g

GE Heathcare

Technical Publications

Direction DOC2332709

Revision 5

StarGuide
DICOM CONFORMANCE STATEMENT

LIST OF REVISIONS

REV	DATE	DESCRIPTION	PAGES	APPR.
1	July 2020	Initial Release	All	M. Mesh
2	Sept 2021	Update private dictionary Add Modality Worklist query support Add Encapsulated PDF support	CONFORMANCE STATEMENT OVERVIEW 1.1, 2.1, 2.2.2, 2.2.3, 2.2.4, 2.3.1, 2.3.1.2, 2.7, 3.4.3.1, 3.1.6.15, 3.4.6.14, 3.4.6.15, 3.4.6.16, 3.4.6.18, 3.5.2, 3.5.5, Section 5 (new), Section 6 (new)	M. Mesh
3	Nov 2021	External Review Update private dictionary	1.1, 3.4.1.1, 3.4.2.1, 3.4.2.2, 3.4.2.3, 3.4.3.1, 3.4.3.4, 3.4.6.3, 3.4.6.15, 3.5.2, 4.4.1.1, 6.4.1.2, 6.4.5.1	M. Mesh
4	Dec 2022	New application Bone DL support	1.6 3.4.6.3	M. Mesh
5	Mar 2023	New major release Update private Dictionary	3.36, 3.37,	K.Elazari

THIS PAGE LEFT INTENTIONALLY BLANK

CONFORMANCE STATEMENT OVERVIEW

The StarGuide is a combination of an NM Camera, SmartConsole™ Data Manager and an Optima CT540 16 Slices CT scanner.

The StarGuide system works in three different modes:

1. NM standalone – Generates NM images.
2. NM/CT hybrid – A single NM SPECT scan partnered with the related Hybrid CT protocol with one or more CT acquisition(s), NM and CT series will be included in the same study.
3. CT standalone exams scheduled via CT UI – Generates CT images only.

The StarGuide DICOM implementation allows the user to send Nuclear Medicine image data acquired by NM Camera, which may be partnered with CT image data acquired through the front-end acquisition system, Multi-frame Grayscale Byte SC Objects, created on the NM camera, as well as images, created by SmartConsole™ Application (See Reference C in Section 1.6) to another DICOM Station via to SmartConsole™ Data Manager (See Reference B in Section 1.6).

Note that CT images, X-Ray Radiation Dose Structure Reports and CT Secondary Capture objects are sent by the CT scanner independently (See Reference A in Section 1.6).

StarGuide DICOM implementation also supports receiving Worklist information from a remote AE. They support receiving more than one Scheduled procedure step per study instance.

StarGuide DICOM implementation provides the Storage commitment for the already transferred data following services via SmartConsole™ Data Manager (See Reference B in Section 1.6). This guarantees the user that the acquired data is safely archived for future use.

StarGuide DICOM implementation also provides a verification mechanism by which a remote AE can verify application-level communication of StarGuide DICOM Server. Also provided is a mechanism by StarGuide user can verify application-level communication with a remote AE.

Table 0.1 provides an overview of the network services supported by StarGuide DICOM.

Table 0.1 – NETWORK SERVICES

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Transfer (*)		
Multi-frame Grayscale Byte SC Image Storage	Yes	No
Nuclear Medicine Image Storage	Yes(*)	No
Encapsulated PDF	Yes	No
Computerized Tomography Image Storage	Yes (**)	No
Enhanced SR	Yes (***)	No
X-Ray Radiation Dose SR	Yes (***)	No
Workflow Management		
Storage Commitment Push Model SOP Class	Yes (*)	No

Modality Worklist Information Model – FIND SOP Class	Yes	No

(*) – via SmartConsole™ Data Manager

(**) – CT Images created by CT Scanner .

(***) – CT Radiation Dose SR objects created by CT Scanner, according to CT Scanner configuration

1. INTRODUCTION

1.1 OVERVIEW

The StarGuide is a combination of an NM Camera, SmartConsole™ Data Manager and an Optima CT540 16 Slices CT scanner.

The StarGuide system works in three different modes:

1. NM standalone – Generates NM images.
2. NM/CT hybrid – A single NM SPECT scan partnered with the related Hybrid CT protocol with one or more CT acquisition(s), NM and CT series will be included in the same study.
3. CT standalone exams scheduled via CT UI – Generates CT images only.

The StarGuide DICOM implementation allows the user to send Nuclear Medicine image data acquired by NM Camera, which may be partnered with CT image data acquired through the front-end acquisition system, Multi-frame Grayscale Byte SC and Encapsulated PDF Objects, created on the NM camera, as well as images, created by SmartConsole™ Application (See Reference C in Section 1.6) to another DICOM Station via to SmartConsole™ Data Manager (See Reference B in Section 1.6).

Note that CT images, X-Ray Radiation Dose Structure Reports and CT Secondary Capture objects are sent by the CT scanner independently (See Reference A in Section 1.6).

The StarGuide DICOM implementation allows the user to send images created by SmartConsole™ Application (See Reference C in Section 1.6) to another DICOM Station via SmartConsole™ Data Manager (See Reference B in Section 1.6)

StarGuide DICOM implementation also supports receiving Worklist information from a remote AE. They support receiving more than one Scheduled procedure step per study instance.

StarGuide DICOM implementation provides the Storage commitment for the already transferred data following services via SmartConsole™ Data Manager (See Reference B in Section 1.6). This guarantees the user that the acquired data is safely archived for future use.

StarGuide DICOM implementation also provides a verification mechanism by which a remote AE can verify application-level communication of StarGuide DICOM Server. Also provided is a mechanism by StarGuide user can verify application-level communication with a remote AE.

The DICOM Conformance related to the NM standalone functionality as well as DICOM behavior of the NM/CT hybrid scanning is described in this document.

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 (NM Image Information Object Implementation), which specifies the GEHC equipment compliance to DICOM requirements for the implementation of a NM Image Information Object.

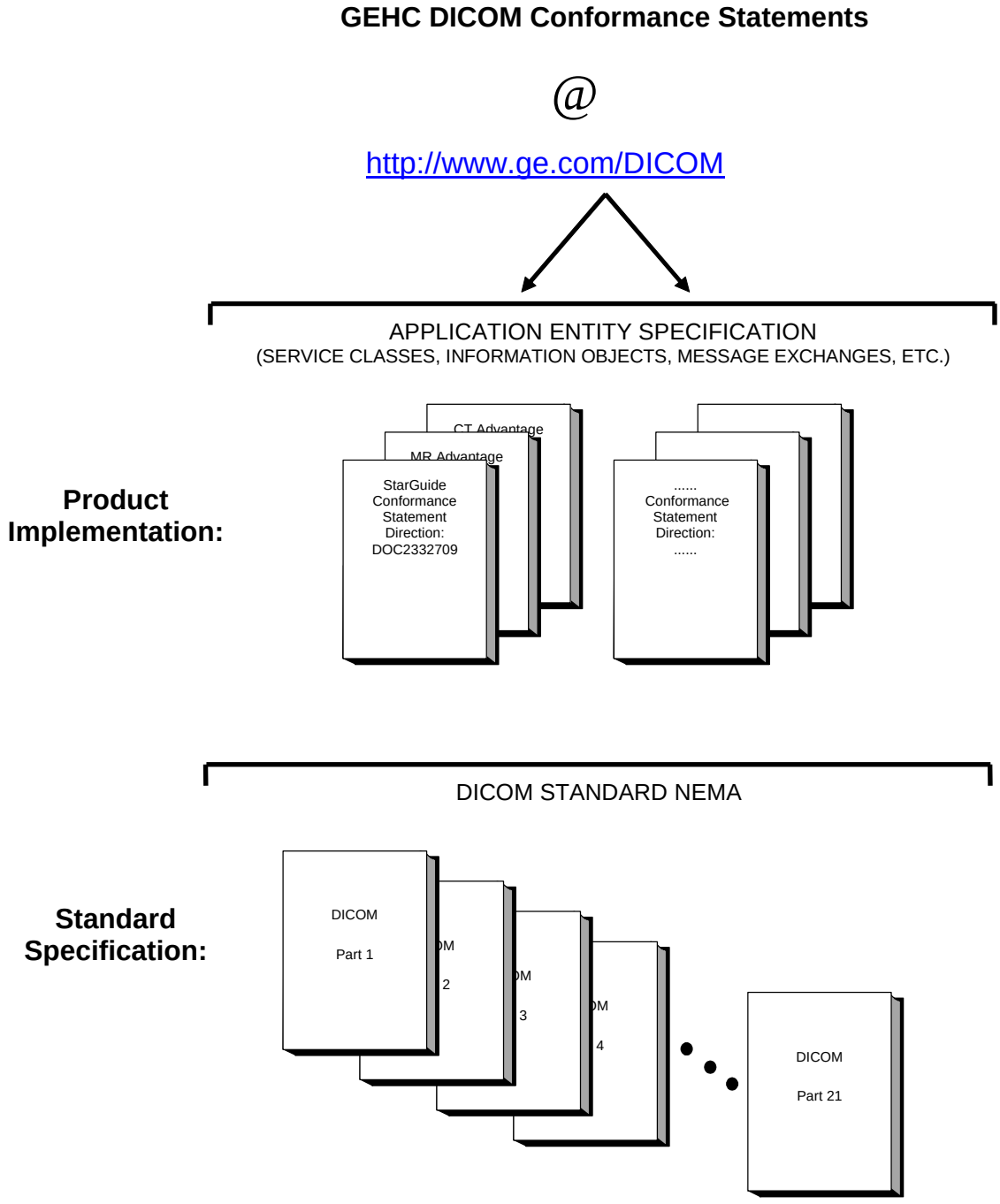
Section 4 (Secondary Capture Image Information Object Implementation), which specifies the GEHC equipment compliance to DICOM requirements for the implementation of a Multi-frame Grayscale Byte SC Information Object.

Section 5 (Encapsulated PDF Information Object Implementation), which specifies the GEHC equipment compliance to DICOM requirements for the implementation of a Encapsulated PDF Information Object.

Section 6 (Modality Worklist Information Model), which specifies the GEHC equipment compliance to DICOM requirements for the implementation of the Modality Worklist service.

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:

StarGuide
Conformance Statement for DICOM
Direction **DOC2332709**

This DICOM Conformance Statement documents the DICOM Conformance Statement and Technical Specification required interoperating 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, 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.

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/
Reference A	DOC1998585,"Optima/BrightSpeed/LightSpeed[16] CT Dicom Conformance Statement"
Reference B	DOC2068936,"SmartConsole™ Data Manager Dicom Conformance Statement"
Reference C	DOC2068940,"SmartConsole™ Application Dicom Conformance Statement"

1.7 DEFINITIONS

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

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

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

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

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

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

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

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

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

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
CT	Computerized Tomography
DHCP	Dynamic Host Configuration Protocol
DICOM	Digital Imaging and Communications in Medicine
DNS	Domain Name System
HIS	Hospital Information System
IOD	Information Object Definition
ISO	International Organization for Standards
JPEG	Joint Photographic Experts Group
LUT	Look-up Table
MWL	Modality Worklist
MPPS	Modality Performed Procedure Step
NM	Nuclear Medicine

□ Optional (Key Attribute)

OSI	Open Systems Interconnection
PACS	Picture Archiving and Communication System
PDU	Protocol Data Unit
PPS	Performed Procedure Step
R	Required (Key Attribute)
RIS	Radiology Information System
RRDR	Radiopharmaceutical Radiation Dose Report
SC	Secondary Capture
SR	Structured Report
SCP	Service Class Provider
SCU	Service Class User
SDO	Series Data Object
SOP	Service-Object Pair

SPS	Scheduled Procedure Step
TCP/IP	Transmission Control Protocol/Internet Protocol
U	Unique (Key Attribute)
UI	User Interface
UL	Upper Layer
VM	Value Multiplicity
VR	Value Representation

2. NETWORK CONFORMANCE STATEMENT

2.1 INTRODUCTION

This section of the DICOM Conformance Statement specifies the StarGuide compliance to DICOM requirements for networking features. Refer to Section 1 for detailed description of products of StarGuide.

This section details the roles and DICOM Service Classes supported by the StarGuide.

The StarGuide DICOM implementation allows the user to send Nuclear Medicine image data acquired by NM Camera, which may be partnered with CT image data acquired through the front-end acquisition system, Multi-frame Grayscale Byte SC Objects, created on the NM camera, as well as images, created by SmartConsole™ Application (See Reference C in Section 1.6) to another DICOM Station via to SmartConsole™ Data Manager (See Reference B in Section 1.6).

In this situation The StarGuide product provides the DICOM C-STORE service as a service class user (SCU).

Note that CT images, X-Ray Radiation Dose Structure Reports and CT Secondary Capture objects are sent by the CT scanner independently (See Reference A in Section 1.6).

The StarGuide DICOM implementation supports receiving Worklist information from a remote AE. The StarGuide DICOM implementation supports scheduling a single Scheduled Procedure Step per study instance (via Worklist or by local scheduling) enabling the acquisition of a single protocol per study.

The StarGuide DICOM implementation supports storage commitment for the already transferred data via SmartConsole™ Data Manager. This guarantees the user that the acquired image data are safely archived for future use. In this situation StarGuide product provides the DICOM Storage Commitment Service as Service Class User (SCU).

StarGuide DICOM implementation also provides a verification mechanism by which a remote AE can verify application-level communication of StarGuide DICOM Server. Also provided is a mechanism by StarGuide user can verify application-level communication with a remote AE.

The StarGuide DICOM Implementation uses three different AE titles: one for the NM Camera, one for SmartConsole™ Data Manager and one for the CT Scanner. A verification mechanism is provided, by which a remote application entity (AE) can verify application-level communication with the NM Camera DICOM Server, SmartConsole™ Data Manager and CT Scanner DICOM server. Also provided is a mechanism by which a StarGuide user can verify application-level communication with a remote DICOM AE. In these situations, StarGuide provides the DICOM C-ECHO service as both a SCP and SCU, respectively, from NM Camera, SmartConsole™ Data Manager and CT Scanner.

2.2 IMPLEMENTATION MODEL

2.2.1 Overview

Three different Application Entities (AE) logically provide all DICOM functionality:

- **CT Scanner DICOM Server AE** for StarGuide CT standalone mode.
- **NM Camera AE** for all other modes of StarGuide product. The NM Camera AE is commanded to perform DICOM services through the use of the NM Camera user interface.
- **SmartConsole™ Data Manager AE** is commanded to perform DICOM services through the use of the SmartConsole™ Data Manager user interface.

The all tree Aes also listen on pre-defined ports for incoming connections from remote DICOM Aes.

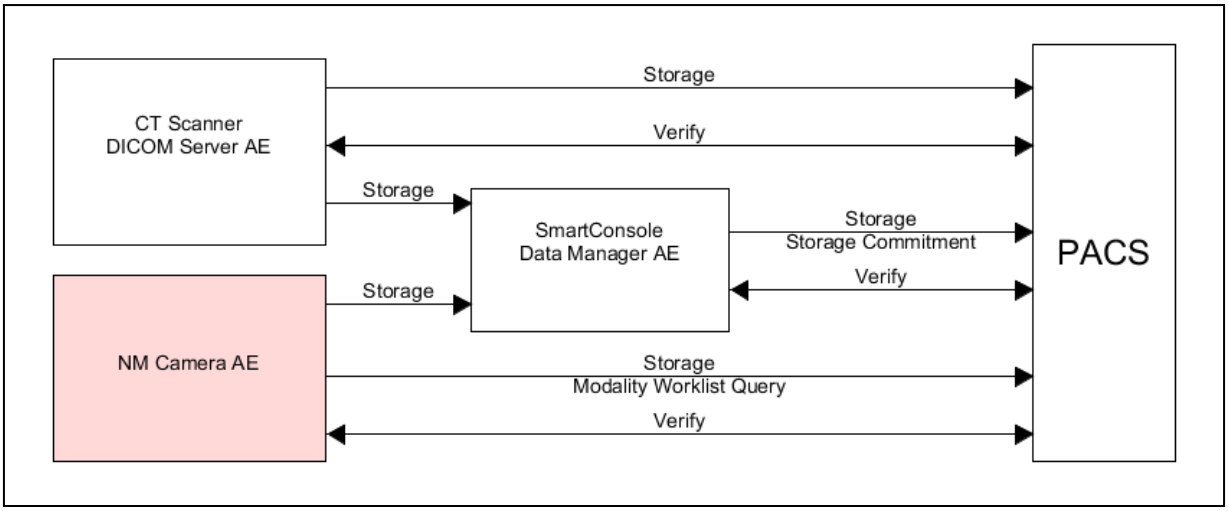
This section describes the only NM Camera Application Entity Implementation Model.

For StarGuide CT Scanner DICOM Server Application Entity Implementation model, refer to CT Scanner DICOM Conformance Statement (Reference A in Section 1.6).

For StarGuide SmartConsole™ Data Manager Application Entity Implementation model, refer to SmartConsole™ Data Manager DICOM Conformance Statement (Reference B in Section 1.6).

2.2.2 Application Data Flow Diagram

The NM Camera AE network application model within the StarGuide DICOM Implementation is shown in the following illustration:



2.2.3 Functional Definition of AE's

The NM Camera Application Entity (AE) initiates the following functions:

- *Storage*: Initiates a DICOM association in order to send images to a SmartConsole™ Data Manager AE. If SmartConsole™ Data Manager AE accepts a presentation context applicable to the image(s) being sent, the NM Camera AE will send the images via the C-STORE service.
- *Verify*: Initiates a DICOM association in order to send a verification message to a SmartConsole™ Data Manager AE via a C-ECHO-RQ message.

- *Modality Work List (MWL)*: Initiates a DICOM association in order to query the work list from a remote AE. If the remote AE accepts a presentation context applicable to the modality work list request being sent, the NM Camera AE will receive appropriate MWL responses via the C-FIND service.

The NM Camera AE responds to the following functions:

- *Verify*: Responds to incoming C-ECHO-RQ messages by returning a C-ECHO-RSP message with a status of "Success."

2.2.4 Sequencing of Real-World Activities

2.2.4.1 Default Protocol Workflow

The NM Camera AE queries the remote station for the Modality Worklist; performs acquisition according to local schedules or by Worklist procedures; notify SmartConsole™ Data Manager about the start of procedure; sends images to SmartConsole™ Data Manager at the end of each scan of the protocol and notify SmartConsole™ Data Manager about the progress of procedure .

2.2.4.2 Local Scheduling

The system either does not have a Modality Worklist Server AE installed or a Modality Worklist Server AE installed but no Worklist information is obtained from HIS/RIS system for the current procedure that is being performed. The information required for performing the procedure is supplied through the user interface of the system.

2.2.4.3 Modality Worklist (MWL)

The system has a Modality Worklist Server AE installed. Work-List information is obtained from HIS/RIS system through the use of Basic Worklist Management Service. The user or the system initiates a MWL query (as a MWL SCU) to the MWL SCP with a given set of query parameters. The MWL SCP returns responses, which match the query parameters.

Items from the returned Worklist responses are presented to the user within Patient Scheduler.

A subset of attributes corresponding to operator selected returned Worklist responses will be included in acquired NM (see sections 3.4). NM Scanner AE transfer this information to CT scanner via internal protocol to include it to CT and CT Radiation Dose SR SOP instances related.

2.2.4.4 Send Images (Manual)

The user has to select data from StarGuide Data Management and select the transfer destination .

2.3 AE SPECIFICATIONS

Note: For CT Scanner DICOM Server AE specifications, refer to CT Scanner DICOM Conformance Statement (Reference A in Section 1.6.)

For SmartConsole™ Data Manager AE Specifications, refer to SmartConsole™ Data Manager DICOM Conformance Statement (Reference B in Section 1.6).

2.3.1 NM Camera AE Specification

The NM Camera 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
Verification SOP Class	1.2.840.10008.1.1	Yes	Yes
Multi-frame Grayscale Byte SC Image Storage	1.2.840.10008.5.1.4.1.1.7.2	Yes	No
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	Yes	No
Encapsulated PDF	1.2.840.10008.5.1.4.1.1.104.1	Yes	No
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	Yes	No

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 NM Camera AE is:

Maximum Length PDU	64234 (Not Configurable)

The SOP Class Extended Negotiation is not supported.

2.3.1.1.2 Number of Associations

The NM Camera AE (SCU) will initiate a single DICOM association to perform a single selected object (study/series/image) send to a remote node. One association is opened per image both in manual send and in auto-send. Multiple Send operations can be performed. The Image Storage Commitment Request (SCU) initiates a new single association for all the images that were successfully stored on the remote AE. NM Camera AE can initiate a maximum of 5 simultaneous associations to remote nodes.

The NM Camera AE (SCP) can accept multiple DICOM associations opened simultaneously to service verifications. The NM Camera AE can support a maximum of 5 simultaneous associations initiated by remote nodes.

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:

NM Camera Implementation UID	**1.2.840.113619.6.450**
NM Camera Implementation Version Name	**NUEVO_4_18_6**

2.3.1.2 Association Initiation Policy

When the NM Camera 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 NM Camera AE 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.

The NM Camera AE initiates a new association in the following cases:

- Due to an image send operation being initiated from the NM Camera user interface, or by auto send option.
- Due to a Verify operation initiated to determine whether the remote DICOM station is operational.
- Due to Modality Worklist request being initiated from the NM Camera user interface

2.3.1.2.1 Real-World Activity Image Send

Note: For description of Real-World Activity Image Send of CT Image(s) created by hybrid scanning in StarGuide DICOM implementation please refer to CT Scanner DICOM Conformance Statement (Reference A in Section 1.6)

For description of Real-World Activity Image Send of NM Images, created by SmartConsole™ Application (see Reference C in Section 1.6), please refer to SmartConsole™ Data Manager DICOM Conformance Statement (See Reference B in Section 1.6).

2.3.1.2.1.1 Associated Real-World Activity

There are two ways to send NM data: manual and automatic. In the manual way, in order to send data, the operator must both select objects (Study/Series/ Image(s)) to be transferred from the Data Management and select a destination.
In the automatic way, when any single acquisition (scan) has been completed (in a NM-only context as well as in the hybrid context) the data is automatically sent to the SmartConsole™ Data Manager; the NM Camera AE will then initiate an association with the SmartConsole™ Data Manager AE in order to send the selected object(s) – one object per association – and will accept and interpret responses received from the SmartConsole™ Data Manager AE.

The UI will indicate the status of the object (Study, Series, Image) being transferred. The status can be one of IN-PROGRESS, SUCCESS, or FAILURE. The associated error messages due to a failed status can be found in system log.

2.3.1.2.1.2 Proposed Presentation Context Table

Presentation Context Table – Proposed by NM Camera AE for "Image Send "Activity					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		

Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	Explicit VR Little Endian Implicit VR Little Endian	1.2.840.10008.1.2.1 1.2.840.10008.1.2	SCU	None
Multi-frame Grayscale Byte SC Storage	1.2.840.10008.5.1.4.1.1.7.2	Explicit VR Little Endian Implicit VR Little Endian	1.2.840.10008.1.2.1 1.2.840.10008.1.2	SCU	None
Encapsulated PDF (**)	1.2.840.10008.5.1.4.1.1.104.1	Explicit VR Little Endian Implicit VR Little Endian	1.2.840.10008.1.2.1 1.2.840.10008.1.2	SCU	None

2.3.1.2.1.2.1 SOP Specific DICOM Conformance Statement for All Storage SOP Classes

The NM Camera AE implementation includes optional data elements in the SOP Instances as described in Section 33 and Section 0.

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

All the operations used by this SOP class support an **Association Timer.** This timer is started when the association request is sent, and is stopped when the respective response is received. The default time-out value is 60 seconds and is not configurable.

Each C-STORE operation also supports an **Operation Inactivity Timer**. This time-out starts once the first C-STORE
request has been issued (on association) or received and is reset each time a C-STORE response has been received or
when subsequent C-STORES are sent. This time-out is 5 minutes. It is non-configurable.
If any of the two timers mentioned above expires, the connection is closed and the operation in progress is considered failed.

Upon receiving a C-STORE confirmation containing a status other than Successful or Warning, this implementation will consider the current request to be a failure but will continue to attempt to send any remaining images in the request on a different association.

When NM Camera AE initiates an association to issue a C-STORE, the image will be transmitted by the NM Camera AE with the same elements as was created locally.

Transfer log shows one of these statuses for store request: JOB_SUCCEEDED, JOB_FAILED, JOB_IN_PROGRESS. The specific error codes can be observed in the log.

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

Service Status	Status Code	Further Meaning	Application Behavior When Receiving Status Code
Failure	A700-A7FF	Refused: Out of resources	The message " JOB FAILED: error sending image" is displayed in Transfer Log.
	A900-A9FF	Error: Data Set does not match SOP Class	The message " JOB FAILED: error sending image" is displayed in Transfer Log
	C000-CFFF	Error: Cannot Understand	The message " JOB FAILED: error sending image" is displayed in Transfer Log
	0122	SOP Class Not Supported	The message " JOB FAILED: error sending image" is displayed in Transfer Log
Warning	B000	Coercion of Data Elements	The message "JOB SUCCEEDED" posted to the Transfer Log.

	B006	Elements Discarded	The message "JOB SUCCEEDED" posted to the Transfer Log.
	B007	Data Set does not match SOP Class	The message "JOB SUCCEEDED" posted to the Transfer Log.
Success	0000		The message "JOB SUCCEEDED" posted to the Transfer Log.
*	*	Any other status code.	The message " JOB FAILED: error sending image" is displayed in Transfer Log.

2.3.1.2.2 Real-World Activity Modality Worklist Query SCU

Note: For NM standalone exams and NM/CT hybrid exams the Worklist query is performed via the NM Camera Operator Console screen. Worklist for CT standalone scanning is performed via CT Scanner Operator Console. For Real World activity: Worklist Query for CT standalone please refer to CT Scanner DICOM Conformance Statement (Reference A in Section 1.6) .

2.3.1.2.2.1 Associated Real-World Activity

NM Camera AE queries the remote AE for a Modality Worklist (MWL) in the following cases:

- When NM Camera application is started, MWL query is automatically performed for updating entries displayed in the NM Camera Patient Scheduler.
- Automatically after each pre-defined time period (10 second) if auto-refresh is set to "On"
- User opens "Search Worklist" button in NM Camera Patient Scheduler UI. Search Modality Worklist dialog is opened, user defines relevant MWL matching keys and presses on "Search" button.
- User presses on "Refresh Worklist" button in NM Camera Patient Scheduler UI.
- User opens "Filter..." button in NM Camera Mapping Utility UI. MWL Filter dialog is opened, user defines relevant MWL matching keys and presses on "Query" button.
- Users requires MWL query using latest MWL matching keys defined to map of the MWL Requested or Scheduled Procedures to the NM Camera acquisition protocols .

2.3.1.2.2.2 Proposed Presentation Context Table

Presentation Context Table – Proposed by NM Camera AE for Modality Worklist Query SCU Activity					
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 Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2	SCU	None

2.3.1.2.2.2.1 SOP Specific DICOM Conformance Statement for the Modality Worklist Information Model – FIND SOP Class

The NM Camera includes matching keys in the Modality Worklist queries as described in Section 5.

If Modality Worklist query failed, the user receives a notification message.

All the operations used by this SOP class support an **Association Timer**. This timer is started when the association request is sent, and is stopped when the respective response is received. The default time-out value is 10 seconds, and is not configurable.

All the operations used by this SOP class support a **Session Timer**. This timer is started when the association is established, and stopped when association is ended. The default time-out value is 180 seconds.

If any of the two timers mentioned above expires, the connection is closed and the operation in progress is considered failed

Sending C-FIND CANCEL is not supported by the NM Camera AE.

When receiving empty list, empty list will display both in Patient Scheduler and Search dialog.
For missing tag that was requested in the Query, a dialog stating the invalid record and Reason will be displayed.

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
Failure	A700	Refused: Out of resources	User receives a notification message. Only locally scheduled studies or studies which acquisition is in progress are displayed in the NM Camera Patient Scheduler
	A900	Error: Identifier does not match SOP Class	User receives a notification message. Only locally scheduled studies or studies which acquisition is in progress are displayed in the NM Camera Patient Scheduler
	C000-CFFF	Error: Unable to process	User receives a notification message. Only locally scheduled studies or studies which acquisition is in progress are displayed in the NM Camera Patient Scheduler
	0122	SOP Class Not Supported	User receives a notification message. Only locally scheduled studies or studies which acquisition is in progress are displayed in the NM Camera Patient Scheduler
Cancel	FE00	Matching terminated due to cancel	Not Applicable
Success	0000	Matching is complete – No final identifier is supplied	All accepted MWL entries, received from MWL SCP system, along with locally scheduled studies or studies which acquisition is in progress are displayed in the NM Camera Patient Scheduler
Pending	FF00	Matches are continuing – Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys.	“MWL query is in progress” notification is displayed along with MWL query progress indicator.
	FF01	Matches are continuing –	“MWL query is in progress” notification is

*		Warning that one or more Optional Keys were not supported for existence for this Identifier	displayed along with MWL query progress indicator.
	*	Any other status code.	User receives a notification message. Only locally scheduled studies or studies which acquisition is in progress are displayed in the NM Camera Patient Scheduler

2.3.1.2.3 Real-World Activity Verify SCU

Note: For CT scanner AE Real Time Activity Verify SCU refer to CT Scanner DICOM Conformance Statement (Reference A in Section 1.6).

For SmartConsole™- Real Time Activity Verify SCU refer to to SmartConsole™ Data Manager DICOM Conformance Statement (See Reference B in Section 1.6)

2.3.1.2.3.1 Associated Real-World Activity

Service personnel invoke the DICOM Station Configuration Utility from NM Camera UI. The user selects any of defined remote DICOM AE and presses on "Dicom Echo" button. The NM Camera AE initiates an association with the remote DICOM AE in order to verify communication at the application level. The success or failure of the verification process is displayed to the user.

2.3.1.2.3.1.1 Proposed Presentation Context Table

Presentation Context Table – Proposed by NM Camera AE for Verify SCU Activity					
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	1.2.840.10008.1.2	SCU	None

2.3.1.2.3.1.2 SOP Specific DICOM Conformance Statement for Verification SOP Class

The NM Camera AE provides standard conformance to the DICOM Verification Service Class.
All the operations used by this SOP class support an Association Timer. This timer is started when the association request is sent, and is stopped when the respective response is received. The default time-out value is 20 seconds and is not configurable.

2.3.1.3 Association Acceptance Policy

The NM Camera AE places no limitation on whom may connect to it. The maximum number of associations accepted in parallel is limited to 5.
Any remote AE can open an association to the NM Camera AE for the purpose of application level communication verification.

2.3.1.3.1 Real-World Activity Verify SCP

2.3.1.3.1.1 Associated Real-World Activity

The NM Camera AE is always listening for associations. No operator action is required to respond to a Verification request.

The real-world activity associated with the Verification request is to send a C-ECHO-RSP message with a status of "Success" to the requesting AE.

2.3.1.3.1.2 Accepted Presentation Context Table

Presentation Context Table – Accepted by NM Camera AE for Verify SCP Activity					
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	1.2.840.10008.1.2	SCP	None

2.3.1.3.1.2.1 SOP Specific DICOM Conformance Statement for Verification SOP Class

The NM Camera AE provides standard conformance to the DICOM verification service class.

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 Linux Operating System.

2.4.2 Physical Media Support

Ethernet 802.3 provides the physical network layer for this product.

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 3.4.6.19.

2.5.1.2 Private SOP Classes

The StarGuide system does not implement any Private SOP Class.

2.5.2 Private Transfer Syntaxes

The StarGuide system does not implement any Private transfer syntax.

2.5.3 Additional Protocols

The StarGuide system supports DHCP Protocol.

2.5.4 Ipv4 and Ipv6 Support

The StarGuide system supports Ipv4 only.

2.6 CONFIGURATION

The StarGuide systems are configured by GE Healthcare Field Service Engineers. The DICOM configuration items below are configurable or re-configurable by a Field Service Engineer but are not accessible through the implementation user interface.

2.6.1 AE Title/Presentation Address Mapping

The StarGuide systems allow for the configuration of the mapping of remote AE titles to IP addresses and ports. The IP address of a remote AE may be in a different subnet (using routing). A router is configurable to ensure communication from one sub-net to another. This configuration is performed by GE Healthcare Field Service Engineers.

2.6.2 Configurable Parameters

The following fields are configurable for NM Camera AE (local):

- Local AE Title

Note: Listening Port Number (default value is 4006), PDU length and any time-outs are not configurable for NM Camera AE. The configuration of IP routers and subnet mask is available on a OS level.

The following fields are configurable for every remote DICOM AE:

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

Note: All configurations must be performed by a GE Field Engineer. The DICOM configuration items are configurable or re-configurable by a Field Service Engineer but are not accessible through the NM Camera user interface.

2.7 SUPPORT OF EXTENDED CHARACTER SETS

The NM Camera AE supports only a single single-byte extended character set ISO_IR 100 (Latin alphabet Number 1 supplementary set.

The NM Camera user interface will allow the user to enter characters from the console keyboard that is within ASCII or the configured extended character set. The product specifies ISO_IR 100 (Latin alphabet Number 1) extended character set in Specific Character Set (0008,0005) whether any such extended characters are included in SOP Instances or not.

The product will accept, as a Modality Worklist SCU, Scheduled Procedure Step Identifiers with any value of Specific Character Set (0008,0005) defined by DICOM standard. It will map that Specific Character Set value without change into the images created pursuant to that Scheduled Procedure Step. Text attributes of the Scheduled Procedure Step Identifier, including Patient and Physician names that include extended characters will be displayed as described above. If Modality Worklist entries do not contain Specific Character Set (0008,0005) value, the NM Camera AE adds ISO_IR 100 (Latin alphabet Number 1) extended character set in Specific Character Set (0008,0005) to the images created pursuant to that Scheduled Procedure Step.

2.8 CODES AND CONTROLLED TERMINOLOGY

2.8.1 Fixed Coded Terminology

The NM Camera AE uses the fixed (non-configurable, non-extensible) coded terminology in NM Image SOP Instance as described in Section 3.

The NM Camera DICOM implementation is capable of supporting arbitrary coding schemes for Procedure and Protocol Codes. During installation, a service technician will establish a mapping between the site-specific codes and the Protocol Names used internally to identify acquisition protocols. A remote AE station configured to act as Worklist provider is configured to map according to one of the DICOM tags:

- (0040,0007) – Scheduled Procedure Step Description
- (0032,1060) – Requested Procedure Description
- (0040,0008) – Scheduled Protocol Code Sequence

2.8.2 Mapped Coded Terminology

The product does not use any mapped coded terminology

2.8.3 Configurable Coded Terminology

The product does not use any configurable coded terminology

2.9 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:

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))

3. NM INFORMATION OBJECT IMPLEMENTATION

3.1 INTRODUCTION

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

3.2 NM CAMERA MAPPING OF DICOM ENTITIES

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

TABLE 3-1
MAPPING OF DICOM ENTITIES TO NM CAMERA ENTITIES

DICOM IE	NM Camera Entity
Patient	Patient
Study	Study
Series	Series
Image	Dataset

3.3 IOD MODULE TABLE

The Nuclear Medicine 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 3.4.6.19.

TABLE 3-2
NM IMAGE IOD MODULES

Entity Name	Module Name	Usage	Reference
Patient	Patient	Used	3.4.1.1
	Clinical Trial Subject	Not Used	N/A
Study	General Study	Used	3.4.2.1
	Patient Study	Used	3.4.2.2
	Standard Extended Study	Used	3.4.2.3
	Private Study	Used	3.4.2.4
	Clinical Trial Study	Not Used	N/A
Series	General Series	Used	3.4.3.1
	Clinical Trial Series	Not Used	N/A
	Standard Extended Series	Used	3.4.3.2
	NM/PET Patient Orientation	Used	3.4.3.3

	Private Series	Used	3.4.3.4
Frame of Reference	Frame of Reference	Used for images where Image Type (0008,0008) Value 3 is TOMO or GATED TOMO	3.4.4.1
Equipment	General Equipment	Used	3.4.5.1
Image	General Image	Used	3.4.6.1
	Image Pixel	Used	3.4.6.2
	Acquisition Context	Used for Cardiac SPECT images only	3.4.6.3
	Device	Not Used	N/A
	NM Image Pixel	Used	3.4.6.4
	Specimen	Not Used	N/A
	Multi-frame	Used	3.4.6.5
	NM Multi-frame	Used	3.4.6.6
	NM Image	Used	3.4.6.7
	NM Isotope	Used	3.4.6.8
	NM Detector	Used	3.4.6.9
	NM Tomo Acquisition	Used for images where Image Type (0008,0008) Value 3 is TOMO or GATED TOMO	3.4.6.10
	NM Multi-gated Acquisition	Used for images where Image Type (0008,0008) Value 3 is GATED TOMO	3.4.6.11
	Overlay Plane	Not Used	N/A
	Multi-frame Overlay	Not Used	N/A
	VOI LUT	Used	3.4.6.12
	SOP Common	Used	3.4.6.13
	Frame Extraction	Not Used	N/A
	Private Image	Used	3.4.6.14
	Private NM Image	Used	3.4.6.15
	Private Image Tomo	Used for images where Image Type (0008,0008) Value 3 is TOMO or GATED TOMO	3.4.6.16
	Private Image Multi-Gated	Used for images where Image Type (0008,0008) Value 3 is GATED TOMO	3.4.6.17
	Private Image GSPECT	Used for images where Image Type (0008,0008) Value 3 is GATED TOMO	3.4.6.18
	Private Dynamic SPECT	Used	3.4.6.19

3.4 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 NM 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 which are not present in tables are not supported.

NM Camera private attributes are defined in private modules, each of which follows the related Standard module. Private data element tags are assigned following the rules given in Part 5 of the DICOM v3.0 Standard, and are identified using the (gggg, xxee) format, where xx represents a reserved block of element numbers within the group gggg.

Note that any element not listed in table(s) means that it is not supported (not stored in the created images).

3.4.1 Patient Entity Modules

3.4.1.1 Patient Module

TABLE 3-3
PATIENT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Patient's Name	(0010,0010)	2	Patient's full name. Compound from user Last Name and First Name for locally scheduled protocols (*)(**)(***)
Patient ID	(0010,0020)	2	Primary hospital identification number or code for the patient. (*)(**)(***)
Issuer of Patient ID	(0010,0021)	3	Not Used
Patient's Birth Date	(0010,0030)	2	Birth date of the patient. (*)(**)(***) Sent as ZERO LENGTH value if value is not received from user input.
Patient's Sex	(0010,0040)	2	Sex of the named patient. (*)(**)(***) Enumerated Values: M = male F = female O = other Always sent as non-empty value
Other Patient Names	(0010,1001)	3	Not Used
Issuer of Patient ID Qualifiers Sequence	(0010,0024)	3	Not Used

Note 1 : *(*) - Attributes copied from the Worklist if the study source was actually copied from a Worklist query result.*
Note 2 : *(**) - Attributes copied from the user input for Locally scheduled Protocols*
Note 3 : *(***) - Cannot be modified by user if meaningful value is received from MWL*

3.4.2 Study Entity Modules

3.4.2.1 General Study Module

TABLE 3-4
GENERAL STUDY MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Study Instance UID	(0020,000D)	1	Unique identifier for the Study.(*)(***) Generated by the system for Locally Scheduled protocols
Study Date	(0008,0020)	2	Date the Study started.
Study Time	(0008,0030)	2	Time the Study started.
Accession Number	(0008,0050)	2	A RIS generated number that identifies the order for the Study. (*)(**) Sent as ZERO LENGTH value if value is not received from user input.
Referring Physician's Name	(0008,0090)	2	Name of the patient's referring physician. (*)(**) Sent as ZERO LENGTH value if value is not received from user input.
Study ID	(0020,0010)	2	User or equipment generated Study identifier.(**) Always sent as non-empty value.
Study Description	(0008,1030)	3	Study Description. (*)(**) Taken from last part of the protocol name Copied from Requested Procedure Description (0032,1060) of the first SPS in the study when read from Worklist Sent as ZERO LENGTH value if value is not received neither from MWL nor from user input User can modify value received from MWL.
Procedure Code Sequence.	(0008,1032)	3	Procedure Code Sequence.(*) Mapped without change from Modality Worklist Requested Procedure Code Sequence (0032,1064).
> Include 'Code Sequence Macro'			
Referenced Study Sequence	(0008,1110)	3	Referenced Study Sequence.(*) Only a single item is permitted in this sequence, if sent. Copied from 1st valid item of Referenced Study Sequence sent in Worklist. If no valid items exist, not sent. May present in locally protocols appended to study with already scheduled MWL

			protocol.
>Include 'SOP Instance Reference Macro'			
Name of Physician(s) Reading Study	(0008,1060)	3	Names of the physician(s) reading the Study.(**) First Name and/or Last Name are copied from user input if entered, otherwise sent as ZERO LENGTH.

Note 1 : (*) - Attributes copied from the Worklist if the study source was actually copied from a Worklist query result.
Note 2 : (**) - Attributes copied from the user input for Locally scheduled Protocols
Note 3 : (***) - Cannot be modified by user if received from MWL

3.4.2.2 Patient Study Module

TABLE 3-5
PATIENT STUDY MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Admitting Diagnoses Description	(0008,1080)	3	Description of the admitting diagnosis (diagnoses) (*)(**) Sent as ZERO LENGTH value if value is not received from user input for locally scheduled protocols
Patient's Age	(0010,1010)	3	Age of the Patient Calculated from Patient Birth Date if Patient Birth Date is not empty. Not sent is Patient Birth Date is not defined. Cannot be updated if Patient Birth Date is entered from MWL.
Patient's Size	(0010,1020)	3	Length or size of the Patient, in meters. (*)(**) Sent as ZERO LENGTH value if value is not received from user input.
Patient's Weight	(0010,1030)	3	Length or size of the Patient, in meters. (*) (**) Sent as ZERO LENGTH value if value is not received either from MWL or from user input. User can modify value received from MWL
Allergies	(0010,2110)	3	Weight of the Patient, in kilograms.(*) (**) Sent as ZERO LENGTH value if value is not received either from MWL or from user input. User can modify value received from MWL
Pregnancy Status	(0010,21C0)	3	Describes pregnancy state of patient. (*)(**) Enumerated Values: 0001 = not pregnant 0002 = possibly pregnant 0003 = definitely pregnant 0004 = unknown Sent as "unknown" if value is not received from user input and if tag (0010,1040) – Patient's Sex – is other than "F" (Female)

Note 1 : (*) - Attributes copied from the Worklist if the study source was actually copied from a Worklist query result.

Note 2 : *(**) - Attributes copied from the user input for Locally scheduled Protocols*

3.4.2.3 Standard Extended Study Module

TABLE 3-6
STANDARD EXTENDED STUDY MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Requested Procedure Comments	(0040,1400)	3	User-defined Study notes Sent as ZERO LENGTH value if value is not received from user input

3.4.2.4 Private Study Module

TABLE 3-7
PRIVATE STUDY MODULE ATTRIBUTES

Attribute Name	Tag	Private Creator ID	Attribute Description
Auto-Processing Application	(0009,xx1E)	QUASAR_INTERNAL_USE	Auto-Processing Application Description. Sent as ZERO-LENGTH if Auto-processing is not defined for protocol.
Acquisition flag	(0009,xx42)	QUASAR_INTERNAL_USE	Used for indicating if the study is acquired. Always sent. Default Value “acquired”
Patient Unique Key	(0009,xx39)	QUASAR_INTERNAL_USE	Patient unique key. Always sent with non-empty value.

3.4.3 Series Entity Modules

3.4.3.1 General Series Module

TABLE 3-8
GENERAL SERIES MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	1	Type of equipment that originally acquired the data used to create the images in this Series. Defined Terms used for data created on this system: NM = Nuclear Medicine
Series Instance UID	(0020,000E)	1	Internally generated unique identifier of the Series.
Series Number	(0020,0011)	2	A number that identifies this Series. Internally generated
Laterality	(0020,0060)	2C	Laterality of (paired) body part examined. Copied from the user input. Not sent if value is not received from user input. Enumerated Values: R = right L = left

Performing Physicians' Name	(0008,1050)	3	Name of the physician(s) administering this Series. (*) (**) Sent as empty string if no user input provided.
Protocol Name	(0018,1030)	3	User-defined description of the conditions under which the Series was performed. The full path of the performed protocol name. E.g. User&Brain&DaTSCAN_RBM Always sent with non-empty value.
Series Description	(0008,103[E])	3	Description of the Series Based on the acquired Scan name. Always sent.
Operators' Name	(0008,1070)	3	Name(s) of the operator(s) supporting the Series Copied from user input. Sent as empty string if no user input provided.
Referenced Performed Procedure Step Sequence	(0008,1111)	3	Uniquely identifies the Performed Procedure Step SOP Instance to which the Series is related. The sequence has exactly 1 item. Sequence is added to all image(s) created by system. Always sent.
>Referenced SOP Class UID	(0008,1150)	1	Set to "1.2.840.10008.3.1.2.3.3"
>Referenced SOP Instance UID	(0008,1155)	1	Uniquely identifies the referenced SOP Instance. Internally generated.
Body Part Examined	(0018,0015)	3	Text description of the part of the body examined. Sent as empty string if no user input provided or user input is "NONE" Defined Terms used on this system: ABDOMEN ANKLE ARM BREAST CHEST CLAVICLE COCCYX CSPINE ELBOW EXTREMITY FOOT HAND HEAD HEART HIP JAW KNEE LEG LSPINE NECK PELVIS SHOULDER SKULL SSPINE

			TSPINE WHOLEBODY NECKCHESTABDPERV
Request Attributes Sequence	(0040,0275)	3	Sequence that contains attributes from the Imaging Service Request. The sequence has exactly 1 item. Used when Series as created as result of MWL request or protocol, appended to MWL request, not sent otherwise.
>Requested Procedure ID	(0040,1001)	1C	Identifier that identifies the Requested Procedure in the Imaging Service Request.(*)
>Accession Number	(0008,0050)	3	A RIS generated number that identifies the order for the Study(*) May be updated by user manually.
>Study Instance UID	(0020,000D)	3	Unique identifier for the Study. (*)(***)
>Referenced Study Sequence	(0008,1110)	3	Uniquely identifies the Study SOP Instances associated with this SOP Instance. The sequence has exactly 1 item. (*)(***)
>> Include 'SOP Instance Reference Macro'			
>Requested Procedure Description	(0032,1060)	3	Institution-generated administrative description or classification of Requested Procedure. (*)(***)
>Requested Procedure Code Sequence	(0032,1064)	3	Not Used
>Scheduled Procedure Step ID	(0040,0009)	1C	Identifier that identifies the Scheduled Procedure Step.(*)(***)
>Scheduled Procedure Step Description	(0040,0007)	3	Institution-generated description or classification of the Scheduled Procedure Step to be performed.(*)(***)
>Scheduled Protocol Code Sequence	(0040,0008)	3	Sequence describing the Scheduled Protocol following a specific coding scheme.(*)(***) The sequence has exactly 1 item. If MWL request contains more than 1 item, only the first valid item is copied.
>>Include 'Code Sequence Macro'			
Comments on the Performed Procedure Step	(0040,0280)	3	User-defined comments on the Performed Procedure Step.(**) Sent as empty string if no user input provided.
Performed Procedure Step ID	(0040,0253)	3	Equipment generated identifier of the protocol carried out within this step. The PPS ID is unique within a study. For MWL scheduled protocols set with "W_" + <SPS ID>. For locally scheduled protocols set with "L_" + numbered id starting from 1 (L_1, L_2). Sent as empty string for QC protocols. Always sent.
Performed Procedure Step Start Date	(0040,0244)	3	The date that the protocol (SPS) acquisition actually started (doesn't matter if the protocol originated from MWL or was locally scheduled). A locally scheduled protocol is an SPS that is created/added in the camera. Always sent.

Performed Procedure Step Start Time	(0040,0245)	3	The time that the protocol (SPS) acquisition actually started (doesn't matter if the protocol originated from MWL or was locally scheduled). A locally scheduled protocol is an SPS that is created/added in the camera. Always sent
Performed Procedure Step Description	(0040,0254)	3	The full path of the performed protocol name. E.g. User&Brain&DaTSCAN_RBM Always sent
Performed Protocol Code Sequence	(0040,0260)	3	Not Used Assisted protocol setting is not supported

Note 1 : (*) *– Attributes copied from the Worklist if the study source was actually copied from a Worklist query result (if available).*

Note 2 : (**) *– Attributes copied from the user input for Locally scheduled Protocols*

Note 3 : (***) *– Cannot be modified by user if received from MWL*

3.4.3.2 Standard Extended Series Module

TABLE 3-9
STANDARD EXTENDED SERIES MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Patient Position	(0018,5100)	3	Patient position descriptor relative to the Equipment: The Defined Terms are: HFS = Head First-Supine FFS = Feet First-Supine Attribute is copied from the user input. Not sent, if another Patient Position is used for acquisition.

3.4.3.3 NM/PET Patient Orientation Module

TABLE 3-10
NM/PET PATIENT ORIENTATION MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Patient Orientation Code Sequence	(0054,0410)	2	Describes the orientation of the patient with respect to gravity. Contains 1 items if Patient Position is one of the following: HFS = Head First-Supine FFS = Feet First-Supine Otherwise contain 0 items.
>Include Code Sequence Macro			CID 19 "Patient Orientation". Code Meaning (0008,0104) shall be Type 3 for historical reasons. Always code meaning "recumbent" is sent:

			(SCT, 102538003) (SRT, F-10450)
> Patient Orientation Modifier Code Sequence	(0054,0412)	2C	Patient Orientation Modifier. Required if needed to fully specify the orientation of the patient with respect to gravity. Contains exactly 1item, if sent
>>Include 'Code Sequence Macro'			CID 20 "Patient Orientation Modifier". Code Meaning (0008,0104) shall be Type 3 for historical reasons. The following code meanings are supported "supine": (SCT, 40199007) (SRT, F-10340)
Patient Gantry Relationship Code Sequence	(0054,0414)	2	Describes the orientation of the patient with respect to the gantry. Contains 1 item if Patient Position is one of the following: HFS = Head First-Supine FFS = Feet First-Supine Otherwise contain 0 items.
>Include Code Sequence Macro			CID 21 "Patient Equipment Relationship". Code Meaning (0008,0104) shall be Type 3 for historical reasons. The following code meanings are supported: • "headfirst" : (SCT, 102540008) (SRT, F-10470) • "feet-first" (SCT, 102541007) (SRT, F-10480)

3.4.3.4 Private Series Module

TABLE 3-11
PRIVATE SERIES MODULE ATTRIBUTES

Attribute Name	Tag	Private Creator ID	Attribute Description
Sequence Type	(0009,xx13)	QUASAR_INTERNAL_USE	Acquired Sequence Type. Always sent as non-empty value
Sequence Name	(0009,xx14)	QUASAR_INTERNAL_USE	Acquired Sequence Name. Always sent as non-empty value
Protocol Scheduled Date	(0009,xx40)	QUASAR_INTERNAL_USE	Protocol Scheduled Date.(*) Set to Study Date for locally scheduled protocols Taken from the SPS Start date of the first SPS in the study – Tag (0040,0002) – for MWL scheduled protocols. Always sent
Protocol Scheduled Time	(0009,xx41)	QUASAR_INTERNAL_USE	Protocol Scheduled Time.(*) Set to Study Date for locally scheduled protocols

			Taken from the SPS Start time of the first SPS in the study – Tag (0040,0003) – for MWL scheduled protocols. Always sent
Private SPS ID	(0009,xx44)	QUASAR_INTERNAL_USE	Sent empty for images of locally scheduled protocols and appended to originally locally scheduled protocols.
Pre-Medication	(0009,xx45)	QUASAR_INTERNAL_USE	Keeps the Pre-Medication from Protocol settings.(*)(**)Sent as empty string if not received from user input.
Anatomic Reference	(0009,xx48)	QUASAR_INTERNAL_USE	Keeps the anatomic reference for the specific scan.(**) Not sent if not received from user input.
Series Data Sequence	(0033,xx70)	GEMS_XELPRV_01	Sequence of item contains information about acquisition parameters. May contain from 1 or more items. Each item describes specific parameters set.
>Object Type	(0033,xx08)	GEMS_XELPRV_01	Object Type. Contains string “SERIES DATA “
>Modified Flag	(0033,xx10)	GEMS_XELPRV_01	Default value = 0 (Not Modified)
>Name	(0033,xx11)	GEMS_XELPRV_01	SDO Name
>Database Object Unique ID	(0033,xx16)	GEMS_XELPRV_01	Database UID of SDO; contains value of SDO UID tag (0033,xx72) generated at time of object creation.
>Date	(0033,xx17)	GEMS_XELPRV_01	SDO Creation date
>Time	(0033,xx18)	GEMS_XELPRV_01	SDO Creation time
>Series Data Flags	(0033,xx19)	GEMS_XELPRV_01	SDO Flags. Default value = 0
>Protocol Name	(0033,xx1A)	GEMS_XELPRV_01	Name of Protocol created SDO
>Relevant Data UID	(0033,xx1B)	GEMS_XELPRV_01	UID(s) of SOP Instance(s) relative to SDO
>Bulk Data	(0033,xx1C)	GEMS_XELPRV_01	SDO parameter(s) stored as binary buffer(s)
>Int Data	(0033,xx1D)	GEMS_XELPRV_01	List of SDO parameters stored as integers
>Double Data	(0033,xx1E)	GEMS_XELPRV_01	List of SDO parameters stored as doubles
>String Data	(0033,xx1F)	GEMS_XELPRV_01	List of SDO parameters stored as list of strings
>Bulk Data Format	(0033,xx20)	GEMS_XELPRV_01	Format of bulk parameters; contains information about name and size of bulk buffers
>Int Data Format	(0033,xx21)	GEMS_XELPRV_01	Format of integer parameters; contains information about name and number of integers in list
>Double Data Format	(0033,xx22)	GEMS_XELPRV_01	Format of double parameters; contains information about name and number of doubles in list
>String Data Format	(0033,xx23)	GEMS_XELPRV_01	Format of string parameters; contains information about name and number of strings in list

>Description	(0033,xx24)	GEMS_XELPRV_01	User or equipment generated SDO description
>SDO Private SOP Class UID	(0033,xx71)	GEMS_XELPRV_01	SDO Private SOP Class UID- "1.2.840.113619.4.17"
>SDO Instance UID	(0033,xx72)	GEMS_XELPRV_01	SDO Instance UID; Internally generated

Note 1 : (*) *– Attributes copied from the Worklist if the study source was actually copied from a Worklist query result (if available)*

Note 2 : (**) *– Attributes copied from the user input for Locally scheduled Protocols*

3.4.4 Frame Of Reference Entity Modules

3.4.4.1 Frame Of Reference Module

This section specifies the Attributes necessary to uniquely identify a Frame Of Reference which insures the spatial relationship of Images within a Series. It also allows Images across multiple Series to share the same Frame Of Reference. This Frame Of Reference (or coordinate system) shall be constant for all Images related to a specific Frame Of Reference.

A hybrid CT/NM scan is composed of a single NM scan partnered with one or more CT scans. The two modalities share the same imaging space and the body imaged by the two modalities is represented, in most of the cases, by spatially aligned images. There are situations for which optimal NM imaging and optimal CT imaging impose changing the table height during the hybrid scan. In this case, the imaging space of both modalities remains the same, but the NM and CT images of the body are no longer spatially aligned. In order to prevent accidental fusion of such images, the same Frame Of Reference UID value shared by two series of different modalities will show that the images are spatially related and that the imaged body was scanned spatially aligned between the two images.

With this approach the handling of Frame Of Reference UID is done as follows:

1. In all combinations, images acquired with the same landmark and same table height will have the same Frame of Reference UID value. The generated images are "inherently" aligned.

2. StarGuide uses:
   i. In NM Images a private tags named "Acquisition Parent UID" (0011,xx31) Private Creator "GEMS_GENIE_1" :
   ii. In NM Images and CT images it is (0031, xx02) Private Creator "GEHC_HYBRID_01".

   All the images (NM projections and CT slices obtained by on-the-fly reconstruction or retrospective reconstruction) resulting from scans defined as part of a single hybrid procedure and using the same landmark shall have the same Acquisition Parent UID value. Hence, when the operator sets a new CT landmark, overriding the landmark set on NM persistence or during a previous CT scan belonging to the same hybrid procedure, a new value is assigned to the Acquisition Parent UID attribute. The Acquisition Parent UID attribute allows Xeleris workstation, or other Image Displayer implementations, to check that CT and NM series were acquired as part of the same hybrid procedure and are using the same landmark.

3. When NM is acquired first, and the CT series is acquired at a different table height than used by NM, but with same landmark, then the CT series will get a different Frame Of Reference UID value than that used by NM, but the same Acquisition Parent UID value as NM. This shows that the imaged body in no longer aligned between the two modalities, although they have been acquired by a single hybrid scan (using the same imaging space). In this case, image registration must be applied in order to register the two modalities. The information stored by each modality in Table Height (0018,1130) can be used in this registration process.

4. When CT is acquired first, and the NM series is acquired at a different table height than used by CT, but with same landmark, the NM series will get the same Frame Of Reference UID value than that used by CT, the same Acquisition Parent UID value as CT and the image position of the NM will be modified to compensate for the table height differences existing between the two modalities. Therefore, in this case, the imaged body in aligned between the two modalities and the same Frame Of Reference UID value shows it.

5. CT images acquired with a different landmark than the NM scan or than previous CT series of the same hybrid scan will get a Frame of Reference UID value different of the NM scan or of the previous CT series, showing that the images are not spatially related. The Acquisition Parent UID value of these images will be also changed, as indicated above at 2. In this way, NM Camera AE (and potentially other image displayers) will be informed that these images are not spatially aligned and image registration must be applied in order to achieve it.

Note that for CT standalone exams, the same Frame of Reference UID (0020,0052) value does not imply imaged body alignment, but just image space alignment. This attribute must be used in conjunction with the Table Height (0018,1130) to determine if two imaged bodies are spatially aligned. See CT Scanner DICOM Conformance Statement. (Reference A in Section 1.6).

The Frame of Reference Module Attributes appear for TOMO and GATED TOMO scan types.

TABLE 3-12
FRAME OF REFERENCE MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Frame of Reference UID	(0020,0052)	1	Uniquely identifies the frame of reference for a Series. See explanation above
Position Reference Indicator	(0020,1040)	2	Sent as ZERO LENGTH value if it is not received from user input.

3.4.5 Equipment Entity Modules

3.4.5.1 General Equipment Module

TABLE 3-13
GENERAL EQUIPMENT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Manufacturer	(0008,0070)	2	Manufacturer of the equipment that produced the composite instances. Default Value "GE MEDICAL SYSTEMS" Always sent
Institution Name	(0008,0080)	3	Institution where the equipment that produced the composite instances is located. Always taken from system configuration. Sent as empty string if it is not received from user input. Always sent.
Institution Address	(0008,0081)	3	Mailing address of the institution where the equipment that produced the composite instances is located. Always taken from system configuration Sent as empty string if it is not received from user

			input. Always sent.
Institutional Department Name	(0008,1040)	3	Department in the institution where the equipment that produced the composite instances is located. Always taken from system configuration Sent as empty string if it is not received from user input. Always sent.
Manufacturer's Model Name	(0008,1090)	3	Manufacturer's model name of the equipment that produced the composite instances. Set to "Stargate_StarGuide" Always sent
Device Serial Number	(0018,1000)	3	Manufacturer's serial number of the equipment that produced the composite instances. Always taken from system configuration Sent as empty string if it is not received from user input. Always sent
Station Name	(0008,1010)	3	User defined name identifying the machine that produced the composite instances. Camera name taken from configuration is used Sent as empty string if it is not received from user input. Always sent
Software Versions	(0018,1020)	3	Manufacturer's designation of software version of the equipment that produced the composite instances Software/Hardware versions of current release e.g. "1.003.730.0\HARDWARE_VERSION_1" Always sent as non-empty value.
Spatial Resolution	(0018,1050)	3	The inherent limiting resolution in mm of the acquisition equipment for high contrast objects for the data gathering and reconstruction technique chosen. Always taken from system configuration. Default value is 5. Always sent
Date of Last Calibration	(0018,1200)	3	Date when the image acquisition device calibration was last changed in any way. Always taken from system configuration Always sent
Time of Last Calibration	(0018,1201)	3	Time when the image acquisition device calibration was last changed in any way. Always taken from system configuration Always sent

3.4.6 Image Entity Modules

3.4.6.1 General Image Module

TABLE 3-14
GENERAL IMAGE MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Instance Number	(0020,0013)	2	A number that identifies this image. Sent as ZERO Length value.
Patient Orientation	(0020,0020)	2C	Not sent for NM (not required)
Content Date	(0008,0023)	2C	The date the image pixel data creation started. Always sent if image is part of a series in which the images are temporally related, may be sent otherwise.
Content Time	(0008,0033)	2C	The time the image pixel data creation started. Always sent if image is part of a series in which the images are temporally related, may be sent otherwise.
Image Type	(0008,0008)	3	See 3.4.6.7.1
Acquisition Date	(0008,0022)	3	The date the acquisition of data that resulted in this image started Always sent with non-empty value
Acquisition Time	(0008,0032)	3	The time the acquisition of data that resulted in this image started Always sent with non-empty value
Image Comments	(0020,4000)	3	Contains additional information about image. Always sent with non-empty value
Quality Control Image	(0028,0300)	3	Indicates whether or not this image is a quality control or phantom image. Enumerated Values: YES NO Always sent

3.4.6.2 Image Pixel Module

TABLE 3-15
IMAGE PIXEL MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Samples per Pixel	(0028,0002)	1	See 3.4.6.4 for NM Images
Photometric Interpretation	(0028,0004)	1	See 3.4.6.4 for NM Images
Rows	(0028,0010)	1	Number of rows in the image.
Columns	(0028,0011)	1	Number of columns in the image
Bits Allocated	(0028,0100)	1	See 3.4.6.4 for NM Images
Bits Stored	(0028,0101)	1	See 3.4.6.4 for NM Images
High Bit	(0028,0102)	1	See 3.4.6.4 for NM Images
Pixel Representation	(0028,0103)	1	Data representation of the pixel samples. Each sample shall have the same pixel representation. Enumerated Values used: 0000H = unsigned integer. 0001H = 2's complement
Pixel Data	(7FE0,0010)	1	A data stream of the pixel samples that comprise the Image.
Planar Configuration	(0028,0006)	1C	Not Used (number of Samples per Pixel is always 1)

Pixel Aspect Ratio	(0028,0034)	1C	Not Used
Smallest Image Pixel Value	(0028,0106)	3	The minimum actual pixel value encountered in this image.
Largest Image Pixel Value	(0028,0107)	3	The maximum actual pixel value encountered in this image.

3.4.6.3 Acquisition Context Module

This section specifies Attributes for the description of the conditions present during data acquisition.

TABLE 3-16
ACQUISITION CONTEXT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Acquisition Context Sequence	(0040,0555)	2	A sequence of Items that describes the conditions present during the acquisition of the data of the SOP Instance. The Acquisition context sequence contains 0 items when acquisition context in scan is left "UNKNOWN", otherwise contains 1 item.
>Value Type	(0040,A040)	1	The type of the value encoded in this name-value Item. Enumerated Value: CODE
>Concept Name Code Sequence	(0040,A043)	1	A concept that constrains the meaning of (i.e. defines the role of) the Observation Value. This sequence contains 1 item
>>Include 'Code Sequence Macro'			(109054, DCM, "Patient State") is supported as defined in TID 3470
>Concept Code Sequence	(0040,A168)	1C	This is the Value component of a Name/Value pair when the Concept implied by Concept Name Code Sequence (0040,A043) is a Coded Value. This sequence contains 1 item
>>Include 'Code Sequence Macro'			DCID 3101 NM Cardiac Procedural State Values is supported as defined in TID 3470: The following code meanings are used: • ((F-01604 ,SRT),(128975004, SCT)) "Resting State" • ((F-05019,SRT), (432655005,SCT) "Cardiac Stress State" • (109092 ,DCM ,"Reinjection State" • (109093 ,DCM ,"Redistribution State" • (109094 ,DCM ,"Delayed Redistribution State"

3.4.6.4 NM Image Pixel Module

This section specifies the Attributes that describe the pixel data of a NM image.

TABLE 3-17
NM IMAGE PIXEL MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Samples per Pixel	(0028,0002)	1	Number of samples (planes) in this image. The value always set to 1.
Photometric Interpretation	(0028,0004)	1	Specifies the intended interpretation of the pixel data Enumerated Values supported : • MONOCHROME2
Bits Allocated	(0028,0100)	1	Number of bits allocated for each pixel sample. Each sample shall have the same number of bits allocated. Enumerated Values supported : 16.
Bits Stored	(0028,0101)	1	Number of bits stored for each pixel sample. Value equal to Bit Allocated (0028,0100)
High Bit	(0028,0102)	1	Most significant bit for pixel sample data. Value equal to Bit Stored (0028,0101) – 1
Pixel Spacing	(0028,0030)	2	Physical distance in the patient between the center of each pixel, specified by a numeric pair – adjacent row spacing (delimiter) adjacent column spacing, in mm.

3.4.6.5 Multi-Frame Module

TABLE 3-18
MULTI-FRAME MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Number of Frames	(0028,0008)	1	Number of frames in a Multi-frame Image.
Frame Increment Pointer	(0028,0009)	1	See 3.4.6.6.1 for further specialization.

3.4.6.6 NM Multi-frame Module

TABLE 3-19
NM MULTI-FRAME MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Frame Increment Pointer	(0028,0009)	1	See 3.4.6.6.1 for further specialization.
Energy Window Vector	(0054,0010)	1C	Defines energy set window to which each frame belongs. Sent if the value of the Frame Increment Pointer (0028,0009) includes the Tag for Energy Window Vector (0054,0010).
Number of Energy Windows	(0054,0011)	1	Number of energy set windows in SOP Instance. Possible values: 1 to 4
Detector Vector	(0054,0020)	1C	Defines detector to which each frame belongs. Sent if the value of the Frame Increment Pointer (0028,0009) includes the Tag for Detector Vector (0054,0020).
Number of Detectors	(0054,0021)	1	Number of detectors in SOP Instance. Possible values:

			• 1 – if Image Type (0008,0008), Value 3 is TOMO or GATED TOMO • 12 – if Image Type (0008,0008), Value 3 is STATIC
Rotation Vector	(0054,0050)	1C	Defines rotation to which each frame belongs. Sent if the value of the Frame Increment Pointer (0028,0009) includes the Tag for Rotation Vector (0054,0050).
Number of Rotations	(0054,0051)	1C	Number of Rotations in SOP Instance. Sent if Image Type (0008,0008), Value 3 is TOMO and GATED TOMO. Possible values : 1-6
R-R Interval Vector	(0054,0060)	1C	Defines R-R Interval to which each frame belongs. Sent if the value of the Frame Increment Pointer (0028,0009) includes the Tag for R-R Interval Vector (0054,0060).
Number of R-R Intervals	(0054,0061)	1C	Number of R-R Intervals in SOP Instance. Sent if the value of the Frame Increment Pointer (0028,0009) includes the Tag for R-R Interval Vector (0054,0060).
Time Slot Vector	(0054,0070)	1C	Defines time slot, within cardiac cycle, to which each frame belongs. Sent if the value of the Frame Increment Pointer (0028,0009) includes the Tag for Time Slot Vector (0054,0070).
Number of Time Slots	(0054,0071)	1C	Number of time slots in SOP Instance. Sent if the value of the Frame Increment Pointer (0028,0009) includes the Tag for Time Slot Vector (0054,0070).
Angular View Vector	(0054,0090)	1C	Defines angular view number to which each frame belongs. Sent if the value of the Frame Increment Pointer (0028,0009) includes the Tag for Angular View Vector (0054,0090).

3.4.6.6.1 Frame Increment Pointer

The Frame Increment Pointer (0028,0009) defines which frame index vectors are present in the NM Image instance. The Frame Increment Pointer is supported per the DICOM specification for all image types defined in Table 3-20.

TABLE 3-20
ENUMERATED VALUES FOR FRAME INCREMENT POINTER

Image Type (0008,0008), Value 3	Frame Increment Pointer (0028,0009)
STATIC	0054H 0010H \ 0054H 0020H Sequencing is by Energy Window Vector (0054,0010), Detector Vector (0054,0020).
TOMO	0054H 0010H \ 0054H 0020H \ 0054H 0050H \ 0054H 0090H Sequencing is by Energy Window Vector (0054,0010), Detector Vector (0054,0020), Rotation Vector (0054,0050), Angular View Vector (0054,0090)
GATED TOMO	0054H 0010H \ 0054H 0020H \ 0054H 0050H \ 0054H 0060H \ 0054H 0070H \ 0054H 0090H

	Sequencing is by Energy Window Vector (0054,0010), Detector Vector (0054,0020), Rotation Vector (0054,0050), R-R Interval Vector (0054,0060), Time Slot Vector (0054,0070), Angular View Vector (0054,0090).

3.4.6.7 NM Image Module

TABLE 3-21
NM IMAGE MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Image Type	(0008,0008)	1	See 3.4.6.7.1 for specialization.
Image ID	(0054,0400)	3	User or equipment generated Image identifier. Based on Scan name
Counts Accumulated	(0018,0070)	2	Sum of all gamma events for all frames in the image.
Acquisition Termination Condition	(0018,0071)	3	Description of how the data collection was stopped. Defined Terms are used: MANU = manual TIME = time Always sent as non-empty value
Actual Frame Duration	(0018,1242)	1C	Elapsed time for one frame acquisition in msec.. Sent when the Image Type (0008,0008), Value 3, is equal to STATIC.
Count Rate	(0018,1243)	3	Maximum count rate achieved during the acquisition in counts/sec Always sent as non-empty value
Corrected Image	(0028, 0051)	3	Corrections have been applied to the image. Defined Terms are used: UNIF = flood corrected COR = center of rotation corrected NRGY = energy corrected BADP = bad Pixels correction Always sent
Table Height	(0018,1130)	3	The height of the patient table in mm. Not sent when the Image Type (0008,0008), Value 3, is equal to TOMO or GATED TOMO. Otherwise sent as non-empty value
Table Traverse	(0018,1131)	3	Location of the patient table in mm. Not sent when the Image Type (0008,0008), Value 3, is equal to TOMO or GATED TOMO. Otherwise sent as non-empty value

3.4.6.7.1 Image Type

The following values of Image Type (0008,0008) are be sent :
Value 1 shall have the following Enumerated Values:

- ORIGINAL identifies an Original Image

Value 2 shall have the following Enumerated Value:

- PRIMARY identifies a Primary Image

The following Enumerated Values of Value 3 are created:

- STATIC - Identifies a Static Image
- TOMO - Identifies a Tomographic (SPECT) Image

- GATED TOMO - Identifies a Multi-gated Tomographic Image

The following Enumerated Values of Value 4 are created:

- EMISSION - Transmission source is NOT active during image acquisition

3.4.6.8 NM Isotope Module

This section contains Attributes that describe the isotope administered for the acquisition.

TABLE 3-22
NM ISOTOPE MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Energy Window Information Sequence	(0054,0012)	2	Sequence of Items that describe the energy window groups used. Contain from 1 to 4 Items. The number of items shall be equal to Number of Energy Windows (0054,0011)
> Energy Window Name	(0054,0018)	3	A user defined name which describes this Energy Window.
>Energy Window Range Sequence	(0054,0013)	3	Sequence describing window energy limits. Contains from 1 to 16 items.
>> Energy Window Lower Limit	(0054,0014)	3	The lower limit of the energy window in KeV.
>> Energy Window Upper Limit	(0054,0015)	3	The upper limit of the energy window in KeV.
Radiopharmaceutical Information Sequence	(0054,0016)	2	Information on radiopharmaceutical(s) used. May contain from 1 to 3 items
> Radionuclide Code Sequence	(0054,0300)	2	Sequence that identifies the radionuclide. May contain from 0 to 1 item Sent as ZERO LENGTH is no user input is provided
>> Include 'Code Sequence Macro'			CID 18 "Radiopharmaceutical Isotope". Code Meaning (0008,0104) shall be Type 3 for historical reasons.
> Radiopharmaceutical Route	(0018,1070)	3	Route of injection. (*)
> Administration Route Code Sequence	(0054,0302)	3	Sequence that identifies the administration route for the radiopharmaceutical. Contains 1 item, if Radiopharmaceutical Route(0018,1070) is sent with non-empty value. Otherwise not sent.(*)
>> Include 'Code Sequence Macro'			CID 11 "Administration Route". Code Meaning (0008,0104) shall be Type 3 for historical reasons.
> Radiopharmaceutical Volume	(0018,1071)	3	Volume of injection in cubic cm. (*)
> Radiopharmaceutical Start Time	(0018,1072)	3	Time of start of injection. (*)
> Radiopharmaceutical Stop Time	(0018,1073)	3	Not used
> Radionuclide Total Dose	(0018,1074)	3	Total amount of radionuclide injected in MBq (*)
> Radiopharmaceutical	(0018,0031)	3	Name of the radiopharmaceutical. (*).
> Radiopharmaceutical Code Sequence	(0054,0304)	3	Sequence that identifies the radiopharmaceutical. Contains 1 item, if Radiopharmaceutical (0018,0031) is sent with non-empty value, otherwise not sent.(*)
>> Include 'Code Sequence Macro'			BCID 25 "Radiopharmaceutical". Code Meaning (0008,0104) shall be Type 3 for historical reasons.

Intervention Drug Information Sequence	(0018,0026)	3	Sequence of Items that describes the intervention drugs used. May contain from 1 to 3 Items. (*)
>Intervention Drug Name	(0018,0034)	3	Name of intervention drug. (*)
>Intervention Drug Code Sequence	(0018,0029)	3	Not Used
>Administration Route Code Sequence	(0054,0302)	3	Not Used
>Intervention Drug Start Time	(0018,0035)	3	Time of administration of the intervention drug, using the same time base as for the Acquisition Start Time (0008,0032). (*)
>Intervention Drug Stop Time	(0018,0027)	3	Time of completion of administration of the intervention drug, using the same time base as for the Acquisition Start Time (0008,0032). (*)
>Intervention Drug Dose	(0018,0028)	3	Intervention drug dose, in mg. (*)

***Note1**: (*) – Attribute value is taken from user input if it's not empty, otherwise is not sent*

3.4.6.9 NM Detector Module

TABLE 3-23
NM DETECTOR MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Detector Information Sequence	(0054,0022)	2	Sequence of Items that describe the detectors used. The number of items shall be equal to Number of Detectors (0054,0021)
> Collimator/Grid Name	(0018,1180)	3	Label describing the collimator used Always sent as non-empty value.
> Collimator Type	(0018,1181)	2	Collimator type. Defined Terms: PARA = Parallel (default) Always sent as non-empty value
> Focal Distance	(0018,1182)	2	Focal distance, in mm. Default value is 0.
> Zoom Center	(0028,0032)	3	The amount of offset from (0, 0) applied to each pixel in the image before application of the zoom factor, specified by a numeric pair (in mm).(*) Always sent as non-empty value
> Zoom Factor	(0028,0031)	3	The amount of magnification applied to each pixel in the image.(*) Typical Range 1.0 to 4.0 Always sent as non-empty value
> Distance Source to Detector	(0018,1110)	2C	Not sent
> Start Angle	(0054,0200)	3	Position of the detector about the patient for the start of the acquisition, in degrees. (*) Sent if Image Type (0008,0008), Value 3, is STATIC.
> Radial Position	(0018,1142)	3	Not Sent
> Image Orientation (Patient)	(0020,0037)	2	The direction cosines of the first row and the first column with respect to the patient. Set for first frame in dataset
> Image Position (Patient)	(0020,0032)	2	The x, y, and z coordinates of the upper left hand corner (center of the first voxel transmitted) of the image, in mm. Set for first frame in dataset.

***Note1**: (*) – Attribute value is taken from user input*

3.4.6.10 NM Tomo Acquisition Module

This module is present when the Image Type (0008,0008) Value 3, is equal to TOMO or GATED TOMO.

TABLE 3-24
NM TOMO ACQUISITION MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Rotation Information Sequence	(0054,0052)	2	Sequence of Items that describe TOMO rotational groups. Contain from 1to 6 item.
> Start Angle	(0054,0200)	1	Position of the detector about the patient for the start of the acquisition, in degrees. (*)
> Angular Step	(0018,1144)	1	The angular scan arc step between views of the TOMO acquisition, in degrees (*)
> Rotation Direction	(0018,1140)	1	Direction of rotation of the detector about the patient. (*) Enumerated Values: CW = clockwise (decreasing angle) CC = counter-clockwise (increasing angle).
> Scan Arc	(0018,1143)	1	The effective angular range of the scan data in degrees. (*) The value is always positive.
> Actual Frame Duration	(0018,1242)	1	Nominal acquisition time per angular position, in msec.
> Radial Position	(0018,1142)	3	Radial distance of the detector from the center of rotation, in mm. Sent as list – one value per angular view.
> Distance Source to Detector	(0018,1110)	2C	Not sent
> Number of Frames in Rotation	(0054,0053)	1	Number of angular views in this rotation.(*)
> Table Traverse	(0018,1131)	3	Table longitudinal position at acquisition start .in mm. Always sent.
> Table Height	(0018,1130)	3	The distance in mm of the top of the patient table to the center of rotation. Sent as non-empty value. In a hybrid scan it is expressed relative to CT iso center, and in non-hybrid scan it is expressed as in normal NM only – measured from floor and up.
Type of Detector Motion	(0054,0202)	3	Describes the detector motion during acquisition. Enumerated Values: STEP AND SHOOT = Interrupted motion, acquire only while stationary. CONTINUOUS = Gantry motion and acquisition are simultaneous and continuous. Always sent as non-empty value

***Note1**: (*) – Attribute value is taken from user input.*

3.4.6.11 NM Multi-gated Acquisition Module

Describe the conditions under which this module is present in this implementation Module applies to a GATED Multi-frame Image. This module is present when the Image Type (0008,0008) Value 3, is equal to GATED TOMO

TABLE 3-25
NM MULTI-GATED ACQUISITION MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Beat Rejection Flag	(0018,1080)	3	Heart beat duration sorting has been applied.

			Enumerated Values: Y = yes Always sent.
PVC Rejection	(0018,1085)	3	Description of type of arrhythmic beat rejection criteria used. Always sent as "Reject beats out of pvc window"
Skip Beats	(0018,1086)	3	Number of beats skipped after a detected arrhythmia Always sent.
Heart Rate	(0018,1088)	3	Average number of heart beats per minute for the collection period for these frames Always sent.
Gated Information Sequence	(0054,0062)	2C	Sequence of Items that describe R-R intervals. Sent if the Frame Increment Pointer (0028,0009) contains the Tag for R-R Interval Vector (0054,0060) Contains only 1 item if presents
> Cardiac Framing Type	(0018,1064)	3	Description of type of framing performed. Always sent.
> Data Information Sequence	(0054,0063)	2	Sequence of Items that describe gating criteria. Contains only 1 item.
>> Frame Time	(0018,1063)	1	Nominal time per individual frame in msec
>> Low R-R Value	(0018,1081)	3	R-R interval lower limit for beat rejection, in msec Always sent.
>> High R-R Value	(0018,1082)	3	R-R interval upper limit for beat rejection, in msec Always sent.
>> Intervals Acquired	(0018,1083)	3	Number of heartbeats that fall within Low R-R Value (0018,1081) and High R-R Value (0018,1082), and were therefore accepted and contribute gamma events to this R-R Interval. Always sent.
>> Intervals Rejected	(0018,1084)	3	Number of heartbeats that fall outside Low R-R (0018,1081) and High R-R Value (0018,1082), and do not contribute gamma events to this R-R Interval. Always sent.
>> Time Slot Information Sequence	(0054,0072)	2C	Sequence of Items that describe Time Slot Information. Sent if the Frame Increment Pointer (0028,0009) contains the Tag for Time Slot vector (0054,0070) Contains 1 or more items if it presents, the number of items is equal to Number of Time Slots (0054,0071).
>>> Time Slot Time	(0054,0073)	3	Not Used

3.4.6.12 VOI LUT Module

TABLE 3-26
VOI LUT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Window Center	(0028,1050)	1C	Window Center for display. Only single value is present. Calculated from actually acquired

			maximal and minimal pixel values. Always sent
Window Width	(0028,1051)	1C	Window Width for display. Only single value is present. Calculated from actually acquired maximal and minimal pixel values. Always sent.

3.4.6.13 SOP Common Module

TABLE 3-27
SOP COMMON MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
SOP Class UID	(0008,0016)	1	Uniquely identifies the SOP Class. Always set to "1.2.840.10008.5.1.4.1.1.20"
SOP Instance UID	(0008,0018)	1	Uniquely identifies the SOP Instance. Internally generated.
Specific Character Set	(0008,0005)	1C	Character Set that expands or replaces the Basic Graphic Set. Defined Terms include for locally created images: ISO_IR 100 = Latin Alphabet No. 1 Always included into image
Instance Number	(0020,0013)	3	See 3.4.6.1 for more specialization

3.4.6.14 Private Image Module

TABLE 3-28
PRIVATE IMAGE MODULE ATTRIBUTES

Attribute Name	Tag	Private Creator ID	Attribute Description
Origin	(0009, xx12)	QUASAR_INTERNAL_USE	The origin of the image. Sent as "regular" if locally scheduled.
Image Type	(0009, xx1B)	QUASAR_INTERNAL_USE	Image type string as passed in the scan request
Stop Reason	(0009, xx1D)	QUASAR_INTERNAL_USE	Defines condition that image was installed to database
Dataset Name	(0011, xx12)	GEMS_GENIE_1	List of dataset names
Acquisition Parent UID	(0011, xx31)	GEMS_GENIE_1	Shared by all images created by same Hybrid scan. Used for correct registration. For more details about NM/CT registration refer to Frame Of Reference, Section 3.4.4.1
Source Translator	(0013, xx11)	GEMS_GENIE_1	Internal code of product DICOM implementation. Enumerated Value: 11 - Dynamic SPECT scans 25 - Other scans
Bed Position	(0027, xx11)	APEX_PRIVATE	Linear position of table in cm

3.4.6.15 Private NM Image Module

TABLE 3-29
PRIVATE NM IMAGE MODULE ATTRIBUTES

Attribute Name	Tag	Private Creator ID	Attribute Description
Pixel Scale	(0011,xx3B)	GEMS_GENIE_1	Internal Pixel scale.

Y offset	(0037,xx71)	QUASAR_INTERNAL_USE	CT to NM Y difference Used for correct registration. For more details about NM/CT registration refer to Section 3.4.4.1.
Image Position Corrections Flag	(0037,xx72)	QUASAR_INTERNAL_USE	Defined if additional image position corrections shall be performed. Always sent as “false”.
NM Bed Position	(0037,xx73)	QUASAR_INTERNAL_USE	For Hybrid NM/CT Scans contains distance from NM FOV center to the position on bed where landmark was set (mm). Used for correct registration For more details about NM/CT registration refer to Section 3.4.4.1.) For other scan types contains linear bed position (in mm).
X offset	(0037,xx78)	QUASAR_INTERNAL_USE	CT to NM X difference Used for correct registration. For more details about NM/CT registration refer to Section 3.4.4.1.
Theta Offset	(0037,xx79)	QUASAR_INTERNAL_USE	CT to NM rotational difference Used for correct registration. For more details about NM/CT registration refer to Section 3.4.4.1
Imageset Objects Count	(0037,xx90)	QUASAR_INTERNAL_USE	Number of frames in NM image.
CT Isocenter Distance From Floor	(0037,xx92)	QUASAR_INTERNAL_USE	Distance of CT Isocenter from floor, in mm. Shared by all images created by same Hybrid scan.
Collimator SQ	(0037,xx10)	QUASAR_INTERNAL_USE	Contains information of collimators parameters. May contain 0 or 1 item.
>Hole Diameter	(0037,xx1B)	QUASAR_INTERNAL_USE	Collimator hole diameter
>Hole Length	(0037,xx30)	QUASAR_INTERNAL_USE	Collimator hole length
>Collimator Thickness	(0037,xx40)	QUASAR_INTERNAL_USE	Collimator thickness
>Septal Thickness	(0037,xx50)	QUASAR_INTERNAL_USE	Collimator septal thickness
>Intrinsic Resolution	(0037,xx60)	QUASAR_INTERNAL_USE	Collimator intrinsic resolution
>Blurring Slope	(0037,xx70)	QUASAR_INTERNAL_U	Collimator blurring slope

		SE	
Radio Nuclide Name	(0011,xx0D)	GEMS_GENIE_1	Name of radionuclide used Contain name of Energy Session, selected for acquisition
Detector Number	(0011,xx15)	GEMS_GENIE_1	Detector number (zero-based), image was acquired by.
Time Vector	(0099,xx50)	STARGATE	Time for each frame.
detector_center_x_vector	(0099,xx51)	STARGATE	distance from center of rotation to detector surface for x-axis
detector_center_y_vector	(0099,xx52)	STARGATE	distance from center of rotation to detector surface for x-axis
detector_angle_vector	(0099,xx53)	STARGATE	absolute angle vector (composed of rotation step and sweep step)
body_poly_points_count	(0097,xx71)	STARGATE	body contour number of points in polygon
body_poly_point_x	(0097,xx72)	STARGATE	body contour x coord of polygon
body_poly_point_y	(0097,xx73)	STARGATE	body contour y coord of polygon
focus_poly_points_count	(0097,xx74)	STARGATE	focus selection number of points in polygon
focus_poly_point_x	(0097,xx75)	STARGATE	focus selection x coord of polygon
focus_poly_point_y	(0097,xx76)	STARGATE	focus selection y coord of polygon
detector_concealment_frame_count_vector	(0097,xx77)	STARGATE	concealment number of elements in concealment vector
detector_concealment_vector	(0097,xx78)	STARGATE	concealment vector
acq_group_uid	(0097,xx79)	STARGATE	allows grouping of a single scan (12 datasets).
body_section	(0097,xx80)	STARGATE	body section string, 3 options, head, torso, legs.
scan_body_poly_points_count	(0097,xx81)	STARGATE	actual scan body contour number of points in polygon
scan_body_poly_point_x	(0097,xx82)	STARGATE	actual scan body contour x coord of polygon
scan_body_poly_point_y	(0097,xx83)	STARGATE	actual scan body contour y coord of polygon
in_focus_proj_vector	(0097,xx84)	STARGATE	boolean vector (i.e. 0..1 values) per frame, indicates if the frame was from the focused area
focused_motion_flag	(0097,xx85)	STARGATE	indicates at least one of the detectors had focused motion
scan_body_poly_points_count_by_e	(0097,xx86)	STARGATE	scan body contour number

mission			of points in polygon calculated based on emission
scan_body_poly_point_x_by_emission	(0097,xx87)	STARGATE	scan body contour x coord of polygon calculated based on emission
scan_body_poly_point_y_by_emission	(0097,xx88)	STARGATE	scan body contour y coord of polygon calculated based on emission

3.4.6.16 Private Image Tomo Module

TABLE 3-30
PRIVATE IMAGE TOMO MODULE ATTRIBUTES

Attribute Name	Tag	Private Creator ID	Attribute Description
Send Joined Flag	(0009,xx23)	QUASAR_INTERNAL_USE	Defines if image shall be joined on send. Set to 1 – for TOMO and GATED TOMO images. For other image types is not sent.

3.4.6.17 Private Image Multi-Gated Module

TABLE 3-31
PRIVATE IMAGE MULTI-GATED MODULE ATTRIBUTES

Attribute Name	Tag	Private Creator ID	Attribute Description
Triggers Modification Flag	(0033,xx30)	GEMS_GENIE_1	Triggers Modification Flag
Number of triggers	(0033,xx33)	GEMS_GENIE_1	Number of triggers
Trigger size	(0033,xx34)	GEMS_GENIE_1	Size of one Trigger data slot
Trigger Data size	(0033,xx35)	GEMS_GENIE_1	Size of Trigger Data size
Trigger Data	(0033,xx36)	GEMS_GENIE_1	Buffer with trigger data information
Starting Heart Rate	(0009,xx37)	GEMS_GENIE_1	Heart rate at start of acquisition.

3.4.6.18 Private Image GSPECT Module

TABLE 3-32
PRIVATE IMAGE GSPECT MODULE ATTRIBUTES

Attribute Name	Tag	Private Creator ID	Attribute Description
Perfusion SOP Instance UID	(0009,xx47)	QUASAR_INTERNAL_USE	Summed image UID

3.4.6.19 Private Dynamic SPECT Module

This section specifies the Attributes which identify and describe a Dynamic SPECT image within a particular series.

TABLE 3-33
DYNAMIC SPECT MODULE ATTRIBUTES
TABLE 33

Attribute Name	Tag	Private Creator	Attribute Description	Attribute Usage
Phase #	(0099,xx60)	GEHC_IG_1	Identification of phase number, taken from first detector,	Used / Copied
Time Frame #	(0099,xx61)	GEHC_IG_1	Identification of time frame number, taken from first detector,	Used/Copied
Nominal Sweep Duration	(0099,xx62)	GEHC_IG_1	Nominal/planned sweep time, taken from first detector,	Used/Copied
Actual Time Offset	(0099,xx63)	STARGATE	Time offset from start of Acquisition in	Used/Copied

			milliseconds. In each time frame, the average offset (of all detectors' projections in this time frame). Offset = the diff between the BL time and the current time frame.	

3.5 STANDARD EXTENDED AND PRIVATE DATA ATTRIBUTES

The Product supports the Standard Extended and Private Attributes defined in the following sections in Standard Extended NM SOP Instances as Type 3 data elements.

3.5.1 Standard Extended Attributes

The Product supports the following attributes, not specified in the NM IOD, in SOP Instances as Type 3 data elements.

TABLE 3-34
STANDARD EXTENDED ATTRIBUTES

Information Entity Name	Attribute Name	Tag	Use
Study	Requested Procedure Comments	(0040,1400)	User-defined Study notes
Series	Patient Position	(0018,5100)	Patient position descriptor relative to the Equipment.

3.5.2 Private Group QUASAR_INTERNAL_USE

TABLE 3-35
PRIVATE GROUP QUASAR_INTERNAL_USE

Attribute Name	Tag	VR	VM	Attribute Description and Use
Private Creator Identification	(0009,00xx)	LO	1	QUASAR_INTERNAL_USE
Origin	(0009,xx12)	LO	1	The origin of the image.
Sequence Type	(0009,xx13)	ST	1	Acquired Sequence Type
Sequence Name	(0009,xx14)	ST	1	Acquired Sequence Name
Image Type	(0009,xx1B)	LO	1	Image type string as passed in the scan request
Stop Reason	(0009,xx1D)	US	1	Defines condition that image was installed to db
Auto-Processing Application	(0009,xx1E)	ST	1	Auto-Processing Application Description
Send Joined Flag	(0009,xx23)	US	1	Defines if image shall be joined on send. Sent for TOMO and GATED TOMO images only
Patient Unique Key	(0009,xx39)	UI	1	Patient unique key
Protocol Scheduled Date	(0009,xx40)	DA	1	Protocol Scheduled Date
Protocol Scheduled Time	(0009,xx41)	TM	1	Protocol Scheduled Time
Acquisition flag	(0009,xx42)	LO	1	Used for indicating if the study is acquired
Private SPS ID	(0009,xx44)	SH	1	Defines protocols that were appended to the original MWL protocol. Contains SPS ID of original MWL Protocol. Sent empty for images of locally scheduled protocols
Pre-Medication	(0009,xx45)	LO	1	Keeps the Pre-Medication as appears in the Patient Scheduler
Perfusion SOP Instance UID	(0009,xx47)	UI	1	Summed image UID .Sent for GATED

				TOMO images only
Anatomic Reference	(0009,xx48)	LO	1	Keeps the anatomic reference for the specific scan
Private Creator Identification	(0037,00xx)	LO	1	QUASAR_INTERNAL_USE
Collimator SQ	(0037,xx10)	SQ	1	Contains information of collimators parameters.
Hole Diameter	(0037,xx1B)	LO	1	Collimator hole diameter
Hole Length	(0037,xx30)	LO	1	Collimator hole length
Collimator Thickness	(0037,xx40)	LO	1	Collimator thickness
Septal Thickness	(0037,xx50)	LO	1	Collimator Septal thickness
Intrinsic Resolution	(0037,xx60)	LO	1	Collimator intrinsic resolution
Blurring Slope	(0037,xx70)	LO	1	Collimator blurring slope
Yoffset	(0037,xx71)	FD	1	CT to NM Y difference
Image Position Corrections Flag	(0037,xx72)	SH	1	Defined if image position corrections are performed.
NM Bed Position	(0037,xx73)	FD	1	According to implementation and scan types contains either - Distance from NM FOV center to the position on bed where landmark was set . or - Distance from NM FOV center to the registration origin or - Linear bed position
Xoffset	(0037,xx78)	FD	1	CT to NM X difference
Theta Offset	(0037,xx79)	FD	1	CT to NM rotational difference
Imageset Objects Count	(0037,xx90)	IS	1	Number of frames in NM image.
CT Isocenter Distance from Floor	(0037,xx92)	DS	1	Distance of CT Isocenter Distance Floor, in mm

3.5.3 Private Group GEMS_GENIE_1

TABLE 3-36
PRIVATE GROUP GEMS_GENIE_1

Attribute Name	Tag	VR	VM	Attribute Description and Use
Private Creator Identification	(0009,00xx)	LO	1	GEMS_GENIE_1
Starting Heart Rate	(0009,xx37)	SL	1	Heart rate at start of acquisition.
Private Creator Identification	(0011,00xx)	LO	1	GEMS_GENIE_1
Radionuclide Name	(0011,xx0D)	LO	1	Name of radionuclide used.
Dataset Name	(0011,xx12)	LO	1-n	List of Dataset names.
Detector Number	(0011,xx15)	SL	1-n	Detector number (zero-based), image was acquired by.
Energy Offset	(0011,xx1C)	SL	1-n	Energy window offset as a percentage of the energy peak.
Energy Range	(0011,xx1D)	SL	1-n	Energy Range The Defined Terms are: 0 = low energy range, X-series detector 1 = high energy range, X-series detector 2 = GE 511 Camera Range 3 = Unknown Always sent with value = 3

Acquisition Parent UID	(0011,xx31)	LO	1-n	Shared by all images created by same scan
Pixel Scale	(0011,xx3B)	FD	1-n	Internal Pixel Scale
Private Creator Identification	(0013,00xx)	LO	1	GEMS_GENIE_1
Source Translator	(0013,xx11)	SL	1	Internal code of product DICOM implementation.
AutoTrack Peak	(0013,xx16)	SL	1	Optima Auto Track energy peak.
AutoTrack Width	(0013,xx17)	SL	1	Optima Auto Track energy width.
Energy Window Name	(0013,xx31)	SH	1	Energy window Name. Added to support Quantitation. Value is equal to value from tag Energy Window Name (0054,0011)-> (0054,0018) from the item of Energy Information SQ (0054,0011) with the same Index.
Isotope Name	(0013,xx32)	LO	1	Isotope Name. Added to support Quantitation. Contains name of isotope associated with Energy Set.
Isotope Half-Life time	(0013,xx33)	FD	1-n	Isotope Half-Life time of isotope specified in tag (0013, xx32). Added to support Quantitation.
Sensitivity factor	(0013,xx34)	FD	1-n	Sensitivity Factor. Added to support Quantitation. Contains value of sensitivity factor measured for Energy set with Name equal to Energy Window Name tag (0055,xx12)-> (0013,xx31) from current sequence item for Energy Session with name taken from tag (0011,xx0D) Always written in counts/min/µCi. Sent as 0.0 if not measured.
Private Creator Identification	(0033,00xx)	LO	1	GEMS_GENIE_1
Triggers Modification Flag	(0033,xx30)	SL	1	Triggers Modification Flag
Number of triggers	(0033,xx33)	SL	1	Number of triggers
Trigger size	(0033,xx34)	SL	1	Size of one Trigger data slot
Trigger Data size	(0033,xx35)	SL	1	Size of Trigger Data size
Trigger Data	(0033,xx36)	OB	1	Buffer with trigger data information
Xeleris Energy Window Information Sequence	(0055,xx12)	SQ	1	Xeleris Energy Window Information Sequence. Private Energy Sequence. The number of items in the Xeleris Energy Window sequence is the same as tag value of tag (0054,0011) and equal to Number of Energy sets in Energy Session
Xeleris Energy Window Range Sequence	(0055,xx13)	SQ	1	May contain from 0 to 4 items. Equal to number of Energy Windows of the Energy Set specified.

3.5.4 Private Group GEMS_XELPRV_01

TABLE 3-37
PRIVATE GROUP GEMS_XELPRV_01

Attribute Name	Tag	VR	VM	Attribute Description and Use
Private Creator Identification	(0033,00xx)	LO	1	GEMS_XELPRV_01
Object Type	(0033,xx08)	CS	1	Object Type. Contains string "SERIES DATA "
Modified Flag	(0033,xx10)	SL	1	Default value = 0 (Not Modified)
Name	(0033,xx11)	LO	1	SDO Name. Contains String “CameraSensitivity”
Database Object Unique ID	(0033,xx16)	LO	1	Database UID of SDO; contains value of SDO UID tag (0033,xx72) generated at time of object creation
Date	(0033,xx17)	SH	1	SDO Creation date. Contains value of tag (0008,0022) – acquisition date
Time	(0033,xx18)	SH	1	SDO Creation time. Contains value of tag (0008,0032) – acquisition time
SeriesDataFlags	(0033,xx19)	UL	1	SDO Flags. Default value = 0
ProtocolName	(0033,xx1A)	LO	1	Name of Protocol created SDO. Contains value “CameraSensitivity”
RelevantDataUID	(0033,xx1B)	LO	1	UID(s) of SOP Instance(s) relative to SDO. Sent as ZERO_LENGTH value.
BulkData	(0033,xx1C)	OB	1	SDO parameter(s) stored as binary buffer(s) Sent as ZERO_LENGTH value.
IntData	(0033,xx1D)	SL	1-n	List of SDO parameters stored as integers Sent as ZERO_LENGTH value.
Double Data	(0033,xx1E)	FD	1-n	List of SDO parameters stored as doubles built according to scheme sent in DoubleDataFormat tag (0033,xx22)
String Data	(0033,xx1F)	OB	1	List of SDO parameters stored as list of strings separated by BACKSLASH (‘\’) character according to scheme sent in StringDataFormat tag (0033,xx23) “Tc99m\1.2.840.113619.2.441.xxxxx” – if generating by SmartConsole (or “Tc99m\1.2.840.113619.2.450.xxxxx” – if Implementation UID of SG is used)
BulkDataFormat	(0033,xx20)	OB	1	Format of bulk parameters; contains information about name and size of bulk buffers. Sent as ZERO_LENGTH value.
IntDataFormat	(0033,xx21)	OB	1	Format of integer parameters; contains information about name and number of integers in list
DoubleDataFormat	(0033,xx22)	OB	1	Format of double parameters; contains information about name and number of doubles in list. May contain 1..n double groups separated by BACKSLASH (‘\’) character ;

				Each Double group contains information about name of groups and number of doubles in the group, separated by BACKSLASH (‘\’) character ; Possible Values (2 Groups) “CameraSensitivity\<N>\HalfLife\<N>”, where <N> is number of Datasets in Xeleris database, equal to number of string in tag (0011,xx12), DatasetName For example, “CameraSensitivity\1\HalfLife\1”
StringDataFormat	(0033,xx23)	OB	1	Format of string parameters; May contain 1..n String groups separated by BACKSLASH (‘\’) character ; Each String group contains information about name of groups and number of strings in the group, separated by BACKSLASH (‘\’) character ; Possible Values (2 Groups) “IsotopeName\<N>\SOPInstanceUID\<N>”, where <N> is number of Datasets in Xeleris database, equal to number of string in tag (0011,xx12), DatasetName SOPInstanceUID group contains list of SOPInstanceUIDs which expected to be assigned by Xeleris during import and split one DICOM image to several DatasetsFor example, “IsotopeName\1\SOPInstanceUID\1”
Description	(0033,xx24)	LT	1	User or equipment generated SDO description. Contains string “Camera Sensitivity Factor and Isotope info per Energy Set”
Series Data Sequence	(0033,xx70)	SQ	1	Sequence of item contains information about acquisition parameters. May contain from 1 to n Items. Each Items describes specific parameters set.
SDO Private SOP Class UID	(0033,xx71)	UI	1	SDO Private SOP Class UID- "1.2.840.113619.4.17"
SDO Instance UID	(0033,xx72)	UI	1	SDO Instance UID; Internally generated. Generated at time of image creation, according to template 1.2.840.113619.2.441.xxx (or 1.2.840.113619.2.450.xxx - if Implementation UID of SG is used)

3.5.5 Private Group STARGATE

TABLE 3-38
PRIVATE GROUP STARGATE

Attribute Name	Tag	VR	VM	Attribute Description and Use
Private Creator Identification	(0097,00xx)	LO	1	STARGATE
body_poly_points_count	(0097, xx71)	SL	1	body contour number of points in polygon
body_poly_point_x	(0097, xx72)	FD	1..n	body contour x coord of polygon
body_poly_point_y	(0097, xx73)	FD	1..n	body contour y coord of polygon
focus_poly_points_count	(0097, xx74)	SL	1	focus selection number of points in polygon
focus_poly_point_x	(0097, xx75)	FD	1..n	focus selection x coord of polygon
focus_poly_point_y	(0097, xx76)	FD	1..n	focus selection y coord of polygon
detector_concealment_frame_count_vector	(0097, xx77)	SL	1	concealment number of elements in concealment vector
detector_concealment_vector	(0097, xx78)	SS	1..n	concealment vector
acq_group_uid	(0097, xx79)	LO	1	allows grouping of a single scan (12 datasets).
body_section	(0097, xx80)	LO	1	body section string, 3 options, head, torso, legs.
scan_body_poly_points_count	(0097, xx81)	SL	1	acutal scan body contour number of points in polygon
scan_body_poly_point_x	(0097, xx82)	FD	1..n	acutal scan body contour x coord of polygon
scan_body_poly_point_y	(0097, xx83)	FD	1..n	acutal scan body contour y coord of polygon
in_focus_proj_vector	(0097, xx84)	US	1..n	boolean vector (i.e. 0..1 values) per frame, indicates if the frame was from the focused area
focused_motion_flag	(0097,xx85)	US	1	indicates at least one of the detectors had focused motion
scan_body_poly_points_count_by_emission	(0097, xx86)	SL	1	scan body contour number of points in polygon calculated based on emission
scan_body_poly_point_x_by_emission	(0097, xx87)	FD	1..n	scan body contour x coord of polygon calculated based on emission
scan_body_poly_point_y_by_emission	(0097, xx88)	FD	1..n	scan body contour y coord of polygon calculated based on emission
Private Creator Identification	(0099,00xx)	LO	1	STARGATE
Time Vector	(0099, xx50)	OF	1..n	Time per frame vector
detector_center_x_vector	(0099, xx51)	OF	1..n	distance from center of rotation to detector surface for x-axis
detector_center_y_vector	(0099, xx52)	OF	1..n	distance from center of rotation to detector surface for x-axis
detector_angle_vector	(0099, xx53)	OF	1..n	absolute angle vector (composed of rotation step and sweep step)

3.5.6 Private Group APEX_PRIVATE

TABLE 3-39
PRIVATE GROUP APEX_PRIVATE

Attribute Name	Tag	VR	VM	Attribute Description and Use
Private Creator Identification	(0027,00xx)	LO	1	APEX_PRIVATE
Bed Position	(0027,xx11)	DS	1	Linear position of table.

4. SECONDARY CAPTURE INFORMATION OBJECT IMPLEMENTATION

4.1 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.

Only Multi-frame Grayscale Byte SC Image IOD is supported.

4.2 NM CAMERA MAPPING OF DICOM ENTITIES

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

TABLE 4-1
MAPPING OF DICOM ENTITIES TO NM CAMERA ENTITIES

DICOM IE	NM Camera Entity
Patient	Patient
Study	Exam
Series	Series
Image	Image

4.3 IOD MODULE TABLE

The Secondary Capture 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.

TABLE 4-2
SC IMAGE IOD MODULES

Entity Name	Module Name	Usage	Reference
Patient	Patient	Same as NM IOD	3.4.1.1
	Clinical Trial Subject	Not Used	N/A
Study	General Study	Same as NM IOD	3.4.2.1
	Patient Study	Same as NM IOD	0
	Standard Extended Study	Same as NM IOD	3.4.2.3
	Clinical Trial Study	Not Used	N/A
Series	General Series	Used	4.4.1.1
	Private SC Series	Used	0
	Clinical Trial Series	Not Used	N/A
Frame of Reference	Frame of Reference	Same as NM IOD	3.4.4.1
Equipment	General Equipment	Used	4.4.2.1
	SC Equipment	Used	4.4.2.2
Image	General Image	Used	4.4.3.1
	Image Pixel	Used	4.4.3.2
	Device	Not Used	N/A
	Specimen	Not Used	N/A
	SC Image	Used	4.4.3.3
	Cine	Used	4.4.3.4
	Multi-Frame	Used	4.4.3.5
	SC Multi-Frame Image	Used	4.4.3.6
	SC Multi-Frame Vector	Used	4.4.3.7
	Overlay Plane	Not Used	N/A
	Modality LUT	Not Used	N/A
	VOI LUT	Not Used	N/A
	SOP Common	Used	4.4.3.8
	Standard Extended Image	Used	4.4.3.9

4.4 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.

4.4.1 Series Entity Modules

4.4.1.1 General Series Module

TABLE 4-3
GENERAL SERIES MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	1	Defined Terms: • NM = Nuclear Medicine
Series Instance UID	(0020,000E)	1	Internally generated unique identifier of the Series.
Series Number	(0020,0011)	2	A number that identifies this Series.
Protocol name	(0018,1030)	3	User-defined description of the conditions under which the Series was performed.
Series Date	(0008,0021)	3	Date the Series started Always sent
Series Time	(0008,0031)	3	Time the Series started. Always sent
Performing Physicians' Name	(0008,1050)	3	Name of the physician(s) administering this Series. (*)(**) Sent as empty string if no user input provided.
Operators' Name	(0008,1070)	3	Name(s) of the operator(s) supporting the Series Copied from user input. Sent as empty string if no user input provided.
Referenced Performed Procedure Step Sequence	(0008,1111)	3	Uniquely identifies the Performed Procedure Step SOP Instance to which the Series is related. The sequence has exactly 1 item. Sequence is added to all image(s) created by system. Always sent.
>Referenced SOP Class UID	(0008,1150)	1	Set to "1.2.840.10008.3.1.2.3.3"
>Referenced SOP Instance UID	(0008,1155)	1	Uniquely identifies the referenced SOP Instance. Internally generated.
Series Description	(0008,103E)	3	Description of the Series. Always sent as non-empty value.

Note 1 : (*) *– Attributes copied from the Worklist if the study source was actually copied from a Worklist query result (if available).*

Note 2 : (**) *– Attributes copied from the user input for Locally scheduled Protocols*

4.4.1.2 Private SC Series

TABLE 4-4
PRIVATE SC SERIES MODULE ATTRIBUTES

Attribute Name	Tag	Private Creator ID	Attribute Description
acq_group_uid	(0097, xx79)	STARGATE	allows grouping of a single scan (12 datasets).

4.4.2 Equipment Entity Modules

4.4.2.1 General Equipment Module

TABLE 4-5
GENERAL EQUIPMENT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Manufacturer	(0008,0070)	2	Manufacturer of the equipment that produced the composite instances. Default Value "GE MEDICAL SYSTEMS" Always sent
Institution Name	(0008,0080)	3	Institution where the equipment that produced the composite instances is located. Always taken from system configuration. Sent as empty string if it is not received from user input. Always sent.
Institution Address	(0008,0081)	3	Mailing address of the institution where the equipment that produced the composite instances is located. Always taken from system configuration Sent as empty string if it is not received from user input. Always sent.
Institutional Department Name	(0008,1040)	3	Department in the institution where the equipment that produced the composite instances is located. Always taken from system configuration Sent as empty string if it is not received from user input. Always sent.
Manufacturer's Model Name	(0008,1090)	3	Manufacturer's model name of the equipment that produced the composite instances. Set to "Stargate_StarGuide" Always sent
Station Name	(0008,1010)	3	User defined name identifying the machine that produced the composite instances. Camera name taken from configuration is used Sent as empty string if it is not received from user input. Always sent
Pixel Padding Value	(0028,0120)	1C	Single pixel value or one limit (inclusive) of a range of pixel values used in an image to pad to rectangular format or to signal background that may be suppressed. Always sent Possible value: 127

4.4.2.2 SC Equipment Module

TABLE 4-6
SC EQUIPMENT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Use
Conversion Type	(0008,0064)	1	Specify Defined Terms used: LF = List file data
Modality	(0008,0060)	3	Always sent. Defined Terms: • NM = Nuclear Medicine • OT = Other

4.4.3 Image Entity Modules

4.4.3.1 General Image Module

TABLE 4-7
GENERAL IMAGE MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Instance Number	(0020,0013)	2	A number that identifies this image. Sent as ZERO Length value
Content Date	(0008,0023)	2C	The date the SC Image pixel data creation started
Content Time	(0008,0033)	2C	The time the SC image pixel data creation started
Quality Control Image	(0028,0300)	3	Not sent
Derivation Description	(0008,2111)	3	Not sent
Burned In Annotation	(0028,0301)	3	Indicates whether or not image contains sufficient burned in annotation to identify the patient and date the image was acquired. See also 4.4.3.6
Image Type	(0008,0008)	3	The following Enumerated Value of Value 1 is supported: • DERIVED - identifies a Derived Image The following Enumerated Value of Value 2 is supported: • SECONDARY - identifies a Secondary Image

4.4.3.2 Image Pixel Module

TABLE 4-8
IMAGE PIXEL MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Samples per Pixel	(0028,0002)	1	Number of samples (planes) in this image. Possible values: 1
Photometric Interpretation	(0028,0004)	1	Specifies the intended interpretation of the pixel data Defined Terms supported: • MONOCHROME2
Rows	(0028,0010)	1	Number of rows in the image. Possible values: 1024
Columns	(0028,0011)	1	Number of columns in the image Possible values: 1024
Bits Allocated	(0028,0100)	1	Number of bits allocated for each pixel sample. Each sample shall have the same number of bits allocated. Enumerated Values supported : 8

Bits Stored	(0028,0101)	1	Number of bits stored for each pixel sample. Value equal to Bit Allocated (0028,0100)
High Bit	(0028,0102)	1	Most significant bit for pixel sample data. Value equal to Bit Stored (0028,0101) - 1
Pixel Representation	(0028,0103)	1	Data representation of the pixel samples. Each sample shall have the same pixel representation. Enumerated Values: 0000H = unsigned integer.
Pixel Data	(7FE0,0010)	1	A data stream of the pixel samples that comprise the Image. VR=OB
Planar Configuration	(0028,0006)	1C	Not sent

4.4.3.3 SC Image Module

TABLE 4-9
SC IMAGE MODULE ATTRIBUTES

Attribute Name	Tag	Type	Use
Pixel Spacing	(0028,0030)	1C	Not sent. Secondary Capture images created by product does not contain pixel data

4.4.3.4 Cine Module

TABLE 4-10
CINE MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Frame Time	(0018,1063)	1C	Nominal time (in msec) per individual frame. Required if Frame Increment Pointer (0028,0009) points to Frame Time.

4.4.3.5 Multi-Frame Module

TABLE 4-11
MULTI-FRAME MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Number of Frames	(0028,0008)	1	Number of frames in a Multi-frame Image.
Frame Increment Pointer	(0028,0009)	1	Contains the Data Element Tags of one or more frame index vectors. See 4.4.3.6 for specialization

4.4.3.6 SC Multi-Frame Image Module

TABLE 4-12
SC MULTI-FRAME IMAGE MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Burned in Annotation	(0028,0301)	1	Indicates whether or not image contains sufficient burned in annotation to identify the patient and date the image was acquired. Enumerated Values : NO
Presentation LUT Shape	(2050,0020)	1C	Specifies an identity transformation for the Presentation LUT, such that the output of all grayscale transformations defined in the IOD containing this Module are defined to be P-Values. Required if Photometric Interpretation (0028,0004) is MONOCHROME2, and BitsStored (0028,0101) is greater than 1. Enumerated Value: IDENTITY - output is in P-Values.

Rescale Intercept	(0028,1052)	1C	The value b in the relationship between stored values (SV) in Pixel Data (7FE0,0010) and the output units specified in Rescale Type (0028,1054). Output units = m*SV + b. Enumerated Value: 0 Required if Photometric Interpretation (0028,0004) is MONOCHROME2, and BitsStored (0028,0101) is greater than 1.
Rescale Slope	(0028,1053)	1C	The value m in the equation specified in Rescale Intercept (0028,1052). Enumerated Value: 1. Required if Photometric Interpretation (0028,0004) is MONOCHROME2, and BitsStored (0028,0101) is greater than 1.
Rescale Type	(0028,1054)	1C	Specifies the output units of Rescale Slope (0028,1053) and Rescale Intercept (0028,1052). Enumerated Value: US = Unspecified. Required if Photometric Interpretation (0028,0004) is MONOCHROME2, and BitsStored (0028,0101) is greater than 1.
Frame Increment Pointer	(0028,0009)	1C	Contains the Data Element Tag of the attribute which is used as the frame increment in Multi-frame pixel data - Frame Time (0018, 1063).

4.4.3.7 SC Multi-Frame Vector Module

This section specifies the IOD Attributes that may be the target of the Frame Increment Pointer (0028,0009) for SC Multi-frame images.

Attributes of this module are not included into MFSC Images created by StarGuide implementation , because Frame Increment Pointer (0028,0009) always points to Frame Time attribute (0018, 1063), which is used as the frame increment in Multi-frame pixel data.

4.4.3.8 SOP Common Module

TABLE 4-13
SOP COMMON MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
SOP Class UID	(0008,0016)	1	Uniquely identifies the SOP Class. Always set to "1.2.840.10008.5.1.4.1.1.7.2"
SOP Instance UID	(0008,0018)	1	Uniquely identifies the SOP Instance. Internally generated.
Specific Character Set	(0008,0005)	1C	Character Set that expands or replaces the Basic Graphic Set. Defined Terms include for locally created images: ISO_IR 100 = Latin Alphabet No. 1 Always sent.
Instance Number	(0020,0013)	3	Sent as empty String

4.4.3.9 Standard Extended Image Module

TABLE 4-14
IMAGE STANDARD EXTENDED ATTRIBUTES

Attribute Name	Tag	Use

Image Comments	(0020,4000)	Equipment defined comments about the image.
Image ID	(0054,0400)	Equipment generated Image identifier. Always sent as “List File Image”

4.5 STANDARD EXTENDED AND PRIVATE DATA ATTRIBUTES

The Product supports the Standard and Private Attributes defined in the following sections in Standard Extended SC SOP Instances as Type 3 data elements.

4.5.1 Standard Extended Attributes

The Product supports the following attributes, not specified in the SC IOD, in SOP Instances as Type 3 data elements.

TABLE 4-15
STANDARD EXTENDED ATTRIBUTES

Information Entity Name	Attribute Name	Tag	Use
Image	Image Comments	(0020,4000)	Equipment defined comments about the image.
	Image ID	(0054,0400)	Equipment generated Image identifier.

4.5.2 Private Group STARGATE

TABLE 4-16
PRIVATE GROUP STARGATE

Attribute Name	Tag	VR	VM	Attribute Description and Use
Private Creator Identification	(0097, 00xx)	LO	1	STARGATE
acq_group_uid	(0097, xx79)	LO	1	allows grouping of a single scan (12 datasets).

4.6 STANDARD EXTENDED AND PRIVATE CONTEXT GROUPS

NM Camera AE does not support any coded terminology.

5. ENCAPSULATED PDF INFORMATION OBJECT IMPLEMENTATION

5.1 INTRODUCTION

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

5.2 NM CAMERA AE MAPPING OF DICOM ENTITIES

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

TABLE 5-1
MAPPING OF DICOM ENTITIES TO NM CAMERA AE ENTITIES

DICOM IE	NM Camera AE Entity
Patient	Patient
Study	Study
Series	Series
Encapsulated Document	Dataset

5.3 IOD MODULE TABLE

The Encapsulated PDF 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.

TABLE 5-2
ENCAPSULATED PDF IOD MODULES

Entity Name	Module Name	Usage	Reference
Patient	Patient	Used (same description as for NM IOD)	3.4.1.1
	Clinical Trial Subject	Not Used	N/A
Study	General Study	Used (same description as for NM IOD)	3.4.2.1
	Patient Study	Used (same description as for NM IOD)	0
	Standard Extended Study	Used (same description as for NM IOD)	3.4.2.3
	Private Study	Used (same description as for NM IOD)	3.4.2.4
	Clinical Trial Study	Not Used	N/A
Series	Encapsulated Document Series	Used	5.4.1.1
	Clinical Trial Series	Not Used	N/A
Equipment	General Equipment	Used (same description as for SC IOD)	4.4.2.1
	SC Equipment	Used (same description as for SC IOD)	4.4.2.2
Encapsulated Document	Encapsulated Document	Used	5.4.2.1
	SOP Common	Used	5.4.2.2

5.4 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 Encapsulated PDF Information Object.
The following modules are included to convey Enumerated Values, Defined Terms, and Optional Attributes generated by NM Camera AE at time of object creation. Type 1 & Type 2 Attributes are also included for completeness and to define what values they may take 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.

5.4.1 Series Entity Modules

5.4.1.1 Encapsulated Document Series Module

TABLE 5-3
ENCAPSULATED DOCUMENT SERIES MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	1	The modality appropriate for the encapsulated document. Defined Term used: NM
Series Instance UID	(0020,000E)	1	Unique identifier of the Series.
Series Number	(0020,0011)	1	Series Number
Series Description	(0008,103E)	3	Description of the Series. Always sent.

5.4.2 Encapsulated Document Entity Modules

5.4.2.1 Encapsulated Document Module

TABLE 5-4
ENCAPSULATED DOCUMENT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Instance Number	(0020,0013)	1	A number that identifies this instance.
Content Date	(0008,0023)	2	The date the document content creation was started
Content Time	(0008,0033)	2	The time the document content creation was started
Acquisition DateTime	(0008,002A)	2	Always sent as empty
Derivation Description	(0008,2111)	3	Not used Not derived from DICOM image(s)
Burned In Annotation	(0028, 0301)	1	Indicates whether or not the encapsulated document contains sufficient burned in annotation to identify the patient and date the data was acquired. Enumerated Values : NO
Source Instance Sequence	(0042,0013)	1C	Not used. Not derived from DICOM image(s)
Document Title	(0042,0010)	2	The title of the document.
Concept Name Code Sequence	(0040,A043)	2	A coded representation of the document title. Always sent as Zero length Sequence
Verification Flag	(0040,A493)	3	Not used
MIME Type of Encapsulated Document	(0042,0012)	1	The type of the encapsulated document stream described using the MIME Media Type. Always sent as “application/pdf”
List of MIME Types	(0042,0014)	1C	MIME Types of subcomponents of the encapsulated document. Always sent as "image/jpeg\application/pdf"
Encapsulated Document	(0042,0011)	1	Encapsulated Document stream, containing a document encoded according to the MIME Type

5.4.2.2 SOP Common Module

TABLE 5-5
SOP COMMON MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
SOP Class UID	(0008,0016)	1	Uniquely identifies the SOP Class. Possible value: "1.2.840.10008.5.1.4.1.1.104.1"
SOP Instance UID	(0008,0018)	1	Uniquely identifies the SOP Instance. Internally generated.
Specific Character Set	(0008,0005)	1C	Not used when the default character set (ISO 646) is used. Set to "ISO IR 100" when extended character sets are used.

5.5 STANDARD EXTENDED AND PRIVATE CONTEXT GROUPS

NM Camera AE does not support any coded terminology

6. MODALITY WORKLIST QUERY IMPLEMENTATION

6.1 INTRODUCTION

The StarGuide implementation (for NM standalone exams and NM/CT hybrid exams) maps DICOM Information Entities to local Information Entities in the product's database and user interface.

In the StarGuide implementation for CT standalone exams, Worklist query is performed via the CT scanner console. For Modality Worklist Information Model Definition, refer to appropriate CT Scanner DICOM Conformance Statements (Reference A Section 1.6)

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.

6.2 NM CAMERA MAPPING OF DICOM ENTITIES

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

TABLE 6-1
MAPPING OF DICOM ENTITIES TO NM CAMERA ENTITIES

DICOM	NM Camera Entity
Scheduled Procedure Step	Protocol
Requested Procedure	Study
Imaging Service Request	Study
Visit	Study
Patient	Patient

Matching Requested Procedure Step to NM Camera protocol is done according to predefined configuration. The configuration contains the following tags

- (0040,0007) – Scheduled Procedure Step Description
- (0032,1060) – Requested Procedure Description

- (0040,0008) – Scheduled Protocol Code Sequence - Code Meaning

The default configuration is (0040,0007) – Scheduled Procedure Step Description
If Scheduled Protocol Code Sequence - tag (0040,0008) - is selected for mapping, the protocol will be mapped according to the value of Code Meaning - tag (0008,0104).

6.3 WORKLIST QUERY MODULE TABLE

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

TABLE 6-2
MODALITY WORKLIST INFORMATION MODEL MODULES

Entity Name	Module Name	Reference
Scheduled Procedure Step	SOP Common	6.4.1.1
	Scheduled Procedure Step	6.4.1.2
Requested Procedure	Requested Procedure	6.4.2.1
Imaging Service Request	Imaging Service Request	6.4.3.1
Visit	Visit Identification	6.4.4.1
	Visit Status	6.4.4.2
	Visit Relationship	6.4.4.3
	Visit Admission	6.4.4.4
Patient	Patient Relationship	Not Used
	Patient Identification	6.4.5.1
	Patient Demographic	6.4.5.2
	Patient Medical	6.4.5.3

6.4 WORKLIST QUERY MODULE DEFINITIONS

Please refer to DICOM Standard PS 3.3. (Information Object Definitions) for a description of each of the query key attributes contained within the Modality Worklist Information Model.

Note that in all tables below information in "**Mapped into Instance"** column is referenced to NM images and CT Images only if not explicitly specified. .

6.4.1 Common Scheduled Procedure Step Entity Modules

6.4.1.1 SOP Common Module

TABLE 6-3
SOP COMMON MODULE ATTRIBUTES

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into Instance	Note
Specific Character Set	(0008,0005)	O	1C	Yes	See 6.4.1.1.1

6.4.1.1.1 Specific Character Set

The NM Scanner AE will use any Specific Character Set value returned in a Scheduled Procedure Step Identifier in the images created pursuant to that Scheduled Procedure Step. Text attributes, including Patient and Physician names, that include non-ASCII characters will be displayed as described in Section 2.7

6.4.1.2 Scheduled Procedure Step Module

TABLE 6-4
SCHEDULED PROCEDURE STEP MODULE ATTRIBUTES

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into Instance	Note
Scheduled Procedure Step Sequence	(0040,0100)	R	1	No	Only one item is supported
>Scheduled Station AE Title	(0040,0001)	R	1	No	Single Value matching is used.
>Scheduled Procedure Step Start Date	(0040,0002)	R	1	Yes	Specified as range of date of the form: from Date - To Date. SPS Start Date is mapped into private attribute "Protocol Scheduled Date" in the image – Tag (0009,xx40), QUASAR_INTERNAL_USE Cannot be modified in UI if received from MWL
>Scheduled Procedure Step Start Time	(0040,0003)	R	1	Yes	Matching is not supported. SPS Start Time is mapped into private attribute "Protocol Scheduled Time" in the image - tag (0009,xx41), QUASAR_INTERNAL_USE Cannot be modified in UI if received from MWL.
>Modality	(0008,0060)	R	1	No	Single value matching is allowed. Possible Values: NM, CT
>Scheduled Performing Physician's Name	(0040,0006)	R	2	Yes	Wildcard matching is allowed by Last Name and First Name separately. User may enter matching values for Last Name and/or First Name separately in UI. The value sent in MWL request is created according to the following template : < Last Name>^< First Name> Mapped to Performing Physicians' Name tag (0008,1050) for NM IODs.
>Scheduled Procedure Step Description	(0040,0007)	O	1C	Yes	Always included in the MWL request. May be used for Protocol Mapping.
>Scheduled Protocol Code Sequence	(0040,0008)	O	1C	Yes	Always included in the MWL request.
>>Code Value	(0008,0100)	O	1	Yes	Requested explicitly
>>Coding Scheme Designator	(0008,0102)	O	1	Yes	Requested explicitly

>>Coding Scheme Version	(0008,0103)	O	3	Yes	Requested explicitly
>>Code Meaning	(0008,0104)	O	3	Yes	Requested explicitly . Returned non-empty value may be used for Protocol Mapping If Protocol Mapping is configured to use this tag, it's never displayed for mapped protocols.
>Scheduled Procedure Step ID	(0040,0009)	O	1	Yes	Always included in the MWL request.
>Scheduled Station Name	(0040,0010)	O	2	No	Included in the MWL request by default. User may remove this tag from MWL request (not recommended).
> Scheduled Procedure Step Location	(0040,0011)	O	2	No	Included in the MWL request by default. User may remove this tag from MWL request (not recommended).
>Pre-Medication	(0040,0012)	O	2C*	Yes	Included in the MWL request by default. User may remove this tag from MWL request (not recommended). Mapped into private attribute Pre-Medication – tag (0009,xx45) "QUASAR_INTERNAL_USE"
>Requested Contrast Agent	(0032,1070)	O	2C	No	Included in the MWL request by default. User may remove this tag from MWL request (not recommended).
>Scheduled Procedure Step Status	(0040,0020)	O	3	No	Included in the MWL request by default. User may remove this tag from MWL request (not recommended).

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

6.4.2 Common Requested Procedure Entity Modules

6.4.2.1 Requested Procedure Module

TABLE 6-5
REQUESTED PROCEDURE MODULE ATTRIBUTES

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into Instance	Note
Requested Procedure ID	(0040,1001)	O	1	Yes	Always included in the MWL request. Single value matching is allowed.

Requested Procedure Description	(0032,1060)	O	1C *	Yes	Always included in the MWL request. Matching is not supported . May be used for Protocol Mapping. Mapped to Study Description tag (0008,1030), if belongs to first Protocol in the Study
Requested Procedure Code Sequence	(0032,1064)	O	1C	Yes	Always included in the MWL request Copied to Procedure Code Sequence (0008,1032) when stored to instance
>Code Value	(0008,0100)	O	1	Yes	Requested explicitly Copied to Procedure Code Sequence (0008,1032) when stored to instance
>Coding Scheme Designator	(0008,0102)	O	1	Yes	Requested explicitly Copied to Procedure Code Sequence (0008,1032) when stored to instance
>Coding Scheme Version	(0008,0103)	O	3	Yes	Requested explicitly Copied to Procedure Code Sequence (0008,1032) when stored to instance
>Code Meaning	(0008,0104)	O	3	Yes	Requested explicitly Copied to Procedure Code Sequence (0008,1032) when stored to instance
Study Date	(0008,0020)	O	3	No	Included in the MWL request by default. User may remove this tag from MWL request (not recommended).
Study Time	(0008,0030)	O	3	No	Included in the MWL request by default. User may remove this tag from MWL request (not recommended).
Study Instance UID	(0020,000D)	O	1	Yes	Always included in the MWL request.
Referenced Study Sequence	(0008,1110)	O	2	Yes	Always included in the MWL request
>Referenced SOP Class UID	(0008,1150)	O	1	Yes	Requested explicitly
>Referenced SOP Instance UID	(0008,1155)	O	1	Yes	Requested explicitly
Requested Procedure Comments	(0040,1400)	O	3*	No	Included in the MWL request by default. User may remove this tag from MWL request (not recommended).
Names of Intended Recipients of Results	(0040,1010)	O	3	No	Included in the MWL request by default. User may remove this tag from MWL request (not recommended).

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

6.4.3 Common Imaging Service Request Entity Modules

6.4.3.1 Imaging Service Request Module

TABLE 6-6
IMAGING SERVICE REQUEST MODULE ATTRIBUTES

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into Instance	Note
Accession Number	(0008,0050)	O	2*	Yes	Always included in the MWL request. Single Value and Wild Card matching may be requested for this data element
Requesting Physician	(0032,1032)	O	2	No	Included in the MWL request by default. User may remove this tag from MWL request (not recommended).
Referring Physician's Name	(0008,0090)	O	2*	Yes	Included in the MWL request by default. User may remove this tag from MWL request (not recommended). Only First Name and Last Name are displayed on screen and stored in image; User can modify value arrived from MWL.
Imaging Service Request Comments	(0040,2400)	O	3	No	Included in the MWL request by default. User may remove this tag from MWL request (not recommended).
Requesting Service	(0032,1033)	O	3	No	Included in the MWL request by default. User may remove this tag from MWL request (not recommended).
Issuer of Accession Number Sequence	(0008,0051)	O	3	No	Included in the MWL request by default. User may remove this tag from MWL request (not recommended).
>Local Namespace Entity ID	(0040,0031)	O	3	No	Requested explicitly
>Universal Entity ID	(0040,0032)	O	3	No	Requested explicitly
>Universal Entity ID Type	(0040,0033)	O	1C	No	Requested explicitly
Placer Order Number / Imaging Service Request	(0040,2016)	O	3	No	Always included in the MWL request.
Filler Order Number / Imaging Service Request	(0040,2017)	O	3	No	Always included in the MWL request.

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

6.4.4 Common Visit Entity Modules

6.4.4.1 Visit Identification Module

TABLE 6-7
VISIT IDENTIFICATION MODULE ATTRIBUTES

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into Instance	Note
Institution Name	(0008,0080)	O	3	No	Included in the MWL request by default. User may remove this tag from MWL request (not recommended) Value from MWL response is not stored in the image – used value from System configuration instead.
Institution Address	(0008,0081)	O	3	No	Included in the MWL request by default. User may remove this tag from MWL request (not recommended) Value from MWL response is not stored in the image – used value from System configuration instead.
Institution Code Sequence	(0008,0082)	O	3	No	Included in the MWL request by default. User may remove this tag from MWL request (not recommended)
>Code Value	(0008,0100)	O	1	No	Requested explicitly
>Coding Scheme Designator	(0008,0102)	O	1	No	Requested explicitly
>Coding Scheme Version	(0008,0103)	O	3	No	Requested explicitly
>Code Meaning	(0008,0104)	O	3	No	Requested explicitly
Admission ID	(0038,0010)	O	2	No	Included in the MWL request by default. User may remove this tag from MWL request (not recommended)
Issuer Of Admission ID Sequence	(0038,0014)	O	3	No	Included in the MWL request by default. User may remove this tag from MWL request (not recommended)
>Local Namespace Entity ID	(0040,0031)	O	3	No	Requested explicitly
>Universal Entity ID	(0040,0032)	O	3	No	Requested explicitly
>Universal Entity ID Type	(0040,0033)	O	1C	No	Requested explicitly

6.4.4.2 Visit Status Module

TABLE 6-8
VISIT STATUS MODULE ATTRIBUTES

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into Instance	Note
Current Patient Location	(0038,0300)	O	2	No	Included in the MWL request by default. User may remove this tag from MWL request (not recommended)
Visit Status ID	(0038,0008)	O	3	No	Not included in the MWL request by default. User may add this tag to MWL request.
Patient's Institution Residence	(0038,0400)	O	3	No	Not included in the MWL request by default. User may add this tag to MWL request.
Visit Comments	(0038,4000)	O	3	No	Not included in the MWL request by default. User may add this tag to MWL request.

6.4.4.3 Visit Relationship Module

TABLE 6-9
VISIT RELATIONSHIP MODULE ATTRIBUTES

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into Instance	Note
Referenced Patient Sequence	(0008,1120)	O	2	No	Included in the MWL request by default. User may remove this tag from MWL request (not recommended)
>Referenced SOP Class UID	(0008,1150)	O	3	No	Requested explicitly
>Referenced SOP Instance UID	(0008,1155)	O	3	No	Requested explicitly

6.4.4.4 Visit Admission Module

TABLE 6-10
VISIT ADMISSION MODULE ATTRIBUTES

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into Instance	Note
Referring Physician's Name	(0008,0090)	O	3*	Yes	Always included in the MWL request Only First Name and Last Name are displayed on screen and stored in image; User can modify value arrived from MWL.
Admitting Diagnoses Description	(0008,1080)	O	3*	Yes	Not included in the MWL request by default. User may add this tag to MWL request. User can modify value arrived from MWL.

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

6.4.5 Common Patient Entity Modules

6.4.5.1 Patient Identification Module

TABLE 6-11
PATIENT IDENTIFICATION MODULE ATTRIBUTES

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into Instance	Note
Patient's Name	(0010,0010)	R	1 *	Yes	Single Value or Wild Card matching is allowed Last name and First Name separately; Only First Name and Last Name are displayed on screen and stored into image. User cannot modify value received from MWL
Patient ID	(0010,0020)	R	1 *	Yes	Only Single Value matching is allowed for this data element. User cannot modify value received from MWL
Issuer of Patient ID	(0010,0021)	O	3	No	Included in the MWL request by default. User may remove this tag from MWL request (not recommended)
Issuer of Patient ID Qualifiers Sequence	(0010,0024)	O	3	No	Not included in the MWL request by default. User may add this tag to MWL
>Universal Entity ID	(0040,0032)	O	3	No	Requested explicitly if Sequence is sent
>Universal Entity ID Type	(0040,0033)	O	1C	No	Requested explicitly if Sequence is sent
Other Patient IDs	(0010,1000)	O	3	No	Not included in the MWL request by default. User may add this tag to MWL
Other Patient IDs Sequence	(0010,1002)	O	3	No	Not included in the MWL request by default. User may add this tag to MWL
>Patient ID	(0010,0020)	O	3	No	Requested explicitly if Sequence is sent
> Issuer of Patient ID	(0010,0021)	O	3	No	Requested explicitly if Sequence is sent
> Issuer of Patient ID Qualifiers Sequence	(0010,0024)	O	3	No	Requested explicitly if Sequence is sent
>Type of Patient ID	(0010,0022)	O	3	No	Requested explicitly if Sequence is sent

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

6.4.5.2 Patient Demographic Module

TABLE 6-12
PATIENT DEMOGRAPHIC MODULE ATTRIBUTES

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into Instance	Note
Patients Birth Date	(0010,0030)	O	2 *	Yes	Always included in the MWL request User cannot modify value received from MWL
Patient's Sex	(0010,0040)	O	2 *	Yes	Always included in the MWL request User cannot modify non-empty value received from MWL
Patient's Weight	(0010,1030)	O	2*	Yes	Included in the MWL request by default. User may remove this tag from MWL request (not recommended) User can modify value received from MWL
Patient's Size	(0010,1020)	O	2*	Yes	Included in the MWL request by default. User may remove this tag from MWL request (not recommended) User can modify value received from MWL
Patient's Age	(0010,1010)	O	3	No	Included in the MWL request by default. User may remove this tag from MWL request (not recommended) Value calculated from Patient Birth Date is displayed on screen stored into image.
Patient's Address	(0010,1040)	O	3	No	Included in the MWL request by default. User may remove this tag from MWL request (not recommended)
Patient's Telephone Numbers	(0010,2154)	O	3	No	Included in the MWL request by default. User may remove this tag from MWL request (not recommended)
Patient Comments	(0010,4000)	O	3	No	Included in the MWL request by default. User may remove this tag from MWL request (not recommended)
Confidentiality Constraint on Patient Data Description	(0040,3001)	O	3	No	Included in the MWL request by default. User may remove this tag from MWL request (not recommended)

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

6.4.5.3 Patient Medical Module

TABLE 6-13
PATIENT MEDICAL MODULE ATTRIBUTES

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into Instance	Note
Patient State	(0038,0500)	O	2	No	Included in the MWL request by default. User may remove this tag from MWL request (not recommended)
Pregnancy Status	(0010,21C0)	O	2*	Yes	Included in the MWL request by default. User may remove this tag from MWL request (not recommended)
Medical Alerts	(0010,2000)	O	2	No	Included in the MWL request by default. User may remove this tag from MWL request (not recommended)
Contrast Allergies	(0010,2110)	O	2*	Yes	Included in the MWL request by default. User may remove this tag from MWL request (not recommended)
Special Needs	(0038,0050)	O	2	No	Included in the MWL request by default. User may remove this tag from MWL request (not recommended)
Additional Patient History	(0010,21B0)	O	3	No	Included in the MWL request by default. User may remove this tag from MWL request (not recommended)

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