study Time | (0008, 0030) | 2 | Always set |
| Referring Physician's Name | (0008, 0090) | 2 | Length=0 when no entry is made |
| Study ID | (0020, 0010) | 2 | Always set |
| Accession Number | (0008, 0050) | 2 | Length=0 when no entry is made |
| Study Description | (0008,1030) | 3 | Not set when no entry is made |
| Physician(s) of Record | (0008,1048) | 3 | Not set when no entry is made |
| Name of Physician(s) Reading Study | (0008,1060) | 3 | Not set when no entry is made |
| Referenced Study Sequence | (0008,1110) | 3 | Not set when no entry is made |
| >Referenced SOP Class UID | (0008,1150) | 1C | Required Referenced Study Sequence is set |
| >Referenced SOP Class Instance UID | (0008,1155) | 1C | Required Referenced Study Sequence is set |
| Procedure Code Sequence | (0008,1032) | 3 | Not set when no entry is made |
| >Code Value | (0008,0100) | 1C | Required if Procedure Code Sequence present |
| >Coding Scheme Designator | (0008,0102) | 1C | Required if Procedure Code Sequence present |
| >Coding Scheme Version | (0008,0103) | 1C | Required if Procedure Code Sequence present and its value is available |
| >Code Meaning | (0008,0104) | 1C | Required if Procedure Code Sequence present |

8.3.2.3 Patient Study Module

Table 40

| Attribute Name | Tag | Type | Attribute Assignment |
|---------------------------------|--------------|------|-------------------------------|
| Admitting Diagnoses Description | (0008,1080) | 3 | Not set when no entry is made |
| Patient's Age | (0010, 1010) | 3 | Not set when no entry is made |
| Patient's Size | (0010,1020) | 3 | Not set when no entry is made |
| Patient's Weight | (0010,1030) | 3 | Not set when no entry is made |
| Occupation | (0010,2180) | 3 | Not set when no entry is made |
| Additional Patient's History | (0010,21B0) | 3 | Not set when no entry is made |

8.3.2.4 General Series Module

Table 41

| Attribute Name | Tag | Type | Attribute Assignment |
|---------------------------------------|--------------|------|---|
| Modality | (0008, 0060) | 1 | Always set |
| Series Instance UID | (0020, 000E) | 1 | Always set |
| Series Number | (0020, 0011) | 2 | Always set |
| Series Date | (0008,0021) | 3 | Not set |
| Series Time | (0008,0031) | 3 | Not set |
| Performing Physician's Name | (0008,1050) | 3 | Not set when no entry is made |
| Protocol Name | (0018,1030) | 3 | Not set when no entry is made |
| Operator's Name | (0008,1070) | 3 | Not set when no entry is made |
| Request Attributes Sequence | (0040,0275) | 3 | Not set when no entry is made |
| >Requested Procedure ID | (0040,1001) | 1C | Set if Request Attributes Sequence is present |
| >Scheduled Procedure Step ID | (0040,0009) | 1C | Set if Request Attributes Sequence is present |
| >Scheduled Procedure Step Description | (0040,0007) | 1C | Set if Request Attributes Sequence is present and the value is available |
| >Scheduled Action Item Code Sequence | (0040,0008) | 3 | Not set when no entry is made |
| >>Code Value | (0008,0100) | 1C | Required if Scheduled Action Item Code Sequence is present |
| >>Coding Scheme Designator | (0008,0102) | 1C | Required if Scheduled Action Item Code Sequence is present |
| >>Coding Scheme Version | (0008,0103) | 1C | Required if Scheduled Action Item Code Sequence is present and its value is available |
| >>Code Meaning | (0008,0104) | 1C | Required if Scheduled Action Item Code Sequence is present |
| Performed Procedure Step ID | (0040,0253) | 3 | Set with Identification value of that part of a Procedure that has been carried out within this step. |

| | | | |
|--------------------------------------|-------------|---|--|
| Performed Procedure Step Start Date | (0040,0244) | 3 | Set with Date on which the Performed Procedure Step started. |
| Performed Procedure Step Start Time | (0040,0245) | 3 | Set with Time on which the Performed Procedure Step started. |
| Performed Procedure Step Description | (0040,0254) | 3 | Set if Institution-generated description of classification of the Procedure Step that was performed is available |

8.3.2.5 Synchronization Module

This module is used and applied only when synchronized with an audio IOD.

Table 42

| Attribute Name | Tag | Type | Attribute Assignment |
|--|--------------|------|----------------------|
| Synchronization Frame of Reference UID | (0020, 0200) | 1 | Always set |
| Synchronization Trigger | (0018, 106A) | 1 | Set to "NO TRIGGER" |
| Acquisition Time Synchronized | (0018, 1800) | 1 | Set to "N" |

8.3.2.6 General Equipment Module

Table 43

| Attribute Name | Tag | Type | Attribute Assignment |
|-------------------------------|--------------|------|----------------------|
| Manufacturer | (0008, 0070) | 2 | Always set |
| Institution Name | (0008, 0080) | 3 | Always set |
| Station Name | (0008,1010) | 3 | Always set |
| Institutional Department Name | (0008,1040) | 3 | Always set |
| Manufacturer's Model Name | (0008,1090) | 3 | Set if available |
| Device Serial Number | (0018,1000) | 3 | Set if available |
| Software Versions | (0018,1020) | 3 | Set if available |

8.3.2.7 General Image Module

Table 44

| Attribute Name | Tag | Type | Attribute Assignment |
|-------------------------|--------------|------|----------------------------|
| Instance Number | (0020, 0013) | 2 | Always set |
| Content Date | (0008, 0023) | 2C | Always set by CIM |
| Acquisition Datetime | (0008,002a) | 3 | Always set |
| Content Time | (0008, 0033) | 2C | Always set by CIM |
| Image Type | (0008, 0008) | 3 | Always set |
| Image Comments | (0020,4000) | 3 | Always set |
| Lossy Image Compression | (0028, 2110) | 3 | Set if it is lossy |
| Derivation Description | (0028, 2111) | 3 | Always set if it is lossy. |

8.3.2.8 Image Pixel Module

Table 45

| Attribute Name | Tag | Type | Attribute Assignment |
|----------------------------|--------------|------|-------------------------------|
| Samples per Pixel | (0028, 0002) | 1 | 3 |
| Photometric Interpretation | (0028, 0004) | 1 | YBR_FULL_422 |
| Rows | (0028, 0010) | 1 | Always set |
| Columns | (0028, 0011) | 1 | Always set |
| Bits Allocated | (0028, 0100) | 1 | Always set (8) |
| Bits Stored | (0028, 0101) | 1 | Always set (8) |
| High Bit | (0028, 0102) | 1 | Always set (7) |
| Pixel Representation | (0028, 0103) | 1 | Always set (0 or 1) |
| Pixel Data | (7FE0, 0010) | 1 | Always set |
| Planar Configuration | (0028, 0006) | 1C | Set if Samples per Pixel is 3 |
| Pixel Aspect Ratio | (0028, 0034) | 1C | Set if ratio is not "1\1" |

8.3.2.9 Cine Module

Table 46

| Attribute Name | Tag | Type | Attribute Assignment |
|--------------------------------|--------------|------|----------------------|
| Frame Time | (0018, 1063) | 1C | Always set by CIM |
| Start Trim | (0008, 2142) | 3 | Always set (0) |
| Stop Trim | (0008, 2143) | 3 | Always set |
| Recommended Display Frame Rate | (0008, 2144) | 3 | Always set |
| Cine Rate | (0018, 0040) | 3 | Always set |
| Frame Delay | (0018, 1066) | 3 | Always set |
| Effective Duration | (0018, 0072) | 3 | Always set |
| Actual Frame Duration | (0018, 1242) | 3 | Always set |

8.3.2.10 Multi-frame Module

Table 47

| Attribute Name | Tag | Type | Attribute Assignment |
|-------------------------|--------------|------|------------------------|
| Number of Frame | (0028, 0008) | 1 | Always set |
| Frame Increment Pointer | (0028, 0009) | 1 | Always set (0018,1063) |

8.3.2.11 US Image Module

Table 48

| Attribute Name | Tag | Type | Attribute Assignment |
|-------------------------------|--------------|------|--------------------------------|
| Sample Per Pixel | (0028, 0002) | 1 | Always set (3) |
| Photometric Interpretation | (0028, 0004) | 1 | Always set |
| Bits Allocated | (0028,0100) | 1 | Always set (8) |
| Bits Stored | (0028, 0101) | 1 | Always set (8) |
| High Bit | (0028, 0102) | 1 | Always set (7) |
| Planar Configuration | (0028, 0006) | 1C | Set if Samples per Pixel is 3 |
| Pixel Representation | (0028, 0103) | 1 | Always set |
| Image Type | (0008, 0008) | 2 | Always set |
| Lossy Image Compression | (0028, 2110) | 1C | Set if it is lossy |
| Ultrasound Color Data Present | (0028, 0014) | 3 | Not set when entry is not made |
| Transducer Type | (0018, 6031) | 3 | Not set when entry is not made |

8.3.2.12 SOP Common Module

Table 49

| Attribute Name | Tag | Type | Attribute Assignment |
|------------------------|--------------|------|-----------------------------|
| SOP Class UID | (0008, 0016) | 1 | Always set |
| SOP Instance UID | (0008, 0018) | 1 | Always set |
| Specific Character Set | (0008, 0005) | 1C | Always set ("ISO_IR 100") |

8.4 Basic Voice Audio Information Object Definition

CIM AE supports to store Basic Voice Audio Information IOD.

8.4.1 Entity Module Definitions

The information modules that CIM AE supports are defined below.

8.4.1.1 Basic Voice Audio IOD Modules

Table 50

| Information Entity | Module | Reference | Usage ¹ |
|--------------------|-------------------------|-----------|--------------------|
| Patient | Patient | 8.4.2.1 | M |
| Study | General Study | 8.4.2.2 | M |
| | Patient Study | 8.4.2.3 | U |
| Series | General Series | 8.4.2.4 | M |
| Frame of Reference | Synchronization | 8.4.2.5 | U |
| Equipment | General Equipment | 8.4.2.6 | M |
| Waveform | Waveform Identification | 8.4.2.7 | M |
| | Waveform | 8.4.2.8 | M |
| | Acquisition Context | Not Used | M |
| | Waveform Annotation | Not Used | U |
| | SOP Common | 8.4.2.9 | M |

8.4.2 Information Object Definitions

8.4.2.1 Patient Module

Table 51

| Attribute Name | Tag | Type | Attribute Assignment |
|------------------------------------|--------------|------|--|
| Patient's Name | (0010, 0010) | 2 | Always set |
| Patient ID | (0010, 0020) | 2 | Always set |
| Patient's Birth Date | (0010, 0030) | 2 | Length=0 when no entry is made |
| Patient's Sex | (0010, 0040) | 2 | Length=0 when no entry is made |
| Referenced Patient Sequence | (0008,1120) | 3 | Not set when no entry is made |
| >Referenced SOP Class UID | (0008,1150) | 1C | Required if Referenced Patient Sequence is set |
| >Referenced SOP Class Instance UID | (0008,1155) | 1C | Required if Referenced Patient Sequence is set |

8.4.2.2 General Study Module

Table 52

| Attribute Name | Tag | Type | Attribute Assignment |
|------------------------------------|--------------|------|--|
| Study Instance UID | (0020, 000D) | 1 | Always set |
| Study Date | (0008, 0020) | 2 | Always set |
| Study Time | (0008, 0030) | 2 | Always set |
| Referring Physician's Name | (0008, 0090) | 2 | Length=0 when no entry is made |
| Study ID | (0020, 0010) | 2 | Always set |
| Accession Number | (0008, 0050) | 2 | Length=0 when no entry is made |
| Study Description | (0008,1030) | 3 | Not set when no entry is made |
| Physician(s) of Record | (0008,1048) | 3 | Not set when no entry is made |
| Name of Physician(s) Reading Study | (0008,1060) | 3 | Not set when no entry is made |
| Referenced Study Sequence | (0008,1110) | 3 | Not set when no entry is made |
| >Referenced SOP Class UID | (0008,1150) | 1C | Required Referenced Study Sequence is set |
| >Referenced SOP Class Instance UID | (0008,1155) | 1C | Required Referenced Study Sequence is set |
| Procedure Code Sequence | (0008,1032) | 3 | Not set when no entry is made |
| >Code Value | (0008,0100) | 1C | Required if Procedure Code Sequence present |
| >Coding Scheme Designator | (0008,0102) | 1C | Required if Procedure Code Sequence present |
| >Coding Scheme Version | (0008,0103) | 1C | Required if Procedure Code Sequence present and its value is available |
| >Code Meaning | (0008,0104) | 1C | Required if Procedure Code Sequence present |

8.4.2.3 Patient Study Module

Table 53

| Attribute Name | Tag | Type | Attribute Assignment |
|---------------------------------|--------------|------|-------------------------------|
| Admitting Diagnoses Description | (0008,1080) | 3 | Not set when no entry is made |
| Patient's Age | (0010, 1010) | 3 | Not set when no entry is made |
| Patient's Size | (0010,1020) | 3 | Not set when no entry is made |
| Patient's Weight | (0010,1030) | 3 | Not set when no entry is made |
| Occupation | (0010,2180) | 3 | Not set when no entry is made |
| Additional Patient's History | (0010,21B0) | 3 | Not set when no entry is made |

8.4.2.4 General Series Module

Table 54

| Attribute Name | Tag | Type | Attribute Assignment |
|---------------------------------------|--------------|------|--|
| Modality | (0008, 0060) | 1 | Always set to "AU" |
| Series Instance UID | (0020, 000E) | 1 | Always set |
| Series Number | (0020, 0011) | 2 | Always set |
| Series Date | (0008,0021) | 3 | Not set |
| Series Time | (0008,0031) | 3 | Not set |
| Performing Physician's Name | (0008,1050) | 3 | Not set when no entry is made |
| Protocol Name | (0018,1030) | 3 | Not set when no entry is made |
| Operator's Name | (0008,1070) | 3 | Not set when no entry is made |
| Request Attributes Sequence | (0040,0275) | 3 | Not set when no entry is made |
| >Requested Procedure ID | (0040,1001) | 1C | Set if Request Attributes Sequence is present |
| >Scheduled Procedure Step ID | (0040,0009) | 1C | Set if Request Attributes Sequence is present |
| >Scheduled Procedure Step Description | (0040,0007) | 1C | Set if Request Attributes Sequence is present and the value is available |
| >Scheduled Action Item Code Sequence | (0040,0008) | 3 | Not set when no entry is made |
| >>Code Value | (0008,0100) | 1C | Required if Scheduled Action Item Code Sequence is present |
| >>Coding Scheme Designator | (0008,0102) | 1C | Required if Scheduled Action Item Code Sequence is present |
| >>Coding Scheme Version | (0008,0103) | 1C | Required if Scheduled Action Item Code Sequence is present and its value is available |
| >>Code Meaning | (0008,0104) | 1C | Required if Scheduled Action Item Code Sequence is present |
| Performed Procedure Step ID | (0040,0253) | 3 | Set with Identification value of that part of a Procedure that has been carried out within this step. |
| Performed Procedure Step Start Date | (0040,0244) | 3 | Set with Date on which the Performed Procedure Step started. |
| Performed Procedure Step Start Time | (0040,0245) | 3 | Set with Time on which the Performed Procedure Step started. |
| Performed Procedure Step Description | (0040,0254) | 3 | Set if Institution-generated description of classification of the Procedure Step that was performed is available |

8.4.2.5 Synchronization Module

Table 55

| Attribute Name | Tag | Type | Attribute Assignment |
|--|--------------|------|----------------------|
| Synchronization Frame of Reference UID | (0020, 0200) | 1 | Always set |
| Synchronization Trigger | (0018, 106A) | 1 | Set to "NO TRIGGER" |
| Acquisition Time Synchronized | (0018, 1800) | 1 | Set to "N" |

8.4.2.6 General Equipment Module

Table 56

| Attribute Name | Tag | Type | Attribute Assignment |
|-------------------------------|--------------|------|----------------------|
| Manufacturer | (0008, 0070) | 2 | Always set |
| Institution Name | (0008, 0080) | 3 | Always set |
| Station Name | (0008,1010) | 3 | Always set |
| Institutional Department Name | (0008,1040) | 3 | Always set |
| Manufacturer's Model Name | (0008,1090) | 3 | Set if available |
| Device Serial Number | (0018,1000) | 3 | Set if available |
| Software Versions | (0018,1020) | 3 | Set if available |

8.4.2.7 Waveform Identification Module

Table 57

| Attribute Name | Tag | Type | Attribute Assignment |
|----------------------|--------------|------|----------------------|
| Instance Number | (0020,0013) | 1 | Always set |
| Content Date | (0008,0023) | 1 | Always set |
| Content Time | (0008,0033) | 1 | Always set |
| Acquisition Datetime | (0008, 002A) | 1 | Always set |

8.4.2.8 Waveform Module

Table 58

| Attribute Name | Tag | Type | Attribute Assignment |
|-------------------------------|--------------|------|--------------------------|
| Waveform Sequence | (5400, 0100) | 1 | Always set |
| > Waveform Originality | (003A, 0004) | 1 | Always Set to "ORIGINAL" |
| > Number of Waveform Channels | (003A, 0005) | 1 | Always set to 1 |
| > Number of Waveform Samples | (003A, 0010) | 1 | Always set |
| > Sampling Frequency | (003A, 001A) | 1 | Always set |
| > Channel Definition Sequence | (003A, 0200) | 1 | Always set |

| | | | |
|----------------------------------|--------------|----|--------------------|
| >> Channel Sample Skew | (003A, 0215) | 1C | Always Set by CIM |
| >> Waveform Bits Stored | (003A, 021A) | 1 | Always set to 8 |
| > Waveform Bits Allocated | (5400, 1004) | 1 | Always set to 8 |
| > Waveform Sample Interpretation | (5400, 1006) | 1 | Always set to "UB" |
| > Waveform Data | (5400, 1010) | 1 | Always set |

8.4.2.9 SOP Common Module

Table 59

| Attribute Name | Tag | Type | Attribute Assignment |
|------------------------|--------------|------|-----------------------------|
| SOP Class UID | (0008, 0016) | 1 | Always set |
| SOP Instance UID | (0008, 0018) | 1 | Always set |
| Specific Character Set | (0008, 0005) | 1C | Always set ("ISO_IR 100") |

9 DIMSE-SERVICES AND ATTRIBUTES

9.1 STORAGE COMMITMENT

9.1.1 DIMSE-Service Class

Table 60

| SOP Class | DIMSE Service Element | Usage SCU |
|--|-----------------------|-----------|
| STORAGE COMMITMENT PUSH MODEL SOP Class | N-ACTION | M |
| | N-EVENT-REPORT | M |

9.1.2 STORAGE COMMITMENT PUSH MODEL SOP CLASS

9.1.2.1 N-ACTION Attributes

Table 61

| Action type Name | Action Type ID | Attribute Name | Tag | Requirement Type SCU |
|----------------------------------|----------------|-------------------------------------|-------------|----------------------|
| Request Storage Commitment | 1 | Transaction UID | (0008,1195) | 1 |
| | | Referenced SOP Sequence | (0008,1199) | 1 |
| | | > Referenced SOP Class UID | (0008,1150) | 1 |
| | | > Referenced SOP Instance UID | (0008,1155) | 1 |
| | | Referenced Study Component Sequence | (0008,1111) | 1C |
| | | > Referenced SOP Class UID | (0008,1150) | 1 |
| | | > Referenced SOP Instance UID | (0008,1155) | 1 |

9.1.2.2 N-EVENT-REPORT Attributes

Table 62

| Event Type Name | Event Type ID | Attribute Name | Tag | Requirement Type SCP |
|---|---------------|-------------------------------|-------------|----------------------|
| Storage Commitment Request Successful | 1 | Transaction UID | (0008,1195) | 1 |
| | | Referenced SOP Sequence | (0008,1199) | 1 |
| | | > Referenced SOP Class UID | (0008,1150) | 1 |
| | | > Referenced SOP Instance UID | (0008,1155) | 1 |
| Storage Commitment Request Complete Failure Exist | 2 | Transaction UID | (0008,1195) | 1 |
| | | Referenced SOP Sequence | (0008,1199) | 1 |
| | | > Referenced SOP Class UID | (0008,1150) | 1 |
| | | > Referenced SOP Instance UID | (0008,1155) | 1 |

9.2 Query/Retrieve SCU

9.2.1 DIMSE-Services

Table 63

| SOP Class | DIMSE Service Element | Usage SCU | Usage |
|---|-----------------------|-----------|-------|
| Patient Root Query/Retrieve information Model - FIND SOP Class | C-FIND | M | Used |
| | C-FIND CANCEL | M | Used |
| Patient Root Query/Retrieve information Model - MOVE SOP Class | C-MOVE | M | Used |
| | C-MOVE CANCEL | M | Used |

9.2.2 Patient Root Q/R Information Model - Find

9.2.2.1 Patient Level SCU Request

Table 64

| Attribute Name | Tag | Type | Attribute Assignment |
|-------------------------------------|--------------|------|-------------------------------------|
| Patient's Name | (0010, 0010) | R | Set to NULL string if not specified |
| Patient ID | (0010, 0020) | U | Set to NULL string if not specified |
| Patient's Birth Date | (0010,0030) | O | |
| Patient's Birth Time | (0010,0032) | O | |
| Patient's Sex | (0010,0040) | O | |
| Other Patient IDs | (0010.1000) | O | |
| Other Patient Names | (0010,1001) | O | |
| Ethnic Group | (0010,2160) | O | |
| Patient Comments | (0010,4000) | O | |
| Number of Patient Related Studies | (0010,1200) | O | |
| Number of Patient Related Series | (0010,1202) | O | |
| Number of Patient Related Instances | (0010,1204) | O | |

9.2.2.2 Study Level SCU Request

Table 65

| Attribute Name | Tag | Type | Attribute Assignment |
|------------------------------------|--------------|------|-------------------------------------|
| Study Date | (0008,0020) | R | Set to NULL string if not specified |
| Study Time | (0008, 0030) | R | Set to NULL string if not specified |
| Accession Number | (0008, 0050) | R | Set to NULL string if not specified |
| Study ID | (0020,0010) | R | Set to NULL string if not specified |
| Study Instance UID | (0020,000D) | U | Set to NULL string if not specified |
| Modalities in Study | (0008,0061) | O | |
| Referring Physician's Name | (0008,0090) | O | |
| Study Description | (0008,1030) | O | |
| Name of Physician(s) Reading Study | (0008,1060) | O | |
| Admitting Diagnoses Description | (0008,1080) | O | |
| Patient's Age | (0010,1010) | O | |
| Patient's Size | (0010,1020) | O | |
| Patient's Weight | (0010,1030) | O | |
| Occupation | (0010,2180) | O | |
| Additional Patient History | (0010,21B0) | O | |
| Other Study Numbers | (0020,1070) | O | |
| Number of Study Related Series | (0020,1206) | O | |
| Number of Study Related Instances | (0020,1208) | O | |
| Interpretation Author | (4008,010C) | O | |

9.2.2.3 Query Attributes and Constraints

- CIM AE allows query attributes with values to be used as constraints for query.
- CIM AE allows attributes with NULL strings to be queried from a remote query SCP.

9.3 Modality WorkList

9.3.1 DIMSE-Service

Table 66

| SOP Class | DIMSE Service Element | Usage SCU *1 | Usage |
|---|-----------------------|--------------|-------|
| Modality Worklist Information Model-FIND | C-FIND | M | Used |

*1 : M = Mandatory

The CIM AE requires query parameters to be configured for Modality Worklist query. Following table shows the suggested parameters (but not limited) that can be used for modality worklist query.

9.3.2 DIMSE Attributes

9.3.2.1 Matching Key Attributes

Attributes listed in this section are suggested matching keys for Modality Worklist query.

CIM AE supports all attributes for Modality Worklist Query. Please refer to PS3.4 of DICOM 3.0 standard (2000 version) for more attributes information.

9.3.2.1.1 Scheduled Procedure Step Module

Table 67

| Description / Module | Tag | Matching Key Type | Remark/Matching Type |
|--|-------------|-------------------|--|
| Scheduled Procedure Step Sequence | (0040,0100) | Required | |
| >Scheduled Station AE title | (0040,0001) | Required | Defined in configuration setting. Single value matching only. |
| >Scheduled Procedure Step Start Date | (0040,0002) | Required | Defined in configuration setting. Single value matching or range matching. |
| >Scheduled Procedure Step Start Time | (0040,0003) | Required | Defined in configuration setting. Single value matching or range matching. |
| >Modality | (0008,0060) | Required | Single value matching only. |
| >Scheduled Performing Physician's Name | (0040,0006) | Required | Single value matching only. |
| >Scheduled Station Name | (0040,0010) | Optional | Single value matching only. |

9.3.2.1.2 Patient Identification Step Module**Table 68**

| Description / Module | Tag | Matching Key Type | Remark/Matching Type |
|----------------------|-------------|-------------------|-----------------------------|
| Patient's Name | (0010,0010) | Required | Single value matching only. |
| Patient ID | (0010,0020) | Required | Single value matching only. |

9.3.2.1.3 Visit Admission Module**Table 69**

| Description / Module | Tag | Matching Key Type | Remark/Matching Type |
|-----------------------------|-------------|-------------------|-----------------------------|
| >Referring Physician's Name | (0008,0090) | Optional | Single value matching only. |

9.3.2.1.4 Study Scheduling Module**Table 70**

| Description / Module | Tag | Matching Key Type | Remark/Matching Type |
|----------------------------------|-------------|-------------------|-----------------------------|
| >Requested Procedure Description | (0032,1060) | Optional | Single value matching only. |

9.3.2.2 Return Key Attributes

The supported Return Key Attributes are listed as follows.

9.3.2.2.1 Scheduled Procedure Step Module**Table 71**

| Description / Module | Tag | Return Key Type | Remark |
|--|-------------|-----------------|--------|
| Scheduled Procedure Step Sequence | (0040,0100) | 1 | |
| >Modality | (0008,0060) | 1 | |
| >Scheduled Station AE title | (0040,0001) | 1 | |
| >Scheduled Procedure Step Start Date | (0040,0002) | 1 | |
| >Scheduled Procedure Step Start Time | (0040,0003) | 1 | |
| >Scheduled Performing Physician's Name | (0040,0006) | 2 | |
| >Scheduled Action item Code Sequence | (0040,0008) | 1C | |
| >>Code Value | (0008,0100) | 1C | |
| >>Code Scheme Designator | (0008,0102) | 1C | |
| >>Code Meaning | (0008,0104) | 3 | |

| | | | |
|-------------------------|-------------|---|--|
| >Scheduled Station Name | (0040,0010) | 2 | |
|-------------------------|-------------|---|--|

9.3.2.2.2 Requested Procedure Module

Table 72

| Description / Module | Tag | Return Key Type | Remark |
|----------------------|-------------|-----------------|--------|
| Study Instance UID | (0020,000D) | 1 | |

9.3.2.2.3 Imaging Service Request Module

Table 73

| Description / Module | Tag | Return Key Type | Remark |
|----------------------|-------------|-----------------|--------|
| Accession Number | (0008,0050) | 2 | |

9.3.2.2.4 Patient Identification Module

Table 74

| Description / Module | Tag | Return Key Type | Remark |
|----------------------|-------------|-----------------|--------|
| Patient's Name | (0010,0010) | 1 | |
| Patient ID | (0010,0020) | 1 | |

9.3.2.2.5 Patient Demographic Module

Table 75

| Description / Module | Tag | Return Key Type | Remark |
|----------------------|-------------|-----------------|--------|
| Patient's Birth Date | (0010,0030) | 2 | |
| Patient's Sex | (0010,0040) | 2 | |

9.3.2.2.6 Visit Identification Module

Table 76

| Description / Module | Tag | Return Key Type | Remark |
|----------------------|-------------|-----------------|--------|
| Admission ID | (0038,0010) | 2 | |

9.3.2.2.7 Visit Status Module

Table 77

| Description / Module | Tag | Return Key Type | Remark |
|--------------------------|-------------|-----------------|--------|
| Current Patient Location | (0038,0300) | 2 | |

9.3.2.2.8 Visit Admission Module

Table 78

| Description / Module | Tag | Return Key Type | Remark |
|-----------------------------|-------------|-----------------|--------|
| >Referring Physician's Name | (0008,0090) | 2 | |

9.3.2.2.9 Study Scheduling Module

Table 79

| Description / Module | Tag | Return Key Type | Remark |
|----------------------------------|-------------|-----------------|--------|
| >Requested Procedure Description | (0032,1060) | 1C | |

9.4 Print

9.4.1 DIMSE-Services

Table 80

| SOP Class | DIMSE Service Element | Reference | Usage SCU ¹ |
|---------------------------------|-----------------------|--------------------|------------------------|
| Basic Film Session SOP Class | N-CREATE | 9.4.2.1 | M |
| | N-SET | Not used | U |
| | N-DELETE | Not used | U |
| | N-ACTION | Not used | U |
| Presentation LUT SOP Class | N-CREATE | Not used | M |
| | N-DELETE | Not Used | U |
| Basic Film Box SOP Class | N-CREATE | 9.4.3.1 | M |
| | N-SET | Not used | U |
| | N-DELETE | Not used | U |
| | N-ACTION | Used | M |
| Image Box SOP Class | N-SET | 9.4.4.1 9.4.5.1 | M |
| Printer SOP Class | N-EVENT-REPORT | Not used | M |
| | N-GET | 9.4.6.1 | U |

¹ M = Mandatory, U = User option

9.4.2 Basic Film Session SOP Class

9.4.2.1 N-CREATE Attributes

Table 81

| Attribute Name | Tag | Usage | Attribute Assignment | |
|--------------------|-------------|-------|----------------------------------|---|
| | | | Options | Default |
| Number of Copies | (2000,0010) | U | [n value] | 1 |
| Print Priority | (2000,0020) | U | LOW MED HIGH | MED |
| Medium Type | (2000,0030) | U | PAPER CLEAR FILM BLUE FILM | PAPER |
| Film Destination | (2000,0040) | U | PROCESSOR MAGAZINE BIN_i | [empty] Not applied if this field is empty or missing |
| Film Session Label | (2000,0050) | U | Not Set | Not Set |
| Memory Allocation | (2000,0060) | U | Not set | Not set |

9.4.3 Basic Film Box SOP Class

9.4.3.1 N-CREATE Attributes

Table 82

| Attribute Name | Tag | Usage | Attribute Assignment | |
|-------------------------------------|-------------|-------|---|--|
| | | | Options | Default |
| Image Display Format | (2010,0010) | M | STANDARD\C,R C = column R = row | STANDARD\2,3 |
| Film Orientation | (2010,0040) | U | PORTRAIT LANDSCAPE | PORTRAIT |
| Film Size ID | (2010,0050) | U | 8INX10IN 10INX12IN 10INX14IN 11INX14IN, 14INX14IN, 14INX17IN, 24CMX24CM, 24CMX30CM etc. | 8INX10IN |
| Magnification Type | (2010,0060) | U | NONE, REPLICATE, BILINEAR, CUBIC | [empty] Not applied if this field is empty or missing |
| Border Density | (2010,0100) | U | BLACK WHITE or a density number | [empty] Not applied if this field is empty or missing |
| Empty Image Density | (2010,0110) | U | BLACK WHITE or a density number | [empty] Not applied if this field is empty or missing] |
| Trim | (2010,0140) | U | YES NO | [empty] Not applied if this field is empty or missing |
| Min Density | (2010,0120) | U | [nValue] | Not applied if this field is empty or missing |
| Max Density | (2010,0130) | U | [nValue] | Not applied if this field is empty or missing |
| Configuration Information | (2010,0150) | U | [Text string] Vendor specific information | Not applied if this field is empty or missing |
| Annotation display format ID | (2010,0030) | U | [Text string] | [empty] Not applied if this field is empty or missing |
| Referenced Film Session Sequence | (2010,0500) | M | Always set | |
| >Referenced SOP Class UID | (0008,1150) | M | Always set | |
| >Referenced SOP Instance UID | (0008,1155) | M | Always set | |

9.4.4 Basic Grayscale Image Box SOP Class

9.4.4.1 N-SET Attributes

Table 83

| Attribute Name | Tag | Usage | Attribute Assignment | |
|--------------------------------|-------------|-------|---|--|
| | | | Options | Default |
| Image Position | (2020,0010) | M | Always set | |
| Polarity | (2020,0020) | U | NORMAL REVERSE | NORMAL |
| Magnification Type | (2010,0060) | U | NONE, REPLICATE, BILINEAR, CUBIC | [empty] Not applied if this field is empty or missing |
| Smoothing Type | (2010,0080) | U | [Text string] Smoothing type, a vendor defined type of interpolation function. Note: This parameter is valid and applied only if MagnificationType is CUBIC | [empty] Not applied if this field is empty or missing |
| Basic Grayscale Image Sequence | (2020,0110) | M | Always set | |
| >Samples Per Pixel | (0028,0002) | M | Always set (1) | |
| >Photometric Interpretation | (0028,0004) | M | Always set | |
| >Rows | (0028,0010) | M | Always set | |
| >Columns | (0028,0011) | M | Always set | |
| >Pixel Aspect Ratio | (0028,0034) | M | Always set | |
| >Bits Allocated | (0028,0100) | M | Always set (8) | |
| >Bits Stored | (0028,0101) | M | Always set (8) | |
| >High Bit | (0028,0102) | M | Always set (7) | |
| >Pixel Representation | (0028,0103) | M | Always set (0) | |
| > Window Center | (0028,1050) | U | [string value] Apply only when photometric interpretation is either MONOCHROME1 or MONOCHROME2 | [empty] Not applied if either window center or window width is empty or missing |
| > Window Width | (0028,1051) | U | [string value] Apply only when photometric interpretation is either MONOCHROME1 or MONOCHROME2 | [empty] Not applied if either window center or window width is empty or missing |
| >Pixel Data | (7FE0,0010) | M | Always set | |

9.4.5 Basic Color Image Box SOP Class

9.4.5.1 N-SET Attributes

Table 84

| Attribute Name | Tag | Usage | Attribute Assignment | |
|-------------------------------|-------------|-------|--|---|
| | | | Options | Default |
| Image Position | (2020,0010) | M | Always set | |
| Polarity | (2020,0020) | U | NORMAL REVERSE | NORMAL |
| Magnification Type | (2010,0060) | U | NONE, REPLICATE, BILINEAR, CUBIC | [empty] Not applied if this field is empty or missing |
| Smoothing Type | (2010,0080) | U | [Text string] Smoothing type, a vendor defined type of interpolation function. Note: This parameter is valid and applied only if MagnificationType is CUBIC | [empty] Not applied if this field is empty or missing |
| Basic Color Image Sequence | (2020,0111) | M | Always set | |
| >Samples Per Pixel | (0028,0002) | M | Always set (3) | |
| >Photometric Interpretation | (0028,0004) | M | Always set | |
| >Planar Configuration | (0028,0006) | M | Always set (0) | |
| >Rows | (0028,0010) | M | Always set | |
| >Columns | (0028,0011) | M | Always set | |
| >Pixel Aspect Ratio | (0028,0034) | M | Always set | |
| >Bits Allocated | (0028,0100) | M | Always set (8) | |
| >Bits Stored | (0028,0101) | M | Always set (8) | |
| >High Bit | (0028,0102) | M | Always set (7) | |
| >Pixel Representation | (0028,0103) | M | Always set (0) | |
| >Pixel Data | (7FE0,0010) | M | Always set | |

9.4.6 Printer SOP Class

9.4.6.1 N-GET Attributes

Table 85

| Attribute Name | Tag | Usage |
|---------------------------|-------------|--------------|
| Printer Status | (2110,0010) | U |
| Printer Status Info | (2110,0020) | U |
| Printer Name | (2110,0030) | U |
| Manufacturer | (0008,0070) | U |
| Manufacturer's Model Name | (0008,1090) | U |
| Device Serial Number | (0018,1000) | U |
| Software Version | (0018,1020) | U |

9.5 DIMSE-Service and Attributes - Storage (Acceptance)

9.5.1 DIMSE-Services

Table 86

| SOP Class | DIMSE Service Element | Usage SCU *1 | Usage |
|--|-----------------------|--------------|-------|
| Ultrasound Image Storage | C-STORE | M | Used |
| Ultrasound Image Storage (Retired) | | | |
| Ultrasound Multi-frame Image Storage | | | |
| Ultrasound Multi-frame Image Storage (Retired) | | | |
| Secondary Capture Image Storage | | | |
| Basic Voice Audio Waveform Storage | | | |

*1: M = Mandatory

9.5.2 C-STORE Attribute

All Type1, Type2, and Type3 attributes defined in the Information Object Definition associated with SOP Class will be stored in local host system.