Technical Publications

Direction DOC1818270
Revision 1

GE OEC Fluorostar Compact
GE OEC Fluorostar Series

DICOM CONFORMANCE STATEMENT

REVISION HISTORY

REV	Version	DATE	REASON FOR CHANGE
1	1	Feb 25, 2016	Initial version

CONFORMANCE STATEMENT OVERVIEW

This DICOM Conformance Statement captures the DICOM capabilities of the GE OEC Fluorostar Compact and GE OEC Fluorostar Series identified below.
Both Systems will be called GE OEC Fluorostar or Fluorostar in the following document.

The DICOM Module is available as an option.

Table 1-1: NETWORK SERVICES

SOP Classes	User of Service (SCU)	Service Class Provider (SCP)
Transfer		
X-Ray Fluoroscopic Image Storage	YES	NO
X-Ray Radiation Dose SR	YES	NO
Print Management		
Basic Grayscale Print Management Meta SOP Class	YES	NO
Print Job SOP Class	YES	NO
Workflow Management		
Modality Worklist Information Model – FIND SOP Class	YES	NO
Modality Performed Procedure Step SOP Class	YES	NO

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1 INTRODUCTION

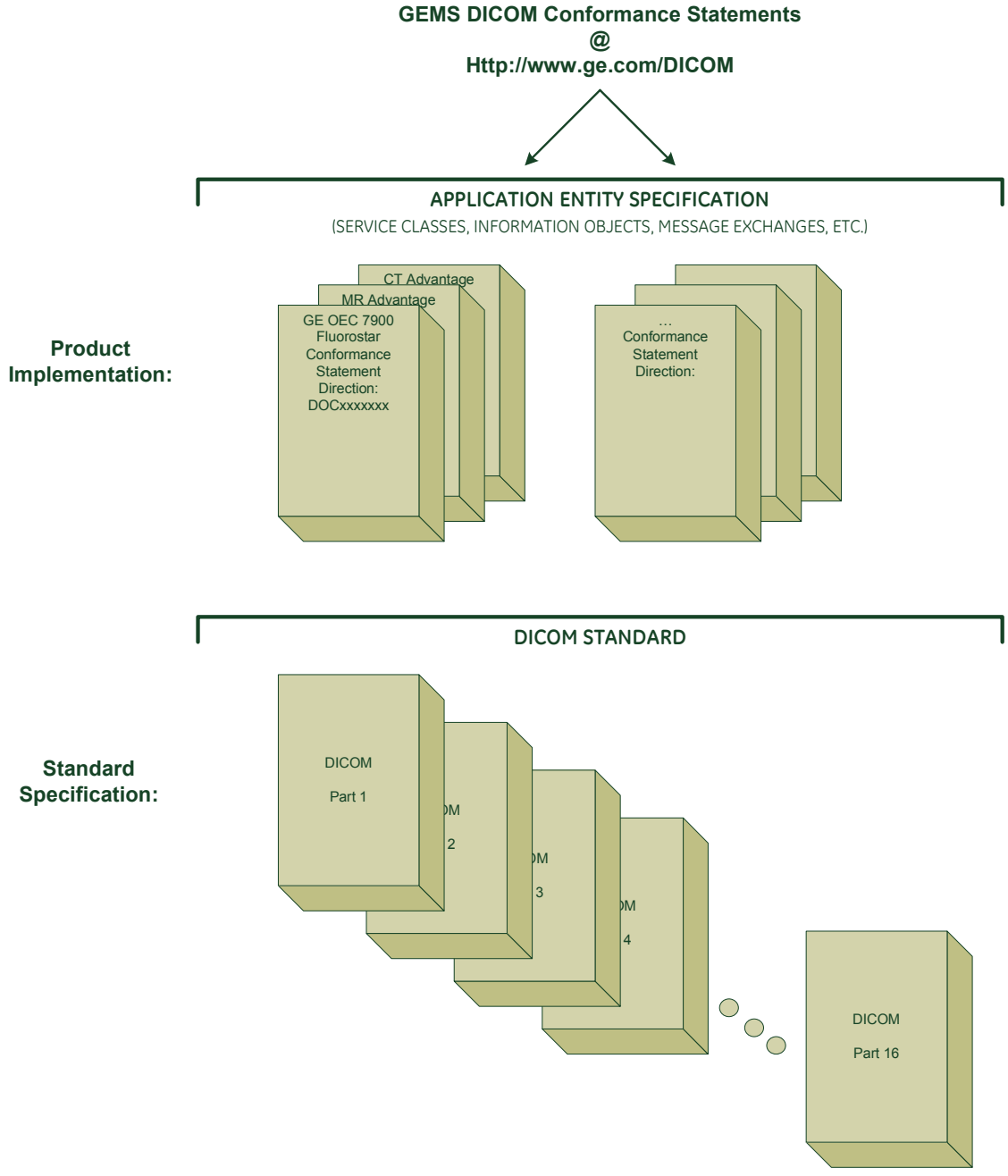
1.1 OVERVIEW

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)**, specifies the GEMS 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 (X-Ray RF Information Object Implementation)**, specifies the GE OEC Fluorostar equipment compliance to DICOM requirements for the implementation of an X-Ray Information Object).
- **Section 5 (Modality Worklist Query Implementation)**, specifies the GE OEC Fluorostar equipment compliance to DICOM requirements for the implementation of the Modality Worklist service.
- **Section 6 (Modality Performed Procedure Step Implementation)**, specifies the GE OEC Fluorostar equipment compliance to DICOM requirements for the implementation of the Modality Performed Procedure Step service.
- **Section 7 (Print Management Implementation)**, specifies the GE OEC Fluorostar equipment compliance to DICOM requirements for the implementation of the Basic Print Meta SOP Classes (Grayscale).
- **Section 8 (X-Ray Radiation Dose SR Object Implementation)**, specifies the GE OEC Fluorostar equipment compliance to DICOM requirements for the implementation of an X-Ray Radiation Dose SR Information Object).

1.2 OVERALL DICOM CONFORMANCE STATEMENT DOCUMENT STRUCTURE

The Documentation Structure of the GEMS DICOM Conformance Statement is shown in the Illustration below.



This document specifies the DICOM implementation. It is entitled:

GE OEC Fluorostar
Conformance Statement for DICOM
Direction DOC1382439

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

The GEMS Conformance Statement, contained in this document, also specifies the Lower Layer communications which it supports (e.g. TCP/IP). However, the Technical Specification 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 Stree, Suite 1752
Rosslyn, VA22209
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 APLICATION

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

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

Included in this DICOM Conformance Statements are the Module Definitions which define all data elements used by this GEMS implementation. If the user encounters unspecified private data

elements while parsing a GEMS Data Set, the user is well advised to ignore those data elements (per the DICOM 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 re-transmit all of the private data elements which are sent by GEMS devices.

1.5 IMPORTANT REMARKS

The user 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 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 application 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.
- **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 GEMS 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 DIOCM 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 Communication in Medicins (DICOM) Standard, available free at http://medical.nema.org/

1.7 DEFINITIONS

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

Abstract Syntax	the information agreed to be exchanged between applications, generally equivalent to a Service/Object Pair (SOP) Class. Examples : Verification SOP Class, Modality Worklist Information Model Find SOP Class, Computed Radiography Image Storage SOP Class.
Application Entity (AE)	an end point of a DICOM information exchange, including the DICOM network or media interface software; i.e., the software that sends or receives DICOM information objects or messages. A single device may have multiple Application Entities.
Application Entity Title	the externally known name of an *Application Entity*, used to identify a DICOM application to other DICOM applications on the network.
Application Context	the specification of the type of communication used between *Application Entities*. Example: DICOM network protocol.
Association	a network communication channel set up between *Application Entities*.
Attribute	a unit of information in an object definition; a data element identified by a *tag*. The information may be a complex data structure (Sequence), itself composed of lower level data elements. Examples: Patient ID (0010,0020), Accession Number (0008,0050), Photometric Interpretation (0028,0004), Procedure Code Sequence (0008,1032).
Information Object Definition (IOD)	the specified set of *Attributes* that comprise a type of data object; does not represent a specific instance of the data object, but rather a class of similar data objects that have the same properties. The *Attributes* may be specified as Mandatory (Type 1), Required but possibly unknown (Type 2), or Optional (Type 3), and there may be conditions associated with the use of an Attribute (Types 1C and 2C). Examples: MR Image IOD, CT Image IOD, Print Job IOD.
Joint Photographic Experts Group (JPEG)	a set of standardized image compression techniques, available for use by DICOM applications.
Media Application Profile	the specification of DICOM information objects and encoding exchanged on removable media (e.g., CDs)
Module	a set of *Attributes* within an *Information Object Definition* that are logically related to each other. Example: Patient Module includes Patient Name, Patient ID, Patient Birth Date, and Patient Sex.
Negotiation	first phase of *Association* establishment that allows *Application Entities* to agree on the types of data to be exchanged and how that data will be encoded.
Presentation Context	the set of DICOM network services used over an *Association*, as negotiated between *Application Entities*; includes *Abstract Syntaxes*

	and *Transfer Syntaxes*.
Protocol Data Unit (PDU)	a packet (piece) of a DICOM message sent across the network. Devices must specify the maximum size packet they can receive for DICOM messages.
Security Profile	a set of mechanisms, such as encryption, user authentication, or digital signatures, used by an *Application Entity* to ensure confidentiality, integrity, and/or availability of exchanged DICOM data
Service Class Provider (SCP)	role of an *Application Entity* that provides a DICOM network service; typically, a server that performs operations requested by another *Application Entity* (*Service Class User*). Examples: Picture Archiving and Communication System (image storage SCP, and image query/retrieve SCP), Radiology Information System (modality worklist SCP).
Service Class User (SCU)	role of an *Application Entity* that uses a DICOM network service; typically, a client. Examples: imaging modality (image storage SCU, and modality worklist SCU), imaging workstation (image query/retrieve SCU)
Service/Object Pair (SOP) Class	the specification of the network or media transfer (service) of a particular type of data (object); the fundamental unit of DICOM interoperability specification. Examples: Ultrasound Image Storage Service, Basic Grayscale Print Management.
Service/Object Pair (SOP) Instance	an information object; a specific occurrence of information exchanged in a *SOP Class*. Examples: a specific x-ray image.
Tag	a 32-bit identifier for a data element, represented as a pair of four digit hexadecimal numbers, the "group" and the "element". If the "group" number is odd, the tag is for a private (manufacturer-specific) data element. Examples: (0010,0020) [Patient ID], (07FE,0010) [Pixel Data], (0019,0210) [private data element]
Transfer Syntax	the encoding used for exchange of DICOM information objects and messages. Examples: *JPEG* compressed (images), little endian explicit value representation.
Unique Identifier (UID)	a globally unique "dotted decimal" string that identifies a specific object or a class of objects; an ISO-8824 Object Identifier. Examples: Study Instance UID, SOP Class UID, SOP Instance UID.
Value Representation (VR)	the format type of an individual DICOM data element, such as text, an integer, a person's name, or a code. DICOM information objects can be transmitted with either explicit identification of the type of each data element (Explicit VR), or without explicit identification (Implicit VR); with Implicit VR, the receiving application must use a DICOM data dictionary to look up the format of each data element.

1.8 SYMBOLS AND ABBREVIATIONS

AE Application Entity

AET	Application Entity Title
CAD	Computer Aided Detection
CDA	Clinical Document Architecture
CD-R	Compact Disk Recordable
CSE	Customer Service Engineer
CR	Computed Radiography
CT	Computed Tomography
DHCP	Dynamic Host Configuration Protocol
DICOM	Digital Imaging and Communications in Medicine
DIT	Directory Information Tree (LDAP)
DN	Distinguished Name (LDAP)
DNS	Domain Name System
DX	Digital X-ray
FSC	File-Set Creator
FSU	File-Set Updater
FSR	File-Set Reader
GSDF	Grayscale Standard Display Function
GSPS	Grayscale Softcopy Presentation State
HIS	Hospital Information System
HL7	Health Level 7 Standard
IHE	Integrating the Healthcare Enterprise
IOD	Information Object Definition
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
ISO	International Organization for Standards
IO	Intra-oral X-ray
JPEG	Joint Photographic Experts Group
LDAP	Lightweight Directory Access Protocol
LDIF	LDAP Data Interchange Format
LUT	Look-up Table
MAR	Medication Administration Record
MPEG	Moving Picture Experts Group
MG	Mammography (X-ray)
MPPS	Modality Performed Procedure Step
MR	Magnetic Resonance Imaging
MSPS	Modality Scheduled Procedure Step
MTU	Maximum Transmission Unit (IP)
MWL	Modality Worklist
NM	Nuclear Medicine
NTP	Network Time Protocol
O	Optional (Key Attribute)
OP	Ophthalmic Photography
OSI	Open Systems Interconnection
PACS	Picture Archiving and Communication System
PET	Positron Emission Tomography
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

2 NETWORK CONFORMANCE STATEMENT

2.1 INTRODUCTION

This section of the DICOM Conformance Statement specifies the GE OEC Fluorostar compliance to DICOM requirements for Networking features.

2.2 PURPOSE OF CONNECTION TO THE NETWORK

The GE OEC Fluorostar is connected to networks for the following purposes:

- Send echo messages to DICOM Verification SCP
- Query DICOM Modality Worklist from a DICOM Worklist SCP
- Print acquired image to a DICOM Printer
- Store acquired image to a DICOM Storage SCP
- Send DICOM Radiation Dose Structured Reports to a DICOM Storage SCP

2.3 REQUIRED NETWORK CHARACTERISTICS/CONFIGURATION

- The following network characteristics are required:Ethernet with IPv4
- 100MBit/s (Full or Half Duplex) or 10MBit/s (Full or Half Duplex)
- RJ45 connector

2.4 TECHNICAL SPECIFICATIONS OF THE NETWORK

2.4.1 Security Profiles

The product does not conform to any defined DICOM Security Profiles.
The GE OEC Fluorostar has no integrated virus protection; for this reason, it is the responsibility of the operator to ensure that the network, to which the GE OEC Fluorostar is connected, is protected against the distribution of viruses and other malware.

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

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

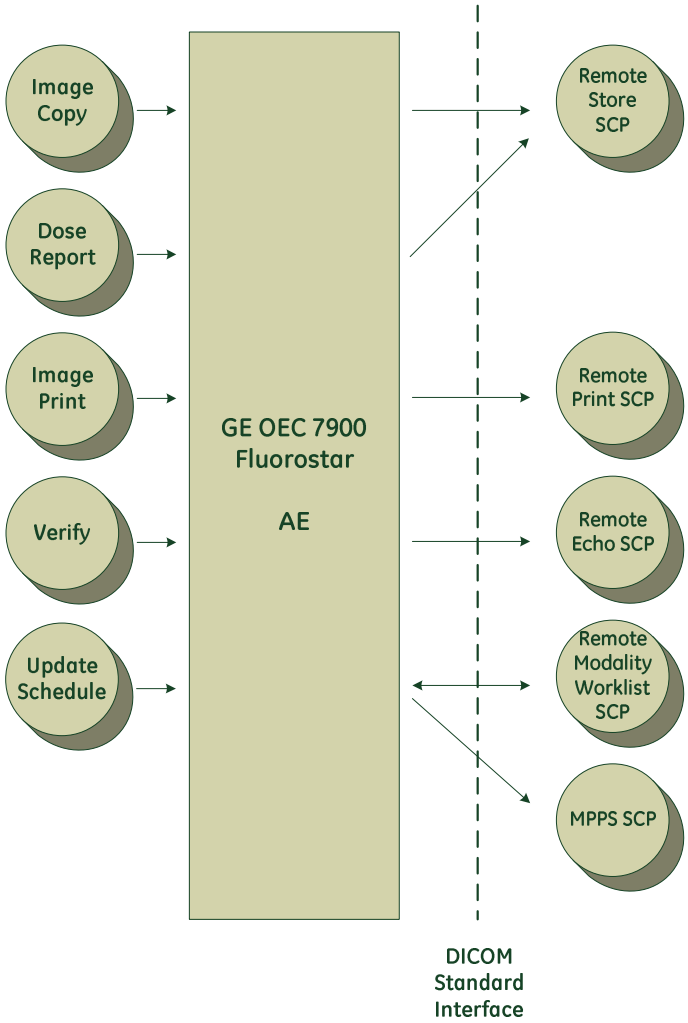
2.5 HAZARDOUS SITUATIONS

- Lack of protection against viruses and malware may lead to partial or total system failure.
- Loss of non-critical system features (for example, because of non-conforming network properties)
    - Impaired archiving functions
    - DICOM print, worklist, MPPS failure
- Please refer to the Operator Manual for the avoidance of other hazardous situations.

2.6 IMPLEMENTATION MODEL

2.6.1 Application Data Flow Diagram

The network application model for the GE OEC Fluorostar is shown in the following illustration:



2.6.2 Functional Definition of AE's

Application Entity "GE OEC Fluorostar" initiates the following functionalities:

- **DICOM Image Store:** Initiate an association to a remote AE to send image(s). If the remote AE accept the presentation context applicable to the image(s), the GE OEC Fluorostar AE will send the image(s) by invoking C-STORE-RQ operation for each image on the same association. The remote DICOM server will send back C-STORE-RSP with status "success" if the operation is successful.
- **DICOM Image Print:** Initiate an association with a remote AE to print grayscale images.
- **DICOM Verification:** Initiate an association and send a C-ECHO-RQ message to the remote DICOM AE. The remote DICOM server will send back a C-ECHO-RSP message with a status of "success" if the operation is successful.
- **Modality Worklist Query:** Initiate an association with a remote AE to query for scheduled exams. A C-FIND-RQ message will be sent to the remote AE. C-FIND-RSP with the query results will be received.
- **Modality Performed Procedure Step (MPPS):** Initiate an association with a remote AE to update the status of a scheduled patient. A N-CREATE-RQ message will be send to set the status to "IN PROGRESS". The server will answer with a N-CREATE-RSP message. A N-SET-RQ message will be send to set the status to "COMPLETED" or "DISCONTIUNUED". The DICOM server will answer with a N-SET-RSP message.
- **DICOM RDSR Store:** Initiate an association to a remote AE to send image(s). If the remote AE accept the presentation context applicable to the Structured Report(s), the GE OEC Fluorostar AE will send the Radiation Dose Structured Report(s) by invoking C-STORE-RQ operation for each image on the same association. The remote DICOM server will send back C-STORE-RSP with status "success" if the operation is successful.
-

2.6.3 Sequencing of Real-World Activities

DICOM Verification can be performed during the configuration enabling the user to perform network diagnostics before procedures. The verification is available for all Store, Print, Worklist, MPPS and RDSR servers.

Configuration must be performed before the system is able to perform DICOM Store, Print, Worklist Query, MPPS or RDSR.

To work with MPPS you must first retrieve a Worklist from the Worklist server.

2.7 AE SPECIFICATIONS

2.7.1 GE OEC Fluorostar AE Specification

The GE OEC Fluorostar Application Entity provides Standard Conformance to the following DICOM SOP Classes as an **SCU** and/or as an **SCP**:

SOP Class Name	SOP Class UID	SCU	SCP

SOP Class Name	SOP Class UID	SCU	SCP
Verification SOP Class	1.2.840.10008.1.1	YES	NO
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	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
Basic Film Session SOP Class	1.2.840.10008.5.1.1.1	YES	NO
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	YES	NO
Basic Film Box SOP Class	1.2.840.10008.5.1.1.2	YES	NO
Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4	YES	NO
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67	YES	NO

2.7.1.1 Association Establishment Policies

2.7.1.1.1 General

The DICOM Application 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 GE OEC Fluorostar is:

Maximum Length PDU	16384

2.7.1.1.2 Number of Associations

The GE OEC Fluorostar will initiate a maximum of 1 simultaneous association to remote nodes.

2.7.1.1.3 Asynchronous Nature

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

2.7.1.1.4 Implementation Identifying Information

The implementation UID for this DICOM Implementation is:

GE OEC Fluorostar Implementation UID	1.2.840.113780.100
GE OEC Fluorostar Implementation Version Name	OEC_FLUOROSTAR

2.7.1.2 Association Initiation Policy

When the GE OEC Fluorostar 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 GE OEC Fluorostar proposes only a single Transfer Syntax in each Presentation Context, i.e., for each Abstract Syntax in the following Presentation Context Tables, the AE proposes one Presentation Context for each specified Transfer Syntax.

2.7.1.2.1 Real-World Activity "Image Copy"

2.7.1.2.1.1 Associated Real-World Activity

Upon a request by the operator the selected images will be sent to the configured DICOM Store SCP.

2.7.1.2.1.2 Proposed Presentation Context Table

Presentation Context Table – Proposed by AE GE OEC Fluorostar for Activity "Image Copy"					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	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
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67	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

When more than one Presentation contexts are accepted by remote application, the selection will be according to the following sequence:

1: 1.2.840.10008.1.2.1 Explicit VR Little Endian Syntax
2: 1.2.840.10008.1.2.2 Explicit VR Big Endian Syntax
3: 1.2.840.10008.1.2 Implicit VR Little Endian Syntax

2.7.1.2.1.2.1 SOP Specific DICOM Conformance Statement for all Storage SOP Classes

The GE OEC Fluorostar includes optional data elements in the SOP Instances described in Section 4.
Following are the status codes that are specifically processed when receiving messages from a Storage SCP equipment.

Service Status	Status Code	Further Meaning	Application Behavior When Receiving Status code
Failure	*	All status codes except Warning and Success status	A screen with an Error message is displayed. including the error code.
Warning	B000 ~ BFFF	All warning Status	Ignored by application and current operation continous
Success	0000	DICOM storage operation is successful	A beep is played to indicate successful operation.

2.7.1.2.2 Real-World Activity "Image Print"

2.7.1.2.2.1 Associated Real-World Activity

Upon a request by the operator the selected images will be sent to the configured DICOM Printer (DICOM Print SCP).

2.7.1.2.2.2 Proposed Presentation Context Table

Presentation Context Table – Proposed by AE GE OEC Fluorostar for Activity "Image 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

When more than one Presentation contexts are accepted by remote application, the selection will be according to the following sequence:

1: 1.2.840.10008.1.2.1 Explicit VR Little Endian Syntax
2: 1.2.840.10008.1.2.2 Explicit VR Big Endian Syntax
3: 1.2.840.10008.1.2 Implicit VR Little Endian Syntax

2.7.1.2.2.2.1 SOP Specific DICOM Conformance Statement for Basic Grayscale Print Management SOP Classes

The GE OEC Fluorostar uses the following DIMSE services of the supported SOP Classes.

SOP Class	SOP Class UID	DIMSE Service Element	SCU Usage
Basic Film Session	1.2.840.10008.5.1.1.1	N-CREATE	Used
		N-ACTION	Used
		N-DELETE	Used
Basic Film Box	1.2.840.10008.5.1.1.2	N-CREATE	Used
		N-ACTION	Used
Basic Gray Scale Image Box	1.2.840.10008.5.1.1.4	N-SET	Used

When a manual print operation is initiated, the AE:

1. initiates a DICOM association and negotiates Presentation Contexts
2. N-CREATEs a Basic Film Session SOP Instance
3. N-CREATEs a Basic Film Box SOP Instance for each film
4. N-SETs the Image Box SOP Instance for each image on the film
5. Prints by N-ACTION on the Basic Film Box SOP Instance
6. N-DELETE the Basic Film Session SOP Instance.
7. Releases the DICOM association after printing is successful or failure has been signaled to the user.

2.7.1.2.2.2.1.1 Basic Film Session SOP Class

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:

Service Status	Status Code	Further Meaning	Application Behavior When Receiving Status code
Failure	*	All status codes except Warning and Success status	A screen with an Error message is displayed. including the error code.
Warning	B000 ~ BFFF	All warning Status	Ignored by application and current operation continous
Success	0000	Basic Film Session SOPC Class N-CREATE is performed successful	The progress indicator is still displayed.

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-DELETE:

Service Status	Status Code	Further Meaning	Application Behavior When Receiving Status code
Failure	*	All status codes except Warning and Success status	A screen with an Error message is displayed including the error code.
Warning	B000 ~ BFFF	All warning Status	Ignored by application and current operation continuous
Success	0000	Basic Film Session SOPC Class N-DELETE is performed successful	The progress indicator is still displayed.

2.7.1.2.2.2.1.2 Basic Film Box SOP Class

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:

Service Status	Status Code	Further Meaning	Application Behavior When Receiving Status code
Failure	*	All status codes except Warning and Success status	A screen with an Error message is displayed. including the error code.
Warning	B000 ~ BFFF	All warning Status	Ignored by application and current operation continous
Success	0000	Basic Film Box SOPC Class N-CREATE is performed successful	The progress indicator is still displayed.

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:

Service Status	Status Code	Further Meaning	Application Behavior When Receiving Status code
Failure	*	All status codes except Warning and Success status	A screen with an Error message is displayed including the error code.
Warning	B000 ~ BFFF	All warning Status	Ignored by application and current operation continuous
Success	0000	Basic Film Box SOPC Class N-ACTION is performed successful	The progress indicator is still displayed.

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:

Service Status	Status Code	Further Meaning	Application Behavior When Receiving Status code
Failure	*	All status codes except Warning and Success status	A screen with an Error message is displayed including the error code.
Warning	B000 ~ BFFF	All warning Status	Ignored by application and current operation continuous
Success	0000	Basic Film Box SOPC Class N-DELETE is performed successful	The progress indicator is still displayed.

2.7.1.2.2.2.1.3 Basic Grayscale Image Box SOP Class

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

Service Status	Status Code	Further Meaning	Application Behavior When Receiving Status code
Failure	*	All status codes except Warning and Success status	A screen with an Error message is displayed including the error code.
Warning	B000 ~ BFFF	All warning Status	Ignored by application and current operation continuous
Success	0000	Basic Film Session SOPC Class N-SET is performed successful	The progress indicator is still displayed.

2.7.1.2.3 Real-World Activity "Verify"

2.7.1.2.3.1 Associated Real-World Activity

The user my initiate a DICOM Verify Request in the configuration screen for each respective remote SCP configuration (Print, Store, Worklist Query, MPPS, ...).

A valid response from the SCP will result in a "Connection has been established" screen displayed on the screen. In the event that the SCP does not response for some reason, the operation will timeout and the GE OEC Fluorostar AE will close the association and results in "Connection could not be established" screen displayed to the user.

2.7.1.2.3.2 Proposed Presentation Context Table

Presentation Context Table – Proposed by AE GE OEC Fluorostar for Activity "Verify"					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Verification SOP Class	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

When more than one Presentation contexts are accepted by remote application, the selection will be according to the following sequence:

1: 1.2.840.10008.1.2.1 Explicit VR Little Endian Syntax
2: 1.2.840.10008.1.2.2 Explicit VR Big Endian Syntax
3: 1.2.840.10008.1.2 Implicit VR Little Endian Syntax

2.7.1.2.3.2.1 SOP Specific DICOM Conformance Statement for Verify SOP Classes

The message "Connection has been established" is displayed when the DICOM Verify is successfully performed, otherwise the message "Connection could not be established" is displayed on the screen.

2.7.1.2.4 Real-World Activity "Update Schedule"

2.7.1.2.4.1 Associated Real-World Activity

Upon a request by the operator, the current scheduled examination list should be updated from the remote Modality Worklist Server.

2.7.1.2.4.2 Proposed Presentation Context Table

Presentation Context Table – Proposed by AE GE OEC Fluorostar for Activity "Update Schedule"					
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

When more than one Presentation contexts are accepted by remote application, the selection will be according to the following sequence:

1: 1.2.840.10008.1.2.1 Explicit VR Little Endian Syntax
2: 1.2.840.10008.1.2.2 Explicit VR Big Endian Syntax
3: 1.2.840.10008.1.2 Implicit VR Little Endian Syntax

2.7.1.2.4.2.1 SOP Specific DICOM Conformance Statement for Basic Grayscale Print Management SOP Classes

The results of the Worklist query are displayed to the user in the Worklist View screen.

The GEO OEC Fluorostar checks if the Specific Character Set tag [0008,0005] contained in a C-FND RSP. ISO_IR_100 will be accepted and all other values will be discarded.

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

Service Status	Status Code	Further Meaning	Application Behavior When Receiving Status code
Cancel	FE00	Matching terminated due to cancel	The progress screen disappears, the Worklist View screen will be displayed.
Success	0000	Matching is completed – No final identifier is supplied	The progress screen disappears, all received scheduled examinations will be displayed in the Worklist View screen.

2.7.1.2.5 Real-World Activity "Dose Report"

2.7.1.2.5.1 Associated Real-World Activity

Upon a request by the operator the selected RDSR will be sent to the configured DICOM Store SCP.

2.7.1.2.5.2 Proposed Presentation Context Table

Presentation Context Table – Proposed by AE GE OEC Fluorostar for Activity "Image Copy"					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67	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

When more than one Presentation contexts are accepted by remote application, the selection will be according to the following sequence:

1: 1.2.840.10008.1.2.1 Explicit VR Little Endian Syntax
2: 1.2.840.10008.1.2.2 Explicit VR Big Endian Syntax
3: 1.2.840.10008.1.2 Implicit VR Little Endian Syntax

2.7.1.2.5.2.1 SOP Specific DICOM Conformance Statement for all Dose SR Classes

The GE OEC Fluorostar includes optional data elements in the SOP Instances described in Section 4.

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

Service Status	Status Code	Further Meaning	Application Behavior When Receiving Status code
Failure	*	All status codes except Warning and Success status	A screen with an Error message is displayed including the error code.
Warning	B000 ~ BFFF	All warning Status	Ignored by application and current operation continuous
Success	0000	DICOM storage operation is successful	A beep is played to indicate successful operation.

2.8 Communication Profiles

2.8.1 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.

2.8.2 Physical Media Support

The product is provided with a 10/100 MBit autosensing Ethernet interface.

2.9 Extensions / Specializations / Privatizations

Not Applicable.

2.10 Configuration

2.10.1 AE Title / Presentation Address Mapping

The AE Title is configurable in the DICOM setup screens.

2.10.2 Configurable Parameters

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

Network

- local static IP address
- local subnet mask
- default gateway
- Network speed (10/100 MBit and ½ or full duplex)

Configuration

- Station Name
- Hospital Name

Every Remote DICOM AE SCP (Store, Print, Modality Worklist, MPPS, RDSR)

- Server Alias
- Local AE Title
- Remote AE Title
- Remote IP Address
- Remote Port Number

Additional fields for Remote DICOM Query Retrieve Worklist Filter

- Patient Name
- Patient Birthdate
- Patient ID
- Accession Number
- Examination Date
- Performing Physician Name

Note: Timeout values are configurable for each device by the field engineer.

2.11 Support of extended character sets

The GE OEC Fluorostar is not configurable to any other Character Set than ISO_IR 100.

The GE OEC Fluorostar user interface will allow the user to enter characters from the console keyboard that are within ASCII. Responses with non-compatible values of (0008,0005) will be discarded.

2.12 Codes and Controlled Terminology

The GE OEC Fluorostar uses no coded terminology.

3 Media Storage Conformance Statement

3.1 Introduction

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

The GE OEC Fluorostar is able to export images in DICOM format to the following media types:

- USB – Flash device
- DVD
- CD

3.2 Implementation

The media interchange application model for the GE OEC Fluorostar is shown in the following Illustration:

3.2.1 Application Data Flow Diagram

Illustration 3-1 GE OEC Fluorostar Media Interchange Application Model And Data Flow Diagram

4 X-Ray RF Information Object implementation

4.1 Introduction

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

4.2 GE OEC Fluorostar Mapping of DICOM Entities

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

DICOM IE	GE OEC Fluorostar Entity
Patient	Patient
Study	Examination
Series	Series
Image	Image

Table 4-1 Mapping of DICOM Entities To GE OEC Fluorostar Entities

4.3 IOD Module Table

The XRF Image Information Object Definition comprises the modules of the following table, plus Standard Extended and Private attributes. Standard Extended and Private attributes are described in Section 4.5.

Entity Name	Module Name	Usage	Reference
Patient	Patient	Used	4.4.1.1
	Clinical Trial Subject	Not Used	N/A
Study	General Study	Used	4.4.2.1
	Patient Study	Not Used	N/A
	Clinical Trial Study	Not Used	N/A
Series	General Series	Used	4.4.3.1
	Clinical Trial Series	Not Used	N/A
Frame of Reference	Synchronization	Not Used	N/A
Equipment	General Equipment	Used	4.4.4.1
Image	General Image	Used	4.4.5.1
	Image Pixel	Used	4.4.5.2
	Contrast Bolus	Not Used	N/A
	Cine	Not Used	N/A

	Multi-Frame	Not Used	N/A
	Frame Pointers	Not Used	N/A
	Mask	Not Used	N/A
	X-Ray Image	Used	4.4.5.3
	X-Ray Acquisition	Used	4.4.5.4
	X-Ray Collimator	Not Used	N/A
	Display Shutter	Not Used	N/A
	Device	Not Used	N/A
	Intervention	Not Used	N/A
	X-Ray Table	Not Used	N/A
	XRF Positioner	Not Used	N/A
	X-Ray Tomo Acquisition	Not Used	N/A
	DX Detector	Not Used	N/A
	Overlay Plane	Not Used	N/A
	Multi-Frame Overlay	Not Used	N/A
	Modality LUT	Not Used	N/A
	VOI LUT	Not Used	4.4.5.5
	SOP Common	Used	4.4.5.6

Table 4-2 XRF Image IOD Modules

4.4 Information Module Definitions

Please refer to DICOM Part 3 (Information Object Definition) for a description of each of the entities, modules and attributes contained within the X-Ray RF Information Object.

The Following modules are included to convey Enumerated Values, Defined Terms and Optional Attributes supported. Type 1 and 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.

4.4.1 Patient Entity Modules

4.4.1.1 Patient Module

Attribute Name	Tag	Type	Attribute Description
Patient's Name	(0010,0010)	2	May be entered from user interface or copied from Worklist.
Patient ID	(0010,0020)	2	May be entered from user interface or copied from Worklist.
Issuer of Patient ID	(0010,0021)	3	Not used
Patient's Birth Date	(0010,0030)	2	May be entered from user interface or copied from Worklist.
Patient's Sex	(0010,0040)	2	May be imported from Worklist.
Referenced Patient Sequence	(0008,1120)	3	Not used
>Include 'SOP Instance Reference Macro'			
Patient's Birth Time	(0010,0032)	3	Not used
Other Patient IDs	(0010,1000)	3	Not used
Other Patient IDs Sequence	(0010,1002)	3	Not used
>Patient ID	(0010,0020)	1	Not used
>Issuer of Patient ID	(0010,0021)	1	Not used
>Type of Patient ID	(0010,0022)	1	Not used
Other Patient Names	(0010,1001)	3	Not used
Ethnic Group	(0010,2160)	3	Not used
Patient Comments	(0010,4000)	3	Not used
Patient Species Description	(0010,2201)	1C	Not used
Patient Species Code Sequence	(0010,2202)	1C	Not used
>Include 'Code Sequence Macro'			
Patient Breed Description	(0010,2292)	2C	Not used
Patient Breed Code Sequence	(0010,2293)	2C	Not used
>Include 'Code Sequence Macro'			
Breed Registration Sequence	(0010,2294)	2C	Not used
>Breed Registration Number	(0010,2295)	1	Not used
>Breed Registry Code Sequence	(0010,2296)	1	Not used
>>Include 'Code Sequence Macro'			
Responsible Person	(0010,2297)	2C	Not used
Responsible Person Role	(0010,2298)	1C	Not used
Responsible Organization	(0010,2299)	2C	Not used
Patient Identity Removed	(0012,0062)	3	Not used

Attribute Name	Tag	Type	Attribute Description
De-identification Method	(0012,0063)	1C	Not used
De-identification Method Code Sequence	(0012,0064)	1C	Not used

Table 4-3 Patient Module Attributes

4.4.2 Study Entity Modules

4.4.2.1 General Study Module

Attribute Name	Tag	Type	Attribute Description
Study Instance UID	(0020,000D)	1	The GE OEC Fluorostar will adopt the Study instance UID which is returned in the MWL response. If there is no Study Instance UID returned from the MWL server, then a new Study Instance UID will be created.
Study Date	(0008,0020)	2	This value is set to the study start date.
Study Time	(0008,0030)	2	This value is set to the study start time.
Referring Physician's Name	(0008,0090)	2	The name of the patient's referring physician. May be entered from user interface or copied from Worklist.
Referring Physician Identification Sequence	(0008,0096)	3	Not Used
>Include 'Person Identification Macro'			
Study ID	(0020,0010)	2	Generated by equipment
Accession Number	(0008,0050)	2	Taken from the Worklist.
Study Description	(0008,1030)	3	Taken from Worklist or user can enter from the user interface.
Physician(s) of Record	(0008,1048)	3	Not Used
Physician(s) of Record Identification Sequence	(0008,1049)	3	Not Used
>Include 'Person Identification Macro'			
Name of Physician(s) Reading Study	(0008,1060)	3	Not Used
Physician(s) Reading Study Identification Sequence	(0008,1062)	3	Not Used
>Include 'Person Identification Macro'			
Referenced Study Sequence	(0008,1110)	3	Not Used
>Include 'SOP Instance Reference Macro'			

Attribute Name	Tag	Type	Attribute Description
Procedure Code Sequence	(0008,1032)	3	Not Used
>*Include 'Code Sequence Macro'*			Not Used

Table 4-4 General Study Module Attributes

4.4.3 Series entity Modules

4.4.3.1 General Series Module

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	1	This value is set to RF. The proper SOP class will be created based on RF.
Series Instance UID	(0020,000E)	1	This ID is uniquely generated by the equipment.
Series Number	(0020,0011)	2	A number that identifies the Series (generated by the equipment).
Laterality	(0020,0060)	2C	Can be selected by the user interface.
Series Date	(0008,0021)	3	This is set to the Series start date.
Series Time	(0008,0031)	3	This is set to the Series start time.
Performing Physicians' Name	(0008,1050)	3	Not used
Performing Physician Identification Sequence	(0008,1052)	3	Not used
>*Include 'Person Identification Macro'*			
Protocol Name	(0018,1030)	3	Not used
Series Description	(0008,103E)	3	Not used
Operators' Name	(0008,1070)	3	Not used
Operator Identification Sequence	(0008,1072)	3	Not used
>*Include 'Person Identification Macro'*			
Referenced Performed Procedure Step Sequence	(0008,1111)	3	Not used
>*Include 'SOP Instance Reference Macro'*			
Related Series Sequence	(0008,1250)	3	Not used
>Study Instance UID	(0020,000D)	1	Not used
>Series Instance UID	(0020,000E)	1	Not used
>Purpose of Reference Code Sequence	(0040,A170)	2	Not used
>>*Include 'Code Sequence Macro'*			
Body Part Examined	(0018,0015)	3	Not used

Attribute Name	Tag	Type	Attribute Description
Patient Position	(0018,5100)	2C	Not used
Smallest Pixel Value in Series	(0028,0108)	3	Not used
Largest Pixel Value in Series	(0028,0109)	3	Not used
Request Attributes Sequence	(0040,0275)	3	Not used
>Requested Procedure ID	(0040,1001)	1C	Not used
>Accession Number	(0008,0050)	3	Not used
>Study Instance UID	(0020,000D)	3	Not used
>Referenced Study Sequence	(0008,1110)	3	Not used
>> *Include 'SOP Instance Reference Macro'*			
>Requested Procedure Description	(0032,1060)	3	Not used
>Requested Procedure Code Sequence	(0032,1064)	3	Not used
>>*Include 'Code Sequence Macro'*			
Reason for the Requested Procedure	(0040,1002)	3	Not used
Reason for Requested Procedure Code Sequence	(0040,100A)	3	Not used
>>*Include' Code Sequence Macro'*			
>Scheduled Procedure Step ID	(0040,0009)	1C	Not used
>Scheduled Procedure Step Description	(0040,0007)	3	Not used
>Scheduled Protocol Code Sequence	(0040,0008)	3	Not used
>>Include 'Code Sequence Macro'			
>>Protocol Context Sequence	(0040,0440)	3	Not used
>>>*Include 'Content Item Macro'*			
>>>Content Item Modifier Sequence	(0040,0441)	3	Not used
>>>>*Include 'Content Item Macro'*			
Performed Procedure Step ID	(0040,0253)	3	Not used
Performed Procedure Step Start Date	(0040,0244)	3	Not used
Performed Procedure Step Start Time	(0040,0245)	3	Not used
Performed Procedure Step Description	(0040,0254)	3	Not used
Performed Protocol Code Sequence	(0040,0260)	3	Not used
>*Include 'Code Sequence Macro'*			
>>Protocol Context Sequence	(0040,0440)	3	
>>>*Include 'Content Item Macro'*			
>>>Content Item Modifier Sequence	(0040,0441)	3	Not used

Attribute Name	Tag	Type	Attribute Description
>>>>*Include 'Content Item Macro'*			
Comments on the Performed Procedure Step	(0040,0280)	3	Not used

Table 4-5 General Series Module Attributes

4.4.4 Equipment Entity Modules

4.4.4.1 General Equipment Module

Attribute Name	Tag	Type	Attribute Description
Manufacturer	(0008,0070)	2	Value is set to „GE MEDICAL SYSTEMS“
Institution Name	(0008,0080)	3	Configurable by user on setup screen (Field name is Hospital name)
Institution Address	(0008,0081)	3	Not used
Station Name	(0008,1010)	3	Configurable by user on setup screen (Field name is Ward)
Institutional Department Name	(0008,1040)	3	Not used
Manufacturer's Model Name	(0008,1090)	3	This value is set to „FLUOROSTAR“
Device Serial Number	(0018,1000)	3	This value is set to the serial number of the system.
Software Versions	(0018,1020)	3	This value is set to software Version of the DICOM module.
Gantry ID	(0018,1008)	3	Not used
Spatial Resolution	(0018,1050)	3	Not used
Date of Last Calibration	(0018,1200)	3	Not used
Time of Last Calibration	(0018,1201)	3	Not used
Pixel Padding Value	(0028,0120)	1C	Not used

Table 4-6 General Equipment Module Attributes

4.4.5 Image Entity Modules

4.4.5.1 General Image Module

Attribute Name	Tag	Type	Attribute Description
Instance Number	(0020,0013)	2	This value iss et to image number.
Patient Orientation	(0020,0020)	2C	Not used

Attribute Name	Tag	Type	Attribute Description
Content Date	(0008,0023)	2C	This value is set to the date image was taken.
Content Time	(0008,0033)	2C	This value is set to the time the image was taken.
Image Type	(0008,0008)	3	This value is set to „ORIGINAL“
Acquisition Number	(0020,0012)	3	Not used
Acquisition Date	(0008,0022)	3	Not used
Acquisition Time	(0008,0032)	3	Not used
Acquisition DateTime	(0008,002A)	3	Not used
Referenced Image Sequence	(0008,1140)	3	Not used
>Include 'SOP Instance Reference Macro'			
>Purpose of Reference Code Sequence	(0040,A170)	3	Not used
>>Include 'Code Sequence Macro'			
Derivation Description	(0008,2111)	3	Not used
Derivation Code Sequence	(0008,9215)	3	Not used
>Include 'Code Sequence Macro'			
Source Image Sequence	(0008,2112)	3	Not used
>Include 'SOP Instance Reference Macro'			
>Purpose of Reference Code Sequence	(0040,A170)	3	Not used
>>Include 'Code Sequence Macro'			
>Spatial Locations Preserved	(0028,135A)	3	Not used
>Patient Orientation	(0020,0020)	1C	Not used
Referenced Instance Sequence	(0008,114A)	3	Not used
>Include 'SOP Instance Reference Macro'			
>Purpose of Reference Code Sequence	(0040,A170)	1	Not used
>>Include 'Code Sequence Macro'			
Images in Acquisition	(0020,1002)	3	Not used
Image Comments	(0020,4000)	3	Not used
Quality Control Image	(0028,0300)	3	Not used
Burned In Annotation	(0028,0301)	3	Not used
Lossy Image Compression	(0028,2110)	3	Not used
Lossy Image Compression Ratio	(0028,2112)	3	Not used
Lossy Image Compression Method	(0028,2114)	3	Not used

Attribute Name	Tag	Type	Attribute Description
Icon Image Sequence	(0088,0200)	3	Not used
>Include 'Image Pixel Macro'			Not used
Presentation LUT Shape	(2050,0020)	3	Not used

Table 4-7 General Image Module Attributes

4.4.5.2 Image Pixel Module

Attribute Name	Tag	Type	Attribute Description
Samples per Pixel	(0028,0002)	1	The value is set to "1"
Photometric Interpretation	(0028,0004)	1	The value is set to "MONOCHROME2"
Rows	(0028,0010)	1	This value is set to „1024"
Columns	(0028,0011)	1	This value is set to „1024"
Bits Allocated	(0028,0100)	1	This value is set to „8"
Bits Stored	(0028,0101)	1	This value is set to „8"
High Bit	(0028,0102)	1	This value is set to „7"
Pixel Representation	(0028,0103)	1	This value is set to "0"
Pixel Data	(7FE0,0010)	1	Pixel data of the Image
Planar Configuration	(0028,0006)	1C	Not Used
Pixel Aspect Ratio	(0028,0034)	1C	Not Used
Smallest Image Pixel Value	(0028,0106)	3	Not Used
Largest Image Pixel Value	(0028,0107)	3	Not Used
Red Palette Color Lookup Table Descriptor	(0028,1101)	1C	Not Used
Green Palette Color Lookup Table Descriptor	(0028,1102)	1C	Not Used
Blue Palette Color Lookup Table Descriptor	(0028,1103)	1C	Not Used
Red Palette Color Lookup Table Data	(0028,1201)	1C	Not Used
Green Palette Color Lookup Table Data	(0028,1202)	1C	Not Used
Blue Palette Color Lookup Table Data	(0028,1203)	1C	Not Used
ICC Profile	(0028,2000)	3	Not Used
Pixel Data Provider URL	(0028,7FE0)	1C	Not Used
Pixel Padding Range Limit	(0028,0121)	1C	Not Used

Table 4-8 General Image Module Attributes

4.4.5.3 X-Ray Image Module

Attribute Name	Tag	Type	Attribute Description
Frame Increment Pointer	(0028,0009)	1C	Not used
Lossy Image Compression	(0028,2110)	1C	Not used
Image Type	(0008,0008)	1	Value set to „ORIGINAL“
Pixel Intensity Relationship	(0028,1040)	1	Value set to “LIN”
Samples per Pixel	(0028,0002)	1	Value set to “1”
Photometric Interpretation	(0028,0004)	1	Value set to “MONOCHROME2”
Bits Allocated	(0028,0100)	1	Value set to “8”
Bits Stored	(0028,0101)	1	Value set to “8”
High Bit	(0028,0102)	1	Value set to “7”
Pixel Representation	(0028,0103)	1	Value set to “0”
Scan Options	(0018,0022)	3	Not used
Anatomic Region Sequence	(0008,2218)	3	Not used
> *Include ‘Code Sequence Macro’*			
>Anatomic Region Modifier Sequence	(0008,2220)	3	Not used
>> *Include ‘Code Sequence Macro’*			
Primary Anatomic Structure Sequence	(0008,2228)	3	Not used
> *Include ‘Code Sequence Macro’*			
>Primary Anatomic Structure Modifier Sequence	(0008,2230)	3	Not used
>> *Include ‘Code Sequence Macro’*			
R Wave Pointer	(0028,6040)	3	Not used
Reference Image Sequence	(0008,1140)	1C	Not used
>Referenced SOP Class UID	(0008,1150)	1	Not used
>Referenced SOP Class UID	(0008,1155)	1	Not used
>Referenced Frame Number	(0008,1160)	1C	Not used
>Referenced Segment Number	(0062,000B)	1C	Not used
>Purpose of Reference Code Sequence	(0040,A170)	3	Not used
>> *Include ‘Code Sequence Macro’*			
Derivation Description	(0008,2111)	3	Not used
Acquisition Device Processing Description	(0018,1400)	3	Not used

Attribute Name	Tag	Type	Attribute Description
Frame Label Vector	(0018,2002)	3	Not used
Frame Dimension Pointer	(0028,000A)	3	Not used
Calibration Image	(0050,0004)	3	Not used

Table 4-9 X-Ray Image Module Attributes

4.4.5.3.1 Image Type

The following values should be always sent:

Value 1 shall have the following enumerated Value:

ORIGINAL identifies an Original Image

Value 2 shall have the following enumerated Value:

PRIMARY identifies a Primary Image

Specify which enumerated values of Value 4 are created/supported:

SINGLE PLANE

4.4.5.4 X-Ray Acquisition Module

Attribute Name	Tag	Type	Attribute Description
KV	(0018,0060)	2	Value is set to the kV value of the shot.
Radiation Setting	(0018,1155)	1	Set to "SC", low dose exposure using fluoroscopic.
X-Ray Tube Current	(0018,1151)	2C	Value is set to the mA value of the shot.
X-Ray Tube Current in microA	(0018,8151)	3	Not used
Exposure Time	(0018,1150)	2C	mSec of the shot
Exposure Time in microS	(0018,8150)	3	Not used
Exposure	(0018,1152)	2C	Not used
Exposure in microAs	(0018,1153)	3	Not used
Grid	(0018,1166)	3	Not used
Average Pulse Width	(0018,1154)	3	Not used
Radiation Mode	(0018,115A)	3	Not used
Type of Filters	(0018,1161)	3	Not used
Intensifier Size	(0018,1162)	3	Not used
Field of View Shape	(0018,1147)	3	Not used
Field of View Dimension(s)	(0018,1149)	3	Not used

Attribute Name	Tag	Type	Attribute Description
Imager Pixel Spacing	(0018,1164)	3	Not used
Pixel Spacing	(0028,0030)	1C	Not used
Pixel Spacing Calibration Type	(0028,0A02)	3	Not used
Pixel Spacing Calibration Description	(0028,0A04)	1C	Not used
Focal Spot	(0018,1190)	3	Not used
Image and Fluoroscopy Area Dose Product	(0018,115E)		Not used

Table 4-10 X-Ray Acquisition Module

4.4.5.5 VOI LUT Module

Attribute Name	Tag	Type	Attribute Description
VOI LUT Sequence	(0028,3010)	1C	Not used
>LUT Descriptor	(0028,3002)	1	Not used
>LUT Explanation	(0028,3003)	3	Not used
>LUT Data	(0028,3006)	1	Not used
Window Center	(0028,1050)	1C	Value set to “128”
Window Width	(0028,1051)	1C	Value set to “256”
Window Center & Width Explanation	(0028,1055)	3	Not used

Table 4-11 VOI LUT Module Attributes

4.4.5.6 SOP Common Module

Attribute Name	Tag	Type	Attribute Description
SOP Class UID	(0008,0016)	1	SOP Class UID for the Class that the data contains, just RF UID
SOP Instance UID	(0008,0018)	1	Created by equipment, using GE OEC Fluorostar prefix.
Specific Character Set	(0008,0005)	1C	Always set to ISO_IR 100 (=Latin Alphabet No. 1)
Instance Creation Date	(0008,0012)	3	Not used
Instance Creation Time	(0008,0013)	3	Not used
Instance Creator UID	(0008,0014)	3	Not used
Related General SOP Class UID	(0008,001A)	3	Not used
Original Specialized SOP Class UID	(0008,001B)	3	Not used

Attribute Name	Tag	Type	Attribute Description
Coding Scheme Identification Sequence	(0008,0110)	3	Not used
>Coding Scheme Designator	(0008,0102)	1	Not used
>Coding Scheme Registry	(0008,0112)	1C	Not used
>Coding Scheme UID	(0008,010C)	1C	Not used
>Coding Scheme External ID	(0008,0114)	2C	Not used
>Coding Scheme Name	(0008,0115)	3	Not used
>Coding Scheme Version	(0008,0103)	3	Not used
>Coding Scheme Responsible Organization	(0008,0116)	3	Not used
Timezone Offset From UTC	(0008,0201)	3	Not used
Contributing Equipment Sequence	(0018,A001)	3	Not used
>Purpose of Reference Code Sequence	(0040,A170)	1	Not used
>>*Include 'Code Sequence Macro'*			Not used
>Manufacturer	(0008,0070)	1	Not used
>Institution Name	(0008,0080)	3	Not used
>Institution Address	(0008,0081)	3	Not used
>Station Name	(0008,1010)	3	Not used
>Institutional Department Name	(0008,1040)	3	Not used
>Manufacturer's Model Name	(0008,1090)	3	Not used
>Device Serial Number	(0018,1000)	3	Not used
>Software Versions	(0018,1020)	3	Not used
>Spatial Resolution	(0018,1050)	3	Not used
>Date of Last Calibration	(0018,1200)	3	Not used
>Time of Last Calibration	(0018,1201)	3	Not used
>Contribution DateTime	(0018,A002)	3	Not used
>Contribution Description	(0018,A003)	3	Not used
Instance Number	(0020,0013)	3	Value set to image number
SOP Instance Status	(0100,0410)	3	Not used
SOP Authorization Date and Time	(0100,0420)	3	Not used
SOP Authorization Comment	(0100,0424)	3	Not used
Authorization Equipment Certification Number	(0100,0426)	3	Not used
MAC Parameters Sequence	(4FFE,0001)	3	Not used
>MAC ID Number	(0400,0005)	1	Not used

Attribute Name	Tag	Type	Attribute Description
>MAC Calculation Transfer Syntax UID	(0400,0010)	1	Not used
>MAC Algorithm	(0400,0015)	1	Not used
>Data Elements Signed	(0400,0020)	1	Not used
Digital Signatures Sequence	(FFFA,FFFA)	3	Not used
>MAC ID Number	(0400,0005)	1	Not used
>Digital Signature UID	(0400,0100)	1	Not used
>Digital Signature DateTime	(0400,0105)	1	Not used
>Certificate Type	(0400,0110)	1	Not used
>Certificate of Signer	(0400,0115)	1	Not used
>Signature	(0400,0120)	1	Not used
>Certified Timestamp Type	(0400,0305)	1C	Not used
>Certified Timestamp	(0400,0310)	3	Not used
>Digital Signature Purpose Code Sequence	(0400,0401)	3	Not used
>>*Include 'Code Sequence Macro'*			Not used
Encrypted Attributes Sequence	(0400,0500)	1C	Not used
>Encrypted Content Transfer Syntax UID	(0400,0510)	1	Not used
>Encrypted Content	(0400,0520)	1	Not used
Original Attributes Sequence	(0400,0561)	3	Not used
>Source of Previous Values	(0400,0564)	2	Not used
>Attribute Modification DateTime	(0400,0562)	1	Not used
>Modifying System	(0400,0563)	1	Not used
>Reason for the Attribute Modification	(0400,0565)	1	Not used
>Modified Attributes Sequence	(0400,0550)	1	Not used
>>Any Attribute from the main data set that was modified or removed; may include Sequence Attributes and their Items.			
HL7 Structured Document Reference Sequence	(0040,A390)	1C	Not used
>Referenced SOP Class UID	(0008,1150)	1	Not used
>Referenced SOP Instance UID	(0008,1155)	1	Not used
>HL7 Instance Identifier	(0040,E001)	1	Not used
>Retrieve URI	(0040,E010)	3	Not used

Table 4-12 SOP Common Module Attributes

4.5 Standard extended and private Data Attributes

Not applicable

4.6 Standard extended and private Context Groups

Not applicable

5 Modality Worklist Query Implementation

5.1 Introduction

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.

5.2 GE OEC Fluorostar Mapping of DICOM Entities

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

DICOM IE	GE OEC Fluorostar Entity
Scheduled Procedure Step	Examination
Requested Procedure Step	Examination
Imaging Service Request	Examination
Visit	Not Applicable
Patient	Patient

Table 5-1 Mapping of DICOM Entities To GE OEC Fluorostar Entities

5.3 Worklist Query Module Table

See DICOM PS3.3 and PS3.4 for a complete definition of the entities, modules and attributes.

Entity Name	Module Name	Reference
Scheduled Procedure Step	SOP Common	5.4.1.1.1
	Scheduled Procedure Step	5.4.1.2
Requested Procedure	Requested Procedure	5.4.2.1
Imaging Service Request	Imaging Service Request	5.4.3.1
Visit	Visit Identification	
	Visit Status	
	Visit Relationship	
	Visit Administration	
Patient	Patient Relationship	
	Patient Identification	
	Patient Demographic	
	Patient Medical	

5.4 Worklist Query Module Definition

Please refer to DICOM Standard PS3.3 (Information Object Definition) for a description of each of the query key attributes contained within the Modality Worklist Information Model.

5.4.1 Common Scheduled Procedure Step Entity Modules

5.4.1.1 SOP Common Module

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped Into Instance	Note
Specific Character Set	(0008,0005)	O	1C	YES	

Table 5-2 SOP Common Module Attributes

5.4.1.1.1 Specific Character Set

The attribute Specific Character Set (0008,0005) will always be sent.

5.4.1.2 Scheduled Procedure Step Module

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped Into Instance	Note
Scheduled Procedure Step Sequence	(0040,0100)	R	1	No	
>Scheduled Procedure Step Start Date	(0040,0002)	R	1 *	No	Using the date configured from the DICOM query filter screen.
>Scheduled Procedure Step Start Time	(0040,0003)	R	1 *	No	
>Modality	(0008,0060)	R	1	N	
>Scheduled Performing Physician's Name	(0040,0006)	R	2	Yes	
>Scheduled Station Name	(0040,0010)	O	2	No	Using the configured station name in the setup screen or the entered station name from the DICOM query filter (if configured as filter criteria).

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped Into Instance	Note
>Scheduled Procedure Step Location	(0040,0011)	O	2	No	
>Scheduled Procedure Step ID	(0040,0009)	O	1	No	

Table 5-3 SOP Common Module Attributes

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

5.4.2 Common Request Procedure Entity Modules

5.4.2.1 Requested Procedure Module

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped Into Instance	Note
Requested Procedure ID	(0040,1001)	O	1	No	
Requested Procedure Description	(0032,1060)	O	1C *	Yes	
Study Instance UID	(0020,000D)	O	1	Yes	

Table 5-4 Requested Procedure Module Attributes

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

5.4.3 Common Imaging Service Request Entity Modules

5.4.3.1 Imaging Service Request Module

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped Into Instance	Note
Accession Number	(0008,0050)	O	2 *	Yes	

Table 5-5 Requested Procedure Module Attributes

5.4.4 Common Visit Identification Modules

5.4.4.1 Visit Identification

Not applicable

5.4.4.2 Visit Status

Not applicable

5.4.4.3 Visit Relationship

Not applicable

5.4.4.4 Visit Admission

Not applicable

5.4.5 Common Patient Entity Modules

5.4.5.1 Patient Relationship

Not applicable

5.4.5.2 Patient Identification

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped Into Instance	Note
Patient's Name	(0010,0010)	R	1 *	Yes	
Patient ID	(0010,0020)	R	1 *	Yes	

Table 5-6 Patient Identification Module Attributes

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

5.4.5.3 Patient Demographic

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped Into Instance	Note
Patients Birth Date	(0010,0030)	O	2 *	Yes	
Patient's Sex	(0010,0040)	O	2	Yes	

Table 5-7 Patient Demographic Module Attributes

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

5.4.5.4 Patient Medical

Not applicable

6 Modality Performed Procedure Step Implementation

6.1 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 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.

6.2 Relationship between Scheduled and Performed Procedure Steps

6.3 Modality Performed Procedure Step Module Table

See DICOM PS3.3 and PS3.4 for a complete definition of the entities, modules and attributes.

Module Name	Reference
SOP Common	6.4.1
Performed Procedure Step Relationship	0
Performed Procedure Step Information	6.4.3
Image Acquisition Results	6.4.4
Radiation Dose	6.4.5
Billing and Material Management Codes	6.4.6

Table 6-1 Modality Performed Procedure Step Modules

6.4 Modality Performed Procedure Step Module Definitions

6.4.1 SOP Common Module

Attribute Name	Tag	Type for SCU N-CREATE	Type for SCU N-SET	Use
Specific Character Set	(0008,0005)	1C	1C	

Table 6-2 SOP Common Module

6.4.2 Performed Procedure Step Relationship Module

Attribute Name	Tag	Type for SCU N-CREATE	
		Acquisition without MWL Entry	Acquisition with MWL Entry
Scheduled Step Attributes Sequence	(0040,0270)	n/a	Only 1 item
>Study Instance UID	(0020,000D)	n/a	Copied from MWL
>Accession Number	(0008,0050)	n/a	Copied from MWL
>Requested Procedure Description	(0032,1060)	n/a	Copied from MWL
>Scheduled Procedure Step ID	(0040,0009)	n/a	Copied from MWL
>Scheduled Procedure Step Description	(0040,0007)	n/a	Copied from MWL
Patient's Name	(0010,0010)	n/a	Copied from MWL
Patient ID	(0010,0020)	n/a	Copied from MWL
Patient's Birth Date	(0010,0030)	n/a	Copied from MWL
Patient's Sex	(0010,0040)	n/a	Copied from MWL

Table 6-3 Performed Procedure Step Relationship Module Attributes

6.4.3 Performed Procedure Step Information Module

Attribute Name	Tag	Type for SCU N-CREATE	Type for SCU N-SET	Use
Performed Procedure Step ID	(0040,0253)	1	-	
Performed Station AE Title	(0040,0241)	1	-	
Performed Station Name	(0040,0242)	2	-	
Performed Location	(0040,0243)	2	-	
Performed Procedure Step Start Date	(0040,0244)	1	-	
Performed Procedure Step Start Time	(0040,0245)	1	-	
Performed Procedure Step Status	(0040,0252)	1	3	

Attribute Name	Tag	Type for SCU N-CREATE	Type for SCU N-SET	Use
Performed Procedure Step Description	(0040,0254)	2	3	
Performed Procedure Type Description	(0040,0255)	2	3	
Procedure Code Sequence	(0008,1032)	2	3	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 Procedure Step End Date	(0040,0250)	2	3	
Performed Procedure Step End Time	(0040,0251)	2	3	

Table 6-4 Performed Procedure Step Information Module Attributes

6.4.4 Image Acquisition Results Module

Attribute Name	Tag	Type for SCU N-CREATE	Type for SCU N-SET	Use
Performed Procedure Step ID	(0040,0253)	1	-	
Performed Station AE Title	(0040,0241)	1	-	
Performed Station Name	(0040,0242)	2	-	
Performed Location	(0040,0243)	2	-	
Performed Procedure Step Start Date	(0040,0244)	1	-	
Performed Procedure Step Start Time	(0040,0245)	1	-	
Performed Procedure Step Status	(0040,0252)	1	3	
Performed Procedure Step Description	(0040,0254)	2	3	

Attribute Name	Tag	Type for SCU N-CREATE	Type for SCU N-SET	Use
Performed Procedure Type Description	(0040,0255)	2	3	
Modality	(0008,0060)	1	-	

Table 6-5 Image Acquisition Results Module Attributes

6.4.5 Radiation Dose Module

Attribute Name	Tag	Type for SCU N-CREATE	Type for SCU N-SET	Use
Distance Source to Detector (SID)	(0018,1110)	3	3	
Distance Source to Entrance	(0040,0306)	3	3	
Entrance Dose	(0040,0302)	3	3	
Entrance Dose in mGy	(0040,8302)	3	3	
Image Area Dose Product	(0018,115E)	3	3	

Table 6-6 Radiation Dose Module Attributes

6.4.6 Billing and Material Management Codes Module

Not applicable

7 Print Management Implementation

7.1 Introduction

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

7.2 Basic Film Session SOP Class

7.2.1 Basic Film Session N-CREATE Attributes

The table lists the attributes that are sent in the Basic Film Session N-CREATE Request:

Attributes	Tag	Use
Specific Character Set	(0008,0005)	Not Used
Number of Copies	(2000,0010)	Value set to "1"
Print Priority	(2000,0020)	Enumerated Terms can be sent: HIGH / *MID* / LOW
Medium Type	(2000,0030)	Enumerated Terms can be sent: PAPER / *CLEAR FILM* / BLUE FILM
Film Destination	(2000,0040)	Enumerated Terms can be sent: MAGAZINE / *PROCESSOR*
Film Session Label	(2000,0050)	Value set to "GE OEC Fluorostar"
Memory Allocation	(2000,0060)	Not Used
Owner ID	(2100,0160)	Value set to "7900 Fluorostar"

7.2.2 Basic Film Session N-DELETE

The N-DELETE is used to delete the complete Basic Film Session SOP Instance hierarchy. As a result, all references to Image SOP Instances within the film session are deleted.

7.3 Basic Film Box SOP Class

7.3.1 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:

Attributes	Tag	Use

Attributes	Tag	Use
Image Display Format	(2010,0010)	Value is user configurable: • STANDARD\1,1 (default) • STANDARD\1,2 • STANDARD\1,3 • STANDARD\1,4 • STANDARD\1,5 • STANDARD\2,2 • STANDARD\2,3 • STANDARD\2,4 • STANDARD\2,5 • STANDARD\3,3 • STANDARD\3,4 • STANDARD\3,5 • STANDARD\4,4 • STANDARD\4,5
Referenced Film Session Sequence	(2010,0500)	Used
>Referenced SOP Class UID	(0008,1150)	Set to "1.2.840.10008.5.1.1.1"
>Referenced SOP Instance UID	(0008,1155)	
Referenced Image Box Sequence	(2010,0510)	Used
>Referenced SOP Class UID	(0008,1150)	Set to "1.2.840.10008.5.1.1.4"
>Referenced SOP Instance UID	(0008,1155)	Received in the N-CREATE Response from SCP
Referenced Basic Annotation Box Sequence	(2010,0520)	Not Used
>Referenced SOP Class UID	(0008,1150)	Not Used
>Referenced SOP Instance UID	(0008,1155)	Not Used
Film Orientation	(2010,0040)	Enumerated Terms can be sent: PORTRAIT / *LANDSCAPE*
Film Size ID	(2010,0050)	Enumerated Terms can be sent: • 8INX10IN • 10INX12IN • *10INX14IN* • 11INX14IN • 14INX14IN • 14INX17IN • 24CMX24CM • 24CMX30CM
Magnification Type	(2010,0060)	Set to "BILINEAR"
Max Density	(2010,0130)	Configurable by Field Engineer. Default set to "300"
Configuration Information	(2010,0150)	Configurable by Field Engineer. Default this value is not sent.

Attributes	Tag	Use
Referenced Presentation LUT Sequence	(2050,0500)	Not Used
>Referenced SOP Class UID	(0008,1150)	Not Used
>Referenced SOP Instance UID	(0008,1155)	Not Used
Annotation Display Format ID	(2010,0030)	Not Used
Smoothing Type	(2010,0080)	Not Used
Border Density	(2010,0100)	Enumerated Terms can be sent: • BLACK • *WHITE* Can be configured by Field Service
Empty Image Density	(2010,0110)	Enumerated Terms can be sent: • BLACK • *WHITE* Can be configured by Field Service
Min Density	(2010,0120)	Configurable by Field Engineer. Default set to "20"
Trim	(2010,0140)	Enumerated Terms can be sent: • *NO* • YES Can be configured by Field Service
Illumination	(2010,015E)	Not Used
Reflected Ambient Light	(2010,0160)	Not Used
Requested Resolution ID	(2020,0050)	Not Used
ICC Profile	(0028,2000)	Not Used

7.3.2 Basic Film Box N-DELETE

The N-DELETE is used to delete the last created Basic Film Box SOP Instance hierarchy. As a result the information describing the last film is deleted.

7.4 Basic Grayscale Image Box SOP Class

7.4.1 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:

Attributes	Tag	Use
Image Position	(2020,0010)	Based on Image Display Format (2010,0010), range of values sent is [1~20]
Basic Grayscale Image Sequence	(2020,0110)	A sequence which provides the content of the Grayscale image pixel data to be printed.
>Samples Per Pixel	(0028,0002)	Value set to "1"

Attributes	Tag	Use
>Photometric Interpretation	(0028,0004)	Value set to “MONOCHROME2”
>Rows	(0028,0010)	Value set to “1024”
>Columns	(0028,0011)	Value set to “˝1280”
>Pixel Aspect Ratio	(0028,0034)	Value set to “1\1”
>Bits Allocated	(0028,0100)	Value set to “8”
>Bits Stored	(0028,0101)	Value set to “8”
>High Bit	(0028,0102)	Value set to “7”
>Pixel Representation	(0028,0103)	Value set to “0”
>Pixel Data	(7FE0,0010)	Image Pixels
Polarity	(2020,0020)	Value set to “NORMAL”
Magnification Type	(2010,0060)	Not Used
Smoothing Type	(2010,0080)	Not Used
Min Density	(2010,0120)	Not Used
Max Density	(2010,0130)	Not Used
Configuration Information	(2010,0150)	Not Used
Requested Image Size	(2020,0030)	Not Used
Requested Decimate/Crop Behavior	(2020,0040)	Not Used
Referenced Presentation LUT Sequence	(2050,0500)	Not Used
> Referenced SOP Class UID	(0008,1150)	Not Used
> Referenced SOP Instance UID	(0008,1155)	Not Used

8 X-Ray Radiation Dose Structured Report Information Object Implementation

8.1 Introduction

This section specifies the use of the DICOM X-Ray Radiation Dose SR IOD to represent results produced by this implementation. Corresponding attributes are conveyed using the module construct.

8.2 GE OEC Fluorostar Mapping of DICOM entities

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

DICOM IE	GE OEC 7900 Entity
Patient	Patient
Study	Exam
Series	Series

Table 8-1 Mapping of DICOM Entities to GE OEC Fluorostar Entities

8.3 IOD Module Table

The X-Ray Radiation Dose Structured Report Information Object Definitions comprise the modules of the following tables, plus Standard Extended and Private attributes. Standard Extended and Private attributes are described in Section 8.5.

The contents of the SR Document Content are constrained by the supported template, as identified in Section 8.4.1.2.1 SR Document Content Descriptions. Standard, Standard Extended and Private templates are further described in Section 8.7 Standard, Standard extended and private templates.

Entity Name	Module Name	Usage	Reference
Patient	Patient	Used	4.4.1.1
Study	General Study	Used	4.4.2.1
Series	SR Document Series	Used	4.4.3.1
Equipment	General Equipment	Used	4.4.4.1
Document	SR Document General	Used	
	SR Document Content	Used	
	SR Common	Used	

Table 8-2 Structured Report IOD Modules

8.4 Information Module Definition

Please refer to DICOM Part 3 (Information Object Definition) for a description of each of the entities, modules, and contained within the SR Information Objects.

The following modules are included to convey Enumerated Values, Defined Terms and Optional Attributes supported. Type 1 & Type 2 Attributes are also included for completeness and to define what values 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 Document Entity Modules

8.4.1.1 SR Document General Module

Attribute Name	Tag	Type	Use
Instance Number	(0020,0013)	1	
Completion Flag	(0040,A491)	1	Enumerated Values: PARTIAL = Patrial Content COMPLETE = Complete Content
Completion Flag Description	(0040,A492)	3	Not Used
Verification Flag	(0040,A493)	1	Fixed Value: UNVERIFIED = Not attestet to.
Content Date	(0008,0023)	1	
Content Time	(0008,0033)	1	
Verifying Observer Sequence	(0040,A073)	1C	Not Used
Author Observer Sequence	(0040,A078)	3	Not Used
Participant Sequence	(0040,A07A)	3	Not Used
Custodial Organization Sequence	(0040,A07C)	3	Not Used
Predecessor Documents Sequence	(0040,A360)	1C	Not Used
Identical Documents Sequence	(0040,A525)	1C	Not Used
Referenced Requested Sequence	(0040,A370)	1C	Not Used
Performed Procedure Code Sequence	(0040,A732)	2	Empty
Current Requested Procedure Evidence Sequence	(0040,A375)	1C	Not Used
Pertinent Other Evidence Sequence	(0040,A385)	1C	Not Used
Referenced Instance Sequence	(0008,114A)	1C	Not Used

Table 8-3 SR Document General Module Attributes

8.4.1.2 SR Document Content Module

Attribute Name	Tag	Type	Use
Observation DateTime	(0040,A032)	1C	
Content Template Sequence	(0040,A504)	1C	
>Mapping Resource	(0008,0105)	1	
>Template Identifier	(0040,DB00)	1	
Value Type	(0040,A040)	1	
Continuity of Content	(0040,A050)	1C	
Concept Name Code Sequence	(0040,A043)	1C	
>Include 'Code Sequence Macro'			
Content Sequence	(0040,A730)	1C	
>Relationship Type	(0040,A010)	1	
>Reference Content Item Identifier	(0040,DB73)	1C	
>Insert SR Document Content Module			Recursive inclusion to create document content tree. See Section 8.4.1.2.1.1 Content Template for the list of supported templates.

Table 8-4 SR Document Content Module Attributes

8.4.1.2.1 SR Document Content Descriptions

8.4.1.2.1.1 Content Template

The Product supports the following root Templates for SR SOP Instances created by the product.

SOP Class	Template ID	Template Name	Use
X-Ray Radiation Dose SR	1001	X-Ray Radiation Dose	Create

Table 8-5 SR Root Templates

8.4.1.3 SOP Common Module

Attribute Name	Tag	Type	Attribute Description
SOP Class UID	(0008,0016)	1	
SOP Instance UID	(0008,0018)	1	Created by timestamp
Specific Character Set	(0008,0005)	1C	Only ISO_IR_100 supported

Attribute Name	Tag	Type	Attribute Description
Instance Number	(0020,0013)	3	

Table 8-6 SOP Common Module Attributes

8.5 Standard extended and private Data Attributes

Not applicable

8.6 Standard extended and private Context Groups

Not applicable

8.7 Standard, Standard extended and private templates

The Product supports the standard templates defined in the following section.

8.7.1 Standard Templates

The Product supports the following standard templates for SOP Instances created by this product.

8.7.1.1 Template ID10001 X-Ray Radiation Dose

	NL	Rel with Parent	VT	Concept Name	Req Type	Condition	Value Set
1			CONTAINER	EV (113701, DCM, "X-Ray Radiation Dose Report")	M		
2	>	HAS CONCEPT MOD	CODE	EV (121058, DCM, "Procedure reported")	M		DT (113704, DCM, "Projection X-Ray")
3	>>	HAS CONCEPT MOD	CODE	EV (G-C0E8, SRT, "Has Intent")	M		SRT | R-408C3 | Diagnostic Intent
4	>		INCLUDE	DTID (1002) Observer Context	M		
5	>	HAS OBS CONTEXT	CODE	EV (113705, DCM, "Scope of Accumulation")	M		DCM | 113014 | Study
6	>>	HAS PROPERTIES	UIDREF	DCID (10001) UID Types	M		
7	>	CONTAINS	INCLUDE	DTID (10002) Accumulated X-Ray Dose	MC	IFF Single Plane system	$Plane = EV (113622, DCM, "Single Plane"
10	>	CONTAINS	INCLUDE	DTID (10003) Irradiation Event X-Ray Data	M		
14	>	CONTAINS	CODE	EV (113854, DCM, "Source of Dose Information")	M		DCM | 113856 | Automated Data Collection

8.7.1.2 Template DTID 1002 Observer Context

	NL	Rel with Parent	VT	Concept Name	Req Type	Condition	Value Set Constraint
1		HAS OBS CONTEXT	CODE	EV (121005,DCM, "Observer Type")	MC	IF Observer type is device	DCID (270) Observer Type Defaults to (121006,DCM, "Person")
3		HAS OBS CONTEXT	INCLUDE	DTID (1004) Device observer identifying attributes	MC	IFF Row 1 value = (121007,DCM, "Device")	

8.7.1.3 Template DTID 1004 Device Observer Identifying Attributes

	NL	Rel with Parent	VT	Concept Name	Req Type	Condition	Value Set Constraint
1			UIDREF	EV (121012,DCM, "Device Observer UID")	M		

8.7.1.4 Template DTID 10002 Accumulated X-Ray Dose

	NL	Rel with Parent	VT	Concept Name	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (113702, DCM, "Accumulated X-Ray Dose Data")	M		
2	>	HAS CONCEPT MOD	CODE	EV (113764, DCM, "Acquisition Plane"	M		
3	>	CONTAINS	CONTAINER	EV (122505, DCM, "Calibration")	MC	IFF Calibration Data is available	
4	>>	HAS CONCEPT MOD	CODE	EV (113794, DCM, "Dose Measurement Device")	M		SRT | A-2C090 | Dosimeter
5	>>	CONTAINS	DATETIME	EV (113723, DCM, "Calibration Date")	M		
6	>>	CONTAINS	NUM	EV (122322, DCM, "Calibration Factor")	M		Units = EV (1, UCUM, "no units")
7	>>	CONTAINS	NUM	EV (113763, DCM, "Calibration Uncertainty")	M		Units = EV (%, UCUM, "Percent")
8	>>	CONTAINS	TEXT	EV (113724, DCM, "Calibration Responsible Party")	M		
9	>	CONTAINS	INCLUDE	DTID (10004) Accumulated Projection X-Ray Dose	MC	XOR row 10, IFF TID (10001) Row 2 = (113704, DCM, "Projection X-Ray")	

8.7.1.5 Template DTID 10004 Accumulated Projection X-Ray Dose

	NL	Rel with Parent	VT	Concept Name	Req Type	Condition	Value Set Constraint
1			NUM	EV (113722, DCM, "Dose Area Product Total")	M		Units = EV (Gy.m2, UCUM, "Gy.m2")
2			NUM	EV (113725, DCM, "Dose (RP) Total")	MC	IF any of the values of TID (10001) Row 14 are not (113858, DCM, "MPPS Content"). May be present otherwise.	Units = EV (Gy, UCUM, "Gy")
3			NUM	EV (113726, DCM, "Fluoro Dose Area Product Total")	MC	IFF TID(10003) Row 4 value = (P5-06000, SRT, "Fluoroscopy") for at least one irradiation event	Units = EV (Gy.m2, UCUM, "Gy.m2")
4			NUM	EV (113728, DCM, "Fluoro Dose (RP) Total")	MC	IFF TID(10003) Row 4 value = (P5-06000, SRT, "Fluoroscopy") for at least one irradiation event AND any of the values of TID (10001) Row 14 are not (113858, DCM, "MPPS Content").	Units = EV (Gy, UCUM, "Gy")
5			NUM	EV (113730, DCM, "Total Fluoro Time")	MC	IFF TID(10003) Row 4 value = (P5-06000, SRT, "Fluoroscopy") for at least one irradiation event.	Units = EV (s, UCUM, "s")
6			NUM	EV (113727, DCM, "Acquisition Dose Area Product Total")	M		Units = EV (Gy.m2, UCUM, "Gy.m2")

7			NUM	EV (113729, DCM, "Acquisition Dose (RP) Total")	MC	IF any of the values of TID (10001) Row 14 are not (113858, DCM, "MPPS Content"). May be present otherwise.	Units = EV (Gy, UCUM, "Gy")
8			NUM	EV (113855, DCM, "Total Acquisition Time")	M		Units = EV (s, UCUM, "s")
11			TEXT	EV (113780, DCM, "Reference Point Definition")	MC	IF Row 2, Row 4 or Row 7 is present and Row 10 is not present.	DCM | 113860 | 15cm from Isocenter toward Source

8.7.1.6 Template DTID 10003 Irradiation Event X-Ray Data

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (113706, DCM, "Irradiation Event X-Ray Data")	1	M		
2	>	HAS CONCEPT MOD	CODE	EV (113764, DCM, "Acquisition Plane"	1	M		DCM | 113622 | Single Plane
3	>	CONTAINS	DATETIME	DT (111526, DCM, "DateTime Started")	1	M		
4	>	CONTAINS	CODE	EV (113721, DCM, "Irradiation Event Type")	1	M		SRT | P5-06000
9	>	CONTAINS	CODE	EV (113780, DCM, "Reference Point Definition")	1	MC	IF Row 13 or Row 14 is present and Row 8 is not present	DCM | 113860 | 15cm from Isocenter toward Source
10	>	CONTAINS	UIDREF	EV (113769, DCM, "Irradiation Event UID")	1	M		
11	>	CONTAINS	NUM	EV (122130, DCM, "Dose Area Product"	1	MC	IFF TID (10001) Row 2 = (113704, DCM, "Projection X-Ray")	Units = EV (Gy.m2, UCUM, "Gy.m2")
13	>	CONTAINS	NUM	EV (113738, DCM, "Dose (RP)")	1	MC	IFF TID (10001) Row 2 = (113704, DCM, "Projection X-Ray") AND any of the values of TID (10001) Row 14 are not (113858, DCM, "MPPS Content")	Units = EV (Gy, UCUM, "Gy")
26	>	CONTAINS	CODE	EV (113732, DCM, "Fluoro Mode")	1	UC	IFF Row 4 value = (P5-06000, SRT, "Fluoroscopy")	DCID (10004) Fluoro Modes
27	>	CONTAINS	NUM	EV (113791, DCM, "Pulse Rate")	1	MC	IFF Row 26 value = (113631, DCM, "Pulsed")	Units = EV ({pulse}/s, UCUM, "pulse/s")
28	>	CONTAINS	NUM	EV (113768, DCM, "Number of Pulses")	1	MC	IFF Row 26 value = (113631, DCM, "Pulsed")	Units = EV (1, UCUM, "no units")
45	>	CONTAINS	CODE	EV (123014 , DCM, ("Target Region")	1	M		SRT | T-D0001 | "Topography unknown"
54	>	CONTAINS	IMAGE	EV (113795, DCM, "Acquired Image")	1-n	MC	IFF Image Object is created for this irradiation event