GE Healthcare

Technical Publications

DIRECTION 5339340-1EN

Revision 1

*Infinia** Conformance Statement for DICOM V3.0

* Refer to Section 1 for a list of products in the Infinia family to which this Conformance Statement applies.

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LIST OF REVISIONS

REV	DATE	DESCRIPTION	PAGES	APPR.
1	Oct. 2009	Infinia Release	All	M. Mesh

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SECTION 1: INTRODUCTION

Note

Throughout this document the term "Infinia" refers to the following Infinia products:

- Infinia
- Infinia with Hawkeye 4
- Infinia VC
- Infinia VC with Hawkeye 4

This document applies to the following software releases for each product:

- Infinia V2.105.x
- Infinia with Hawkeye 4 V2.105.x
- Infinia VC V2.105.x
- Infinia VC with Hawkeye 4 V2.105.x

1.1 OVERVIEW

This DICOM Conformance Statement is divided into Sections and Appendices 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 GE Healthcare equipment compliance to the DICOM requirements for the implementation of Networking features.

Section 3 - Nuclear Medicine Information Object Implementation, which specifies the GE Healthcare equipment compliance to DICOM requirements for the implementation of a Nuclear Medicine Information Object.

Section 4 - Modality Worklist Information Model, which specifies the information model used for the implementation of the Modality Worklist Information Model.

Section 5- Infinia Storage Commitment PUSH Model Implementation, which is used both for N-ACTION Storage Commitment requests by the SCU and N-EVENT REPORT Storage Commitment notifications by the SCP.

Section 6 - Infinia Protocol Data Object Implementation, which specifies the GE Healthcare equipment compliance to DICOM requirements for the implementation of a Private Infinia Protocol Data Object.

Section 7 - Infinia Modality Performed Procedure Step SOP Class Definition allows a Modality Performed Procedure Step Message to be communicated to the Hospital/Radiology information system. The PPS feature provides the DICOM Modality Performed Procedure Step service as a service class user (SCU).

Section 8 - Secondary Capture Information Object Implementation, which specifies the GE Healthcare equipment compliance to DICOM requirements for the implementation of a Secondary Capture Information Model.

Appendix A - Infinia Private Data Dictionary

1.2 OVERALL DICOM CONFORMANCE STATEMENT DOCUMENT STRUCTURE

The Documentation Structure of the GE Healthcare Conformance Statements and their relationship with the DICOM V3.0 Conformance Statements is shown in the Illustration 1-1.

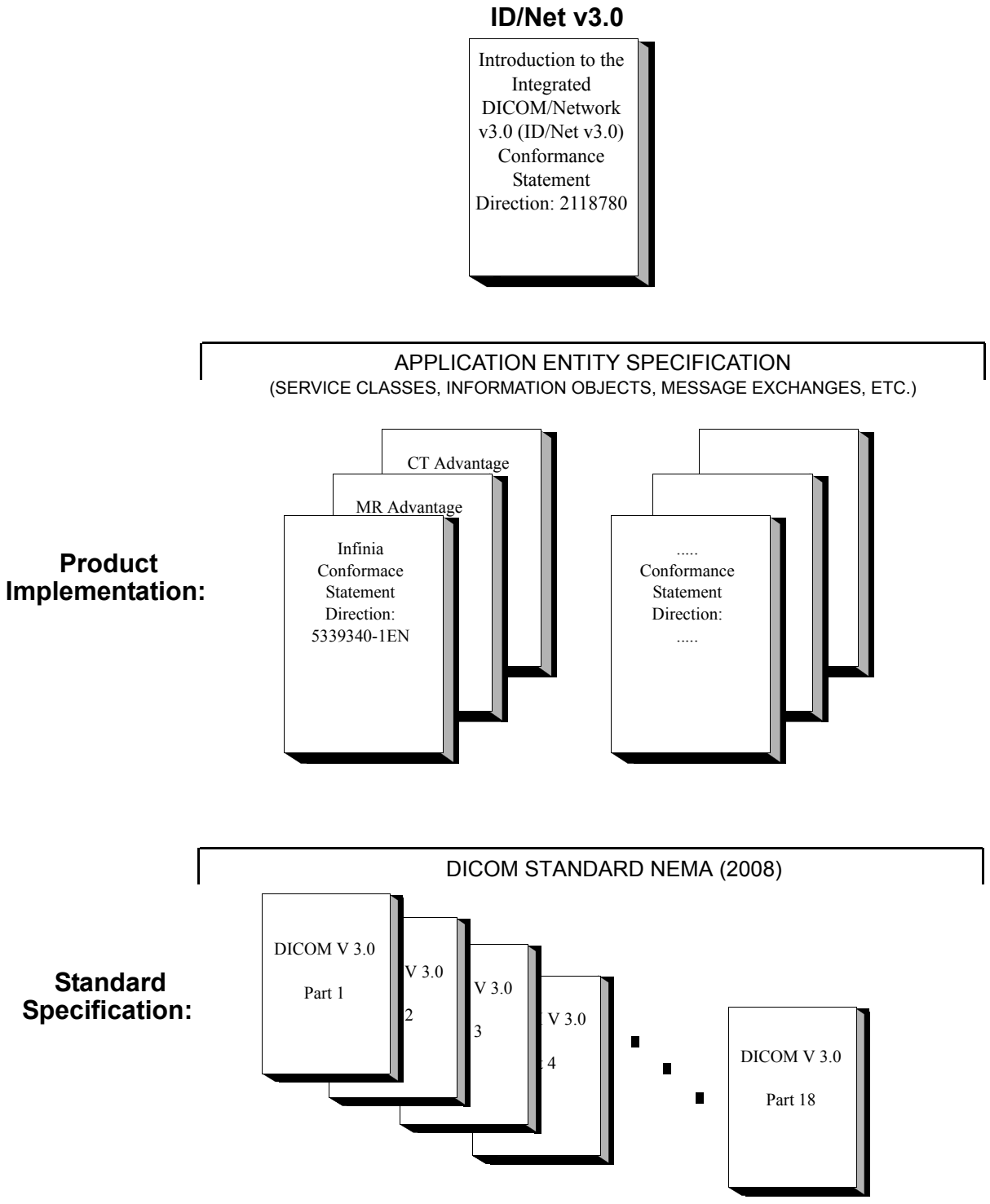

Illustration 1-1. Documentation Structure

This document specifies the DICOM v3.0 implementation.

It documents the DICOM v3.0 Conformance Statement and Technical Specification required to interoperate with the GE Healthcare network interface. Introductory information, which is applicable to all GE Healthcare Conformance Statements, is described in the document:

Introduction to the Integrated DICOM/Network v3.0 (ID/Net v3.0)
Conformance Statement
Direction: 2118780.

This Introduction familiarizes the reader with DICOM terminology and general concepts. It should be read prior to reading the individual products' GE Healthcare Conformance Statements.

The GE Healthcare 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 v3.0 Part 8 standard.

For more information including Network Architecture and basic DICOM concepts, please refer to the Introduction.

For the convenience of software developers, there is "collector" Direction available. By ordering the collector, the Introduction described above and all of the currently published GE Healthcare Product Conformance Statements will be received. The collector Direction is:

ID/Net v3.0 Conformance Statements
Direction: 2117016

For more information regarding DICOM v3.0, copies of the Standard may be obtained via the Internet at <http://medical.nema.org>. Comments to the Standard may be addressed to:

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Rosslyn, VA 22209
USA
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1.3 INTENDED AUDIENCE

The reader of this document is concerned with software design and/or system integration issues. It is assumed that the reader of this document is familiar with the DICOM v3.0 Standards and with the terminology and concepts which are used in those Standards.

If readers are unfamiliar with DICOM v3.0 terminology they should first refer to the document listed below, then read the DICOM v3.0 Standard itself, prior to reading this DICOM Conformance Statement document.

Introduction to the Integrated DICOM/Network v3.0 (ID/Net v3.0)
Conformance Statement
Direction: 2118780

1.4 SCOPE AND FIELD OF APPLICATION

It is the intent of this document, in conjunction with the *Introduction to the Integrated DICOM/Network v3.0 (ID/Net v3.0) Conformance Statement, Direction: 2118780*, to provide an unambiguous specification for GE Healthcare implementations. This specification, called a Conformance Statement, includes a DICOM v3.0 Conformance Statement and is necessary to ensure proper processing and interpretation of GE Healthcare medical data exchanged using DICOM v3.0. The GE Healthcare Conformance Statements are available to the public.

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

Included in this DICOM Conformance Statement are the Module Definitions which define all data elements used by this GE Healthcare implementation. If the user encounters unspecified private data elements while parsing a GE Healthcare Data Set, the user is well advised to ignore those data elements (per the DICOM V3.0 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 GE Healthcare devices.

1.5 IMPORTANT REMARKS

The use of these DICOM Conformance Statements, in conjunction with the DICOM V3.0 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 V3.0 Standard. DICOM V3.0 will incorporate new features and technologies and GE may follow the evolution of the Standard. The GE Healthcare protocol is based on DICOM V3.0 as specified in each DICOM Conformance Statement. Evolution of the Standard may require changes to devices which have implemented DICOM V3.0. **In addition, GE reserves the right to discontinue or make changes to the support of communications features (on its products) reflected on by these ID/Net 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

A list of references which is applicable to all GE Healthcare Conformance Statements is included in the *Introduction to the Integrated DICOM/Network V3.0 (ID/Net V3.0) Conformance Statement, Direction: 2118780*.

The information object implementation refers to DICOM PS 3.3 (Information Object Definition).

1.7 DEFINITIONS

A set of definitions which is applicable to all GE Healthcare Conformance Statements is included in *the Introduction to the IDICOM/Network V3.0 (ID/Net V3.0) Conformance Statement, Direction: 2118780*.

1.8 SYMBOLS AND ABBREVIATIONS

A list of symbols and abbreviations which is applicable to all GE Healthcare Conformance Statements is included in the *Introduction to the Integrated DICOM/Network V3.0 (ID/Net V3.0) Conformance Statement, Direction: 2118780*.

SECTION 2: NETWORK CONFORMANCE STATEMENT

2.1 INTRODUCTION

This section of the DICOM Conformance Statement specifies the compliance to DICOM conformance requirements for the relevant **Networking** features on this GE Healthcare product.

Infinia systems provide sophisticated acquisition, image processing and storage functions of nuclear image data acquired through the front end acquisition system. In view of the requirements to conform to a global standard that permits interoperability across equipment produced by different vendors, Infinia system will provide support for DICOM 3.0.

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

The Infinia DICOM implementation allows the user to send Nuclear Medicine image data, acquired through the front-end acquisition system, and Secondary Capture Objects, created as reports of several Quality Control (QC) operations, to another DICOM station. In this situation Infinia provides the DICOM C-STORE service as a service class user (SCU).

The Infinia DICOM implementation supports storage commitment for the already transferred data. This guarantees the user that the acquired Nuclear Medicine image data is safely archived for future use. In this situation Infinia provides the DICOM Storage Commitment Service as Service Class User (SCU).

The Infinia DICOM implementation supports receiving Worklist information from, and sending Modality Performed Procedure Step information to a remote AE. Receiving Worklist information is associated with the real world activity: Modality Worklist Query. When a query is performed the remote AE Worklist items matching the query request are received.

The Infinia DICOM implementation supports receiving more than one Scheduled procedure step per study instance, enabling the acquisition of their matching number of protocols for this study. Similarly, Infinia supports scheduling locally more than one protocol to be performed for a study.

The Infinia DICOM implementation creates and updates Modality Performed Procedure Step (MPPS) instances managed by a remote AE in association with image acquisition. Completion or discontinuation of the MPPS is performed as the result of an operator action.

The Infinia DICOM implementation also provides a verification mechanism by which a remote application entity (AE) can verify application-level communication with the Infinia DICOM Server. Also provided is a mechanism by which a Infinia user can verify application-level communication with a remote DICOM AE. In these situations, Infinia provides the DICOM C-ECHO service as both a SCP and SCU, respectively.

2.2 IMPLEMENTATION MODEL

All DICOM functionality on the Infinia product is logically provided by the Infinia_SCANNER Server AE. The Infinia_SCANNER Server AE is commanded to perform DICOM services through the use of the Infinia user interface. The Infinia_SCANNER Server AE also listens on a pre-defined port for incoming connections from remote DICOM AEs.

2.2.1 Application Data Flow Diagram

The Basic and Specific Application models for this device are shown in Illustration 2-1, below.

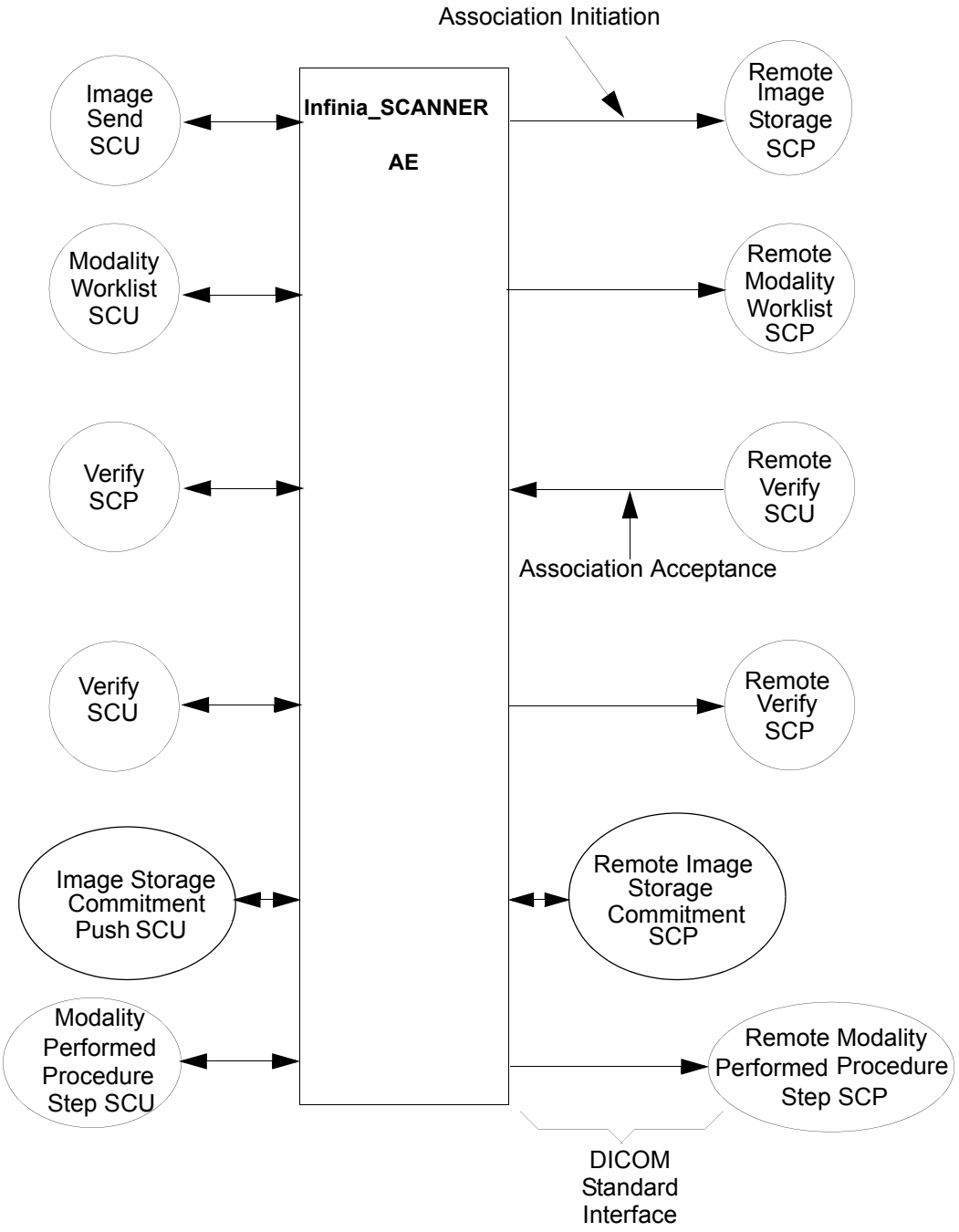

Illustration 2-1. Basic and Specific Application Models

2.2.2 Functional Definitions of Application Entities

The Infinia Infinia_SCANNER Server Application Entity (AE) initiates the following functions:

- *Store*: Initiates a DICOM association in order to send images to a remote AE. If the remote AE accepts a presentation context applicable to the image(s) being sent, the Infinia_SCANNER Server will send the images via the C-STORE service.
- *Storage commitment:* Initiates a DICOM association in order to request a storage commitment from a remote AE. If the remote AE supports storage commitment the Infinia_SCANNER DICOM server will request a storage commitment for the image(s) previously sent successfully via the N-ACTION-RQ.
- *Verify*: Initiates a DICOM association in order to send a verification message to a remote 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 Infinia_SCANNER Server will receive appropriate MWL responses via the C-FIND service.
- *Modality Performed Procedure Step (MPPS)*: Initiates a DICOM association in order to report the progress of the procedure step. When starting the acquisition of the first scan in the protocol, Infinia DICOM implementation creates an MPPS instance and updates this instance whenever a scan's acquisition is completed for this protocol, and when the operator marks this protocol as completed or discontinued.

The Infinia Infinia_SCANNER Server 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.”
- *Storage Commitment Response*: Responds to incoming N-EVENT_REPORT messages arriving from Remote AE with the status of storage commitment for images previously requested by Infinia_SCANNER Server AE.

2.2.3 Sequencing of Real-World Activities

The Infinia Application Entity queries the remote station for the modality Worklist; performs acquisition according to local schedules, or by Worklist procedures; stores images; reports the progress of procedure using MPPS; and then requests Storage Commitment for previously stored images.

2.3 AE SPECIFICATIONS

2.3.1 DICOM Server AE Specification

This Application Entity provides Standard Conformance to the following DICOM v3.0 SOP Classes as an **SCU**:

SOP Class Name	SOP Class UID
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7

SOP Class Name	SOP Class UID
Verification - SOP Class	1.2.840.10008.1.1
Modality Worklist Information Model - Find	1.2.840.10008.5.1.4.31
Private Class	1.2.840.113619.4.27
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3

This Application Entity provides Standard Conformance to the following DICOM v3.0 SOP Classes as an **SCP**:

SOP Class Name	SOP Class UID
Verification - SOP Class	1.2.840.10008.1.1

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 negotiation is included in all association establishment requests. The maximum length PDU for an association initiated by the Infinia_SCANNER Server is:

Maximum Length PDU	28672 bytes

The SOP Class Extended Negotiation is not supported.

The maximum number of Presentation Context Items that will be proposed is 7. Note that the same Abstract Syntax may be offered multiple times with different Transfer Syntaxes.

The user information items sent by this product are:

- PDU Maximum length (PDU maximum length is 28672, and is not configurable)
- Implementation UID

2.3.1.1.2 Number of Associations

The Infinia_SCANNER AE (SCU) will initiate a single DICOM association to perform a single image store to a remote AE. One association is opened per image both in manual send and in auto-send. Multiple Send operations can be performed. The Storage Commitment Request (SCU) initiates a new single association for all the images that were successfully stored on the remote AE. The Modality Performed Procedure Step Message (SCU) initiates a new DICOM association for each MPPS message. The Maximum Number of associations that the DICOM Server AE (SCU) can open in parallel is 5.

The Infinia_SCANNER AE (SCP) can have multiple DICOM associations open simultaneously to service verifications. The Maximum Number of associations that the Infinia_SCANNER AE (SCP) can accept in parallel is 5.

2.3.1.1.3 Asynchronous Nature

Asynchronous mode is not supported. All operations are performed synchronously.

2.3.1.1.4 Implementation Identifying Information

The Implementation UID for this DICOM v3.0 Implementation is:

Infinia Implementation UID	1.2.840.113619.6.265

2.3.1.2 Association Initiation Policy

The Infinia_SCANNER Server AE initiates a new association

- Due to an image send operation being initiated from the Infinia user interface, or by auto send option.
- Due to a storage commitment request operation being initiated from the Infinia user interface upon successful image transfer 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 Infinia user interface
- A new association is initiated for each PPS message.

2.3.1.2.1 Real-World Activity: Image Send

2.3.1.2.1.1 Associated Real-World Activity

The operator must both select image(s) to be transferred from the Patient Selector and select a destination by pressing the destination button. Once these selections have been made, the operator pushes the Transfer Destination button to initiate an image send operation. The Infinia_SCANNER Server will then initiate an association with the remote AE in order to send the selected image(s) – one image per association – and will accept and interparty responses received from the remote AE.

Note that for each send operation, typically one association is established. The exception to this is that, if an image send fails, the current association is closed and another is opened for sending the remaining image(s).

The UI will indicate the status of the dataset being transferred. The status can be one of PENDING, 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

The following table shows the proposed presentation contexts for the Infinia_SCANNER Server AE after real-world activity “Image Send” has been initiated:

Presentation Context Table - Proposed					
Abstract Syntax		Transfer Syntax		Role	Extended
Name	UID	Name List	UID List		Negotiation
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None
Secondary Image Capture Storage	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None

2.3.1.2.1.2.1 SOP Specific DICOM Conformance Statement for all Storage SOP Classes

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 15 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 the association is ended. The default time-out value is 3000 seconds.

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 Successful status, this implementation will close the current association and perform the next C-STORE operation(s).

Upon receiving a C-STORE confirmation containing a Refused status, this implementation will terminate the association.

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.

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

Service Status	Status Codes	Further Meaning	Application Behavior When receiving Status Codes
Refused	A7xx	Out of resources.	The message "Transfer Failed" is displayed in Transfer Log.
Error	Cxxx	Cannot Understand	The message "Transfer Failed" is displayed in Transfer Log.
	A900	Data Set does not match SOP Class	The message "Transfer Failed" is displayed in Transfer Log.

Service Status	Status Codes	Further Meaning	Application Behavior When receiving Status Codes
Warning	B000	Coercion of Data Elements	The message “Warning!! Instance does not match SOP Class or Coercion of data elements” posted to the Log.
	B007	Data Set does not match SOP Class	The message “Warning!! Instance does not match SOP Class or Coercion of data elements” posted to the Log.
	B006	Elements Discarded	The message “Warning!! Instance does not match SOP Class or Coercion of data elements” posted to the Log.
Success	0000		The message “Transfer Completed” posted to the Log.

2.3.1.2.2 Real -world Activity: Storage Commitment Push Model

2.3.1.2.2.1 Associated Real-World Activity

The operator must both select image(s) to be transferred from the Patient Selector and select a destination from the list of previously defined destinations. Once these selections have been made, the operator pushes the “Destination” button to initiate an image send operation. The Infinia_SCANNER will then initiate the multiple associations with the remote AE in order to send the selected image(s) and will accept interparty responses received from the remote AE. If the destination is configured as storage commitment capable or the destination is configured to use other storage commitment capable devices, the Infinia SCANNER will initiate one separate association with the remote storage commitment capable AE in order to request a storage commitment for all the successfully transferred image(s).

Note The storage commitment request it will always use a new association for requesting a commitment for the successfully transferred image(s). The storage commitment response will usually require the remote AE to initiate a new association with the Infinia_SCANNER.

The UI shows the status of the storage commitment request progress. The status can be either PENDING, SUCCESS, or FAILURE. The associated error messages due to a failure can be found in the system log.

2.3.1.2.2.2 Proposed Presentation Context Table

The following table shows the proposed presentation contexts for the Infinia_SCANNER Server AE after real-world activity “Storage Commitment Request” has been initiated:

Presentation Context Table - Proposed					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None

2.3.1.2.2.3 SOP Specific DICOM Conformance Statement for Storage Commitment SOP Class

The storage commitment request (N-ACTION) can perform a storage commitment request for multiple images over a single association. A new association is initiated for the storage commitment request for every group of successfully transferred image(s).

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 15 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 the association is ended. The default time-out value is 360 seconds and is not 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 N-ACTION confirmation containing a “Successful” status, the next N_ACTION_RQ operation is performed for the new association.

Upon receiving a N-ACTION confirmation containing a “Refused” status, the association is terminated. The reason for termination is recorded in the system log file.

Upon receiving a N-ACTION confirmation containing a status other than the DICOM standard defined values, the current request is considered to be a failure and will terminate the association. The reason for termination is recorded in the system log file.

As part of the storage commitment implementation, Remote AE (SCP) will initiate an association to this implementation and will send an N-EVENT-REPORT. The attribute of the N-EVENT-REPORT message will include an indication on all images for which a commitment has succeeded and those for which it has failed.

The receipt of a N-EVENT-REPORT on an association that Infinia_SCANNER has initiated is not supported. The Remote AE (SCP) must initiate a new association in order to send the new N-EVENT-REPORT.

Table 2-1. Storage Commitment Failure Reasons Module for N-action

Failure Reason	Meaning	SCU Behavior
0110H	Processing failure	Error logged
0112H	No such object instance	Error logged
0213H	Resource limitation	Error logged
0122H	Referenced SOP Class not supported	Error logged
0119H	Class / Instance conflict	Error logged
0131H	Duplicate transaction UID	Error logged

2.3.1.2.3 Real-world Activity: Verify

2.3.1.2.3.1 Associated real-World Activity

Service personnel invoke the DICOM Station Configuration Utility from the Infinia user interface. The AE Title of the remote DICOM AE is supplied on the command line along with the IP address and the port number of the remote

DICOM station.The Infinia_SCANNER server will initiate 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.

2.3.1.2.3.2 Proposed Presentation Context Table

Presentation Context Table - Proposed					
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

2.3.1.2.3.2.1 SOP Specific DICOM Conformance Statement for Verification SOP Class

The Infinia_SCANNER Server 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 15 seconds and is not configurable.

2.3.1.2.4 Real-World Activity: Modality Worklist

2.3.1.2.4.1 Associated Real-World Activity

The user requests Infinia to query the remote AE for a worklist.

2.3.1.2.4.2 Proposed Presentation Context Table

The following table shows the proposed presentation contexts for the Infinia_SCANNER Server AE after real-world activity “Modality Work List” has been initiated:

Presentation Context Table - Proposed					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Modality Worklist C - FIND	1.2.840.10008.5.1.4.31	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None

2.3.1.2.4.2.1 SOP Specific DICOM Conformance Statement for all Query SOP Classes

Infinia provides standard conformance to the DICOM V3.0 Modality Worklist Service Class as an SCU for the following SOP Classes:

- Modality Worklist C-FIND, UID = 1.2.840.10008.5.1.4.31

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 15 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 360 seconds.

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

2.3.1.2.5 Real-World Activity: Performed Procedure Step creation and update

2.3.1.2.5.1 Associated Real-World Activity

Infinia_SCANNER AE generates an association establishment request upon the following events:

- In order to issue an N-CREATE message with Performed Procedure Step status = IN PROGRESS when the acquisition of the first scan in the protocol is started.

Note In the acquisition station terminology, "Protocol" means "Scheduled Procedure Step”.

Upon starting additional scans acquisition in the same protocol, no additional MPPS message is sent.

- In order to issue an N-SET message with Performed Procedure Step status = IN PROGRESS upon every scan acquisition completion. Note that an N-SET message is sent only upon successful completion of a scan. No MPPS message is sent when operator quits a scan or when the scan is aborted due to an error.

- In order to send an N-SET message with Performed Procedure Step status = COMPLETED in the following events:

  -1 When the operator presses the "Protocol Completed" button for a selected protocol.

  -2 When the operator presses the "Protocol Completed" button where a study instance is selected. The N-SET message is sent for all protocols in a study that has acquired data. Note that pressing "Protocol Completed" when the protocol has no acquired images that were not reported by PPS (N-CREATE message was not sent) will not result in sending N-SET MPPS message.

  -3 When the acquisition of the last scan in a protocol is completed leaving no non-acquired scans in the protocol, the protocol is automatically considered completed.

- In order to send an N-SET message with Performed Procedure Step status = DISCONTINUED when the operator presses the "Discontinue Protocol" button for a selected protocol or for all of the protocols in a study when study is selected. The message will be set with the reason for discontinuing the protocol as selected by the operator.

2.3.1.2.5.2 Proposed Presentation Contexts

The following table shows the proposed presentation contexts for the Infinia_SCANNER AE after any of the real-world activities listed in Section 2.3.1.2.5.1 are initiated.

Presentation Context Table - Proposed					
Abstract Syntax		Transfer Syntax		Role	Extended
Name	UID	Name List	UID List		Negotiation
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None

2.3.1.2.5.3 SOP Specific Conformance statement for MPPS SOP class

- When sending a PPS message, the system looks for a station configured to act as a PPS manager. Upon association, if the remote AE does not support the proposed Presentation context, an appropriate error message is logged. Only one association is opened at a time.
- All the operations used by this SOP class support an association timer. The timer is started when a request (N-CREATE request or N-SET request) is sent, and stopped when the respective response is received. The default time-out value is 15 seconds, and it 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 3000 seconds, and it is not configurable.
- If any of the above timers expires the association is aborted and the operation in-progress is considered FAILED. The user can see if the PPS message was received successfully or unsuccessfully, using the "Transfer Log" screen.
- If the N-CREATE operation fails, the system marks the condition to enable sending N-CREATE again upon next scan's acquisition start.
- If the N-SET operation fails upon scan's acquisition completion, an error is logged. The operator is not informed in any way. This is an intermediate update that will be reported again by a following COMPLETE or DISCONTINUE message or additional scan's completion N-SET message(s) after completion of the next scan(s) of the same protocol.
- The PPS N-SET request can inform of completion of multiple images over a single association. A new association is initiated for the PPS request upon a scan completion that may result in multiple images. And upon pressing "Protocol completed" or 'Discontinue protocol" which may encapsulate multiple series and images.

2.3.1.2.6 Transfer Syntax Selection Policies

The transfer syntax selection policy is as follows:

- Only the following transfer syntaxes are proposed: Implicit VR Little Endian (1.2.840.10008.1.2), Explicit VR Little Endian (1.2.840.10008.1.2.1)

- Among all proposed transfer syntaxes, the Explicit Little Endian transfer syntax is chosen first if all proposed Transfer Syntaxes are accepted by Remote AE.

2.3.1.3 Association Acceptance Policy

The Infinia_SCANNER Server 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 DICOM Server 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 Infinia_SCANNER Server 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					
Abstract Syntax		Transfer Syntax		Role	Extended
Name	UID	Name List	UID List		Negotiation
Verification SOP Class	1.2.840.10008.1.1	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCP	None

2.3.1.3.1.2.1 SOP Specific DICOM Conformance Statement for Verification SOP Class

The Infinia_SCANNER Server AE provides standard conformance to the DICOM verification service class.

2.3.1.3.2 Real-World Activity: Receive N-EVENT-REPORT from Storage Commitment SCP

2.3.1.3.2.1 Associated Real-World Activity

As part of the storage commitment implementation, Remote AE (SCP) initiates an association to this implementation and sends an N-EVENT-REPORT. The attribute of the N-EVENT-REPORT message includes an indication on all images for which a commitment has succeeded and those for which it has failed.

The receipt of an N-EVENT-REPORT on an association that Infinia_SCANNER Server AE has initiated is not supported. The Remote AE (SCP) must initiate a new association in order to send the new N-EVENT-REPORT.

On reception of a successful N-EVENT-REPORT-RQ notification from the Storage Commitment Provider, the images are flagged as committed in the database.

2.3.1.3.2.2 Accepted Presentation Context Table

The following table shows the proposed presentation contexts for the Infinia_SCANNER Server AE after real-world activity “Storage Commitment Request” has been initiated:

Presentation Context Table - Accepted					
Abstract Syntax		Transfer Syntax		Role	Extended
Name	UID	Name List	UID List		Negotiation
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None

2.3.1.3.3 Presentation Context Acceptance Criterion

The Presentation Context that will be accepted by the Infinia_SCANNER Server will be the one to which the remote Storage SCP has accorded the highest priority and that is supported by the Infinia_SCANNER Server.

2.3.1.3.4 Transfer Syntax Selection Policies

A Transfer Syntax that will be selected will be the one to which the remote SCU has accorded the highest priority and that is supported by the Infinia_SCANNER Server.

2.4 COMMUNICATION PROFILES

2.4.1 Support Communication Stacks (PS 3.8, PS 3.9)

DICOM Upper Layer (PS 3.8) is supported using TCP/IP.

2.4.2 OSI Stack

The OSI Communication Stack is not supported by this implementation.

2.4.3 TCP/IP Stack

The TCP/IP Communication Stack is inherited from the Windows operating system.

2.4.3.1 API

Not applicable to this product.

2.4.3.2 Physical Media Support

Ethernet 802.3 provides the physical network layer for this product.

2.4.4 Point-to-Point Stack

The Point-to-Point Communication Stack is not supported by this implementation.

2.5 EXTENSIONS / SPECIALIZATIONS / PRIVATIZATIONS

2.5.1 Standard Extended/Specialized/Private SOPs

2.5.1.1 Standard Extended SOP Classes

Infinia NM Images are Standard Extended NM Image Storage SOP Class (see Section 3 for a complete description).

Infinia Secondary Capture Images are Standard Extended Secondary Capture Image Storage SOP Class (see Section 8 for a complete description).

2.5.1.2 Private SOP Class

Infinia implements a Private SOP Class for sending Private Series Data objects (acquisition Raw data – List data) to Remote AE for processing and archiving purposes.

Series data objects are not visible on the Infinia patient selector, but are generally sent automatically with image data if the entire series is selected for transfer. For details of the Infinia Private Data Objects refer to Section 6.

2.5.1.3 Private Transfer Syntaxes

Infinia does not implement any private transfer syntaxes.

2.6 CONFIGURATION

The Infinia system is 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 Infinia user interface.

2.6.1 AE Title/Presentation Address Mapping

Infinia allows 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 Configuration Parameters

The following parameters are configurable for the DICOM Server AE:

- Local AE Title – default value is INFINIA_SCANNER
- Local IP address

- Local DICOM Port Number – default value is 104

Note that PDU length and any time-outs are not configurable for Infinia. The configuration of IP routers and subnet mask is available on a OS level.

The following parameters are configurable for the Remote DICOM AE:

- Remote AE Title
- Remote IP address
- Remote DICOM Port Number – default value is 104
- Remote AE functionality flags:
  - Send destination
  - Auto-send destination
  - Auto-Processing destination (shall be used for Xeleris Workstations only)
  - Modality Worklist Provider
  - MPPS Provider

2.7 SUPPORT OF EXTENDED CHARACTER SETS

Infinia will support only the ISO_IR 100 (ISO 8859-1:1987 Latin alphabet N 1. supplementary set) as extended character sets.

2.8 CODES AND CONTROLLED TERMINOLOGY

2.8.1 Fixed Coded Terminology

The product uses the fixed (non-configurable, non-extensible) coded terminology in Image SOP Instance attributes:

- (0054, 0300) - Radionuclide Code Sequence (See Section 3.5.8.4 NM Isotope Module)
- (0054, 0412) - Patient Orientation Modifier (See Section 3.5.3.3 NM/PET Patient Orientation Module)

The Infinia DICOM implementation is capable of supporting arbitrary coding schemes for Procedure and Protocol Codes. The contents of Requested Procedure Code Sequence (0032,1064) and Scheduled Protocol Code Sequence (0040,0008) supplied in Worklist Items will be mapped to Image IOD and MPPS attributes as described in DICOM Standard. 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 three tags:

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

The contents of Performed Procedure Step Discontinuation Reason Code Sequence (0040,0281) for a discontinued MPPS will be filled with a code selected by the user from a fixed list corresponding to Context Group 9300

2.8.2 Mapped Coded Terminology

The product uses no mapped coded terminology

2.8.3 Configurable Coded Terminology

The product uses no configurable coded terminology

2.9 SECURITY PROFILES

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

It is recommended that the product is used within a secured environment that 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)).

SECTION 3: NUCLEAR MEDICINE (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. The contents of this section are:

3.2 NM IOD IMPLEMENTATION

The Infinia implementation of DICOM uses the Nuclear Medicine multi-frame image format when creating image objects. In order to preserve full fidelity when transferring data to a Xeleris/eNTEGRA station, some specialized database information is encoded as private DICOM attributes. All of the Standard and private attributes used are defined in the module tables. The Infinia private data dictionary is included in Appendix A.

3.3 NM ENTITY-RELATIONSHIP MODE

The Entity-Relationship diagram for the NM Image inter-operability schema is shown in Illustration 3-1**.** In this figure, the following diagrammatic convention is established to represent the information organization:

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

The relationships are fully defined with the maximum number of possible entities in the relationship shown. For example, the relationship between Series and Image can have up to n NM Images per Series, but the NM Image can only belong to 1 Series.

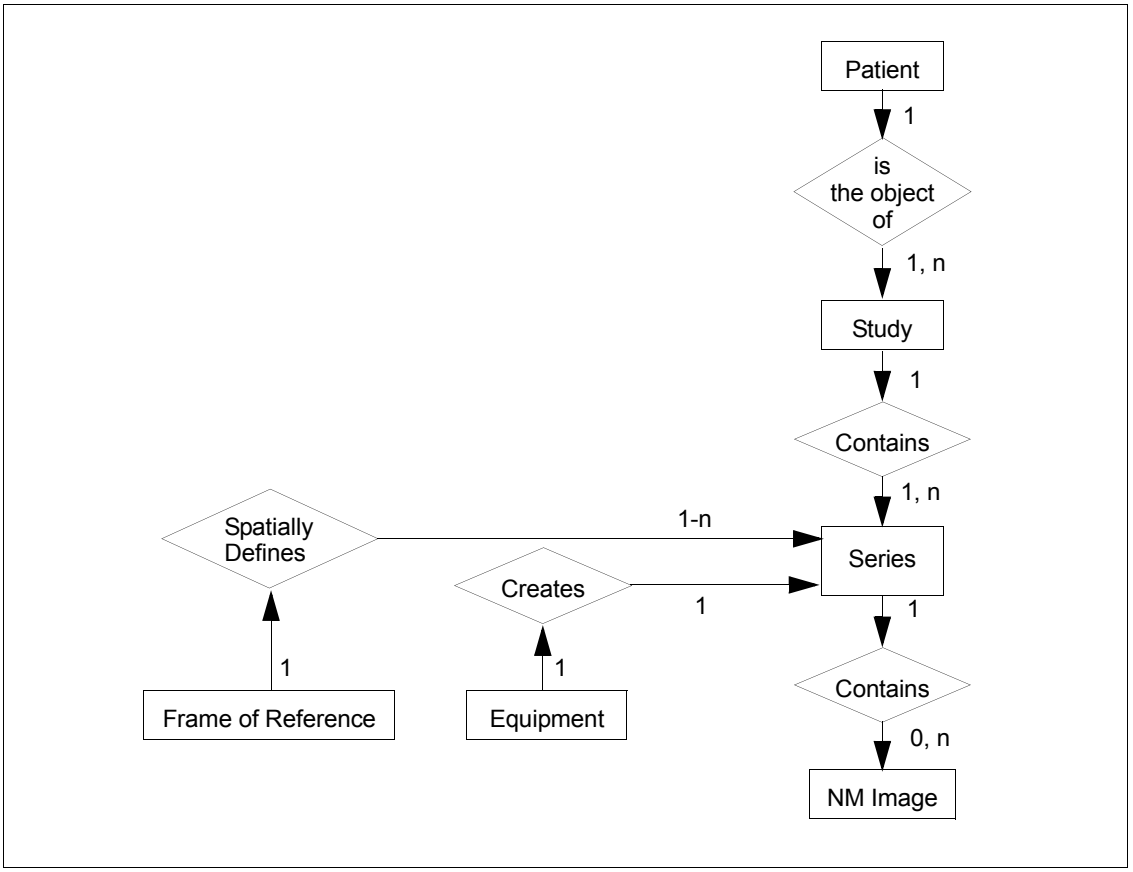

Illustration 3-1. NM Image Entity Relationship Diagram

3.3.1 Entity Descriptions

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

3.3.1.1 Patient Entity Description

The Patient Entity defines the characteristics of a patient who is the subject of one or more medical studies which produce medical images.

3.3.1.2 Study Entity Description

The Study Entity defines the characteristics of a medical study performed on a patient. A study is a collection of one or more series of medical images which are logically related for the purpose of diagnosing a patient. Each study is associated with exactly one patient.

3.3.1.3 Series Entity Description

The Series Entity defines the attributes which are used to group images into distinct logical sets. Each series is associated with exactly one study.

3.3.1.4 Equipment Entity Description

The Equipment Entity describes the particular imaging device which produced the series of images. An imaging device may produce one or more series within a study. The Equipment Entity does not describe the data acquisition or image creation Attributes used to generate images within a series.

3.3.1.5 Frame of Reference Entity Description

The Frame of Reference Entity identifies the coordinate system which conveys spatial and/or temporal information of images in a series.

3.3.1.6 NM Image Entity Description

The NM Image Entity defines the attributes which describe the pixel data of a NM image. The pixel data is generated as a direct result of patient scanning (an ORIGINAL image). An image is defined by its image plane, pixel data characteristics, gray scale and/or color mapping characteristics and modality specific characteristics (acquisition parameters and image creation information).

3.3.2 Infinia Mapping of DICOM Entities

Table 3-2. Mapping of DICOM Entities to Infinia Entities

DICOM	Infinia Entity
Patient	Patient
Study	Study
Series	Series
Image	Imageset
Frame	Not Applicable

3.4 IOD MODULE TABLE

Within an entity of the DICOM v3.0 NM IOD, attributes are grouped into related sets of attributes. A set of related attributes is termed a module. A module facilitates the understanding of the semantics concerning the attributes and how the attributes are related to each other. A module grouping does not infer any encoding of information into datasets.

Table 3-3 identifies the defined modules within the entities which comprise the DICOM v3.0 NM IOD. Modules are identified by Module Name.

Please refer to the DICOM v3.0 Standard Part 3 for a complete definition of the entities, modules, and attributes.

Table 3-3. NM Image IOD Modules

Entity Name	Module	Reference
Patient	Patient	Section 3.5.1.1
Study	General Study	Section 3.5.2.1
	Patient Study	Section 3.5.2.2
Series	General Series	Section 3.5.3.1
	Infinia Private Series	Section 3.5.3.2
	NM/PET Patient orientation	Section 3.5.3.3
Frame of Reference	Frame of Reference	Section 3.5.4.1
Equipment	General Equipment	Section 3.5.5.1
Image	General Image	Section 3.5.6.1
	Infinia Private Image	Section 3.5.6.2
	Image Pixel	Section 3.5.8.1
	NM Image Pixel	Section 3.5.8.1
	Multi-frame	Section 3.5.6.4
	NM Multi-frame	Section 3.5.8.2
	NM Image	Section 3.5.8.3
	NM Isotope	Section 3.5.8.4
	NM Detector	Section 3.5.8.5
	NM TOMO Acquisition	Section 3.5.8.6

Table 3-3. NM Image IOD Modules (Continued)

Entity Name	Module	Reference
	Infinia Private TOMO Acquisition	Section 3.5.8.7
	NM Multi-gated Acquisition	Section 3.5.8.8
	NM Phase	Section 3.5.8.11
	Infinia Private Multi-Gated	Section 3.5.8.9
	Infinia Private GSPECT Acquisition	Section 3.5.8.10
	NM Reconstruction	Section 3.5.8.12
	Infinia Private SPECT Reconstruction	Section 3.5.8.13
	SOP Common	Section 3.5.7.1

3.5 INFORMATION MODULE DEFINITIONS

Please refer to the DICOM v3.0 Standard Part 3 (Information Object Definitions) for a description of each of the Standard entities and modules 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. It should be noted that they are the same as those defined in the DICOM v3.0 Standard Part 3 (Information Object Definitions).

Infinia Private attributes are defined in private modules, each of which follow 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,xxnn) format, where xx represents a reserved block of element numbers within the group gggg.

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

3.5.1 Common Patient Entity Modules

3.5.1.1 Patient Module

This section specifies the Attributes of the patient that describe and identify the patient who is the subject of a diagnostic Study. This Module contains Attributes of the patient that are needed for diagnostic interpretation of the Image and are common for all studies performed on the patient. The fields in the Patient Module which can be copied from user input or the worklist will be updated to reflect the possible sources.

Table 3-4. Patient Module Attributes

Attribute Name	Tag	Type	Attribute Description
Patient's Name	(0010,0010)	2	Patient Name*
Patient ID	(0010,0020)	2	Patient ID*
Patient's Birth Date	(0010,0030)	2	Patient Date Of Birth*
Patient's Sex	(0010,0040)	2	Patient Sex*

***Copied from the work list if the study source was actually copied from a worklist query result (if available).**

3.5.2 Common Study Entity Modules

The following Study IE Modules are common to all Composite Image IODs which reference the Study IE. These Modules contain Attributes of the patient and study that are needed for diagnostic interpretation of the image.

3.5.2.1 General Study Modules

This section specifies the Attributes which describe and identify the study performed upon the patient..

Table 3-5. General Study Module Attributes

Attribute Name	Tag	Type	Attribute Description
Study Instance UID	(0020,000D)	1	Unique identifier to be used to identify the Study. * Generated by the system for Locally Scheduled protocols.
Study Date	(0008,0020)	2	Creation date of study entity. Study date is taken from the SPS Start date of the first SPS in the study – Tag (0040, 0002).
Study Time	(0008,0030)	2	Creation time of study entity. Study time is taken from the SPS Start time of the first SPS in the study – Tag (0040, 0003).
Referring Physician's Name	(0008,0090)	2	Name of the patient's referring physician.*
Study ID	(0020,0010)	2	Study Name (Processing Tag field).*
Accession Number	(0008,0050)	2	A RIS generated number that identifies the order for the Study.* Can be modified in user interface.

Table 3-5. General Study Module Attributes (Continued)

Attribute Name	Tag	Type	Attribute Description
Study Description	(0008,1030)	3	Institution-generated description or classification of the Study (component) performed.
Name of Physician(s) Reading Study	(0008,1060)	3	Names of the physician(s) reading the Study.
Procedure Code Sequence	(0008,1032)	3	A Sequence that conveys the type of procedure performed. Copied from Requested Procedure Code SQ (0032,1064) of MWL. Contains only one item. NA for locally scheduled protocols
>Include 'Code Sequence Macro'			
Referenced Study Sequence	(0008,1110)	3	A sequence that provides reference to a Study SOP Class/Instance pair.* NA for locally scheduled protocols. May have only 1 item.
>Include SOP Instance Reference Macro			

***Copied from the work list if the study source was actually copied from a worklist query result.**

3.5.2.2 Patient Study Modules

This section defines Attributes that provide information about the Patient at the time the Study was performed..

Table 3-6. Patient Study Module Attributes

Attribute Name	Tag	Type	Attribute Description
Patient's Age	(0010,1010)	3	Patient Age field.
Patient's Size	(0010,1020)	3	Patient Height field.
Patient's Weight	(0010,1030)	3	Patient Weight field.*
Occupation	(0010,2180)	3	Patient Occupation field.
Additional Patient's History	(0010,21B0)	3	Other Patient History field.

***Copied from the work list if the study source was actually copied from a worklist query result (if available).**

3.5.3 Common Series Entity Modules

The following Series IE Modules are common to all Composite Image IODs which reference the Series IE.

3.5.3.1 General Series Modules

This section specifies the Attributes which identify and describe general information about the Series within a Study.

Table 3-7. General Series Module Attributes

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	1	Internally set to “NM”.
Series Instance UID	(0020,000E)	1	Internally generated.
Series Number	(0020,0011)	2	Internally generated.
Laterality	(0020,0060)	2C	Body Part Laterality, if present.
Series Date	(0008,0021)	3	Date of Series Creation.
Series Time	(0008,0031)	3	Time of Series Creation.
Performing Physicians’ Name	(0008,1050)	3	Name of the physician(s) administering the Series. Used for MWL query only, not stored in the image.
Protocol Name	(0018,1030)	3	User-defined description of the protocol identification performed for the Series creation.
Series Description	(0008,103E)	3	User provided description of the Series.
Operators' Name	(0008,1070)	3	Operator’s Name
Referenced Performed Procedure Step Sequence	(0008,1111)	3	Uniquely identifies the Modality 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 even if no PPS server is configured on system.
>Referenced SOP Class UID	(0008,1150)	1C	Set with "1.2.840.10008.3.1.2.3.3”.
>Referenced SOP Instance UID	(0008,1155)	1C	Uniquely identifies the referenced SOP Instance of the associated MPPS message
Body Part Examined	(0018,0015)	3	Body Part field.

Table 3-7. General Series Module Attributes (Continued)

Attribute Name	Tag	Type	Attribute Description
Patient Position	(0018,5100)	2C	Patient Position The Defined Terms are: HFP = Head First-Prone HFS = Head First-Supine HFDR = Head First-Decubitus Right HFDL = Head First-Decubitus Left FFDR = Feet First-Decubitus Right FFDL = Feet First-Decubitus Left FFP = Feet First-Prone FFS = Feet First-Supine
Smallest Pixel Value in Series	(0028,0108)	3	Min Pixel field
Largest Pixel Value in Series	(0028,0109)	3	Max Pixel field
Performed Procedure Step Start Date	(0040,0244)	3	PPS Start Date is 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.
Performed Procedure Step Start Time	(0040,0245)	3	PPS Start Time is 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.
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 "WLPID_" + <SPS ID> For locally scheduled protocols set with "LCPID_" + numbered id starting from 1 (LCPID_1, LCPID_2).
Performed Procedure Step Description	(0040,0254)	3	The full path of the performed protocol name. E.g. Factory&MPH Cardiology&One Day
Performed Protocol Code Sequence	(0040,0260)	3	Assisted protocol setting is not supported.
Request Attributes Sequence	(0040,0275)	3	The sequence has exactly 1 item. Relevant only for items deriving from MWL.
>Accession Number	(0008,0050)	3	An identifier of the Imaging Service Request for this Requested Procedure.* May be set in User Interface.

Table 3-7. General Series Module Attributes (Continued)

Attribute Name	Tag	Type	Attribute Description
>Study Instance UID	(0020,000D)	3	The unique identifier for the Study provided for this Requested Procedure.*
>Requested Procedure Description	(0032,1060)	3	Institution-generated administrative description or classification of Requested Procedure.*
>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.*
> Requested Procedure ID	(0040,1001)	1C	Identifier that identifies the Requested Procedure in the Imaging Service Request.*
>Referenced Study Sequence	(0008,1110)	3	Uniquely identifies the Study SOP Instances associated with this SOP Instance. One item may be included.*
>Requested Procedure Code Sequence	(0032,1064)	3	Not stored in the image.

***Copied from the work list if the study source was actually copied from a worklist query result (if available).**

3.5.3.2 Infinia Private Series Module

This Module contains private Attributes that convey information not contained in the related DICOM Standard v3.0 General Series Module.

Table 3-8. Infinia Private Series Module Attributes

Attribute Name	Tag	Type	Private Creator ID	Attribute Description
Matched protocol	(0009, xx43)	3	"QUASAR_INTERNAL_USE"	For Worklist items. The originally matched protocol vs. protocol name which is the protocol actually acquired

3.5.3.3 NM/PET Patient Orientation Module

This section specifies the Attributes which identify and describe NM/PET Patient Orientation of the Series within a Study..

Table 3-9. 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.
> ‘Code Sequence Macro’			Baseline Context ID is 19
> 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.
>> `Code Sequence Macro'			Baseline Context ID is 20
Patient Gantry Relationship Code Sequence	(0054,0414)	2	Describes the orientation of the patient with respect to the gantry.
> `Code Sequence Macro'			Baseline Context ID is 21

3.5.4 Common Frame of Reference Entity Modules

The following Frame of Reference IE Module is common to all Composite Image IODs which reference the Frame of Reference IE.

3.5.4.1 Frame of Reference Modules

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.

Infinia systems group spatially and/or temporally related Images in the same Series. Acquisition data created on other systems may be missing frame of reference information, and for these cases the attribute contains a null value.

Table 3-10. Frame of Reference Module Attributes

Attribute Name	Tag	Type	Attribute Description
Frame of Reference UID	(0020,0052)	1	Frame of Reference UID. Appears for TOMO, GATED TOMO and RECON TOMO scan types. Not available for STATIC, WHOLE BODY, GATED and DYNAMIC scans.
Position Reference Indicator	(0020,1040)	2	Position Reference Indicator, if available.

3.5.5 Common Equipment Entity Modules

The following Equipment IE Module is common to all Composite Image IODs which reference the Equipment IE.

3.5.5.1 General Equipment Module

This section specifies the Attributes which identify and describe the piece of equipment which produced a Series of Images. For Series created on the Infinia system, the values are generally copied from the original data

Table 3-11. General Equipment Module Attributes

Attribute Name	Tag	Type	Attribute Description
Manufacturer	(0008,0070)	2	GE MEDICAL SYSTEMS
Institution Name	(0008,0080)	3	Copied from the work list if the study source was actually copied from a worklist query result. Otherwise taken from Infinia's configuration
Institution Address	(0008,0081)	3	Taken from Infinia's configuration.
Station Name	(0008,1010)	3	Station Name
Institutional Department Name	(0008,1040)	3	Taken from Infinia's configuration
Manufacturer's Model Name	(0008,1090)	3	INFINIA
Device Serial Number	(0018,1000)	3	Taken from Infinia's configuration
Software Versions	(0018,1020)	3	Software Versions . e.g. 2.105.027.0 HARDWARE_VERSION_1

3.5.6 Common Image Entity Modules

The following Image IE Modules are common to all Composite Image IODs which reference the Image IE.

3.5.6.1 General Image Module

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

Table 3-12. General Image Module Attributes

Attribute Name	Tag	Type	Attribute Description
Instance Number	(0020,0013)	2	Dataset Image Number
Patient Orientation	(0020,0020)	2C	Not required for NM.

Table 3-12. General Image Module Attributes (Continued)

Attribute Name	Tag	Type	Attribute Description
Content Date	(0008,0023)	2C	Image Date
Content Time	(0008,0033)	2C	Image Time
Image Type	(0008,0008)	3	See “NM Image Module” on page 3-19.
Acquisition Date	(0008,0022)	3	Dataset Start Date
Acquisition Time	(0008,0032)	3	Dataset Start Time
Image Comments	(0020,4000)	3	Dataset Comments

3.5.6.2 Infinia Private Image Module

This section specifies the Attributes which identify and describe an image within a particular series. This Module contains *private* Attributes that convey information not contained in the related DICOM Standard v3.0 Module.

Table 3-13. Infinia Private Image Module Attributes

Attribute Name	Tag	Type	Private Creator ID	Attribute Description
Camera Shape	(0009, xx08)	3	"QUASAR_INTERNAL_USE"	Camera Shape: H mode, L mode
Origin	(0009, xx12)	3	"QUASAR_INTERNAL_USE"	The origin of the image."isWorklist" if scheduled in MWL. "regular" if locally scheduled.
Sequence Type	(0009, xx13)	3	"QUASAR_INTERNAL_USE"	Acquired Sequence Type
Sequence Name	(0009, xx14)	3	"QUASAR_INTERNAL_USE"	Acquired Sequence Name
Image Type	(0009, xx1B)	3	"QUASAR_INTERNAL_USE"	Image type string as passed in the scan request
Stop Reason	(0009, xx1D)	3	"QUASAR_INTERNAL_USE"	Defines condition that image was installed to db
Patient Unique Key	(0009, xx39)	3	"QUASAR_INTERNAL_USE"	Patient unique key
Protocol Scheduled Date	(0009, xx40)	3	"QUASAR_INTERNAL_USE"	Protocol Scheduled Date
Protocol Scheduled Time	(0009, xx41)	3	"QUASAR_INTERNAL_USE"	Protocol Scheduled Time
Acquisition flag	(0009, xx42)	3	"QUASAR_INTERNAL_USE"	Used for indicating if the study is acquired

Table 3-13. Infinia Private Image Module Attributes (Continued)

Attribute Name	Tag	Type	Private Creator ID	Attribute Description
Private SPS ID	(0009, xx44)	3	"QUASAR_INTERNAL_USE"	Keeps the SPS ID for protocols that were appended to the original MWL protocol.
Collimator SQ	(0037,xx10)	3	"QUASAR_INTERNAL_USE"	Contains information of collimators parameters. Contains 1 item.
> Hole Diameter	(0037,xx1B)	3	"QUASAR_INTERNAL_USE"	collimator hole diameter
>Hole Length	(0037,xx30)	3	"QUASAR_INTERNAL_USE"	collimator hole length
>Collimator Thickness	(0037,xx40)	3	"QUASAR_INTERNAL_USE"	collimator thickness
>Septal Thickness	(0037,xx50)	3	"QUASAR_INTERNAL_USE"	collimator septal thickness
>Intrinsic Resolution	(0037,xx60)	3	"QUASAR_INTERNAL_USE"	collimator intrinsic resolution
> Blurring Slope	(0037,xx70)	3	"QUASAR_INTERNAL_USE"	collimator blurring slope
Radio Nuclide Name	(0011, xx0D)	3	"GEMS_GENIE_1"	Name of radionuclide used.
Dataset Name	(0011, xx12)	3	"GEMS_GENIE_1"	
Acquisition Parent UID	(0011, xx31)	3	"GEMS_GENIE_1"	
Pixel Scale	(0011, xx3B)	3	"GEMS_GENIE_1"	
Software Translator	(0013, xx11)	3	"GEMS_GENIE_1"	Internal code of product DICOM implementation. Enumerated Value = 12.
Bed Position	(0027,xx11)	3	"APEX_PRIVATE"	

3.5.6.3 Image Pixel Module

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

Table 3-14. Image Pixel Module Attributes

Attribute Name	Tag	Type	Attribute Description
Samples per Pixel	(0028,0002)	1	See Table 3-17, "NM Image Pixel Module Attributes," on page 3-17.
Photometric Interpretation	(0028,0004)	1	See Table 3-17, "NM Image Pixel Module Attributes," on page 3-17.
Rows	(0028,0010)	1	Rows
Columns	(0028,0011)	1	Columns
Bits Allocated	(0028,0100)	1	See Table 3-17, "NM Image Pixel Module Attributes," on page 3-17.
Bits Stored	(0028,0101)	1	See Table 3-17, "NM Image Pixel Module Attributes," on page 3-17.
High Bit	(0028,0102))	1	See Table 3-17, "NM Image Pixel Module Attributes," on page 3-17.
Pixel Representation	(0028,0103)	1	Pixel Representation (see Table 3-17, "NM Image Pixel Module Attributes," on page 3-17)
Pixel Data	(7FE0,0010)	1	Pixel Data (see details in Table 3-17, "NM Image Pixel Module Attributes," on page 3-17)
Smallest Image Pixel Value	(0028,0106))	3	Set to minimum pixel value in image.
Largest Image Pixel Value	(0028,0107)	3	Set to maximum pixel value in image.

3.5.6.4 Multi-Frame Module

This section specifies the Attributes of a Multi-frame pixel data Image.

Table 3-15. Multi-Frame Module Attributes

Attribute Name	Tag	Type	Attribute Description
Number of Frames	(0028,0008)	1	Set to total number of frames in image.

Table 3-15. Multi-Frame Module Attributes

Frame Increment Pointer	(0028,0009)	1	See Section 3.5.8.2.1 for further explanation.

3.5.6.4.1 Multi-Frame Attribute Descriptions

3.5.6.4.1.1 Frame Increment Pointer

See the NM Multi-Frame Module (Section 3.5.8.2.1) for further information.

3.5.7 General Modules

The SOP Common Module is mandatory for all DICOM IODs.

3.5.7.1 SOP Common Module

This section defines the Attributes which are required for proper functioning and identification of the associated SOP Instances. They do not specify any semantics about the Real-World Object represented by the IOD.

Table 3-16. SOP Common Module Attributes

Attribute Name	Tag	Type	Attribute Description
SOP Class UID	(0008,0016)	1	Set to “1.2.840.10008.5.1.4.1.1.20”, Nuclear Medicine Image Storage SOP Class UID.
SOP Instance UID	(0008,0018)	1	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.
Instance Creation Date	(0008,0012)	3	Date of instance creation.
Instance Creation Time	(0008,0013)	3	Time of instance creation.
Instance Creator UID	(0008,0014)	3	Set to the Implementation UID (see Section 2.3.1.1.4)

3.5.8 Nuclear Medicine Modules

This Section describes NM Image Modules. These Modules contain Attributes that are specific to the NM Image IOD.

NM images always use the NM Multi-frame module and the appropriate frame vectors even if there is only one frame in the Image sent. If the user selects an entire Series for one Send operation, individual datasets in the Series will be combined into multi-frame NM Images as appropriate.

If the user selects and sends individual datasets within a Series, then each is sent as a separate DICOM Image.

3.5.8.1 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	Samples per Pixel (always 1 for NM)
Photometric Interpretation	(0028,0004)	1	Photometric Interpretation (always MONOCHOME2)
Bits Allocated	(0028,0100)	1	Bits Allocated (16)
Bits Stored	(0028,0101)	1	Bits Stored (same as Bits Allocated)
High Bit	(0028,0102)	1	High Bit (15)
Pixel Spacing	(0028,0030)	2	Pixel Spacing

3.5.8.2 NM Multi-Frame Module

This section specifies the Attributes of a NM Multi-frame Image. This module is always included in a NM SOP instance, even if there is only one frame in the image.

Table 3-18. NM Multi-Frame Module Attributes

Attribute Name	Tag	Type	Attribute Description
Frame Increment Pointer	(0028,0009)	1	See for specialization by NM image type (see Section 3.5.8.2.1).
Energy Window Vector	(0054,0010)	1C	Defines energy set window to which each frame belongs.
Number of Energy Windows	(0054,0011)	1	Number of energy set windows in SOP Instance.
Detector Vector	(0054,0020)	1C	Defines detector to which each frame belongs.
Number of Detectors	(0054,0021)	1	Number of detectors in SOP Instance.
Phase Vector	(0054,0030)	1C	Defines phase to which each frame belongs.
Number of Phases	(0054,0031)	1C	Number of phases in SOP Instance.
Rotation Vector	(0054,0050)	1C	Defines rotation to which each frame belongs.
Number of Rotations	(0054,0051)	1C	Number of Rotations in SOP Instance.
R-R Interval Vector	(0054,0060)	1C	Defines R-R Interval to which each frame belongs.
Number of R-R Intervals	(0054,0061)	1C	Number of R-R Intervals in SOP Instance.
Time Slot Vector	(0054,0070)	1C	Defines time slot, within cardiac cycle, to which each frame belongs.
Number of Time Slots	(0054,0071)	1C	Number of time slots in SOP Instance.
Slice Vector	(0054,0080)	1C	Defines image slice to which each frame belongs.
Number of Slices	(0054,0081)	1C	Number of images slices in SOP Instance.
Angular View Vector	(0054,0090)	1C	Defines angular view number to which each frame belongs.
Time Slice Vector	(0054,0100)	1C	Defines frame numbers within each phase.

3.5.8.2.1 NM Multi-Frame Attribute Description

3.5.8.2.1.1 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 3-19.

Table 3-19. Enumerated Values for Frame Increment Pointer

Image Type (0008,0008), Value 3	Frame Increment Pointer (0028,0009)
STATIC or WHOLE BODY	0054H 0010H \ 0054H 0020H Sequencing is by Energy Window Vector (0054,0010), Detector Vector (0054,0020)
DYNAMIC	0054H 0010H \ 0054H 0020H \ 0054H 0030H \ 0054H 0100H Sequencing is by Energy Window Vector (0054,0010), Detector Vector (0054,0020) Phase Vector (0054,0030), Time Slice Vector (0054,0100)
GATED	0054H 0010H \ 0054H 0020H \ 0054H 0060H \ 0054H 0070H Sequencing is by Energy Window Vector (0054,0010), Detector Vector (0054,0020), R-R Interval Vector (0054,0060), Time Slot Vector (0054,0070)
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).
RECON TOMO	0054H 0080H Sequencing is by Slice Vector (0054,0080)

3.5.8.3 NM Image Module

This section contains the Attributes that describe Nuclear Medicine Images.

Table 3-20. NM Image Module Attributes

Attribute Name	Tag	Type	Attribute Description
Image Type	(0008,0008)	1	Dataset Type (See Section 3.5.8.3.1.1)
Image ID	(0054,0400)	3	Set to name of imageset.
Counts Accumulated	(0018,0070)	2	Detector Counts (number of counts in imageset)

Table 3-20. NM Image Module Attributes (Continued)

Attribute Name	Tag	Type	Attribute Description
Acquisition Termination Condition	(0018,0071)	3	Defined Terms used: CNTS = count limit reached DENS = count limit reached within ROI MANU = manual TIME = time limit reached TRIG = number of beats limit reached
Actual Frame Duration	(0018,1242)	1C	Duration of each frame in imageset. Sent when when the Image Type (0008,0008), Value 3, is equal to STATIC or WHOLE BODY.
Count Rate	(0018,1243)	3	Maximum count rate during image acquisition.

3.5.8.3.1 NM Image Module Attribute Description

3.5.8.3.1.1 Image Type

The following Image Type (0008,0008) values are sent:

- Value 1 has the following Enumerated Value:

  ORIGINAL Identifies an Original Image

- Value 2 has the following Enumerated Value:

  PRIMARY Identifies a Primary Image

- Value 3 has one of the following Enumerated Values:

  STATIC Identifies a Static Image

  DYNAMIC Identifies a Dynamic Image

  GATED Identifies a Multi-gated Image

  WHOLE BODY Identifies a Whole Body Image

  TOMO Identifies a Tomographic Image

  RECON TOMO Identifies a reconstructed Tomographic Image

  GATED TOMO Identifies a Multi-gated Tomographic Image

- Value 4 has one of the following Enumerated Values:

  EMISSION Transmission source NOT active during image acquisition

  TRANSMISSION Transmission source active during image acquisition

3.5.8.4 NM Isotope Module

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

Table 3-21. NM Isotope Module Attributes

Attribute Name	Tag	Type	Attribute Description
Energy Window Information Sequence	(0054,0012)	2	Energy window information. May contain from 1 to 8 items.
>Energy Window Range Sequence	(0054,0013)	3	Sequence describing window energy limits. May contain from 1 to 16 items.
>> Energy Window Lower Limit	(0054,0014)	3	Lower energy limit in KeV.
>> Energy Window Upper Limit	(0054,0015)	3	Upper energy limit 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	Null Sequence
> Radionuclide Total Dose	(0018,1074)	3	Total Dose field.
> Radiopharmaceutical	(0018,0031)	3	Entered on Energy|Isotope card, Pharm field.

3.5.8.5 NM Detector Module

This section contains IOD Attributes that describe Nuclear Medicine Detectors used to produce an image.

Table 3-22. NM Detector Module Attributes

Attribute Name	Tag	Type	Attribute Description
Detector Information Sequence	(0054,0022)	2	Detector information. May contain 1 or 2 items.
> Collimator/Grid Name	(0018,1180)	3	Name of collimator used on this detector.
> Collimator Type	(0018,1181)	2	Defined Terms used: PARA = Parallel PINH = Pinhole FANB = Fan-beam CONE = Cone-beam SLNT = Slant hole ASTG = Astigmatic DIVG = Diverging NONE = No collimator UNKN = Unknown

Table 3-22. NM Detector Module Attributes (Continued)

Attribute Name	Tag	Type	Attribute Description
> Field of View Shape	(0018,1147)	3	Defined Terms used: RECTANGLE ROUND HEXAGONAL
> Field of View Dimension(s)	(0018,1149)	3	Dimensions of the field of view.
> Focal Distance	(0018,1182)	2	Focal distance. Value 0 may be sent.
> X Focus Center	(0018,1183)	3	Center point of the focus position.
> Y Focus Center	(0018,1184)	3	Center point of the focus position.
> Zoom Center	(0028,0032)	3	Image center offset from field of view center.
> Zoom Factor	(0028,0031)	3	Zoom factor, typical range: 1.00 to 4.00.
> Center of Rotation Offset	(0018,1145)	3	Offset between detector center and mechanical center
> Gantry/Detector Tilt	(0018,1120)	3	Detector tilt position
> Distance Source to Detector	(0018,1110)	2C	Distance between transmission source and detector during transmission scanning. Sent when Image Type (0008,0008) Value 4 is TRANSMISSION, Value 3 is not TOMO.
> Start Angle	(0054,0200)	3	Start Angle
> Radial Position	(0018,1142)	3	Detector radial position at start of acquisition.
> Image Orientation (Patient)	(0020,0037)	2	Set for first frame in dataset
> Image Position (Patient)	(0020,0032)	2	Set for first frame in dataset

3.5.8.6 NM TOMO Acquisition Module

This section contains Attributes that describe Rotation information of a tomographic image performed on the patient. This module is present when the Image Type (0008,0008) Value 3, is equal to TOMO, GATED TOMO or RECON TOMO.

Table 3-23. NM TOMO Acquisition Module Attributes

Attribute Name	Tag	Type	Attribute Description
Rotation Information Sequence	(0054,0052)	2	Provides TOMO rotation information. Contains only 1 item.
> Start Angle	(0054,0200)	1	Detector start angle at start of acquisition.
> Angular Step	(0018,1144)	1	Incremental rotational angle change per view.
> Rotation Direction	(0018,1140)	1	Direction of rotation.
> Scan Arc	(0018,1143)	1	Total rotation angle.
> Actual Frame Duration	(0018,1242)	1	Duration of a view.
> Radial Position	(0018,1142)	3	Detector radial position at start of acquisition.
> Distance Source to Detector	(0018,1110)	2C	Distance between transmission source and detector during transmission scanning. Sent when Image Type (0008,0008) Value 4 is TRANSMISSION.
> Number of Frames in Rotation	(0054,0053)	1	Number of tomographic views acquired.
> Table Traverse	(0018,1131)	3	Table longitudinal position at acquisition start.
> Table Height	(0018,1130)	3	Height of table above floor at acquisition start.
Type of Detector Motion	(0054,0202)	3	Enumerated Values used: STEP AND SHOOT CONTINUOUS ACQ DURING STEP

3.5.8.7 Infinia Private TOMO Acquisition Module

This module is present only when the Image Type (0008,0008), Value 3, is equal to TOMO or GATED TOMO. The module contains private Attributes that convey information not contained in the related DICOM Standard v3.0 NM TOMO Acquisition Module.

Table 3-24. Infinia Private TOMO Acquisition Module Attributes

Attribute Name	Tag	Type	Private Creator ID	Attribute Description
Rate Vector	(0009, xx01)	3	"QUASAR_INTERNAL_USE"	Rate for each frame
Count Vector	(0009, xx02)	3	"QUASAR_INTERNAL_USE"	Counts accumulated for each frame
Time Vector	(0009, xx03)	3	"QUASAR_INTERNAL_USE"	Time for each frame
Angle Vector	(0009, xx07)	3	"QUASAR_INTERNAL_USE"	Angle for each TOMO frame. For each frame is tells what is the angle of the detector
Raw Time Vector	(0009, xx1A)	3	"QUASAR_INTERNAL_USE"	Raw time vector
Effective Series Duration	(0011, xx0B)	3	"GEMS_GENIE_1"	Duration of acquisition.

3.5.8.8 NM Multi-Gated Acquisition Module

This section contains Attributes that describe a multi-gated acquisition performed on the patient. This refers to frames acquired while the patient is connected to a gating device. This module is present when the Image Type (0008,0008) Value 3, is equal to GATED or GATED TOMO.

Table 3-25. NM Multi-Gated Acquisition Module Attributes

Attribute Name	Tag	Type	Attribute Description
Beat Rejection Flag	(0018,1080)	3	Whether a bad beat rejection algorithm used. Enumerated values: Y = bad beat rejection algorithm used N = bad beat rejection algorithm NOT used
Skip Beats	(0018,1086)	3	Beats skipped for each rejected beat
Heart Rate	(0018,1088)	3	Average heart rate during acquisition.
Gated Information Sequence	(0054,0062)	2C	One set of attributes per R-R acceptance window. Contains only 1 item. Sent always.
> Data Information Sequence	(0054,0063)	2	Only one set is used.
>> Frame Time	(0018,1063)	1	Gated frame duration in the imageset.

Table 3-25. NM Multi-Gated Acquisition Module Attributes

Attribute Name	Tag	Type	Attribute Description
>> Low R-R Value	(0018,1081)	3	Minimum R-R interval value accepted. In msec.
>> High R-R Value	(0018,1082)	3	Maximum R-R interval value accepted. In msec
>> Intervals Acquired	(0018,1083)	3	Number of accepted intervals.
>> Intervals Rejected	(0018,1084)	3	Number of rejected intervals.
>> Time Slot Information Sequence	(0054,0072)	2C	Sent always as Null sequence.

3.5.8.9 Infinia Private Multi-Gated Acquisition Module

This module is present only when the Image Type (0008,0008), Value 3, is equal to GATED and GATED TOMO. The module contains private Attributes that convey information not contained in the related DICOM Standard v3.0 NM Multi-Gated Acquisition Module.

Table 3-26. Infinia Private Multi-GATED Acquisition Module Attributes

Attribute Name	Tag	Type	Private Creator ID	Attribute Description
Triggers Modification Flag	(0033,xx30)	3	"GEMS_GENIE_1"	Triggers Modification Flag
Number of triggers	(0033,xx33)	3	"GEMS_GENIE_1"	Number of triggers
Trigger size	(0033,xx34)	3	"GEMS_GENIE_1"	Size of one Trigger data slot
Trigger Data size	(0033,xx35)	3	"GEMS_GENIE_1"	Size of Trigger Trigger Data size
Trigger Data	(0033,xx36)	3	"GEMS_GENIE_1"	Buffer with trigger data information

3.5.8.10 Infinia Private GSPECT Acquisition Module

This module is present only when the Image Type (0008,0008), Value 3, is equal to GATED TOMO. The module contains private Attributes that convey information not contained in the related DICOM Standard v3.0 NM Multi-Gated Acquisition Module.

Table 3-27. Infinia Private GSPECT Acquisition Module Attributes

Attribute Name	Tag	Type	Private Creator ID	Attribute Description
Avr RR Time Vector	(0009, xx15)	3	"QUASAR_INTERNAL_USE"	Average r-r time vector
Low Limit Vector	(0009, xx16)	3	"QUASAR_INTERNAL_USE"	Low window limit vector
High Limit Vector	(0009, xx17)	3	"QUASAR_INTERNAL_USE"	High window limit vector

Table 3-27. Infinia Private GSPECT Acquisition Module Attributes (Continued)

Attribute Name	Tag	Type	Private Creator ID	Attribute Description
Begin Index Vector	(0009, xx18)	3	"QUASAR_INTERNAL_USE"	begin index vector: link to heart beat vector
End Index Vector	(0009, xx19)	3	"QUASAR_INTERNAL_USE"	end index vector: link to heart beat vector
Perfusion SOP Instance UID	(0011, xx33)	3	"QUASAR_INTERNAL_USE"	
Starting Heart Rate	(0009, xx37)	3	"GEMS_GENIE_1"	Heart rate at start of acquisition.

3.5.8.11 NM Phase Module

This section contains Attributes that describe dynamic phases of a dynamic acquisition image performed on the patient. This module is present when the Image Type (0008,0008) Value 3, is equal to DYNAMIC.

Table 3-28. NM Phase Module Attributes

Attribute Name	Tag	Type	Attribute Description
Phase Information Sequence	(0054,0032)	2C	One sequence item per dynamic phase.
> Phase Delay	(0054,0036)	1	Phase Delay
> Actual Frame Duration	(0018,1242)	1	Frame Duration (same for all frames in this phase)
> Pause Between Frames	(0054,0038)	1	Pause Between Frames
> Number of Frames in Phase	(0054,0033)	1	Number of frames in this phase.
>Trigger Vector	(0054,0210)	3	Trigger Vector for gated data
>Number of Triggers in Phase	(0054,0211)	1C	Number of Triggers in Phase

3.5.8.12 NM Reconstruction Module

This section contains Attributes that describe Nuclear Medicine reconstructed volumes. Reconstructed volumes are created by applying a transformation (reconstruction) process to the acquired TOMO frames. Define the conditions under which this module is present. This module is present only when the Image Type (0008,0008), Value 3, is equal

to RECON TOMO**.**

Table 3-29. NM Reconstruction Module Attributes

Attribute Name	Tag	Type	Attribute Description
Spacing Between Slices	(0018,0088)	2	Spacing Between Slices
Slice Thickness	(0018,0050)	2	Slice Thickness

3.5.8.13 Infinia Private SPECT Reconstruction Module

This section contains Attributes that describe Nuclear Medicine reconstructed volumes. Reconstructed volumes are created by applying a transformation (reconstruction) process to the acquired TOMO frames. This module is present only when the Image Type (0008,0008), Value 3, is equal to RECON TOMO**.** This Module contains *private* Attributes that convey information not contained in the related DICOM Standard v3.0 Module. Note that each of these attributes may have multiple values when gated reconstructed data is combined into a single DICOM dataset.

Table 3-30. Infinia Private SPECT Reconstruction Module Attributes

Attribute Name	Tag	Type	Private Creator ID	Attribute Description
Normalization Factor	(0009, xx22)	3	"QUASAR_INTERNAL_USE"	Image normalization factor
Processing Parent UID	(0011, xx32)	3	"GEMS_GENIE_1"	Parent projections UID for a recon image

SECTION 4: MODALITY WORKLIST QUERY IMPLEMENTATION

4.1 INFINIA MAPPING OF DICOM ENTITIES

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

Table 4-1. Mapping of DICOM Entities to Infinia Entities

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

Matching Requested Procedure Step to Infinia protocol is done according to predefined configuration.

The configuration contains the following tags

(0040,0007) – Scheduled Procedure Step Description

(0032,1060) – Requested Procedure Description

The default configuration is (0040,0007)

If (0040,0007) which are part of Scheduled Procedure Step Sequence is used protocol will be mapped according to the defined tag value.

Infinia also allows mapping of Worklist requested procedure Step to protocol according to Requested Procedure Description (0032,1060).

4.1.1 WORKLIST QUERY MODULE TABLE

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

Table 4-31. MODALITY WORKLIST INFORMATION MODEL MODULES

Entity Name	Module Name	Reference
Scheduled Procedure Step	SOP Common	Section 4.1.2.1
	Scheduled Procedure Step	Section 4.1.2.2

Table 4-31. MODALITY WORKLIST INFORMATION MODEL MODULES

Entity Name	Module Name	Reference
Requested Procedure	Requested Procedure	Section 4.1.2.3
Imaging Service Request	Imaging Service Request	Section 4.1.2.3.1
Visit	Visit Identification	Section 4.1.2.3.2
	Visit Status	Section 4.1.2.3.3
	Visit Relationship	Section 4.1.2.3.4
	Visit Admission	Section 4.1.2.3.5
Patient	Patient Relationship	Section 4.1.2.3.6
	Patient Identification	Section 4.1.2.3.7
	Patient Demographic	Section 4.1.2.3.8
	Patient Medical	Section 4.1.2.3.9

4.1.2 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.

4.1.2.1 SOP Common Module

TABLE 4-32. SOP COMMON MODULE ATTRIBUTES

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into the Image	Use
Specific Character Set	(0008,0005)	O	1C	No	

4.1.2.2 Scheduled Procedure Step Module

Table 4-33. Scheduled Procedure Step Module Attributes

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into the Image	Use
Scheduled Procedure Step Sequence	(0040,0100)	R	1	No	
>Scheduled Station AE Title	(0040,0001)	R	1	No	Matching supported. User can specify AE title when flittering modality worklist entries.
>Scheduled Procedure Step Start Date	(0040,0002)	R	1	Yes	Matching Supported. Specified as range of date of the form: Date-Date where Date is specified as: yyyyMMdd. SPS Start Date is mapped into private attribute "Protocol Scheduled Date" in the image - tag (0009, xx40), "QUASAR_INTERNAL_USE"
>Scheduled Procedure Step Start Time	(0040,0003)	R	1	Yes	Matching not supported. SPS Start Time is mapped into private attribute "Protocol Scheduled Time" in the image - tag (0009, xx41), "QUASAR_INTERNAL_USE"
>Scheduled Procedure Step End Date	(0040,0004)	O	3	No	Not sent in MWL request.
>Scheduled Procedure Step End Time	(0040,0005)	O	3	No	Not sent in MWL request.
>Modality	(0008,0060)	R	1	Yes	Matching Supported. Single value matching performed.
>Scheduled Performing Physician's Name	(0040,0006)	R	2	No	Matching Supported. Single Value or Wildcard. User can define performing physician last name and/or first name in the MWL request, but returned value is not stored in the image..
>Scheduled Procedure Step Description	(0040,0007)	O	1C	No	

Table 4-33. Scheduled Procedure Step Module Attributes (Continued)

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into the Image	Use
>Scheduled Station Name	(0040,0010)	O	2	No	No matching supported. Matched only by AE.
>Scheduled Procedure Step Location	(0040,0011)	O	2	No	
>Scheduled Protocol Code Sequence	(0040,0008)	O	1C	Yes	Sent as NULL sequence in MWL request
>> *'Code Sequence Macro'*					
>Scheduled Procedure Step ID	(0040,0009)	O	1	Yes	
>Pre-Medication	(0040,0012)	O	2C	No	
>Scheduled Procedure Step Status	(0040,0020)	O	1	No	
>Comments on the Scheduled Procedure Step	(0040,0400)	O	3	No	Not sent in MWL request.
>Requested Contrast Agent	(0032,1070)	O	2C	No	

4.1.2.3 Requested Procedure Module

Table 4-34. Requested Procedure Module Attributes

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into the Image	Use
Requested Procedure ID	(0040,1001)	O	1	Yes. Copied to Study ID (0020,0010)	Matching supported Single value, Wildcard. Displayed in the ToDo list UI.
Requested Procedure Description	(0032,1060)	O	1C	Yes	Matching is not supported

Table 4-34. Requested Procedure Module Attributes (Continued)

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into the Image	Use
Requested Procedure Code Sequence	(0032,1064)	O	1C	Yes. Copied to Procedure Code Sequence (0008,1032)	
> *'Code Sequence Macro'*				Yes. Copied to Procedure Code Sequence (0008,0032)	
Study Instance UID	(0020,000D)	O	1	Yes	
Referenced Study Sequence	(0008,1110)	O	2	Yes	
>Referenced SOP Class UID	(0008,1150)	O	1C	Yes	
>Referenced SOP Instance UID	(0008,1155)	O	1C	Yes	
Requested Procedure Priority	(0040,1003)	O	2	No	
Patient Transport Arrangements	(0040,1004)	O	2	No	
Requested Procedure Location	(0040,1005)	O	3	No	
Confidentiality Code	(0040,1008)	O	3	No	Not sent in MWL request.
Reporting Priority	(0040,1009)	O	3	No	Not sent in MWL request.
Names of Intended Recipients of Results	(0040,1010)	O	3	No	
Reason for the Requested Procedure	(0040,1002)	O	3	No	
Requested Procedure Comments	(0040,1400)	O	3	No	

4.1.2.3.1 Imaging Service Request Module

Table 4-35. Imaging Service Request Module Attributes

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into the Image	Use
Accession Number	(0008,0050)	O	2	Yes	Matching Supported. Single Value, Wildcard. Displayed in the ToDo list UI.
Requesting Physician	(0032,1032)	O	2	No	
Referring Physician's Name	(0008,0090)	O	2	Yes	
Requesting Service	(0032,1033)	O	3	No	
Reason for the Imaging Service Request	(0040,2001)	O	3	No	Not sent in MWL request.
Imaging Service Request Comments	(0040,2400)	O	3	No	Not sent in MWL request.
Issue Date of Imaging Service Request	(0040,2004)	O	3	No	Not sent in MWL request.
Issue Time of Imaging Service Request	(0040,2005)	O	3	No	Not sent in MWL request.
Placer Order Number / Imaging Service Request	(0040,2016)	O	3	No	Not sent in MWL request.
Filler Order Number / Imaging Service Request	(0040,2017)	O	3	No	Not sent in MWL request.
Order entered by...	(0040,2008)	O	3	No	Not sent in MWL request.
Order Enterer’s Location	(0040,2009)	O	3	No	Not sent in MWL request.
Order Callback Phone Number	(0040,2010)	O	3	No	Not sent in MWL request.
Imaging Service Request Comments	(0040,2400)	O	3	No	

4.1.2.3.2 Visit Identification

TABLE 4-36. VISIT IDENTIFICATION MODULE ATTRIBUTES

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into the Image	Note
Admission ID	(0038,0010)	O	2	No	
Institution Name	(0008.0080)	O	3	Yes	
Institution Address	(0008,0081)	O	3	No	Not sent in MWL request.
Institution Code Sequence	(0008,0082)	O	3	No	Not sent in MWL request.
Issuer of Admission ID	(0038,0011)	O	3	No	Not sent in MWL request.

4.1.2.3.3 Visit Status

Table 4-37. Visit Status Module Attributes

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into the Image	Note
Current Patient Location	(0038,0300)	O	2	No	
Visit Status ID	(0038,0008)	O	3	No	Not sent in MWL request.
Patient's Institution Residence	(0038,0400)	O	3	No	Not sent in MWL request.
Visit Comments	(0038,4000)	O	3	No	Not sent in MWL request.

4.1.2.3.4 Visit Relationship

TABLE 4-38. VISIT RELATIONSHIP MODULE ATTRIBUTES

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into the Image	Note
Referenced Patient Sequence	(0008,1120)	O	2	No	
>Referenced SOP Class UID	(0008,1150)	O	1C	No	
>Referenced SOP Instance UID	(0008,1155)	O	1C	No	

4.1.2.3.5 Visit Admission

Table 4-39. VISIT ADMISSION MODULE ATTRIBUTES

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into the Image	Note
Referring Physician's Name	(0008,0090)	O	3	Yes	
Referring Physician's Address	(0008,0092)	O	3	No	Not sent in MWL request.
Referring Physician's Phone Numbers	(0008,0094)	O	3	No	Not sent in MWL request.
Admitting Diagnoses Description	(0008,1080)	O	3	No	Not sent in MWL request.
Admitting Diagnoses Code Sequence	(0008,1084)	O	3	No	Not sent in MWL request.
Route of Admissions	(0038,0016)	O	3	No	Not sent in MWL request.

Table 4-39. VISIT ADMISSION MODULE ATTRIBUTES (Continued)

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into the Image	Note
Admitting Date	(0038,0020)	O	3	No	Not sent in MWL request.
Admitting Time	(0038,0021)	O	3	No	Not sent in MWL request.

4.1.2.3.6 Patient Relationship

TABLE 4-40. PATIENT RELATIONSHIP MODULE ATTRIBUTES

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into the Image	Note
Referenced Visit Sequence	(0008,1125)	O	3	No	Not sent in MWL request.
Referenced Patient Alias Sequence	(0038,0004)	O	3	No	Not sent in MWL request.

4.1.2.3.7 Patient Identification

Table 4-41. PATIENT IDENTIFICATION MODULE ATTRIBUTES

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into the Image	Note
Patient's Name	(0010,0010)	R	1	Yes	Matching supported. User can define patient last name and/or patient first name. Mapped to image field (0010,0010) Patient's Name. Displayed in the ToDo list UI.
Patient ID	(0010,0020)	R	1	Yes	Matching by Single Value supported. Displayed in the ToDo list UI.
Issuer of Patient ID	(0010,0021)	O	3	No	Not sent in MWL request.

Table 4-41. PATIENT IDENTIFICATION MODULE ATTRIBUTES (Continued)

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into the Image	Note
Other Patient IDs	(0010,1000)	O	3	No	
Other Patient Names	(0010,1001)	O	3	No	Not sent in MWL request.
Patient's Birth Name	(0010,1005)	O	3	No	Not sent in MWL request.
Patient's Mother's Birth Name	(0010,1060)	O	3	No	Not sent in MWL request.
Medical Record Locator	(0010,1090)	O	3	No	Not sent in MWL request.

4.1.2.3.8 Patient Demographic

Table 4-42. PATIENT DEMOGRAPHIC MODULE ATTRIBUTES

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into the Image	Note
Patients Birth Date	(0010,0030)	O	2	Yes	
Patient's Birth Time	(0010,0032)	O	2	No	
Patient's Sex	(0010,0040)	O	2	Yes	
Patient's Weight	(0010,1030)	O	2	Yes	
Confidentiality constraint on patient data	(0040,3001)	O	2	No	Not sent in MWL request.
Patient’s Size	(0010,1020)	O	3	No	Not sent in MWL request.
Patient’s Address	(0010,1040)	O	3	No	Not sent in MWL request.
Patient’s Telephone Numbers	(0010,2154)	O	3	No	Not sent in MWL request.

Table 4-42. PATIENT DEMOGRAPHIC MODULE ATTRIBUTES (Continued)

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into the Image	Note
Patient's Age	(0010,1010)	O	3	No	Not sent in MWL request.
Occupation	(0010,2180)	O	3	No	Not sent in MWL request.
Patient’s Birth Time	(0010,0032)	O	3	No	
Patient's Insurance Plan Code Sequence	(0010,0050)	O	3	No	Not sent in MWL request.
Patient’s Primary Language Code Sequence	(0010,0101)	O	3	No	Not sent in MWL request.
> Patient’s Primary Language Code Modifier Sequence	(0010,0102)	O	3	No	Not sent in MWL request.
Military Rank	(0010,1080)	O	3	No	Not sent in MWL request.
Branch of Service	(0010,1081)	O	3	No	Not sent in MWL request.
Country of Residence	(0010,2150)	O	3	No	Not sent in MWL request.
Region of Residence	(0010,2152)	O	3	No	Not sent in MWL request.
Ethnic Group	(0010,2160)	O	3	No	Not sent in MWL request.
Patient's Religious Preference	(0010,21F0)	O	3	No	Not sent in MWL request.
Patient Comments	(0010,4000)	O	3	No	Not sent in MWL request.

4.1.2.3.9 Patient Medical

Table 4-43. PATIENT MEDICAL MODULE ATTRIBUTES

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into the Image	Note
Patient State	(0038,0500)	O	2	No	
Pregnancy Status	(0010,21C0)	O	2	No	
Medical Alerts	(0010,2000)	O	2	No	
Contrast Allergies	(0010,2110)	O	2	No	
Special Needs	(0038,0050)	O	2	No	
Smoking Status	(0010,21A0)	O	3	No	Not sent in MWL request.
Additional Patient History	(0010,21B0)	O	3	No	
Last Menstrual Date	(0010,21D0)	O	3	No	Not sent in MWL request.

SECTION 5: INFINIA STORAGE COMMITMENT PUSH MODEL IMPLEMENTATION

5.1 INTRODUCTION

This section describes the Infinia storage commitment information object definition. The storage commitment information object is used both for N-action storage commitment request by the SCU and N-event report storage commitment notifications by the SCP.

5.2 IOD MODULE TABLE

5.2.1 Storage Commitment Module for N-action

Table 5-44. Storage Commitment Module for N-action

Attribute Name	Tag	Attribute Description
Transaction UID	(0008,1195)	Internally generated
Retrieve AE Title	(0008,0054)	Not used.
Storage Media File-Set ID	(0088,0130)	Not used.
Storage Media File-Set UID	(0088,0140)	Not used.
Referenced SOP Sequence	(0008,1199)	
>Referenced SOP Class UID	(0008,1150)	1.2.840.10008.5.1.4.1.1.20 Nuclear Medicine Image Storage SOP Class UID. 1.2.840.10008.5.1.4.1.1.7 - Secondary Capture Image Storage SOP Class UID
>Referenced SOP Instance UID	(0008,1155)	Internally generated.
>Retrieve AE Title	(0008,0054)	Not used.
>Storage Media File-Set ID	(0088,0130)	Not used.
>Storage Media File-Set UID	(0088,0140)	Not used.
Failed SOP Sequence	(0008,1198)	Not used.

5.2.2 Storage Commitment Module For N-event Report

Table 5-45. Storage Commitment Module For N-event Report

Event Type Name	Event Type ID	Attribute	Tag	Requirement Type SCU/SCP
Storage Commitment Request Successful	1	Transaction UID	(0008,1195)	-/1
		Retrieve AE Title	(0008,0054)	Ignored
		Storage Media File-Set ID	(0088,0130)	Ignored
		Storage Media File-Set UID	(0088,0140)	Ignored
		Referenced SOP Sequence	(0008,1199)	-/1
		>Referenced SOP Class UID	(0008,1150)	-/1
		>Referenced SOP Instance UID	(0008,1155)	-/1
		>Retrieve AE Title	(0008,0054)	Ignored
		>Storage Media File-Set ID	(0088,0130)	Ignored
		>Storage Media File-Set UID	(0088,0140)	Ignored

Table 5-45. Storage Commitment Module For N-event Report (Continued)

Event Type Name	Event Type ID	Attribute	Tag	Requirement Type SCU/SCP
Storage Commitment Request Complete - Failures Exist	2	Transaction UID	(0008,1195)	-/1
		Retrieve AE Title	(0008,0054)	Ignored
		Storage Media File-Set ID	(0088,0130)	Ignored
		Storage Media File-Set UID	(0088,0140)	Ignored
		Referenced SOP Sequence	(0008,1199)	-/1C
		>Referenced SOP Class UID	(0008,1150)	-/1
		>Referenced SOP Instance UID	(0008,1155)	-/1
		>Retrieve AE Title	(0008,0054)	Ignored
		>Storage Media File-Set ID	(0088,0130)	Ignored
		>Storage Media File-Set UID	(0088,0140)	Ignored
		Failed SOP Sequence	(0008,1198)	-/1. SOP Instances failed to commitment are not marked as archived in the system Patient Browser.
		>Referenced SOP Class UID	(0008,1150)	-/1
		>Referenced SOP Instance UID	(0008,1155)	-/1
		>Failure Reason	(0008,1197)	-/1

SECTION 6: INFINIA PRIVATE DATA OBJECT IMPLEMENTATION

6.1 INTRODUCTION

The Infinia non–image DICOM Private Series data objects IOD (SDO) described in this section are implemented using an Infinia Private DICOM SOP class. The object type is determined by the use of an object type attribute, as defined in the tables.

6.2 INFINIA PRIVATE DATA IOD IMPLEMENTATION

The Infinia private Series data objects (SDO) are used for storage of additional information acquired by system during the scan that relevant to Series and cannot be sent with the specific Image. SDO is transferred to Xeleris Workstation using Infinia Private SOP Class. Xeleris uses this information in several Applications dedicated to processing of Infinia NM Images.

Due to internal usage of SDO, these objects are not referenced by PPS.

6.3 IOD MODULE TABLE

This section of the mapping document defines a Infinia private Series Data Object that consists of the DICOM standard Patient, Study, Series, and SOP Common modules, and the Infinia Private Series Data Module.

The Infinia Private Series Data Object Module Table is shown below. The Patient, Study, and other standard modules use all of the standard mapping tables defined in the image data parts of the mapping document. The Nuclear Medicine specific tables and the Infinia private tables from the image IODs are not a part of the Series Data Object. Only the modules shown are included in the private object.

The Infinia Series Data Object contains the modules listed in table Table 6-46.

Table 6-46. Private Series Data IOD Modules

Entity	Module	Reference
Patient	Patient	Section 3.5.1.1
Study	General Study	Section 3.5.2.1
Series	General Series	Section 3.5.3.1
Infinia	Infinia Private Series Data	Section 6.4.1
SDO	SOP Common	Section 6.4.2

6.4 INFORMATION MODULE DEFINITIONS

The table below shows the Infinia to DICOM mappings for the Series Data Object.

6.4.1 Infinia Private Series Data Object Module

The following table shows the mapping for SDO to the Infinia object.

Table 6-47. Infinia Series Data Module Attributes

Attribute Name	Tag	Type	Private Creator ID	Attribute Description
Object Type	(0033,xx08)	3	"GEMS_GENIE_1"	Defined term is "SERIES DATA"
Modified Flag	(0033,xx10)	3	"GEMS_GENIE_1"	Default value = 0 (Not Modified)
Name	(0033,xx11)	3	"GEMS_GENIE_1"	SDO Name
Series Data UID	(0033,xx16)	3	"GEMS_GENIE_1"	Internally generated UID of SDO
Date	(0033,xx17)	3	"GEMS_GENIE_1"	SDO Creation date
Time	(0033,xx18)	3	"GEMS_GENIE_1"	SDO Creation time
Series Data Flags	(0033,xx19)	3	"GEMS_GENIE_1"	Default value = 0
ProtocolName	(0033,xx1A)	3	"GEMS_GENIE_1"	Name of Protocol created SDO
Relevant data UID	(0033,xx1B)	3	"GEMS_GENIE_1"	UID of SOP Instance relative to SDO
Bulk Data	(0033,xx1C)	3	"GEMS_GENIE_1"	SDO parameter(s) stored as binary buffer(s)
Int Data	(0033,xx1D)	3	"GEMS_GENIE_1"	List of SDO parameters stored as integers
DoubleData	(0033,xx1E)	3	"GEMS_GENIE_1"	List of SDO parameters stored as doubles.
StringData	(0033,xx1F)	3	"GEMS_GENIE_1"	List of SDO parameters stored as list of strings
BulkDataFormat	(0033,xx20)	3	"GEMS_GENIE_1"	Format of bulk parameters; contains information about name and size of bulk bufferters
IntDataFormat	(0033,xx21)	3	"GEMS_GENIE_1"	Format of integer parameters; contains information about name and number of integers in list
DoubleDataFormat	(0033,xx22)	3	"GEMS_GENIE_1"	Format of double parameters; contains information about name and number of doubles in list

Table 6-47. Infinia Series Data Module Attributes (Continued)

Attribute Name	Tag	Type	Private Creator ID	Attribute Description
StringDataFormat	(0033,xx23)	3	"GEMS_GENIE_1"	Format of string parameters; contains information about name and number of strings in list

6.4.2 SOP Common Module

This section defines the Attributes which are required for proper functioning and identification of the associated SOP Instances. They do not specify any semantics about the Real-World Object represented by the IOD.

Table 6-48. SOP Common Module Attributes

Attribute Name	Tag	Type	Attribute Description
SOP Class UID	(0008,0016)	1	Set to “1.2.840.113619.4.27”, Private SOP Class UID.
SOP Instance UID	(0008,0018)	1	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.
Instance Creation Date	(0008,0012)	3	Date of instance creation.
Instance Creation Time	(0008,0013)	3	Time of instance creation.
Instance Creator UID	(0008,0014)	3	Set to the Implementation UID (see Section 2.3.1.1.4)

6.5 GENERAL MAPPING RULES FOR SERIES DATA OBJECTS

All of the Infinia database attributes in the Patient, Study, and Series modules are copied directly to the DICOM object as defined in the mapping tables for the parent Patient/Study/Series.

6.6 EXPORT NOTES FOR SERIES DATA OBJECTS

Every Infinia database attribute in the Series data module is copied directly into the DICOM object. There are no defaults on export. If there is no value in the database, then the elements may be left out of the DICOM object.

SECTION 7: PERFORMED PROCEDURE STEP CONFORMANCE STATEMENT

7.1 INTRODUCTION

The PPS option allows a Modality Performed Procedure Step to be communicated to the Hospital/Radiology information system. The PPS feature is providing the DICOM Modality Performed Procedure Step service as a service class user (SCU).

This capability works in conjunction with DICOM Modality Worklist feature. However the conformance of the Modality Performed Procedure Step is independent of Modality Worklist feature. For information on conformance of Modality Worklist to DICOM standard please refer to Section 4 of this document.

7.2 IOD MODULE TABLE

7.2.1 Modality Performed Procedure Step IOD Module

The table below lists the Modality Performed Procedure Step attributes, which appears in the MPPS message. Image IOD describes the mapping to the image created by the system.

Table 7-49. Supported N-Set/ N-Create Request Attributes for MPPS

Attribute Name	Tag	N-Create	N-Set	Acquisition w MWL Data	Acquisition w/o MWL Data	Image IOD
Requested Procedure Step Relationship Module						
Scheduled Step Attribute Sequence	(0040,0270)	Y	N	Contains exactly one item	Contains exactly one item	N
>Study instance UID	(0020,000D)	Y	N	Copied from MWL	Locally generated Unique ID	Y (Study module)
> Referenced Study Sequence	(0008,1110)	Y	N	Copied from MWL	null	Y (Study module)
>>Referenced SOP Class UID	(0008,1150)	Y	N	Copied from MWL	NA	Y
>>Referenced SOP instance UID	(0008,1155)	Y	N	Copied from MWL	NA	Y

Table 7-49. Supported N-Set/ N-Create Request Attributes for MPPS (Continued)

Attribute Name	Tag	N-Create	N-Set	Acquisition w MWL Data	Acquisition w/o MWL Data	Image IOD
>Accession Number	(0008,0050)	Y	N	Copied from MWL. Operator can modify value in user interface	Operator can set accession number value manually in user interface, but, if none was set during scheduling, Accession Number remains empty string.	Y (Study module)
>Requested Procedure ID	(0040,1001)	Y	N	Copied from MWL	Null	Y (In Request Attributes Sequence (0040,0275) in series module)
>Requested Procedure Description	(0032,1060)	Y	N	Copied from MWL	Null	Y (In Request Attributes Sequence (0040,0275) in series module)
>Requested Procedure Code Sequence	(0032,1064)	N	N	Copied From MWL	Null	Y (In Procedure code sequence (0008, 1032) General Study Module)
>Scheduled Procedure Step ID	(0040,0009)	Y	N	Copied from MWL	Null	Y (In Request Attributes Sequence (0040,0275) in series module)
>Scheduled Procedure Step Description	(0040,0007)	Y	N	Copied from MWL	Null	Y (In Request Attributes Sequence (0040,0275) in series module)
>Scheduled Protocol Code Sequence	(0040,0008)	Y	N	Copied from MWL	Null	Y (In Request Attributes Sequence (0040,0275) in series module) - for images acquired with MWL only.

Table 7-49. Supported N-Set/ N-Create Request Attributes for MPPS (Continued)

Attribute Name	Tag	N-Create	N-Set	Acquisition w MWL Data	Acquisition w/o MWL Data	Image IOD
>>Code Value	(0008,0100)	Y	N	Copied from MWL	NA	Y
>>Code Scheme Designator	(0008,0102)	Y	N	Copied from MWL	NA	Y
>>Code Scheme Version	(0008,0103)	Y	N	Copied from MWL	NA	Y
>>Code Meaning	(0008,0104)	Y	N	Copied from MWL, if presented; otherwise copied from Code Value.	NA	Y
Patient Name	(0010,0010)	Y	N	Copied from MWL. Operator can modify value in user interface, before any image in study is acquired.	Locally set	Y (Patient module)
Patient ID	(0010,0020)	Y	N	Copied from MWL. Operator can modify value in user interface, before any image in study is acquired.	Locally set	Y (Patient module)
Patient's Birth Date	(0010,0030)	Y	N	Copied from MWL. Operator can modify value in user interface	Locally set	Y (Patient module)
Patient’s Sex	(0010,0040)	Y	N	Copied from MWL. Operator can modify value in user interface	Locally set	Y (Patient module)
Referenced Patient Sequence	(0008,1120)	Y	N	Copied from MWL	Null	N
Admission ID	(0038,0010)	Y	N	Copied from MWL. Operator can modify value in user interface	Null	N
Issuer of Admission ID	(0038,0011)	Not Used		Not Used	Not Used	Not Used

Table 7-49. Supported N-Set/ N-Create Request Attributes for MPPS (Continued)

Attribute Name	Tag	N-Create	N-Set	Acquisition w MWL Data	Acquisition w/o MWL Data	Image IOD
Performed Procedure Step Information						
Performed Procedure Step ID	(0040,0253)	Y	N	"WLPID_" + <SPS ID>	“LCPID_" + numbered id starting from 1 (i.e. LCPID_1, LCPID_2)	Same * (In General series module)
Performed Station AE Title	(0040,0241)	Y	N	AE Title as configured	Same *	N/A
Performed Station Name	(0040,0242)	Y	N	Computer name	Same *	N/A
Performed Location	(0040,0243)	Y	N	The institution address as configured in	Same *	N/A
Performed Procedure Step Start Date	(0040,0244)	Y	N	Equals to study date.	Same *	Y (General Series Module)
Performed Procedure Step Start Time	(0040,0245)	Y	N	Equals to Study Time	Same *	Y (General Series Module)
Performed Procedure Step Status	(0040,0252)	Y	Y	"IN PROGRESS" when acquisition starts, and after the end of each scan in the protocol. "COMPLETED" when operator presses "Protocol Completed" or when all the scans in the protocol are completed. "DISCONTINUED ” when operator marks protocol as Discontinued	Same *	N

Table 7-49. Supported N-Set/ N-Create Request Attributes for MPPS (Continued)

Attribute Name	Tag	N-Create	N-Set	Acquisition w MWL Data	Acquisition w/o MWL Data	Image IOD
Performed Procedure Step Description	(0040,0254)	Y	Y	The full path of the protocol name e.g. "Factory&MPH Cardiology&One Day"	Same *	Same * (In General series module)
Performed Procedure Type Description	(0040,0255)	Y	Y	Null	Null	N
Procedure Code Sequence	(0008,1032)	Y	Y	Read from Requested Procedure Code Sequence (0032,1064). If the protocol originally matched from MWL was not changed.	Null	Y (when not null) (General Study Module)
>Code Value	(0008,0100)	Y	Y	Read from Requested Procedure Code Sequence (0032,1064). If the protocol originally matched from MWL was not changed.	NA	N
>Coding Scheme Designator	(0008,0102)	Y	Y	Read from Requested Procedure Code Sequence (0032,1064). If the protocol originally matched from MWL was not changed.	NA	N
>Code Meaning	(0008,0104)	Y	Y	Read from Requested Procedure Code Sequence (0032,1064). If the protocol originally matched from MWL was not changed. Otherwise, zero length	NA	N

Table 7-49. Supported N-Set/ N-Create Request Attributes for MPPS (Continued)

Attribute Name	Tag	N-Create	N-Set	Acquisition w MWL Data	Acquisition w/o MWL Data	Image IOD
Performed Procedure Step End Date	(0040,0250)	Y (null)	Y (if final state)	The time at which the PPS Status was set to "COMPLETED" or "DISCONTINUED"	Same *	N/A
Performed Procedure Step End Time	(0040,0251)	Y (null)	Y (if final state)	The date at which the PPS Status was set to "COMPLETED" or "DISCONTINUED"	Same *	N/A
Comments on the Performed Procedure Step	(0040,0280)	N	N	Not Used	Not Used	N (General Series Module)
Performed Procedure Step Discontinuation Reason Code Sequence	(0040,0281)	Y (null)	Y (if final state is other than DISCONTINUED, sent as Null Sequence. Refer to Table 7-50 on page 7-8 for more information.)	As selected by the operator when pressing "Protocol Discontinued"	Same *	N/A
Image Acquisition Results						
Modality	(0008,0060)	Y	N			Y (General Series Module)

Table 7-49. Supported N-Set/ N-Create Request Attributes for MPPS (Continued)

Attribute Name	Tag	N-Create	N-Set	Acquisition w MWL Data	Acquisition w/o MWL Data	Image IOD
Study ID	(0020,0010)	Y	N	Copied from the first 16 characters of the Requested Procedure ID (0040,1001)	Equals to the short version of protocol name of the first protocol in the study. If Sort version of Protocol Name is longer than 16 characters, only the first 16 characters are used.	
Performed Protocol Code Sequence	(0040,0260)	Y	Y	Empty (Currently Assisted Protocol Settings option is not supported)	Same *	N (General Series Module)
Performed Series Sequence	(0040,0340)	Y (null)	Y	One or more items	Same *	N/A
>Performing Physician's Name	(0008,1050)	N	Y (Zero Length)	Zero length	Same *	N (General Series Modules)
>Protocol Name	(0018,1030)	N	Y	The full path of the protocol name e.g. "Factory&MPH Cardiology&One Day”	Same *	Y (General Series Modules)
>Operator's Name	(0008,1070)	N	Y	Zero length	Same *	N/A
>Series Instance UID	(0020,000E)	N	Y	Locally generated unique UID	Same *	Y (General Series Modules)
>Series Description	(0008,103E)	N	Y	Series Description e.g. "Rest”	Same *	Y (General Series Modules)
>Retrieve AE Title	(0008,0054)	N	Y	Zero length	Same *	N/A
>Referenced Image Sequence	(0008,1140)	N	Y	Number of items as number of acquired images in this series (1 or more item)	Same *	N/A

Table 7-49. Supported N-Set/ N-Create Request Attributes for MPPS (Continued)

Attribute Name	Tag	N-Create	N-Set	Acquisition w MWL Data	Acquisition w/o MWL Data	Image IOD
>>Referenced SOP Class UID	(0008,1150)	N	Y	1.2.840.10008.5.1.4.1.1.20 or 1.2.840.10008.5.1.4.1.1.7	Same *	Y (SOP Common Module)
>>Referenced SOP Instance UID	(0008,1155)	N	Y	Locally generated unique UID of this image.	Same *	Y(SOP Common Module)
>Referenced Standalone SOP Instance Sequence	(0040,0220)	N	N	N/A no non-images instances	Same *	N/A

* Same as Acquisition with MWL Data

Table 7-50. Performed Procedure Discontinue Reasons

Reason description	Code
"Doctor cancelled procedure"	110500
"Nursing unit cancel"	110511
"Incorrect procedure ordered"	110502
"Change of procedure for correct charging"	110509
"Duplicate order"	110510
"Incorrect worklist entry selected"	110514
"Patient allergic to media/contrast"	110503
"Patient refused to continue procedure"	110505
"Patient condition prevented continuing"	110515
"Patient taken for treatment or surgery"	110506
"Patient did not arrive"	110507
"Patient pregnant"	110508
"Patient died"	110504
"Equipment failure"	110501
"Equipment change"	110516
"Discontinued for unspecified reason"	110513

SECTION 8: SC INFORMATION OBJECT IMPLEMENTATION

8.1 INTRODUCTION

This section specifies the use of the DICOM SC Image IOD to represent the information included in SC images produced by this implementation. SC Object attributes are conveyed using the module construct. The contents of this section are:

8.2 SC IOD IMPLEMENTATION

Screen Save images created on the Infinia system, as reports of several Quality Control Operations (Daily QC, Weekly QC, etc.), are sent as DICOM Secondary Capture images.

Only single frame Secondary Capture Image IOD is supported.

8.3 SC ENTITY-RELATIONSHIP MODEL

The Entity-Relationship diagram for the SC Image interoperability schema is shown in Illustration 8-1 In this figure, the following diagrammatic convention is established to represent the information organization:

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

The relationships are fully defined with the maximum number of possible entities in the relationship shown. For example, the relationship between Series and SC Image can have up to n SC Images per Series, but the SC Image can only belong to 1 Series.

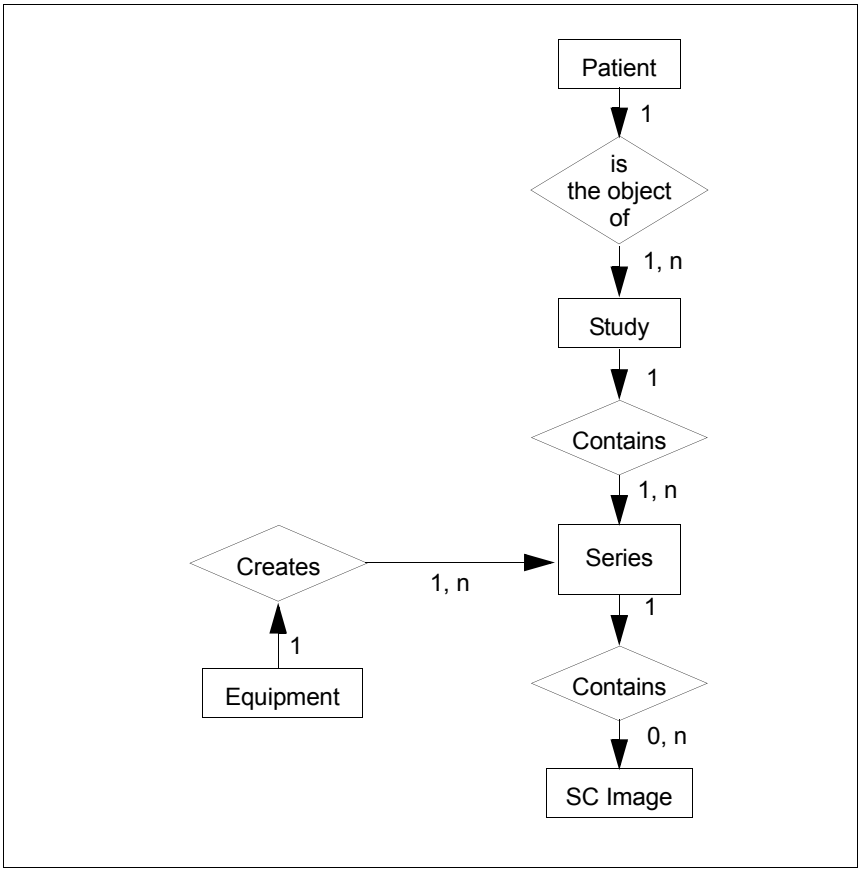

Illustration 8-1. SC Image Entity Relationship Diagram

8.3.1 Entity Descriptions

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

8.3.1.1 Patient Entity Description

The Patient Entity defines the characteristics of a patient who is the subject of one or more medical studies which produce medical images.

8.3.1.2 Study Entity Description

The Study Entity describes the characteristics of a medical study performed on a patient. A study is a collection of one or more series of medical images which are logically related for the purpose of diagnosing a patient. Each study is associated with exactly one patient.

8.3.1.3 Series Entity Description

The Series Entity defines the attributes which are used to group images into distinct logical sets. Each series is associated with exactly one study.

8.3.1.4 Equipment Entity Description

The Equipment Entity describes the particular imaging device which produced the series of images. An imaging device may produce one or more series within a study. The Equipment Entity does not describe the data acquisition or image creation Attributes used to generate images within a series.

8.3.1.5 SC Image Entity Description

The SC Image Entity defines the attributes which describe the pixel data of a Secondary Capture image. The pixel data is derived from an original image through image processing steps (a DERIVED image). An image is defined by its image plane, pixel data characteristics, gray scale and/or color mapping characteristics and modality specific characteristics (acquisition parameters and image creation information)

8.3.2 Infinia Mapping of DICOM Entities

Table 8-1. Mapping DICOM Entities to Infinia Entities

DICOM	Infinia Entity
Patient	Patient
Study	Exam
Series	Series
Equipment	Equipment
Image	Image

8.4 IOD MODULE TABLE

Within an entity of the DICOM v3.0 SC IOD, attributes are grouped into related set of attributes. A set of related attributes is termed a module. A module facilitates the understanding of the semantics concerning the attributes and how the attributes are related with each other. A module grouping does not infer any encoding of information into DICOM datasets.

Table 8-2 identifies the defined modules within the entities which comprise the DICOM v3.0 SC IOD. Modules are identified by Module Name.

See DICOM v3.0 Part 3 for a complete definition of the entities, modules, and attributes.

Table 8-2. SC Image IOD Modules

Entity Name	Module Name	Reference
Patient	Patient	Section 8.5.1.1
Study	General Study	Section 8.5.2.1
Series	General Series	Section 8.5.3.1
Equipment	General Equipment	Section 8.5.4.1
	SC Equipment	Section 8.5.6.2

Table 8-2. SC Image IOD Modules (Continued)

Entity Name	Module Name	Reference
Image	General Image	Section 8.5.5.1
	Infinia Private SC Image	Section 8.5.5.2
	Image Pixel	Section 8.5.5.3
	SOP Common	Section 8.5.6.1

8.5 INFORMATION MODULE DEFINITIONS

Please refer to DICOM v3.0 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. Attributes from the DICOM Standard modules are also included for completeness and to define what values they may take and where these values are obtained from. It should be noted that they are the same ones as defined in the DICOM v3.0 Standard Part 3 (Information Object Definitions).

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

8.5.1 Common Patient Entity Modules

8.5.1.1 Patient Module

This section specifies the Attributes of the Patient that describe and identify the Patient who is the subject of a diagnostic Study. This Module contains Attributes of the patient that are needed for diagnostic interpretation of the Image and are common for all studies performed on the patient.

Table 8-3. Patient Module Attributes

Attribute Name	Tag	Type	Attribute Description
Patient's Name	(0010,0010)	2	Name of user that performed the QC protocol. For example, "Service^^^^ "
Patient ID	(0010,0020)	2	Description of QC test performed. For example, "NM Daily QC", "Uniformity Test", "COR Test", etc.
Patient's Birth Date	(0010,0030)	2	Execution date of the QC Test
Patient's Sex	(0010,0040)	2	NULL value

8.5.2 Common Study Entity Modules

The following Study IE Modules are common to all Composite Image IODs which reference the Study IE. These Module contain Attributes of the patient and study that are needed for diagnostic interpretation of the image.

8.5.2.1 General Study Module

This section specifies the Attributes which describe and identify the Study performed upon the Patient.

Table 8-4. General Study Module Attributes

Attribute Name	Tag	Type	Attribute Description
Study Instance UID	(0020,000D)	1	Study Instance UID, internally generated
Study Date	(0008,0020)	2	Study Date
Study Time	(0008,0030)	2	Study Time
Referring Physician's Name	(0008,0090)	2	Referring Physician's Name. Set as an empty string.
Study ID	(0020,0010)	2	Study ID. Description of the QC test performed. For example, "NM Daily QC", "Uniformity Test", "COR Test", etc.
Accession Number	(0008,0050)	2	Accession Number. Set as an empty string.
Study Description	(0008,1030)	3	Study Description. Default Value "QC-protocol"

8.5.3 Common Series Entity Modules

The following Series IE Modules are common to all Composite Image IODs which reference the Series IE.

8.5.3.1 General Series Module

This section specifies the Attributes which identify and describe general information about the Series within a Study.

Table 8-5. General Series Module Attributes

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	1	SC Images created by Infinia generally have this attribute set to the value found in the original image. Defined Terms: NM = Nuclear Medicine
Series Instance UID	(0020,000E)	1	Series Instance UID. Internally generated.
Series Number	(0020,0011)	2	Series Number. Set as NULL value.
Series Description	(0008,103E)	3	Series Description. Internally generates the name of the QC report.

Table 8-5. General Series Module Attributes (Continued)

Attribute Name	Tag	Type	Attribute Description
Referenced Performed Procedure Step Sequence	(0008,1111)	3	Uniquely identifies the Modality Performed Procedure Step SOP Instance to which the Series is related. The sequence has exactly 1 item. The sequence is added to all image(s) created by the system, even when no PPS server is configured on that system.
>Referenced SOP Class UID	(0008,1150)	1C	Set with "1.2.840.10008.3.1.2.3.3"
>Referenced SOP Instance UID	(0008,1155)	1C	Uniquely identifies the referenced SOP Instance of the associated MPPS message

8.5.4 Common Equipment Entity Modules

The following Equipment IE Module is common to all Composite Image IODs which reference the Equipment IE

8.5.4.1 General Equipment Module

This section specifies the Attributes which identify and describe the piece of equipment which produced a Series of Images. If the SC object instance was derived from Infinia original images, then some of the attributes listed in the table below may be set to values copied from the original images.

Table 8-6. General Equipment Module Attributes

Attribute Name	Tag	Type	Attribute Description
Manufacturer	(0008,0070)	2	Manufacturer. Default value is "GE MEDICAL SYSTEMS"

8.5.5 Common Image Entity Modules

The following Image IE Modules are common to all Composite Image IODs which reference the Image IE.

8.5.5.1 General Image Module

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

Table 8-7. General Image Module Attributes

Attribute Name	Tag	Type	Attribute Description
Image Number	(0020,0013)	2	Image Number. Set with NULL value.
Image Date	(0008,0023)	2C	Image Date
Image Time	(0008,0033)	2C	Image Time
Image Type	(0008,0008)	3	Image Type, See Section 8.5.5.1.1.1

Table 8-7. General Image Module Attributes (Continued)

Attribute Name	Tag	Type	Attribute Description
Quality Control Image	(0028,0300)	3	Indicates that this image is a quality control image. Enumerated Values: YES

8.5.5.1.1 General Image Attribute Description

8.5.5.1.1.1 Image Type

Value 1 has the following Enumerated Value:

DERIVED identifies a Derived Image

Value 2 has the following Enumerated Value:

SECONDARY identifies a Secondary Image

8.5.5.2 Infinia SC Private Image Module

This section specifies the Attributes which identify and describe a Secondary Capture (SC) image within a particular series. This Module contains *private* Attributes that convey information not contained in the related DICOM Standard v3.0 Module. The private attributes are required for full fidelity transfer between Infinia and Xeleris workstation systems.

Table 8-8. Infinia Private SC Image Module Attributes

Attribute Name	Tag	Type	Private Creator	Attribute Description
Sequence Name	(0009, xx14)	3	"QUASAR_INTERNAL_USE"	Acquired Sequence Name
Patient Unique Key	(0009, xx39)	3	"QUASAR_INTERNAL_USE"	Patient unique key
Dataset Name	(0011, xx12)	3	"GEMS_GENIE_1"	

8.5.5.3 Image Pixel Module

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

Table 8-9. Image Pixel Module Attributes

Attribute Name	Tag	Type	Attribute Description
Samples per Pixel	(0028,0002)	1	3 (for RGB)
Photometric Interpretation	(0028,0004)	1	Defined Terms: RGB
Rows	(0028,0010)	1	Set to 878
Columns	(0028,0011)	1	Set to 1004
Bits Allocated	(0028,0100)	1	Set to 8
Bits Stored	(0028,0101)	1	Set to 8
High Bit	(0028,0102)	1	Set to 7

Table 8-9. Image Pixel Module Attributes (Continued)

Attribute Name	Tag	Type	Attribute Description
Pixel Representation	(0028,0103)	1	Set to 0
Pixel Data	(7FE0,0010)	1	
Planar Configuration	(0028,0006)	1C	Set to 0

8.5.6 General Modules

The SOP Common Module is mandatory for all DICOM IODs.

8.5.6.1 SOP Common Module

This section defines the Attributes which are required for proper functioning and identification of the associated SOP Instances. They do not specify any semantics about the Real-World Object represented by the IOD.

Table 8-10. SOP Common Module Attributes

Attribute Name	Tag	Type	Attribute Description
SOP Class UID	(0008,0016)	1	SOP Class UID. Set to "1.2.840.10008.5.1.4.1.1.7"
SOP Instance UID	(0008,0018)	1	SOP Instance UID. 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.

8.5.6.2 SC Image Equipment Module

This Module describes equipment used to convert SC images into a DICOM format.

Table 8-11. SC Image Equipment Module Attributes

Attribute Name	Tag	Type	Attribute Description
Conversion Type	(0008,0064)	1	Set to "SI"
Modality	(0008,0060)	3	Modality. Set to "NM".

APPENDIX A: INFINIA PRIVATE DATA DICTIONARY

This section provides value representation and multiplicity information for all of the Private Attributes used by this implementation. Private Attributes contained within the Information Model are described in the preceding sections.

Table A-1. Infinia Private Creator Identification "QUASAR_INTERNAL_USE"

Attribute Name	Tag	VR	VM	Attribute Description
Rate Vector	(0009, xx01)	UL	1-n	Rate for each frame
Count Vector	(0009, xx02)	UL	1-n	Counts accumulated for each frame
Time Vector	(0009, xx03)	UL	1-n	Time for each frame
Angle Vector	(0009, xx07)	UL	1-n	Angle for each TOMO frame. For each frame is tells what is the angle of the detector
Camera Shape	(0009, xx08)	US	1	Camera Shape: H mode, L mode
Origin	(0009, xx12)	LO	1	The origin of the image."isWorklist" if scheduled in MWL. "regular" if locally scheduled.
Sequence Type	(0009, xx13)	ST	1	Acquired Sequence Type
Sequence Name	(0009, xx14)	ST	1	Acquired Sequence Name
Avr RR Time Vector	(0009, xx15)	UL	1-n	Average r-r time vector
Low Limit Vector	(0009, xx16)	UL	1-n	Low window limit vector
High Limit Vector	(0009, xx17)	UL	1-n	High window limit vector
Begin Index Vector	(0009, xx18)	UL	1-n	begin index vector: link to heart beat vector
End Index Vector	(0009, xx19)	UL	1-n	end index vector: link to heart beat vector
Raw Time Vector	(0009, xx1A)	UL	1-n	Raw time vector
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
Normalization Factor	(0009, xx22)	FL	1	Image normalization factor
Patient Unique Key	(0009, xx39)	UI	1	Patient unique key
Protocol Scheduled Date	(0009, xx40)	DT	1	Protocol Scheduled Date

Table A-1. Infinia Private Creator Identification "QUASAR_INTERNAL_USE" (Continued)

Attribute Name	Tag	VR	VM	Attribute Description
Protocol Scheduled Time	(0009, xx41)	TM	1	Protocol Scheduled Time
Acquisition flag	(0009, xx42)	LO	1	Used for indicating if the study is acquired
Matched protocol	(0009, xx43)	LO	1	For Worklist items. The originally matched protocol vs. protocol name which is the protocol actually acquired
Private SPS ID	(0009, xx44)	SH	1	Keeps the SPS ID for protocols that were appended to the original MWL protocol.
Perfusion SOP Instance UID	(0011, xx33)	LO	1	
Collimator SQ	(0037,xx10)	SQ	1	Contains information of collimators parameters. Contains 1 item.
>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

Table A-2. Infinia Private Creator Identification "GEMS_GENIE_1"

Attribute Name	Tag	VR	VM	Attribute Description
Starting Heart Rate	(0009, xx37)	SL	1	Heart rate at start of acquisition.
Effective Series Duration	(0011, xx0B)	SL	1	Duration of acquisition.
Radio Nuclide Name	(0011, xx0D)	LO	1	Name of radionuclide used.
Dataset Name	(0011, xx12)	LO	1-n	
Acquisition Parent UID	(0011, xx31)	LO	1-n	

Table A-2. Infinia Private Creator Identification "GEMS_GENIE_1" (Continued)

Attribute Name	Tag	VR	VM	Attribute Description
Processing Parent UID	(0011, xx32)	LO	1-n	Parent projections UID for a recon image
Pixel Scale	(0011, xx3B)	FD	1-n	
Software Translator	(0013, xx11)	SL	1	Internal code of product DICOM implementation. Enumerated Value = 11
Object Type	(0033,xx08)	CS	1	Defined term is "SERIES DATA"
Modified Flag	(0033,xx10)	SL	1	Default value = 0 (Not Modified)
Name	(0033,xx11)	LO	1	SDO Name
Series Data UID	(0033,xx16)	LO	1	Internally generated UID of SDO
Date	(0033,xx17)	SH	1	SDO Creation date
Time	(0033,xx18)	SH	1	SDO Creation time
Series Data Flags	(0033,xx19)	UL	1	Default value = 0
ProtocolName	(0033,xx1A)	LO	1	Name of Protocol created SDO
Relevant data UID	(0033,xx1B)	LO	1	UID of SOP Instance relative to SDO
Bulk Data	(0033,xx1C)	OB	1	SDO parameter(s) stored as binary buffer(s)
Int Data	(0033,xx1D)	UL	1-n	List of SDO parameters stored as integers
DoubleData	(0033,xx1E)	FD	1-n	List of SDO parameters stored as doubles.
StringData	(0033,xx1F)	OB	1	List of SDO parameters stored as list of strings
BulkDataFormat	(0033,xx20)	OB	1	Format of bulk parameters; contains information about name and size of bulk bufferters
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

Table A-2. Infinia Private Creator Identification "GEMS_GENIE_1" (Continued)

Attribute Name	Tag	VR	VM	Attribute Description
StringDataFormat	(0033,xx23)	OB	1	Format of string parameters; contains information about name and number of strings in list
Triggers Modification Flag	(0033,xx30)	UL	1	Triggers Modification Flag
Number of triggers	(0033,xx33)	UL	1	Number of triggers
Trigger size	(0033,xx34)	UL	1	Size of one Trigger data slot
Trigger Data size	(0033,xx35)	UL	1	Size of Trigger Trigger Data size
Trigger Data	(0033,xx36)	OB	1	Buffer with trigger data information

Table A-3. Infinia Private Creator Identification "APEX_PRIVATE"

Attribute Name	Tag	VR	VM	Attribute Description
Bed Position	(0027,xx11)	DS	1	