

# Technical Publications

Direction DOC1560375  
Revision 1

## MR SV25 DICOM CONFORMANCE STATEMENT

### SUPPORTED PRODUCTS:

- Optima<sup>\*</sup> MR360
- Brivo<sup>\*</sup> MR355
- SIGNA Explorer
- SIGNA Creator

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## CONFORMANCE STATEMENT OVERVIEW

Table o.1 provides an overview of the network services supported by MR.

**Table o.1 – NETWORK SERVICES**

| SOP Classes  | User of Service (SCU) | Provider of Service (SCP) |
|--|-----------------------|---------------------------|
| <b>Transfer</b>                                      |                       |                           |
| Verification SOP Class                               | Yes                   | Yes                       |
| CT Image Storage                                     | Yes                   | Yes                       |
| MR Image Storage                                     | Yes                   | Yes                       |
| Secondary Capture Image Storage                      | Yes                   | Yes                       |
| Grayscale Softcopy Presentation State Storage        | Yes                   | No                        |
| Enhanced SR  | Yes                   | Yes                       |
| Positron Emission Tomography Image Storage           | Yes                   | Yes                       |
| RT Structure Set Storage                             | Yes                   | Yes                       |
| GE Private PET Raw Data                              | Yes                   | Yes                       |
| Encapsulated PDF                                     | Yes                   | No                        |
| <b>Query/Retrieve</b>                                |                       |                           |
| Study Root Query/Retrieve Information Model – FIND   | Yes                   | Yes                       |
| Study Root Query/Retrieve Information Model - MOVE   | Yes                   | Yes                       |
| <b>Workflow Management</b>                           |                       |                           |
| Storage Commitment Push Model SOP Class              | Yes                   | No                        |
| Modality Performed Procedure Step SOP Class          | Yes                   | No                        |
| Modality Worklist Information Model – FIND SOP Class | Yes                   | No                        |
| <b>Print Management</b>                              |                       |                           |
| Basic Grayscale Print Management Meta SOP Class      | Yes                   | No                        |
| Basic Color Print Management Meta SOP Class          | Yes                   | No                        |
| Print Job SOP Class                                  | Yes                   | No                        |
| Printer SOP Class                                    | Yes                   | No                        |

Table o.2 provides an overview of the Media Storage Application Profiles supported by MR.

**Table o.2 - MEDIA SERVICES**

| <b>Media Storage Application Profile</b> | <b>Write Files<br/>(FSC or FSU)</b> | <b>Read Files<br/>(FSR)</b> |
|--|-------------------------------------|-----------------------------|
| <b>Compact Disk – Recordable</b>         |                                     |                             |
| General Purpose CD-R                     | FSC                                 | Yes                         |
| <b>DVD</b>                               |                                     |                             |
| General Purpose JPEG DVD                 | FSC                                 | Yes                         |
| <b>USB</b>                               |                                     |                             |
| General Purpose JPEG USB                 | FSC                                 | Yes                         |

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## 1. INTRODUCTION

### 1.1 OVERVIEW

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

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

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

**Section 3 (Media Storage Conformance Statement)**, which specifies the GEHC equipment compliance to the DICOM requirements for the implementation of Media Storage features.

**Section 4 (Modality Worklist Query Implementation)**, which specifies the GEHC equipment compliance to DICOM requirements for the implementation of the Modality Worklist service.

**Section 5 (Modality Performed Procedure Step Implementation)**, which specifies the GEHC equipment compliance to DICOM requirements for the implementation of the Modality Performed Procedure Step service.

**Section 6 (Storage Commitment Push Model Implementation)**, which specifies the GEHC equipment compliance to DICOM requirements for the implementation of the Storage Commitment service.

**Section 7 (Basic Directory Information Object Implementation)**, which specifies the GEHC equipment compliance to DICOM requirements for the implementation of the Basic Directory storage service.

**Section 8 (Secondary Capture Information Object Implementation)**, which specifies the GEHC equipment compliance to DICOM requirements for the implementation of the Secondary Capture IOD.

**Section 9 (Grayscale Softcopy Presentation State Information Object Implementation)**, which specifies the GEHC equipment compliance to DICOM requirements for the implementation of the Grayscale Softcopy Presentation State IOD.

**Section 10 (Print Management Implementation)**, which specifies the GEHC equipment compliance to DICOM requirements for the implementation of the Print management service.

**Section 11 (MR Information Object Implementation)**, which specifies the GEHC equipment compliance to DICOM requirements for the implementation of the MR IOD.

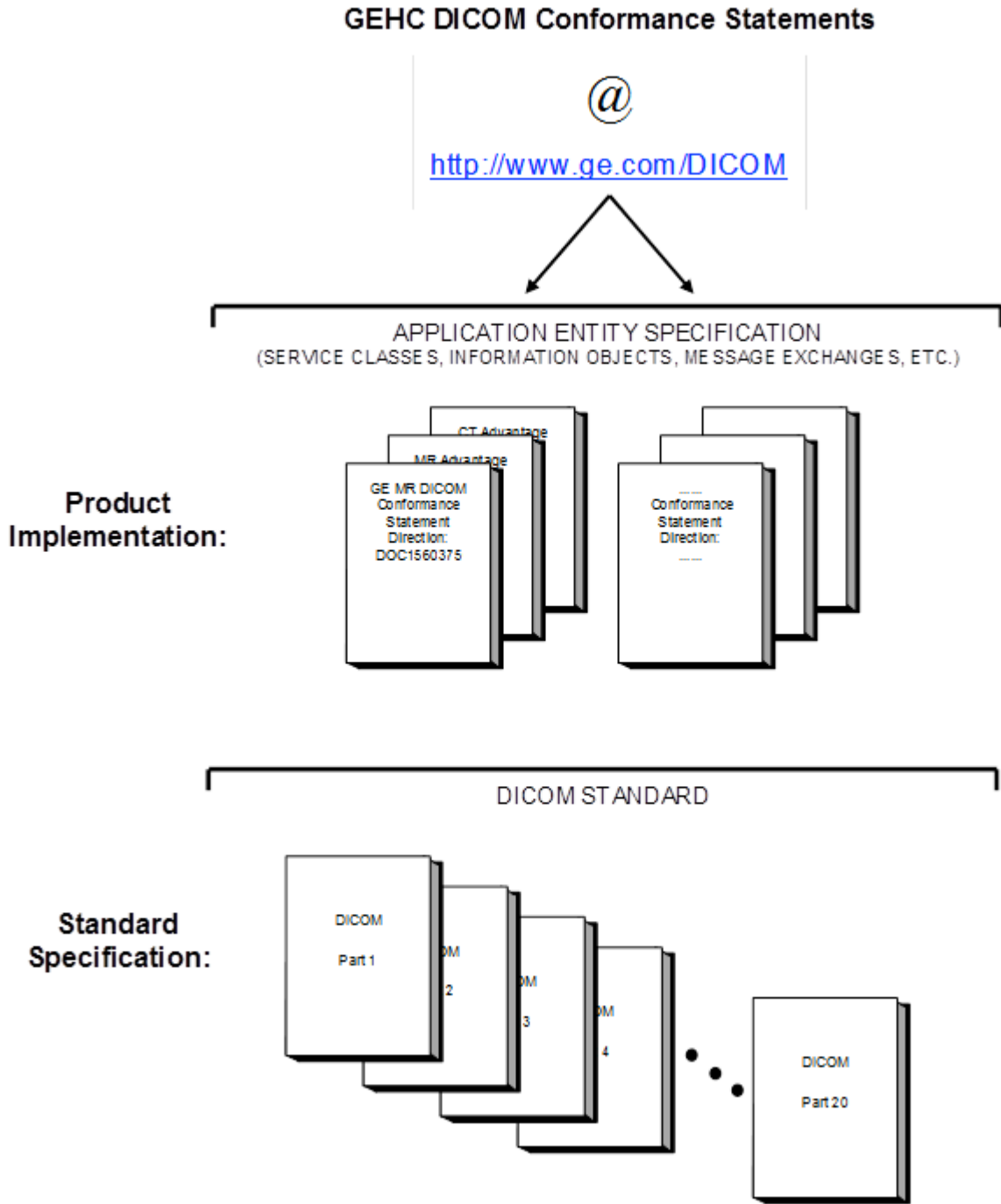
**Section 12 (Security Conformance Statement)**, which specifies the GEHC equipment compliance to DICOM requirements for the implementation of the Security features.

**Section 13 (Enhanced Structured Report Information Object Implementation)**, which specifies the GEHC equipment compliance to DICOM requirements for the implementation of the Enhanced SR IOD.

**Section 14 (Encapsulated Document Module Information Object Implementation)**, which specifies the GEHC equipment compliance to DICOM requirements for the implementation of the Encapsulated Document Module.

1.2 OVERALL DICOM CONFORMANCE STATEMENT DOCUMENT STRUCTURE

The Documentation Structure of the GEHC DICOM Conformance Statements is shown in the Illustration below.





This document specifies the DICOM implementation. It is entitled:

**MRSV25**  
*Conformance Statement for DICOM*  
*Direction DOC1560375*

This DICOM Conformance Statement documents the DICOM Conformance Statement and Technical Specification required to interoperate with the GEHC network interface.

The GEHC Conformance Statement, contained in this document, also specifies the Lower Layer communications which it supports (e.g., TCP/IP). However, the Technical Specifications are defined in the DICOM Part 8 standard.

For more information regarding DICOM, copies of the Standard may be obtained on the Internet at <http://medical.nema.org>. Comments on the Standard may be addressed to:

DICOM Secretariat  
NEMA  
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Rosslyn, VA 22209  
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### 1.3 INTENDED AUDIENCE

The reader of this document is concerned with software design and/or system integration issues. It is assumed that the reader of this document is familiar with the DICOM Standard and with the terminology and concepts which are used in that Standard.

### 1.4 SCOPE AND FIELD OF APPLICATION

It is the intent of this document to provide an unambiguous specification for GEHC implementations. This specification, called a Conformance Statement, includes a DICOM Conformance Statement and is necessary to ensure proper processing and interpretation of GEHC medical data exchanged using DICOM. The GEHC Conformance Statements are available to the public.

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

Included in this DICOM Conformance Statement are the Module Definitions which define all data elements used by this GEHC implementation. If the user encounters unspecified private data elements while parsing a GEHC Data Set, the user is well advised to ignore those data elements (per the DICOM standard). Unspecified private data element information is subject to change without notice. If, however, the device is acting as a "full fidelity storage device", it should retain and re-transmit all of the private data elements which are sent by GEHC devices.

Private data elements may be updated from one release to the next release. This is done in order to add additional information or remove information that does not apply

to the image object. Please refer to the appropriate product release DICOM Conformance Statement for the list of private elements supported.

The following table provides the GE MR product(s) covered in this document and their specific details.

| Software version | Product Name   | Product Implementation UID | CD/DVD DICOM Implementation version name |
|------------------|----------------|----------------------------|--|
| SV25             | Optima™ MR360  | 1.2.840.113619.6.388       | MergeCOM3_300                            |
| SV25             | Brivo™ MR355   | 1.2.840.113619.6.388       | MergeCOM3_300                            |
| SV25             | SIGNA Explorer | 1.2.840.113619.6.388       | MergeCOM3_300                            |
| SV25             | SIGNA Creator  | 1.2.840.113619.6.388       | MergeCOM3_300                            |

### 1.5 IMPORTANT REMARKS

The use of these DICOM Conformance Statements, in conjunction with the DICOM Standards, is intended to facilitate communication with GE imaging equipment. However, **by itself, it is not sufficient to ensure that inter-operation will be successful.** The **user (or user's agent)** needs to proceed with caution and address at least four issues:

- Integration** - The integration of any device into an overall system of interconnected devices goes beyond the scope of standards (DICOM), and of this introduction and associated DICOM Conformance Statements when interoperability with non-GE equipment is desired. The responsibility to analyze the applications requirements and to design a solution that integrates GE imaging equipment with non-GE systems is the **user's** responsibility and should not be underestimated. The **user** is strongly advised to ensure that such an integration analysis is correctly performed.
- Validation** - Testing the complete range of possible interactions between any GE device and non-GE devices, before the connection is declared operational, should not be overlooked. Therefore, the **user** should ensure that any non-GE provider accepts full responsibility for all validation required for their connection with GE devices. This includes the accuracy of the image data once it has crossed the interface between the GE imaging equipment and the non-GE device and the stability of the image data for the intended applications.  
 Such a validation is required before any clinical use (diagnosis and/or treatment) is performed. It applies when images acquired on GE imaging equipment are processed/displayed on a non-GE device, as well as when images acquired on non-GE equipment is processed/displayed on a GE console or workstation.
- Future Evolution** - GE understands that the DICOM Standard will evolve to meet the user's growing requirements. GE is actively involved in the development of the DICOM Standard. DICOM will incorporate new features and technologies and GE may follow the evolution of the Standard. The GEHC protocol is based on DICOM as specified in each DICOM Conformance Statement. Evolution of the Standard

may require changes to devices which have implemented DICOM. In addition, GE reserves the right to discontinue or make changes to the support of communications features (on its products) described by these DICOM Conformance Statements. The user should ensure that any non-GE provider, which connects with GE devices, also plans for the future evolution of the DICOM Standard. Failure to do so will likely result in the loss of function and/or connectivity as the DICOM Standard changes and GE Products are enhanced to support these changes.

- **Interaction** - It is the sole responsibility of the non-GE provider to ensure that communication with the interfaced equipment does not cause degradation of GE imaging equipment performance and/or function.

## 1.6 REFERENCES

NEMA PS3          Digital Imaging and Communications in Medicine (DICOM) Standard, available free at <http://medical.nema.org/>

## 1.7 DEFINITIONS

Informal definitions are provided for the following terms used in this Conformance Statement. The DICOM Standard is the authoritative source for formal definitions of these terms.

**Abstract Syntax** – the information agreed to be exchanged between applications, generally equivalent to a Service/Object Pair (SOP) Class. Examples : Verification SOP Class, Modality Worklist Information Model Find SOP Class, Computed Radiography Image Storage SOP Class.

**Application Entity (AE)** – an end point of a DICOM information exchange, including the DICOM network or media interface software; i.e., the software that sends or receives DICOM information objects or messages. A single device may have multiple Application Entities.

**Application Entity Title** – the externally known name of an *Application Entity*, used to identify a DICOM application to other DICOM applications on the network.

**Application Context** – the specification of the type of communication used between *Application Entities*. Example: DICOM network protocol.

**Association** – a network communication channel set up between *Application Entities*.

**Attribute** – a unit of information in an object definition; a data element identified by a *tag*. The information may be a complex data structure (Sequence), itself composed of lower level data elements. Examples: Patient ID (0010,0020), Accession Number (0008,0050), Photometric Interpretation (0028,0004), Procedure Code Sequence (0008,1032).

**Information Object Definition (IOD)** – the specified set of *Attributes* that comprise a type of data object; does not represent a specific instance of the data object, but rather a class of similar data objects that have the same properties. The *Attributes* may be specified as Mandatory (Type 1), Required but possibly unknown (Type 2), or Optional (Type 3), and there may be conditions associated with the use of an Attribute (Types 1C and 2C). Examples: MR Image IOD, CT Image IOD, Print Job IOD.

**Joint Photographic Experts Group (JPEG)** – a set of standardized image compression techniques, available for use by DICOM applications.

**Media Application Profile** – the specification of DICOM information objects and encoding exchanged on removable media (e.g., CDs)

**Module** – a set of *Attributes* within an *Information Object Definition* that are logically related to each other. Example: Patient Module includes Patient Name, Patient ID, Patient Birth Date, and Patient Sex.

**Negotiation** – first phase of *Association* establishment that allows *Application Entities* to agree on the types of data to be exchanged and how that data will be encoded.

**Presentation Context** – the set of DICOM network services used over an *Association*, as negotiated between *Application Entities*; includes *Abstract Syntaxes* and *Transfer Syntaxes*.

**Protocol Data Unit (PDU)** – a packet (piece) of a DICOM message sent across the network. Devices must specify the maximum size packet they can receive for DICOM messages.

**Security Profile** – a set of mechanisms, such as encryption, user authentication, or digital signatures, used by an *Application Entity* to ensure confidentiality, integrity, and/or availability of exchanged DICOM data

**Service Class Provider (SCP)** – role of an *Application Entity* that provides a DICOM network service; typically, a server that performs operations requested by another *Application Entity* (*Service Class User*). Examples: Picture Archiving and Communication System (image storage SCP, and image query/retrieve SCP), Radiology Information System (modality worklist SCP).

**Service Class User (SCU)** – role of an *Application Entity* that uses a DICOM network service; typically, a client. Examples: imaging modality (image storage SCU, and modality worklist SCU), imaging workstation (image query/retrieve SCU)

**Service/Object Pair (SOP) Class** – the specification of the network or media transfer (service) of a particular type of data (object); the fundamental unit of DICOM interoperability specification. Examples: Ultrasound Image Storage Service, Basic Grayscale Print Management.

**Service/Object Pair (SOP) Instance** – an information object; a specific occurrence of information exchanged in a *SOP Class*. Examples: a specific x-ray image.

**Tag** – a 32-bit identifier for a data element, represented as a pair of four digit hexadecimal numbers, the “group” and the “element”. If the “group” number is odd, the tag is for a private (manufacturer-specific) data element. Examples: (0010,0020) [Patient ID], (07FE,0010) [Pixel Data], (0019,0210) [private data element]

**Transfer Syntax** – the encoding used for exchange of DICOM information objects and messages. Examples: *JPEG* compressed (images), little endian explicit value representation.

**Unique Identifier (UID)** – a globally unique “dotted decimal” string that identifies a specific object or a class of objects; an ISO-8824 Object Identifier. Examples: Study Instance UID, SOP Class UID, SOP Instance UID.

**Value Representation (VR)** – the format type of an individual DICOM data element, such as text, an integer, a person’s name, or a code. DICOM information objects can be transmitted with either explicit identification of the type of each data element

(Explicit VR), or without explicit identification (Implicit VR); with Implicit VR, the receiving application must use a DICOM data dictionary to look up the format of each data element.

## 1.8 SYMBOLS AND ABBREVIATIONS

|       |  |
|-------|--|
| AE    | Application Entity                             |
| AET   | Application Entity Title                       |
| CAD   | Computer Aided Detection                       |
| CDA   | Clinical Document Architecture                 |
| CD-R  | Compact Disk Recordable                        |
| CSE   | Customer Service Engineer                      |
| CR    | Computed Radiography                           |
| CT    | Computed Tomography                            |
| DHCP  | Dynamic Host Configuration Protocol            |
| DICOM | Digital Imaging and Communications in Medicine |
| DIT   | Directory Information Tree (LDAP)              |
| DN    | Distinguished Name (LDAP)                      |
| DNS   | Domain Name System                             |
| DX    | Digital X-ray                                  |
| FSC   | File-Set Creator                               |
| FSU   | File-Set Updater                               |
| FSR   | File-Set Reader                                |
| GSDf  | Grayscale Standard Display Function            |
| GSPS  | Grayscale Softcopy Presentation State          |
| HIS   | Hospital Information System                    |
| HL7   | Health Level 7 Standard                        |
| IHE   | Integrating the Healthcare Enterprise          |
| IOD   | Information Object Definition                  |
| IPv4  | Internet Protocol version 4                    |
| IPv6  | Internet Protocol version 6                    |
| ISO   | International Organization for Standards       |
| IO    | Intra-oral X-ray                               |
| JPEG  | Joint Photographic Experts Group               |

|      |  |
|------|--|
| LDAP | Lightweight Directory Access Protocol      |
| LDIF | LDAP Data Interchange Format               |
| LUT  | Look-up Table                              |
| MAR  | Medication Administration Record           |
| MPEG | Moving Picture Experts Group               |
| MG   | Mammography (X-ray)                        |
| MPPS | Modality Performed Procedure Step          |
| MR   | Magnetic Resonance Imaging                 |
| MSPS | Modality Scheduled Procedure Step          |
| MTU  | Maximum Transmission Unit (IP)             |
| MWL  | Modality Worklist                          |
| NM   | Nuclear Medicine                           |
| NTP  | Network Time Protocol                      |
| O    | Optional (Key Attribute)                   |
| OP   | Ophthalmic Photography                     |
| OSI  | Open Systems Interconnection               |
| PACS | Picture Archiving and Communication System |
| PET  | Positron Emission Tomography               |
| PDI  | Portable Data for Imaging                  |
| PDU  | Protocol Data Unit                         |
| R    | Required (Key Attribute)                   |
| RDN  | Relative Distinguished Name (LDAP)         |
| RF   | Radiofluoroscopy                           |
| RIS  | Radiology Information System               |
| RT   | Radiotherapy                               |
| SC   | Secondary Capture                          |
| SCP  | Service Class Provider                     |
| SCU  | Service Class User                         |
| SOP  | Service-Object Pair                        |
| SPS  | Scheduled Procedure Step                   |
| SR   | Structured Reporting                       |

|        |   |
|--------|---|
| TCP/IP | Transmission Control Protocol/Internet Protocol |
| U      | Unique (Key Attribute)                          |
| UL     | Upper Layer                                     |
| US     | Ultrasound                                      |
| VL     | Visible Light                                   |
| VR     | Value Representation                            |
| XA     | X-ray Angiography                               |
| USB    | Universal Serial Bus                            |

## 2. NETWORK CONFORMANCE STATEMENT

### 2.1 INTRODUCTION

This section of the DICOM Conformance Statement specifies the MR compliance to DICOM requirements for **Networking** features.

This product uses healthcare industry standard DICOM protocol to exchange information with other DICOM compliant device on the network.

### 2.2 IMPLEMENTATION MODEL

#### 2.2.1 Application Data Flow Diagram

The network application model for the MR is shown in the following figure :



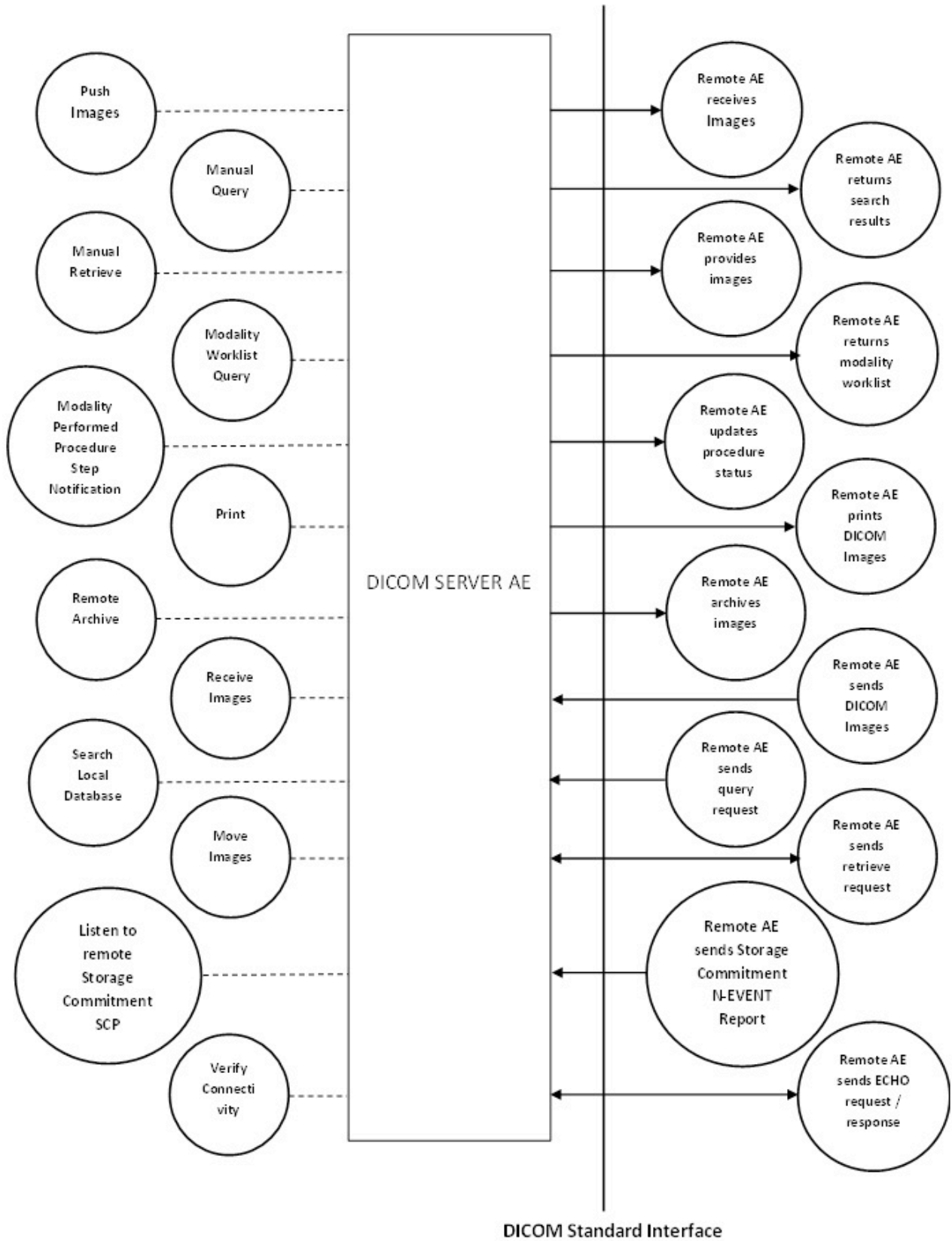


FIGURE 2-1  
MR NETWORK APPLICATION MODEL AND DATA FLOW DIAGRAM

Note: The DICOM SERVER AE accepts also the DICOM Verification SOP class as a SCP. It is not indicated on the illustration above.

The DICOM SERVER Application Entity (AE) is an application that handles DICOM protocol communication. The DICOM SERVER AE is automatically brought up when the MR is initialized.

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

- **Push Images**

For this operation, the operator selects some studies, series or images on the browser and then sends the selected studies, series or images to one or several remote DICOM AE by clicking on the icon that represents the wanted remote DICOM AE.

The transfer activity is displayed on a specific icon.

The declaration of remote DICOM AE is done through a configuration tool.

- **Manual Query**

For this operation, the operator queries one or a set of remote DICOM databases to obtain a list of data at Study/Series/Image level by clicking on the icon that represents the wanted remote DICOM AE.

- **Manual Retrieve**

Once the remote browser has displayed (Manual Query) query results, the operator can retrieve the study/series/images from the remote DICOM AE.

- **Receive images**

When remote DICOM hosts sends DICOM images to DICOM SERVER AE , images are installed in the local database, the browser displays the content of the local database.

- **Search Local Database**

For this operation, a remote DICOM AE asks to obtain the list of data at Study/Series/Image level.

- **Move Images**

For this operation, a remote DICOM AE asks to send data at Study/Series/Image level from the local AE to another DICOM Remote AE. The Remote DICOM AE shall be declared locally on the system. The declaration of remote DICOM AE is done through a configuration tool.

- **Remote Archive**

For this operation, the operator selects some studies, series or images on the browser and clicks on the icon that represents the wanted remote DICOM AE. This initiates the DICOM push of the selected exam/series/images to the remote AE. After the successful storage of the selected exam/series/images on the remote AE, a storage commitment request is sent to the remote DICOM AE. The transfer/storage commit activity is displayed on a specific icon.

The declaration of remote DICOM AE with archiving support is done through the configuration tool on browser.

- **Listen to remote Storage Commitment SCP**

The DICOM SERVER AE is indefinitely listening for association requests. No operator action is required to receive a Storage Commitment notification (N-EVENT-REPORT).

- **Verify Connectivity**

The operator can choose to verify a remote Application Entity. Upon user's request, DICOM SERVER AE sends out a verification request to a Remote AE.

The DICOM SERVER AE also acts as an SCP for incoming Verification requests. No operator action is required to process Verification requests from Remote AEs.

- **Modality Worklist Query**

The user or the system initiates a modality worklist query to the modality worklist SCP with a given set of query parameters. The modality worklist SCP returns responses matching the query parameters. Worklist items from the returned worklist query responses are presented to the user. The user then chooses the desired worklist item and begins the image acquisition process.

- **Modality Performed Procedure Step Notification**

When the user begins the image acquisition process and generates the first image, the DICOM SERVER AE sends a N-CREATE message to the configured MPPS SCP to indicate that the image acquisition process has been started for the requested procedure.

The user can close the acquisition session either by completing the acquisition process or discontinuing the ongoing scan. On closing the acquisition session, the DICOM SERVER AE sends N-SET message to the configured MPPS SCP to indicate the acquisition state of the requested procedure, with appropriate MPPS status (COMPLETED/DISCONTINUED).

- **Print**

The Film Composer allows the user to select printers and it also allows the user to drag and drop the images (from viewer application) into the film. When user presses the "Print" Button, the DICOM SERVER AE tries to establish the association with requested printer and sends the images for printing.

### 2.2.2 Functional Definition of AE's

DICOM SERVER AE can receive and initiate DICOM association requests. It runs as a UNIX process and is automatically started as part of MR application startup.

Once started, the DICOM SERVER AE will wait for other DICOM applications to connect to its DICOM services.

Client applications on MR also have the ability to initiate DICOM associations to remote DICOM devices for Verification, Storage, Storage Commitment, Print, Query/Retrieve, Modality Worklist Query and MPPS services through DICOM SERVER AE.

### 2.2.3 Sequencing of Real-World Activities

#### 2.2.3.1 Manual Query

Real-World Activity *Manual Query* must be performed before *Manual Retrieve* activity can be performed.

### 2.3 AE SPECIFICATIONS

#### 2.3.1 DICOM SERVER AE Specification

DICOM SERVER Application Entity provides Standard or Standard Extended Conformance to the following DICOM SOP Classes as an **SCU** and/or as an **SCP**:

TABLE 2.3-1 SUPPORTED SOP CLASSES

| SOP Class Name                                     | SOP Class UID                 | SCU | SCP |
|--|-------------------------------|-----|-----|
| Verification SOP Class                             | 1.2.840.10008.1.1             | Yes | Yes |
| CT Image Storage                                   | 1.2.840.10008.5.1.4.1.1.2     | Yes | Yes |
| MR Image Storage                                   | 1.2.840.10008.5.1.4.1.1.4     | Yes | Yes |
| Secondary Capture Image Storage                    | 1.2.840.10008.5.1.4.1.1.7     | Yes | Yes |
| Grayscale Softcopy Presentation State Storage *    | 1.2.840.10008.5.1.4.1.1.11.1  | Yes | No  |
| Enhanced SR  | 1.2.840.10008.5.1.4.1.1.88.22 | Yes | Yes |
| Positron Emission Tomography Image Storage         | 1.2.840.10008.5.1.4.1.1.128   | Yes | Yes |
| RT Structure Set Storage                           | 1.2.840.10008.5.1.4.1.1.481.3 | Yes | Yes |
| GE Private PET Raw Data                            | 1.2.840.113619.4.30           | Yes | Yes |
| Study Root Query/Retrieve Information Model - FIND | 1.2.840.10008.5.1.4.1.2.2.1   | Yes | Yes |
| Study Root Query/Retrieve Information Model - MOVE | 1.2.840.10008.5.1.4.1.2.1.2   | Yes | Yes |
| Storage Commitment Push Model SOP Class            | 1.2.840.10008.1.20.1          | Yes | No  |
| Basic Grayscale Print Management Meta SOP Class    | 1.2.840.10008.5.1.1.9         | Yes | No  |
| Encapsulated PDF                                   | 1.2.840.10008.5.1.4.1.1.104.1 | Yes | No  |

**Note:** \* The MR can receive Grayscale Softcopy Presentation State objects from other systems, but the display applications do not support Mask, Bitmap Display Shutter, Overlay Plane and Overlay/Curve Activation.

#### 2.3.1.1 Association Establishment Policies

##### 2.3.1.1.1 General

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

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

The maximum length PDU receive size for the DICOM SERVER AE is:

|                    |                     |
|--------------------|---------------------|
| Maximum Length PDU | 64KB (Configurable) |
|--------------------|---------------------|

#### 2.3.1.1.2 Number of Associations

The DICOM SERVER AE will initiate a maximum of one simultaneous associations to remote nodes.

The DICOM SERVER AE will support a maximum of 10 simultaneous associations initiated by remote nodes and it is configurable.

#### 2.3.1.1.3 Asynchronous Nature

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

#### 2.3.1.1.4 Implementation Identifying Information

The Implementation UID for this DICOM Implementation is:

|                             |                      |
|-----------------------------|----------------------|
| Implementation UID          | 1.2.840.113619.6.388 |
| Implementation Version Name | SV25 (Configurable)  |

#### 2.3.1.2 Association Initiation Policy

When the DICOM SERVER Application Entity initiates an Association for any Real-World Activity, it will propose the Presentation Contexts for all Real-World Activities; i.e., there is only a single, comprehensive Presentation Context Negotiation proposed for the AE.

The DICOM SERVER AE proposes all supported Transfer Syntaxes in a single Presentation Context for a given Abstract Syntax. i.e., for each Abstract Syntax in the following Presentation Context Tables, the AE proposes one Presentation Context with all Transfer Syntaxes supported for that Abstract Syntax.

#### 2.3.1.2.1 Real-World Activity: Push Images

##### 2.3.1.2.1.1 Associated Real-World Activity

The operator first selects the exam/series/image on the local database browser and clicks on the Remote DICOM AE to which the operator desires to send the exam/series/image to.

If multiple exams/series are chosen to be pushed, one association will be established for each of the exam/series. A single association will be used for multiple C-STORE operations necessary for the images in a individual series.

##### 2.3.1.2.1.2 Proposed Presentation Context Table

The following table shows the proposed presentation contexts for the DICOM SERVER AE after Real-World Activity "Push Images" operation has been performed.

TABLE 2.3.1.2.1.2-1 PRESENTATION CONTEXT– PROPOSED BY DICOM SERVER AE FOR ACTIVITY *PUSH IMAGES*

| Abstract Syntax                               |                               | Transfer Syntax  |   | Role | Extended Negotiation |
|---|-------------------------------|--|---|------|----------------------|
| Name  | UID                           | Name List  | UID List  |      |                      |
| CT Image Storage                              | 1.2.840.10008.5.1.4.1.1.2     | Implicit VR Little Endian<br>Explicit VR Little Endian<br>Explicit VR Big Endian | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| MR Image Storage                              | 1.2.840.10008.5.1.4.1.1.4     | Implicit VR Little Endian<br>Explicit VR Little Endian<br>Explicit VR Big Endian | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| Secondary Capture Image Storage               | 1.2.840.10008.5.1.4.1.1.7     | Implicit VR Little Endian<br>Explicit VR Little Endian<br>Explicit VR Big Endian | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| Grayscale Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.1  | Implicit VR Little Endian<br>Explicit VR Little Endian<br>Explicit VR Big Endian | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| Enhanced SR                                   | 1.2.840.10008.5.1.4.1.1.88.22 | Implicit VR Little Endian<br>Explicit VR Little Endian<br>Explicit VR Big Endian | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| Positron Emission Tomography Image Storage    | 1.2.840.10008.5.1.4.1.1.128   | Implicit VR Little Endian<br>Explicit VR Little Endian<br>Explicit VR Big Endian | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| RT Structure Set Storage                      | 1.2.840.10008.5.1.4.1.1.481.3 | Implicit VR Little Endian<br>Explicit VR Little Endian<br>Explicit VR Big Endian | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| GE Private PET Raw Data                       | 1.2.840.113619.4.30           | Implicit VR Little Endian<br>Explicit VR Little Endian<br>Explicit VR Big Endian | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| Encapsulated PDF                              | 1.2.840.10008.5.1.4.1.1.104.1 | Explicit VR Little Endian<br>Explicit VR Big Endian                              | 1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2                      | SCU  | None                 |

2.3.1.2.1.2.1 SOP Specific DICOM Conformance Statement for All Storage SOP Classes

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

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

Upon receiving a C-STORE confirmation containing a Refused status, this implementation will consider the current request to be a failure and will terminate the association.

For all C-STORE statuses other than success or warnings received, this implementation will consider the current request to be a failure and will terminate the association, except if the C-STORE is invoked from a C-MOVE SCP. In this case it will continue to attempt to send the remaining images in the request on the same association. The error details will be logged in the log files.

Each C-STORE operation supports an "Association Timer". This timer starts when the association request is sent and stops when the association is established. Default time-out is 60 seconds and is configurable.

Each C-STORE operation supports an "Operation Inactivity Timer". This timer starts when a C-STORE request is emitted and is reset each time a C-STORE response has been received, or when subsequent C-STORE are received. Default time-out is 300 seconds and is configurable.

If any of the two timers mentioned above expires, the connection is aborted and the operation is considered as failed.

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

**TABLE 2.3.1.2.1.2-2 STATUS CODES RECEIVED BY DICOM SERVER AE FOR ACTIVITY PUSH IMAGES**

| Service Status | Status Code | Further Meaning                          | Application Behavior When Receiving Status Code   |
|----------------|-------------|--|---|
| Failure        | A700-A7FF   | Refused: Out of resources                | Operation considered as failed. Error displayed in the Network status and browser job manager queue. Log-files updated. |
|                | A900-A9FF   | Error: Data Set does not match SOP Class | Operation considered as failed. Error displayed in the Network status and browser job manager queue. Log-files updated. |
|                | C000-CFFF   | Error: Cannot Understand                 | Operation considered as failed. Error displayed in the Network status and browser job manager queue. Log-files updated. |
|                | 0110        | Error: Processing Failure                | Operation considered as failed. Error displayed in the Network status and browser job manager queue. Log-files updated. |
| Warning        | B000        | Coercion of Data Elements                | Operation considered as successful. Warning is logged in the log files.   |
|                | B006        | Elements Discarded                       | Operation considered as successful. Warning is logged in the log files.   |
|                | B007        | Data Set does not match SOP Class        | Operation considered as successful. Warning is logged in the log files.   |
| Success        | 0000        |  | Success status displayed in the Network status and browser job manager queue. Log files updated.                        |
| *              | *           | Any other status code.                   | Operation considered as failed. Error displayed in the Network status and browser job manager queue. Log-files updated. |

### 2.3.1.2.1.2.2 SOP Specific DICOM Conformance Statement for the Grayscale Softcopy Presentation State Storage SOP Class

Following sequence of activities are performed to create GSPS objects:

- User selects the Series/Images from the browser and launches the Viewer
- User performs 2D operations like windowing, zoom etc on the images displayed in the viewports
- User adds text annotations and graphic objects to mark region of interest as required
- User selects the save presentation state panel by clicking on Film/Save tab. The default option in the panel is set to create GSPS objects for all images of the loaded series in the viewport. User can also choose the range option to limit the number of images to be captured in the GSPS object
- User then specifies the Presentation Label. If not specified, "Presentation Series" is used by default for the generated GSPS object
- User clicks on Save State button to create the GSPS object

User can choose any graphic objects provided as user controls in the Viewer control panel to apply them on the viewport. Viewer provides controls for circle, ellipse, rectangle, polygon, free hand draw, point graphic object and text annotations.

See Section 2.3.1.2.1.2.1 "SOP Specific DICOM Conformance Statement for All Storage SOP Classes" for details on general Storage Service SCU processing also applicable to the Grayscale Softcopy Presentation State Storage SOP Class.

The DICOM SERVER AE supports creation of Grayscale Softcopy Presentation State Storage SOP Instances for the following Image Storage SOP Classes:

| SOP Class Name   | SOP Class UID             |
|------------------|---------------------------|
| CT Image Storage | 1.2.840.10008.5.1.4.1.1.2 |
| MR Image Storage | 1.2.840.10008.5.1.4.1.1.4 |

### 2.3.1.2.2 Real-World Activity: Manual Query

#### 2.3.1.2.2.1 Associated Real-World Activity

The operator queries a Remote database by clicking on the corresponding icon on the MR browser source dropdown.

If the "Custom search" parameter on the remote host is set to "Off", the "Query" operation will cause the DICOM SERVER AE to initiate an association and send a non-filtered request (with zero length Patient name, Patient id, Study date, Accession number, and Study id) to the selected Remote AE.



If the "Custom search" parameter on the remote host is set to "On", the "Query" operation will cause a "Filter Data" menu to appear. The operator can enter values for Patient name, Patient Id, Study Id, Accession number, and Study date. Not entering a value will result in universal match for that field. For Study date, the operator selects a date matching type from the "Exam date" pull down menu, where the choices are Equals, Between, Before or After. Once a date matching type is selected, the correct number of fields appear and the operator enters dates into those fields. Once the desired parameters are entered the operator chooses "Ok".

The "Query" operation will cause the DICOM SERVER AE to initiate an association to the selected Remote AE.

MR Browser will be populated with the query results upon successful query. The operator can invoke the "Retrieve" operation from the displayed results by clicking on the icon representing the local database of MR Browser.

**2.3.1.2.2.2 Proposed Presentation Context Table**

When the remote DICOM AE is declared as a Query/Retrieve SCP and the invoked operation is "Query", the presentation context shown in following table is proposed

**TABLE 2.3.1.2.2.2-1 PRESENTATION CONTEXT– PROPOSED BY DICOM SERVER AE FOR ACTIVITY *MANUAL QUERY***

| Abstract Syntax                                    |                             | Transfer Syntax           |                     | Role | Extended Negotiation |
|--|-----------------------------|---------------------------|---------------------|------|----------------------|
| Name   | UID                         | Name List                 | UID List            |      |                      |
| Study Root Query/Retrieve Information Model – FIND | 1.2.840.10008.5.1.4.1.2.2.1 | Implicit VR Little Endian | 1.2.840.10008.1.2   | SCU  | None                 |
|  |                             | Explicit VR Little Endian | 1.2.840.10008.1.2.1 |      |                      |
|  |                             | Explicit VR Big Endian    | 1.2.840.10008.1.2.2 |      |                      |
| Study Root Query/Retrieve Information Model – MOVE | 1.2.840.10008.5.1.4.1.2.2.2 | Implicit VR Little Endian | 1.2.840.10008.1.2   | SCU  | None                 |
|  |                             | Explicit VR Little Endian | 1.2.840.10008.1.2.1 |      |                      |
|  |                             | Explicit VR Big Endian    | 1.2.840.10008.1.2.2 |      |                      |

NOTE: When the Real-World activity "Manual Query" is initiated, all presentation contexts specified in the above table are proposed during association establishment, but only the Query/Retrieve-FIND related context is applicable to this activity.

**2.3.1.2.2.2.1 SOP Specific DICOM Conformance Statement for the Study Root Query/Retrieve Information Model - FIND SOP Classes**

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

The Study level query will request for studies in the remote database that match the user specified Patient name, Patient ID, Study date, Accession number, and Study ID. Zero length data in any of the field means match on any value. Zero length data is the default value if the user does not specify a value.

In addition to Universal Matching, several filter types can be applied for the query. Here is the list of the supported filter types:

| Filter type | Filter description |
|-------------|--------------------|
|-------------|--------------------|

|                       |   |
|-----------------------|---|
| Single Value Matching | This is to obtain an exact match on the value contained in a Key Attribute  |
| List of UID Matching  | This is to obtain a match on any of the UID items present in a list of UIDs in a Key Attribute.   |
| Wild Card Matching    | This is to obtain a match on any sequence of characters contained in a Key Attribute.<br>"*" or "?" characters present in the Key Attribute, where "*" shall match any sequence of characters and "?" matches against a single character.   |
| Range Matching        | This is to obtain a match on values of date and time contained in the Key Attributes<br>"<date1> - <date2>" to match against all values that fall in this date range<br>"<date>" to match against all values that are before this date<br>"<date> -" to match against all values that are after this date |

User can specify patient name search criteria to be an exact match or a wild card match. Wild card searches are specified using asterisk (\*). Below samples demonstrate some of the search patterns.

- " – represents all patient names
- "\*" – represents all patient names
- "\*m" – represents all patient names ending with character 'm'
- "m\*" – represents all patient names beginning with character 'm'
- "\*m\*" – represents all patient names containing character 'm'
- "m" – represents all patients whose name is 'm' exactly

The user can combine the above described patterns to form desired filter conditions.

The Study date search criteria is specified using below formats :

- "" represents any date,
- "yyyymmdd-" represents any date on or after that year/month/day,
- "-yyyymmdd" represents any date on or before that year/month/day,
- "yyyymmdd-yyyymmdd" represents any date on or between those dates,
- "yyyymmdd" represents the exact date.

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

Each C-FIND SCU operation supports an "Association Timer" and "Operation Inactivity Timer" using QueryAssociationTimeout and QueryResponseTimeout configuration parameters. Default values are 30 seconds, 5 minutes respectively.

The user can cancel the current C-FIND request by initiating Query activity to another network node or clicking on the local database. If a query operation is in progress, the

DICOM SERVER AE will issue a C-FIND-CANCEL message to the remote AE to discontinue the ongoing C-FIND operation.

If a "Failure" status is returned from the Remote AE, the association is closed and the operation terminated.

Tables 2.3.1.2.2.2.1-1 - 2.3.1.2.2.2.1-3 show the various fields that are requested at the Study, Series, and Image levels of the C-FIND request.

Note: In the following Tables the *Type* field has the following meaning:

- R - Required
- U - Unique
- O - Optional

**TABLE 2.3.1.2.2.2.1-1 REQUESTED STUDY LEVEL KEYS**

| Description                       | Tag       | Type | Value  |
|-----------------------------------|-----------|------|--|
| Study Date                        | 0008,0020 | R    | Study dates (supported filter: single value matching, range matching)  |
| Study Time                        | 0008,0030 | R    | Zero length  |
| Accession Number                  | 0008,0050 | R    | Accession Number (supported filter: single value matching, wild card matching)   |
| Patient's Name                    | 0010,0010 | R    | Patient Name (Supported filter: single value matching, wild card matching). If the user needs to do a query onto a criterion (last name, first name), s/he will have to put a caret between the last and the first name. |
| Patient ID                        | 0010,0020 | R    | Patient ID (supported filter: single value matching, wild card matching)   |
| Study ID                          | 0020,0010 | R    | Study ID (supported filter: single value matching, wild card matching)   |
| Study Instance UID                | 0020,000D | U    | Zero length for Study level query. Study Instance UID of study for which matches are requested at a lower level  |
| Modalities in Study               | 0008,0061 | O    | Zero length  |
| Station Name                      | 0008,1010 | O    | Zero length  |
| Study Description                 | 0008,1030 | O    | Zero length  |
| Patient's Birth Date              | 0010,0030 | O    | Zero length  |
| Patient's Sex                     | 0010,0040 | O    | Zero length  |
| Patient's Birth Time              | 0010,0032 | O    | Zero length  |
| Number of Study Related Instances | 0020,1208 | O    | Zero length  |

Following table shows the various fields that are requested at the Series level of the C-FIND request:

**TABLE 2.3.1.2.2.2.1-2 REQUESTED SERIES LEVEL KEYS**

| Description   | Tag       | Type | Value       |
|---------------|-----------|------|-------------|
| Series Number | 0008,0011 | R    | Zero length |
| Modality      | 0008,0060 | R    | Zero length |

| Description                        | Tag       | Type | Value  |
|------------------------------------|-----------|------|--|
| Series Instance UID                | 0020,000E | U    | Zero length for Series level query. Series instance UID of series for which matches are requested at a lower level |
| Series Description                 | 0008,103E | O    | Zero length  |
| Series Date                        | 0008,0021 | O    | Zero Length  |
| Series Time                        | 0008,0031 | O    | Zero length  |
| Series Type                        | 0054,1000 | O    | Zero length  |
| Manufacturer                       | 0008,0070 | O    | Zero length  |
| Number Of Series Related Instances | 0020,1209 | O    | Zero length  |
| Image type (for legacy systems)    | 0008,0008 | O    | Zero length  |

Following table shows the various fields that are requested at the Image level of the C-FIND request. The list of requested fields depends on the value returned for the Modality (0008,0060) in the C-FIND-RSP response at series level given by the remote AE.

**TABLE 2.3.1.2.2.1-3 REQUESTED IMAGE LEVEL KEYS**

| Description                 | Tag       | Type | Value       | Modality |
|-----------------------------|-----------|------|-------------|----------|
| Instance Number             | 0020,0013 | R    | Zero length | All      |
| SOP Instance UID            | 0008,0018 | U    | Zero length | All      |
| SOP Class UID               | 0008,0016 | O    | Zero length | All      |
| Image Type                  | 0008,0008 | O    | Zero length | All      |
| Acquisition Time            | 0008,0032 | O    | Zero length | All      |
| Modality                    | 0008,0060 | O    | Zero length | All      |
| Contrast / Bolus Agent      | 0018,0010 | O    | Zero length | All      |
| Slice Thickness             | 0018,0050 | O    | Zero length | All      |
| Repetition Time             | 0018,0080 | O    | Zero length | All      |
| Echo Time                   | 0018,0081 | O    | Zero length | All      |
| Inversion Time              | 0018,0082 | O    | Zero length | All      |
| Number Of Averages          | 0018,0083 | O    | Zero length | All      |
| Echo Number                 | 0018,0086 | O    | Zero length | All      |
| Spacing Between Slices      | 0018,0088 | O    | Zero length | All      |
| Data Collection Diameter    | 0018,0090 | O    | Zero length | All      |
| Trigger Time                | 0018,1060 | O    | Zero length | All      |
| Reconstruction Diameter     | 0018,1100 | O    | Zero length | All      |
| Gantry / Detector Tilt      | 0018,1120 | O    | Zero length | All      |
| Convolution Kernel          | 0018,1210 | O    | Zero length | All      |
| Flip Angle                  | 0018,1314 | O    | Zero length | All      |
| Image Position (Patient)    | 0020,0032 | O    | Zero length | All      |
| Image Orientation (Patient) | 0020,0037 | O    | Zero length | All      |
| Slice Location              | 0020,1041 | O    | Zero length | All      |
| Rows                        | 0028,0010 | O    | Zero length | All      |
| Columns                     | 0028,0011 | O    | Zero length | All      |
| Pixel Spacing               | 0028,0030 | O    | Zero length | All      |
| Units                       | 0054,1001 | O    | Zero length | All      |
| Reconstruction Method       | 0054,1103 | O    | Zero length | All      |
| Image ID                    | 0054,0400 | O    | Zero length | All      |

During the C-FIND, the following pending status values are supported:

- 0xFF00: Study/Series/Image items contained in identifier is collected for later display or further processing and wait for the next response from the remote host.
- 0xFF01: Study/Series/Image items contained in identifier is collected for later display or further processing and wait for the next response from the remote host.

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

**TABLE 2.3.1.2.2.1-4 STATUS CODES RECEIVED BY DICOM SERVER AE FOR ACTIVITY *MANUAL QUERY***

| Service Status | Status Code | Further Meaning  | Application Behavior When Receiving Status Code  |
|----------------|-------------|--|--|
| Failure        | A700        | Refused: Out of resources  | Browser displays appropriate error to user   |
|                | A900        | Error: Identifier does not match SOP Class   | Browser displays appropriate error to user   |
|                | C000-CFFF   | Error: Unable to process   | Browser displays appropriate error to user   |
| Cancel         | FE00        | Matching terminated due to cancel  | 1. Considered as invalid status and the operation is terminated if the query CANCEL was not requested.<br>2. If the query CANCEL was requested by the SCU, then system gracefully exits the C-FIND request processing. |
| Success        | 0000        | Matching is complete - No final identifier is supplied   | Processed and gracefully exits the C-FIND request processing   |
| Pending        | FF00        | Matches are continuing - Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys. | Processed and the data is displayed in the Browser   |
|                | FF01        | Matches are continuing - Warning that one or more Optional Keys were not supported for existence for this Identifier         | Processed and the data is displayed in the Browser   |
| *              | *           | Any other status code.   | Operation terminated and the association is closed. Browser displays appropriate error to user   |

**2.3.1.2.3 Real-World Activity: Manual Retrieve**

**2.3.1.2.3.1 Associated Real-World Activity**

The operator has to perform the Real-World activity "Query" to get a list of Studies, Series and Images. Once the list of Studies, Series or Images is retrieved, the operator can invoke the "Retrieve" operation from the displayed results (select exam/series/images from the results and click on local database button on the Browser).

### 2.3.1.2.3.2 Proposed Presentation Context Table

When the remote DICOM AE is declared as a Query/Retrieve SCP and the invoked operation is "retrieve", the presentation context shown in following table is proposed.

**TABLE 2.3.1.2.3.2-1 PRESENTATION CONTEXT– PROPOSED BY DICOM SERVER AE FOR ACTIVITY *MANUAL RETRIEVE***

| Abstract Syntax                                    |                             | Transfer Syntax  |   | Role | Extended Negotiation |
|--|-----------------------------|--|---|------|----------------------|
| Name   | UID                         | Name List  | UID List  |      |                      |
| Study Root Query/Retrieve Information Model – MOVE | 1.2.840.10008.5.1.4.1.2.2.2 | Implicit VR Little Endian<br>Explicit VR Little Endian<br>Explicit VR Big Endian | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| Study Root Query/Retrieve Information Model – FIND | 1.2.840.10008.5.1.4.1.2.2.1 | Implicit VR Little Endian<br>Explicit VR Little Endian<br>Explicit VR Big Endian | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |

NOTE: When a Real-World activity "Manual Retrieve" is initiated, all presentation contexts specified in the above table are proposed during association establishment, but only the Query/Retrieve-MOVE related context is applicable to this activity.

#### 2.3.1.2.3.2.1 SOP Specific DICOM Conformance Statement for the Study Root Query/Retrieve Information Model - MOVE SOP Classes

When the operator initiates a *Move* operation at any level (Study, Series, Image) the DICOM SERVER AE will initiate a C-MOVE-RQ request to the Remote AE with the DICOM SERVER AE as the Destination AE. The Storage SCP (refer [section 2.3.1.3.1 - "Receive Images"](#)) will handle the incoming images.

Each C-MOVE SCU supports an "Association Timer" and an "Operation Inactivity Timer". These timers are defaulted to 60 and 300 seconds respectively. These timers are configurable.

The C-MOVE SCU supports only the Baseline behavior and does not negotiate for Extended behavior during association. During the move operations, Unique Key values for all levels above the Query/Retrieve Level specified will be supplied in the C-MOVE request.

The DICOM SERVER AE does not send a C-MOVE request with List of UIDs. If the user chooses multiple exams from the remote browser for retrieval, then individual retrieve-jobs for each exam selected will be created. Each retrieve-job will create separate association and send one C-MOVE request with single exam UID to retrieve the exam. The system works the same way when the user tries to retrieve multiple series.

However, if the user tries to retrieve multiple images within a series, then a single retrieve-job is created. Image level retrieve-job will create single association and sends multiple C-MOVE requests; one C-MOVE request per image within the same association.

If the C-MOVE SCU receives a status different from success (0x0000) or pending (0xFF00) during the association, the DICOM SERVER AE will release the association. This information will be logged in the system log files and the network/job manager queue will be updated accordingly.

During *Manual Retrieve*, the DICOM SERVER AE is able to generate a C-MOVE-CANCEL.

When a Cancel response (oxFE00) is received, the DICOM SERVER AE will release the association. This information will be logged in the system log files and the network queue will be updated accordingly.

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

**TABLE 2.3.1.2.3.2-2 STATUS CODES RECEIVED BY DICOM SERVER AE FOR ACTIVITY *MANUAL RETRIEVE***

| Service Status | Status Code | Further Meaning   | Application Behavior When Receiving Status Code  |
|----------------|-------------|---|--|
| Failure        | A701        | Refused: Out of resources - Unable to calculate number of matches | System will display the failure message in job manager user interface and retry the operation after configured time is elapsed.  |
|                | A702        | Refused: Out of resources - Unable to perform sub-operations      | System will display the failure message and retry the operation after configured time is elapsed.  |
|                | A801        | Refused: Move Destination Unknown                                 | System will display the failure message in job manager user interface.   |
|                | A900        | Error: Identifier does not match SOP Class                        | System will display the failure message in job manager user interface.   |
|                | C000-CFFF   | Error: Unable to process  | System will display the failure message in job manager user interface.   |
| Cancel         | FE00        | Sub-operations terminated due to a Cancel indication              | 1. Considered as invalid status and the operation is terminated if the Move CANCEL was not requested.<br>2. If the Move CANCEL was requested by the SCU, then system gracefully exits the C-MOVE request processing. |
| Warning        | B000        | Sub-operations Complete - One or more Failures.                   | System will display the failure message in the job manager user interface  |
| Success        | 0000        | Sub-operations Complete - No Failure.                             | Processed and gracefully exits C-MOVE request processing   |
| Pending        | FF00        | Sub-operations are continuing -                                   | System processes the information and displays the progress in the job manager UI   |
| *              | *           | Any other status code.  | C-MOVE operation is considered as failure. System will display the failure message in the job manager user interface and log the information in the log files.   |

**2.3.1.2.4 Real-World Activity: Remote Archive**

**2.3.1.2.4.1 Associated Real-World Activity**

The operator can associate a DICOM Storage Commitment Provider AE to a Remote AE. The user can choose to configure Storage Commitment AEs in the below two modes :

1. Same Remote AE for Image Storage and Storage Commitment requests:  
In this case both images and the Storage Commitment requests are sent to the same Remote AE.

2. Separate Remote AEs for Image Storage and Storage Commitment requests:

In this case, images will be sent to Image Storage SCP AE and the Storage Commitment requests will be sent separately to Storage Commitment SCP AE after the image storage operation is complete.

The user selects one or more exams or series from the browser that are to be archived. The user then clicks on the transfer destination button representing the REMOTE AE. Image level archival (by selecting individual images in a series) is not supported.

This operation will cause the following actions:

1. The system retrieves the appropriate DICOM images from its database for pushing.
2. The DICOM SERVER AE initiates a DICOM association, negotiates with the Remote AE an appropriate Abstract and Transfer Syntax.
3. If the negotiation is successful, the DICOM SERVER AE emits C-STORE command to send the images to the Remote AE.
4. When all the images have been successfully sent, the DICOM SERVER AE emits a N-ACTION request (immediately after the C-STORE request) to ask for a commitment on images previously sent. Only one N-ACTION request is sent for all images to be committed. N-ACTION is on different association than the C-STORE request.

**Note:** The table in section [2.3.1.2.1.2 \(Proposed Presentation Context\)](#) has the full list of SOP Classes that can be Storage Committed.

#### 2.3.1.2.4.2 Proposed Presentation Context

TABLE 2.3.1.2.4.2-1 PRESENTATION CONTEXT—PROPOSED BY DICOM SERVER AE FOR ACTIVITY REMOTE ARCHIVE

| 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                 |
|                               |                      | Explicit VR Little Endian | 1.2.840.10008.1.2.1 |      |                      |
|                               |                      | Explicit VR Big Endian    | 1.2.840.10008.1.2.2 |      |                      |

#### 2.3.1.2.4.2.1 SOP Specific DICOM Conformance Statement for the Storage Commitment Push Model SOP Class SCU (N-ACTION)

The DICOM SERVER AE may request Storage Commitment for Instances of any of the Composite SOP Classes it supports as an SCU (see [Section 2.3.1.2.1.2](#) ).

The DICOM SERVER AE uses DICOM network storage services to transfer SOP Instances which are to be committed. If there are any failures in the image transfers, the Storage commitment request will not be sent. The corresponding job will be marked as failed and user will be notified of the status of job.



If all the images are successfully transferred, then the commitment (N\_ACTION) request will be sent on a different association with the list of SOP instances.

If the N\_ACTION request fails, the job will be marked as failed; otherwise following sequence of actions will take place:

The SCU waits for N\_ACTION response from the provider on the same association for a configurable amount of time. Default time-out is 600 seconds. If it does not receive N\_ACTION response during this time it closes the association and marks the job as failed.

If the received N-ACTION Response from the Storage Commitment Provider has a success status, the DICOM SERVER AE waits 10 seconds for an N-EVENT-REPORT on the same association. This time-out is not configurable. If the N-EVENT-REPORT request is not received in this time, it closes the association and changes the Job state to "Waiting" indicating the job is waiting for the response from commitment provider.

The DICOM SERVER AE can receive a N-EVENT-REPORT from the Storage Commitment Provider at any time (See [section 2.3.1.3.4 - Real-World Activity: Listen to remote Storage Commitment SCP](#)).

A new Transaction UID will be created for each retry by the user. The old Transaction UID is not applicable for these requests.

Following are the status codes that are more specifically processed when receiving N-Action responses from a **Storage Commitment** SCP equipment:

**TABLE 2.3.1.2.4.2-2 STATUS CODES RECEIVED BY DICOM SERVER AE FOR ACTIVITY REMOTE ARCHIVE**

| Service Status | Status Code | Further Meaning         | Application Behavior When Receiving Status Code   |
|----------------|-------------|-------------------------|---|
| Failure        | 0119        | Class-instance conflict | System displays the appropriate error message in job manager user interface   |
|                | 0115        | Invalid argument value  | System displays the appropriate error message in job manager user interface   |
|                | 0117        | Invalid SOP Instance    | System displays the appropriate error message in job manager user interface   |
|                | 0212        | Mistyped argument       | System displays the appropriate error message in job manager user interface   |
|                | 0114        | No such argument        | System displays the appropriate error message in job manager user interface   |
|                | 0118        | No such SOP Class       | System displays the appropriate error message in job manager user interface   |
|                | 0110        | Processing failure      | System displays the appropriate error message in job manager user interface   |
|                | 0213        | Resource limitation     | System logs the appropriate error message and retries the operation after the configured time is elapsed.                         |
|                | 0211        | Unrecognized operation  | System displays the appropriate error message in job manager user interface   |
| Success        | 0000        |                         | The request for storage comment is considered successfully sent. System displays "waiting" message in job manager user interface. |
| *              | *           | Any other status code.  | System displays the appropriate error message in job manager user interface.  |

If a Storage Commitment N-EVENT-REPORT is received on the Association initiated by this Application Entity, it will be processed as described for Association initiated by the Storage Commitment SCP (see Section [2.3.1.3.4](#)).

### 2.3.1.2.5 Real-World Activity: Verify Connectivity

#### 2.3.1.2.5.1 Associated Real-World Activity

The operator can choose to verify a remote Application Entity. Upon user's request, DICOM SERVER AE sends out a verification request to a Remote AE.

#### 2.3.1.2.5.2 Proposed Presentation Context

TABLE 2.3.1.2.5.2-1 PRESENTATION CONTEXT—PROPOSED BY DICOM SERVER AE FOR ACTIVITY *VERIFY CONNECTIVITY*

| 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                 |
|                 |                   | Explicit VR Little Endian | 1.2.840.10008.1.2.1 |      |                      |
|                 |                   | Explicit VR Big Endian    | 1.2.840.10008.1.2.2 |      |                      |

#### 2.3.1.2.5.2.1 SOP Specific DICOM Conformance Statement for Verification SOP class

The DICOM SERVER AE provides standard conformance. In case of failure the verification is not retried.

Each C-ECHO operation supports an "Association Timer". This timer starts when the association request is sent and stops when the association is established. Default time-out is 20 seconds and is configurable. If the remote AE does not respond with the association time-out, the verification operation is considered as failed.

### 2.3.1.2.6 Real-World Activity: Modality Worklist Query

#### 2.3.1.2.6.1 Associated Real-World Activity

The operator of the system initiates a query for a modality worklist by either opening the *Schedule* screen or by opening the *Schedule* screen and pressing the Refresh button. The choice of which of these two behaviors occurs is user configurable. The DICOM SERVER AE will then initiate an association with the remote AE in order to query for the worklist. The association is closed upon receipt of the final query response from the remote AE. The association can also be closed by the DICOM SERVER AE upon receipt of error status from the remote AE or upon expiration of association timers.

A user can configure a number of parameters, which directly control the worklist query request. The user can request worklist items that are intended for the scanner the user is working at, all items that apply to the modality of the scanner the user is working at or all worklist items available. These selections and their effects on worklist query parameters are given below:

#### This System:

Modality, (0008,0060) - set to MR

Scheduled Station AE Title, (0040,0001) - set to Station name AE title

**This Modality:**

Modality, (0008,0060) - set to MR  
Scheduled Station AE Title, (0040,0001) - zero-length (universal matching)

**All Modalities:**

Modality, (0008,0060) – set to "\*" (universal matching)  
Scheduled Station AE Title, (0040,0001) - zero-length (universal matching)

Note that the "All Modalities" query above can return worklist items for all modalities, if such items exist. The system will warn the operator and disallow selection if a dissimilar modality is selected from the worklist.

The scheduled dates of procedures of interest can be specified for query by selecting a specific date range. The date ranges available are Today, Date Range and Any Days. These selections and their affects on worklist query parameters are given below:

**Today:**

Scheduled Procedure Step Start Date, (0040,0002) - set to YYYYMMDD, where this date is the current date.

**Date Range:**

Scheduled Procedure Step Start Date, (0040,0002) - set to YYYYMMDD-YYYYMMDD, where this date range represents the specified number of days before today and/or after today. Note that number of days both before and after can be specified in the same query and that each always includes today.

**Any Day:**

Scheduled Procedure Step Start Date, (0040,0002) - zero-length (universal matching)

Note that selecting All Scanners and All Days with no worklist specific fields specified results in an unconstrained worklist query. The response to an unconstrained worklist query can differ between different modality worklist SCP implementations. Consult the modality worklist SCP manufacturer if difficulties occur when attempting unconstrained queries.

Worklist specific fields targeted to retrieve a single or very small set of related entries may also be specified. These fields may be used for a query combined with scanner and scheduled time to provide a very specific query to the worklist server. The specific fields are specified below:

**Patient Name (0010,0010)**

Matching with leading and trailing wildcards is allowed on either Patient Last Name or Patient First Name (user selectable), zero length matches all values.

Ex: "Doe^John"^^^Ph.D= (One family name; one given name; no middle name; no prefix; one suffix; no ideographic component; no phonetic component)

**Patient ID (0010,0020)**

Zero length or single value matching only of value entered.

**Requested Procedure ID (0040,1001)**

Zero length if value not specified or single value matching of value if specified.

**Accession Number (0008,0050)**

Leading and trailing wildcard matching for value entered.

**2.3.1.2.6.2 Proposed Presentation Context**

Below table shows the proposed presentation contexts for the DICOM SERVER AE after real-world activity "Modality Worklist Query" has been initiated:

**TABLE 2.3.1.2.6.2-1 PRESENTATION CONTEXT—PROPOSED BY DICOM SERVER AE FOR ACTIVITY *MODALITY WORKLIST QUERY***

| 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<br>Explicit VR Little Endian<br>Explicit VR Big Endian | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |

**2.3.1.2.6.2.1 SOP Specific DICOM Conformance Statement for the Modality Worklist Information Model FIND SOP Class**

If the remote AE does not support the proposed Presentation Context, an appropriate error is logged and the operator is notified.

This implementation can receive multiple C-FIND results over a single association. Only one association is opened at a time.

Each C-FIND response received from the remote AE is parsed to verify the length/type of the items in the response. Upon detecting any error in the response data, the response is discarded and the next response (if any) is considered.

Each C-FIND SCU operation supports an "Association Timer" and "Operation Inactivity Timer" using QueryAssociationTimeout and QueryResponseTimeout configuration parameters. Default values are 30 seconds, 5 minutes respectively.

All errors and failures detected by the DICOM SERVER AE are logged to the service log files.

In case of ERROR, persisted worklist item(s) got from previous request to the configured SCP would be shown.

User can cancel the ongoing worklist query by clicking on the Cancel button in the UI. Upon cancel, the DICOM SERVER AE will send C-FIND-CANCEL request to the Modality Worklist SCP.

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

**TABLE 2.3.1.2.6.2-2 STATUS CODES RECEIVED BY DICOM SERVER AE FOR ACTIVITY *MODALITY WORKLIST QUERY***

| Service Status | Status Code | Further Meaning  | Application Behavior When Receiving Status Code   |
|----------------|-------------|--|---|
| Failure        | A700        | Refused: Out of resources  | Logs the error and displays all the persisted worklists   |
|                | A900        | Error: Identifier does not match SOP Class   | Logs the error and displays all the persisted worklists   |
|                | C001        | Error: Unable to process   | Logs the error and displays all the persisted worklists   |
| Cancel         | FE00        | Matching terminated due to cancel  | Closes the association  |
| Success        | 0000        | Matching is complete - No final identifier is supplied   | Displays all the worklists items obtained from the SCP  |
| Pending        | FF00        | Matches are continuing - Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys. | Continue to wait for worklists items from SCP   |
|                | FF01        | Matches are continuing - Warning that one or more Optional Keys were not supported for existence for this Identifier         | Continue to wait for worklists items from SCP   |
| *              | *           | Any other status code.   | Worklist query operation is considered as failure and the error message is displayed to the user. Persisted worklist item(s) got from previous request to the SCP will be shown |

### 2.3.1.2.6.2.2 Record Acceptance Policy

The DICOM SERVER AE has a lenient policy regarding the rejection of the MWL. In case any parameters retrieved from the MWL is invalid, the system will require\allow the user to enter the value through the UI.

### 2.3.1.2.7 Real-World Activity: Modality Performed Procedure Step Notification

The DICOM SERVER AE initiates association to the remote MPPS SCP AE for the following functions during real world activity *Modality Performed Procedure Step Notification*:

- *Start PPS*: Initiates a DICOM association in order to create a DICOM Modality Performed Procedure Step SOP instance in the remote AE. If the remote AE accepts a presentation context applicable to Modality performed Procedure Step, the SCU will issue a request to create the SOP instance in the remote AE via the N-CREATE service.
- *Complete PPS*: Initiates a DICOM association in order to update a DICOM Modality Performed Step instance that is already created with the remote AE. If the remote AE accepts a presentation context applicable to Modality performed Procedure Step, the SCU will issue a request to update the SOP instance in the remote AE via the N-SET service. The PPS Status is set to 'COMPLETED'.
- *Discontinue PPS*: Initiates a DICOM association in order to update a DICOM Modality Performed Step instance that is already created with the remote AE. If the remote AE accepts a presentation context applicable to Modality performed Procedure Step, the SCU will issue a request to update the SOP instance in the remote AE via the N-SET service. The PPS Status is set to 'DISCONTINUED'.

#### 2.3.1.2.7.1 Associated Real-World Activity

The real-world activities are described in the following sections. Each of the real world activity results in either creating a new Performed Procedure Step SOP instance at the remote SCP or updating an already created Performed Procedure Step SOP instance as per the DICOM standard.

#### 2.3.1.2.7.1.1 Sequencing of Real-World Activities

##### 2.3.1.2.7.1.1.1 PPS from Acquisition System with MWL data

Modality Worklist information is obtained from Modality Worklist SCP through the use of Basic Worklist Management Service. Use of the retrieved worklist information in MPPS SOP instances is described later in this document.

1. The system initiates a 'Start PPS' after the first image is acquired into the database. The system retrieves necessary information related to the Scheduled Procedure Step from Modality Worklist Server. DICOM SERVER AE initiates a MPPS (Modality Performed Procedure Step) N-CREATE request to the remote AE (MPPS SCP), in-order to create a MPPS SOP instance at the remote AE.
2. The MPPS SCP returns response indicating the success/failure of the request execution. The PPS state information is updated in the system based on the response data. The DICOM association is closed.
3. Please refer to Section 5 (Modality Performed Procedure Step Implementation) for specific Scheduled Procedure Step and Performed Procedure Step information included by the system.
4. At the end of image acquisition, system initiates a 'Complete PPS' or 'Discontinue PPS' based on the choice selected by the user using the user interface provided.

5. The remote AE returns response indicating the success/failure of the request execution. The PPS state information is updated in the system based on the response data.

#### 2.3.1.2.7.1.1.2 PPS from acquisition system without MWL data

This sequence of real world activities are applicable if the system either does not have a Modality Worklist server installed or if no worklist information is available for the current procedure that is being performed. The information required for performing the procedure is supplied through the user interface of the system. The use of this information in MPPS SOP instances is described later in this document.

1. The system initiates a 'Start PPS' after the first image is acquired into the database. DICOM SERVER AE initiates a MPPS (Modality Performed Procedure Step) N-CREATE request to the remote AE (MPPS SCP), in-order to create a MPPS SOP instance at the remote AE.
2. The MPPS SCP returns response indicating the success/failure of the request execution. The PPS state information is updated in the system based on the response data. The DICOM association is closed.
3. Please refer to [Section 5 \(Modality Performed Procedure Step Implementation\)](#) for specific Scheduled Procedure Step and Performed Procedure Step information included by the system.
4. At the end of image acquisition, system initiates a 'Complete PPS' or 'Discontinue PPS' based on the choice selected by the user using the user interface provided.
5. The remote AE returns response indicating the success/failure of the request execution. The PPS state information is updated in the system based on response data.

#### 2.3.1.2.7.2 Proposed Presentation Context

TABLE 2.3.1.3.7.2-1 PRESENTATION CONTEXT– PROPOSED BY DICOM SERVER AE FOR ACTIVITY *MODALITY PERFORMED PROCEDURE STEP NOTIFICATION*

| Abstract Syntax                   |                         | Transfer Syntax  |   | Role | Extended Negotiation |
|-----------------------------------|-------------------------|--|---|------|----------------------|
| Name                              | UID                     | Name List  | UID List  |      |                      |
| Modality Performed Procedure Step | 1.2.840.10008.3.1.2.3.3 | Implicit VR Little Endian<br>Explicit VR Little Endian<br>Explicit VR Big Endian | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |

#### 2.3.1.2.7.2.1 SOP Specific DICOM Conformance Statement for the Modality Performed Procedure Step SOP Class

Only one association is opened at a time. The association is open until the response message is returned from the SCP or a network error occurs. No other configurable timers are available.

If the remote AE does not support the proposed Presentation context, an appropriate error message is logged.

Following are the status codes that are more specifically processed when receiving an N-CREATE and N-SET response from an **MPPS SCP** equipment:

**TABLE 2.3.1.2.7.2-2 STATUS CODES RECEIVED BY DICOM SERVER AE FOR ACTIVITY MODALITY PERFORMED PROCEDURE STEP NOTIFICATION**

| Service Status | Status Code      | Further Meaning   | Application Behavior When Receiving Status Code   |
|----------------|------------------|---|---|
| Success        | 0000             | Success   | System updates the state and indicates the same on the user interface   |
| Failure        | 0105             | No such attribute   | Error message is logged into system log-file and indicates the status on the user interface   |
|                | 0106             | Invalid attribute value   | Error message is logged into system log-file and indicates the status on the user interface   |
|                | 0110             | Processing failure  | Error message is logged into system log-file and indicates the status on the user interface. Retries the operation after the configured time is elapsed |
|                | 0112             | No such SOP Instance  | Error message is logged into system log-file and indicates the status on the user interface   |
|                | 0115             | Invalid argument value  | Error message is logged into system log-file and indicates the status on the user interface   |
|                | 0117             | Invalid SOP Instance  | Error message is logged into system log-file and indicates the status on the user interface   |
|                | 0118             | No such SOP Class   | Error message is logged into system log-file and indicates the status on the user interface   |
|                | 0119             | Class-instance conflict   | Error message is logged into system log-file and indicates the status on the user interface   |
|                | 0120             | Missing attribute   | Error message is logged into system log-file and indicates the status on the user interface   |
|                | 0144             | No such argument  | Error message is logged into system log-file and indicates the status on the user interface   |
|                | 0210             | Duplicate invocation  | Error message is logged into system log-file and indicates the status on the user interface   |
|                | 0211             | Unrecognized operation  | Error message is logged into system log-file and indicates the status on the user interface   |
|                | 0212             | Mistyped argument   | Error message is logged into system log-file and indicates the status on the user interface   |
|                | 0213             | Resource limitation   | Error message is logged into system log-file and indicates the status on the user interface. Retries the operation after the configured time is elapsed |
| C002           | Operation failed | Error message is logged into system log-file and indicates the status on the user interface. Retries the operation after the configured time is elapsed |   |
| *              | *                | Any other status code.  | The operation is deemed 'Failed'. Detailed message is logged into system log-file and   |



|  |  |  |  |
|--|--|--|--|
|  |  |  | indicates the status on the user interface. Retries the operation after the configured time is elapsed |
|--|--|--|--|

### 2.3.1.2.8 Real-World Activity: Print

#### 2.3.1.2.8.1 Associated Real-World Activity

The Film Composer allows the user to select printers and it also allows the user to drag and drop the images (from viewer application) into the film. It also allows the user to manipulate some print parameters like film format and number of copies to print. When user presses the "Print" Button, the Film Composer communicates this request to DICOM SERVER AE, which then tries to establish the association with requested printer and sends the images for printing.

##### 2.3.1.2.8.1.1 Sequencing of Real-World Activities

1. User has to select the DICOM printer from the Film Composer Interface.
2. The images to be printed shall be dragged and dropped into Film Composer slots from Viewing Applications either manually or automatically.
3. In case of manual drag and drop, the user has to press the Print Button to print the images.
4. The DICOM SERVER AE will start the Print Session. The Print Session involves establishing association with the printer followed by the next sequence of activities:
  - a. The DICOM SERVER AE gets the Printer status using N-GET service. If the Printer returns FAILURE status the print session will be terminated and the requester will be notified of the printer status.
  - b. The film session is created using N-CREATE service. In case of error, the print session will be terminated. The attribute values for the Film session will be specified with the film session request.
  - c. The film box is created using N-CREATE service. The print session will be terminated if the printer fails to create the film box. The film box attribute values will be sent in the film box create request.
  - d. The image attributes for the images to be printed in this session will be set using the N-SET service. If the printer fails to accommodate the images in the image set, the print session will be terminated.
  - e. The film will be printed using the N-ACTION service. Only film box printing is supported. In case of error, the print session will be terminated.
  - f. The Film Box instance will be deleted using the N-DELETE service.
  - g. The SCU does not wait for N-EVENT-REPORT from the Printer after deleting the film box instance. The N-EVENT-REPORT received when the association was still active is handled, but the data received will be ignored.

- h. Finally the association will be terminated and if all the above operations are successful the requester will be notified of the successful print session. This status just indicates that the images to be printed have been successfully sent to the printer.

### 2.3.1.2.8.2 Proposed Presentation Context

TABLE 2.3.1.3.8.2-1 PRESENTATION CONTEXT– PROPOSED BY DICOM SERVER AE FOR ACTIVITY *PRINT*

| Abstract Syntax                                 |                        | Transfer Syntax           |                     | Role | Extended Negotiation |
|---|------------------------|---------------------------|---------------------|------|----------------------|
| Name  | UID                    | Name List                 | UID List            |      |                      |
| Basic Grayscale Print Management Meta SOP Class | 1.2.840.10008.5.1.1.9  | Implicit VR Little Endian | 1.2.840.10008.1.2   | SCU  | None                 |
|   |                        | Explicit VR Little Endian | 1.2.840.10008.1.2.1 |      |                      |
|   |                        | Explicit VR Big Endian    | 1.2.840.10008.1.2.2 |      |                      |
| Basic Color Print Management Meta SOP Class     | 1.2.840.10008.5.1.1.18 | Implicit VR Little Endian | 1.2.840.10008.1.2   | SCU  | None                 |
|   |                        | Explicit VR Little Endian | 1.2.840.10008.1.2.1 |      |                      |
|   |                        | Explicit VR Big Endian    | 1.2.840.10008.1.2.2 |      |                      |
| Printer SOP Class                               | 1.2.840.10008.5.1.1.16 | Implicit VR Little Endian | 1.2.840.10008.1.2   | SCU  | None                 |
|   |                        | Explicit VR Little Endian | 1.2.840.10008.1.2.1 |      |                      |
|   |                        | Explicit VR Big Endian    | 1.2.840.10008.1.2.2 |      |                      |

#### 2.3.1.2.8.2.1 SOP Specific DICOM Conformance Statement for Basic Grayscale and Color Print Management SOP Classes

The DICOM SERVER AE uses the following DIMSE services of the supported SOP Classes:

TABLE 2.3.1.2.8.2-2 DIMSE SERVICES USED BY DICOM SERVER AE FOR ACTIVITY *PRINT*

| SOP Class                 | SOP Class UID           | DIMSE Service Element | SCU Usage        |
|---------------------------|-------------------------|-----------------------|------------------|
| Basic Film Session        | 1.2.840.10008.5.1.1.1   | N-CREATE              | Used (Mandatory) |
|                           |                         | N-SET                 | Not Used         |
|                           |                         | N-DELETE              | Not Used         |
|                           |                         | N-ACTION              | Not Used         |
| Basic Film Box            | 1.2.840.10008.5.1.1.2   | N-CREATE              | Used (Mandatory) |
|                           |                         | N-ACTION              | Used (Mandatory) |
|                           |                         | N-DELETE              | Used             |
|                           |                         | N-SET                 | Not Used         |
| Basic Grayscale Image Box | 1.2.840.10008.5.1.1.4   | N-SET                 | Used (Mandatory) |
| Basic Color Image Box     | 1.2.840.10008.5.1.1.4.1 | N-SET                 | Used (Mandatory) |
| Printer                   | 1.2.840.10008.5.1.1.16  | N-EVENT-REPORT        | Used (Mandatory) |
|                           |                         | N-GET                 | Used             |

2.3.1.2.8.2.1.1 Basic Film Session SOP Class

The DICOM SERVER AE supports the following DIMSE Service Elements for the Basic Film Session SOP Class.

- N-CREATE - Requests the Print SCP to create an instance of Basic Film Session.

Only one association is opened at a time. The association is open until the response message is returned from the SCP or a network error occurs. No other configurable timers are available.

Following are the status codes that are more specifically processed when receiving messages from a **Print** SCP equipment for the Basic Film Session SOP Class N-CREATE:

TABLE 2.3.1.2.8.2-3 STATUS CODES RECEIVED BY DICOM SERVER AE FOR BASIC FILM SESSION SOP CLASS N-CREATE

| Service Status | Status Codes | Further Meaning         | Application Behavior When receiving Status Codes   |
|----------------|--------------|-------------------------|--|
| Failure        | 0119         | Class-instance conflict | Pauses print job and displays print failure message on film composer UI. Error details along with the status code is logged. |
|                | 0210         | Duplicate invocation    | Pauses print job and displays print failure message on film composer UI. Error details along with the status code is logged. |
|                | 0111         | Duplicate SOP Instance  | Pauses print job and displays print failure message on film composer UI. Error details along with the status code is logged. |
|                | 0106         | Invalid attribute value | Pauses print job and displays print failure message on film composer UI. Error details along with the status code is logged. |
|                | 0117         | Invalid SOP instance    | Pauses print job and displays print failure message on film composer UI. Error details along with the status code is logged. |
|                | 0120         | Missing attribute       | Pauses print job and displays print failure message on film composer UI. Error details along with the status code is logged. |
|                | 0121         | Missing attribute value | Pauses print job and displays print failure message on film composer UI. Error details along with the status code is logged. |
|                | 0212         | Mistyped argument       | Pauses print job and displays print failure message on film composer UI. Error details along with the status code is logged. |
|                | 0105         | No such attributes      | Pauses print job and displays print failure message on film composer UI. Error details along with the status code is logged. |
|                | 0118         | No such SOP Class       | Pauses print job and displays print failure message on film composer UI. Error details along with the status code is logged. |
|                | 0112         | No such SOP Instance    | Pauses print job and displays print failure message on film composer UI. Error details along with the status code is logged. |
|                | 0110         | Processing failure      | Pauses print job and displays print failure message on film composer UI. Error details                                       |

|         |      |                                   |  |
|---------|------|-----------------------------------|--|
|         |      |                                   | along with the status code is logged.  |
|         | 0213 | Resource limitation               | Pauses print job and displays print failure message on film composer UI. Resource limitation error details is logged.        |
|         | 0211 | Unrecognized operation            | Pauses print job and displays print failure message on film composer UI. Error details along with the status code is logged. |
| Warning | B600 | Memory allocation not supported   | Pauses print job and displays print failure message on film composer UI. Error details along with the status code is logged. |
| Success | 0000 | Film session successfully created | Logs film session instance UID and proceeds for creating film box.   |
| *       | *    | Any other status code.            | Pauses print job and displays print failure message on film composer UI. Error details along with the status code is logged. |

If a Failure/Warning status is returned by the Print SCP during the N-CREATE operation of the Film Session, the association will be terminated.

**2.3.1.2.8.2.1.2 Basic Film Box SOP Class**

The DICOM SERVER AE supports the following DIMSE Service Elements for the Basic Film Box SOP Class:

- N-CREATE - Requests the Print SCP to create an instance of Film Box.
- N-ACTION - Requests the Print SCP to print the Film Box onto Printer.
- N-DELETE - Requests the Print SCP to delete the Film Box Instance.

Only one association is opened at a time. The association is open until the response message is returned from the SCP or a network error occurs. No other configurable timers are available.

Following are the status codes that are more specifically processed when receiving messages from a **Print SCP** equipment for the Basic Film Box SOP Class N-CREATE:

**TABLE 2.3.1.2.8.2-4 STATUS CODES RECEIVED BY DICOM SERVER AE FOR BASIC FILM BOX SOP CLASS N-CREATE**

| Service Status | Status Codes | Further Meaning  | Application Behavior When receiving Status Codes   |
|----------------|--------------|--|--|
| Failure        | C616         | There is an existing Film Box that has not been printed and N-ACTION at the Film Session level is not supported. A new Film Box will not be created when a previous Film Box has not been printed. | Pauses print job and displays print failure message on film composer UI. Error details along with the status code is logged. |
|                | 0119         | Class-instance conflict  | Pauses print job and displays print failure message on film composer UI. Error details along with the status code is logged. |
|                | 0210         | Duplicate invocation   | Pauses print job and displays print failure message on film composer UI. Error details along with the status code is logged. |
|                | 0111         | Duplicate SOP Instance   | Pauses print job and displays print failure message on film composer UI. Error details                                       |

|         |      |  |  |
|---------|------|--|--|
|         |      |  | along with the status code is logged.  |
|         | 0106 | Invalid attribute value  | Pauses print job and displays print failure message on film composer UI. Error details along with the status code is logged.     |
|         | 0117 | Invalid SOP instance   | Pauses print job and displays print failure message on film composer UI. Error details along with the status code is logged.     |
|         | 0120 | Missing attribute  | Pauses print job and displays print failure message on film composer UI. Error details along with the status code is logged.     |
|         | 0121 | Missing attribute value  | Pauses print job and displays print failure message on film composer UI. Error details along with the status code is logged.     |
|         | 0212 | Mistyped argument  | Pauses print job and displays print failure message on film composer UI. Error details along with the status code is logged.     |
|         | 0105 | No such attributes   | Pauses print job and displays print failure message on film composer UI. Error details along with the status code is logged.     |
|         | 0118 | No such SOP Class  | Pauses print job and displays print failure message on film composer UI. Error details along with the status code is logged.     |
|         | 0112 | No such SOP Instance   | Pauses print job and displays print failure message on film composer UI. Error details along with the status code is logged.     |
|         | 0110 | Processing failure   | Pauses print job and displays print failure message on film composer UI. Error details along with the status code is logged.     |
|         | 0213 | Resource limitation  | Pauses print job and displays print failure message on film composer UI.<br>Resource limitation error details is logged.         |
|         | 0211 | Unrecognized operation   | Pauses print job and displays print failure message on film composer UI. Error details along with the status code is logged.     |
| Warning | B605 | Requested Min Density or Max Density outside of printer's operating range. The printer will use its respective minimum or maximum density value instead. | Pauses print job and displays print failure message on film composer UI. Error details along with the status code is logged.     |
| Success | 0000 | Film box successfully created  | Proceed for setting image box.   |
| *       | *    | Any other status code.   | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |

If a Failure or Warning status is returned during the N-CREATE operation of the Film Box, the association will be terminated.

Following are the status codes that are more specifically processed when receiving messages from a **Print** SCP equipment for the Basic Film Box SOP Class N-ACTION:

TABLE 2.3.1.2.8.2-5 STATUS CODES RECEIVED BY DICOM SERVER AE FOR BASIC FILM BOX SOP CLASS N-ACTION

| Service Status | Status Codes           | Further Meaning  | Application Behavior When receiving Status Codes   |
|----------------|------------------------|--|--|
| Failure        | C602                   | Unable to create Print Job SOP Instance; print queue is full   | Logs "unable to create print job" error. Pauses print job and displays print failure message on the film composer UI.            |
|                | C603                   | Image size is larger than image box size (by using the specified magnification value)  | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
|                | C604                   | Image position collision : multiple images assigned to single image position   | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
|                | C613                   | Combined Print Image size is larger than the Image Box size  | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
|                | 0119                   | Class-instance conflict  | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
|                | 0210                   | Duplicate invocation   | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
|                | 0115                   | Invalid argument value   | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
|                | 0117                   | Invalid SOP Instance   | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
|                | 0212                   | Mistyped argument  | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
|                | 0123                   | No such action   | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
|                | 0114                   | No such argument   | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
|                | 0118                   | No such SOP Class  | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
|                | 0112                   | No such SOP Instance   | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
|                | 0110                   | Processing failure   | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
|                | 0213                   | Resource limitation  | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
| 0211           | Unrecognized operation | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |  |

|         |      |   |  |
|---------|------|---|--|
| Warning | B603 | Film Box SOP Instance hierarchy does not contain Image Box SOP Instances (empty page)   | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
|         | B604 | Image size is larger than image box size, the image has been demagnified.   | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
|         | B609 | Image size is larger than the Image Box size. The Image has been cropped to fit.  | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
|         | B60A | Image size or Combined Print Image size is larger than the Image Box size. Image or Combined Print Image has been decimated to fit. | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
| Success | 0000 | Film accepted for printing; if supported, the Print Job SOP Instance is created   | Proceed in parsing N-Action response.  |
| *       | *    | Any other status code.  | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |

If a Failure or Warning status is returned during the N-ACTION operation of the Film Box, the association will be terminated.

Following are the status codes that are more specifically processed when receiving messages from a **Print SCP** equipment for the Basic Film Box SOP Class N-DELETE:

**TABLE 2.3.1.2.8.2-6 STATUS CODES RECEIVED BY DICOM SERVER AE FOR BASIC FILM BOX SOP CLASS N-DELETE**

| Service Status | Status Codes | Further Meaning         | Application Behavior When receiving Status Codes   |
|----------------|--------------|-------------------------|--|
| Failure        | 0119         | Class-instance conflict | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
|                | 0210         | Duplicate invocation    | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
|                | 0117         | Invalid SOP instance    | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
|                | 0212         | Mistyped argument       | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
|                | 0118         | No such SOP Class       | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
|                | 0112         | No such SOP Instance    | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
|                | 0110         | Processing failure      | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
|                | 0213         | Resource limitation     | Pauses print job and displays print failure message on the film composer UI. Error details                                       |

|         |      |                               |  |
|---------|------|-------------------------------|--|
|         |      |                               | along with the status code is logged.  |
|         | 0211 | Unrecognized operation        | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
| Success | 0000 | Film box successfully deleted | Logs the success message.  |
| *       | *    | Any other status code.        | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |

If a Failure or Warning status is returned during the N-DELETE operation of the Film Box, the association will be terminated.

2.3.1.2.8.2.1.3 Basic Grayscale and Color Image Box SOP Classes

The DICOM SERVER AE supports the following DIMSE Service Elements for Basic Grayscale and Color Image Box SOP Classes :

- N-SET - Requests the Printer to set the image box attributes.

Only one association is opened at a time. The association is open until the response message is returned from the SCP or a network error occurs. No other configurable timers are available.

Following are the status codes that are more specifically processed when receiving messages from a **Print** SCP equipment for the Basic Grayscale and Color Image Box SOP Classes N-SET:

TABLE 2.3.1.2.8.2-7 STATUS CODES RECEIVED BY DICOM SERVER AE FOR BASIC GRAYSCALE AND COLOR IMAGE BOX SOP CLASSES N-SET

| Service Status | Status Codes | Further Meaning   | Application Behavior When receiving Status Codes   |
|----------------|--------------|---|--|
| Failure        | C603         | Image size is larger than image box size                    | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
|                | C605         | Insufficient memory in printer to store the image           | Log printer memory full error. Pauses print job and displays print failure message on the film composer UI.                      |
|                | C613         | Combined Print Image size is larger than the Image Box size | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
|                | 0119         | Class-instance conflict                                     | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
|                | 0210         | Duplicate invocation  | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
|                | 0106         | Invalid attribute value                                     | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
|                | 0212         | Mistyped argument   | Pauses print job and displays print failure message on the film composer UI. Error details                                       |



|         |      |  |  |
|---------|------|--|--|
|         |      |  | along with the status code is logged.  |
|         | 0117 | Invalid SOP instance   | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
|         | 0121 | Missing attribute value  | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
|         | 0105 | No such attributes   | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
|         | 0118 | No such SOP Class  | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
|         | 0112 | No such SOP Instance   | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
|         | 0110 | Processing failure   | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
|         | 0213 | Resource limitation  | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
|         | 0211 | Unrecognized operation   | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
| Warning | B604 | Image size larger than image box size, the image has been demagnified.   | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
|         | B605 | Requested Min Density or Max Density outside of printer's operating range. The printer will use its respective minimum or maximum density value instead. | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
|         | B609 | Image size is larger than the Image Box size. The Image has been cropped to fit.   | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
|         | B60A | Image size or Combined Print Image size is larger than the Image Box size. The Image or Combined Print Image has been decimated to fit.                  | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
| Success | 0000 | Image successfully stored in Image Box   | Continues setting image box if more images are there, else sends N-Action request.   |
| *       | *    | Any other status code.   | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |

If a Failure/Warning status is returned during the N-SET operation of the Image Box, the association will be terminated.

## 2.3.1.2.8.2.1.4 Printer SOP Class

The N-GET DIMSE service is supported for the Printer SOP Class. If an N-EVENT-REPORT DIMSE service is received when the association is active, the DICOM SERVER AE handles the relevant states, but the data received is ignored.

Following are the status codes the Application may send back in the **N-Event-Report** response command to the **Printer SOP Class** SCP Equipment that sent the N-Event-Report request:

**TABLE 2.3.1.2.8.2-8 STATUS CODES RETURNED BY DICOM SERVER AE FOR PRINTER SOP CLASS N-EVENT-REPORT**

| Service Status | Status Code | Further Meaning | Status Code Explanation              | Related Fields Sent Back to the SCU |
|----------------|-------------|-----------------|--------------------------------------|-------------------------------------|
| Success        | 0000        |                 | N-EVENT-REPORT received successfully | None                                |

The DICOM SERVER AE issues the N-GET service to retrieve the printer status. The statuses are processed as follows:

- If Printer status (2110,0010) is NORMAL, the film is printed.
- If Printer status (2110,0010) is FAILURE the print job is terminated. The Printer Status Info (2110,0020) attribute is not processed.
- If Printer status (2110,0010) is WARNING one of two things will happen:
  - If the Printer Status Info (2110,0020) is "RECEIVER FULL" or "SUPPLY EMPTY", or "FILM JAM" the status is displayed to the user and the print job is aborted.
  - For all other Printer Status Info (2110,0020) values, the status is ignored and the print job continues.

Only one association is opened at a time. The association is open until the response message is returned from the SCP or a network error occurs. No other configurable timers are available.

For the attribute list requested by this product and for the behavior of this product on each returned value, refer to Section 10.5.2 Printer N-Get Attributes.

Following are the status codes that are more specifically processed when receiving messages from a **Print** SCP equipment for the Printer SOP Class N-GET:

**TABLE 2.3.1.2.8.2-9 STATUS CODES RECEIVED BY DICOM SERVER AE FOR PRINTER SOP CLASS N-GET**

| Service Status | Status Codes | Further Meaning         | Application Behavior When receiving Status Codes   |
|----------------|--------------|-------------------------|--|
| Failure        | 0107         | Attribute list error    | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged. |
|                | 0119         | Class-instance conflict | Pauses print job and displays print failure message on the film composer UI. Error details                                       |

|         |      |                        |  |
|---------|------|------------------------|--|
|         |      |                        | along with the status code is logged.  |
|         | 0210 | Duplicate invocation   | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged.     |
|         | 0117 | Invalid SOP instance   | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged.     |
|         | 0212 | Mistyped argument      | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged.     |
|         | 0118 | No such SOP Class      | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged.     |
|         | 0112 | No such SOP Instance   | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged.     |
|         | 0110 | Processing failure     | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged.     |
|         | 0213 | Resource limitation    | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged.     |
|         | 0211 | Unrecognized operation | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged.     |
| Success | 0000 | Success                | Proceed with parsing dataset returned from N-Get response and perform appropriate operations. Refer section <a href="#">10.5.2</a> . |
| *       | *    | Any other status code. | Pauses print job and displays print failure message on the film composer UI. Error details along with the status code is logged.     |

### 2.3.1.3 Association Acceptance Policy

The DICOM SERVER AE places limitations on who may connect to it.

If the Remote AE needs to “Push Images” or “Query/Retrieve Images”, to the local system then it has to be configured in the Local system to do the same.

Any remote AE can open an association to the DICOM SERVER AE for the purpose of verification.

The DICOM SERVER AE rejects the association if there are too many open connections.

#### 2.3.1.3.1 Real-World Activity: Receive Images

The DICOM SERVER AE is indefinitely listening for associations. No operator action is required to receive an image.

### 2.3.1.3.1.1 Associated Real-World Activity

The Real-World Activity associated with the *Receive Images* operation is the storage of the images on the disk drive of the local system and the declaration of the images in the database of the same station.

### 2.3.1.3.1.2 Accepted Presentation Context Table

TABLE 2.3.1.3.1.2-1 PRESENTATION CONTEXT– ACCEPTED BY DICOM SERVER AE FOR ACTIVITY *RECEIVE IMAGES*

| Abstract Syntax                                 |                               | Transfer Syntax  |   | Role | Extended Negotiation |
|---|-------------------------------|--|---|------|----------------------|
| Name  | UID                           | Name List  | UID List  |      |                      |
| CT Image Storage                                | 1.2.840.10008.5.1.4.1.1.2     | Implicit VR Little Endian<br>Explicit VR Little Endian<br>Explicit VR Big Endian | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCP  | None                 |
| MR Image Storage                                | 1.2.840.10008.5.1.4.1.1.4     | Implicit VR Little Endian<br>Explicit VR Little Endian<br>Explicit VR Big Endian | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCP  | None                 |
| Secondary Capture Image Storage                 | 1.2.840.10008.5.1.4.1.1.7     | Implicit VR Little Endian<br>Explicit VR Little Endian<br>Explicit VR Big Endian | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCP  | None                 |
| Grayscale Softcopy Presentation State Storage * | 1.2.840.10008.5.1.4.1.1.11.1  | Implicit VR Little Endian<br>Explicit VR Little Endian<br>Explicit VR Big Endian | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCP  | None                 |
| Enhanced SR                                     | 1.2.840.10008.5.1.4.1.1.88.22 | Implicit VR Little Endian<br>Explicit VR Little Endian<br>Explicit VR Big Endian | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCP  | None                 |
| Positron Emission Tomography Image Storage      | 1.2.840.10008.5.1.4.1.1.128   | Implicit VR Little Endian<br>Explicit VR Little Endian<br>Explicit VR Big Endian | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCP  | None                 |
| RT Structure Set Storage                        | 1.2.840.10008.5.1.4.1.1.481.3 | Implicit VR Little Endian<br>Explicit VR Little Endian<br>Explicit VR Big Endian | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCP  | None                 |
| GE Private PET Raw Data                         | 1.2.840.113619.4.30           | Implicit VR Little Endian<br>Explicit VR Little Endian<br>Explicit VR Big Endian | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCP  | None                 |

**Note:**

\* The MR can receive Grayscale Softcopy Presentation State objects from other systems, but the display applications do not support Mask, Bitmap Display Shutter, Overlay Plane and Overlay/Curve Activation.

**2.3.1.3.1.2.1 SOP Specific DICOM Conformance Statement for all Storage SOP Classes**

The DICOM SERVER AE provides Level 2 (FULL) Conformance, and stores all standard and private data elements of received SOP Instances. It does not coerce any data elements during Storage. The DICOM SERVER AE provides Level 1 Digital Signature support.

The DICOM SERVER AE monitors an "Operation Inactivity" timer. The connection with the SCU will be terminated if it is inactive for the configured time-out interval. Default time-out is 15 seconds and is configurable.

Successfully received SOP Instances may be accessed via the user interface and by DICOM network query retrieve. SOP Instances are stored until manually deleted by the user.

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

**TABLE 2.3.1.3.1.2-2 STATUS CODES RETURNED BY DICOM SERVER AE FOR ACTIVITY RECEIVE IMAGES**

| Service Status | Status Code | Further Meaning                          | Status Code Explanation  | Related Fields Sent Back to the SCU |
|----------------|-------------|--|--|-------------------------------------|
| Failure        | A700        | Refused: Out of resources                | Not enough diskspace to store the DICOM object   | (0000,0902)                         |
|                | A710        | Refused: Out of resources                | Remote AE is not given permission to store on DICOM SERVER AE                              | (0000,0902)                         |
|                | A711        | Refused: Out of resources                | Unable to connect to local database for storage (such as maximum connection limit reached) | (0000,0902)                         |
|                | A900        | Error: Data Set does not match SOP Class | Storage of the DICOM object failed due to corrupt/invalid dataset                          | (0000,0902)                         |
|                | C000        | Error: Cannot understand                 | Error while storing DICOM object in the repository   | (0000,0902)                         |
| Success        | 0000        | Success                                  | DICOM instance stored successfully   | None                                |

If the image installation is unsuccessful, a message will appear in the system log informing the user of the failure.

**2.3.1.3.1.3 Presentation Context Acceptance Criterion**

The DICOM SERVER AE evaluates each Presentation Context independently, and accepts any Presentation Context that matches an Abstract Syntax for any Real-World Activity.

**2.3.1.3.1.4 Transfer Syntax Selection Policies**

Within each Presentation Context, the DICOM SERVER AE will select Transfer Syntaxes according to the following priority (highest priority first):

1. Explicit VR Little Endian
2. Implicit VR Little Endian
3. Explicit VR Big Endian

### 2.3.1.3.2 Real-World Activity : Search Local Database

This AE is indefinitely listening for associations. No operator action is required to respond to a DICOM *query* request.

#### 2.3.1.3.2.1 Associated Real-World Activity

The Real-World Activity associated with the "Search Local Database" is to search the local database for entries that match the request and send a C-FIND response message with a status of "pending" for each matching entry and send a C-FIND response message with a status of "success" after the last "pending" response.

If the C-FIND SCP receives a C-FIND-CANCEL request, it sends a C-FIND response message with a status of "cancel (FEooH)".

#### 2.3.1.3.2.2 Accepted Presentation Context Table

Acceptable Presentation Contexts for DICOM SERVER AE and Real-World Activity "Search Local Database"

TABLE 2.3.1.3.2.2-1 PRESENTATION CONTEXT– ACCEPTED BY DICOM SERVER AE FOR ACTIVITY SEARCH LOCAL DATABASE

| Abstract Syntax                                    |                             | Transfer Syntax           |                     | Role | Extended Negotiation |
|--|-----------------------------|---------------------------|---------------------|------|----------------------|
| Name   | UID                         | Name List                 | UID List            |      |                      |
| Study Root Query/Retrieve Information Model – FIND | 1.2.840.10008.5.1.4.1.2.2.1 | Implicit VR Little Endian | 1.2.840.10008.1.2   | SCP  | None                 |
|  |                             | Explicit VR Little Endian | 1.2.840.10008.1.2.1 |      |                      |
|  |                             | Explicit VR Big Endian    | 1.2.840.10008.1.2.2 |      |                      |

#### 2.3.1.3.2.2.1 SOP Specific DICOM Conformance Statement for the Study Root Query/Retrieve Information Model - FIND SOP Classes

All Required (R) and Unique (U) study, series, and image level keys for the Study-Root Query/Retrieve information model are supported. Optional (O) keys mentioned in the following tables are matched if they have a non-zero length value in the C-FIND request.

DICOM SERVER AE always returns the below listed optional attributes in the C-FIND response irrespective of being requested or not in the C-FIND request, provided the optional attributes have a non-zero length value in the database. It does not return any other optional attributes even if they are requested in the C-FIND request.

DICOM SERVER AE Query SCP can be configured in one of the following two modes :

1. DICOM Only mode – Only standard DICOM elements will be returned in the C-FIND response
2. Legacy mode – Apart from standard DICOM elements, Private elements are also returned in the C-FIND response to support legacy systems

Following sections describe the supported keys in DICOM Only and Legacy mode setup.

### 2.3.1.3.2.2.1.1 Supported keys in DICOM Only mode :

Following is the supported study level keys:

**TABLE 2.3.1.3.2.2-2 STUDY LEVEL KEYS IN DICOM ONLY MODE**

| Description                       | Tag         | Type |
|-----------------------------------|-------------|------|
| Study Date                        | (0008,0020) | R    |
| Study Time                        | (0008,0030) | R    |
| Accession Number                  | (0008,0050) | R    |
| Patient's Name                    | (0010,0010) | R    |
| Patient ID                        | (0010,0020) | R    |
| Study ID                          | (0020,0010) | R    |
| Study Instance UID                | (0020,000D) | U    |
| Modalities In Study               | (0008,0061) | O    |
| Referring Physicians Name         | (0008,0090) | O    |
| Specific Character Set            | (0008,0005) | O    |
| Instance Availability             | (0008,0056) | O    |
| Study Description                 | (0008,1030) | O    |
| Number of Study Related Series    | (0020,1206) | O    |
| Number of Study Related Instances | (0020,1208) | O    |

**Note:** Patient Name matching is case sensitive.

**Note:** Wildcard query is supported for Patient's Name, Patient ID and Accession Number.

**Note:** Caret Symbol needs to be passed by the user for Patient Name matching.

**Note:** Range matching is supported on Date & time.

Following is the supported series level keys:

**TABLE 2.3.1.3.2.2-3 SERIES LEVEL KEYS IN DICOM ONLY MODE**

| Description                        | Tag         | Type |
|------------------------------------|-------------|------|
| Modality                           | (0008,0060) | R    |
| Series Number                      | (0020,0011) | R    |
| Series Instance UID                | (0020,000E) | U    |
| Specific Character Set             | (0008,0005) | O    |
| Instance Availability              | (0008,0056) | O    |
| Station Name                       | (0008,1010) | O    |
| Series Description                 | (0008,103E) | O    |
| Number of Series Related Instances | (0020,1209) | O    |

Following is the supported image level keys:

**TABLE 2.3.1.3.2.2-4 IMAGE LEVEL KEYS IN DICOM ONLY MODE**

| Description            | Tag         | Type | Modality |
|------------------------|-------------|------|----------|
| Instance Number        | (0020,0013) | R    | All      |
| SOP Instance UID       | (0008,0018) | U    | All      |
| SOP Class UID          | (0008,0016) | O    | All      |
| Specific Character Set | (0008,0005) | O    | All      |
| Instance Availability  | (0008,0056) | O    | All      |
| Rows                   | (0028,0010) | O    | All      |
| Columns                | (0028,0011) | O    | All      |

#### 2.3.1.3.2.2.1.2 Supported keys in Legacy mode :

Following is the supported study level keys:

**TABLE 2.3.1.3.2.2-5 STUDY LEVEL KEYS IN LEGACY MODE**

| Description                       | Tag         | Type |
|-----------------------------------|-------------|------|
| Study Date                        | (0008,0020) | R    |
| Study Time                        | (0008,0030) | R    |
| Accession Number                  | (0008,0050) | R    |
| Patient's Name                    | (0010,0010) | R    |
| Patient ID                        | (0010,0020) | R    |
| Study ID                          | (0020,0010) | R    |
| Study Instance UID                | (0020,000D) | U    |
| Modality                          | (0008,0060) | O    |
| Modalities In Study               | (0008,0061) | O    |
| Referring Physicians Name         | (0008,0090) | O    |
| Specific Character Set            | (0008,0005) | O    |
| Instance Availability             | (0008,0056) | O    |
| Station Name                      | (0008,1010) | O    |
| Study Description                 | (0008,1030) | O    |
| Patient's Sex                     | (0010,0040) | O    |
| Number of Study Related Series    | (0020,1206) | O    |
| Number of Study Related Instances | (0020,1208) | O    |

**Note:** Patient Name matching is case sensitive.

**Note:** Wildcard query is supported for Patient's Name, Patient ID and Accession Number.

**Note:** Caret Symbol needs to be passed by the user for Patient Name matching.

**Note:** Range matching is supported on Date & time.



Following is the supported series level keys:

**TABLE 2.3.1.3.2.2-6 SERIES LEVEL KEYS IN LEGACY MODE**

| Description                        | Tag         | Type |
|------------------------------------|-------------|------|
| Modality                           | (0008,0060) | R    |
| Series Number                      | (0020,0011) | R    |
| Series Instance UID                | (0020,000E) | U    |
| Specific Character Set             | (0008,0005) | O    |
| Image Type                         | (0008,0008) | O    |
| SOP Class UID                      | (0008,0016) | O    |
| Instance Availability              | (0008,0056) | O    |
| Manufacturer                       | (0008,0070) | O    |
| Series Description                 | (0008,103E) | O    |
| Private Creator Identification     | (0009,0010) | O    |
| Proprietary Tag                    | (0009,1018) | O    |
| Proprietary Tag                    | (0009,10E1) | O    |
| Images in Acquisition              | (0020,1002) | O    |
| Number of Series Related Instances | (0020,1209) | O    |
| Series Type                        | (0054,1000) | O    |

Following is the supported image level keys:

**TABLE 2.3.1.3.2.2-7 IMAGE LEVEL KEYS IN LEGACY MODE**

| Description                    | Tag         | Type | Modality |
|--------------------------------|-------------|------|----------|
| Instance Number                | (0020,0013) | R    | All      |
| SOP Instance UID               | (0008,0018) | U    | All      |
| Specific Character Set         | (0008,0005) | O    | All      |
| Image Type                     | (0008,0008) | O    | All      |
| SOP Class UID                  | (0008,0016) | O    | All      |
| Acquisition Time               | (0008,0032) | O    | All      |
| Instance Availability          | (0008,0056) | O    | All      |
| Private Creator Identification | (0009,0010) | O    | All      |
| Proprietary Tag                | (0009,1019) | O    | All      |
| Proprietary Tag                | (0009,1025) | O    | All      |
| Proprietary Tag                | (0009,1036) | O    | All      |
| Proprietary Tag                | (0009,1063) | O    | All      |
| Proprietary Tag                | (0009,1069) | O    | All      |
| Proprietary Tag                | (0009,106A) | O    | All      |

|                                |             |   |     |
|--------------------------------|-------------|---|-----|
| Proprietary Tag                | (0009,106C) | O | All |
| Proprietary Tag                | (0009,106D) | O | All |
| Proprietary Tag                | (0009,108C) | O | All |
| Private Creator Identification | (0017,0010) | O | All |
| Proprietary Tag                | (0017,1004) | O | All |
| Slice Thickness                | (0018,0050) | O | All |
| Repetition Time                | (0018,0080) | O | All |
| Echo Time                      | (0018,0081) | O | All |
| Echo Number(s)                 | (0018,0086) | O | All |
| Spacing Between Slices         | (0018,0088) | O | All |
| Data Collection Diameter       | (0018,0090) | O | All |
| Reconstruction Diameter        | (0018,1100) | O | All |
| Gantry / Detector Tilt         | (0018,1120) | O | All |
| Convolution Kernel             | (0018,1210) | O | All |
| Flip Angle                     | (0018,1314) | O | All |
| Private Creator Identification | (0019,0010) | O | All |
| Proprietary Tag                | (0019,1004) | O | All |
| Proprietary Tag                | (0019,101E) | O | All |
| Proprietary Tag                | (0019,1024) | O | All |
| Proprietary Tag                | (0019,1026) | O | All |
| Proprietary Tag                | (0019,107E) | O | All |
| Image Position (Patient)       | (0020,0032) | O | All |
| Image Orientation (Patient)    | (0020,0037) | O | All |
| Slice Location                 | (0020,1041) | O | All |
| Private Creator Identification | (0021,0010) | O | All |
| Proprietary Tag                | (0021,1001) | O | All |
| Proprietary Tag                | (0021,104A) | O | All |
| Private Creator Identification | (0027,0010) | O | All |
| Proprietary Tag                | (0027,1040) | O | All |
| Proprietary Tag                | (0027,1041) | O | All |
| Proprietary Tag                | (0027,1042) | O | All |
| Proprietary Tag                | (0027,1043) | O | All |
| Proprietary Tag                | (0027,1050) | O | All |
| Proprietary Tag                | (0027,1051) | O | All |
| Proprietary Tag                | (0027,1052) | O | All |
| Proprietary Tag                | (0027,1053) | O | All |
| Proprietary Tag                | (0027,1054) | O | All |
| Proprietary Tag                | (0027,1055) | O | All |

|                       |             |   |     |
|-----------------------|-------------|---|-----|
| Proprietary Tag       | (0027,1060) | O | All |
| Proprietary Tag       | (0027,1061) | O | All |
| Proprietary Tag       | (0027,1062) | O | All |
| Number of Frames      | (0028,0008) | O | All |
| Rows                  | (0028,0010) | O | All |
| Columns               | (0028,0011) | O | All |
| Pixel Spacing         | (0028,0030) | O | All |
| Bits Allocated        | (0028,0100) | O | All |
| Units                 | (0054,1001) | O | All |
| Reconstruction Method | (0054,1103) | O | All |

DICOM SERVER AE does not support Sequence matching.

Range matching is supported for attributes of type date and time.

Only hierarchical query is supported. The C-FIND SCP will not perform any extended negotiation.

The DICOM SERVER AE does not support Relational Search.

Specific Character Set (0008,0005) value will be used to interpret the non ASCII DICOM attributes ( Like patient name, patient id etc. ).

The DICOM SERVER AE monitors an "Operation Inactivity" timer. The connection with the SCU will be terminated if it is inactive for the configured time-out interval. Default time-out is 15 seconds and is configurable.

Following are the status codes the Application may send back to the SCU Equipment while performing the requested **Query** :

**TABLE 2.3.1.3.21.2-8 STATUS CODES RETURNED BY DICOM SERVER AE FOR ACTIVITY SEARCH LOCAL DATABASE**

| Service Status | Status Code | Further Meaning                   | Status Code Explanation   | Related Fields Sent Back to the SCU |
|----------------|-------------|-----------------------------------|---|-------------------------------------|
| Failure        | A900        | Error: Invalid dataset            | This status code is sent for the following reasons<br>1. When does not have required information, like query retrieve level   | (0000,0902)                         |
|                | C001        | Error: Unable to process          | This status code is sent for the following reasons<br>1. When remote AE is not given permission to store on this AE.<br>2. Not able to connect to local database , because of max connection limit reached.<br>3. Database query fails. | (0000,0902)                         |
| Cancel         | FE00        | Matching terminated due to cancel | This status code will be returned when DICOM SERVER AE receives C-FIND-CANCEL from remote AE  | None                                |

|         |      |  |                      |            |
|---------|------|--|----------------------|------------|
| Success | 0000 | Matching is complete - No final identifier is supplied   | Matching complete    | None       |
| Pending | FF00 | Matches are continuing - Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys. | For pending messages | Identifier |

### 2.3.1.3.2.3 Presentation Context Acceptance Criterion

The DICOM SERVER AE evaluates each Presentation Context independently, and accepts any Presentation Context that matches an Abstract Syntax for any Real-World Activity.

### 2.3.1.3.2.4 Transfer Syntax Selection Policies

Within each Presentation Context, the DICOM SERVER AE will select Transfer Syntaxes according to the following priority (highest priority first):

1. Explicit VR Little Endian
2. Implicit VR Little Endian
3. Explicit VR Big Endian

### 2.3.1.3.3 Real-World Activity : Move Images

This AE is indefinitely listening for associations. No operator action is required to respond to a DICOM *retrieve* request.

#### 2.3.1.3.3.1 Associated Real-World Activity

The Real-World Activity associated with the “*Move Images*” is to send all images corresponding to the C-MOVE request to the destination AE through a separate association.

If the C-MOVE SCP receives a C-MOVE-CANCEL request, it discontinues the move operation and closes the separate association.

#### 2.3.1.3.3.2 Accepted Presentation Context Table

Acceptable Presentation Contexts for DICOM SERVER AE and Real-World Activity “*Move Images*”

TABLE 2.3.1.3.3.2-1 PRESENTATION CONTEXT– ACCEPTED BY DICOM SERVER AE FOR ACTIVITY *MOVE IMAGES*

| Abstract Syntax                                    |                             | Transfer Syntax           |                     | Role | Extended Negotiation |
|--|-----------------------------|---------------------------|---------------------|------|----------------------|
| Name   | UID                         | Name List                 | UID List            |      |                      |
| Study Root Query/Retrieve Information Model - MOVE | 1.2.840.10008.5.1.4.1.2.2.2 | Implicit VR Little Endian | 1.2.840.10008.1.2   | SCP  | None                 |
|  |                             | Explicit VR Little Endian | 1.2.840.10008.1.2.1 |      |                      |
|  |                             | Explicit VR Big Endian    | 1.2.840.10008.1.2.2 |      |                      |

**2.3.1.3.3.2.1 SOP Specific DICOM Conformance Statement for the Study Root Query/Retrieve Information Model - MOVE SOP Classes**

The DICOM SERVER AE supports Storage Sub-operations for Instances of any of the Composite SOP Classes it supports as an SCU (see [Section 2.3.1.2.1.2](#)).

DICOM SERVER AE supports only Baseline behavior. It does not support Relational-Retrieve. It expects the MOVE SCU to supply single Unique Key value for all levels above the Query/Retrieve Level specified in the C-MOVE request.

Along with Single Value matching, the DICOM SERVER AE also supports List of UID matching if the Query/Retrieve level specified in the move request is either STUDY or SERIES or IMAGE.

The DICOM SERVER AE makes a single association to the Move Destination AET specified in the C-MOVE request. This association is open for the entire C-MOVE operation and no new associations are made. The Move Destination AET must already be configured in the system for the C-MOVE operation to be successful. If the Move Destination details are not configured in the system, the DICOM SERVER AE returns A801 (Move Destination Unknown) error status in the C-MOVE response to the SCU.

The DICOM SERVER AE sends multiple C-STORE requests (one per image) to the Move Destination AET depending on the number of composites involved in the move operation. The DICOM SERVER AE sends back C-MOVE PENDING response to the Move SCU after every Storage sub-operation is complete.

The DICOM SERVER AE monitors an "Operation Inactivity" timer. The connection with the SCU will be terminated if it is inactive for the configured time-out interval. Default time-out is 15 seconds and is configurable.

Each C-STORE sub-operation supports an "Association Timer". This timer starts when the association request is sent and stops when the association is established. Default time-out is 15 seconds and is configurable.

Following are the status codes the Application may send back to the SCU Equipment while performing the requested **Retrieve** :

**TABLE 2.3.1.3.3.2-2 STATUS CODES RETURNED BY DICOM SERVER AE FOR ACTIVITY MOVE IMAGES**

| Service Status | Status Code | Further Meaning   | Status Code Explanation  | Related Fields Sent Back to the SCU |
|----------------|-------------|---|--|-------------------------------------|
| Failure        | A701        | Refused: Out of resources - Unable to calculate number of matches | This status code is sent when local database query fails   | (0000,0902)                         |
|                | A702        | Refused: Out of resources - Unable to perform sub-operations      | This status code is sent to Retrieve SCU for the following reasons: <ol style="list-style-type: none"> <li>1. Unable to make association with the C-STORE SCP</li> <li>2. Association is aborted by the C-STORE SCP while sending images</li> <li>3. C-STORE SCP returns 0xA700 (Out of resources) error code</li> </ol> | (0000,0902)                         |

|         |      |  |  |   |
|---------|------|--|--|---|
|         | A801 | Error: Move Destination Unknown                      | This status code is sent when the destination AE named in the C-MOVE request is unknown to DICOM SERVER AE.  | (0000,0902)   |
|         | A900 | Error: Invalid dataset                               | This status code is sent for the following reasons<br>1. When the retrieve request does not contain required information. Such as missing or invalid query retrieve level, missing Move destination AET etc.                           | (0000,0902)   |
|         | Co01 | Error: Unable to process                             | This status code is sent for the following reasons<br>1. When Remote AE does not have permissions to use DICOM SERVER AE's retrieve service<br>2. Not able to connect to local database (such as maximum connection limit reached etc) | (0000,0902)   |
| Cancel  | FE00 | Sub-operations terminated due to a Cancel indication | This status code is sent when DICOM SERVER AE receives C-MOVE-CANCEL request from the Remote AE.   | (0000,1021)<br>(0000,1022)<br>(0000,1023)<br>(0000,0902)) |
| Success | 0000 | Sub-operations Complete - No Failure.                | All the composite SOP instances have been successfully sent to the C-MOVE destination  | (0000,1021)<br>(0000,1022)<br>(0000,1023)                 |
| Warning | Bo00 | Sub-operations Complete – One or more Failures       | Move operation completed, but some of the SOP instances could not be sent to the C-STORE SCP   | (0000,1021)<br>(0000,1022)<br>(0000,1023)                 |
| Pending | FF00 | Sub-operations are continuing -                      | For pending suboperation to remote AE  | (0000,1020)<br>(0000,1021)<br>(0000,1022)<br>(0000,1023)  |

#### 2.3.1.3.3.3 Presentation Context Acceptance Criterion

The DICOM SERVER AE evaluates each Presentation Context independently, and accepts any Presentation Context that matches an Abstract Syntax for any Real-World Activity.

#### 2.3.1.3.3.4 Transfer Syntax Selection Policies

Within each Presentation Context, the DICOM SERVER AE will select Transfer Syntaxes according to the following priority (highest priority first):

1. Explicit VR Little Endian
2. Implicit VR Little Endian
3. Explicit VR Big Endian

#### 2.3.1.3.4 Real-World Activity: Listen to remote Storage Commitment SCP

The DICOM SERVER AE is indefinitely listening for associations. No operator action is required to receive a Storage Commitment notification (N-EVENT-REPORT).

#### 2.3.1.3.4.1 Associated Real-World Activity

The Real-World Activity consists of the following:

- Flag the exams/series that have been committed (transfer of ownership) in the database
- Display the error when some images of a patient existing in the database have not been committed

#### 2.3.1.3.4.2 Accepted Presentation Context

The Storage Commitment Provider initiating the association must use the role selection negotiation.

**Table 2.3.1.3.4.2-1 Presentation Context– Accepted by DICOM SERVER AE for Activity *Listen to remote Storage Commitment SCP***

| 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<br>Explicit VR Little Endian<br>Explicit VR Big Endian | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |

#### 2.3.1.3.4.2.1 SOP Specific DICOM Conformance Statement for the Storage Commitment Push Model SOP Class (N-EVENT-REPORT)

The DICOM SERVER AE monitors an “Operation Inactivity” timer. The connection with the SCU will be terminated if it is inactive for the configured time-out interval. Default time-out is 15 seconds and is configurable.

Once the N\_EVENT\_REPORT response is received from the SCP, the following actions will be taken depending on the status of response.

##### 2.3.1.3.4.2.1.1 Commitment response with SUCCESS status

The “Archived” flag information in the browser for all the successfully archived exam/series will be updated. The archive status column in the browser will be changed to display “Archived” icon to indicate that the exam/series has been archived successfully. The job queue entry will be removed.

N\_EVENT\_REPORT response will be sent on the same association as N\_EVENT\_REPORT request. No data set will be sent along with the response.

Following are the status codes the Application may send back to the SCP Equipment after receiving the N-EVENT-REPORT:

**TABLE 2.3.1.3.4.2-2 STATUS CODES RETURNED BY DICOM SERVER AE FOR ACTIVITY *LISTEN TO REMOTE STORAGE COMMITMENT SCP WITH SUCCESS STATUS***

| Service Status | Status Codes | Further Meaning    | Status Code sending explanation                             | Related Fields sent back to the SCU |
|----------------|--------------|--------------------|---|-------------------------------------|
| Error          | 0110         | Processing Failure | Indicates that an internal error occurred while processing. | None                                |
| Success        | 0000         | Success            | The storage commitment result received successfully.        | None                                |

### 2.3.1.3.4.2.1.2 Commitment response with FAILURE status

In the event of complete/partial failure the user will be notified about the status and the job entry will be paused. There is no attempt made to automatically retry the failed SOP instances. However the user can manually retry the failed jobs. Such requests will be treated as new requests. This will go through the complete sequence of operations once again.

The failure reason is ignored. Failed SOP instances will have their "Archived" flag information unaltered. Failed SOP instances are logged.

**Note:** The archived status flag in the browser is a shared flag with local archive. When the status is "Archived", it means that the images are archived but doesn't specify whether on local archive device or remote archive device. It is left to the user's discretion whether the local SOP instances are to be deleted.

N\_EVENT\_REPORT response will be sent on the same association as N\_EVENT\_REPORT request. No data set will be sent along with the response.

Please see [section 6.1.2.1](#) for the complete list of N\_EVENT\_REPORT failure statuses processed by the system.

Following are the status codes the Application may send back to the SCP Equipment after receiving the N-EVENT-REPORT:

**TABLE 2.3.1.3.4.2-3 STATUS CODES RETURNED BY DICOM SERVER AE FOR ACTIVITY LISTEN TO REMOTE STORAGE COMMITMENT SCP WITH FAILURE STATUS**

| Service Status | Status Codes | Further Meaning    | Status Code sending explanation                             | Related Fields sent back to the SCU |
|----------------|--------------|--------------------|---|-------------------------------------|
| Error          | 0110         | Processing Failure | Indicates that an internal error occurred while processing. | None                                |
| Success        | 0000         | Success            | The storage commitment result received successfully.        | None                                |

### 2.3.1.3.4.3 Presentation Context Acceptance Criterion

The DICOM SERVER AE evaluates each Presentation Context independently, and accepts any Presentation Context that matches an Abstract Syntax for any Real-World Activity.

### 2.3.1.3.4.4 Transfer Syntax Selection Policies

Within each Presentation Context, the DICOM SERVER AE will select Transfer Syntaxes according to the following priority (highest priority first):

1. Explicit VR Little Endian
2. Implicit VR Little Endian
3. Explicit VR Big Endian



**2.3.1.3.5 Real-World Activity: Verify Connectivity**

**2.3.1.3.5.1 Associated Real-World Activity**

A remote Application Entity verifies its ability to communicate with DICOM SERVER AE by sending a verification request.

**2.3.1.3.5.2 Accepted Presentation Context**

**Table 2.3.1.3.5.2-1 Presentation Context– Accepted by DICOM SERVER AE for Activity *Verify Connectivity***

| 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                 |
|                 |                   | Explicit VR Little Endian | 1.2.840.10008.1.2.1 |      |                      |
|                 |                   | Explicit VR Big Endian    | 1.2.840.10008.1.2.2 |      |                      |

**2.3.1.3.5.2.1 SOP Specific DICOM Conformance Statement for Verification SOP class**

The DICOM SERVER AE provides standard conformance.

The DICOM SERVER AE monitors an “Operation Inactivity” timer. The connection with the SCU will be terminated if it is inactive for the configured time-out interval. Default time-out is 15 seconds and is configurable.

**2.3.1.3.5.3 Presentation Context Acceptance Criterion**

The DICOM SERVER AE evaluates each Presentation Context independently, and accepts any Presentation Context that matches an Abstract Syntax for any Real-World Activity.

**2.3.1.3.5.4 Transfer Syntax Selection Policies**

Within each Presentation Context, the DICOM SERVER AE will select Transfer Syntaxes according to the following priority (highest priority first):

1. Explicit VR Little Endian
2. Implicit VR Little Endian
3. Explicit VR Big Endian

**2.4 COMMUNICATION PROFILES**

**2.4.1 Supported Communication Stacks**

The DICOM Upper Layer Protocol is supported using TCP/IP, as specified in DICOM PS3.8.

The TCP/IP stack is inherited from the Unix operating system.

**2.4.2 Physical Media Support**

The product is provided with upto 1Gb/s auto-sensing Ethernet interface. Additional or alternate network interfaces may be available.

**Note:** For more information about the Physical Media available, please refer to the Product Data Sheet.

### 2.4.3 Additional Protocols

This product does not support DHCP.

MR supports the following System Management Profiles and configuration management protocols as defined in DICOM PS3.15.

**TABLE 2.4.3-1 SYSTEM MANAGEMENT PROFILES**

| Profile Name                       | Actor      | Protocols Used | Optional Transactions | Security Support |
|------------------------------------|------------|----------------|-----------------------|------------------|
| Basic Time Synchronization Profile | NTP Client | NTP            | N/A                   | None             |

#### 2.4.3.1 Basic Time Synchronization Profile

NTP configuration is provided through the Unix operating system. See the appropriate product service documentation.

This is equivalent to the Integrating the Healthcare Enterprise (IHE) Consistent Time Profile.

#### 2.4.4 IPv4 and IPv6 Support

This product only supports IPv4 connections.

## 2.5 EXTENSIONS / SPECIALIZATIONS/ PRIVATIZATIONS

### 2.5.1 Standard Extended / Specialized / Private SOP Classes

#### 2.5.1.1 Standard Extended SOP Classes

The product provides Standard Extended Conformance to all supported SOP Classes, through the inclusion of additional Type 3 Standard Elements and Private Data Elements. The extensions are defined in Section 11.4.1.

#### 2.5.1.2 Specialized SOP Classes

The specialized IOD is defined in Section 11.3.8.

#### 2.5.1.3 Private SOP Classes

The system supports the GE Private PET Raw Data SOP Class, as specified in Direction # 5330620-1EN Discovery 710/610 and Optima 560 DICOM Conformance Statement.

### 2.5.2 Private Transfer Syntaxes

No Private Transfer Syntax is supported.

## 2.6 CONFIGURATION

### 2.6.1 AE Title/Presentation Address Mapping

#### 2.6.2 Configurable Parameters

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

- Local AE Title
- Local IP Address
- Local Listening Port Number
- Local IP Netmask

The following fields are configurable for every remote DICOM AE:

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

A **default router** IP Address for **all remote nodes** can be configured as well as some specific routes.

The following fields are configurable:

- Association Establishment Timer
- Store, Find, Move Timers
- Inactivity Timers
- Maximum Length PDU
- Number of simultaneous associations

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

## 2.7 SUPPORT OF EXTENDED CHARACTER SETS

The Defined Terms for Specific Character Set in Table 2.7-1 are supported by MR :

TABLE 2.7-1  
SUPPORTED SPECIFIC CHARACTER SET DEFINED TERMS

| Defined Term | Character Set Description |
|--------------|---------------------------|
| ISO_IR 100   | Latin alphabet No. 1      |

As a Storage SCP, the product will not accept SOP Instances that contain unsupported character sets. The system will return appropriate failure status code.

As a Query SCU, it will accept response items with any value of Specific Character Set. However, it will display in the user interface only characters specified as within ISO\_IR 6 (ASCII) or the configured extended character set.

The product user interface will allow the user to enter characters from the console keyboard that are within ASCII or the configured extended character set. If any such extended characters are included in SOP Instances or in query identifier matching fields, the product will appropriately specify the extended character set in Specific Character Set (0008,0005). The generated MPPS messages will also specify the character set in (0008,0005) if the referenced images contain extended characters.

As a Modality Worklist SCU, it only uses ISO\_IR 100 Specific Character Set in the worklist query requests.

## 2.8 SECURITY PROFILES

The product does not conform to any defined DICOM Security Profiles.

It is assumed that the product is used within a secured environment. It is assumed that a secured environment includes at a minimum:

- Firewall or router protections to ensure that only approved external hosts have network access to the product.
- Firewall or router protections to ensure that the product only has network access to approved external hosts and services.
- Any communications with external hosts and services outside the locally secured environment use appropriate secure network channels (such as a Virtual Private Network (VPN))

## 3. MEDIA STORAGE CONFORMANCE STATEMENT

### 3.1 INTRODUCTION

This section of the DICOM conformance statement specifies the MR system compliance to DICOM requirements for **Media Interchange**. It details the DICOM Media Storage Application Profiles and roles that are supported by this product.

The MR system provides capabilities to DICOM Media Interchange on CD (Compact Disc), DVD (Digital Video Disc –Recordable) and USB Storage device with VFAT filesystem. The system works with most of the IOD's like Computed Tomography (CT), Magnetic Resonance (MR), Positron Emission Tomography (PET), and Digital X-Ray images.

### 3.2 IMPLEMENTATION MODEL

#### 3.2.1 Application Data Flow Diagram

The media interchange application model for the MR system is shown in the following illustration :

The DICOM Media Interchange Application Entity (AE) handles the DICOM CREATE/RESTORE functionality for the CD/DVD and USB storage media. The DICOM Media Interchange AE is commanded by the user to perform DICOM services operating on the DICOM media through the use of buttons and menu selections on the graphical user interface of the platform.

The user requests the creation of a DICOM File Set and the writing of this DICOM File Set on blank Interchange Media by selecting images in the local Browser and selecting the Interchange Media as being the selected device. Then, the isog660 image of the CD/DVD to burn will be generated. Once the generation has been done, it burns the complete set of data on the selected Interchange Media. For USB Storage media with VFAT filesystem, DICOM File Set is copied to blank Interchange media.

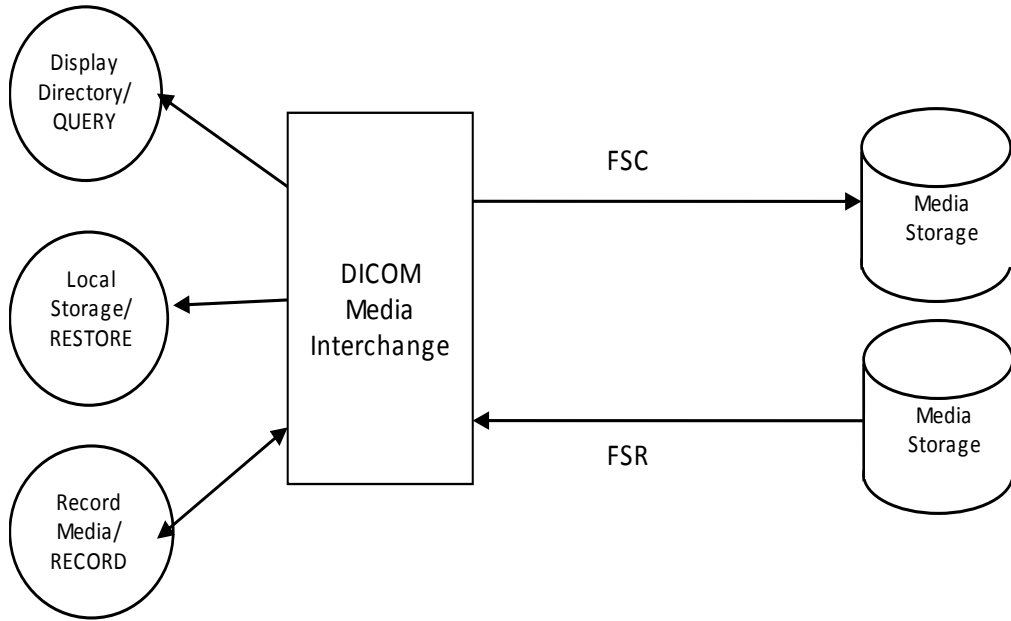


FIGURE 3-1 MR SYSTEM MEDIA INTERCHANGE APPLICATION MODEL AND DATA FLOW DIAGRAM

The DICOM Media Interchange AE has a local storage that may contain various SOP instances. These may have been obtained by original creation, network (DICOM or proprietary) or by removable media using other application entities. These instances are external to this conformance claim and the origin of SOP instances is outside the scope of this claim.

The Media Creator initializes Media by acting as an FSC to create a new DICOM File-set on a 700MB CD/4.7GB DVD/USB Storage(no size limit) blank Interchange Media. It initializes the DICOM File-set and writes all the specified SOP instances onto the Interchange Media at once. The SOP instances written will be limited to instances that match the criteria of one of the Application Profiles that is supported. Updating the media is not supported.

The DICOM Media Interchange AE acts as an FSR when requested to browse the Interchange Media such that user can select the SOP instances that he wants the DICOM Media Interchange AE to copy on the local database by selecting appropriate Study/Series/Image instances.

The supported media during creation and restore are listed below:

TABLE 3.2.1-1

| Media   | Supported during Media Create (FSC) | File System supported (FSC) | Supported during Media Restore (FSR) | File System supported (FSR) |
|---------|-------------------------------------|-----------------------------|--------------------------------------|-----------------------------|
| CD -R   | YES                                 | ISO 9660                    | YES                                  | ISO 9660                    |
| CD -RW  | YES                                 | ISO 9660                    | YES                                  | ISO 9660                    |
| DVD -R  | YES                                 | ISO 9660                    | YES                                  | ISO 9660 & UDF              |
| DVD -RW | YES                                 | ISO 9660                    | YES                                  | ISO 9660 & UDF              |

|                                |     |          |     |                |
|--------------------------------|-----|----------|-----|----------------|
| DVD+R                          | NO  | ISO 9660 | YES | ISO 9660 & UDF |
| DVD+RW                         | NO  | ISO 9660 | YES | ISO 9660 & UDF |
| DVD-ROM                        | NO  | ISO 9660 | YES | ISO 9660 & UDF |
| USB Storage (VFAT file system) | YES | VFAT     | YES | VFAT           |

### 3.2.2 Functional Definition of AE's

The DICOM Media Interchange AE supports the following functions:

- Generate and write a DICOM File Set (FSC) in a one shot activity. (SAVE).
- Read a DICOM File Set (FSR) on an Interchange Media (QUERY).
- It can copy SOP instances from the media onto local storage. (RESTORE).

### 3.2.3 Sequencing of Real-World Activities

Not Applicable.

### 3.2.4 File Meta Information Options (See PS3.10)

The File Meta-Information for this implementation is :

|                                 |  |
|---------------------------------|--|
| Source Application Entity Title | If present in composite object instances it will be set to same value, otherwise not present |
| File Meta-Information Version   | 1  |
| Implementation UID              | 1.2.826.0.1.3680043.2.60.0.1   |
| Implementation Version Name     | MEDIACREATOR_V1  |

## 3.3 AE SPECIFICATIONS

### 3.3.1 DICOM Media (CD /DVD /USB) Interchange AE Specification

The DICOM CD/DVD/USB Media AE provides standard conformance to DICOM Media Interchange Option of the Media Storage Service Class. The supported Application Profiles and roles are listed below.

**TABLE 3.3.1-1 SUPPORTED APPLICATION PROFILES AND ROLES**

| Supported Application Profile | Real World Activity | Role |
|-------------------------------|---------------------|------|
| STD-GEN-CD                    | CREATE CD           | FSC  |
| STD-GEN-CD                    | QUERY CD            | FSR  |
| STD-GEN-CD                    | RESTORE CD          | FSR  |
| STD-GEN-DVD-JPEG              | CREATE DVD          | FSC  |
| STD-GEN-DVD-JPEG              | QUERY DVD           | FSR  |
| STD-GEN-DVD-JPEG              | RESTORE DVD         | FSR  |
| STD-GEN-USB-JPEG              | CREATE USB          | FSC  |
| STD-GEN-USB-JPEG              | QUERY USB           | FSR  |
| STD-GEN-USB-JPEG              | RESTORE USB         | FSR  |

**3.3.1.1 File Meta Information for the DICOM Media Interchange AE**

Refer to section 3.2.4.

**3.3.1.2 Real-World Activities for the DICOM Media Interchange AE****3.3.1.2.1 Real-World Activity Create (Generate and Write) CD/DVD/USB Storage**

The DICOM Media Interchange AE acts as an FSC using the interchange option when requested to copy SOP Instances from the local database to a CD /DVD /USB Storage.

The user selects the entries in the local database that he/she wants the DICOM Media Interchange AE to copy onto Interchange Media.

The graphic interface allows the user to select the entries (studies, series or images) in the local database to be copied onto to the selected Interchange Media.

The DICOM Media Interchange AE creates one File Set per generated Interchange Media.

- A user can only create one copy of CD/DVD/USB image for a drive at a time; any other attempt of creation will not be allowed until the first one is complete or cancelled.
- A user cannot create CD/DVD/USB while restore CD/DVD/USB is in process.
- A DICOM Media Viewer is provided along with the selected object instances on the interchange media. This viewer can be loaded on a standard PC running Windows XP, Windows Vista or Windows 7.

Before writing on the Interchange Media, the DICOM Media Interchange AE checks for the following condition:

The inserted media is blank and write-able. If the condition is not met, an error is displayed and the user needs to replace it with a blank media.

Following are the SOP Classes supported by this AE. All SOP Instances use the Explicit VR Little Endian Uncompressed Transfer Syntax, UID 1.2.840.10008.1.2.1.

**TABLE 3.3.1.2-1 SOP CLASSES SUPPORTED BY ACTIVITY CREATE CD/DVD/USB STORAGE**

| SOP Class                                     | SOP Class UID                |
|---|------------------------------|
| CT Image Storage                              | 1.2.840.10008.5.1.4.1.1.2    |
| MR Image Storage                              | 1.2.840.10008.5.1.4.1.1.4    |
| Positron Emission Tomography Image Storage    | 1.2.840.10008.5.1.4.1.1.128  |
| Nuclear Medicine Image Storage                | 1.2.840.10008.5.1.4.1.1.20   |
| Ultrasound Image Storage                      | 1.2.840.10008.5.1.4.1.1.6    |
| X-Ray Angiographic Image Storage              | 1.2.840.10008.5.1.4.1.1.12.1 |
| Secondary Capture Image Storage               | 1.2.840.10008.5.1.4.1.1.7    |
| Grayscale Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.1 |



|                                  |                               |
|----------------------------------|-------------------------------|
| Enhanced SR Storage              | 1.2.840.10008.5.1.4.1.1.88.22 |
| GEMS PET Raw Information Storage | 1.2.840.113619.4.30           |

### 3.3.1.2.1.1 Application Profile for the RWA Create CD/DVD/USB Storage

Refer to Sec 3.3.1 for the list of Application Profiles that invoke this AE for the Create CD/DVD/USB Storage RWA.

#### 3.3.1.2.1.1.1 Options for STD-GEN-CD Application Profile:

Refer Table 3.3.1.2-1 for SOP Classes supported by this AE.

Common DICOMDIR Directory Records created by this AE will include key attributes as described in [Section 7 - Basic Directory Information Object Implementation](#).

#### 3.3.1.2.1.1.2 Options for STD-GEN-DVD-JPEG Application Profile

Refer Table 3.3.1.2-1 for SOP Classes supported by this AE.

Common DICOMDIR Directory Records created by this AE will include key attributes as described in [Section 7 - Basic Directory Information Object Implementation](#).

#### 3.3.1.2.1.1.3 Options for STD-GEN-USB-JPEG Application Profile

Refer Table 3.3.1.2-1 for SOP Classes supported by this AE.

Common DICOMDIR Directory Records created by this AE will include key attributes as described in [Section 7 - Basic Directory Information Object Implementation](#).

### 3.3.1.2.2 Real-World Activity Display CD/DVD/USB Storage – QUERY

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

When the DICOM Media Interchange AE is requested to provide a directory listing, it reads the File-set and displays the DICOMDIR directory entries, according to the STUDY Root paradigm.

If the media is not blank, then Interchange Media gets mounted. To remove the media, the user has to select the eject button on user interface for the appropriate drive.

A user cannot display the directory when create/restore CD/DVD/USB is in progress.

### 3.3.1.2.2.1 Application Profile for the RWA Display CD/DVD/USB Storage

For the list of Application Profiles that invoke this AE for the Display Directory CD/DVD/USB Storage RWA, see the TABLE 3.3.1-1.

#### 3.3.1.2.2.1.1 Options for STD-GEN-CD/STD-GEN-DVD-JPEG/STD-GEN-USB-JPEG Application Profile

Common DICOMDIR Directory Records read by this AE will include key attributes as described in [Section 7 - Basic Directory Information Object Implementation](#).

Following are the SOP Classes supported by the RWA "Display Directory of CD/DVD/USB Storage.

TABLE 3.3.1.2-5 SOP CLASSES SUPPORTED BY ACTIVITY *DISPLAY CD/DVD/USB STORAGE*

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

Refer Sections 3.3.1.2.1.1.1, 3.3.1.2.1.1.2 and 3.3.1.2.1.1.3 for the additional DICOMDIR keys, which are read (if present).

### 3.3.1.2.3 Real-World Activity Restore CD/DVD/USB Storage

The DICOM Media (CD/DVD /USB Storage) Interchange AE acts as an FSR using the interchange option when requested to copy SOP instances from the CD/DVD/USB to the local database.

The user selects the SOP instances that he wants the DICOM Media Interchange AE to copy on the local database by selecting appropriate Study/Series/Image instances and clicking on the suitable restore buttons. Once selected, the SOP instances are copied from the media to the local database.

If the media is not blank, then the Interchange Media gets mounted. To remove the media, the user has to select the eject button on the User Interface for the appropriate drive.

A user cannot restore CD/DVD/USB while create CD/DVD/USB is in process.

A user can only restore selected composite objects at a time from a media; any other attempt of selections to restore CD/DVD/USB on media in same drive will wait until the first one is completed.

#### 3.3.1.2.3.1 Application Profile for the RWA Restore CD/DVD/USB Storage

For the list of Application Profiles that invoke this AE for the Display Directory CD/DVD/USB Storage RWA, see the TABLE 3.3.1-1.

##### 3.3.1.2.3.1.1 Options for STD-GEN-CD/STD-GEN-DVD-JPEG/STD-GEN-USB-JPEG Application Profile

Common DICOMDIR Directory Records read by this AE will include key attributes as described in [Section 7 - Basic Directory Information Object Implementation](#).

Following are the SOP Classes supported by the RWA Restore CD/DVD/USB Storage.

TABLE 3.3.1.2-6 SOP CLASSES SUPPORTED BY ACTIVITY RESTORE CD/DVD/USB STORAGE

| Information Object Definition   | SOP Class UID        | Transfer Syntax   | Transfer Syntax UID    |
|---------------------------------|----------------------|---|------------------------|
| Media Storage Directory Storage | 1.2.840.10008.1.3.10 | Explicit VR Little Endian   | 1.2.840.10008.1.2.1    |
| See Table 3.3.1.2-1             | See Table 3.3.1.2-1  | Explicit VR Little Endian   | 1.2.840.10008.1.2.1    |
| See Table 3.3.1.2-1             | See Table 3.3.1.2-1  | JPEG Lossless Process 14 (selection value 1)  | 1.2.840.10008.1.2.4.70 |
| See Table 3.3.1.2-1             | See Table 3.3.1.2-1  | JPEG Lossy, Baseline Sequential with Huffman Coding (Process 1)   | 1.2.840.10008.1.2.4.50 |
| See Table 3.3.1.2-1             | See Table 3.3.1.2-1  | JPEG Extended (Process 2 & 4): Default Transfer Syntax for Lossy JPEG 12 Bit Image Compression (Process 4 only) | 1.2.840.10008.1.2.4.51 |

#### 3.4 AUGMENTED AND PRIVATE APPLICATION PROFILES

No augmented/private profile is implemented.

#### 3.5 EXTENSIONS / SPECIALIZATIONS / PRIVATIZATIONS

None.

#### 3.6 CONFIGURATION

None

#### 3.7 SUPPORT OF EXTENDED CHARACTER SETS

The DICOM Media Interchange AE will support copy of SOP instances containing the ISO IR 100 (Latin alphabet No. 1, supplementary set) and DICOM default character sets as defined in PS3.5.

#### 3.8 IHE INTEGRATION

##### 3.8.1 IHE PDI

The MR supports the Integrating the Healthcare Enterprise (IHE) Portable Data for Imaging (PDI) Profile as Portable Media Creator, Portable Media Importer, and Image Display actors.

Table 3.8.1-1 lists the IHE PDI profile options supported by Portable Media Creator.

TABLE 3.8.1-1 SUPPORT OF IHE PDI PROFILE AS PORTABLE MEDIA CREATOR

| Option             | Support |
|--------------------|---------|
| Write to DVD Media | Yes     |
| Write to USB Media | Yes     |
| Add Basic Viewer   | Yes     |
| Media Labelling    | Yes     |
| Privacy Protection | No      |

|                  |    |
|------------------|----|
| Sending Software | No |
| WEB Content      | No |

Portable Media Importer and Image Display actors are supported for reading media.

## 4. MODALITY WORKLIST QUERY IMPLEMENTATION

This section specifies the use of the DICOM Modality Worklist Information Model used to organize data and against which a Modality Worklist Query will be performed.

### 4.1 MODALITY WORKLIST INFORMATION MODEL ENTITY-RELATIONSHIP MODEL

The Entity-Relationship diagram for the Modality Worklist Information Model schema is shown in Figure 4-1-1. It represents the information that composes a Worklist Item. In this figure, the following diagrammatic convention is established to represent the information organization:

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

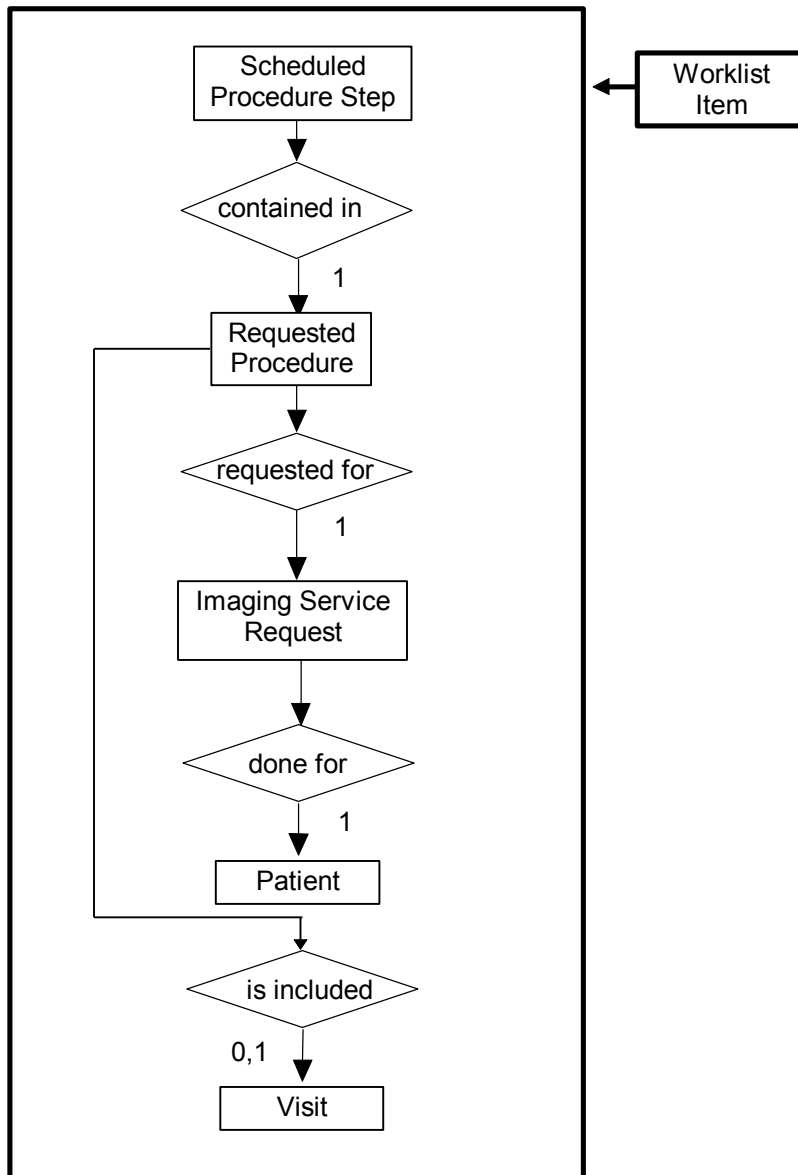


FIGURE 4-1-1 MODALITY WORKLIST INFORMATION MODEL E/R DIAGRAM

#### 4.1.1 Entity Descriptions

Please refer to DICOM Standard PS 3.3. (Information Object Definitions) and PS 3.4 (Service Class Specifications) for a description of each of the Entities contained within the Modality Worklist Information Model.

##### 4.1.1.1 Scheduled Procedure Step

A Scheduled Procedure Step is an arbitrarily defined scheduled unit of service that is specified by the Procedure Plan for a Requested Procedure. It specifies one or more Action Items (events) involving equipment (i.e. imaging modality equipment), human resources, location and time (i.e. start time, stop time, duration).

**4.1.1.2 Requested Procedure Entity Description**

A Requested Procedure is an instance of a Procedure of a given Procedure Type. An instance of a Requested Procedure includes all of the items of information that are specified by an instance of a Procedure Plan that is selected for the Requested Procedure by the imaging service provider.

**4.1.1.3 Imaging Service Request Entity Description**

An Imaging Service Request is a set of one or more Requested Procedures selected from a list of Procedure Types. An Imaging Service Request is submitted by one authorized imaging service requester to one authorized imaging service provider in the context of one Service Episode.

**4.1.1.4 Visit Entity Description**

A Visit is the context in which the treatment or management of an arbitrary subset of a Patient's medical conditions occurs. A Visit is limited to the description of a Patient's activities at a single facility.

**4.1.1.5 Patient Entity Description**

A Patient is a person receiving, or registered to receive, healthcare services.

**4.2 MR MAPPING OF DICOM ENTITIES**

The MR maps DICOM Information Entities to local Information Entities in the product's database and user interface.

**TABLE 4.4.1.1-1-1**  
**MAPPING OF DICOM ENTITIES TO MR ENTITIES**

| DICOM                    | MR Entity |
|--------------------------|-----------|
| Scheduled Procedure Step | Exam      |
| Requested Procedure      | Exam      |
| Imaging Service Request  | Exam      |
| Visit                    | Exam      |
| Patient                  | Patient   |

**4.3 MODALITY WORKLIST INFORMATION MODEL MODULE**

Within an entity of the DICOM Modality Worklist Information Model, attributes are grouped together into related set of attributes called modules. A module facilitates the understanding of the semantics concerning the attributes and how the attributes relate to one another. A module grouping does not infer any encoding of information into datasets.

Table 4.4.1.1-11 identifies the defined modules within the entities which comprise the DICOM Modality Worklist Information Model. Modules are identified by Module Name.

See DICOM PS 3.3 and PS 3.4 for a complete definition of the entities, modules, and attributes.

TABLE 4.4.1.1-1-1 MODALITY WORKLIST INFORMATION MODEL MODULES

| Entity Name              | Module Name              | Reference |
|--------------------------|--------------------------|-----------|
| Scheduled Procedure Step | SOP Common               | 4.4.2.1   |
|                          | Scheduled Procedure Step | 4.4.2.2   |
| Requested Procedure      | Requested Procedure      | 4.4.3.1   |
| Imaging Service Request  | Imaging Service Request  | 4.4.4.1   |
| Visit                    | Visit Identification     | 4.4.5.1   |
|                          | Visit Status             | 4.4.5.2   |
|                          | Visit Relationship       | 4.4.5.3   |
|                          | Visit Admission          | 4.4.5.4   |
| Patient                  | Patient Relationship     | 4.4.6.1   |
|                          | Patient Identification   | 4.4.6.2   |
|                          | Patient Demographic      | 4.4.6.3   |
|                          | Patient Medical          | 4.4.6.4   |

#### 4.4 INFORMATION MODEL KEYS

Please refer to DICOM Standard PS 3.3. (Information Object Definitions) and PS 3.4 (Service Class Specifications) for a description of each of the Entities contained within the Modality Worklist Information Model.

The following Module descriptions contain the attributes, which are present in a C-FIND request message sent by the DICOM SERVER AE to a remote AE. It should be noted that they are the same as those defined in the DICOM Standard, PS 3.4 (Service Class Specifications). Required attributes for the MR are also indicated.

- **Attribute Name**
- **Tag:** group and element numbers
- **Required for MWL:** These attributes are required for MR configured with Modality Worklist. { Yes=required; No=Not required }
- **Mapped into The Image:** Whether this data is mapped into subsequently acquired images
- **Notes:** Clarification of this implementation's use/treatment of this attribute

All data elements in the following Module descriptions are requested by the DICOM SERVER AE if requested by the operator. Values of data elements that are not mapped into images, and that are not otherwise dealt with (displayed on the user interface, etc.) are not used and thus, are discarded upon receipt – although they may be used to filter the entries returned.

Data elements for which values can be sent for matching purposes are described as such. Data elements for which values are not sent are sent with zero length and



universal matching will apply. This is the default case if no other description to the contrary is provided.

#### 4.4.1 Supported Matching

The following are the types of matching that can be requested by the implementation:

- Single Value matching
- Universal matching
- Range of date/time matching
- Wildcard matching

#### 4.4.2 Common Scheduled Procedure Step Entity Modules

##### 4.4.2.1 SOP Common Module

TABLE 4.4.2.1-1 SOP COMMON MODULE ATTRIBUTES

| Attribute Name         | Tag         | Expected Matching Key Type | Expected Returned Key Type | Mapped into Instance / MPPS | Note   |
|------------------------|-------------|----------------------------|----------------------------|-----------------------------|--|
| Specific Character Set | (0008,0005) | O                          | 1C                         | No/Yes                      | This attribute is part of MWL query. See section <a href="#">4.4.2.1.1</a> . |

##### 4.4.2.1.1 Specific Character Set

ISO\_IR\_100 is the Specific Character Set (0008, 0005) value sent during querying and while interpreting response. The attribute Specific Character Set (0008,0005) will not be sent unless Patient Name is sent.

##### 4.4.2.2 Scheduled Procedure Step Module

TABLE 4.4.2.2-1 SCHEDULED PROCEDURE STEP MODULE ATTRIBUTES

| Attribute Name                    | Tag         | Expected Matching Key Type | Expected Returned Key Type | Mapped into Instance / MPPS | Note   |
|-----------------------------------|-------------|----------------------------|----------------------------|-----------------------------|--|
| Scheduled Procedure Step Sequence | (0040,0100) | R                          | 1                          | No/No                       | Requested in the MWL queries.  |
| >Scheduled Station AE Title       | (0040,0001) | R                          | 1                          | No/No                       | Matching is supported as follows: <ol style="list-style-type: none"> <li>1. No AE title is supplied (universal matching),</li> <li>2. Scanner's Worklist Server Station Name is supplied for matching (Single value matching).</li> </ol> This is user selectable. |

|  |             |   |      |         |   |
|--|-------------|---|------|---------|---|
| >Scheduled Procedure Step Start Date   | (0040,0002) | R | 1 *  | No/No   | Requested in the MWL queries. Matching is supported as one of the following: <ul style="list-style-type: none"> <li>• Any day,</li> <li>• Today only,</li> <li>• Today and a number of days before today,</li> <li>• Today and a number of days after today,</li> <li>• Date range – between a given start date and end date.</li> </ul> The number of days before/after is specified by the user. These options are user selectable and are displayed on "Worklist Schedule" Screen. |
| >Scheduled Procedure Step Start Time   | (0040,0003) | R | 1 *  | No/No   | Requested in the MWL queries with zero-length value.  |
| >Scheduled Procedure Step End Date     | (0040,0004) | O | 3    | No/No   | Not requested   |
| >Scheduled Procedure Step End Time     | (0040,0005) | O | 3    | No/No   | Not requested   |
| >Modality                              | (0008,0060) | R | 1 *  | No/No   | Requested in the MWL queries. Matching: Single value and Universal matching. This is configurable.  |
| >Scheduled Performing Physician's Name | (0040,0006) | R | 2    | No/No   | Requested in the MWL queries with zero-length value.  |
| >Scheduled Procedure Step Description  | (0040,0007) | O | 1C * | Yes/Yes | Requested in the MWL queries with zero-length value.  |
| >Scheduled Station Name                | (0040,0010) | O | 2    | No/No   | Requested in the MWL queries. Matching: Single value matching. This is configurable.  |
| >Scheduled Procedure Step Location     | (0040,0011) | O | 2    | No/No   | Not requested   |
| >Scheduled Protocol Code Sequence      | (0040,0008) | O | 1C * | Yes/Yes | Requested in the MWL queries. Content from the returned C-FIND response is used for mapping local protocols.  |

|   |             |   |      |         |   |
|---|-------------|---|------|---------|---|
| >>Code Value                              | (0008,0100) | O | 1 *  | Yes/Yes | Requested in the MWL queries.<br>For MR systems, when a procedure step is selected from the schedule, the returned value is used to automatically select and launch a protocol for MR systems (if the appropriate mapping has been established). See the MR system documentation for further details. |
| >>Coding Scheme Designator                | (0008,0102) | O | 1    | Yes/Yes | Requested in the MWL queries.   |
| >>Coding Scheme Version                   | (0008,0103) | O | 3    | Yes/Yes | Requested in the MWL queries.   |
| >>Code Meaning                            | (0008,0104) | O | 3 *  | Yes/Yes | Requested in the MWL queries.   |
| >Pre-Medication                           | (0040,0012) | O | 2C * | No/No   | Requested in the MWL queries. Displayed on "Other Information" screen.  |
| >Scheduled Procedure Step ID              | (0040,0009) | O | 1    | Yes/Yes | Requested in the MWL queries.   |
| >Requested Contrast Agent                 | (0032,1070) | O | 2C   | No/No   | Requested in the MWL queries. Can be configured for display.  |
| >Scheduled Procedure Step Status          | (0040,0020) | O | 3    | No/No   | Requested in the MWL queries.   |
| >Comments on the Scheduled Procedure Step | (0040,0400) | O | 3    | No/No   | Not requested.  |

**Note:** \* in the *Expected Return Key Type* column indicates that this information is displayed on screen, if available

#### 4.4.3 Common Requested Procedure Entity Modules

##### 4.4.3.1 Requested Procedure Module

TABLE 4.4.3.1-1 REQUESTED PROCEDURE MODULE ATTRIBUTES

| Attribute Name                  | Tag         | Expected Matching Key Type | Expected Returned Key Type | Mapped into Instance / MPPS | Note   |
|---------------------------------|-------------|----------------------------|----------------------------|-----------------------------|--|
| Requested Procedure ID          | (0040,1001) | O                          | 1 *                        | Yes/Yes                     | Requested in the MWL queries.<br>Matching: Single Value and Universal matching (zero length) |
| Requested Procedure Description | (0032,1060) | O                          | 1C                         | Yes/Yes                     | Requested in the MWL queries.  |

|   |             |   |     |         |   |
|---|-------------|---|-----|---------|---|
| Requested Procedure Code Sequence       | (0032,1064) | O | 1C  | No/Yes  | Requested in the MWL queries. Content from this sequence is mapped to (0008,1032) "Procedure Code Sequence" in the generated MPPS instance. |
| >Code Value                             | (0008,0100) | O | 1   | No/Yes  |   |
| >Coding Scheme Designator               | (0008,0102) | O | 1   | No/Yes  |   |
| >Coding Scheme Version                  | (0008,0103) | O | 3   | No/Yes  |   |
| >Code Meaning                           | (0008,0104) | O | 3 * | No/Yes  |   |
| Study Instance UID                      | (0020,000D) | O | 1   | Yes/Yes | Requested in the MWL queries.   |
| Study Date                              | (0008,0020) | O | 3   | No/No   | Requested in the MWL queries.   |
| Study Time                              | (0008,0030) | O | 3   | No/No   | Requested in the MWL queries.   |
| Referenced Study Sequence               | (0008,1110) | O | 2   | Yes/Yes | Requested in the MWL queries.   |
| >Referenced SOP Class UID               | (0008,1150) | O | 1C  | Yes/Yes | Requested in the MWL queries.   |
| >Referenced SOP Instance UID            | (0008,1155) | O | 1C  | Yes/Yes | Requested in the MWL queries.   |
| Requested Procedure Priority            | (0040,1003) | O | 2   | No/No   | Not requested.  |
| Patient Transport Arrangements          | (0040,1004) | O | 2   | No/No   | Not requested.  |
| Requested Procedure Location            | (0040,1005) | O | 3   | No/No   | Not requested.  |
| Confidentiality Code                    | (0040,1008) | O | 3   | No/No   | Not requested.  |
| Reporting Priority                      | (0040,1009) | O | 3   | No/No   | Not requested.  |
| Names of Intended Recipients of Results | (0040,1010) | O | 3   | No/No   | Not requested.  |
| Reason for the Requested Procedure      | (0040,1002) | O | 3   | No/No   | Not requested.  |
| Requested Procedure Comments            | (0040,1400) | O | 3   | No/No   | Not requested.  |

**Note:**

\* in the *Expected Return Key Type* column indicates that this information is displayed on screen, if available

## 4.4.4 Common Imaging Service Request Entity Modules

## 4.4.4.1 Imaging Service Request Module

TABLE 4.4.4.1-1 IMAGING SERVICE REQUEST MODULE ATTRIBUTES

| Attribute Name                                | Tag         | Expected Matching Key Type | Expected Returned Key Type | Mapped into Instance / MPPS | Note   |
|---|-------------|----------------------------|----------------------------|-----------------------------|--|
| Accession Number                              | (0008,0050) | 0                          | 2 *                        | Yes/Yes                     | Requested in the MWL queries.<br>Matching: Single Value and Universal matching (zero length) |
| Requesting Physician                          | (0032,1032) | 0                          | 2                          | No/No                       | Requested in the MWL queries with zero-length value.   |
| Referring Physician's Name                    | (0008,0090) | 0                          | 2 *                        | Yes/No                      | Requested in the MWL queries with zero-length value.   |
| Requesting Service                            | (0032,1033) | 0                          | 3                          | No/No                       | Not requested  |
| Reason for the Imaging Service Request        | (0040,2001) | 0                          | 3                          | No/No                       | Not requested.   |
| Imaging Service Request Comments              | (0040,2400) | 0                          | 3                          | No/No                       | Not requested.   |
| Issue Date of Imaging Service Request         | (0040,2004) | 0                          | 3                          | No/No                       | Not requested.   |
| Issue Time of Imaging Service Request         | (0040,2005) | 0                          | 3                          | No/No                       | Not requested.   |
| Placer Order Number / Imaging Service Request | (0040,2016) | 0                          | 3                          | Yes/Yes                     | Requested in the MWL queries with zero-length value.   |
| Filler Order Number / Imaging Service Request | (0040,2017) | 0                          | 3                          | Yes/Yes                     | Requested in the MWL queries with zero-length value.   |
| Order entered by ...                          | (0040,2008) | 0                          | 3                          | No/No                       | Not requested.   |
| Order Enterer's Location                      | (0040,2009) | 0                          | 3                          | No/No                       | Not requested.   |
| Order Callback Phone Number                   | (0040,2010) | 0                          | 3                          | No/No                       | Not requested.   |

**Note:** \* in the *Expected Return Key Type* column indicates that this information is displayed on screen, if available

#### 4.4.5 Common Visit Entity Modules

##### 4.4.5.1 Visit Identification

TABLE 4.4.5.1-1 VISIT IDENTIFICATION MODULE ATTRIBUTES

| Attribute Name            | Tag         | Expected Matching Key Type | Expected Returned Key Type | Mapped into Instance / MPPS | Note   |
|---------------------------|-------------|----------------------------|----------------------------|-----------------------------|--|
| Admission ID              | (0038,0010) | O                          | 2                          | Yes/Yes                     | Requested in the MWL queries with zero-length value. |
| Institution Name          | (0008,0080) | O                          | 3                          | No/No                       | Not requested.                                       |
| Institution Address       | (0008,0081) | O                          | 3                          | No/No                       | Not requested.                                       |
| Institution Code Sequence | (0008,0082) | O                          | 3                          | No/No                       | Not requested.                                       |
| Issuer of Admission ID    | (0038,0011) | O                          | 3                          | Yes/Yes                     | Requested in the MWL queries with zero-length value. |

##### 4.4.5.2 Visit Status

TABLE 4.4.5.2-1 VISIT STATUS MODULE ATTRIBUTES

| Attribute Name                  | Tag         | Expected Matching Key Type | Expected Returned Key Type | Mapped into Instance / MPPS | Note   |
|---------------------------------|-------------|----------------------------|----------------------------|-----------------------------|--|
| Current Patient Location        | (0038,0300) | O                          | 2                          | No/No                       | Requested in the MWL queries with zero-length value. |
| Visit Status ID                 | (0038,0008) | O                          | 3                          | No/No                       | Not requested.                                       |
| Patient's Institution Residence | (0038,0400) | O                          | 3                          | No/No                       | Not requested.                                       |
| Visit Comments                  | (0038,4000) | O                          | 3                          | No/No                       | Not requested.                                       |

##### 4.4.5.3 Visit Relationship

TABLE 4.4.5.3-1 VISIT RELATIONSHIP MODULE ATTRIBUTES

| Attribute Name | Tag | Expected Matching Key Type | Expected Returned Key Type | Mapped into Instance / MPPS | Note |
|----------------|-----|----------------------------|----------------------------|-----------------------------|------|
|----------------|-----|----------------------------|----------------------------|-----------------------------|------|

|                              |             |   |    |        |               |
|------------------------------|-------------|---|----|--------|---------------|
| Referenced Patient Sequence  | (0008,1120) | O | 2  | No/Yes | Not requested |
| >Referenced SOP Class UID    | (0008,1150) | O | 1C | No/Yes | Not requested |
| >Referenced SOP Instance UID | (0008,1155) | O | 1C | No/Yes | Not requested |

#### 4.4.5.4 Visit Admission

No data elements are requested from the Visit Admission Module.

#### 4.4.6 Common Patient Entity Modules

##### 4.4.6.1 Patient Relationship

No data elements are requested from the Patient Relationship Module.

##### 4.4.6.2 Patient Identification

TABLE 4.4.6.2-1 PATIENT IDENTIFICATION MODULE ATTRIBUTES

| Attribute Name                           | Tag         | Expected Matching Key Type | Expected Returned Key Type | Mapped into Instance / MPPS | Note  |
|--|-------------|----------------------------|----------------------------|-----------------------------|---|
| Patient's Name                           | (0010,0010) | R                          | 1 *                        | Yes/Yes                     | Requested in the MWL queries.<br>Matching: Single value, Wildcard and Universal matching.<br>^ delimiter is automatically added when the name entered by the user contains multiple name parts. |
| Patient ID                               | (0010,0020) | R                          | 1 *                        | Yes/Yes                     | Requested in the MWL queries.<br>Matching: Single value and Universal matching (zero-length).   |
| Issuer of Patient ID                     | (0010,0021) | O                          | 3                          | Yes/Yes                     | Requested in the MWL queries with zero-length value.  |
| Issuer of Patient ID Qualifiers Sequence | (0010,0024) | O                          | 3                          | No/No                       | Not requested.  |
| Other Patient IDs Sequence               | (0010,1002) | O                          | 3                          | No/No                       | Not requested.  |
| Other Patient IDs                        | (0010,1000) | O                          | 3                          | Yes/No                      | Requested in the MWL queries with zero-length value.<br>Displayed on "More Info..." screen  |

|                               |             |   |   |       |                |
|-------------------------------|-------------|---|---|-------|----------------|
| Other Patient Names           | (0010,1001) | O | 3 | No/No | Not requested. |
| Patient's Birth Name          | (0010,1005) | O | 3 | No/No | Not requested. |
| Patient's Mother's Birth Name | (0010,1060) | O | 3 | No/No | Not requested. |
| Medical Record Locator        | (0010,1090) | O | 3 | No/No | Not requested. |

**Note:** \* in the *Expected Return Key Type* column indicates that this information is displayed on screen, if available

#### 4.4.6.3 Patient Demographic

TABLE 4.4.6.3-1 PATIENT DEMOGRAPHIC MODULE ATTRIBUTES

| Attribute Name                             | Tag         | Expected Matching Key Type | Expected Returned Key Type | Mapped into Instance / MPPS | Note   |
|--|-------------|----------------------------|----------------------------|-----------------------------|--|
| Patients Birth Date                        | (0010,0030) | O                          | 2 *                        | Yes/Yes                     | Requested in the MWL queries with zero-length value.<br>Displayed on the "More Info.." screen.   |
| Patient's Sex                              | (0010,0040) | O                          | 2 *                        | Yes/Yes                     | Requested in the MWL queries with zero-length value.<br>Displayed on the "More Info.." screen.   |
| Patient's Weight                           | (0010,1030) | O                          | 2                          | No/No                       | Requested in the MWL queries with zero-length value.<br>Displayed on "More Info..." screen.<br>Weight is an operator entry requirement for MR on the "Patient Information" screen. |
| Confidentiality constraint on patient data | (0040,3001) | O                          | 2                          | No/No                       | Not requested.   |
| Patient's Size                             | (0010,1020) | O                          | 3                          | Yes/No                      | Requested in the MWL queries with zero-length value.   |
| Patient's Address                          | (0010,1040) | O                          | 3                          | No/No                       | Not requested.   |
| Patient's Telephone Numbers                | (0010,2154) | O                          | 3                          | No/No                       | Not requested.   |
| Patient's Age                              | (0010,1010) | O                          | 3*                         | Yes/No                      | Requested in the MWL queries   |
| Occupation                                 | (0010,2180) | O                          | 3                          | No/No                       | Not requested.   |
| Patient's Birth Time                       | (0010,0032) | O                          | 3                          | No/No                       | Not requested.   |
| Patient's Insurance Plan Code Sequence     | (0010,0050) | O                          | 3                          | No/No                       | Not requested.   |



|                                |             |   |   |       |  |
|--------------------------------|-------------|---|---|-------|--|
| Military Rank                  | (0010,1080) | O | 3 | No/No | Not requested.   |
| Branch of Service              | (0010,1081) | O | 3 | No/No | Not requested.   |
| Country of Residence           | (0010,2150) | O | 3 | No/No | Not requested.   |
| Region of Residence            | (0010,2152) | O | 3 | No/No | Not requested.   |
| Patient's Telephone Numbers    | (0010,2154) | O | 3 | No/No | Not requested.   |
| Ethnic Group                   | (0010,2160) | O | 3 | No/No | Requested in the MWL queries.<br>Displayed on "More Info..." screen. |
| Patient's Religious Preference | (0010,21F0) | O | 3 | No/No | Not requested.   |
| Patient Comments               | (0010,4000) | O | 3 | No/No | Requested in the MWL queries<br>Displayed on "More Info..." screen.  |

**Note:** \* in the *Expected Return Key Type* column indicates that this information is displayed on screen, if available

#### 4.4.6.4 Patient Medical

TABLE 4.4.6.4-1 PATIENT MEDICAL MODULE ATTRIBUTES

| Attribute Name             | Tag         | Expected Matching Key Type | Expected Returned Key Type | Mapped into Instance / MPPS | Note   |
|----------------------------|-------------|----------------------------|----------------------------|-----------------------------|--|
| Patient State              | (0038,0500) | O                          | 2                          | No/No                       | Not requested.   |
| Pregnancy Status           | (0010,21C0) | O                          | 2 *                        | No/No                       | Requested in the MWL queries with zero-length value.<br>Displayed on "Other Information" screen. |
| Medical Alerts             | (0010,2000) | O                          | 2 *                        | No/No                       | Requested in the MWL queries with zero-length value.   |
| Contrast Allergies         | (0010,2110) | O                          | 2 *                        | No/No                       | Requested in the MWL queries with zero-length value.<br>Displayed on "Other Information" screen. |
| Special Needs              | (0038,0050) | O                          | 2                          | No/No                       | Requested in the MWL queries with zero-length value. Can be configured for displaying.           |
| Smoking Status             | (0010,21A0) | O                          | 3                          | No/No                       | Not requested.   |
| Additional Patient History | (0010,21B0) | O                          | 3                          | Yes/No                      | Requested in the MWL queries with zero-length value.<br>Displayed on "Other Information" screen. |
| Last Menstrual Date        | (0010,21D0) | O                          | 3                          | No/No                       | Not requested.   |

**Note:**

\* in the Expected Return Key Type column indicates that this information is displayed on screen, if available

## 5. MODALITY PERFORMED PROCEDURE STEP IMPLEMENTATION

### 5.1 INTRODUCTION

This section specifies the use of the DICOM Modality Performed Procedure Step information to be communicated to the Hospital/Radiology information system.

This feature works in conjunction with DICOM Modality Worklist feature, if installed. However the conformance of this feature is independent of Modality Worklist feature. For information on conformance of Modality Worklist feature to DICOM standard please refer to the appropriate section in this document.

### 5.2 RELATIONSHIP BETWEEN SCHEDULED AND PERFORMED PROCEDURE STEPS

MR supports one-to-one relationship, zero-to-one relationship (aka Unscheduled Case or Acquisition without MWL Data), a one-to-multiple relationship (aka Append Case or Post-processing) between Scheduled Procedure Step and PPS.

### 5.3 MODALITY PERFORMED PROCEDURE STEP MODULE TABLE

See DICOM PS 3.3 and PS 3.4 for a complete definition of the entities, modules, and attributes.

**TABLE 5.3-1 MODALITY PERFORMED PROCEDURE STEP MODULES**

| Module Name                           | Reference |
|---------------------------------------|-----------|
| SOP Common                            | 5.4.1     |
| Performed Procedure Step Relationship | 5.4.2     |
| Performed Procedure Step Information  | 5.4.3     |
| Image Acquisition Results             | 5.4.4     |
| Radiation Dose                        | 5.4.5     |
| Billing and Material Management Codes | 5.4.6     |

### 5.4 MODALITY PERFORMED PROCEDURE STEP MODULE DEFINITIONS

Please refer to DICOM Standard PS 3.3. (Information Object Definitions) for a description of each of the attributes contained within the Modality Performed Procedure Step Information Object Definition.

#### 5.4.1 SOP Common Module

**TABLE 5.4.1-1 SOP COMMON MODULE ATTRIBUTES**

| Attribute Name         | Tag         | Type for SCU<br>N-CREATE | Type for SCU<br>N-SET | Use  |
|------------------------|-------------|--------------------------|-----------------------|--|
| Specific Character Set | (0008,0005) | 1C                       | 1C                    | If present, this tag is read from the image. Default value for this tag is "ISO_IR 100". |

## 5.4.2 Performed Procedure Step Relationship Module

MPPS IOD creator of the system reads the MPPS data to be sent from the composite.

TABLE 5.4.2-1 PERFORMED PROCEDURE STEP RELATIONSHIP MODULE ATTRIBUTES

| Attribute Name                               | Tag         | Type for SCU - N-CREATE                                  |  |   |
|--|-------------|--|--|---|
|  |             | Acquisition without MWL Entry                            | Acquisition with MWL Entry   | Post-Processing   |
| Scheduled Step Attributes Sequence           | (0040,0270) | 1, Only one item   | 1  | 1   |
| >Study Instance UID                          | (0020,000D) | 1, Created at the scanner.                               | 1, Copied from SPS, if option to copy is present or else created at the scanner. | 1, Same as in the composite   |
| >Referenced Study Sequence                   | (0008,1110) | 2, Sent empty  | 2, Copied from SPS if present, else sent empty. Only one item                    | 2, Same as for the source composite if present, else sent empty. Only one item. |
| >>Referenced SOP Class UID                   | (0008,1150) | 1, Not Sent  | 1, Copied from SPS if present, else not sent                                     | 1, Same as for the source composite, else not sent                              |
| >>Referenced SOP Instance UID                | (0008,1155) | 1, Not Sent  | 1, Copied from SPS if present, else not sent                                     | 1, Same as for the source composite if present else not sent                    |
| >Accession Number                            | (0008,0050) | 2, User input on the scanner if entered. Else sent empty | 2, Copied from SPS if present else sent empty                                    | 2, Same as for the source composite else sent empty                             |
| >Placer Order Number/Imaging Service Request | (0040,2016) | 3, Not Sent  | 3, Copied from SPS if present else not sent                                      | 3, Copied from composite if present else not sent                               |
| >Filler Order Number/Imaging Service Request | (0040,2017) | 3, Not Sent  | 3, Copied from SPS if present else not sent                                      | 3, Copied from composite if present else not sent                               |
| >Requested Procedure ID                      | (0040,1001) | 2, User input on the scanner if entered else sent empty  | 2, Copied from SPS if present else sent empty                                    | 2, Same as for the source composite if present else sent empty                  |
| >Requested Procedure Code Sequence           | (0032,1064) | 3, Not Sent  | 3, Copied from SPS if present, else not sent                                     | 3, Same as for the source composite if present else not sent                    |
| >>Code Value                                 | (0008,0100) | 1, Not Sent  | 1, Not Sent  | 1, Not Sent   |
| >>Coding Scheme Designator                   | (0008,0102) | 1, Not Sent  | 1, Not Sent  | 1, Not Sent   |
| >>Code Meaning                               | (0008,0104) | 1, Not Sent  | 1, Not Sent  | 1, Not Sent   |

|  |             |   |   |   |
|--|-------------|---|---|---|
| >Requested Procedure Description         | (0032,1060) | 2, Sent empty   | 2, Copied from SPS if present, else sent empty  | 2, Same as for the source composite if present, else sent empty |
| >Scheduled Procedure Step ID             | (0040,0009) | 2, Sent empty   | 2, Copied from SPS if present, else sent empty  | 2, Same as for the source composite if present, else sent empty |
| >Scheduled Procedure Step Description    | (0040,0007) | 2, Sent empty   | 2, Copied from SPS if present, else sent empty  | 2, Same as for the source composite if present, else sent empty |
| >Scheduled Protocol Code Sequence        | (0040,0008) | 2, Sent empty   | 2, Copied from SPS if selected else sent empty. | 2, Same as for the source composite if present else sent empty. |
| >>Code Value                             | (0008,0100) | 1, Not Sent   | 1, Copied from SPS                              | 1, Same as for the source composite                             |
| >>Coding Scheme Designator               | (0008,0102) | 1, Not Sent   | 1, Copied from SPS                              | 1, Same as for the source composite                             |
| >>Coding Scheme Version                  | (0008,0103) | 3, Not Sent   | 3, Copied from SPS if selected else sent empty  | 3, Same as for the source composite if present else sent empty  |
| >>Code Meaning                           | (0008,0104) | 3, Not Sent   | 3, Copied from SPS if selected else sent empty  | 3, Same as for the source composite if present else sent empty  |
| Patient's Name                           | (0010,0010) | 2, User input on the scanner if entered else sent empty | 2, Copied from SPS if present else sent empty   | 2, Same as for the source composite if present else sent empty  |
| Patient ID                               | (0010,0020) | 2, User input on the scanner if entered else sent empty | 2, Copied from SPS if present else sent empty   | 2, Same as for the source composite if present else sent empty  |
| Issuer of Patient ID                     | (0010,0021) | 3, Not sent   | 3, Copied from SPS if present, else not sent    | 3, Same as for the source composite if present else not sent    |
| Issuer of Patient ID Qualifiers Sequence | (0010,0024) | 3, Not Used   | 3, Not Used                                     | 3, Not Used   |
| Patient's Birth Date                     | (0010,0030) | 2, User input on the scanner if entered else sent empty | 2, Copied from SPS if present else sent empty   | 2, Same as for the source composite if present else sent empty  |

|                              |             |   |   |  |
|------------------------------|-------------|---|---|--|
| Patient's Sex                | (0010,0040) | 2, User input on the scanner if entered else sent empty | 2, Copied from SPS if present else sent empty | 2, Same as for the source composite if present else sent empty |
| Referenced Patient Sequence  | (0008,1120) | 2, Sent empty   | 2, Copied from SPS if present else sent empty | 2, Same as for the source composite if present else sent empty |
| >Referenced SOP Class UID    | (0008,1150) | 1, Not Sent   | 1, Copied from SPS if present else not sent   | 1, Same as for the source composite if present else not sent   |
| >Referenced SOP Instance UID | (0008,1155) | 1, Not Sent   | 1, Copied from SPS if present else not sent   | 1, Same as for the source composite if present else not sent   |
| Admission ID                 | (0038,0010) | 3, Not Sent   | 3, Copied from SPS if present else not sent   | 3, Same as for the source composite if present else not sent   |
| Issuer of Admission ID       | (0038,0011) | 3, Not Sent   | 3, Copied from SPS if present else not sent   | 3, Same as for the source composite if present else not sent   |
| Service Episode ID           | (0038,0060) | 3, Not Sent   | 3, Not Sent                                   | 3, Not Sent  |
| Issuer of Service Episode ID | (0038,0061) | 3, Not Sent   | 3, Not Sent                                   | 3, Not Sent  |
| Service Episode Description  | (0038,0062) | 3, Not Sent   | 3, Not Sent                                   | 3, Not Sent  |

### 5.4.3 Performed Procedure Step Information Module

TABLE 5.4.3-1 PERFORMED PROCEDURE STEP INFORMATION MODULE ATTRIBUTES

| Attribute Name                       | Tag         | Type for SCU N-CREATE | Type for SCU N-SET | Use   |
|--------------------------------------|-------------|-----------------------|--------------------|---|
| Performed Procedure Step ID          | (0040,0253) | 1                     | -                  | Unique string generated at scanner for entire session   |
| Performed Station AE Title           | (0040,0241) | 1                     | -                  | Local system's PPS SCU AE Title                         |
| Performed Station Name               | (0040,0242) | 2                     | -                  | Local system's host-name                                |
| Performed Location                   | (0040,0243) | 2                     | -                  | Copied from image if present, else sent empty           |
| Performed Procedure Step Start Date  | (0040,0244) | 1                     | -                  | Same as date of first scan                              |
| Performed Procedure Step Start Time  | (0040,0245) | 1                     | -                  | Same as time of first scan                              |
| Performed Procedure Step Status      | (0040,0252) | 1                     | 3                  | Status is one of IN PROGRESS, COMPLETED or DISCONTINUED |
| Performed Procedure Step Description | (0040,0254) | 2                     | 3                  | Copied from image if present, else sent empty           |

|   |             |   |   |   |
|---|-------------|---|---|---|
| Performed Procedure Type Description                          | (0040,0255) | 2 | 3 | Set empty in MPPS header  |
| Procedure Code Sequence                                       | (0008,1032) | 2 | 3 | Left blank if performed procedure and requested procedure is different. Else copied from 0032, 1064 when present in the MWL |
| >Code Value   | (0008,0100) | 1 | 1 |   |
| >Coding Scheme Designator                                     | (0008,0102) | 1 | 1 |   |
| >Coding Scheme Version  | (0008,0103) | 3 | 3 |   |
| >Code Meaning   | (0008,0104) | 3 | 3 |   |
| Performed Procedure Step End Date                             | (0040,0250) | 2 | 3 | Date when user chooses Complete or Discontinue action   |
| Performed Procedure Step End Time                             | (0040,0251) | 2 | 3 | Time when user chooses Complete or Discontinue action   |
| Comments on the Performed Procedure Step                      | (0040,0280) | 3 | 3 | User input on the scanner.  |
| Performed Procedure Step Discontinuation Reason Code Sequence | (0040,0281) | 3 | 3 | Set if the procedure was discontinued.  |
| >Code Value   | (0008,0100) | 1 | 1 |   |
| >Coding Scheme Designator                                     | (0008,0102) | 1 | 1 |   |
| >Coding Scheme Version  | (0008,0103) | 3 | 3 |   |
| >Code Meaning   | (0008,0104) | 3 | 3 |   |

#### 5.4.4 Image Acquisition Results Module

TABLE 5.4.4-1 IMAGE ACQUISITION RESULTS MODULE ATTRIBUTES

| Attribute Name                   | Tag         | Type for SCU N-CREATE | Type for SCU N-SET | Use  |
|----------------------------------|-------------|-----------------------|--------------------|--|
| Modality                         | (0008,0060) | 1                     | -                  | Set based on the performed Study type <MR, CT, PT ...> |
| Study ID                         | (0020,0010) | 2                     | -                  | Same as Exam number                                    |
| Performed Protocol Code Sequence | (0040,0260) | 2                     | 3                  | Copied from image if present, else sent empty          |
| >Code Value                      | (0008,0100) | 1                     | 1                  |  |
| >Coding Scheme Designator        | (0008,0102) | 1                     | 1                  |  |
| >Coding Scheme Version           | (0008,0103) | 3                     | 3                  |  |
| >Code Meaning                    | (0008,0104) | 3                     | 3                  |  |
| Performed Series Sequence        | (0040,0340) | 2                     | 3                  | Sent in the MPPS header                                |
| >Performing Physician's Name     | (0008,1050) | 2                     | 2                  | Copied from image if present, else sent empty          |

|   |             |   |   |   |
|---|-------------|---|---|---|
| >Protocol Name  | (0018,1030) | 1 | 1 | The name of the protocol selected on the scanner. Copied from image           |
| >Operator's Name                                      | (0008,1070) | 2 | 2 | User input on the scanner. Sent empty if not entered.                         |
| >Series Instance UID                                  | (0020,000E) | 1 | 1 | Copied from Image   |
| >Series Description                                   | (0008,103E) | 2 | 2 | Copied from Image   |
| >Retrieve AE Title                                    | (0008,0054) | 2 | 2 | Sent empty  |
| >Referenced Image Sequence                            | (0008,1140) | 2 | 2 | One item for each image created within the series                             |
| >>Referenced SOP Class UID                            | (0008,1150) | 1 | 1 | SOP Class UID of the created image  |
| >>Referenced SOP Instance UID                         | (0008,1155) | 1 | 1 | SOP Instance UID of the created image   |
| >Referenced Non-Image Composite SOP Instance Sequence | (0040,0220) | 2 | 2 | One item for each non-image (GSPS, SR etc) instance created within the series |
| >>Referenced SOP Class UID                            | (0008,1150) | 1 | 1 | SOP Class UID of the created object   |
| >>Referenced SOP Instance UID                         | (0008,1155) | 1 | 1 | SOP Instance UID of the created object  |

#### 5.4.5 Radiation Dose Module

This module is not used.

#### 5.4.6 Billing and Material Management Codes Module

This module is not used.

#### 5.5 STANDARD EXTENDED AND PRIVATE DATA ATTRIBUTES

None

#### 5.6 STANDARD EXTENDED AND PRIVATE CONTEXT GROUPS

None



## 6. STORAGE COMMITMENT PUSH MODEL IMPLEMENTATION

### 6.1 STORAGE COMMITMENT PUSH MODEL INFORMATION OBJECT DEFINITION

Please refer to DICOM Part 3 (Information Object Definitions) for a description of each of the attributes contained within the Storage Commitment Information Object.

The Storage Commitment Information Object is used both for N-ACTION Storage Commitment Requests and N-EVENT-REPORT Storage Commitment Notifications by the SCU.

#### 6.1.1 Storage Commitment Module for N-ACTION

TABLE – 6.1.1-1 STORAGE COMMITMENT MODULE FOR N-ACTION

| Attribute Name               | Tag         | SCU Use                  |
|------------------------------|-------------|--------------------------|
| Transaction UID              | (0008,1195) | Generated for each retry |
| Storage Media File-Set ID    | (0088,0130) | Not supported            |
| Storage Media File-Set UID   | (0088,0140) | Not supported            |
| Referenced SOP Sequence      | (0008,1199) |                          |
| >Referenced SOP Class UID    | (0008,1150) |                          |
| >Referenced SOP Instance UID | (0008,1155) |                          |
| >Storage Media File-Set ID   | (0088,0130) | Not supported            |
| >Storage Media File-Set UID  | (0088,0140) | Not supported            |

#### 6.1.2 Storage Commitment Module for N-EVENT-REPORT

TABLE – 6.1.2-1 STORAGE COMMITMENT MODULE FOR N-EVENT-REPORT

| Attribute Name             | Tag         | SCU Use                 |
|----------------------------|-------------|-------------------------|
| Transaction UID            | (0008,1195) | Value received from SCP |
| Retrieve AE Title          | (0008,0054) | Not used                |
| Storage Media File-Set ID  | (0088,0130) | Not used                |
| Storage Media File-Set UID | (0088,0140) | Not used                |

|                              |             |   |
|------------------------------|-------------|---|
| Referenced SOP Sequence      | (0008,1199) | When status is SUCCESS, the "Archived" flag value for the referenced SOP instances is changed to "Yes" in the browser.<br>In case of partial failure, the archival status of a series is updated only if all the images of the series are archived successfully. Archive status of series is not updated if archiving of one or more images of the series failed. Image level archive status updation is not supported. |
| >Referenced SOP Class UID    | (0008,1150) |   |
| >Referenced SOP Instance UID | (0008,1155) |   |
| >Retrieve AE Title           | (0008,0054) | Not used.   |
| >Storage Media File-Set ID   | (0088,0130) | Not used  |
| >Storage Media File-Set UID  | (0088,0140) | Not used  |
| Failed SOP Sequence          | (0008,1198) | "Archived" flag value for the failed SOP instance is unaltered. Failed SOP instances are logged.  |
| >Referenced SOP Class UID    | (0008,1150) |   |
| >Referenced SOP Instance UID | (0008,1155) |   |
| >Failure Reason              | (0008,1197) | Not used.   |

#### 6.1.2.1 Processing of Failure Reason when received in a N-Event-Report

When receiving a N-Event-Report request with a Event Type ID equal to 2, meaning that Storage Commitment is complete, but failure exists, following is the set of value that this Storage Commitment SCU AE is able to process.

| Failure Reason | Meaning                            | Application Behavior When Receiving Reason Code                  |
|----------------|------------------------------------|--|
| 0110H          | Processing failure                 | Log file updated: Processing Failure. Job failed.                |
| 0112H          | No such object instance            | Log file updated: No such object instance. Job failed.           |
| 0213H          | Resource limitation                | Log file updated: resource limitation. Job failed.               |
| 0122H          | Referenced SOP Class not supported | Log file updated: reference SOP class not supported. Job failed. |
| 0119H          | Class / Instance conflict          | Log file updated: class/instance conflict. Job failed.           |
| 0131H          | Duplicate transaction UID          | Log file updated: duplicate transaction UID. Job failed.         |
| *              | Other Failure Reason code values   | Log file updated: unknown failure. Job failed.                   |

## 7. BASIC DIRECTORY INFORMATION OBJECT IMPLEMENTATION

### 7.1 IOD MODULE TABLE

Table 7.1-1 identifies the defined modules within the entities which comprise the Basic Directory IOD. Modules are identified by Module Name.

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

**TABLE 7.1-1 BASIC DIRECTORY IOD MODULES**

| Entity Name             | Module Name             | Reference                 |
|-------------------------|-------------------------|---------------------------|
| File Set Identification | File Set Identification | <a href="#">Sec 7.2.1</a> |
| Directory Information   | Directory Information   | <a href="#">Sec 7.2.2</a> |

### 7.2 INFORMATION MODULE DEFINITIONS

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

The following modules are included to convey Enumerated Values, Defined Terms, and Optional Attributes supported. Type 1 & Type 2 Attributes are also included for completeness and to define what values they may take and where these values are obtained from. It should be noted that they are the same ones as defined in the DICOM Standard Part 3 (Information Object Definitions). Also note that Attributes not present in tables are not supported.

#### 7.2.1 File Set Identification Module

**TABLE 7.2.1-1 FILE-SET IDENTIFICATION MODULE**

| Attribute Name | Tag         | Type | Attribute Description |
|----------------|-------------|------|-----------------------|
| File-set ID    | (0004,1130) | 2    | Set by application    |

#### 7.2.2 Directory Information Module

**TABLE 7.2.2-1 DIRECTORY INFORMATION MODULE**

| Attribute Name  | Tag         | Type | Attribute Description           |
|---|-------------|------|---------------------------------|
| Offset of the First Directory Record of the Root Directory Entity | (0004,1200) | 1    | Set by application              |
| Offset of the Last Directory Record of the Root Directory Entity  | (0004,1202) | 1    | Set by application              |
| File-set Consistency Flag   | (0004,1212) | 1    | 0000H: no known inconsistencies |
| Directory Record Sequence   | (0004,1220) | 2    | Supported                       |
| >Offset of the Next Directory Record                              | (0004,1400) | 1    | Set by application              |
| >Record In-use Flag   | (0004,1410) | 1    | FFFFH: record is in use         |

|  |             |    |   |
|--|-------------|----|---|
| >Offset of Referenced Lower-Level Directory Entity | (0004,1420) | 1  | Set by application  |
| >Directory Record Type                             | (0004,1430) | 1  | PATIENT, STUDY, SERIES, IMAGE, PRESENTATION, SR DOCUMENT and PRIVATE  |
| >Private Record UID                                | (0004,1432) | 1C | Not supported   |
| >Referenced File ID                                | (0004,1500) | 1C | Generated only for Image Directory Record, starting with A/A/A/A/Zo1  |
| >Referenced SOP Class UID in File                  | (0004,1510) | 1C | Generated only for Image, Presentation and SR Document Directory Records  |
| >Referenced SOP Instance UID in File               | (0004,1511) | 1C | Generated only for Image, Presentation and SR Document Directory Records. Set to SOP Instance UID (0008,0018) during save to media. |
| >Referenced Transfer Syntax UID in File            | (0004,1512) | 1C | Generated only for Image, Presentation and SR Document Directory Records  |
| > Referenced Related General SOP Class UID in File | (0004,151A) | 1C | Not supported   |
| >Record Selection Keys                             |             |    | See 7.2.3 and Section 3 for Additional Keys per Application Profiles.   |

### 7.2.3 Definition of Specific Directory Records

#### 7.2.3.1 Patient Directory Record Definition

TABLE 7.2.3.1-1 PATIENT RECORD KEYS

| Key                    | Tag         | Type (for CD) | Type (for DVD / USB) | Attribute Description  |
|------------------------|-------------|---------------|----------------------|--|
| Specific Character Set | (0008,0005) | 1C            | 1C                   | ISO_IR 100   |
| Patient's Name         | (0010,0010) | 2             | 2                    | If present in composite object instances it will be set to same value, otherwise sent empty  |
| Patient ID             | (0010,0020) | 1             | 1                    | If present in composite object instances it will be set to same value, otherwise sent empty  |
| Patient Birth Date     | (0010,0030) | E             | 1C                   | If present in composite object instances it will be set to same value, otherwise not present |
| Patient Birth Time     | (0010,0032) | E             | E                    | If present in composite object instances it will be set to same value, otherwise not present |
| Patient Sex            | (0010,0040) | E             | 1C                   | If present in composite object instances it will be set to same value, otherwise not present |

NOTE: E represents Standard Extended Element.

#### 7.2.3.2 Study Directory Record Definition

TABLE 7.2.3.2-1 STUDY RECORD KEYS

| Key                    | Tag         | Type (for CD) | Type (for DVD / USB) | Attribute Description |
|------------------------|-------------|---------------|----------------------|-----------------------|
| Specific Character Set | (0008,0005) | 1C            | 1C                   | ISO_IR 100            |

|                    |             |    |    |   |
|--------------------|-------------|----|----|---|
| Study Date         | (0008,0020) | 1  | 1  | If present in composite object instances it will be set to same value, otherwise computed                                     |
| Study Time         | (0008,0030) | 1  | 1  | If present in composite object instances it will be set to same value, otherwise computed                                     |
| Study Description  | (0008,1030) | 2  | 2  | If present in composite object instances it will be set to same value, otherwise sent empty                                   |
| Study Instance UID | (0020,000D) | 1C | 1C | This is set to value that is present in the composite object instances, otherwise composite object instances are not Archived |
| Study ID           | (0020,0010) | 1  | 1  | If present in composite object instances it will be set to same value, otherwise computed                                     |
| Accession Number   | (0008,0050) | 2  | 2  | If present in composite object instances it will be set to same value, otherwise sent empty                                   |

#### 7.2.3.2.1 Method to set default values for Study Date and Time

Below is the logic for providing default values for Study Date and Time if the values are found null or if absent in the DICOM file

```

if (studyDateTime is present)
{
    put its value in DICOMDIR
}
else
{
    look for seriesDateTime
    if (seriesDateTime is present)
    {
        put seriesDateTime value in DICOMDIR
    }
    else
    {
        look for acquisitionDateTime (either ((0008,0022),(0008,0032)) or (0008,002A))
        if (acquisitionDateTime is present)
        {
            put acquisitionDateTime value in DICOMDIR
        }
        else
        {
            look for contentDateTime
            if(contentDateTime is present)
            {
                put contentDateTime value in DICOMDIR
            }
            else
            {
                look for instanceCreationDateTime
                if(instanceCreationDateTime is present)
                {
                    put instanceCreationDateTime value in DICOMDIR
                }
            }
        }
    }
}

```

```

        }
        else
        {
            put a DummyDateTime
        }
    }
}

```

### 7.2.3.2.2 Method to set default value for Study ID

Below is the logic for providing default values for Study ID if the values are found null or if absent in the DICOM file

```

if (studyID is present in the image)
{
    put studyID value in DICOMDIR
}
else
{
    put a dummy studyID value in DICOMDIR.)
}

```

### 7.2.3.3 Series Directory Record Definition

TABLE 7.2.3.3-1 SERIES RECORD KEYS

| Key                         | Tag         | Type<br>(for CD) | Type<br>(for DVD /<br>USB) | Attribute Description  |
|-----------------------------|-------------|------------------|----------------------------|--|
| Specific Character Set      | (0008,0005) | 1C               | 1C                         | ISO_IR 100   |
| Modality                    | (0008,0060) | 1                | 1                          | If present in composite object instance it will be set to same value, otherwise an error is returned and the object not put on media   |
| Series Instance UID         | (0020,000E) | 1                | 1                          | This is set to value that is present in the composite object instance, otherwise check for presence of Referenced SOP Instance UID in File (0004,1511), if both not present, instance is not put on media. |
| Series Number               | (0020,0011) | 1                | 1                          | If present in composite object instance it will be set to same value, otherwise computed   |
| Icon Image Sequence         | (0088,0200) | 3                | 3                          | Not supported  |
| Manufacturer                | (0008,0070) | E                | E                          | If present in composite object instances it will be set to same value, otherwise not sent  |
| Manufacturer's Model Name   | (0008,1090) | E                | E                          | If present in composite object instances it will be set to same value, otherwise not sent  |
| Performing Physician's Name | (0008,1050) | E                | 1C                         | If present in composite object instances it will be set to same value, otherwise not sent  |
| Institution Name            | (0008,0080) | E                | 1C                         | If present in composite object instances it will be set to same value, otherwise not sent  |

|                     |             |   |    |   |
|---------------------|-------------|---|----|---|
| Institution Address | (0008,0081) | E | 1C | If present in composite object instances it will be set to same value, otherwise not sent |
|---------------------|-------------|---|----|---|

NOTE: E represents Standard Extended Element.

#### 7.2.3.3.1 Method to set default value for Series Number

Below is the logic for providing default values for Series number if the values are found null or if absent in the DICOM file

```

dummySeriesNum = 0;
if (seriesNum is present in image)
{
    put seriesNum value in DICOMDIR
}
else
{
    if (same series)
    {
        put dummySeriesNum value in DICOMDIR
    }
    else (different series)
    {
        put (++dummySeriesNum) value in DICOMDIR
    }
}
}

```

#### 7.2.3.4 Image Directory Record Definition

TABLE 7.2.3.4-1 IMAGE RECORD KEYS

| Key                       | Tag         | Type<br>(for CD) | Type<br>(for DVD /<br>USB) | Attribute Description   |
|---------------------------|-------------|------------------|----------------------------|---|
| Specific Character Set    | (0008,0005) | 1C               | 1C                         | ISO_IR 100  |
| SOP Instance UID          | (0008,0018) | E                | E                          | If present in composite object instances it will be set to same value, otherwise sent empty |
| Acquisition Time          | (0008,0032) | E                | E                          | If present in composite object instances it will be set to same value, otherwise sent empty |
| Acquisition Datetime      | (0008,002A) | E                | 1C                         | If present in composite object instances it will be set to same value, otherwise not sent   |
| Image Type                | (0008,0008) | 1C               | 1C                         | If present in composite object instances it will be set to same value, otherwise not sent   |
| Referenced Image Sequence | (0008,1140) | 1C               | 1C                         | If present in composite object instances it will be set to same value, otherwise not sent   |
| Sequence Variant          | (0018,0021) | E                | E                          | If present in composite object instances it will be set to same value, otherwise sent empty |
| Slice Thickness           | (0018,0050) | E                | E                          | If present in composite object instances it will be set to same value, otherwise sent empty |
| Repetition Time           | (0018,0080) | E                | E                          | If present in composite object instances it will be set to same value, otherwise sent empty |
| Echo Time                 | (0018,0081) | E                | E                          | If present in composite object instances it will be set to same value, otherwise sent empty |

|  |             |   |    |   |
|--|-------------|---|----|---|
| Inversion Time                         | (0018,0082) | E | E  | If present in composite object instances it will be set to same value, otherwise sent empty |
| Number of Averages                     | (0018,0083) | E | E  | If present in composite object instances it will be set to same value, otherwise not sent   |
| Echo Number                            | (0018,0086) | E | E  | If present in composite object instances it will be set to same value, otherwise not sent   |
| Spacing between slices                 | (0018,0088) | E | E  | If present in composite object instances it will be set to same value, otherwise not sent   |
| Data Collection Diameter               | (0018,0090) | E | E  | If present in composite object instances it will be set to same value, otherwise not sent   |
| Contrast/Bolus Route                   | (0018,1040) | E | E  | If present in composite object instances it will be set to same value, otherwise not sent   |
| Trigger Time                           | (0018,1060) | E | E  | If present in composite object instances it will be set to same value, otherwise not sent   |
| Reconstruction Diameter                | (0018,1100) | E | E  | If present in composite object instances it will be set to same value, otherwise not sent   |
| Gantry/Detector Tilt                   | (0018,1120) | E | E  | If present in composite object instances it will be set to same value, otherwise not sent   |
| Convolution Kernel                     | (0018,1210) | E | E  | If present in composite object instances it will be set to same value, otherwise not sent   |
| Flip Angle                             | (0018,1314) | E | E  | If present in composite object instances it will be set to same value, otherwise sent empty |
| Acquisition Time Synchronized          | (0018,1800) | E | 1C | If present in composite object instances it will be set to same value, otherwise not sent   |
| Instance Number                        | (0020,0013) | 1 | 1  | If present in composite object instance it will be set to same value, otherwise computed    |
| Image Position (Patient)               | (0020,0032) | E | 1C | If present in composite object instances it will be set to same value, otherwise not sent   |
| Image Orientation (Patient)            | (0020,0037) | E | 1C | If present in composite object instances it will be set to same value, otherwise not sent   |
| Frame of Reference UID                 | (0020,0052) | E | 1C | If present in composite object instances it will be set to same value, otherwise not sent   |
| Slice Location                         | (0020,1041) | E | E  | If present in composite object instances it will be set to same value, otherwise not sent   |
| Synchronization Frame of Reference UID | (0020,0200) | E | 1C | If present in composite object instances it will be set to same value, otherwise not sent   |
| Rows                                   | (0028,0010) | E | 1  | If present in composite object instances it will be set to same value, otherwise not sent   |
| Columns                                | (0028,0010) | E | 1  | If present in composite object instances it will be set to same value, otherwise not sent   |
| Pixel Spacing                          | (0028,0030) | E | 1C | If present in composite object instances it will be set to same value, otherwise not sent   |
| Number of Frames                       | (0028,0008) | E | 1C | If present in composite object instances it will be set to same value, otherwise not sent   |
| Lossy Image Compression Ratio          | (0028,2112) | E | 1C | If present in composite object instances it will be set to same value, otherwise not sent   |
| Calibration Image                      | (0050,0004) | E | 1C | Not used  |
| Units                                  | (0054,1001) | E | E  | If present in composite object instances it will be set to same value, otherwise sent empty |
| Attenuation Correction Method          | (0054,1101) | E | E  | If present in composite object instances it will be set to same value, otherwise not sent   |
| Reconstruction Method                  | (0054,1103) | E | E  | present in composite object instances it will be  |



|              |             |   |   |   |
|--------------|-------------|---|---|---|
|              |             |   |   | set to same value, otherwise not sent   |
| Image Number | (0020,0013) | 1 | 1 | If present in composite object instances it will be set to same value, otherwise not sent |

NOTE: E represents Standard Extended Element.

#### 7.2.3.4.1 Method to set default value for Instance number

Below is the logic for providing default values for Instance number if the values are found null or if absent in the DICOM file

```

dummyInstanceNum = 0;
if (instanceNum is present in image)
{
    put instanceNum value in DICOMDIR
}
else
{
    put ++ dummyInstanceNum in DICOMDIR
}

```

#### 7.2.3.5 Presentation Directory Record Definition

TABLE 7.2.3.5-1 PRESENTATION RECORD KEYS

| Key                        | Tag         | Type<br>(for CD) | Type<br>(for DVD /<br>USB) | Attribute Description   |
|----------------------------|-------------|------------------|----------------------------|---|
| Specific Character Set     | (0008,0005) | 1C               | 1C                         | ISO_IR 100  |
| Instance Number            | (0020,0013) | 1                | 1                          | If present in composite object instance it will be set to same value, otherwise computed    |
| SOP Instance UID           | (0008,0018) | E                | E                          | If present in composite object instances it will be set to same value, otherwise sent empty |
| Referenced Series Sequence | (0008,1115) | 1C               | 1C                         | Not used.   |
| Content Label              | (0070,0080) | 1                | 1                          | If present in composite object instance it will be set to same value, otherwise not sent    |
| Content Description        | (0070,0081) | 2                | 2                          | If present in composite object instances it will be set to same value, otherwise not sent   |
| Presentation Creation Date | (0070,0082) | 1                | 1                          | If present in composite object instances it will be set to same value, otherwise not sent   |
| Presentation Creation Time | (0070,0083) | 1                | 1                          | If present in composite object instances it will be set to same value, otherwise not sent   |
| Content Creator's Name     | (0070,0084) | 2                | 2                          | If present in composite object instances it will be set to same value, otherwise not sent   |

NOTE: E represents Standard Extended Element.

## 7.2.3.6 Structured Report Directory Record Definition

TABLE 7.2.3.6-1 SR RECORD KEYS

| Key                         | Tag         | Type<br>(for CD) | Type<br>(for DVD /<br>USB) | Attribute Description   |
|-----------------------------|-------------|------------------|----------------------------|---|
| Specific Character Set      | (0008,0005) | 1C               | 1C                         | ISO_IR 100  |
| Instance Number             | (0020,0013) | 1                | 1                          | If present in composite object instance it will be set to same value, otherwise computed    |
| SOP Instance UID            | (0008,0018) | E                | E                          | If present in composite object instances it will be set to same value, otherwise sent empty |
| Completion Flag             | (0040,A491) | 1                | 1                          | If present in composite object instance it will be set to same value, otherwise not sent    |
| Content Date                | (0008,0023) | 1                | 1                          | If present in composite object instances it will be set to same value, otherwise not sent   |
| Content Time                | (0008,0033) | 1                | 1                          | If present in composite object instances it will be set to same value, otherwise not sent   |
| Concept Name Code Sequence  | (0040,A043) | 1                | 1                          | If present in composite object instances it will be set to same value, otherwise not sent   |
| Verifying Observer Sequence | (0040,A073) | E                | E                          | If present in composite object instances it will be set to same value, otherwise sent empty |
| Verification Flag           | (0040,A493) | 1                | 1                          | If present in composite object instances it will be set to same value, otherwise not sent   |
| Verification Date Time      | (0040,A030) | 1C               | 1C                         | Not used  |
| Content Sequence            | (0040,A730) | 1C               | 1C                         | Not used  |

NOTE: E represents Standard Extended Element.

## 7.2.3.7 Private (GEMS PET Raw) Directory Record Definition

TABLE 7.2.3.7-1 PRIVATE (GEMS PET RAW) RECORD KEYS

| Key                    | Tag         | Type<br>(for CD) | Type<br>(for DVD /<br>USB) | Attribute Description   |
|------------------------|-------------|------------------|----------------------------|---|
| Specific Character Set | (0008,0005) | 1C               | 1C                         | ISO_IR 100  |
| Instance Number        | (0020,0013) | 1                | 1                          | If present in composite object instance it will be set to same value, otherwise computed    |
| SOP Instance UID       | (0008,0018) | 2                | 2                          | If present in composite object instances it will be set to same value, otherwise sent empty |
| Frame of Reference UID | (0020,0052) | 2                | 2                          | If present in composite object instance it will be set to same value, otherwise sent empty  |
| Rows                   | (0028,0010) | 2                | 2                          | If present in composite object instances it will be set to same value, otherwise sent empty |
| Columns                | (0028,0011) | 2                | 2                          | If present in composite object instances it will be set to same value, otherwise sent empty |

## 8. SECONDARY CAPTURE INFORMATION OBJECT IMPLEMENTATION

### 8.1 INTRODUCTION

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

### 8.2 MR MAPPING OF DICOM ENTITIES

The MR maps DICOM Information Entities to local Information Entities in the product's database and user interface.

**TABLE 8.2-7.2.3-1 MAPPING OF DICOM ENTITIES TO MR ENTITIES**

| DICOM IE | MR Entity |
|----------|-----------|
| Patient  | Patient   |
| Study    | Exam      |
| Series   | Series    |
| Image    | Image     |

### 8.3 IOD MODULE TABLE

The Secondary Capture Information Object Definition comprises the modules of the following table.

**TABLE 8.3-1 SC IMAGE IOD MODULES**

| Entity Name | Module Name            | Usage    | Reference |
|-------------|------------------------|----------|-----------|
| Patient     | Patient                | Used     | 8.4.1.1   |
|             | Clinical Trial Subject | Not used | N/A       |
| Study       | General Study          | Used     | 8.4.2.1   |
|             | Patient Study          | Used     | 8.4.2.2   |
|             | Clinical Trial Study   | Not used | N/A       |
| Series      | General Series         | Used     | 8.4.3.1   |
|             | Clinical Trial Series  | Not used | N/A       |
| Equipment   | General Equipment      | Used     | 8.4.4.1   |
|             | SC Equipment           | Used     | 8.4.4.2   |
| Image       | General Image          | Used     | 8.4.5.1   |
|             | Image Pixel            | Used     | 8.4.5.2   |
|             | Device                 | Not used | N/A       |
|             | Specimen               | Not used | N/A       |
|             | SC Image               | Not used | N/A       |

|               |          |         |
|---------------|----------|---------|
| Overlay Plane | Not used | N/A     |
| Modality LUT  | Used     | 8.4.5.3 |
| VOI LUT       | Used     | 8.4.5.4 |
| ICC Profile   | Not used | N/A     |
| SOP Common    | Used     | 8.4.5.5 |

#### 8.4 INFORMATION MODULE DEFINITIONS

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

The following modules are included to convey Enumerated Values, Defined Terms, and Optional Attributes supported. Type 1 & Type 2 Attributes are also included for completeness and to define what values they may take and where these values are obtained from when generating the instance. It should be noted that they are the same ones as defined in the DICOM Standard Part 3 (Information Object Definitions). Also note that Attributes not present in tables are not supported.

##### 8.4.1 Patient Entity Modules

##### 8.4.1.1 Patient Module

TABLE 8.4.1.1-1 PATIENT MODULE ATTRIBUTES

| Attribute Name                           | Tag         | Type | Attribute Description            |
|--|-------------|------|----------------------------------|
| Patient's Name                           | (0010,0010) | 2    | Copied from the referenced image |
| Patient ID                               | (0010,0020) | 2    | Copied from the referenced image |
| Patient's Birth Date                     | (0010,0030) | 2    | Copied from the referenced image |
| Patient's Sex                            | (0010,0040) | 2    | Copied from the referenced image |
| Issuer of Patient ID                     | (0010,0021) | 3    | Copied from the referenced image |
| Issuer of Patient ID Qualifiers Sequence | (0010,0024) | 3    | Unused                           |
| Other Patient IDs                        | (0010,1000) | 3    | Unused                           |
| Other Patient IDs Sequence               | (0010,1002) | 3    | Unused                           |
| >Patient ID                              | (0010,0020) | 1    | Unused                           |
| >Issuer of Patient ID                    | (0010,0021) | 1    | Unused                           |
| >Type of Patient ID                      | (0010,0022) | 1    | Unused                           |
| Referenced Patient Sequence              | (0008,1120) | 3    | Copied from Referenced Images    |
| >Referenced SOP Class UID                | (0008,1150) | 1C   | Copied from Referenced Images    |
| >Referenced SOP Instance UID             | (0008,1155) | 1C   | Copied from Referenced Images    |

## 8.4.2 Study Entity Modules

### 8.4.2.1 General Study Module

TABLE 8.4.2.1-1 GENERAL STUDY MODULE ATTRIBUTES

| Attribute Name             | Tag         | Type | Attribute Description            |
|----------------------------|-------------|------|----------------------------------|
| Study Instance UID         | (0020,000D) | 1    | Copied from the referenced image |
| Study Date                 | (0008,0020) | 2    | Copied from the referenced image |
| Study Time                 | (0008,0030) | 2    | Copied from the referenced image |
| Referring Physician's Name | (0008,0090) | 2    | Copied from the referenced image |
| Study ID                   | (0020,0010) | 2    | Copied from the referenced image |
| Accession Number           | (0008,0050) | 2    | Copied from the referenced image |
| Study Description          | (0008,1030) | 3    | Copied from the referenced image |
| Referenced Study Sequence  | (0008,1110) | 3    | Unused                           |

### 8.4.2.2 Patient Study Module

TABLE 8.4.2.2-1 PATIENT STUDY MODULE ATTRIBUTES

| Attribute Name               | Tag         | Type | Attribute Description  |
|------------------------------|-------------|------|--|
| Patient's Age                | (0010,1010) | 3    | Copied if the referenced image contains the value else this attribute is not included in the SC IOD instance |
| Patient's Size               | (0010,1020) | 3    | Copied from the referenced image   |
| Patient's Weight             | (0010,1030) | 3    | Copied from the referenced image   |
| Admission ID                 | (0038,0010) | 3    | Copied from the referenced image   |
| Issuer of Admission ID       | (0038,0011) | 3    | Copied from the referenced image   |
| Additional Patient's History | (0010,21B0) | 3    | Copied from the referenced image   |

## 8.4.3 Series Entity Modules

## 8.4.3.1 General Series Module

TABLE 8.4.3.1-1 GENERAL SERIES MODULE ATTRIBUTES

| Attribute Name   | Tag         | Type | Attribute Description   |
|--|-------------|------|---|
| Modality   | (0008,0060) | 1    | Copied from the referenced image  |
| Series Instance UID                                    | (0020,000E) | 1    | Unique Series Instance UID generated  |
| Series Number  | (0020,0011) | 2    | Set to 99 if screen capture of displayed image or set to 98 if screen capture of text page display. |
| Laterality   | (0020,0060) | 2C   | Copied from the referenced image if present   |
| Performing Physicians' Name                            | (0008,1050) | 3    | Copied from the referenced image  |
| Protocol Name  | (0018,1030) | 3    | Copied from the referenced image  |
| Series Description                                     | (0008,103E) | 3    | Set to "Screen Save" if secondary capture of displayed image else set to "Exam/Series Text Page"    |
| Operators' Name  | (0008,1070) | 3    | Copied from the referenced image  |
| Referenced Performed Procedure Step Sequence           | (0008,1111) | 3    | May be sent   |
| <i>&gt;Include 'SOP Instance Reference Macro'</i>      |             |      |   |
| Patient Position                                       | (0018,5100) | 2C   | Copied from the referenced image  |
| Request Attributes Sequence                            | (0040,0275) | 3    | All sequence items are copied from the referenced image   |
| >Requested Procedure ID                                | (0040,1001) | 1C   | Copied from the referenced image  |
| >Accession Number                                      | (0008,0050) | 3    | Copied from the referenced image  |
| >Study Instance UID                                    | (0020,000D) | 3    | Copied from the referenced image  |
| >Referenced Study Sequence                             | (0008,1110) | 3    | All sequence items are copied from the referenced image   |
| <i>&gt;&gt; Include 'SOP Instance Reference Macro'</i> |             |      |   |
| >Requested Procedure Description                       | (0032,1060) | 3    | Copied from the referenced image  |
| >Requested Procedure Code Sequence                     | (0032,1064) | 3    | All sequence items are copied from the referenced image   |
| <i>&gt;&gt; Include 'Code Sequence Macro'</i>          |             |      |   |
| >Reason for the Requested Procedure                    | (0040,1002) | 3    | Copied from the referenced image  |
| >Reason for Requested Procedure Code Sequence          | (0040,100A) | 3    | All sequence items are copied from the referenced image   |
| <i>&gt;&gt;Include' Code Sequence Macro'</i>           |             |      |   |
| >Scheduled Procedure Step ID                           | (0040,0009) | 1C   | Copied from the referenced image  |
| >Scheduled Procedure Step Description                  | (0040,0007) | 3    | Copied from the referenced image  |
| >Scheduled Protocol Code Sequence                      | (0040,0008) | 3    | All sequence items are copied from the referenced image   |

|                                      |             |   |                                  |
|--------------------------------------|-------------|---|----------------------------------|
| >> Include 'Code Sequence Macro'     |             |   |                                  |
| Performed Procedure Step ID          | (0040,0253) | 3 | Copied from the referenced image |
| Performed Procedure Step Description | (0040,0254) | 3 | Copied from the referenced image |
| Performed Protocol Code Sequence     | (0040,0260) | 3 | Copied from the referenced image |

#### 8.4.4 Equipment Entity Modules

##### 8.4.4.1 General Equipment Module

TABLE 8.4.4.1-1 GENERAL EQUIPMENT MODULE ATTRIBUTES

| Attribute Name            | Tag         | Type | Attribute Description            |
|---------------------------|-------------|------|----------------------------------|
| Manufacturer              | (0008,0070) | 2    | Copied from the referenced image |
| Institution Name          | (0008,0080) | 3    | Copied from the referenced image |
| Institution Address       | (0008,0081) | 3    | Copied from the referenced image |
| Station Name              | (0008,1010) | 3    | Copied from the referenced image |
| Manufacturer's Model Name | (0008,1090) | 3    | Copied from the referenced image |
| Pixel Padding Value       | (0028,0120) | 1C   | Not Used                         |

##### 8.4.4.2 SC Equipment Module

TABLE 8.4.4.2-1 SC EQUIPMENT MODULE ATTRIBUTES

| Attribute Name  | Tag         | Type | Use  |
|-----------------|-------------|------|--|
| Conversion Type | (0008,0064) | 1    | Enumerated value used :<br>WSD = Workstation |
| Modality        | (0008,0060) | 3    | Copied from the referenced image             |

#### 8.4.5 Image Entity Modules

##### 8.4.5.1 General Image Module

TABLE 8.4.5.1-1 GENERAL IMAGE MODULE ATTRIBUTES

| Attribute Name      | Tag         | Type | Attribute Description  |
|---------------------|-------------|------|--|
| Instance Number     | (0020,0013) | 2    | Screen save number auto-generated  |
| Patient Orientation | (0020,0020) | 2C   | See 8.4.5.1.1  |
| Content Date        | (0008,0023) | 2C   | Date on which the screen capture IOD instance is generated   |
| Image Type          | (0008,0008) | 3    | See 8.4.5.1.2  |
| Image Comments      | (0020,4000) | 3    | If screen capture of series text page then "Series <seriesno> Text Page <text page number> / <total series text page>. |

|                              |             |    |  |
|------------------------------|-------------|----|--|
|                              |             |    | If screen capture of ROI text page<br>"ROI Text Page <text page number> /<br><total ROI text page> |
| Burned In Annotation         | (0028,0301) | 3  | Value set to "YES"   |
| Source Image Sequence        | (0008,2112) | 3  | Copied from the referenced image<br>(MR Screen Save)   |
| >Referenced SOP Class UID    | (0008,1150) | 1C | Copied from the referenced image<br>(MR Screen Save)   |
| >Referenced SOP Instance UID | (0008,1155) | 1C | Copied from the referenced image<br>(MR Screen Save)   |

#### 8.4.5.1.1 Patient Orientation

If the referenced source image has Patient Orientation (0020,0020) attribute with non-zero length value, then the attribute is copied to the generated screen capture IOD instance.

#### 8.4.5.1.2 Image Type

Following are the values that may be sent for Image Type (0008,0008) attribute:

For Value 1:

- DERIVED - identifies a Derived Image

For Value 2:

- SECONDARY - identifies a Secondary Image

For Value 3:

- SCREEN SAVE

#### 8.4.5.2 Image Pixel Module

TABLE 8.4.5.2-1 IMAGE PIXEL MODULE ATTRIBUTES

| Attribute Name             | Tag         | Type | Attribute Description  |
|----------------------------|-------------|------|--|
| Samples per Pixel          | (0028,0002) | 1    | Values supported : 1 (for MONOCHROME2) or 3 (for RGB)                  |
| Photometric Interpretation | (0028,0004) | 1    | - MONOCHROME2<br>- RGB   |
| Rows                       | (0028,0010) | 1    | For text page, values equal to the height of text page else always 512 |
| Columns                    | (0028,0011) | 1    | For text page, values equal to the width of text page else always 512  |
| Bits Allocated             | (0028,0100) | 1    | 16 for MONOCHROME2 and 8 for RGB                                       |



|                      |             |    |   |
|----------------------|-------------|----|---|
| Bits Stored          | (0028,0101) | 1  | 16 for MONOCHROME2 and 8 for RGB                        |
| High Bit             | (0028,0102) | 1  | 15 for MONOCHROME2 and 7 for RGB                        |
| Pixel Representation | (0028,0103) | 1  | 1 for MONOCHROME2 and 0 for RGB                         |
| Pixel Data           | (7FE0,0010) | 1  | Rendered pixel data of the image or text page displayed |
| Planar Configuration | (0028,0006) | 1C | Value supported : 0                                     |

#### 8.4.5.3 Modality LUT module

TABLE 8.4.5-1 MODALITY LUT MODULE ATTRIBUTES

| Attribute Name    | Tag         | Type | Attribute Description                       |
|-------------------|-------------|------|---|
| Rescale Slope     | (0028,1052) | 1C   | Copied from the referenced image if present |
| Rescale Intercept | (0028,1053) | 1C   | Copied from the referenced image if present |
| Rescale Type      | (0028,1054) | 1C   | Copied from the referenced image if present |

#### 8.4.5.4 VOI LUT module

TABLE 8 VOI LUT MODULE ATTRIBUTES

| Attribute Name | Tag         | Type | Attribute Description  |
|----------------|-------------|------|--|
| Window Center  | (0028,1050) | 1C   | Only single value present.<br>For text page set as 1 else value is derived from the user operation on the displayed image. |
| Window Width   | (0028,1051) | 1C   | Only single value present.<br>For text page set as 1 else value is derived from the user operation on the displayed image  |
| SOP Class UID  | (0008,0016) | 1    | Copied for referenced image (MR Screen Save)   |

#### 8.4.5.5 SOP Common Module

TABLE 8.4.5.5-1 SOP COMMON MODULE ATTRIBUTES

| Attribute Name   | Tag         | Type | Attribute Description     |
|------------------|-------------|------|---------------------------|
| SOP Class UID    | (0008,0016) | 1    | 1.2.840.10008.5.1.4.1.1.7 |
| SOP Instance UID | (0008,0018) | 1    | Auto-generated Unique id. |

|                        |             |    |  |
|------------------------|-------------|----|--|
| Specific Character Set | (0008,0005) | 1C | Copied from the referenced image if present, else uses : ISO_IR 100 = Latin Alphabet No. 1 |
| Instance Number        | (0020,0013) | 3  | Screen save number auto-generated  |

#### 8.5 STANDARD EXTENDED AND PRIVATE DATA ATTRIBUTES

None

#### 8.6 STANDARD EXTENDED AND PRIVATE CONTEXT GROUPS

None

## 9. GRAYSCALE SOFTCOPY PRESENTATION STATE INFORMATION OBJECT IMPLEMENTATION

### 9.1 INTRODUCTION

This section specifies the use of the DICOM Grayscale Softcopy Presentation State (GSPS) IOD to represent the information included in GSPSs produced by this implementation. Corresponding attributes are conveyed using the module construct.

### 9.2 MR MAPPING OF DICOM ENTITIES

The MRmaps DICOM Information Entities to local Information Entities in the product's database and user interface.

TABLE 9.2-8.4.5-1 MAPPING OF DICOM ENTITIES TO MR ENTITIES

| DICOM IE           | MR Entity          |
|--------------------|--------------------|
| Patient            | Patient            |
| Study              | Exam               |
| Series             | Series             |
| Presentation State | Presentation State |

### 9.3 IOD MODULE TABLE

The Grayscale Softcopy Presentation State Information Object Definition comprises the modules of the following table.

TABLE 9 GSPS IOD MODULES

| Entity Name | Module Name            | Usage   | Reference |
|-------------|------------------------|---|-----------|
| Patient     | Patient                | Used  | 9.4.1.1   |
|             | Clinical Trial Subject | Used when the referenced image contains this module | 9.4.1.2   |
| Study       | General Study          | Used  | 9.4.2.1   |
|             | Patient Study          | Used  | 9.4.2.2   |
|             | Clinical Trial Study   | Used when the referenced image contains this module | 9.4.2.3   |
| Series      | General Series         | Used  | 9.4.3.1   |
|             | Clinical Trial Series  | Used when the referenced image contains this module | 9.4.3.2   |

|                           |                                   |   |          |
|---------------------------|-----------------------------------|---|----------|
|                           | Presentation Series               | Used  | 9.4.3.3  |
| Equipment                 | General Equipment                 | Used  | 9.4.4.1  |
| Presentation State        | Presentation State Identification | Used  | 9.4.5.1  |
|                           | Presentation State Relationship   | Used  | 9.4.5.2  |
|                           | Presentation State Shutter        | Used  | 9.4.5.3  |
|                           | Presentation State Mask           | Not Used  | N/A      |
|                           | Mask                              | Not Used  | N/A      |
|                           | Display Shutter                   | Used, if the user has applied a rectangular/elliptical Display Shutter to any of the referenced image(s)    | 9.4.5.44 |
|                           | Bitmap Display Shutter            | Not Used  | N/A      |
|                           | Overlay Plane                     | Not Used  | N/A      |
|                           | Overlay Activation                | Not Used  | N/A      |
|                           | Displayed Area                    | Used  | 9.4.5.5  |
|                           | Graphic Annotation                | Used, if the user has applied text graphic annotations on any of the referenced image(s)                    | 9.4.5.6  |
|                           | Spatial Transformation            | Used, if rotation or flipping transformations are applied to the referenced image(s)                        | 9.4.5.77 |
|                           | Graphic Layer                     | Used, if the user has applied any Graphic Object on the referenced image(s) to highlight region of interest | 9.4.5.8  |
|                           | Graphic Group                     | Not Used  | N/A      |
|                           | Modality LUT                      | Used, if a Modality LUT is applied to the referenced image(s)   | 9.4.5.9  |
|                           | Softcopy VOI LUT                  | Used, if a VOI LUT is applied to the referenced image(s)  | 9.4.5.10 |
| Softcopy Presentation LUT | Used                              | 9.4.5.11  |          |
| SOP Common                | Used                              | 9.4.5.12  |          |

## 9.4 INFORMATION MODULE DEFINITIONS

Please refer to DICOM Part 3 (Information Object Definitions) for a description of each of the entities, modules, and attributes contained within the GSPS Information Object.

The following modules are included to convey Enumerated Values, Defined Terms, and Optional Attributes supported. Type 1 & Type 2 Attributes are also included for completeness and to define what values they may take and where these values are obtained from when generating the instance. It should be noted that they are the same ones as defined in the DICOM Standard Part 3 (Information Object Definitions). Also note that Attributes not present in tables are not supported.

### 9.4.1 Patient Entity Modules

#### 9.4.1.1 Patient Module

TABLE 9 PATIENT MODULE ATTRIBUTES

| Attribute Name                           | Tag         | Type | Attribute Description            |
|--|-------------|------|----------------------------------|
| Patient's Name                           | (0010,0010) | 2    | Copied from the referenced image |
| Patient ID                               | (0010,0020) | 2    | Copied from the referenced image |
| Patient's Birth Date                     | (0010,0030) | 2    | Copied from the referenced image |
| Patient's Sex                            | (0010,0040) | 2    | Copied from the referenced image |
| Patient's Birth Time                     | (0010,0032) | 3    | Copied from the referenced image |
| Other Patient IDs                        | (0010,1000) | 3    | Copied from the referenced image |
| Other Patient Names                      | (0010,1001) | 3    | Copied from the referenced image |
| Ethnic Group                             | (0010,2160) | 3    | Copied from the referenced image |
| Issuer of Patient ID                     | (0010,0021) | 3    | Unused                           |
| Issuer of Patient ID Qualifiers Sequence | (0010,0024) | 3    | Unused                           |
| Other Patient IDs                        | (0010,1000) | 3    | Unused                           |
| Other Patient IDs Sequence               | (0010,1002) | 3    | Unused                           |
| >Patient ID                              | (0010,0020) | 1    | Unused                           |
| >Issuer of Patient ID                    | (0010,0021) | 1    | Unused                           |
| >Type of Patient ID                      | (0010,0022) | 1    | Unused                           |

#### 9.4.1.2 Clinical Trial Subject Module

TABLE 9 CLINICAL TRIAL SUBJECT MODULE ATTRIBUTES

| Attribute Name               | Tag         | Type | Attribute Description            |
|------------------------------|-------------|------|----------------------------------|
| Clinical Trial Sponsor Name  | (0012,0010) | 1    | Copied from the referenced image |
| Clinical Trial Protocol ID   | (0012,0020) | 1    | Copied from the referenced image |
| Clinical Trial Protocol Name | (0012,0021) | 2    | Copied from the referenced image |
| Clinical Trial Site ID       | (0012,0030) | 2    | Copied from the referenced image |
| Clinical Trial Site Name     | (0012,0031) | 2    | Copied from the referenced image |
| Clinical Trial Subject ID    | (0012,0040) | 1C   | Copied from the referenced image |

|                                   |             |    |                                  |
|-----------------------------------|-------------|----|----------------------------------|
| Clinical Trial Subject Reading ID | (0012,0042) | 1C | Copied from the referenced image |
|-----------------------------------|-------------|----|----------------------------------|

#### 9.4.2 Study Entity Modules

##### 9.4.2.1 General Study Module

TABLE 9 GENERAL STUDY MODULE ATTRIBUTES

| Attribute Name             | Tag         | Type | Attribute Description            |
|----------------------------|-------------|------|----------------------------------|
| Study Instance UID         | (0020,000D) | 1    | Copied from the referenced image |
| Study Date                 | (0008,0020) | 2    | Copied from the referenced image |
| Study Time                 | (0008,0030) | 2    | Copied from the referenced image |
| Referring Physician's Name | (0008,0090) | 2    | Copied from the referenced image |
| Study ID                   | (0020,0010) | 2    | Copied from the referenced image |
| Accession Number           | (0008,0050) | 2    | Copied from the referenced image |
| Referenced Study Sequence  | (0008,1110) | 3    | Unused                           |

##### 9.4.2.2 Patient Study Module

TABLE 9 PATIENT STUDY MODULE ATTRIBUTES

| Attribute Name                  | Tag         | Type | Attribute Description            |
|---------------------------------|-------------|------|----------------------------------|
| Admitting Diagnoses Description | (0008,1080) | 3    | Copied from the referenced image |
| Patient's Age                   | (0010,1010) | 3    | Unused                           |
| Patient's Size                  | (0010,1020) | 3    | Unused                           |
| Patient's Weight                | (0010,1030) | 3    | Unused                           |
| Additional Patient's History    | (0010,21B0) | 3    | Unused                           |
| Admission ID                    | (0038,0010) | 3    | Unused                           |
| Issuer of Admission ID          | (0038,0011) | 3    | Unused                           |
| Service Episode ID              | (0038,0060) | 3    | Unused                           |
| Issuer of Service Episode ID    | (0038,0061) | 3    | Unused                           |
| Service Episode Description     | (0038,0062) | 3    | Unused                           |

##### 9.4.2.3 Clinical Trial Study Module

TABLE 9 CLINICAL TRIAL STUDY MODULE ATTRIBUTES

| Attribute Name                        | Tag         | Type | Attribute Description            |
|---------------------------------------|-------------|------|----------------------------------|
| Clinical Trial Time Point ID          | (0012,0050) | 2    | Copied from the referenced image |
| Clinical Trial Time Point Description | (0012,0051) | 3    | Copied from the referenced image |

## 9.4.3 Series Entity Modules

## 9.4.3.1 General Series Module

TABLE 9 GENERAL SERIES MODULE ATTRIBUTES

| Attribute Name                                    | Tag         | Type | Attribute Description   |
|---|-------------|------|---|
| Modality  | (0008,0060) | 1    | Value = PR  |
| Series Instance UID                               | (0020,000E) | 1    | New Instance UID auto-generated   |
| Series Number                                     | (0020,0011) | 2    | Value is set to "10000" + <Series number of the referenced image>   |
| Laterality  | (0020,0060) | 2C   | Unused  |
| Series Date                                       | (0008,0021) | 3    | Unused  |
| Series Time                                       | (0008,0031) | 3    | Unused  |
| Performing Physicians' Name                       | (0008,1050) | 3    | Unused  |
| Protocol Name                                     | (0018,1030) | 3    | Unused  |
| Series Description                                | (0008,103E) | 3    | Value set to "Presentation Series"  |
| Operators' Name                                   | (0008,1070) | 3    | Unused  |
| Referenced Performed Procedure Step Sequence      | (0008,1111) | 3    | Generated if the referenced image also contains this sequence.<br>References the PPS this GSPS instance belongs to. |
| <i>&gt;Include 'SOP Instance Reference Macro'</i> |             |      |   |
| Body Part Examined                                | (0018,0015) | 3    | Unused  |
| Patient Position                                  | (0018,5100) | 2C   | Unused  |
| Request Attributes Sequence                       | (0040,0275) | 3    | Unused  |
| >Requested Procedure ID                           | (0040,1001) | 1C   | Unused  |
| >Accession Number                                 | (0008,0050) | 3    | Unused  |
| >Study Instance UID                               | (0020,000D) | 3    | Unused  |
| >Referenced Study Sequence                        | (0008,1110) | 3    | Unused  |
| >Requested Procedure Description                  | (0032,1060) | 3    | Unused  |
| >Requested Procedure Code Sequence                | (0032,1064) | 3    | Unused  |
| >Scheduled Procedure Step ID                      | (0040,0009) | 1C   | Unused  |
| >Scheduled Procedure Step Description             | (0040,0007) | 3    | Unused  |
| >Scheduled Protocol Code Sequence                 | (0040,0008) | 3    | Unused  |
| Performed Procedure Step ID                       | (0040,0253) | 3    | Value set to Series Number (0020,0011) of the referenced image  |
| Performed Procedure Step Start Date               | (0040,0244) | 3    | Date on which the instance is created   |
| Performed Procedure Step Start Time               | (0040,0245) | 3    | GSPS IOD Instance creation time   |
| Performed Procedure Step Description              | (0040,0254) | 3    | Unused  |
| Performed Protocol Code Sequence                  | (0040,0260) | 3    | Unused  |

## 9.4.3.2 Clinical Trial Series Module

TABLE 9 CLINICAL TRIAL SERIES MODULE ATTRIBUTES

| Attribute Name                          | Tag         | Type | Attribute Description            |
|---|-------------|------|----------------------------------|
| Clinical Trial Coordinating Center Name | (0012,0060) | 2    | Copied from the referenced image |

## 9.4.3.3 Presentation Series Module

TABLE 9 PRESENTATION SERIES MODULE ATTRIBUTES

| Attribute Name | Tag         | Type | Use        |
|----------------|-------------|------|------------|
| Modality       | (0008,0060) | 1    | Value = PR |

## 9.4.4 Equipment Entity Modules

## 9.4.4.1 General Equipment Module

TABLE 9 GENERAL EQUIPMENT MODULE ATTRIBUTES

| Attribute Name                | Tag         | Type | Attribute Description            |
|-------------------------------|-------------|------|----------------------------------|
| Manufacturer                  | (0008,0070) | 2    | Copied from the referenced image |
| Institution Name              | (0008,0080) | 3    | Copied from the referenced image |
| Institution Address           | (0008,0081) | 3    | Copied from the referenced image |
| Station Name                  | (0008,1010) | 3    | Copied from the referenced image |
| Institutional Department Name | (0008,1040) | 3    | Copied from the referenced image |
| Manufacturer's Model Name     | (0008,1090) | 3    | Copied from the referenced image |
| Device Serial Number          | (0018,1000) | 3    | Copied from the referenced image |
| Software Versions             | (0018,1020) | 3    | Copied from the referenced image |
| Gantry ID                     | (0018,1008) | 3    | Copied from the referenced image |
| Spatial Resolution            | (0018,1050) | 3    | Copied from the referenced image |
| Date of Last Calibration      | (0018,1200) | 3    | Copied from the referenced image |
| Time of Last Calibration      | (0018,1201) | 3    | Copied from the referenced image |
| Pixel Padding Value           | (0028,0120) | 1C   | Not Used                         |

## 9.4.5 Presentation State Entity Modules

## 9.4.5.1 Presentation State Identification Module

TABLE 9 PRESENTATION STATE IDENTIFICATION MODULE ATTRIBUTES

| Attribute Name | Tag | Type | Use |
|----------------|-----|------|-----|
|----------------|-----|------|-----|



|                            |             |   |   |
|----------------------------|-------------|---|---|
| Presentation Creation Date | (0070,0082) | 1 | Value set to the date on which the GSPS IOD instance is created |
| Presentation Creation Time | (0070,0083) | 1 | Value set to the time of creation of the GSPS IOD instance      |
| Instance Number            | (0020,0013) | 1 | Auto-generated  |
| Content Label              | (0070,0080) | 1 | User specified. The value is set to "JAMI_GSPS" by default      |
| Content Description        | (0070,0081) | 2 | Value set to "Template GSPS"                                    |
| Content Creator's Name     | (0070,0084) | 2 | Hostname of the system is used by default                       |

#### 9.4.5.2 Presentation State Relationship Module

TABLE 9 PRESENTATION STATE RELATIONSHIP MODULE ATTRIBUTES

| Attribute Name                | Tag         | Type | Use   |
|-------------------------------|-------------|------|---|
| Referenced Series Sequence    | (0008,1115) | 1    | Only one item                               |
| >Series Instance UID          | (0020,000E) | 1    | Series Instance UID of the referenced image |
| >Referenced Image Sequence    | (0008,1140) | 1    | One item for each of the referenced image   |
| >>Referenced SOP Class UID    | (0008,1150) | 1    | SOP Class UID of the referenced image       |
| >>Referenced SOP Instance UID | (0008,1155) | 1    | SOP Instance UID of the referenced image    |
| >>Referenced Frame Number     | (0008,1160) | 1C   | Not used                                    |
| >>Referenced Segment Number   | (0062,000B) | 1C   | Not used                                    |

#### 9.4.5.3 Presentation State Shutter Module

TABLE 9 PRESENTATION STATE SHUTTER MODULE ATTRIBUTES

| Attribute Name                           | Tag         | Type | Use  |
|--|-------------|------|--|
| Shutter Presentation Value               | (0018,1622) | 1C   | Value set to 0 when display shutter is applied on the referenced image |
| Shutter Presentation Color CIE Lab Value | (0018,1624) | 1C   | Not used   |

#### 9.4.5.4 Display Shutter Module

This module is included in the GSPS instance only if any (RECTANGULAR, ELLIPTICAL, POLYGONAL) display shutters are applied on the displayed image.

TABLE 9 DISPLAY SHUTTER MODULE ATTRIBUTES

| Attribute Name | Tag         | Type | Attribute Description  |
|----------------|-------------|------|--|
| Shutter Shape  | (0018,1600) | 1    | Any of the below Enumerated values may be set:<br>- RECTANGULAR<br>- CIRCULAR<br>- POLYGONAL |

|                                   |             |    |   |
|-----------------------------------|-------------|----|---|
| Shutter Left Vertical Edge        | (0018,1602) | 1C | Used when RECTANGULAR Shape shutter is applied. |
| Shutter Right Vertical Edge       | (0018,1604) | 1C | Used when RECTANGULAR Shape shutter is applied. |
| Shutter Upper Horizontal Edge     | (0018,1606) | 1C | Used when RECTANGULAR Shape shutter is applied. |
| Shutter Lower Horizontal Edge     | (0018,1608) | 1C | Used when RECTANGULAR Shape shutter is applied. |
| Center of Circular Shutter        | (0018,1610) | 1C | Used when CIRCULAR Shape shutter is applied.    |
| Radius of Circular Shutter        | (0018,1612) | 1C | Used when CIRCULAR Shape shutter is applied.    |
| Vertices of the Polygonal Shutter | (0018,1620) | 1C | Used when POLYGONAL Shape shutter is applied.   |
| Shutter Presentation Value        | (0018,1622) | 3  | Value = 0                                       |

#### 9.4.5.5 Displayed Area Module

TABLE 9 DISPLAYED AREA MODULE ATTRIBUTES

| Attribute Name                           | Tag         | Type | Use   |
|--|-------------|------|---|
| Displayed Area Selection Sequence        | (0070,005A) | 1    | One entry for each referenced image displayed area selection                        |
| >Referenced Image Sequence               | (0008,1140) | 1C   |   |
| >>Referenced SOP Class UID               | (0008,1150) | 1    | SOP Class UID of the referenced image   |
| >>Referenced SOP Instance UID            | (0008,1155) | 1    | SOP Instance UID of the referenced image  |
| >>Referenced Frame Number                | (0008,1160) | 1C   | Not used  |
| >>Referenced Segment Number              | (0062,000B) | 1C   | Not used  |
| >Displayed Area Top Left Hand Corner     | (0070,0052) | 1    | Transformed X and Y coordinate points of top left corner of the displayed image     |
| >Displayed Area Bottom Right Hand Corner | (0070,0053) | 1    | Transformed X and Y coordinate points of bottom right corner of the displayed image |
| >Presentation Size Mode                  | (0070,0100) | 1    | Enumerated Values used:<br>SCALE TO FIT<br>TRUE SIZE<br>MAGNIFY                     |
| >Presentation Pixel Spacing              | (0070,0101) | 1C   | Width and Height value of each pixel.   |
| >Presentation Pixel Aspect Ratio         | (0070,0102) | 1C   | Used if aspect ratio is greater than 0  |
| >Presentation Pixel Magnification Ratio  | (0070,0103) | 1C   | Used when Presentation Size Mode = MAGNIFY.<br>Value = 1                            |

## 9.4.5.6 Graphic Annotation Module

TABLE 9 GRAPHIC ANNOTATION MODULE ATTRIBUTES

| Attribute Name                               | Tag         | Type | Use   |
|--|-------------|------|---|
| Graphic Annotation Sequence                  | (0070,0001) | 1    | One entry for each graphic annotation item  |
| >Referenced Image Sequence                   | (0008,1140) | 1C   |   |
| >>Referenced SOP Class UID                   | (0008,1150) | 1    | SOP Class UID of the referenced image   |
| >>Referenced SOP Instance UID                | (0008,1155) | 1    | SOP Instance UID of the referenced image  |
| >>Referenced Frame Number                    | (0008,1160) | 1C   | Not used  |
| >>Referenced Segment Number                  | (0062,000B) | 1C   | Not used  |
| >Graphic Layer                               | (0070,0002) | 1    | Value set to "GRX LAYER 0"  |
| >Text Object Sequence                        | (0070,0008) | 1C   | One item for each text annotation added on the referenced image   |
| >>Bounding Box Annotation Units              | (0070,0003) | 1C   | Enumerated Values used:<br>PIXEL<br>DISPLAY   |
| >>Anchor Point Annotation Units              | (0070,0004) | 1C   | Enumerated Values used:<br>PIXEL<br>DISPLAY   |
| >>Unformatted Text Value                     | (0070,0006) | 1    | User input displayed as text annotation   |
| >>Bounding Box Top Left Hand Corner          | (0070,0010) | 1C   | Used when text annotation is applied. Values specify the X and Y values of top left corner of bounding box of text annotation     |
| >>Bounding Box Bottom Right Hand Corner      | (0070,0011) | 1C   | Used when text annotation is applied. Values specify the X and Y values of bottom right corner of bounding box of text annotation |
| >>Bounding Box Text Horizontal Justification | (0070,0012) | 1C   | LEFT  |
| >>Anchor Point                               | (0070,0014) | 1C   | X and Y value of the anchor point of displayed text annotation  |
| >>Anchor Point Visibility                    | (0070,0015) | 1C   | Value set to 'Y' if text annotation anchor visible else 'N'   |
| >Graphic Object Sequence                     | (0070,0009) | 1C   | One item for each graphic object added on the referenced image  |
| >>Graphic Annotation Units                   | (0070,0005) | 1    | Enumerated Values used:<br>PIXEL<br>DISPLAY   |
| >>Graphic Dimensions                         | (0070,0020) | 1    | Value = 2   |
| >>Number of Graphic Points                   | (0070,0021) | 1    | Total number of end points forming the graphic object (e.g., 4 for a rectangle, 4 for ellipse etc.,)                              |
| >> Graphic Data                              | (0070,0022) | 1    | Generated   |

|                  |             |    |   |
|------------------|-------------|----|---|
| >>Graphic Type   | (0070,0023) | 1  | Enumerated values used based on the graphic object displayed :<br>POINT<br>POLYLINE<br>INTERPOLATED<br>CIRCLE<br>ELLIPSE  |
| >>Graphic Filled | (0070,0024) | 1C | This tag is used when closed POLYLINE based Graphic Objects (Rectangle, Polygon, Circle, Free hand etc) are applied on referenced images.<br><br>Enumerated values used:<br>Y = Yes<br>N = No |

#### 9.4.5.7 Spatial Transformation Module

TABLE 9 SPATIAL TRANSFORMATION MODULE ATTRIBUTES

| Attribute Name        | Tag         | Type | Use   |
|-----------------------|-------------|------|---|
| Image Rotation        | (0070,0042) | 1    | Enumerated values used :<br>0<br>90<br>180<br>270 |
| Image Horizontal Flip | (0070,0041) | 1    | Enumerated values used :<br>Y = Yes<br>N = No     |

#### 9.4.5.8 Graphic Layer Module

TABLE 9 GRAPHIC LAYER MODULE ATTRIBUTES

| Attribute Name                                     | Tag         | Type | Use                                      |
|--|-------------|------|--|
| Graphic Layer Sequence                             | (0070,0060) | 1    | One entry                                |
| >Graphic Layer                                     | (0070,0002) | 1    | Value set to "GRX LAYER 0"               |
| >Graphic Layer Order                               | (0070,0062) | 1    | Value = 1                                |
| >Graphic Layer Recommended Display Grayscale Value | (0070,0066) | 3    | Value = 65535                            |
| >Graphic Layer Recommended Display RGB Value       | (0070,0067) | 3    | Used only for legacy products            |
| >Graphic Layer Recommended Display CIELab Value    | (0070,0401) | 3    | Not used                                 |
| >Graphic Layer Description                         | (0070,0068) | 3    | Value set to "GEHC Graphic Layer Module" |

## 9.4.5.9 Modality LUT module

TABLE 9 MODALITY LUT MODULE ATTRIBUTES

| Attribute Name    | Tag         | Type | Attribute Description            |
|-------------------|-------------|------|----------------------------------|
| Rescale Slope     | (0028,1052) | 1C   | Copied from the referenced image |
| Rescale Intercept | (0028,1053) | 1C   | Copied from the referenced image |
| Rescale Type      | (0028,1054) | 1C   | Copied from the referenced image |

## 9.4.5.10 Softcopy VOI LUT Module

TABLE 9 SOFTCOPY VOI LUT MODULE ATTRIBUTES

| Attribute Name                     | Tag         | Type | Use   |
|------------------------------------|-------------|------|---|
| Softcopy VOI LUT Sequence          | (0028,3110) | 1    | One entry for each referenced image Softcopy VOILUT item  |
| >Referenced Image Sequence         | (0008,1140) | 1C   |   |
| >>Referenced SOP Class UID         | (0008,1150) | 1C   | SOP Class UID of the referenced image                     |
| >>Referenced SOP Instance UID      | (0008,1155) | 1C   | SOP Instance UID of the referenced image                  |
| >>Referenced Frame Number          | (0008,1160) | 1C   | Not used  |
| >>Referenced Segment Number        | (0062,000B) | 1C   | Not used  |
| >VOI LUT Sequence                  | (0028,3010) | 1C   | Needed if (0028,1050) not defined                         |
| >>LUT Descriptor                   | (0028,3002) | 1    | Value set to "GEMS JAMI ww/wl setting"                    |
| >>LUT Explanation                  | (0028,3003) | 3    | Look up Table   |
| >>LUT Data                         | (0028,3006) | 1    | LUT data  |
| >Window Center                     | (0028,1050) | 1C   | Window level value derived from user windowing operations |
| >Window Width                      | (0028,1051) | 1C   | Window width value derived from user windowing operations |
| >Window Center & Width Explanation | (0028,1055) | 3    | Value set to "GEMS JAMI ww/wl setting"                    |

## 9.4.5.11 Softcopy Presentation LUT Module

TABLE 9 SOFTCOPY PRESENTATION LUT MODULE ATTRIBUTES

| Attribute Name         | Tag         | Type | Use  |
|------------------------|-------------|------|--|
| Presentation LUT Shape | (2050,0020) | 1C   | Enumerated values used:<br>IDENTITY<br>INVERSE |

## 9.4.5.12 SOP Common Module

TABLE 9 SOP COMMON MODULE ATTRIBUTES

| Attribute Name         | Tag         | Type | Attribute Description             |
|------------------------|-------------|------|-----------------------------------|
| SOP Class UID          | (0008,0016) | 1    | 1.2.840.10008.5.1.4.1.1.11.1      |
| SOP Instance UID       | (0008,0018) | 1    | Auto generated UID                |
| Specific Character Set | (0008,0005) | 1C   | ISO_IR 100 = Latin Alphabet No. 1 |
| Instance Creation Date | (0008,0012) | 3    | GSPS IOD instance creation date   |
| Instance Creation Time | (0008,0013) | 3    | GSPS IOD instance creation time   |
| Instance Number        | (0020,0013) | 3    | Generated                         |

## 10. PRINT MANAGEMENT IMPLEMENTATION

### 10.1 INTRODUCTION

This section of the DICOM Conformance Statement specifies the implementation for the specific SOP Classes supported in the Basic Grayscale and Color Print Management Meta SOP Classes, the attributes supported for both IODs and services, and the valid range of values for mandatory and optional attributes.

### 10.2 BASIC FILM SESSION SOP CLASS

#### 10.2.1 Basic Film Session N-Create Attributes

This table lists the attributes that are sent in the Basic Film Session N-Create Request:

| Attribute name         | Tag         | Use  |
|------------------------|-------------|--|
| Specific Character Set | (0008,0005) | Not used   |
| Number of Copies       | (2000,0010) | Set by user.<br>Valid range is : 1-99  |
| Print Priority         | (2000,0020) | Set when a printer device is added using the Film Composer Tool.<br>Valid Range is :<br>HIGH or MED or LOW                 |
| Medium Type            | (2000,0030) | Set when a printer device is added using the Film Composer Tool.<br>Valid values are :<br>PAPER or CLEAR FILM or BLUE FILM |
| Film Destination       | (2000,0040) | Set when a printer device is added using the Film Composer Tool.<br>Valid values are :<br>MAGAZINE or PROCESSOR            |
| Film Session Label     | (2000,0050) | Not used.  |
| Memory Allocation      | (2000,0060) | Not used.  |
| Owner ID               | (2100,0160) | Not used.  |

### 10.3 BASIC FILM BOX SOP CLASS

#### 10.3.1 Basic Film Box N-Create Attributes

This table lists the attributes that are sent to the SCP in the Basic Film Box N-Create Request, and that are received in the Basic Film Box N-Create Response from the SCP

| Attribute Name       | Tag         | Use                    |
|----------------------|-------------|------------------------|
| Image Display Format | (2010,0010) | Set in User Interface. |

|                                  |             |  |
|----------------------------------|-------------|--|
|                                  |             | Valid Range: STANDARD\C,R  |
| Referenced Film Session Sequence | (2010,0500) | Sent in the request  |
| >Referenced SOP Class UID        | (0008,1150) | Film session SOP Class UID (1.2.840.10008.5.1.1.1)   |
| >Referenced SOP Instance UID     | (0008,1155) | Film session SOP instance UID  |
| Referenced Image Box Sequence    | (2010,0510) | Used in Image Box N-SET request  |
| >Referenced SOP Class UID        | (0008,1150) |  |
| >Referenced SOP Instance UID     | (0008,1155) |  |
| Film Orientation                 | (2010,0040) | Set when a printer device is added using the Film Composer Tool.<br>Valid value is : PORTRAIT.   |
| Film Size ID                     | (2010,0050) | Set when a printer device is added using the Film Composer Tool.<br>Valid values are :<br>14INX17IN,<br>A3,<br>A4,<br>8INX10IN,<br>8.5INX11IN,<br>10INX12IN,<br>10INX14IN,<br>11INX14IN,<br>11INX17IN,<br>14INX14IN,<br>24CMX24CM,<br>24CMX30CM. |
| Magnification Type               | (2010,0060) | Set when a printer device is added using the Film Composer Tool.<br>Valid values are:<br>REPLICATE<br>BILINEAR<br>CUBIC<br>NONE  |
| Max Density                      | (2010,0130) | Set when a printer device is added using the Film Composer Tool.<br>Valid range is : 0-4095.   |
| Configuration Information        | (2010,0150) | Set when a printer device is added using the Film Composer Tool.   |
| Annotation Display Format ID     | (2010,0030) | Not Supported.   |
| Smoothing Type                   | (2010,0080) | Set when a printer device is added using the Film Composer Tool.   |
| Border Density                   | (2010,0100) | Set when a printer device is added using the Film Composer Tool.<br>Valid values are:<br>BLACK or WHITE or Not sent  |



|                         |             |   |
|-------------------------|-------------|---|
| Empty Image Density     | (2010,0110) | Set when a printer device is added using the Film Composer Tool.<br>Valid values are:<br>BLACK or WHITE or Not sent |
| Min Density             | (2010,0120) | Set when a printer device is added using the Film Composer Tool.<br>Valid values are:<br>0-4095 or Not sent         |
| Trim                    | (2010,0140) | Valid values are:<br>YES or NO or Not Sent  |
| Illumination            | (2010,015E) | Not Supported.  |
| Reflected Ambient Light | (2010,0160) | Not Supported.  |
| Requested Resolution ID | (2020,0050) | Not Supported.  |
| ICC Profile             | (0028,2000) | Not Supported.  |

### 10.3.2 Basic Film Box N-Action Attributes

Following are the Action reply arguments that are supported if present in the N-Action response of the Basic Film Box SOP Class

| Action Type Name | Action Type ID | Attribute                     | Tag         | Usage SCU     |
|------------------|----------------|-------------------------------|-------------|---------------|
| Print            | 1              | Referenced Print Job Sequence | (2100,0500) | Ignored       |
|                  |                | >Referenced SOP Class UID     | (0008,1150) | Ignored       |
|                  |                | >Referenced SOP Instance UID  | (0008,1155) | Ignored       |
|                  |                | >Print Job ID                 | (2100,0010) | Not supported |

### 10.3.3 Basic Film Box N-Delete

The DICOM SERVER AE requests the Print SCP to delete the Film Box Instance.

## 10.4 BASIC GRAYSCALE AND COLOR IMAGE BOX SOP CLASSES

### 10.4.1 Basic Grayscale Image Box Pixel N-Set Attributes

This table lists the attributes that are sent in the Basic Grayscale Image Box N-Set Request:

| Attribute Name                 | Tag         | Use                           |
|--------------------------------|-------------|-------------------------------|
| Image Position                 | (2020,0010) | Based on Image Display Format |
| Basic Grayscale Image Sequence | (2020,0110) | Sent in the request           |
| >Samples Per Pixel             | (0028,0002) | 1                             |

|                                      |             |   |
|--------------------------------------|-------------|---|
| >Photometric Interpretation          | (0028,0004) | MONOCHROME2                                       |
| >Rows                                | (0028,0010) | Image Dependent                                   |
| >Columns                             | (0028,0011) | Image Dependent                                   |
| >Pixel Aspect Ratio                  | (0028,0034) | 1\1   |
| >Bits Allocated                      | (0028,0100) | 8 (if Bits Stored=8) or<br>16 (if Bits Stored=12) |
| >Bits Stored                         | (0028,0101) | 8 or 12   |
| >High Bit                            | (0028,0102) | 7 (if Bits Stored=8) or<br>11 (if Bits Stored=12) |
| >Pixel Representation                | (0028,0103) | 0 (unsigned integer)                              |
| >Pixel Data                          | (7FE0,0010) | Pixel data  |
| Polarity                             | (2020,0020) | NORMAL  |
| Magnification Type                   | (2010,0060) | BILINEAR<br>CUBIC<br>REPLICATE<br>NONE            |
| Smoothing Type                       | (2010,0080) | Printer Dependent                                 |
| Min Density                          | (2010,0120) | 0-4095, Not Sent                                  |
| Max Density                          | (2010,0130) | 0-4095  |
| Configuration Information            | (2010,0150) | Printer Dependent                                 |
| Requested Image Size                 | (2020,0030) | Not used  |
| Requested Decimate/Crop Behavior     | (2020,0040) | Not used  |
| Referenced Presentation LUT Sequence | (2050,0500) | Not supported.                                    |
| > Referenced SOP Class UID           | (0008,1150) | Not supported.                                    |
| > Referenced SOP Instance UID        | (0008,1155) | Not supported.                                    |

#### 10.4.2 Basic Color Image Box Pixel N-Set Attributes

This table lists the attributes that are sent in the Basic Color Image Box N-Set Request:

| Attribute Name              | Tag         | Use                           |
|-----------------------------|-------------|-------------------------------|
| Image Position              | (2020,0010) | Based on Image Display Format |
| Basic Color Image Sequence  | (2020,0111) |                               |
| >Samples Per Pixel          | (0028,0002) | 3                             |
| >Photometric Interpretation | (0028,0004) | RGB                           |
| >Planar Configuration       | (0028,0006) | 1                             |
| >Rows                       | (0028,0010) | Image Dependent               |
| >Columns                    | (0028,0011) | Image Dependent               |
| >Pixel Aspect Ratio         | (0028,0034) | 1/1                           |

|                                  |             |  |
|----------------------------------|-------------|--|
| >Bits Allocated                  | (0028,0100) | 8                                      |
| >Bits Stored                     | (0028,0101) | 8                                      |
| >High Bit                        | (0028,0102) | 7                                      |
| >Pixel Representation            | (0028,0103) | 0 (unsigned integer)                   |
| >Pixel Data                      | (7FE0,0010) | Pixel data                             |
| Polarity                         | (2020,0020) | NORMAL                                 |
| Magnification Type               | (2010,0060) | BILINEAR<br>CUBIC<br>REPLICATE<br>NONE |
| Smoothing Type                   | (2010,0080) | Printer Dependent                      |
| Requested Image Size             | (2020,0030) | Not used                               |
| Requested Decimate/Crop Behavior | (2020,0040) | Not used                               |

## 10.5 PRINTER SOP CLASS

### 10.5.1 Printer N-Event-Report Attributes

If an N-EVENT-REPORT DIMSE service is received when the association is active, the DICOM SERVER AE handles the relevant states, but the data received is ignored.

### 10.5.2 Printer N-Get Attributes

N-Get request is sent when the user initiates the print activity by clicking on the Print button. Based on the N-Get response, the DICOM SERVER AE continues to send the Film Session's N-CREATE request if status is NORMAL, else pauses the print job and displays the error message on the Film Composer UI.

This table defines the set of attributes that this product may request using the Printer N-Get service. It also describes what is the product behavior when receiving the N-Get response from the Printer SCP.

| Attribute Name | Tag         | Use   |
|----------------|-------------|---|
| Printer Status | (2110,0010) | NORMAL: Status is logged and sends Film Session N-CREATE request.<br><br>WARNING: Status is logged. Pauses the print job and displays status code on the film composer UI.<br><br>FAILURE: Status is logged. Pauses the print job and displays print failure message on the film composer UI. |

|                          |             |   |
|--------------------------|-------------|---|
| Printer Status Info      | (2110,0020) | SUPPLY LOW: Logs the message and continues printing.<br><br>SUPPLY EMPTY: print job is paused and the message is logged.<br><br>RECEIVER FULL: print job is paused and the message is logged.<br><br>FILM JAM: print job is paused and the message is logged. |
| Printer Name             | (2110,0030) | Logged if sent by SCP   |
| Manufacturer             | (0008,0070) | Logged if sent by SCP   |
| Manufacturer Model Name  | (0008,1090) | Logged if sent by SCP   |
| Device Serial Number     | (0018,1000) | Logged if sent by SCP   |
| Software Versions        | (0018,1020) | Logged if sent by SCP   |
| Date Of Last Calibration | (0018,1200) | Ignored   |
| Time Of Last Calibration | (0018,1201) | Ignored   |

## 11. MR INFORMATION OBJECT IMPLEMENTATION

### 11.1 INTRODUCTION

This section specifies the use of the DICOM MR specific IOD to represent the information included in MR produced by this implementation. Corresponding attributes are conveyed using the module construct.

### 11.2 IOD MODULE TABLE

The MR Information Object Definition comprises the modules of the following table.

TABLE 10.5.2-1 MR IOD MODULES

| Entity Name        | Module Name        | Usage | Reference |
|--------------------|--------------------|-------|-----------|
| Patient            | Patient            | Used  | 11.3.1.1  |
| Study              | General Study      | Used  | 11.3.2.1  |
|                    | Patient Study      | Used  | 11.3.2.2  |
| Series             | General Series     | Used  | 11.3.3.1  |
| Equipment          | General Equipment  | Used  | 11.3.4.1  |
| Frame of Reference | Frame of Reference | Used  | 11.3.5.1  |
| Image              | General Image      | Used  | 11.3.6.1  |
|                    | Image Plane        | Used  | 11.3.6.2  |
|                    | Image Pixel        | Used  | 11.3.6.3  |
|                    | Contrast/Bolus     | Used  | 11.3.6.4  |
|                    | MR Image           | Used  | 11.3.6.5  |
|                    | SOP Common         | Used  | 11.3.6.6  |

### 11.3 INFORMATION MODULE DEFINITIONS

Please refer to DICOM Part 3 (Information Object Definitions) for a description of each of the entities, modules, and attributes contained within the MR specific Information Object.

The following modules are included to convey Enumerated Values, Defined Terms, and Optional Attributes supported. Type 1 & Type 2 Attributes are also included for completeness and to define what values they may take and where these values are obtained from when generating the instance. It should be noted that they are the same ones as defined in the DICOM Standard Part 3 (Information Object Definitions). Also note that Attributes not present in tables are not supported and Attributes marked as "Not used" are not generated by this software release but were supported in prior releases.

## 11.3.1 Patient Entity Modules

## 11.3.1.1 Patient Module

TABLE 11.3.1-1 PATIENT MODULE ATTRIBUTES

| Attribute Name               | Tag         | Type | Attribute Description   |
|------------------------------|-------------|------|---|
| Patient's Name               | (0010,0010) | 2    | As entered at the user interface or from worklist. Supports 5 different components delimited by "^". Supports a maximum length of 64 characters including the delimiter. Delimiters must be set by the operator, entered from the user interface. |
| Patient ID                   | (0010,0020) | 2    | As entered at user interface or from worklist.  |
| Issuer of Patient ID         | (0010,0021) | 3    | Value from the worklist.  |
| Patient's Birth Date         | (0010,0030) | 2    | As entered at user interface or from worklist.  |
| Patient's Sex                | (0010,0040) | 2    | As entered at user interface or from worklist.  |
| Referenced Patient Sequence  | (0008,1120) | 3    | Not sent.   |
| >Referenced SOP Class UID    | (0008,1150) | 1C   | Not sent.   |
| >Referenced SOP Instance UID | (0008,1155) | 1C   | Not sent.   |
| Patient's Birth Time         | (0010,0032) | 3    | Unused  |
| Other Patient IDs            | (0010,1000) | 3    | Value from the worklist.  |
| Other Patient Names          | (0010,1001) | 3    | Unused  |
| Ethnic Group                 | (0010,2160) | 3    | Unused  |
| Patient Comments             | (0010,4000) | 3    | Unused  |

### 11.3.2 Study Entity Modules

#### 11.3.2.1 General Study Module

TABLE 11.3.2-1 GENERAL STUDY MODULE ATTRIBUTES

| Attribute Name                                     | Tag         | Type | Attribute Description   |
|--|-------------|------|---|
| Study Instance UID *                               | (0020,000D) | 1    | Value from worklist is used if present. Value is generated uniquely for each exam if worklist entry is not present. |
| Study Date   | (0008,0020) | 2    | Generated for each exam and always sent.  |
| Study Time   | (0008,0030) | 2    | Generated for each exam and always sent.  |
| Referring Physician's Name                         | (0008,0090) | 2    | Value from user interface or modality worklist.   |
| Referring Physician Identification Sequence        | (0008,0096) | 3    | Unused  |
| Study ID *   | (0020,0010) | 2    | Auto-generated sequential number.   |
| Accession Number                                   | (0008,0050) | 2    | Value from user interface or worklist sent.   |
| Study Description                                  | (0008,1030) | 3    | Value from user interface or worklist sent.   |
| Procedure Code Sequence                            | (0008,1032) | 3    | Unused  |
| Physician(s) of Record                             | (0008,1048) | 3    | Unused  |
| Physician(s) of Record Identification Sequence     | (0008,1049) | 3    | Unused  |
| Name of Physician(s) Reading Study                 | (0008,1060) | 3    | Value from user interface.  |
| Physician(s) Reading Study Identification Sequence | (0008,1062) | 3    | Unused  |
| Referenced Study Sequence                          | (0008,1110) | 3    | Value from the worklist   |
| >Referenced SOP Class UID                          | (0008,1150) | 1C   | Value from the worklist   |
| >Referenced SOP Instance UID                       | (0008,1155) | 1C   | Value from the worklist   |

\* When modality worklist is used, the Study ID associated with a Study Instance UID is not guaranteed to be constant. If multiple exams are created on the scanner by reusing a single worklist entry, then each use will be assigned a new study ID. Although all exams will share the same Study Instance UID, each exam will have its own Study ID. Within the data base browser, each exam will be listed separately by its study ID (exam number); however, on some PACS systems the exams will be joined into a single study based solely on the Study Instance UID.

#### 11.3.2.2 Patient Study Module

TABLE 11.3.2-2 PATIENT STUDY MODULE ATTRIBUTES

| Attribute Name                    | Tag         | Type | Attribute Description  |
|-----------------------------------|-------------|------|--|
| Admitting Diagnoses Description   | (0008,1080) | 3    | Not Supported. Information will be removed.                              |
| Admitting Diagnoses Code Sequence | (0008,1084) | 3    | Unused   |
| Patient's Age                     | (0010,1010) | 3    | Calculated from Date of Birth entered at user interface or from the MWL. |

|                              |             |   |  |
|------------------------------|-------------|---|--|
| Patient's Size               | (0010,1020) | 3 | Value from modality worklist.  |
| Patient's Weight             | (0010,1030) | 3 | Value from user interface.   |
| Occupation                   | (0010,2180) | 3 | Unused   |
| Additional Patient's History | (0010,21B0) | 3 | Value from modality worklist or user interface. Truncated to 60 characters |
| Admission ID                 | (0038,0010) | 3 | Value from modality worklist.  |
| Issuer of Admission ID       | (0038,0011) | 3 | Value from modality worklist.  |

### 11.3.3 Series Entity Modules

#### 11.3.3.1 General Series Module

TABLE 11.3.3-1 GENERAL SERIES MODULE ATTRIBUTES

| Attribute Name                               | Tag         | Type | Attribute Description  |
|--|-------------|------|--|
| Modality                                     | (0008,0060) | 1    | MR   |
| Series Instance UID                          | (0020,000E) | 1    | Locally Generated UID  |
| Series Number                                | (0020,0011) | 2    | Generated and always sent.   |
| Laterality                                   | (0020,0060) | 2C   | Not sent for some pulse sequences; other pulse sequences send zero length.   |
| Series Date                                  | (0008,0021) | 3    | Generated for each series and always sent.   |
| Series Time                                  | (0008,0031) | 3    | Generated for each series and always sent.   |
| Performing Physicians' Name                  | (0008,1050) | 3    | Unused   |
| Performing Physician Identification Sequence | (0008,1052) | 3    | Unused   |
| Protocol Name                                | (0018,1030) | 3    | Filled with series description if series not from protocol. Can also be entered at the user interface. Limited to 24 characters. |
| Series Description                           | (0008,103E) | 3    | Value from user interface is sent.   |
| Operators' Name                              | (0008,1070) | 3    | Value from user interface is sent. Limited to 4 characters.  |
| Operator Identification Sequence             | (0008,1072) | 3    | Unused   |
| Referenced Performed Procedure Step Sequence | (0008,1111) | 3    | Value used for performed procedure step  |
| >Referenced SOP Class UID                    | (0008,1150) | 1C   | Value used for performed procedure step  |
| >Referenced SOP Instance UID                 | (0008,1155) | 1C   | Value used for performed procedure step  |
| Body Part Examined                           | (0018,0015) | 3    | Unused   |
| Patient Position                             | (0018,5100) | 2C   | Always sent. As selected by operator when patient is positioned.   |
| Smallest Pixel Value in Series               | (0028,0108) | 3    | Unused   |
| Largest Pixel Value in Series                | (0028,0109) | 3    | Unused   |



|                                       |             |    |  |
|---------------------------------------|-------------|----|--|
| Performed Procedure Step Start Date   | (0040,0244) | 3  | Created at the scanner to be added into the N-Create/N-Set messages and image. |
| Performed Procedure Step Start Time   | (0040,0245) | 3  | Created at the scanner to be added into the N-Create/N-Set messages and image. |
| Performed Procedure Step ID           | (0040,0253) | 3  | Created at the scanner to be added into the N-Create/N-Set messages and image. |
| Performed Procedure Step Description  | (0040,0254) | 3  | Value copied and set from (0008,1030)  |
| Performed Protocol Code Sequence      | (0040,0260) | 3  | Unused   |
| Request Attribute Sequence            | (0040,0275) | 3  | Will be present only if SPS, obtained from HIS/RIS is selected for scanning.   |
| >Scheduled Procedure Step Description | (0040,0007) | 3  | Will be present only if SPS, obtained from HIS/RIS is selected for scanning.   |
| >Scheduled Protocol Code Sequence     | (0040,0008) | 3  | Will be present only if SPS, obtained from HIS/RIS is selected for scanning.   |
| >Scheduled Procedure Step ID          | (0040,0009) | 1C | Will be present only if SPS, obtained from HIS/RIS is selected for scanning.   |
| >Requested Procedure ID               | (0040,1001) | 1C | Will be present only if SPS, obtained from HIS/RIS is selected for scanning.   |
| Comments on Performed Procedure Step  | (0040,0280) | 3  | Unused   |

#### 11.3.4 Equipment Entity Modules

##### 11.3.4.1 General Equipment Module

TABLE 11.3.4-1 GENERAL EQUIPMENT MODULE ATTRIBUTES

| Attribute Name                | Tag         | Type | Attribute Description   |
|-------------------------------|-------------|------|---|
| Manufacturer                  | (0008,0070) | 2    | Always sent as "GE MEDICAL SYSTEMS"   |
| Institution Name              | (0008,0080) | 3    | Sent. Value is configurable. Limited to 32 characters.  |
| Institution Address           | (0008,0081) | 3    | Unused  |
| Station Name                  | (0008,1010) | 3    | Sent. Value is configurable.  |
| Institutional Department Name | (0008,1040) | 3    | Unused  |
| Manufacturers Model Name      | (0008,1090) | 3    | Always sent.  |
| Device Serial Number          | (0018,1000) | 3    | Always sent.  |
| Software Versions             | (0018,1020) | 3    | Always sent as<br>" <<SW ver>> \<<plat>> \MR Software<br>release: <<SW build>> "<br>Where <<plat>> is "LX" or "MX"<br>and<br>Where <<SW build>> is of the example form<br>"14.o_M4_o620.a"<br>Full example:<br>14\LX\MR Software release:14.o_M4_o620.a |

|                          |             |   |                                      |
|--------------------------|-------------|---|--------------------------------------|
| Spatial Resolution       | (0018,1050) | 3 | Sent only for pre-11.0 GE MR images. |
| Date of Last Calibration | (0018,1200) | 3 | Unused                               |
| Time of Last Calibration | (0018,1201) | 3 | Unused                               |
| Pixel Padding Value      | (0028,0120) | 3 | Not Used.                            |

### 11.3.5 Frame of Reference Modules

#### 11.3.5.1 Frame of Reference Module

TABLE 11.3.5-1 FRAME OF REFERENCE MODULE ATTRIBUTES

| Attribute Name               | Tag         | Type | Attribute Description |
|------------------------------|-------------|------|-----------------------|
| Frame of Reference UID       | (0020,0052) | 1    | Always sent           |
| Position Reference Indicator | (0020,1040) | 2    | Set to zero length    |

## 11.3.6 Image Modules

## 11.3.6.1 General Image Module

TABLE 11.3.6-1 GENERAL IMAGE MODULE ATTRIBUTES

| Attribute Name               | Tag         | Type | Attribute Description  |
|------------------------------|-------------|------|--|
| Image Type                   | (0008,0008) | 3    | Always sent. See section 11.3.8 for image type values                        |
| Acquisition Date             | (0008,0022) | 3    | Generated for each acquisition, always sent.                                 |
| Image Date                   | (0008,0023) | 2C   | Generated for each image, always sent.                                       |
| Acquisition Date/Time        | (0008,002A) | 3    | Unused   |
| Acquisition Time             | (0008,0032) | 3    | Value set at each series prep time, always sent.                             |
| Image Time                   | (0008,0033) | 2C   | Value set at each series prep time, always sent.                             |
| Referenced Image Sequence    | (0008,1140) | 3    | Sent for GRx prescribed series images, 1-4 referenced images may be provided |
| >Referenced SOP Class UID    | (0008,1150) | 1C   |  |
| >Referenced SOP Instance UID | (0008,1155) | 1C   |  |
| >Referenced Frame Number     | (0008,1160) | 3    | Unused   |
| Derivation Description       | (0008,2111) | 3    | Unused   |
| Source Image Sequence        | (0008,2112) | 3    | Unused   |
| Derivation Code Sequence     | (0008,9215) | 3    | Unused   |
| Referenced Waveform Sequence | (0008,113A) | 3    | Unused   |
| Acquisition Number           | (0020,0012) | 3    | Generated for each acquisition, always sent.                                 |
| Image Number                 | (0020,0013) | 2    | Generated sequentially, always sent.   |
| Patient Orientation          | (0020,0020) | 2C   | Unused   |
| Images in Acquisition        | (0020,1002) | 3    | Always sent. (Not sent for pre-12.0 GE MR systems).                          |
| Image Comments               | (0020,4000) | 3    | Unused   |
| Quality Control Image        | (0028,0300) | 3    | Unused   |
| Burned in Annotation         | (0028,0301) | 3    | Unused   |
| Lossy Image Compression      | (0028,2110) | 3    | Unused   |

## 11.3.6.2 Image Plane Module

TABLE 11.3.6-2 IMAGE PLANE MODULE ATTRIBUTES

| Attribute Name              | Tag         | Type | Attribute Description |
|-----------------------------|-------------|------|-----------------------|
| Slice Thickness             | (0018,0050) | 2    | Value always sent.    |
| Image Orientation (Patient) | (0020,0037) | 1    | Value always sent.    |
| Image Position (Patient)    | (0020,0032) | 1    | Value always sent.    |
| Slice Location              | (0020,1041) | 3    | Value always sent.    |
| Pixel Spacing               | (0028,0030) | 1    | Value always sent.    |

## 11.3.6.3 Image Pixel Module

TABLE 11.3.6-3 IMAGE PIXEL MODULE ATTRIBUTES

| Attribute Name                              | Tag         | Type | Attribute Description                 |
|---|-------------|------|---------------------------------------|
| Samples per Pixel                           | (0028,0002) | 1    | Value always sent.                    |
| Photometric Interpretation                  | (0028,0004) | 1    | Value always sent.                    |
| Rows  | (0028,0010) | 1    | Value always sent.                    |
| Columns                                     | (0028,0011) | 1    | Value always sent.                    |
| Bits Allocated                              | (0028,0100) | 1    | Value always sent.                    |
| Bits Stored                                 | (0028,0101) | 1    | Value always sent.                    |
| High Bit                                    | (0028,0102) | 1    | Value always sent.                    |
| Pixel Presentation                          | (0028,0103) | 1    | Value always sent.                    |
| Smallest Pixel Value                        | (0028,0106) | 3    | Sent for some pulse sequences.        |
| Largest Pixel Value                         | (0028,0207) | 3    | Sent for some pulse sequences.        |
| Planar Configuration                        | (0028,0006) | 1C   | Unused                                |
| Pixel Aspect Ratio                          | (0028,0034) | 1C   | Unused                                |
| Red Palette Color Lookup Table Descriptor   | (0028,1101) | 1C   | Filled in for some applications only. |
| Green Palette Color Lookup Table Descriptor | (0028,1102) | 1C   | Filled in for some applications only. |
| Blue Palette Color Lookup Table Descriptor  | (0028,1103) | 1C   | Filled in for some applications only. |
| Red Palette Color Lookup Table Data         | (0028,1201) | 1C   | Filled in for some applications only. |
| Green Palette Color Lookup Table Data       | (0028,1202) | 1C   | Filled in for some applications only. |
| Blue Palette Color Lookup Table Data        | (0028,1203) | 1C   | Filled in for some applications only. |
| Pixel Data                                  | (7FE0,0010) | 1    | Value always sent.                    |

## 11.3.6.4 Contrast/Bolus Module

TABLE 11.3.6-4 CONTRAST\BOLUS MODULE ATTRIBUTES

| Attribute Name                               | Tag         | Type | Attribute Description                                |
|--|-------------|------|--|
| Contrast/Bolus Agent                         | (0018,0010) | 2    | Sent if contrast exam, as entered in user interface. |
| Contrast/Bolus Agent Sequence                | (0018,0012) | 3    | Unused   |
| >Code Value                                  | (0008,0100) | 1C   | Unused   |
| >Coding Scheme Designator                    | (0008,0102) | 1C   | Unused   |
| >Code Meaning                                | (0008,0104) | 3    | Unused   |
| Contrast/Bolus Route                         | (0018,1040) | 3    | Sent if contrast exam, as entered in user interface. |
| Contrast/Bolus Administration Route Sequence | (0018,0014) | 3    | Unused   |
| Contrast/Bolus Volume                        | (0018,1041) | 3    | Unused   |
| Contrast/Bolus Start Time                    | (0018,1042) | 3    | Unused   |
| Contrast/Bolus Stop Time                     | (0018,1043) | 3    | Unused   |
| Contrast/Bolus Total Dose                    | (0018,1044) | 3    | Unused   |
| Contrast Flow Rate(s)                        | (0018,1046) | 3    | Unused   |
| Contrast Flow Duration(s)                    | (0018,1047) | 3    | Unused   |
| Contrast/Bolus Ingredient                    | (0018,1048) | 3    | Unused   |
| Contrast/Bolus Ingredient Concentration      | (0018,1049) | 3    | Unused   |

## 11.3.6.5 MR Image Module

TABLE 11.3.6-5 MR IMAGE MODULE ATTRIBUTES

| Attribute Name                 | Tag         | Type | Attribute Description  |
|--------------------------------|-------------|------|--|
| Image Type                     | (0008,0008) | 1    | Always sent. See section 11.3.8.1 for image type values  |
| Volumetric Properties          | (0008,9206) | 3    | This value is used for Graphic Rx Compatibility. Images that contain this attribute with values of "VOLUME" or "SAMPLED" are compatible with Graphic Rx. Images containing other values are not compatible. If the value does not exist then the image may or may not be compatible. |
| Samples per pixel              | (0028,0002) | 1    | Always sent.   |
| Photometric Interpretation     | (0028,0004) | 1    | Always sent.   |
| Bits Allocated                 | (0028,0100) | 1    | Always sent.   |
| Scanning Sequence              | (0018,0020) | 1    | Always sent.   |
| Sequence Variant               | (0018,0021) | 1    | Always sent.   |
| Scan Options                   | (0018,0022) | 2    | Always sent. (even if value is zero length)  |
| MR Acquisition Type            | (0018,0023) | 2    | 2D or 3D depending on acquisition type.  |
| Sequence Name                  | (0018,0024) | 3    | Unused   |
| Repetition Time                | (0018,0080) | 2C   | Sent if Scanning Sequence is EP and Sequence Variant is not SK. Also sent for non-EP.  |
| Echo Time                      | (0018,0081) | 2    | Always Sent. (even if value is zero length)  |
| Inversion Time                 | (0018,0082) | 2C   | Always Sent. (even if value is zero length)  |
| Echo Train Length              | (0018,0091) | 2    | Always Sent. (even if value is zero length)  |
| Trigger Time                   | (0018,1060) | 2C   | Always Sent. (even if value is zero length)  |
| Angio Flag                     | (0018,0025) | 3    | Sent 'Y' or 'N' from some pulse sequences  |
| Number Of Averages             | (0018,0083) | 3    | Always sent (even if value is zero length)   |
| Imaging Frequency              | (0018,0084) | 3    | Always sent.   |
| Imaged Nucleus                 | (0018,0085) | 3    | 1H or SPECT  |
| Echo Number                    | (0018,0086) | 3    | Always sent.   |
| Magnetic Field Strength        | (0018,0087) | 3    | Always sent.   |
| Spacing Between Slices         | (0018,0088) | 3    | Always sent (even if value is zero length)   |
| Number of Phase Encoding Steps | (0018,0089) | 3    | Unused   |
| Percent Sampling               | (0018,0093) | 3    | Always sent (even if value is zero length)   |
| Percent Phase Field of View    | (0018,0094) | 3    | Always sent (even if value is zero length)   |
| Pixel Bandwidth                | (0018,0095) | 3    | Sent if available, else not sent   |
| Nominal Interval               | (0018,1062) | 3    | Sent if available, else not sent   |

|                              |             |   |   |
|------------------------------|-------------|---|---|
| Beat Rejection Flag          | (0018,1080) | 3 | Unused  |
| Low R-R Value                | (0018,1081) | 3 | Unused  |
| High R-R Value               | (0018,1082) | 3 | Unused  |
| Intervals Acquired           | (0018,1083) | 3 | Sent for Propeller & MR-Echo only.  |
| Intervals Rejected           | (0018,1084) | 3 | Unused  |
| PVC Rejection                | (0018,1085) | 3 | Unused  |
| Skip Beats                   | (0018,1086) | 3 | Unused  |
| Heart Rate                   | (0018,1088) | 3 | Sent if available, else not sent  |
| Cardiac Number of Images     | (0018,1090) | 3 | Sent if available, else not sent  |
| Trigger Window               | (0018,1094) | 3 | Sent if available, else not sent  |
| Reconstruction Diameter      | (0018,1100) | 3 | Always sent. (even if value is zero length)   |
| Receiving Coil               | (0018,1250) | 3 | Sent if available, else not sent.   |
| Transmitting Coil            | (0018,1251) | 3 | Sent if available, else not sent.   |
| Acquisition Matrix           | (0018,1310) | 3 | Sent if available, else not sent.   |
| Phase Encoding Direction     | (0018,1312) | 3 | Always sent.  |
| Flip Angle                   | (0018,1314) | 3 | Primary excitation pulse spin tip angle<br>Exception: Represents spin-echo refocusing pulse tip angle when (0019, 109E) equals FSE, (0018, 0023) equals 2D (2D Fast Spin Echo), and (0019, 10B5) (user data 14) equals 1. |
| Variable Flip Angle Flag     | (0018,1315) | 3 | Always sent. Value is 'Y' for RAMPED_x: where x is AP, IS, IR, PA, SI, or AL, else value is 'N'.  |
| SAR                          | (0018,1316) | 3 | Sent if available, else not sent.   |
| DB/dt                        | (0018,1318) | 3 | Unused  |
| Temporal Position Identifier | (0020,0100) | 3 | Filled in for some applications only.   |
| Number of Temporal Positions | (0020,0105) | 3 | Filled in for some applications only.   |
| Temporal Resolution          | (0020,0110) | 3 | Always sent. (even if value is zero length)   |

## 11.3.6.6 SOP Common Module

TABLE 11.3.6-6 SOP COMMON MODULE ATTRIBUTES

| Attribute Name         | Tag         | Type | Attribute Description |
|------------------------|-------------|------|-----------------------|
| SOP Class UID          | (0008,0016) | 1    | Always sent           |
| SOP Instance UID       | (0008,0018) | 1    | Always sent           |
| Specific Character Set | (0008,0005) | 1C   | ISO_IR 100            |
| Instance Creation Date | (0008,0012) | 3    | Not Used.             |
| Instance Creation Time | (0008,0013) | 3    | Not Used.             |
| Instance Creator UID   | (0008,0014) | 3    | Not Used.             |
| Instance Number        | (0020,0013) | 3    | Always sent.          |



### 11.3.7 Additional Attributes

#### 11.3.7.1 Additional Attributes

TABLE 11.3.7-1 ADDITIONAL ATTRIBUTES

| Attribute Name                       | Tag         | Type  | Attribute Description  |
|--------------------------------------|-------------|-------|--|
| Trigger Delay Time                   | (0020,9153) | 3     | Filled in for some applications only. Time delta from peak of the R wave and the peak of the echo produced in ms.          |
| Stack ID                             | (0020,9056) | 3     | Filled in for some applications only. Number (starting at 1) of the graphic prescription slice group the image belongs to. |
| In-Stack Position Number             | (0020,9057) | 3     | Filled in for some applications only. Slice number within the stack that this image belongs to.                            |
| Real World Value Mapping Sequence    | (0040,9096) | 3     | Filled in for some applications only.  |
| >Real World Value Intercept          | (0040,9224) | 3(1C) | Filled in for some applications only.  |
| >Real World Value Slope              | (0040,9225) | 3(1C) | Filled in for some applications only.  |
| >Real World Value First Value Mapped | (0040,9216) | 3(1C) | Filled in for some applications only.  |
| >Real World Value Last Value Mapped  | (0040,9211) | 3(1C) | Filled in for some applications only.  |
| >LUT Explanation                     | (0028,3003) | 3(1)  | Filled in for some applications only.  |
| >LUT Label                           | (0040,9210) | 3(1)  | Filled in for some applications only.  |
| >Measurement units Code Sequence     | (0040,08EA) | 3(1C) | Filled in for some applications only.  |
| >>Code value                         | (0008,0100) | 3(1C) | Filled in for some applications only.  |
| >>Coding Scheme Designator           | (0040,0102) | 3(1C) | Filled in for some applications only.  |
| >>Coding Scheme Version              | (0040,0103) | 3(1C) | Filled in for some applications only.  |
| >>Code Meaning                       | (0040,0104) | 3(1C) | Filled in for some applications only.  |
| Relative Opacity                     | (0070,0403) | 3     | Filled in for some applications only.  |
| Inversion Times                      | (0018,9079) | 3     | Filled in for some applications only.  |
| Diffusion b-value                    | (0018,9087) | 3     |  |

### 11.3.8 Specialized IOD

The following is a list of additional GE specific attributes for Image Type and Scan Options DICOM elements defined for a standard MR IOD. For incoming third-party DICOM images the values in these DICOM elements are retained without modification.

#### 11.3.8.1 Image Types

(0008,0008) Image Types (private attributes for 3rd and 4th values)

##### Acquisition Data Types:

ORIGINAL\PRIMARY\OTHER  
 ORIGINAL\PRIMARY\OTHER\SUBTRACTION  
 ORIGINAL\PRIMARY\EPI\NONE  
 ORIGINAL\PRIMARY\T2\NONE

ORIGINAL\PRIMARY\PROPELLER\NONE  
 ORIGINAL\PRIMARY\DIFFUSION\NONE  
 ORIGINAL\PRIMARY\CARDIACREALTIME\NONE  
 ORIGINAL\PRIMARY\CARDIAC\NONE  
 DERIVED\PRIMARY\PROJECTION IMAGE\COLLAPSE  
 DERIVED\PRIMARY\PROJECTION IMAGE\VASCULAR  
 ORIGINAL\PRIMARY\MDE\_PHASE\NONE  
 ORIGINAL\PRIMARY\MDE\NONE  
 ORIGINAL\PRIMARY\ASL  
 DERIVED\PRIMARY\ASL\PERFUSION\_ASL

**Post Processed Data Types:**

DERIVED\PRIMARY\ADC\ADC  
 DERIVED\PRIMARY\CMB\CMB  
 DERIVED\PRIMARY\DIXON\FAT\_FRACTION  
 DERIVED\PRIMARY\DIXON\R2\_STAR\_MAP  
 DERIVED\PRIMARY\DIXON\WATER  
 DERIVED\PRIMARY\DIXON\FAT  
 DERIVED\PRIMARY\DIXON\IN\_PHASE  
 DERIVED\PRIMARY\DIXON\OUT\_PHASE  
 DERIVED\PRIMARY\DIXON\FIELD\_MAP  
 DERIVED\PRIMARY\DIXON\WATER\_FRACTION  
 DERIVED\PRIMARY\EADC\EADC  
 DERIVED\PRIMARY\PROJECTION IMAGE\IVI  
 DERIVED\PRIMARY\VAR\VAR  
 DERIVED\SECONDARY\COMBINED  
 DERIVED\SECONDARY\PROCESSED  
 DERIVED\SECONDARY\OTHER\SCREEN SAVE  
 DERIVED\SECONDARY\PJN  
 DERIVED\SECONDARY\PJN\MIP  
 DERIVED\SECONDARY\PJN\HD MIP  
 DERIVED\SECONDARY\PJN\MIN IP  
 DERIVED\SECONDARY\PJN\RAYSUM  
 DERIVED\SECONDARY\PJN\INTEGRAL  
 DERIVED\SECONDARY\REFORMATTED  
 DERIVED\SECONDARY\REFORMATTED\MIP  
 DERIVED\SECONDARY\REFORMATTED\MIN IP  
 DERIVED\SECONDARY\REFORMATTED\AVERAGE  
 DERIVED\SECONDARY\REFORMATTED\VOLREN  
 DERIVED\SECONDARY\3D  
 DERIVED\SECONDARY\3D\SURFACE  
 DERIVED\SECONDARY\3D\MIP  
 DERIVED\SECONDARY\3DHD MIP  
 DERIVED\SECONDARY\3D\MIN IP  
 DERIVED\SECONDARY\3D\VOLREN  
 DERIVED\SECONDARY\3D\RAYSUM  
 DERIVED\SECONDARY\3D\INTEGRAL  
 DERIVED\SECONDARY\SCREEN SAVE  
 DERIVED\SECONDARY\SCREEN SAVE\MIP  
 DERIVED\SECONDARY\SCREEN SAVE\MIN IP  
 DERIVED\SECONDARY\SCREEN SAVE\AVERAGE  
 DERIVED\SECONDARY\SCREEN SAVE\VOLREN

### 11.3.8.2 Scan Options

(0018,0022) Scan Options: Defined Terms

|                  |                 |
|------------------|-----------------|
| NONE             | RAMP_AP_GEMS    |
| CINE_GEMS        | RAMP_IS_GEMS    |
| CL_GEMS          | RAMP_LR_GEMS    |
| CS_GEMS          | RAMP_PA_GEMS    |
| DEP_GEMS         | RAMP_RL_GEMS    |
| EDR_GEMS         | RAMP_SI_GEMS    |
| EPI_GEMS         | RT_GEMS         |
| FAST_GEMS        | RTR_GEMS        |
| FC_FREQ_AX_GEMS  | SAT_GEMS        |
| FC_SLICE_AX_GEMS | SEQ_GEMS        |
| FILTERED_GEMS    | SQPIX_GEMS      |
| FT_GEMS          | SS_GEMS         |
| GRAPH_GEMS       | TRF_GEMS        |
| MRF_GEMS         | VASCANGIO_GEMS  |
| IRP_GEMS         | VASCPC_GEMS     |
| MP_GEMS          | IFLOW_GEMS      |
| MT_GEMS          | VASCTOF_GEMS    |
| NF_GEMS          | ACC_GEMS        |
| NPW              | VB_GEMS         |
| POMP_GEMS        | MART_GEMS       |
| SPIRAL_GEMS      | PROP_GEMS       |
| VRG_GEMS         | ARTM_GEMS       |
| ARTH_GEMS        | IDEAL_GEMS      |
| PARTL_BLADE_GEMS | MRCP_GEMS       |
| PROMO_GEMS       | PTX_BoMAP_GEMS  |
| PTX_B1PHASE_GEMS | PTX_B1MAG_GEMS  |
| PTX_RFSHIM_GEMS  | PTX_RFDSGN_GEMS |
| ART_GEMS         | FSA_GEMS        |
| FSP_GEMS         | FSL_GEMS        |
| FSR_GEMS         | FSS_GEMS        |
| FSI_GEMS         |                 |

Also refer to section 11.3.7 for standard DICOM elements that are not part of the MR IOD.

## 11.4 STANDARD EXTENDED AND PRIVATE DATA ATTRIBUTES

### 11.4.1 Standard Attributes

None

### 11.4.2 Private Group GEMS\_IDEN\_01

Private Group GEMS\_IDEN\_01 is modeled as part of the Image Information Entity.

TABLE 11.4.2-1 PRIVATE GROUP GEMS\_IDEN\_01

| Attribute Name | Tag | VR | VM | Attribute Description and Use |
|----------------|-----|----|----|-------------------------------|
|----------------|-----|----|----|-------------------------------|

|                               |             |    |   |              |
|-------------------------------|-------------|----|---|--------------|
| GEHC Private Creator ID       | (0009,0010) | LO | 1 | GEMS_IDEN_01 |
| Suite id                      | (0009,1002) | SH | 1 |              |
| Product id                    | (0009,1004) | SH | 1 |              |
| Image actual date             | (0009,1027) | SL | 1 |              |
| Service id                    | (0009,1030) | SH | 1 |              |
| Mobile location number        | (0009,1031) | SH | 1 |              |
| Equipment UID                 | (0009,10E3) | UI | 1 |              |
| Actual series data time stamp | (0009,10E9) | SL | 1 |              |

#### 11.4.3 Private Group GEMS\_PATI\_01

Private Group GEMS\_PATI\_01 is modeled as part of the Patient Information Entity.

TABLE 11.4.3-1 PRIVATE GROUP GEMS\_PATI\_01

| Attribute Name          | Tag         | VR | VM | Attribute Description and Use |
|-------------------------|-------------|----|----|-------------------------------|
| GEHC Private Creator ID | (0011,0010) | LO | 1  | GEMS_PATI_01                  |
| Patient Status          | (0011,1010) | SS | 1  |                               |

#### 11.4.4 Private Group GEMS\_ACQU\_01

Private Group GEMS\_ACQU\_01 is modeled as part of the Image Information Entity.

TABLE 11.4.4-1 PRIVATE GROUP GEMS\_ACQU\_01

| Attribute Name                                      | Tag         | VR | VM | Attribute Description and Use |
|---|-------------|----|----|-------------------------------|
| GEHC Private Creator ID                             | (0019,0010) | LO | 1  | GEMS_ACQU_01                  |
| Horiz. Frame of ref.                                | (0019,100F) | DS | 1  |                               |
| Series contrast                                     | (0019,1011) | SS | 1  |                               |
| Last pseq   | (0019,1012) | SS | 1  | Not Used                      |
| Series plane  | (0019,1017) | SS | 1  | Not Used                      |
| First scan ras Not supported for 3plane & RTIA      | (0019,1018) | LO | 1  | Not Used                      |
| First scan location Not supported for 3plane & RTIA | (0019,1019) | DS | 1  | Not Used                      |
| Last scan ras Not supported for 3plane & RTIA       | (0019,101A) | LO | 1  | Not Used                      |
| Last scan loc Not supported for 3plane & RTIA       | (0019,101B) | DS | 1  | Not Used                      |
| Display field of view                               | (0019,101E) | DS | 1  |                               |
| Acquisition Duration                                | (0019,105A) | FL | 1  |                               |
| Second echo   | (0019,107D) | DS | 1  |                               |
| Number of echoes                                    | (0019,107E) | SS | 1  |                               |

|                                    |             |    |   |          |
|------------------------------------|-------------|----|---|----------|
| Table delta                        | (0019,107F) | DS | 1 |          |
| Contiguous                         | (0019,1081) | SS | 1 |          |
| Peak SAR                           | (0019,1084) | DS | 1 | Not Used |
| Monitor SAR                        | (0019,1085) | SS | 1 | Not Used |
| Cardiac repetition time            | (0019,1087) | DS | 1 |          |
| Images per cardiac cycle           | (0019,1088) | SS | 1 |          |
| Actual receive gain analog         | (0019,108A) | SS | 1 |          |
| Actual receive gain digital        | (0019,108B) | SS | 1 |          |
| Delay after trigger                | (0019,108D) | DS | 1 |          |
| Swappf                             | (0019,108F) | SS | 1 |          |
| Pause Interval                     | (0019,1090) | SS | 1 |          |
| Pause Time                         | (0019,1091) | DS | 1 |          |
| Slice offset on freq axis          | (0019,1092) | SL | 1 |          |
| Auto Prescan Center Frequency      | (0019,1093) | DS | 1 |          |
| Auto Prescan Transmit Gain         | (0019,1094) | SS | 1 |          |
| Auto Prescan Analog receiver gain  | (0019,1095) | SS | 1 |          |
| Auto Prescan Digital receiver gain | (0019,1096) | SS | 1 |          |
| Bitmap defining CVs                | (0019,1097) | SL | 1 |          |
| Center freq. Method                | (0019,1098) | SS | 1 |          |
| Pulse Sequence Mode                | (0019,109B) | SS | 1 |          |
| Pulse Sequence Name                | (0019,109C) | LO | 1 |          |
| Pulse Sequence Date                | (0019,109D) | DT | 1 |          |
| Internal Pulse Sequence Name       | (0019,109E) | LO | 1 |          |
| Transmitting Coil Type             | (0019,109F) | SS | 1 |          |
| Surface Coil Type                  | (0019,10A0) | SS | 1 |          |
| Extremity Coil flag                | (0019,10A1) | SS | 1 |          |
| Raw data run number                | (0019,10A2) | SL | 1 |          |
| SAT fat/water/bone                 | (0019,10A4) | SS | 1 |          |
| Receive bandwidth                  | (0019,10A5) | DS | 1 | Not Used |
| User data 0                        | (0019,10A7) | DS | 1 |          |
| User data 1                        | (0019,10A8) | DS | 1 |          |
| User data 2                        | (0019,10A9) | DS | 1 |          |
| User data 3                        | (0019,10AA) | DS | 1 |          |
| User data 4                        | (0019,10AB) | DS | 1 |          |
| User data 5                        | (0019,10AC) | DS | 1 |          |
| User data 6                        | (0019,10AD) | DS | 1 |          |
| User data 7                        | (0019,10AE) | DS | 1 |          |
| User data 8                        | (0019,10AF) | DS | 1 |          |

|                           |             |    |   |          |
|---------------------------|-------------|----|---|----------|
| User data 9               | (0019,10B0) | DS | 1 |          |
| User data 10              | (0019,10B1) | DS | 1 |          |
| User data 11              | (0019,10B2) | DS | 1 |          |
| User data 12              | (0019,10B3) | DS | 1 |          |
| User data 13              | (0019,10B4) | DS | 1 |          |
| User data 14              | (0019,10B5) | DS | 1 |          |
| User data 15              | (0019,10B6) | DS | 1 |          |
| User data 16              | (0019,10B7) | DS | 1 |          |
| User data 17              | (0019,10B8) | DS | 1 |          |
| User data 18              | (0019,10B9) | DS | 1 |          |
| User data 19              | (0019,10BA) | DS | 1 |          |
| User data 20              | (0019,10BB) | DS | 1 |          |
| User data 21              | (0019,10BC) | DS | 1 |          |
| User data 22              | (0019,10BD) | DS | 1 |          |
| Projection angle          | (0019,10BE) | DS | 1 |          |
| Saturation planes         | (0019,10C0) | SS | 1 |          |
| Surface coil intensity    | (0019,10C1) | SS | 1 | Not Used |
| SAT location R            | (0019,10C2) | SS | 1 |          |
| SAT location L            | (0019,10C3) | SS | 1 |          |
| SAT location A            | (0019,10C4) | SS | 1 |          |
| SAT location P            | (0019,10C5) | SS | 1 |          |
| SAT location H            | (0019,10C6) | SS | 1 |          |
| SAT location F            | (0019,10C7) | SS | 1 |          |
| SAT thickness R/L         | (0019,10C8) | SS | 1 |          |
| SAT thickness A/P         | (0019,10C9) | SS | 1 |          |
| SAT thickness H/F         | (0019,10CA) | SS | 1 |          |
| Phase Contrast flow axis  | (0019,10CB) | SS | 1 |          |
| Velocity encoding         | (0019,10CC) | SS | 1 |          |
| Thickness disclaimer      | (0019,10CD) | SS | 1 |          |
| Prescan type              | (0019,10CE) | SS | 1 |          |
| Prescan status            | (0019,10CF) | SS | 1 |          |
| Raw data type             | (0019,10D0) | SH | 1 |          |
| Projection Algorithm      | (0019,10D2) | SS | 1 |          |
| Projection Algorithm Name | (0019,10D3) | SH | 1 |          |
| Fractional echo           | (0019,10D5) | SS | 1 |          |
| Prep pulse                | (0019,10D6) | SS | 1 | Not Used |
| Cardiac phase number      | (0019,10D7) | SS | 1 |          |
| Variable echoflag         | (0019,10D8) | SS | 1 |          |

|  |             |    |   |  |
|--|-------------|----|---|--|
| Concatenated SAT {# DTI Diffusion Dir., release 9.0 & below} | (0019,10D9) | DS | 1 |  |
| User data 23 {# DTI Diffusion Dir., release 9.0 & below}     | (0019,10DF) | DS | 1 |  |
| User data 24 {# DTI Diffusion Dir., release 10.0 & above}    | (0019,10E0) | DS | 1 |  |
| Velocity Encode Scale  | (0019,10E2) | DS | 1 |  |
| Fast phases  | (0019,10F2) | SS | 1 |  |
| Transmit gain  | (0019,10F9) | DS | 1 |  |

#### 11.4.5 Private Group GEMS\_RELA\_01

Private Group GEMS\_RELA\_01 is modeled as part of the Image Information Entity.

TABLE 11.4.5-1 PRIVATE GROUP GEMS\_RELA\_01

| Attribute Name               | Tag         | VR | VM | Attribute Description and Use |
|------------------------------|-------------|----|----|-------------------------------|
| GEHC Private Creator ID      | (0021,0010) | LO | 1  | GEMS_RELA_01                  |
| Series from which Prescribed | (0021,1003) | SS | 1  | Not Used                      |
| Genesis Version – now        | (0021,1005) | SH | 1  | Not Used                      |
| Series Record checksum       | (0021,1007) | UL | 1  | Not Used                      |
| Genesis version – Now        | (0021,1018) | SH | 1  | Not Used                      |
| Acq recon record checksum    | (0021,1019) | UL | 1  | Not Used                      |
| Table start location         | (0021,1020) | DS | 1  | Not Used                      |
| Series from which prescribed | (0021,1035) | SS | 1  |                               |
| Image from which prescribed  | (0021,1036) | SS | 1  |                               |
| Screen Format                | (0021,1037) | SS | 1  |                               |
| Locations in acquisition     | (0021,104F) | SS | 1  |                               |
| Graphically prescribed       | (0021,1050) | SS | 1  |                               |
| Rotation from source x rot   | (0021,1051) | DS | 1  |                               |
| Rotation from source y rot   | (0021,1052) | DS | 1  |                               |
| Rotation from source z rot   | (0021,1053) | DS | 1  |                               |
| Image position               | (0021,1054) | SH | 3  | Not Used                      |
| Image orientation            | (0021,1055) | SH | 6  | Not Used                      |
| Num 3D slabs                 | (0021,1056) | SL | 1  |                               |
| Locs per 3D slab             | (0021,1057) | SL | 1  |                               |
| Overlaps                     | (0021,1058) | SL | 1  |                               |
| Image Filtering 0.5/0.2T     | (0021,1059) | SL | 1  |                               |
| Diffusion direction          | (0021,105A) | SL | 1  |                               |
| Tagging Flip Angle           | (0021,105B) | DS | 1  |                               |
| Tagging Orientation          | (0021,105C) | DS | 1  |                               |

|                          |             |    |     |          |
|--------------------------|-------------|----|-----|----------|
| Tag Spacing              | (0021,105D) | DS | 1   |          |
| RTIA_timer               | (0021,105E) | DS | 1   |          |
| Fps                      | (0021,105F) | DS | 1   |          |
| Auto window/level alpha  | (0021,1081) | DS | 1   | Not Used |
| Auto window/level beta   | (0021,1082) | DS | 1   | Not Used |
| Auto window/level window | (0021,1083) | DS | 1   |          |
| Auto window/level level  | (0021,1084) | DS | 1   |          |
| Annotation Strings       | (0021,1094) | LO | 1-n |          |

#### 11.4.6 Private Group GEMS\_STDY\_01

Private Group GEMS\_STDY\_01 is modeled as part of the Study Information Entity.

TABLE 11.4.6-1 PRIVATE GROUP GEMS\_STDY\_01

| Attribute Name                                    | Tag         | VR | VM | Attribute Description and Use   |
|---|-------------|----|----|---|
| GEHC Private Creator ID                           | (0023,0010) | LO | 1  | GEMS_STDY_01  |
| Number of series in Study                         | (0023,1001) | SL | 1  | Not Used  |
| Number of unarchived Series                       | (0023,1002) | SL | 1  | Not Used  |
| Reference image field                             | (0023,1010) | SS | 1  | Not Used  |
| Summary image                                     | (0023,1050) | SS | 1  | Not Used  |
| Start time(secs) in first axial                   | (0023,1070) | FD | 1  | Not Used  |
| No. of updates to header                          | (0023,1074) | SL | 1  | Not Used  |
| Indicates study has complete info (DICOM/genesis) | (0023,107D) | SS | 1  | Not Used  |
| PPS Data Sequence                                 | (0023,1080) | SQ | 1  | Sequence containing data necessary for platform to generate PPS n-Create and n-Set transactions that is not otherwise contained in the image. |

#### 11.4.7 Private Group GEMS\_SERS\_01

Private Group GEMS\_SERS\_01 is modeled as part of the Series Information Entity.

TABLE 11.4.7-1 PRIVATE GROUP GEMS\_SERS\_01

| Attribute Name                     | Tag         | VR | VM | Attribute Description and Use |
|------------------------------------|-------------|----|----|-------------------------------|
| GEHC Private Creator ID            | (0025,0010) | LO | 1  | GEMS_SERS_01                  |
| Last pulse sequence used           | (0025,1006) | SS | 1  | Not Used                      |
| Images in Series                   | (0025,1007) | SL | 1  |                               |
| Landmark Counter                   | (0025,1010) | SL | 1  |                               |
| Number of Acquisitions             | (0025,1011) | SS | 1  |                               |
| Indicates no. of updates to header | (0025,1014) | SL | 1  | Not Used                      |



|                                  |             |    |   |          |
|----------------------------------|-------------|----|---|----------|
| Series Complete Flag             | (0025,1017) | SL | 1 | Not Used |
| Number of images archived        | (0025,1018) | SL | 1 | Not Used |
| Last image number used           | (0025,1019) | SL | 1 |          |
| Primary Receiver Suite and Host  | (0025,101A) | SH | 1 |          |
| Protocol Data Block (compressed) | (0025,101B) | OB | 1 |          |

#### 11.4.8 Private Group GEMS\_IMAG\_01

Private Group GEMS\_IMAG\_01 is modeled as part of the Image Information Entity.

TABLE 11.4.8-1 PRIVATE GROUP GEMS\_IMAG\_01

| Attribute Name                 | Tag         | VR | VM | Attribute Description and Use |
|--------------------------------|-------------|----|----|-------------------------------|
| GEHC Private Creator ID        | (0027,0010) | LO | 1  | GEMS_IMAG_01                  |
| Image archive flag             | (0027,1006) | SL | 1  | Not Used                      |
| Scout Type                     | (0027,1010) | SS | 1  | Not Used                      |
| Foreign Image Revision         | (0027,1030) | SH | 1  | Not Used                      |
| Imaging Mode                   | (0027,1031) | SS | 1  |                               |
| Pulse Sequence                 | (0027,1032) | SS | 1  |                               |
| Imaging Options                | (0027,1033) | UL | 1  |                               |
| Plane Type                     | (0027,1035) | SS | 1  |                               |
| Oblique Plane                  | (0027,1036) | SL | 1  | Not Used                      |
| RAS letter of image location   | (0027,1040) | SH | 1  |                               |
| Image location                 | (0027,1041) | FL | 1  |                               |
| Center R coord of plane image  | (0027,1042) | FL | 1  | Not Used                      |
| Center A coord of plane image  | (0027,1043) | FL | 1  | Not Used                      |
| Center S coord of plane image  | (0027,1044) | FL | 1  | Not Used                      |
| Normal R coord                 | (0027,1045) | FL | 1  | Not Used                      |
| Normal A coord                 | (0027,1046) | FL | 1  | Not Used                      |
| Normal S coord                 | (0027,1047) | FL | 1  | Not Used                      |
| R Coord of Top Right Corner    | (0027,1048) | FL | 1  | Not Used                      |
| A Coord of Top Right Corner    | (0027,1049) | FL | 1  | Not Used                      |
| S Coord of Top Right Corner    | (0027,104A) | FL | 1  | Not Used                      |
| R Coord of Bottom Right Corner | (0027,104B) | FL | 1  | Not Used                      |
| A Coord of Bottom Right Corner | (0027,104C) | FL | 1  | Not Used                      |
| S Coord of Bottom Right Corner | (0027,104D) | FL | 1  | Not Used                      |
| Image dimension - X            | (0027,1060) | FL | 1  |                               |
| Image dimension - Y            | (0027,1061) | FL | 1  |                               |
| Number of Excitations          | (0027,1062) | FL | 1  |                               |

**11.4.9 Private Group GEMS\_IMPS\_01**

Private Group GEMS\_IMPS\_01 is modeled as part of the Image Information Entity.

**TABLE 11.4.9-1 PRIVATE GROUP GEMS\_IMPS\_01**

| Attribute Name            | Tag         | VR | VM | Attribute Description and Use |
|---------------------------|-------------|----|----|-------------------------------|
| GEHC Private Creator ID   | (0029,0010) | LO | 1  | GEMS_IMPS_01                  |
| Lower range of Pixels1    | (0029,1015) | SL | 1  |                               |
| Upper range of Pixels1    | (0029,1016) | SL | 1  |                               |
| Lower range of Pixels2    | (0029,1017) | SL | 1  | Not used                      |
| Upper range of Pixels2    | (0029,1018) | SL | 1  | Not used                      |
| Len of tot hdr in bytes   | (0029,101A) | SL | 1  | Not used                      |
| Version of the hdr struct | (0029,1026) | SS | 1  | Not used                      |
| Advantage comp. Overflow  | (0029,1034) | SL | 1  | Not used                      |
| Advantage comp. Underflow | (0029,1035) | SL | 1  | Not used                      |

**11.4.10 Private Group GEMS\_PARM\_01**

Private Group GEMS\_PARM\_01 is modeled as part of the Image Information Entity.

**TABLE 11.4.10-1 PRIVATE GROUP GEMS\_PARM\_01**

| Attribute Name                              | Tag         | VR | VM | Attribute Description and Use |
|---|-------------|----|----|-------------------------------|
| GEHC Private Creator ID                     | (0043,0010) | LO | 1  | GEMS_PARM_01                  |
| Bitmap of prescan options                   | (0043,1001) | SS | 1  |                               |
| Gradient offset in X                        | (0043,1002) | SS | 1  |                               |
| Gradient offset in Y                        | (0043,1003) | SS | 1  |                               |
| Gradient offset in Z                        | (0043,1004) | SS | 1  |                               |
| Img is original or unoriginal               | (0043,1005) | SS | 1  | Not used                      |
| Number of EPI shots                         | (0043,1006) | SS | 1  |                               |
| Views per segment                           | (0043,1007) | SS | 1  |                               |
| Respiratory rate, bpm                       | (0043,1008) | SS | 1  |                               |
| Respiratory trigger point                   | (0043,1009) | SS | 1  |                               |
| Type of receiver used                       | (0043,100A) | SS | 1  |                               |
| DB/dt Peak rate of change of gradient field | (0043,100B) | DS | 1  |                               |
| dB/dt Limits in units of percent            | (0043,100C) | DS | 1  |                               |
| PSD estimated limit                         | (0043,100D) | DS | 1  |                               |
| PSD estimated limit in tesla per second     | (0043,100E) | DS | 1  |                               |
| Saravghead                                  | (0043,100F) | DS | 1  | Not used                      |
| Window value                                | (0043,1010) | US | 1  | Not used                      |

|   |             |    |    |          |
|---|-------------|----|----|----------|
| GE image integrity  | (0043,101C) | SS | 1  |          |
| Level value   | (0043,101D) | SS | 1  | Not used |
| Unique image iden   | (0043,1028) | OB | 1  | Not used |
| Histogram tables  | (0043,1029) | OB | 1  |          |
| User defined data   | (0043,102A) | OB | 1  |          |
| Private Scan Options  | (0043,102B) | SS | 4  | Not used |
| Effective echo spacing  | (0043,102C) | SS | 1  |          |
| Filter Mode (String slop field 1 in legacy GE MR images)  | (0043,102D) | SH | 1  |          |
| String slop field 2   | (0043,102E) | SH | 1  |          |
| Raw data type (image_type)  | (0043,102F) | SS | 1  |          |
| Image Type (real, imaginary, phase, magnitude)  | (0043,102F) | SS | 1  |          |
| Vas collapse flag   | (0043,1030) | SS | 1  |          |
| RA cord of target recon center  | (0043,1031) | DS | 2  | Not used |
| Vas flags   | (0043,1032) | SS | 1  |          |
| Neg_scanspacing   | (0043,1033) | FL | 1  |          |
| Offset Frequency  | (0043,1034) | IS | 1  |          |
| User_usage_tag  | (0043,1035) | UL | 1  |          |
| User_fill_map_MSX   | (0043,1036) | UL | 1  |          |
| User_fill_map_LSW   | (0043,1037) | UL | 1  |          |
| User data 25...User data 48<br>{User4,8=Effective Resolution for spiral}  | (0043,1038) | FL | 24 |          |
| Slop_int_6... slop_int_9<br>6: b_value<br>7: private imaging options 2<br>8: ihtagging<br>9: ihtagspc                               | (0043,1039) | IS | 4  |          |
| Slop_int_10...slop_int_17<br>10: ihfcineim<br>11: ihfcinent<br>12: Reserved<br>13: oprtarr<br>14: averages<br>15: Current Station # | (0043,1060) | IS | 8  |          |

|   |             |    |        |          |
|---|-------------|----|--------|----------|
| 16: Total # of Stations   |             |    |        |          |
| 17: private imaging options 3   |             |    |        |          |
| Scanner Study ID  | (0043,1062) | SH | 1      | Not used |
| Scanner Table Entry (single gradient coil systems only)<br>Scanner Table Entry + Gradient Coil Selected<br>1:table entry, 2: table swing angle, 3: table lateral offset, 4: gradient coil selected (multiple gradient systems only) | (0043,106f) | DS | 3 or 4 |          |
| Paradigm Description  | 0043,1071   | ST | 1      |          |
| Paradigm UID  | 0043,1072   | UI | 1      |          |
| Experiment Type   | 0043,1073   | US | 1      |          |
| #rest volumes   | 0043,1074   | US | 1      |          |
| #active volumes   | 0043,1075   | US | 1      |          |
| #dummy scans  | 0043,1076   | US | 1      |          |
| Application Name  | 0043,1077   | SH | 1      |          |
| Application Version   | 0043,1078   | SH | 1      |          |
| Slices Per Volume   | 0043,1079   | US | 1      |          |
| Expected Time Points  | 0043,107A   | US | 1      |          |
| Regressor Values  | 0043,107B   | FL | 1..n   |          |
| Delay after slice group   | 0043,107C   | FL | 1      |          |
| Recon mode flag word  | 0043,107D   | US | 1      |          |
| PACC specific information   | 0043,107E   | LO | 1..n   |          |
| Private Data  | 0043,107F   | DS | 1..n   |          |
| Coil ID Data  | 0043,1080   | LO | 1..n   |          |
| GE Coil Name  | 0043,1081   | LO | 1      |          |
| System Configuration Information  | 0043,1082   | LO | 1..n   |          |
| Asset R Factors   | 0043,1083   | DS | 1..2   |          |
| Additional Asset Data   | 0043,1084   | LO | 5      |          |
| Debug Data (text format)  | 0043,1085   | UT | 1      |          |
| Debug Data (binary format)  | 0043,1086   | OB | 1      |          |
| Scanner Software Version Long Form  | 0043,1087   | UT | 1      |          |
| PURE Acquisition Calibration Series UID   | 0043,1088   | UI | 1      |          |
| Governing Body, dB/dt, and SAR definition   | 0043,1089   | LO | 3      |          |

|   |            |    |      |  |
|---|------------|----|------|--|
| Private In-Plane Phase Encoding Direction               | 0043,108A  | CS | 1    |  |
| FMRI Binary Data Block                                  | 0043,108B  | OB | 1    |  |
| Voxel Location  | 0043,108C  | DS | 6    |  |
| SAT Band Locations                                      | 0043,108D  | DS | 7n   |  |
| Spectro Prescan Values                                  | 0043,108E  | DS | 3    |  |
| Spectro Parameters                                      | 0043,108F  | DS | 3    |  |
| SAR Definition  | 0043,1090  | LO | 1..n |  |
| SAR value   | 0043,1091  | DS | 1..n |  |
| Image Error Text  | 0043,1092  | LO | 1    |  |
| Spectro Quantitation Values                             | 0043,1093  | DS | 1..n |  |
| Spectro Ratio Values                                    | 0043,1094  | DS | 1..n |  |
| Prescan Reuse String                                    | 0043,1095  | LO | 1    |  |
| Content Qualification                                   | 0043,1096  | CS | 1    |  |
| Image Filtering Parameters                              | 0043,1097  | LO | 8    |  |
| ASSET Acquisition Calibration Series UID                | 0043,1098  | UI | 1    |  |
| Extended Options  | 0043,1099  | LO | 1..n |  |
| Rx Stack Identification                                 | 0043,109A  | IS | 1    |  |
| NPW factor  | 0043,109B  | DS | 1    |  |
| Research Tag 1  | 0043,109C  | OB | 1    |  |
| Research Tag 2  | 0043,109D  | OB | 1    |  |
| Research Tag 3  | 0043,109E  | OB | 1    |  |
| Research Tag 4  | 0043,109F  | OB | 1    |  |
| Spectroscopy Pixel Sequence                             | 0043,10A0  | SQ | 1    |  |
| Spectroscopy Default Display Sequence                   | 0043,10A1  | SQ | 1    |  |
| MEF Data  | 0043,10A2  | DS | 1-n  |  |
| ASL Contrast technique                                  | 0043,10A3  | CS | 1    |  |
| Detailed text for ASL labeling technique                | 0043,10A4  | LO | 1    |  |
| Duration of the label or control pulse                  | 0043,10A5  | IS | 1    |  |
| Offset frequency value for FastB <sub>1</sub> map       | 0043,10A6  | DS | 1    |  |
| Motion Encoding Factor                                  | 0043,10A7  | DS | 1    |  |
| Dual Drive Mode, Amplitude Attenuation and Phase Offset | 0043,10A8  | DS | 3    |  |
| 3D Cal Data   | 0043, 10A9 | LO | 1-n  |  |
| Additional Filtering Parameters                         | 0043, 10AA | LO | 1-n  |  |

|   |            |    |     |                     |
|---|------------|----|-----|---------------------|
| Silenz Data                               | 0043, 10AB | DS | 1-n |                     |
| QMAP Delay Data (RESERVED for FUTURE USE) | 0043, 10AC | DS | 1-n |                     |
| Other Recovery Times Values               | 0043, 10AD | DS | 1-n |                     |
| Other Recovery Times Labels               | 0043, 10AE | LO | 1-n |                     |
| Additional Echo Times                     | 0043, 10AF | DS | 1-n |                     |
| Rescan Time in Acquisition                | 0043, 10B0 | FL | 1   |                     |
| Excitation Mode                           | 0043, 10B1 | SS | 1   |                     |
| Advanced Eddy Correction                  | 0043, 10B3 | DS | 1-n |                     |
| MRF Transmit Gain (reused)                | 0043, 10B4 | SS | 1   | AB1 reused TG value |

#### 11.4.11 Private Group BRAINWAVE: 1.2.840.113819.3

Private Group BrainWave: 1.2.840.113819.3 is modeled as part of the Image Information Entity.

TABLE 11.4.11-1 PRIVATE GROUP BRAINWAVE: 1.2.840.113819.3

| Attribute Name                               | Tag       | VR | VM  | Attribute Description and Use |
|--|-----------|----|-----|-------------------------------|
| Private Creator ID                           | 2001,0010 | LO | 1   | BRAINWAVE: 1.2.840.113819.3   |
| DICOM Implementation UID                     | 2001,1010 | UI | 1   |                               |
| DICOM Implementation Version                 | 2001,1011 | SH | 1   |                               |
| Within-DICOM-Implementation SOP Instance UID | 2001,1012 | UI | 1   |                               |
| Application Name                             | 2001,1013 | SH | 1   |                               |
| Application Version                          | 2001,1014 | SH | 1   |                               |
| Compatibility Version                        | 2001,1015 | SH | 1   |                               |
| Referenced Series UID                        | 2001,1021 | UI | 1-n |                               |
| Number of Objects Averaged                   | 2001,1031 | US | 1   |                               |
| Number of Expected Time Points               | 2001,1041 | US | 1   |                               |
| Number of Slices Per Volume                  | 2001,1051 | US | 1   |                               |
| BW Image Type                                | 2001,1060 | US | 1   |                               |
| Experiment Type                              | 2001,1061 | US | 1   |                               |
| Paradigm UID                                 | 2001,1071 | UI | 1   |                               |
| Paradigm Name                                | 2001,1072 | LO | 1   |                               |
| Paradigm Description                         | 2001,1073 | ST | 1   |                               |
| Contrast                                     | 2001,1080 | OB | 1   |                               |
| Regressor Values                             | 2001,1081 | FL | 1-n |                               |
| Number of Degrees of Freedom                 | 2001,1086 | US | 1   |                               |
| Z Threshold                                  | 2001,108A | FL | 1   |                               |
| p Threshold                                  | 2001,108B | FL | 1   |                               |

|                         |           |    |     |  |
|-------------------------|-----------|----|-----|--|
| Processing parameters   | 2001,1090 | OB | 1   |  |
| Motion Plot             | 2001,1091 | OB | 1   |  |
| ROIs                    | 2001,1092 | OB | 1   |  |
| Tracts                  | 2001,1093 | OB | 1   |  |
| Report                  | 2001,1094 | OB | 1   |  |
| Response Data           | 2001,1095 | OB | 1   |  |
| Design Matrix           | 2001,1096 | OB | 1   |  |
| Quality Metrics         | 2001,1097 | FL | 1-n |  |
| Motion Parameters       | 2001,10A0 | FL | 1-n |  |
| Registration Parameters | 2001,10A1 | FL | 1-n |  |
| Subject Data            | 2001,10A2 | FL | 1-n |  |
| DTI Parameters          | 2001,10B0 | OB | 1   |  |
| Paradigm Info           | 2001,10C0 | OB | 1   |  |

#### 11.4.12 Private Group GEMS\_MR\_RAW\_01

Private Group GEMS\_MR\_RAW\_01 is modeled as part of the Image Information Entity.

TABLE 11.4.12-1 PRIVATE GROUP GEMS\_MR\_RAW\_01

| Attribute Name          | Tag       | VR | VM | Attribute Description and Use |
|-------------------------|-----------|----|----|-------------------------------|
| GEHC Private Creator ID | 7001,0010 | LO | 1  | GEMS_MR_RAW_01                |
| rdb_hdr_rec             | 7001,1001 | OB | 1  |                               |
| rdb_hdr_per_pass_tab    | 7001,1002 | OB | 1  |                               |
| rdb_hdr_unlock_raw      | 7001,1003 | OB | 1  |                               |
| rdb_hdr_data_acq_tab    | 7001,1004 | OB | 1  |                               |
| rdb_hdr_nex_tab         | 7001,1005 | OB | 1  |                               |
| rdb_hdr_nex_abort_tab   | 7001,1006 | OB | 1  |                               |
| rdb_hdr_tool            | 7001,1007 | OB | 1  |                               |
| rdb_raw_data            | 7001,1008 | OB | 1  |                               |
| SSP save                | 7001,1009 | OB | 1  |                               |
| UDA save                | 7001,100A | OB | 1  |                               |
| rdb_chemsat_data        | 7001,100B | OB | 1  |                               |

#### 11.4.13 Private Group GEMS\_FUNCTOOL\_01

Private Group GEMS\_FUNCTOOL\_01 is modeled as part of the Image Information Entity.

TABLE 11.4.13-1 PRIVATE GROUP GEMS\_FUNCTOOL\_01

| Attribute Name | Tag | VR | VM | Attribute Description and Use |
|----------------|-----|----|----|-------------------------------|
|----------------|-----|----|----|-------------------------------|

|  |           |    |   |                  |
|--|-----------|----|---|------------------|
| GEHC Private Creator ID                                      | 0051,0010 | LO | 1 | GEMS_FUNCTOOL_01 |
| Functional Proc Group Name                                   | 0051,1001 | LO | 1 |                  |
| Functional Processing Name                                   | 0051,1002 | LO | 1 |                  |
| Bias of Functional Image                                     | 0051,1003 | SL | 1 |                  |
| Scale of Functional Image                                    | 0051,1004 | FL | 1 |                  |
| Length of Parameters String                                  | 0051,1005 | SL | 1 |                  |
| Store Parameters string, delimited by character CR=0x0D (13) | 0051,1006 | LT | 1 |                  |
| Functional Image Version                                     | 0051,1007 | LO | 1 |                  |
| Store Color Ramp   | 0051,1008 | SL | 1 |                  |
| Store Width of Functional Image                              | 0051,1009 | SL | 1 |                  |
| Store level of Functional Image                              | 0051,100A | SL | 1 |                  |
| Store B-Value with Functional Image                          | 0051,100B | FL | 1 |                  |
| Analysis Package   | 0051,100C | LO | 1 |                  |

#### 11.4.14 Private Group GEHC\_REPORTCARD0

Private Group GEHC\_REPORTCARD0 is modeled as part of the Image Information Entity.

TABLE 11.4.14-1 PRIVATE GROUP GEHC\_REPORTCARD0

| Attribute Name  | Tag        | VR | VM | Attribute Description and Use          |
|---|------------|----|----|--|
| GEHC Private Creator ID   | 0099, 0010 | LO | 1  | GEHC_REPORTCARD0                       |
| Report Card Private Data<br>(Application Analysis State Byte Array) | 0099, 1001 | OB | 1  | Created by the ReportCARD application. |
| Report Card Private Data  | 0099, 1002 | OB | 1  | Created by the ReportCARD application. |



## 12. SECURITY CONFORMANCE STATEMENT

### 12.1 INTRODUCTION

This section of the DICOM conformance statement specifies the MR system compliance to DICOM requirements for **Data Security**.

The MR system provides capabilities for de-identification and association level security.

### 12.2 DE-IDENTIFICATION

The MR system supports the following requirements for de-identification. De-identification occurs, for example, when an anonymize patient operation is performed. This de-identification only covers DICOM attributes that contain protected patient information. The encrypted data capability is not supported, so once an image has been de-identified no facility is provided to recover the lost information.

The de-identification specified in this section only applies to GE generated images. All third party images have only the standard DICOM elements de-identified, all private tags (non-GE private tags) within these images are dropped.

De-identification supports the following object types:

- MR Image Objects

De-identification does not support the following object types:

- Secondary capture images
- Structured reports
- Grayscale presentation state objects

This de-identification specification applies when the MR system is configured for full de-identification. If the system is configured for partial de-identification, some attributes will remain unchanged.

In this product, Study ID is auto generated by the scanner and will not be anonymized as it is not unique.

Table 12.2-1 provides the list of attributes and the expected action when de-identifying images

TABLE 11.4.14-1 DICOM ATTRIBUTES DE-IDENTIFIED

| Tag       | Attribute Name       | Action           | Comments        |
|-----------|----------------------|------------------|-----------------|
| 0008,0014 | Instance Creator UID | element dropped  | Refer to Note 1 |
| 0008,0018 | SOP Instance UID     | assign new UID   |                 |
| 0008,0050 | Accession Number     | made zero length |                 |
| 0008,0080 | Institution Name     | made zero length |                 |

|            |   |                  |   |
|------------|---|------------------|---|
| 0008,0081  | Institution Address                     | element dropped  | Refer to Note 1   |
| 0008,0090  | Referring Physician's Name              | made zero length |   |
| 0008,0092  | Referring Physician's Address           | element dropped  | Refer to Note 1   |
| 0008,0094  | Referring Physician's Telephone Numbers | element dropped  | Refer to Note 1   |
| 0008,1010  | Station Name                            | made zero length |   |
| 0008,1030  | Study Description                       | "ANONYMIZED"     |   |
| 0008,103E  | Series Description                      | "ANONYMIZED"     |   |
| 0008,1040  | Institutional Department Name           | element dropped  | Refer to Note 1   |
| 0008,1048  | Physicians of Record                    | element dropped  | Refer to Note 1   |
| 0008,1050  | Performing Physicians' Name             | element dropped  | Refer to Note 1   |
| 0008,1060  | Name of Physicians Reading Study        | made zero length |   |
| 0008,1070  | Operators' Name                         | made zero length |   |
| 0008,1080  | Admitting Diagnoses Description         | element dropped  | Refer to Note 1   |
| 0008,1110  | Referenced Study Sequence               | drop sequence    |   |
| >0008,1150 | Referenced SOP Class UID                | element dropped  |   |
| >0008,1155 | Referenced SOP Instance UID             | element dropped  |   |
| 0008,1140  | Referenced Image Sequence               | drop sequence    | Special handling is performed when the entire exam is de-identified in one operation. See Table 12.2-2 for details. |
| >0008,1150 | Referenced SOP Class UID                | element dropped  |   |
| >0008,1155 | Referenced SOP Instance UID             | element dropped  |   |
| 0008,2111  | Derivation Description                  | element dropped  |   |
| 0009,1001  | Genesis FF Flag                         | element dropped  |   |
| 0010,0010  | Patient's Name                          | "ANONxxxx"       | xxxx = study id   |
| 0010,0020  | Patient ID                              | "ANONxxxx"       | xxxx = study id   |
| 0010,0030  | Patient's Birth Date                    | made zero length |   |
| 0010,0032  | Patient's Birth Time                    | element dropped  | Refer to Note 1   |
| 0010,0040  | Patient's Sex                           | made zero length |   |
| 0010,1000  | Other Patient Ids                       | element dropped  | Refer to Note 1   |
| 0010,1001  | Other Patient Names                     | element dropped  | Refer to Note 1   |
| 0010,1010  | Patient's Age                           | made zero length |   |
| 0010,1020  | Patient's Size                          | element dropped  | Refer to Note 1   |
| 0010,1030  | Patient's Weight                        | made zero length |   |
| 0010,1090  | Medical Record Locator                  | element dropped  | Refer to Note 1   |
| 0010,2160  | Ethnic Group                            | element dropped  | Refer to Note 1   |
| 0010,2180  | Occupation                              | element dropped  | Refer to Note 1   |

|            |  |                                  |   |
|------------|--|----------------------------------|---|
| 0010,21B0  | Additional Patient's History           | made zero length                 |   |
| 0010,4000  | Patient Comments                       | element dropped                  | Refer to Note 1   |
| 0018,1000  | Device Serial Number                   | made zero length                 |   |
| 0018,1030  | Protocol Name                          | made zero length                 |   |
| 0020,000D  | Study Instance UID                     | Assign new UID                   | This value is used for all images in exam   |
| 0020,000E  | Series Instance UID                    | Assign new UID                   | This value is used for all images in series   |
| 0020,0010  | Study ID                               | Retain Study ID                  | This value is used in patient ID  |
| 0020,0052  | Frame of Reference UID                 | Assign new UID                   | This value is used for all images sharing this UID  |
| 0020,0200  | Synchronization Frame of Reference UID | element dropped                  | Refer to Note 1   |
| 0020,4000  | Image Comments                         | element dropped                  |   |
| 0040,0275  | Request Attributes Sequence            | drop sequence                    |   |
| >0040,1001 | Requested Procedure ID                 | element dropped                  |   |
| >0040,0009 | Scheduled Procedure Step ID            | element dropped                  |   |
| >0040,0007 | Scheduled Procedure Step Description   | element dropped                  |   |
| >0040,0253 | Performed Procedure Step ID            | element dropped                  |   |
| >0040,0254 | Performed Procedure Step Description   |                                  |   |
| 0040,A124  | UID                                    | element dropped                  | Refer to Note 1   |
| 0040,A730  | Content Sequence                       | drop sequence                    | Refer to Note 1   |
| 0043,1061  | Scanner Study Entity UID               | Set to same value as (0020,000D) | Element may be dropped.   |
| 0043,1062  | Scanner Study ID                       | Set to same value as (0020,0010) | Element may be dropped.   |
| 0043,1088  | PURE calibration series UID            | element dropped                  | Special handling is performed when the entire exam in de-identified in one operation. See Table 12.2-2 for details. |
| 0043,1098  | ASSET calibration series UID           | element dropped                  | Special handling is performed when the entire exam in de-identified in one operation. See Table 12.2-2 for details. |
| 0045,1000  | Annotation group UID                   | set to same value as (0008,0018) |   |
| 0088,0140  | Storage Media File-set UID             | element dropped                  | Refer to Note 1   |
| 3006,0024  | Referenced Frame of Reference UID      | element dropped                  | Refer to Note 1   |
| 3006,00C2  | Related Frame of Reference UID         | element dropped                  | Refer to Note 1   |

**Note 1:** these elements are not currently present in GE images, however, the described action will occur on 3<sup>rd</sup> party images.

The following additional de-identification occurs when processing an entire exam (create anonymous exam function.)

**TABLE 11.4.14-2 ADDITIONAL DE-IDENTIFICATION BY ELEMENT FOR EXAM-BASED PROCESSING**

| Tag        | Attribute Name               | Action   | Comments   |
|------------|------------------------------|--|--|
| 0008,1140  | Referenced Image Sequence    | Sequence regenerated                           | This sequence is regenerated using the new UIDs generated for the images within the exam |
| >0008,1150 | Referenced SOP Class UID     |  |  |
| >0008,1155 | Referenced SOP Instance UID  | element contents updated                       |  |
| 0043,1088  | PURE calibration image UID   | set to value assigned to associated PURE image |  |
| 0043,1098  | ASSET calibration series UID | set to value assigned to calibration series    |  |

The following special processing is performed based on image type:

**TABLE 11.4.14-3 DE-IDENTIFICATION PROCESSING BY IMAGE TYPE**

| Image Type | Processing                              |
|------------|---|
| MR Image   | de-identified based on the tables above |
| SC Image   | image discarded                         |
| GSPS       | object discarded                        |
| SR         | object discarded                        |

### 12.3 ASSOCIATION LEVEL SECURITY

The MR system provides association level security for Query Retrieve operations. The system will only allow remote DICOM servers to pull images if the remote DICOM server is defined on the MR system. The remote DICOM server's IP address, AE title, and Port number must be configured on the MR system for the networking pull to begin.

Note that this association level security only applies to the retrieve request; query operations will be accepted from any connected DICOM client.

## 13. ENHANCED STRUCTURED REPORT INFORMATION OBJECT IMPLEMENTATION

### 13.1 INTRODUCTION

This section specifies the use of the DICOM Enhanced Structured Report (SR) IOD to represent the information included in Enhanced SR produced by this implementation. Corresponding attributes are conveyed using the module construct.

### 13.2 IOD MODULE TABLE

The Enhanced SR Information Object Definition comprises the modules of the following table.

**TABLE 11.4.14-1 ENHANCED SR IOD MODULES**

| Entity Name | Module Name         | Usage | Reference |
|-------------|---------------------|-------|-----------|
| Patient     | Patient             | Used  | 13.3.1.1  |
| Study       | General Study       | Used  | 13.3.2.1  |
|             | Patient Study       | Used  | 13.3.2.2  |
| Series      | SR Document Series  | Used  | 13.3.3.1  |
| Equipment   | General Equipment   | Used  | 13.3.4.1  |
| Document    | SR Document General | Used  | 13.3.5.1  |
|             | SR Document Content | Used  | 13.3.5.2  |
|             | SOP Common          | Used  | 13.3.5.3  |

### 13.3 INFORMATION MODULE DEFINITIONS

Please refer to DICOM Part 3 (Information Object Definitions) for a description of each of the entities, modules, and attributes contained within the SR Information Objects.

The following modules are included to convey Enumerated Values, Defined Terms, and Optional Attributes supported. Type 1 & Type 2 Attributes are also included for completeness and to define what values they may take and where these values are obtained from when generating the instance. It should be noted that they are the same ones as defined in the DICOM Standard Part 3 (Information Object Definitions). Also note that Attributes not present in tables are not supported.

## 13.3.1 Patient Entity Modules

## 13.3.1.1 Patient Module

TABLE 13.3.1-1 PATIENT MODULE ATTRIBUTES

| Attribute Name               | Tag         | Type | Attribute Description            |
|------------------------------|-------------|------|----------------------------------|
| Patient's Name               | (0010,0010) | 2    | Copied from the referenced image |
| Patient ID                   | (0010,0020) | 2    | Copied from the referenced image |
| Patient's Birth Date         | (0010,0030) | 2    | Copied from the referenced image |
| Patient's Sex                | (0010,0040) | 2    | Copied from the referenced image |
| Referenced Patient Sequence  | (0008,1120) | 3    | Copied from the referenced image |
| >Referenced SOP Class UID    | (0008,1150) | 1C   | Copied from the referenced image |
| >Referenced SOP Instance UID | (0008,1155) | 1C   | Copied from the referenced image |
| Patient's Birth Time         | (0010,0032) | 3    | Unused                           |
| Other Patient IDs            | (0010,1000) | 3    | Unused                           |
| Other Patient Names          | (0010,1001) | 3    | Unused                           |
| Ethnic Group                 | (0010,2160) | 3    | Unused                           |
| Patient Comments             | (0010,4000) | 3    | Unused                           |

### 13.3.2 Study Entity Modules

#### 13.3.2.1 General Study Module

TABLE 13.3.2-1 GENERAL STUDY MODULE ATTRIBUTES

| Attribute Name                                     | Tag         | Type | Attribute Description            |
|--|-------------|------|----------------------------------|
| Study Instance UID *                               | (0020,000D) | 1    | Copied from the referenced image |
| Study Date   | (0008,0020) | 2    | Copied from the referenced image |
| Study Time   | (0008,0030) | 2    | Copied from the referenced image |
| Referring Physician's Name                         | (0008,0090) | 2    | Copied from the referenced image |
| Referring Physician Identification Sequence        | (0008,0096) | 3    | Unused                           |
| Study ID *   | (0020,0010) | 2    | Copied from the referenced image |
| Accession Number                                   | (0008,0050) | 2    | Copied from the referenced image |
| Study Description                                  | (0008,1030) | 3    | Copied from the referenced image |
| Procedure Code Sequence                            | (0008,1032) | 3    | Unused                           |
| Physician(s) of Record                             | (0008,1048) | 3    | Unused                           |
| Physician(s) of Record Identification Sequence     | (0008,1049) | 3    | Unused.                          |
| Name of Physician(s) Reading Study                 | (0008,1060) | 3    | Copied from the referenced image |
| Physician(s) Reading Study Identification Sequence | (0008,1062) | 3    | Unused                           |
| Referenced Study Sequence                          | (0008,1110) | 3    | Copied from the referenced image |
| >Referenced SOP Class UID                          | (0008,1150) | 1C   | Copied from the referenced image |
| >Referenced SOP Instance UID                       | (0008,1155) | 1C   | Copied from the referenced image |

#### 13.3.2.2 Patient Study Module

TABLE 13.3.2-2 PATIENT STUDY MODULE ATTRIBUTES

| Attribute Name                    | Tag         | Type | Attribute Description            |
|-----------------------------------|-------------|------|----------------------------------|
| Admitting Diagnoses Description   | (0008,1080) | 3    | Not Supported.                   |
| Admitting Diagnoses Code Sequence | (0008,1084) | 3    | Unused                           |
| Patient's Age                     | (0010,1010) | 3    | Copied from the referenced image |
| Patient's Size                    | (0010,1020) | 3    | Unused                           |
| Patient's Weight                  | (0010,1030) | 3    | Copied from the referenced image |
| Occupation                        | (0010,2180) | 3    | Unused                           |
| Additional Patient's History      | (0010,21B0) | 3    | Copied from the referenced image |

**13.3.3 Series Entity Modules****13.3.3.1 SR Document Series Module****TABLE 13.3.3-1 SR DOCUMENT SERIES MODULE ATTRIBUTES**

| Attribute Name                               | Tag         | Type | Attribute Description                  |
|--|-------------|------|--|
| Modality                                     | (0008,0060) | 1    | Value = SR                             |
| Series Instance UID                          | (0020,000E) | 1    | Generated                              |
| Series Number                                | (0020,0011) | 1    | Generated                              |
| Referenced Performed Procedure Step Sequence | (0008,1111) | 2    | Empty – zero length or sent with value |

**13.3.4 Equipment Entity Modules****13.3.4.1 General Equipment Module****TABLE 13.3.4-1 GENERAL EQUIPMENT MODULE ATTRIBUTES**

| Attribute Name                | Tag         | Type | Attribute Description            |
|-------------------------------|-------------|------|----------------------------------|
| Manufacturer                  | (0008,0070) | 2    | Copied from the referenced image |
| Institution Name              | (0008,0080) | 3    | Copied from the referenced image |
| Institution Address           | (0008,0081) | 3    | Unused                           |
| Station Name                  | (0008,1010) | 3    | Copied from the referenced image |
| Institutional Department Name | (0008,1040) | 3    | Unused                           |
| Manufacturers Model Name      | (0008,1090) | 3    | Copied from the referenced image |
| Device Serial Number          | (0018,1000) | 3    | Copied from the referenced image |
| Software Versions             | (0018,1020) | 3    | Copied from the referenced image |
| Spatial Resolution            | (0018,1050) | 3    | Copied from the referenced image |
| Date of Last Calibration      | (0018,1200) | 3    | Unused                           |
| Time of Last Calibration      | (0018,1201) | 3    | Unused                           |
| Pixel Padding Value           | (0028,0120) | 3    | Not Used                         |



## 13.3.5 Document Modules

## 13.3.5.1 SR Document General Module

TABLE 13.3.5-1 SR DOCUMENT GENERAL MODULE ATTRIBUTES

| Attribute Name                                   | Tag         | Type | Attribute Description  |
|--|-------------|------|--|
| Instance Number                                  | (0020,0013) | 1    | Generated  |
| Completion Flag                                  | (0040,A491) | 1    | Enumerated Values:<br>PARTIAL = Partial content.<br>COMPLETE = Complete content.                         |
| Completion Flag Description                      | (0040,A492) | 3    | Empty  |
| Verification Flag                                | (0040,A493) | 1    | Set to 'UNVERIFIED'  |
| Content Date                                     | (0008,0023) | 1    | Current date of creation.  |
| Content Time                                     | (0008,0033) | 1    | Current time of creation.  |
| Verifying Observer Sequence                      | (0040,A073) | 1C   | Unused   |
| >Verifying Observer Name                         | (0040,A075) | 1    | Unused   |
| >Verifying Observer Identification Code Sequence | (0040,A088) | 2    | Unused   |
| >Verifying Organization                          | (0040,A027) | 1    | Unused   |
| >Verification DateTime                           | (0040,A030) | 1    | Unused   |
| Predecessor Documents Sequence                   | (0040,A360) | 1C   | Not supported  |
| Identical Documents Sequence                     | (0040,A525) | 1C   | Not supported  |
| Referenced Request Sequence                      | (0040,A370) | 1C   | Not supported  |
| Performed Procedure Code Sequence                | (0040,A372) | 2    | Empty  |
| Current Requested Procedure Evidence Sequence    | (0040,A375) | 1C   | Generated using<br>Source's Study Instance UID, Series Instance UID, SOP Instance UID and SOP Class UID. |
| > Referenced Series Sequence                     | 0008,1115   | 1C   | Generated using<br>Source's Series Instance UID, SOP Instance UID and SOP Class UID.                     |
| >> Referenced SOP Sequence                       | 0008,1199   | 1C   | Generated using<br>Source's SOP Instance UID and SOP Class UID.  |
| >>> Referenced SOP Class UID                     | 0008,1150   | 1C   | Copied from source DICOM header.<br>(Source's SOP Class UID)   |
| >>> Referenced SOP Instance UID                  | 0008,1155   | 1C   | Copied from source DICOM header  |
| >> Series Instance UID                           | 0020,000E   | 1C   | Generated  |
| > Study Instance UID                             | 0020,000D   | 1C   | Copied from source DICOM header  |
| Pertinent Other Evidence Sequence                | (0040,A385) | 1C   | Empty  |

## 13.3.5.2 SR Document Content Module

TABLE 13.3.5-2 SR DOCUMENT CONTENT MODULE ATTRIBUTES

| Attribute Name                       | Tag         | Type | Attribute Description  |
|--------------------------------------|-------------|------|--|
| Observation DateTime                 | (0040,A032) | 1C   |  |
| Content Template Sequence            | (0040,A504) | 1C   |  |
| > Mapping Resource                   | (0008,0105) | 1    | 99GEMSMR   |
| > Template Identifier                | (0040,DB00) | 1    | 111111   |
| Value Type                           | (0040,A040) | 1    | Value = CONTAINER  |
| Continuity of Content                | (0040,A050) | 1C   | Value = SEPARATE   |
| Concept Name Code Sequence           | (0040,A043) | 1C   |  |
| > Code Value                         | (0008,0100) | 1    | Defined terms: (Also see Table 13.3.5-3)<br>Functool-0051, Functool-0052, Functool-0053,<br>Functool-0055, Functool-0057, Functool-0050  |
| > Code Scheme Designator             | 0008,0102   | 1    | Defined terms: (Also see Table 13.3.5-3)<br><br>99GEMS   |
| > Code Meaning                       | 0008,0104   | 1    | Defined terms: (Also see Table 13.3.5-3)<br><br>Series Images, Functional Images, Function<br>Name, ROI ID, Description, Location        |
| Text Value                           | 0040,A160   | 1C   | Text of items like Description, Findings,<br>Procedure, etc.   |
| Content Sequence                     | (0040,A730) | 1C   | SR content: the sequence of top level<br>content items.  |
| > Relationship Type                  | (0040,A010) | 1    | Defined Terms:<br><br>CONTAINS, HAS PROPERTIES, HAS OBS<br>CONTEXT, HAS ACQ CONTEXT, INFERRED<br>FROM, SELECTED FROM, HAS CONCEPT<br>MOD |
| > Referenced Content Item Identifier | (0040,DB73) | 1C   | Unused   |

The following table describes the defined terms for the SR Document Module.

TABLE 13.3.5-3 SR DOCUMENT GENERAL ATTRIBUTE DESCRIPTION

| Code Value<br>(0008, 0100) | Code Scheme Designator<br>(0008, 0102) | Code Meaning<br>(0008, 0104) | Use       |
|----------------------------|--|------------------------------|-----------|
| Functool-0051              | 99GEMS                                 | Series Images                | Generated |
| Functool-0052              | 99GEMS                                 | Functional Images            | Generated |
| Functool-0053              | 99GEMS                                 | Function Name                | Generated |
| Functool-0055              | 99GEMS                                 | ROI ID                       | Generated |
| Functool-0057              | 99GEMS                                 | Description                  | Generated |
| Functool-0050              | 99GEMS                                 | Location                     | Generated |

## 13.3.5.3 SOP Common Module

TABLE 13.3.5-4 SOP COMMON MODULE ATTRIBUTES

| Attribute Name         | Tag         | Type | Attribute Description                                   |
|------------------------|-------------|------|---|
| SOP Class UID          | (0008,0016) | 1    | Enumerated Values:<br><br>1.2.840.10008.5.1.4.1.1.88.22 |
| SOP Instance UID       | (0008,0018) | 1    | Unique UID auto generated by system                     |
| Specific Character Set | (0008,0005) | 1C   | Copied from source DICOM header                         |
| Instance Creation Date | (0008,0012) | 3    | Current date of creation                                |
| Instance Creation Time | (0008,0013) | 3    | Current time of creation                                |
| Instance Creator UID   | (0008,0014) | 3    | Empty   |
| Instance Number        | (0020,0013) | 3    | Generated   |

## 13.4 STANDARD EXTENDED AND PRIVATE DATA ATTRIBUTES

## 13.4.1 Standard Attributes

None

## 13.4.2 Private Group GEMS\_MRFCTL\_01

Private Group GEMS\_MRFCTL\_01 is modeled as part of the Equipment Information Entity.

TABLE 13.4.2-1  
PRIVATE GROUP GEMS\_MRFCTL\_01

| Attribute Name            | Tag         | VR | VM | Attribute Description and Use               |
|---------------------------|-------------|----|----|---|
| GEHC Private Creator ID   | (0039,0010) | LO | 1  | GEMS_MRFCTL_01                              |
| Application specific data | (0039,1095) | LO | 1  | VV#<application_version>#<application_name> |

## 13.5 STANDARD EXTENDED AND PRIVATE CONTEXT GROUPS

## 13.5.1 Private Context Groups

## 13.5.1.1 CID GEMS-CID-MR01 Non Spectroscopy Maps

## Context ID GEMS-CID-MR01

## Non Spectroscopy Maps

Type: Extensible

| Coding Scheme Designator | Code Value | Code Meaning                     |
|--------------------------|------------|----------------------------------|
| DCM                      | 113044     | Diffusion Anisotropy             |
| 99GEMSMR                 | 90000      | Fractional Anisotropy            |
| 99GEMSMR                 | 90001      | Relative Anisotropy              |
| 99GEMSMR                 | 90002      | Surface/Average Anisotropy Ratio |
| 99GEMSMR                 | 90003      | Volume/Average Anisotropy Ratio  |
| 99GEMSMR                 | 90004      | Volume ratio Anisotropy          |
| 99GEMSMR                 | 90005      | Volume/Surface Anisotropy Ratio  |
| 99GEMSMR                 | 90006      | Exponential attenuation          |
| 99GEMSMR                 | 90007      | Diffusion Tensor Directions      |
| 99GEMSMR                 | 90008      | Average Diffusion Coefficient    |
| 99GEMSMR                 | 90009      | Surface Diffusion Coefficient    |
| 99GEMSMR                 | 90010      | Volume Diffusion Coefficient     |
| 99GEMSMR                 | 90011      | Magnitude Diffusion Coefficient  |
| 99GEMSMR                 | 90012      | Minimum eigenvalue               |
| 99GEMSMR                 | 90013      | Middle eigenvalue                |
| 99GEMSMR                 | 90014      | Maximum eigenvalue               |
| 99GEMSMR                 | 90015      | First Invariant                  |
| 99GEMSMR                 | 90016      | Second Invariant                 |
| 99GEMSMR                 | 90017      | Third Invariant                  |
| 99GEMSMR                 | 90018      | Fourth Invariant                 |
| 99GEMSMR                 | 90019      | T2-wieghted Trace                |
| 99GEMSMR                 | 90020      | T2-weighted Trace                |
| 99GEMSMR                 | 90021      | Fiber Map                        |
| 99GEMSMR                 | 90022      | Negative Activation Magnitude    |
| 99GEMSMR                 | 90023      | Positive Activation Magnitude    |
| 99GEMSMR                 | 90024      | Negative Correlation Coefficient |
| 99GEMSMR                 | 90025      | Positive Correlation Coefficient |
| DCM                      | 113055     | Regional Cerebral Blood Flow     |
| DCM                      | 113056     | Regional Cerebral Blood Volume   |
| DCM                      | 113052     | Mean Transit Time                |
| DCM                      | 113069     | Time to Peak map                 |
| DCM                      | 113055     | Regional Cerebral Blood Flow     |
| DCM                      | 113056     | Regional Cerebral Blood Volume   |
| 99GEMSMR                 | 90026      | Bolus Arrival Time               |
| DCM                      | 113052     | Mean Transit Time                |
| DCM                      | 113052     | Mean Transit Time                |
| DCM                      | 113069     | Time to Peak map                 |

| Coding Designator | Scheme | Code Value | Code Meaning                               |
|-------------------|--------|------------|--|
| 99GEMSMR          |        | 90027      | Time to Maximum map                        |
| 99GEMSMR          |        | 90036      | R2* Map                                    |
| DCM               |        | 113064     | T2* Map                                    |
| DCM               |        | 113041     | Apparent Diffusion Coefficient             |
| DCM               |        | 113041     | Apparent Diffusion Coefficient             |
| 99GEMSMR          |        | 90037      | Exponential Apparent Diffusion Coefficient |
| DCM               |        | 113049     | Pixel by Pixel Mean                        |
| DCM               |        | 113054     | Negative Enhancement Integral              |
| 99GEMSMR          |        | 90038      | Positive Enhancement Integral              |
| 99GEMSMR          |        | 90039      | Mean Time to Enhance                       |
| 99GEMSMR          |        | 90040      | Signal Enhancement Ratio                   |
| 99GEMSMR          |        | 90041      | Maximum Slope of Increase                  |
| 99GEMSMR          |        | 90042      | Maximum Slope of Decrease                  |
| 99GEMSMR          |        | 90043      | Ratio (A-B)/(C-D)                          |
| DCM               |        | 113069     | Time to Peak map                           |
| 99GEMSMR          |        | 90044      | Time to Minimum map                        |
| DCM               |        | 113063     | T1 Map                                     |
| DCM               |        | 113065     | T2 Map                                     |
| DCM               |        | 113065     | T2 Map                                     |
| DCM               |        | 113058     | Proton Density Map                         |
| 99GEMSMR          |        | 90045      | Interpolation (T1)                         |
| 99GEMSMR          |        | 90046      | Interpolation (T2)                         |
| DCM               |        | 113055     | Regional Cerebral Blood Flow               |
| 99GEMSMR          |        | 90047      | Stiffness                                  |
| 99GEMSMR          |        | 90047      | Stiffness                                  |
| 99GEMSMR          |        | 90048      | Corrected Phase Map                        |
| 99GEMSMR          |        | 90049      | Series Data                                |

## 13.5.1.2 CID GEMS-CID-MR02 Derivation

## Context ID GEMS-CID-MR02

## Derivation

## Type: Extensible

| Coding Designator | Scheme | Code Value | Code Meaning       |
|-------------------|--------|------------|--------------------|
| SRT               |        | G-A437     | Maximum            |
| SRT               |        | R-404FB    | Minimum            |
| SRT               |        | R-00317    | Mean               |
| SRT               |        | R-10047    | Standard Deviation |
| 99GEMSMR          |        | 90050      | Relative Deviation |

## 13.5.1.3 CID GEMS-CID-MR03 Spectroscopy Maps

## Context ID GEMS-CID-MR03

## Spectroscopy Maps

Type: Extensible

| Coding Designator | Scheme | Code Value | Code Meaning                     |
|-------------------|--------|------------|----------------------------------|
| SRT               |        | F-61620    | Choline                          |
| SRT               |        | F-61380    | Creatine                         |
| SRT               |        | F-6175A    | N-acetylaspartate                |
| DCM               |        | 113094     | Creatine and Choline             |
| SRT               |        | F-61A90    | Inositol                         |
| SRT               |        | F-61080    | Citrate                          |
| DCM               |        | 113095     | Lipid and Lactate                |
| 99GEMSMR          |        | 90028      | Metabolites (Composite)          |
| 99GEMSMR          |        | 90029      | User Defined                     |
| 99GEMSMR          |        | 90029      | User Defined                     |
| 99GEMSMR          |        | 90030      | Single Voxel                     |
| 99GEMSMR          |        | 90031      | Single Voxel Breast              |
| DCM               |        | 113081     | Choline/Creatine Ratio           |
| 99GEMSMR          |        | 90032      | Creatine/Choline Ratio           |
| 99GEMSMR          |        | 90033      | Choline/N-acetylaspartate Ratio  |
| DCM               |        | 113083     | N-acetylaspartate/Choline Ratio  |
| 99GEMSMR          |        | 90034      | Creatine/N-acetylaspartate Ratio |
| DCM               |        | 113082     | N-acetylaspartate/Creatine Ratio |
| DCM               |        | 113096     | Creatine+Choline/Citrate Ratio   |
| 99GEMSMR          |        | 90035      | Signal Over Noise                |

## 13.6 STANDARD EXTENDED AND PRIVATE TEMPLATES

## 13.6.1 Private Templates

## 13.6.1.1 TID 111111 MR Functool SR Report

This template describes the SR Report.

TID 111111

TEMPLATE NAME: MR FUNCTOOL SR REPORT

TYPE: EXTENSIBLE

|    | NL  | Relation with Parent | VT         | Concept Name   | VM  | Req Type | Condition          | Value Set Constraint                   |
|----|-----|----------------------|------------|--|-----|----------|--------------------|--|
| 1  |     |                      | CONTAINER  | EV (18755-9, LN, "MRI-Report")                             |     | M        |                    |  |
| 2  | >   | HAS CONCEPT MOD      | CODE       | EV (121049, DCM, Language of Content Item and Descendants) | 1   | M        |                    | DCID(5000)                             |
| 3  | >   | HAS OBS CONTEXT      | PNAME      | EV (121008, DCM, Person Observer Name)                     | 1   | M        |                    |  |
| 4  | >   | CONTAINS             | CONTAINER  | EV (121060, DCM, History)                                  | 1   | M        |                    |  |
| 5  | >>  | CONTAINS             | TEXT       | EV (121060, DCM, History)                                  | 1   | M        |                    | "-", if user does not enter any value  |
| 6  | >   | CONTAINS             | CONTAINER  | EV (121062, DCM, Request)                                  | 1   | M        |                    |  |
| 7  | >>  | CONTAINS             | TEXT       | EV (121062, DCM, Request)                                  | 1   | M        |                    | "-", if user does not enter any value. |
| 8  | >   | CONTAINS             | CONTAINER  | EV (121064, DCM, Current Procedure Description)            | 1   | M        |                    |  |
| 9  | >>  | CONTAINS             | TEXT       | EV (121064, DCM, Current Procedure Description)            | 1   | M        |                    | "-", if user does not enter any value  |
| 10 | >   | CONTAINS             | CONTAINER  | EV (121070, DCM, Findings)                                 | 1   | M        |                    |  |
| 13 | >>  | CONTAINS             | COINTAINER | EV (125007, DCM, Measurement Group)                        | 1-n | M        |                    |  |
| 11 | >>> | HAS CONCEPT MOD      | TEXT       | EV (122337, DCM, Relative Position)                        | 1   | M        |                    | See description below table            |
| 12 | >>> | CONTAINS             | IMAGE      | EV (121112, DCM, Source of Measurement)                    | 1-n | UC       | IFF non-custom map |  |
| 14 | >>> | HAS OBS CONTEXT      | TEXT       | EV (112039, DCM, Tracking Identifier)                      | 1   | UC       |                    | See description below table            |

|       | NL   | Relation with Parent | VT        | Concept Name   | VM  | Req Type | Condition   | Value Set Constraint             |
|-------|------|----------------------|-----------|--|-----|----------|---|----------------------------------|
| 15    | >>>  | CONTAINS             | NUM       | DCID (GEMS-CID-MR01)<br>Non Spectroscopy Maps                | 1-n | UC       | IFF non-spectroscopy                                |                                  |
| 16    | >>>> | HAS CONCEPT MOD      | CODE      | EV (121401, DCM, Derivation)                                 | 1   | M        |   | DCID (GEMS-CID-MR02) Derivations |
| <- 17 | >>>  | CONTAINS             | NUM       | EV (G-A16A, SRT, Area of defined region)                     | 1   | UC       | IFF non-spectroscopy                                | (mm2, UCUM, "mm^2")              |
| 18    | >>>  | CONTAINS             | NUM       | DCID (GEMS-CID-MR03)<br>MR Spectroscopy Maps                 | 1-n | UC       | IFF spectroscopy                                    |                                  |
| 19    | >>>  | CONTAINS             | TEXT      | EV(90053, 99GEMSMR, "Image Description")                     | 1   | UC       | IF source Images Selected by the User               | user entered value               |
| 20    | >>>  | CONTAINS             | IMAGE     | EV (121200, DCM, "Illustration of ROI")                      | 1   | UC       |   |                                  |
| 21    | >>   | CONTAINS             | CONTAINER | EV (90051, 99GEMSMR, Non-Measurement Group)                  | 1-n | UC       | IFF Graph/Histogram/ROI List/Tracto/Custom Viewport |                                  |
| 22    | >>>  | HAS CONCEPT MOD      | TEXT      | EV (122337, DCM, Relative Position)                          | 1   | M        |   | See description below table.     |
| 23    | >>>  | CONTAINS             | TEXT      | EV(90053, 99GEMSMR, "Image Description")                     | 1   | UC       | IF source Images Selected by the User               | user entered value               |
| 24    | >>>  | CONTAINS             | IMAGE     | EV (90052, 99GEMSMR, Illustration for Non-Measurement Group) | 1-n | M        |   |                                  |



## 14. ENCAPSULATED DOCUMENT MODULE INFORMATION OBJECT IMPLEMENTATION

### 14.1 INTRODUCTION

This section specifies the use of the Encapsulated Document objects (ePDF) which are produced on the scanner and can be processed by Brainwave PA on the same scanner.

### 14.2 IOD MODULE TABLE

The Encapsulated Document Module Information Object Definition comprises the modules of the following table.

**TABLE 13.6.1-1 ENCAPSULATED DOCUMENT IOD MODULES**

| Entity Name | Module Name           | Usage | Reference |
|-------------|-----------------------|-------|-----------|
| Patient     | Patient               | Used  | 14.3.1.1  |
| Study       | General Study         | Used  | 14.3.2.1  |
|             | Patient Study         | Used  | 14.3.2.2  |
| Series      | Encapsulated Document | Used  | 14.3.3.1  |
| Equipment   | General Equipment     | Used  | 14.3.4.1  |
| Document    | Encapsulated Document | Used  | 14.3.5.1  |

**14.3 INFORMATION MODULE DEFINITIONS****14.3.1 Patient Entity Modules****14.3.1.1 Patient Module****TABLE 14.3.1-1 PATIENT MODULE ATTRIBUTES**

| Attribute Name               | Tag         | Type | Attribute Description            |
|------------------------------|-------------|------|----------------------------------|
| Patient's Name               | (0010,0010) | 2    | Copied from the referenced image |
| Patient ID                   | (0010,0020) | 2    | Copied from the referenced image |
| Patient's Birth Date         | (0010,0030) | 2    | Copied from the referenced image |
| Patient's Sex                | (0010,0040) | 2    | Copied from the referenced image |
| Referenced Patient Sequence  | (0008,1120) | 3    | Copied from the referenced image |
| >Referenced SOP Class UID    | (0008,1150) | 1C   | Copied from the referenced image |
| >Referenced SOP Instance UID | (0008,1155) | 1C   | Copied from the referenced image |
| Patient's Birth Time         | (0010,0032) | 3    | Unused                           |
| Other Patient IDs            | (0010,1000) | 3    | Unused                           |
| Other Patient Names          | (0010,1001) | 3    | Unused                           |
| Ethnic Group                 | (0010,2160) | 3    | Unused                           |
| Patient Comments             | (0010,4000) | 3    | Unused                           |

### 14.3.2 Study Entity Modules

#### 14.3.2.1 General Study Module

TABLE 14.3.2-1 GENERAL STUDY MODULE ATTRIBUTES

| Attribute Name                                     | Tag         | Type | Attribute Description            |
|--|-------------|------|----------------------------------|
| Study Instance UID *                               | (0020,000D) | 1    | Copied from the referenced image |
| Study Date   | (0008,0020) | 2    | Copied from the referenced image |
| Study Time   | (0008,0030) | 2    | Copied from the referenced image |
| Referring Physician's Name                         | (0008,0090) | 2    | Copied from the referenced image |
| Referring Physician Identification Sequence        | (0008,0096) | 3    | Unused                           |
| Study ID *   | (0020,0010) | 2    | Copied from the referenced image |
| Accession Number                                   | (0008,0050) | 2    | Copied from the referenced image |
| Study Description                                  | (0008,1030) | 3    | Copied from the referenced image |
| Procedure Code Sequence                            | (0008,1032) | 3    | Unused                           |
| Physician(s) of Record                             | (0008,1048) | 3    | Unused                           |
| Physician(s) of Record Identification Sequence     | (0008,1049) | 3    | Unused.                          |
| Name of Physician(s) Reading Study                 | (0008,1060) | 3    | Copied from the referenced image |
| Physician(s) Reading Study Identification Sequence | (0008,1062) | 3    | Unused                           |
| Referenced Study Sequence                          | (0008,1110) | 3    | Copied from the referenced image |
| >Referenced SOP Class UID                          | (0008,1150) | 1C   | Copied from the referenced image |
| >Referenced SOP Instance UID                       | (0008,1155) | 1C   | Copied from the referenced image |

#### 14.3.2.2 Patient Study Module

TABLE 14.3.2-2 PATIENT STUDY MODULE ATTRIBUTES

| Attribute Name               | Tag         | Type | Attribute Description            |
|------------------------------|-------------|------|----------------------------------|
| Patient's Age                | (0010,1010) | 3    | Copied from the referenced image |
| Patient's Weight             | (0010,1030) | 3    | Copied from the referenced image |
| Additional Patient's History | (0010,21B0) | 3    | Copied from the referenced image |

**14.3.3 Series Entity Modules****14.3.3.1 Encapsulated Document Series Module****TABLE 14.3.3-1 ENCAPSULATED DOCUMENT SERIES MODULE ATTRIBUTES**

| Attribute Name                               | Tag         | Type | Attribute Description |
|--|-------------|------|-----------------------|
| Modality                                     | (0008,0060) | 1    |                       |
| Series Instance UID                          | (0020,000E) | 1    |                       |
| Series Number                                | (0020,0011) | 1    |                       |
| Referenced Performed Procedure Step Sequence | (0008,1111) | 3    | Not supported         |
| Series Description                           | (0008,103E) | 3    |                       |
| Series Description Code Sequence             | (0008,103F) | 3    | Not supported         |
| Request Attributes Sequence                  | (0040,0275) | 3    | Not supported         |

**14.3.4 Equipment Entity Modules****14.3.4.1 General Equipment Module****TABLE 14.3.4-1 GENERAL EQUIPMENT MODULE ATTRIBUTES**

| Attribute Name                | Tag         | Type | Attribute Description            |
|-------------------------------|-------------|------|----------------------------------|
| Manufacturer                  | (0008,0070) | 2    | Copied from the referenced image |
| Institution Name              | (0008,0080) | 3    | Copied from the referenced image |
| Institution Address           | (0008,0081) | 3    | Unused                           |
| Station Name                  | (0008,1010) | 3    | Copied from the referenced image |
| Institutional Department Name | (0008,1040) | 3    | Unused                           |
| Manufacturers Model Name      | (0008,1090) | 3    | Copied from the referenced image |
| Device Serial Number          | (0018,1000) | 3    | Copied from the referenced image |
| Software Versions             | (0018,1020) | 3    | Copied from the referenced image |
| Spatial Resolution            | (0018,1050) | 3    | Copied from the referenced image |
| Date of Last Calibration      | (0018,1200) | 3    | Unused                           |
| Time of Last Calibration      | (0018,1201) | 3    | Unused                           |
| Pixel Padding Value           | (0028,0120) | 3    | Not Used                         |

**14.3.5 Document Modules****14.3.5.1 Encapsulated Document Module****TABLE 14.3.5-1 ENCAPSULATED DOCUMENT MODULE ATTRIBUTES**

| Attribute Name                     | Tag         | Type | Attribute Description                                  |
|------------------------------------|-------------|------|--|
| Instance Number                    | (0020,0013) | 1    |  |
| Content Date                       | (0008,0023) | 2    |  |
| Content Time                       | (0008,0033) | 2    |  |
| Acquisition Date Time              | (0008,002A) | 2    |  |
| Image Laterality                   | (0020,0062) | 3    | Not supported  |
| Burned In Annotation               | (0028,0301) | 1    |  |
| Recognizable<br>Visual Features    | (0028,0302) | 3    | Not supported  |
| Source Instance Sequence           | (0042,0013) | 1C   |  |
| >Referenced SOP Class UID          | (0008,1150) | 1    |  |
| >Referenced SOP Instance UID       | (0008,1155) | 1    |  |
| Document Title                     | (0042,0010) | 2    |  |
| Concept Name Code Sequence         | (0040,A043) | 2    | Present with zero items                                |
| Document Class Code Sequence       | (0040,E008) | 3    | Not supported  |
| Verification Flag                  | (0040,A493) | 3    |  |
| HL7 Instance<br>Identifier         | (0040,E001) | 1C   | Not supported, encapsulated document is PDF<br>not CDA |
| MIME Type of Encapsulated Document | (0042,0012) | 1    | application/pdf  |
| List of MIME Types                 | (0042,0014) | 1C   | application/pdf  |
| Encapsulated Document              | (0042,0011) | 1    |  |

**14.4 STANDARD EXTENDED AND PRIVATE DATA ATTRIBUTES**

None

**14.5 STANDARD EXTENDED AND PRIVATE CONTEXT GROUPS**

None

**14.6 STANDARD EXTENDED AND PRIVATE TEMPLATES**

None

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