Technical Publications

Direction DOC1974641
Revision 1

RX27.0
DV27.0
DICOM CONFORMANCE STATEMENT

Supported Products:

SIGNA Product Line

- **SIGNA* Premier**
- **SIGNA* Architect**

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CONFORMANCE STATEMENT OVERVIEW

Table 0.1 provides an overview of the network services supported by MR system.

Table 0.1 – NETWORK SERVICES

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Transfer		
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
PET Advance Private Data (PET RAW)	Yes	Yes
Encapsulated PDF Storage	Yes	No
Query/Retrieve		
Study Root Query/Retrieve Information Model – FIND	Yes	Yes
Study Root Query/Retrieve Information Model - MOVE	Yes	Yes
Workflow Management		
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
Print Management		
Basic Grayscale Print Management Meta SOP Class	Yes	No
Basic Color Print Management Meta SOP Class	Yes	No
Printer SOP Class	Yes	No

Note: **#** The MR System 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.

Table 0.2 provides an overview of the Media Storage Application Profiles supported by MR System.

Table 0.2 - MEDIA SERVICES

Media Storage Application Profile	Write Files (FSC or FSU)	Read Files (FSR)
Compact Disk – Recordable		
General Purpose CD-R	FSC	Yes
DVD		
General Purpose JPEG DVD	FSC	Yes
USB		
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.

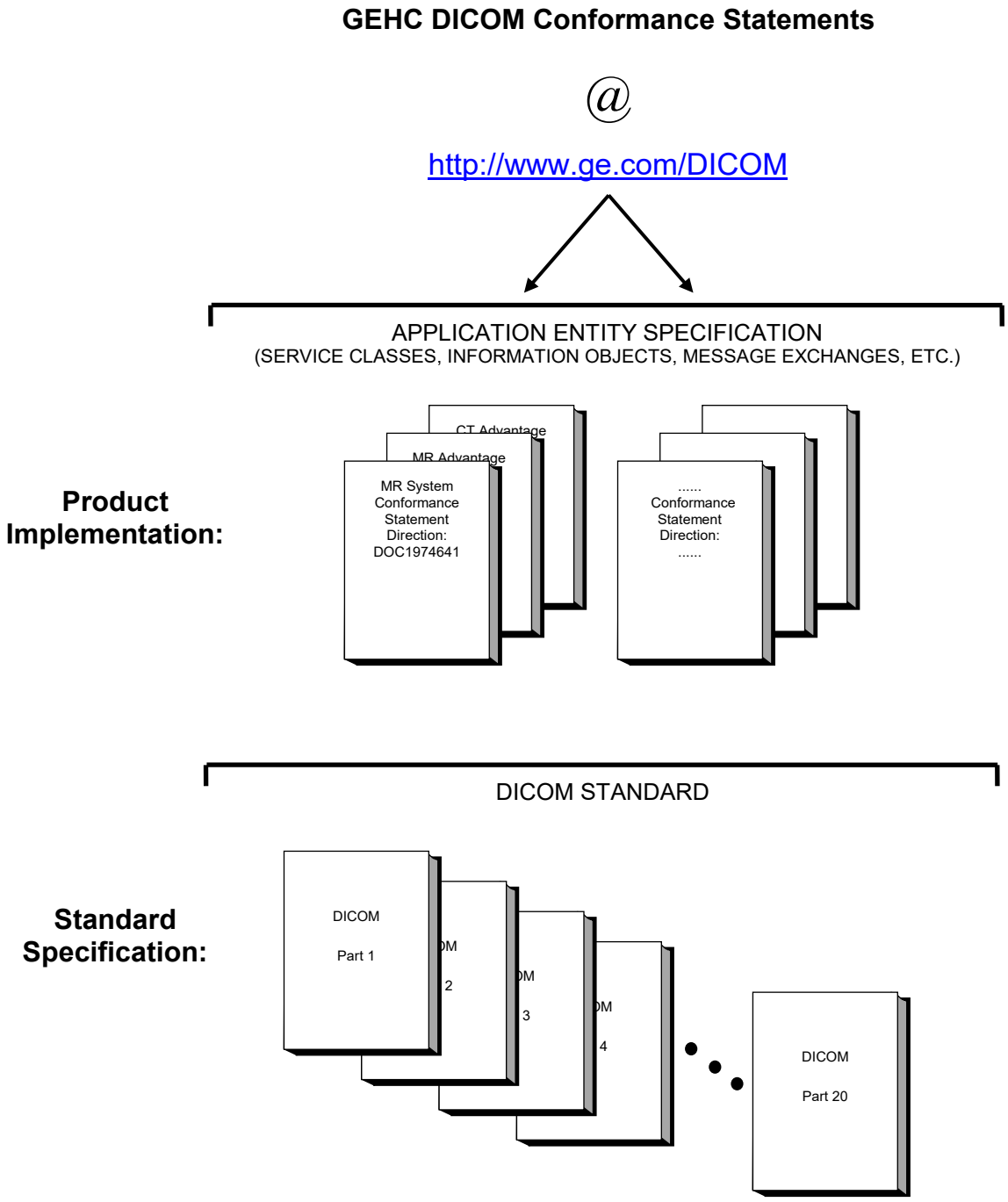
Section 13 (Encapsulated Document Module Information Object Implementation), which specifies the GEHC equipment compliance to DICOM requirements for the implementation of the Encapsulated Document Module.

Note: Following IODs are supported as SCU (not generated by MR product and just forwarded):

CT Image Storage
Enhanced SR Storage
Positron Emission Tomography Image Storage
RT Structure Set Storage

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:

MR SYSTEM
Conformance Statement for DICOM
Direction ***DOC1974641***

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
1300 N. 17th Street, Suite 1752
Rosslyn, VA 22209
USA
Phone: +1.703.841.3200

1.3 INTENDED AUDIENCE

The reader of this document is concerned with software design and/or system integration issues. It is assumed that the reader of this document is familiar with the DICOM 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
RX27.0	SIGNA Premier	1.2.840.113619.6.440	RX27.0
DV27.0	SIGNA Architect	1.2.840.113619.6.440	DV27.0

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 v3.0), and of this introduction and associated DICOM Conformance Statements when interoperability with non-GE equipment is desired. The responsibility to analyze the applications requirements and to design a solution that integrates GE imaging equipment with non–GE systems is the **user's** responsibility and should not be underestimated. The **user** is strongly advised to ensure that such an integration analysis is correctly performed.

- **Validation** - Testing the complete range of possible interactions between any GE device and non–GE devices, before the connection is declared operational, should not be overlooked. Therefore, the **user** should ensure that any non–GE provider accepts full responsibility for all validation required for their connection with GE devices. This includes the accuracy of the image data once it has crossed the interface between the GE imaging equipment and the non–GE device and the stability of the image data for the intended applications.

  Such a validation is required before any clinical use (diagnosis and/or treatment) is performed. It applies when images acquired on GE imaging equipment are processed/displayed on a non-GE device, as well as when images acquired on non-GE equipment is processed/displayed on a GE console or workstation.

- **Future Evolution** - GE understands that the DICOM Standard will evolve to meet the user's growing requirements. GE is actively involved in the development of the DICOM 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 definitons 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 3.0 protocol to exchange information with other DICOM compliant devices 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 :

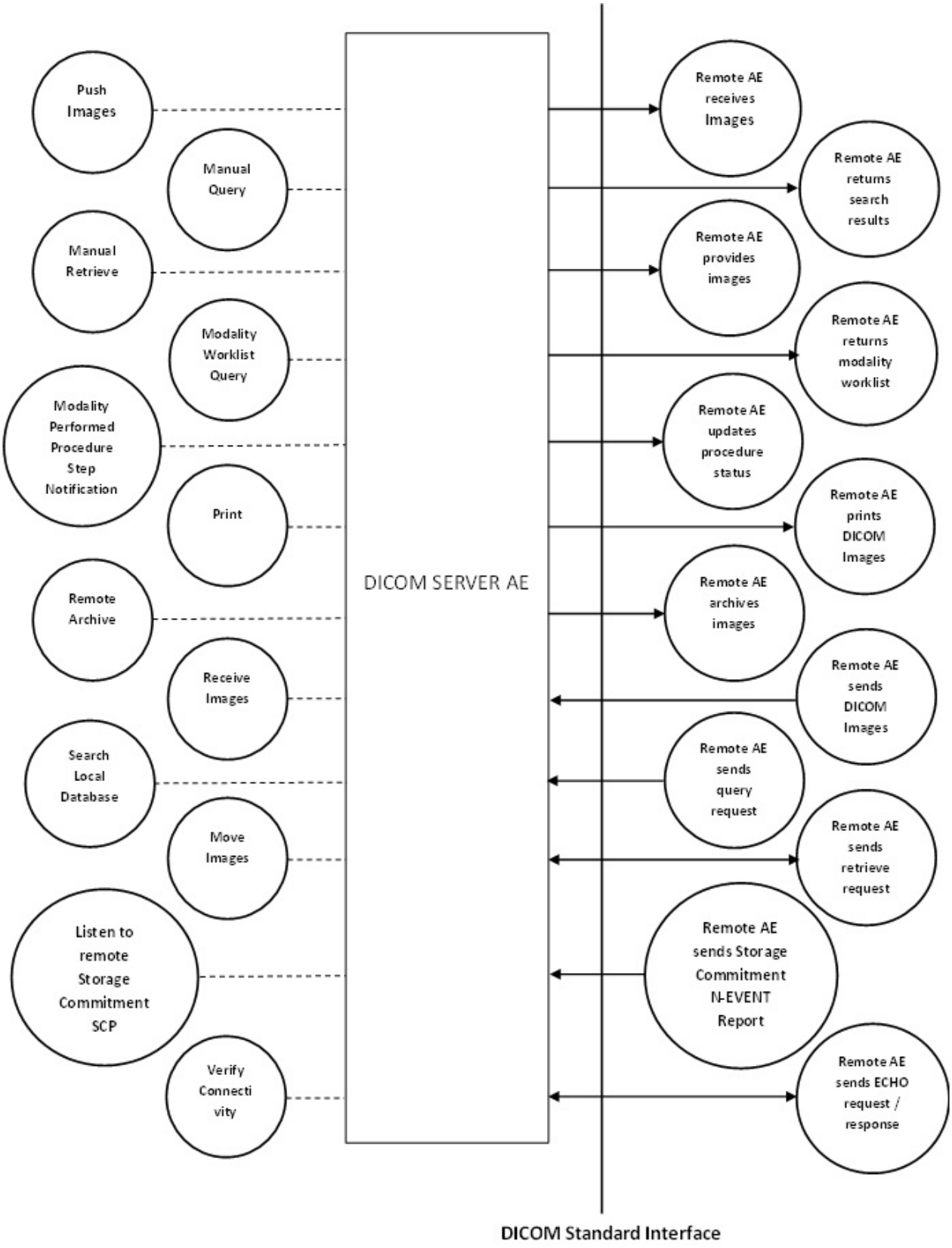


FIGURE 2–1 MR SYSTEM NETWORK APPLICATION MODEL AND DATA FLOW DIAGRAM

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 system 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 system application startup.

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

Client applications on MR system 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
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Yes	No
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
PET Advance Private Data (PET RAW)	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	1.2.840.10008.5.1.4.1.2.2.2	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
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18	Yes	No
Printer SOP Class	1.2.840.10008.5.1.1.16	Yes	No
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Yes	No
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Yes	No

Note: * The MR system 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	1.2.840.113619.6.440
Implementation Version Name	DV27, RX27

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 Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 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 Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 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 Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 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 Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 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 Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 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 Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 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 Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
PET Advance Private Data (PET RAW)	1.2.840.113619.4.30	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 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 system 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 system 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 Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None

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. "*" 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 "<date1> - <date2>" to match against all values that fall in this date range "-<date>" to match against all values that are before this date "<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
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 2.3.1.2.2.2.1-3 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:

- oxFF00: 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.
- oxFF01: 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 2.3.1.2.2.2.1-4 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. 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 Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 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 Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 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 releated 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. 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 Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None

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 Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None

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 type 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 Modalites:

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 item 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 idegraphic 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 Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 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 Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 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 2.3.1.2.8.2-1 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 Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
Printer SOP Class	1.2.840.10008.5.1.1.16	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None

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. 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 10.5.2.
*	*	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 Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 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 Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 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 Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 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 Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 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 Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 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 Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 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 Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None
PET Advance Private Data (PET RAW)	1.2.840.113619.4.30	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None

Note: * MR system 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 (FE00H)".

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 Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None

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 insensitive.

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 insensitive.

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 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 1.When remote AE is not given permission to store on this AE. 2. Not able to connect to local database , because of max connection limit reached. 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	FFoo	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 Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None

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: 1. Unable to make association with the C-STORE SCP 2. Association is aborted by the C-STORE SCP while sending images 3. C-STORE SCP returns 0xA700 (Out of resources) error code	(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 1.When the retrieve request does not contain required information. Such asmissing or invalid query retrieve level, missing Move destination AET etc.	(0000,0902)
	C001	Error: Unable to process	This status code is sent for the following reasons 1.When Remote AE does not have permissions to use DICOM SERVER AE's retrieve service 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) (0000,1022) (0000,1023) (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) (0000,1022) (0000,1023)
Warning	B000	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) (0000,1022) (0000,1023)
Pending	FF00	Sub-operations are continuing -	For pending suboperation to remote AE	(0000,1020) (0000,1021) (0000,1022) (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 Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 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 occured 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 occured 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 Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None

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 a 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 system 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 supports both IPv4 and IPv6 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 Sections 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 / Hostname
- 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 system :

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 intechange 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 iso9660 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.

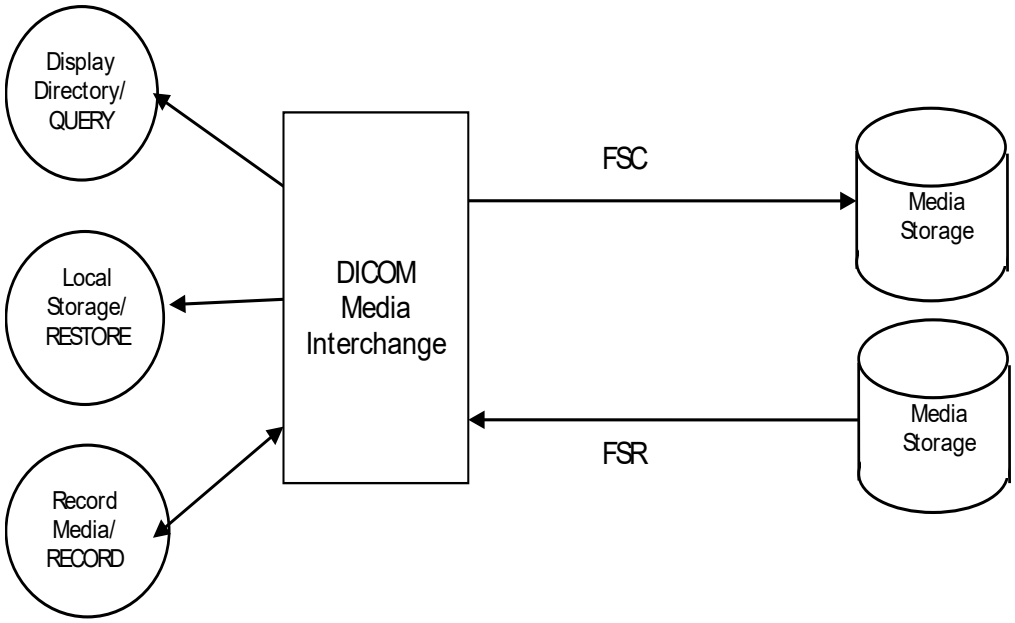


FIGURE 3–1 MR SYSTEM MEDIA INTERCHANGE APPLICATION MODEL AND DATA FLOW DIAGRAM

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 Media (CD/DVD/USB) Interchange 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

*Note: See limitation on support for these Application Profiles in Section 3.3.1.2.3.1.1

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 3.3.1.2-2 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 3.3.1.2-3 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	RLE Lossless	1.2.840.10008.1.2.5

This AE does not support restoring images encoded with Lossy JPEG 12 Bit Image Compression (Transfer Syntax 1.2.840.10008.1.2.4.51). This is a known deviation from the requirements of the STD-GEN-DVD-JPEG and STD-GEN-USB-JPEG Application Profiles.

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 system 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.

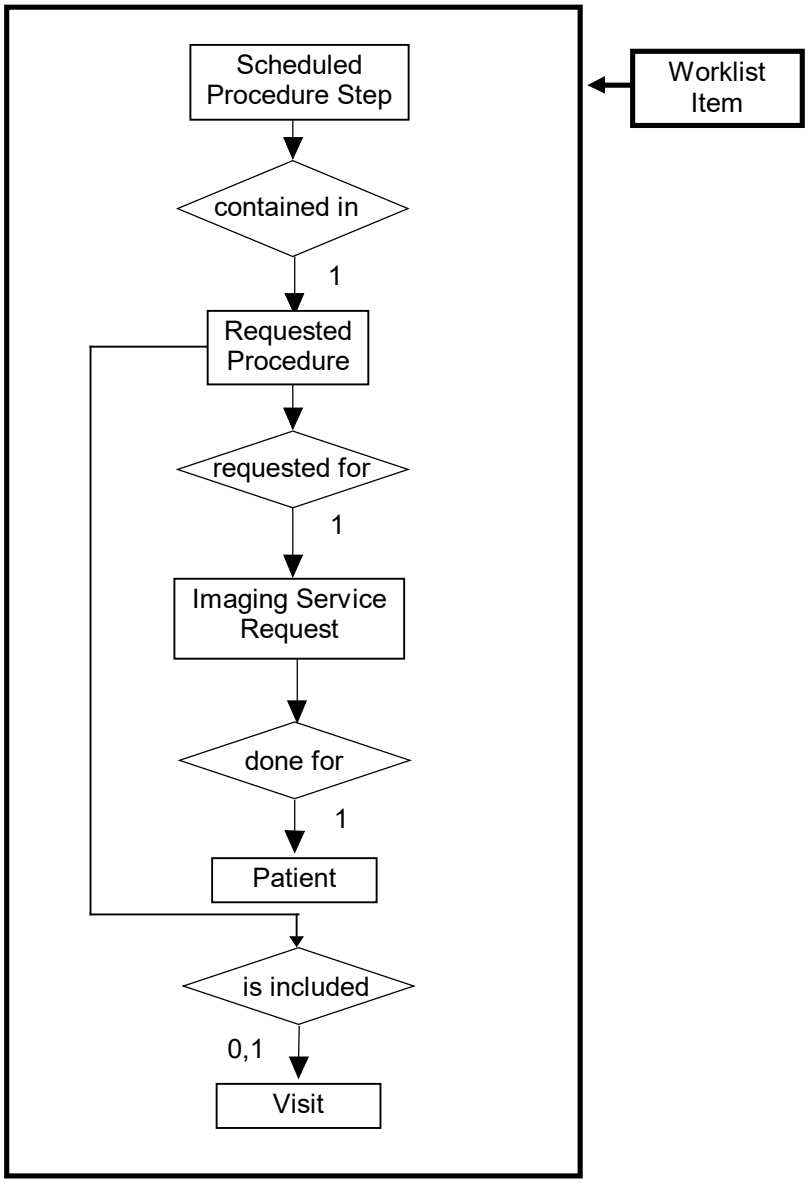


FIGURE 4-1-1 MODALITY WORKLIST INFORMATION MODEL E/R DIAGRAM

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

TABLE 4.1-1
MAPPING OF DICOM ENTITIES TO MR SYSTEM ENTITIES

DICOM	MR system **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 4.3-1 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 4.2-1 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 system are also indicated.

- **Attribute Name**
- **Tag**: group and element numbers
- **Required for MWL**: These attributes are required for MR system 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 4.4.2.1.1.

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: 1. No AE title is supplied (universal matching), 2. Scanner's Worklist Server Station Name is supplied for matching (Single value matching). 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: • Any day, • Today only, • Today and a number of days before today, • Today and a number of days after today, • Date range – between a given start date and end date. 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 and copied into IOD description. 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. 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)	O	2 *	Yes/Yes	Requested in the MWL queries. Matching: Single Value and Universal matching (zero length)
Requesting Physician	(0032,1032)	O	2	No/No	Requested in the MWL queries with zero-length value.
Referring Physician's Name	(0008,0090)	O	2 *	Yes/No	Requested in the MWL queries with zero-length value.
Requesting Service	(0032,1033)	O	3	No/No	Not requested
Reason for the Imaging Service Request	(0040,2001)	O	3	No/No	Not requested.
Imaging Service Request Comments	(0040,2400)	O	3	No/No	Not requested
Issue Date of Imaging Service Request	(0040,2004)	O	3	No/No	Not requested.
Issue Time of Imaging Service Request	(0040,2005)	O	3	No/No	Not requested.
Placer Order Number / Imaging Service Request	(0040,2016)	O	3	No/Yes	Requested in the MWL queries with zero-length value.
Filler Order Number / Imaging Service Request	(0040,2017)	O	3	No/Yes	Requested in the MWL queries with zero-length value.
Order entered by ...	(0040,2008)	O	3	No/No	Not requested.
Order Enterer's Location	(0040,2009)	O	3	No/No	Not requested.
Order Callback Phone Number	(0040,2010)	O	3	No/No	Not requested.

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

4.4.5 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	No/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	No/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	Requested in the MWL queries with zero-length value.
>Referenced SOP Class UID	(0008,1150)	O	1C	No/Yes	Requested in the MWL queries with zero-length value.
>Referenced SOP Instance UID	(0008,1155)	O	1C	No/Yes	Requested in the MWL queries with zero-length value.

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. Matching: Single value, Wildcard and Universal matching. ^ 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. Matching: Single value and Universal matching (zero-length).
Issuer of Patient ID	(0010,0021)	O	3	No/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	No/No	Requested in the MWL queries with zero-length value. 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.
Patient's Sex	(0010,0040)	O	2 *	Yes/Yes	Requested in the MWL queries with zero-length value.
Patient's Weight	(0010,1030)	O	2	No/No	Requested in the MWL queries with zero-length value. Limited to maximum value of 999 kg. Displayed on "More Info..." screen. Weight is an operator entry requirement for MR on the "Patient Information" screen.
Confidentiality constraint on patient data	(0040,3001)	O	2	No/No	Requested in the MWL queries with zero-length value.
Patient's Size	(0010,1020)	O	3	No/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	Not requested.
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

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	Requested in the MWL queries with zero-length value.
Pregnancy Status	(0010,21C0)	O	2 *	No/No	Requested in the MWL queries with zero-length value.
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.
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.
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 system 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 N-CREATE	Type for SCU 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. Modalities populate the MPPS tags in the image.

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	
>>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. 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	Sec 7.2.1
Directory Information	Directory Information	Sec 7.2.2

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, Presentation, SR Document and PRIVATE Directory Record, starting with A/A/A/A/Z01
>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 when DR is PRIVATE. 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 when DR is PRIVATE
> 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, taking care of the length (< 16)
}
```

7.2.3.3 Series Directory Record Definition

TABLE 7.2.3.3-1 SERIES RECORD KEYS

Key	Tag	Type (for CD)	Type (for DVD / 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 (for CD)	Type (for DVD / 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	
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

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 (for CD)	Type (for DVD / 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 (for CD)	Type (for DVD / 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 (for CD)	Type (for DVD / 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 system maps DICOM Information Entities to local Information Entities in the product's database and user interface.

TABLE 8.2-1 MAPPING OF DICOM ENTITIES TO MR SYSTEM ENTITIES

DICOM IE	MR system **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

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
>Referenced SOP Class UID	(0008,1150)	3	Unused
>Referenced SOP Instance UID	(0008,1155)	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
>*Include 'SOP Instance Reference Macro'*			
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
>> *Include 'SOP Instance Reference Macro'*			
>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
>> *Include 'Code Sequence Macro'*			
>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
>>*Include' Code Sequence Macro'*			
>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
> *Include 'Code Sequence Macro'*			
Placer Order Number / Imaging Service Request	(0040,2016)	3	Unused
Filler Order Number / Imaging Service Request	(0040,2017)	3	Unused

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 : 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 "ROI Text Page <text page number> / <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 (MR Screen Save)
>Referenced SOP Class UID	(0008,1150)	1C	Copied from the referenced image (MR Screen Save)
>Referenced SOP Instance UID	(0008,1155)	1C	Copied from the referenced image (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 - 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 2 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 8.4.5.4-1 VOI LUT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Window Center	(0028,1050)	1C	Only single value present. 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. 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 MR system maps DICOM Information Entities to local Information Entities in the product's database and user interface.

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

DICOM IE	MR system **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 9.3-1 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)	9.4.5.4
	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)	9.4.5.7
	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 9.4.1.1-1 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
Patient's Birth Time	(0010,0032)	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 9.4.1.2-1 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 9.4.2.1-1 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
Referenced Study Sequence	(0008,1110)	3	Unused
>Referenced SOP Class UID	(0008,1150)	3	Unused
>Referenced SOP Instance UID	(0008,1155)	3	Unused

9.4.2.2 Patient Study Module

TABLE 9.4.2.2-1 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	Copied from the referenced image
Patient's Size	(0010,1020)	3	Unused
Patient's Weight	(0010,1030)	3	Copied from the referenced image
Additional Patient's History	(0010,21B0)	3	Unused
Admission ID	(0038,0010)	3	Copied from the referenced image
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 9.4.2.3-1 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 9.4.3.1-1 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 "100000" + <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	Copied from the referenced image
Protocol Name	(0018,1030)	3	Unused
Series Description	(0008,103E)	3	Value set to "Presentation Series"
Operators' Name	(0008,1070)	3	Copied from the referenced image
Referenced Performed Procedure Step Sequence	(0008,1111)	3	Generated if the referenced image also contains this sequence. References the PPS this GSPS instance belongs to.
>*Include 'SOP Instance Reference Macro'*			
Body Part Examined	(0018,0015)	3	Unused
Patient Position	(0018,5100)	2C	Unused
Request Attributes Sequence	(0040,0275)	3	Copied from the referenced image
>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	Copied from the referenced image.
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
Placer Order Number / Imaging Service Request	(0040,2016)	3	Unused
Filler Order Number / Imaging Service Request	(0040,2017)	3	Unused

9.4.3.2 Clinical Trial Series Module

TABLE 9.4.3.2-1 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 9.4.3.3-1 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 9.4.4.1-1 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
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 9.4.5.1-1 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 9.4.5.2-1 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	
>>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 9.4.5.3-1 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 CIELab Value	(0018,1624)	1C	Not used

9.4.5.4 Display Shutter Module

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

TABLE 9.4.5.4-1 DISPLAY SHUTTER MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Shutter Shape	(0018,1600)	1	Any of the below Enumerated values may be set: - RECTANGULAR - CIRCULAR - 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 9.4.5.5-1 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: SCALE TO FIT TRUE SIZE 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. Value = 1

9.4.5.6 Graphic Annotation Module

TABLE 9.4.5.6-1 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: PIXEL DISPLAY
>>Anchor Point Annotation Units	(0070,0004)	1C	Enumerated Values used: PIXEL 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: PIXEL 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 : POINT POLYLINE INTERPOLATED CIRCLE 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. Enumerated values used: Y = Yes N = No

9.4.5.7 Spatial Transformation Module

TABLE 9.4.5.7-1 SPATIAL TRANSFORMATION MODULE ATTRIBUTES

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

9.4.5.8 Graphic Layer Module

TABLE 9.4.5.8-1 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 9.4.5.9-1 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 9.4.5.10-1 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)	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
>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 9.4.5.11-1 SOFTCOPY PRESENTATION LUT MODULE ATTRIBUTES

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

9.4.5.12 SOP Common Module

TABLE 9.4.5.12-1 SOP COMMON MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
SOP Class UID	(0008,0016)	1	1.2.840.10008.5.1.4.1.1.11.1
SOP Instance UID	(0008,0018)	1	Auto generated UID
Specific Character Set	(0008,0005)	1C	Copied from the reference image. If absent, use 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. Valid range is : 1-99
Print Priority	(2000,0020)	Set when a printer device is added using the Film Composer Tool. Valid Range is : HIGH or MED or LOW
Medium Type	(2000,0030)	Set when a printer device is added using the Film Composer Tool. Valid values are : PAPER or CLEAR FILM or BLUE FILM
Film Destination	(2000,0040)	Set when a printer device is added using the Film Composer Tool. Valid values are : 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. Valid value is : PORTRAIT.
Film Size ID	(2010,0050)	Set when a printer device is added using the Film Composer Tool. Valid values are : 14INX17IN,

		A3, A4, 8INX10IN, 8.5INX11IN, 10INX12IN, 10INX14IN, 11INX14IN, 11INX17IN, 14INX14IN, 24CMX24CM, 24CMX30CM.
Magnification Type	(2010,0060)	Set when a printer device is added using the Film Composer Tool. Valid values are: REPLICATE BILINEAR CUBIC NONE
Max Density	(2010,0130)	Set when a printer device is added using the Film Composer Tool. 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. Valid values are: BLACK or WHITE or Not sent
Empty Image Density	(2010,0110)	Set when a printer device is added using the Film Composer Tool. Valid values are: BLACK or WHITE or Not sent
Min Density	(2010,0120)	Set when a printer device is added using the Film Composer Tool. Valid values are: 0-4095 or Not sent
Trim	(2010,0140)	Valid values are: 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 16 (if Bits Stored=12)
>Bits Stored	(0028,0101)	8 or 12
>High Bit	(0028,0102)	7 (if Bits Stored=8) or 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 CUBIC REPLICATE 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 CUBIC REPLICATE 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. WARNING: Status is logged. Pauses the print job and displays status code on the film composer UI. 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. SUPPLY EMPTY: print job is paused and the message is logged. RECEIVER FULL: print job is paused and the message is logged. 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 11.2-1 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.
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	Unused
Other Patient Names	(0010,1001)	3	Unused
Ethnic Group	(0010,2160)	3	Unused
Patient Comments	(0010,4000)	3	Unused
Issuer of Patient ID	(0010,0021)	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	Not used.
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	Unused
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)	1	Value from the worklist
>Referenced SOP Instance UID	(0008,1155)	1	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 user interface.
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
Issuer of Admission ID	(0038,0011))	3	Issuer of Admission ID

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)	1	Value used for performed procedure step
>Referenced SOP Instance UID	(0008,1155)	1	Value used for performed procedure step
Body Part Examined	(0018,0015)	3	Value from user interface is sent.
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.
>Requested Procedure Description	(0032,1060)	3	Requested in the MWL queries and copied into IOD description.
>Scheduled Procedure Step Description	(0040,0007)	3	Will be present only if SPS, obtained from HIS/RIS is selected for scanning. Requested in the MWL queries and copied into IOD description.
>Scheduled Protocol Code Sequence	(0040,0008)	3	Will be present only if SPS, obtained from HIS/RIS is selected for scanning. Requested in the MWL queries and copied into IOD description.
>>Code Value	(0008,0100)	1C	Requested in the MWL queries and copied into IOD description.
>>Coding Scheme Designator	(0008,0102)	1C	Requested in the MWL queries and copied into IOD description.
>>Coding Scheme Version	(0008,0103)	1C	Requested in the MWL queries and copied into IOD description.
>>Code Meaning	(0008,0104)	1	Requested in the MWL queries and copied into IOD description.
>Scheduled Procedure Step ID	(0040,0009)	1C	Will be present only if SPS, obtained from HIS/RIS is selected for scanning. Requested in the MWL queries and copied into IOD description.
>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
Placer Order Number / Imaging Service Request	(0040,2016)	3	Unused
Filler Order Number / Imaging Service Request	(0040,2017)	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 "<<SW ver>>\<<plat>>\MR Software release:<<SW build>>" Where <<plat>> is "LX" or "MX" and Where <<SW build>> is of the example form "14.0_M4_0620.a" Full example: 14\LX\MR Software release:14.0_M4_0620.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)	1C	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	
>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	
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	Unused
Green Palette Color Lookup Table Descriptor	(0028,1102)	1C	Unused
Blue Palette Color Lookup Table Descriptor	(0028,1103)	1C	Unused
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.
Bits Stored	(0028,0101)	1	Always sent.
High Bit	(0028,0102)	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	
Low R-R Value	(0018,1081)	3	
High R-R Value	(0018,1082	3	
Intervals Acquired	(0018,1083)	3	Sent for Propeller & MR-Echo only.
Intervals Rejected	(0018,1084)	3	
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 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)
Anatomic Region Sequence	(0008,2218)	3	Always sent.
>Code Value	(0008,0100)	1C	Always sent.
>Coding Scheme Designator	(0008,0102)	1C	Always sent.
>Coding Scheme Version	(0008,0103)	1C	Unused
>Code Meaning	(0008,0104)	1	Always sent.
>Anatomic Region Modifier Sequence	(0008,2220)	3	Unused
>>Code Value	(0008,0100)	1	Unused
>>Coding Scheme Designator	(0008,0102)	1	Unused
>>Coding Scheme Version	(0008,0103)	1C	Unused

>>Code Meaning	(0008,0104)	1	Unused
Primary Anatomic Structure Sequence	(0008,2228)	3	Unused
>Code Value	(0008,0100)	1	Unused
>Coding Scheme Designator	(0008,0102)	1	Unused
>Coding Scheme Version	(0008,0103)	1C	Unused
>Code Meaning	(0008,0104)	1	Unused
>Primary Anatomic Structure Modifier Sequence	(0008,2230)	3	Unused
>>Code Value	(0008,0100)	1	Unused
>>Coding Scheme Designator	(0008,0102)	1	Unused
>>Coding Scheme Version	(0008,0103)	1C	Unused
>>Code Meaning	(0008,0104)	1	Unused

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	Unused.
Inversion Times	(0018,9079)	3	Filled in for some applications only.
Diffusion b-value	(0018,9087)	3	Filled in for some applications only.
Geometry of k-Space Traversal	(0018,9032)	3(1C)	Filled in for some applications only
Rectilinear Phase Encode Reordering	(0018,9034)	3(1C)	Filled in for some applications only

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
ORIGINAL\PRIMARY\MAGIC\NONE

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

DERIVED\PRIMARY\QMAP\T1
DERIVED\PRIMARY\QMAP\T2
DERIVED\PRIMARY\QMAP\PD
DERIVED\PRIMARY\QMAP\R1
DERIVED\PRIMARY\QMAP\R2
DERIVED\PRIMARY\MULTI_QMAP\ENCRYPTED\T1\T2\PD
DERIVED\PRIMARY\T1\SYNTHETIC
DERIVED\PRIMARY\T2\SYNTHETIC
DERIVED\PRIMARY\PD\SYNTHETIC
DERIVED\PRIMARY\T1FLAIR\SYNTHETIC
DERIVED\PRIMARY\T2FLAIR\SYNTHETIC
DERIVED\PRIMARY\FLAIR\SYNTHETIC
DERIVED\PRIMARY\IR\SYNTHETIC
DERIVED\PRIMARY\PSIR\SYNTHETIC
DERIVED\PRIMARY\T1T2\SYNTHETIC
DERIVED\PRIMARY\SCREENSHOT
DERIVED\PRIMARY\STIR\SYNTHETIC
DERIVED\PRIMARY\DIR\SYNTHETIC
DERIVED\PRIMARY\DIR_REAL\SYNTHETIC

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
IIC_GEMS	VASCANGIO_GEMS
IRP_GS	VASCPC_GEMS
MP_GEMS	VASCPC_GEMS
MT_GEMS	VASCTOF_GEMS
NF_GEMS	VASCTOF_GEMS
NPW	VB_GEMS
OMP_GEMS	MART_GEMS
SPIRAL_GEMS	PROP_GEMS
VRG_GEMS	ARTM_GEMS

ARTH_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

Attributes described as "Not Used" were in previous GE MR Scanner releases that are no longer used but may exist depending on the origin of the image.

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	C slices are contiguous
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	
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_MSW	(0043,1036)	UL	1	
User_fill_map_LSW	(0043,1037)	UL	1	
User data 25...User data 48 {User48=Effective Resolution for spiral}	(0043,1038)	FL	24	
Slop_int_6... slop_int_9	(0043,1039)	IS	4	

6: b_value 7: private imaging options 2 8: ihtagging 9: ihtagspc				
Slop_int_10...slop_int_17 10: ihfcineim 11: ihfcinent 12: Reserved 13: oprtarr 14: averages 15: Current Station # 16: Total # of Stations 17: private imaging options 3	(0043,1060)	IS	8	
Scanner Study ID	(0043,1062)	SH	1	Not used
Scanner Table Entry (single gradient coil systems only) Scanner Table Entry + Gradient Coil Selected 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	Not used
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 FastB1map	0043,10A6	DS	1	Not Used
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
MR Table Position Information	0043,10B2	LO	1	
Multiband Parameters	0043,10B6	LO	7	
Compressed Sensing Parameters	0043,10B7	LO	4	
Grad Comp Parameters	0043,10B8	DS	1	
Parallel Transmit Information	0043,10B9	LO	1	
Echo Spacing	0043,10BA	DS	1	
Pixel Information	0043,10BB	LO	1	
Heart Beats pattern	0043,10BC	IS	1	
HyperKat factor	0043,10BD	LO	1	
Delta Transmit Gain	0043,10BF	DS	1-n	
Rx Dual Drive	0043,10C0	DS	1..n	
Full Coil mode REGs	0043,10C1	LO	1..n	
Local Coil Mode REGs	0043,10C2	LO	1..n	
Full Coil Mode Extents	0043,10C3	LO	1..n	
Local Coil Mode Extents	0043,10C4	LO	1..n	

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	
Dir Enc Map	2001,10C1	OB	1	Unused
DTI Multi Tensor Parameters	2001,10C2	OB	1	
DTI Tracking Model Parameters	2001,10C3	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_REPORTCARDo

Private Group GEHC_REPORTCARDo is modeled as part of the Image Information Entity.

TABLE 11.4.14-1 PRIVATE GROUP GEHC_REPORTCARDo

Attribute Name	Tag	VR	VM	Attribute Description and Use
GEHC Private Creator ID	0099, 0010	LO	1	GEHC_REPORTCARDo
Report Card Private Data (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.

11.4.15 Private Group SyMRI

Private Group GEHC_SyMR is modeled as part of the Image Information Entity.

TABLE 11.4.15-1 PRIVATE GROUP SyMRI

Attribute Name	Tag	VR	VM	Attribute Description and Use
SyMRI Private Creator ID	3005, 0010	LO	1	Private group creator name : "SyMRI"
TC	3005, 1000	DS	1	No longer in use. Listed only for references.
Turbo Factor	3005, 1001	LO	1	No longer in use. Listed only for references.
FOV	3005, 1002	DS	1	SyMRI FOV
Object	3005, 1004	LO	1	SyMRI Object
Image Type Syn	3005, 1008	LO	1	SyMRI image type SYN
Original Version	3005, 1016	LO	1	The software version from the original dataset
Quantified by Version	3005, 1017	LO	1	Version used for quantification
Quantified by Release Name	3005, 1018	LO	1	Release used for quantification
Saved by Version	3005, 1019	LO	1	SyMRI version which saved this image
Saved by Release Name	3005, 1020	LO	1	Release which saved this image
Saved by Application	3005, 1021	LO	1	Appcalition which saved this image
Quantified by Application	3005, 1022	LO	1	Application which quantified this image

Not For Clinical Use	3005, 1023	IS	1	The Qmaps were triggering a "not for clinical use" warning when quantified
Total Slice Count	3005, 1024	IS	1	The number of slices in the stack
Encryption Mode	3005, 1030	SH	1	Encryption meta-data,only applicable if Image Type (0008, 0008) contains ENCRYPTED
QMap DICOM Set	3005, 1040	SH	1	SyMRI DICOM Set. Tags. Only applicable if (0008,0008) Image Type contains MULTI_QMAP.
Quantitative T1	3005, 1041	OB	1	Quantitative T1. Only applicable if (0008,0008) Image Type contains MULTI_QMAP.
Quantitative T2	3005, 1042	OB	1	Quantitative T2. Only applicable if (0008,0008) Image Type contains MULTI_QMAP.
Quantitative PD	3005, 1043	OB	1	Quantitative PD. Only applicable if (0008,0008) Image Type contains MULTI_QMAP.
Quantitative B1	3005, 1044	OB	1	Quantitative B1. Only applicable if (0008,0008) Image Type contains MULTI_QMAP. Only be present if the QMap stack was created with a special license
Quantitative Residual	3005, 1045	OB	1	Quantitative Residual. Only applicable if (0008,0008) Image Type contains MULTI_QMAP. Only be present if the QMap stack was created with a special license

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 12.2-1 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	
>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 3rd party images.

The following additional de-identification occurs when processing an entire exam (create anonymous exam function.)

TABLE 12.2-2 ADDITIONAL DE-IDENTIFICATION BY ELEMENT FOR EXAM-BASED PROCESSING

Tag	Attribute Name	Action	Comments
0008,1140	Referenced Image Sequence	Sequence regenerated	
>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 12.2-3 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. ENCAPSULATED DOCUMENT MODULE INFORMATION OBJECT IMPLEMENTATION

13.1 INTRODUCTION

This section specific 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.

13.2 IOD MODULE TABLE

The Encapsulated Document Module Information Object Definition comprises the modules of the following table.

TABLE 13.2-1 ENCAPSULATED DOCUMENT 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	Encapsulated Document Series	Used	13.3.3.1
Equipment	General Equipment	Used	13.3.4.1
Document	Encapsulated Document	Used	13.3.5.1
	SC Equipment	Used	13.3.5.2
	SOP Common	Used	13.3.5.3

13.3 INFORMATION MODULE DEFINITIONS

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)	1	Copied from the referenced image
>Referenced SOP Instance UID	(0008,1155)	1	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
Issuer of Patient ID	(0010,0021)	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	Not used.
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)	1	Copied from the referenced image
>Referenced SOP Instance UID	(0008,1155)	1	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
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

13.3.3 Series Entity Modules

13.3.3.1 Encapsulated Document Series Module

TABLE 13.3.3-1 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	Copied from the referenced image
>Requested Procedure ID	(0040,1001)	1C	Copied from the referenced image
>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	Copied from the referenced image
>Scheduled Procedure Step Description	(0040,0007)	3	Unused
>Scheduled Protocol Code Sequence	(0040,0008)	3	Copied from the referenced image.
Placer Order Number / Imaging Service Request	(0040,2016)	3	Unused
Filler Order Number / Imaging Service Request	(0040,2017)	3	Unused

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)	1C	Not Used

13.3.5 Document Modules

13.3.5.1 Encapsulated Document Module

TABLE 13.3.5-1 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 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 Identifier	(0040,E001)	1C	Not supported, encapsulated document is PDF 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	

13.3.5.2 SC Equipment Module

TABLE 13.3.5.2 SC EQUIPMENT MODULE ATTRIBUTES

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

13.3.5.3 SOP Common Module

TABLE 13.3.5.3 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.

13.4 STANDARD EXTENDED AND PRIVATE DATA ATTRIBUTES

None

13.5 STANDARD EXTENDED AND PRIVATE CONTEXT GROUPS

None

13.6 STANDARD EXTENDED AND PRIVATE TEMPLATES

None

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