



Technical Publications

DIRECTION 2343444GSP

Revision 0

***Discovery LS 1.0* Conformance Statement For DICOM V3.0**

GE Medical Systems

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Section 1 - Introduction

1.1 Overview

The Discovery LS is made up of several existing product that will be "Merged" together to create a new product offering. The new product offering will use the three implementations (with respect to Connectivity / DICOM) to provide that functionality. This implies that all three hosts (CT, PET and eNTEGRA workstation) can be used to send / receive DICOM images. The compliant to DICOM 3.0 of each of these hosts is described in the related document (see section 1.6 for details).

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

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

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

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

Section 4 (Print SCU Conformance Statement), which specifies the GEMS equipment compliance to the DICOM requirements for the implementation of Print SCU application profile.

1.2 Conformance Statement Documentation Structure

The Documentation Structure of the GEMS Conformance Statements and their relationship with the DICOM v3.0 Conformance Statements is shown in [Figure 1-1](#).

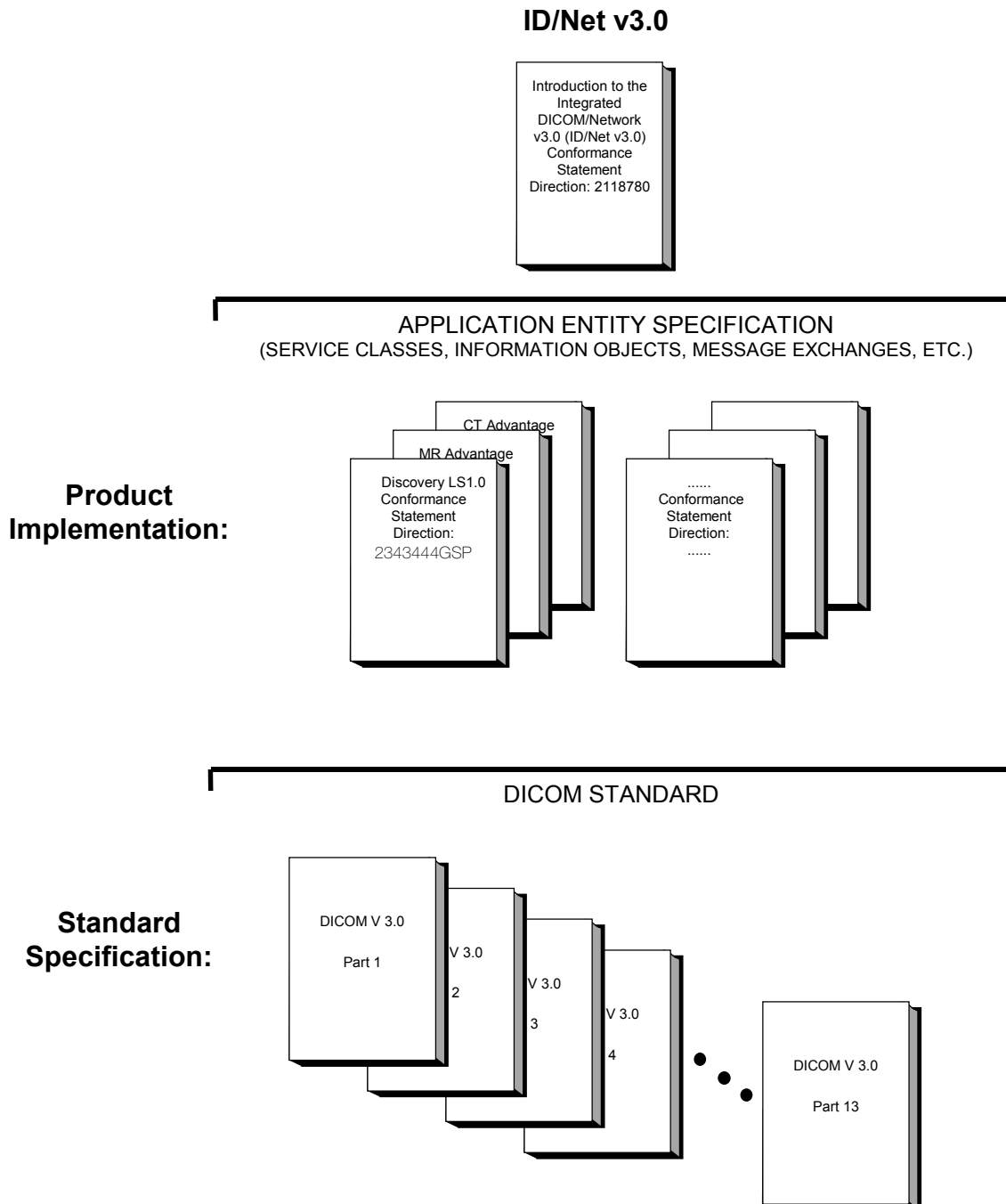


Figure 1-1: Discovery LS 1.0 Conformance Statement for DICOM V3.0
Direction 2343444GSP

This DICOM Conformance Statement documents the DICOM v3.0 Conformance Statement and Technical Specification required to interoperate with the GEMS network interface.

Introductory information, which is applicable to all GEMS 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' GEMS Conformance Statements.

The GEMS 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 GEMS 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 by written request or phone by contacting:

NEMA Publication
1300 North 17th Street
Suite 1847
Rosslyn, VA 22209
USA
Phone: (703) 841-3200

1.3 Intended Audience

The reader of this document is concerned with software design and/or system integration issues. It is assumed that the reader of this document is familiar with the DICOM 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 GEMS implementations. This specification, called a Conformance Statement, includes a DICOM v3.0 Conformance Statement and is necessary to ensure proper processing and interpretation of GEMS medical data exchanged using DICOM v3.0. The GEMS Conformance Statements are available to the public.

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

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

- **To be informed of the evolution of the implementation described in this document, the User is advised to regularly check the GE Internet Server, accessible via anonymous ftp (GE Internet Server Address: ftp.med.ge.com, 192.88.230.11).**
- **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 GEMS 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). The Positron Emission Tomography Information Object Definition is provided as part of DICOM Supplement 12.

Discovery LS product combines the LightSpeed Plus CT, PET Advance and eNTEGRA into one product. As such, the DICOM services provided by the Discovery LS are the merge of the services provided by those three systems. For details see:

LightSpeed Plus 2.0

*Conformance Statement for DICOM v3.0 (ID/Net v3.0)
Direction 2288570-100*

Advance 5.1

*Conformance Statement for DICOM v3.0
Direction 2293013-100*

eNTEGRA™ Processing & Review R2.0

*Conformance Statement for DICOM V3.0
Direction 2281484-100*

1.7 Definitions

A set of definitions which is applicable to all GEMS Conformance Statements is included in the *"Introduction to the Integrated DICOM/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 GEMS 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 GEMS product. Note that the format of this section strictly follows the format defined in DICOM Standard PS 3.2 (Conformance). Please refer to that part of the standard while reading this section.

The Discovery LS product provides sophisticated image processing and storage functions on Computed Tomography (CT) and Positron Emission Tomography (PET) data. In view of the requirements to conform to a global standard that permits interoperability across equipment produced by different vendors, Discovery LS will provide support for DICOM 3.0.

The Discovery LS product combines the LightSpeed Plus CT, PET Advance and eNTEGRA into one product. As such, the DICOM services provided by the Discovery LS are the merge of the services provided by those three systems.

The CT subsystem uses DICOM services to import CT images for possible further analysis and/or processing. It also uses DICOM services to export CT images to other DICOM-compliant machines.

For more information about LightSpeed Plus DICOM implementation see:

LightSpeed Plus 2.0

*Conformance Statement for DICOM v3.0 (ID/Net v3.0) Direction
2288570-100*

The PET subsystem provides the ability to receive DICOM CT/MR images onto the PET subsystem, which allows users to co-register and fuse the anatomical detail of the CT/MR images with the Functional PET images. This leverages the strengths of both modalities and maximizes Patient Treatment planning and tracking.

The PET DICOM implementation allows the user to send PET Image, PET Curve and GE Advance Data acquired through the acquisition system or received from any other DICOM Compliant system to another DICOM station. PET is capable of receiving DICOM Data Sets from another DICOM compliant station. PET also allows query and retrieve of data stored in its local database from a remote station and can query and retrieve images stored in a remote DICOM station. In this situation PET is providing the DICOM C-FIND and C-MOVE services as a service class provider (SCP) and that of a DICOM C-FIND and C-MOVE service class user (SCU).

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

For more information about PET Advance DICOM implementation see:

Advance 5.1

Conformance Statement for DICOM v3.0

Direction 2293013-100

The eNTEGRA Processing & Review DICOM implementation allows the user to send Nuclear Medicine image data, acquired through a front-end acquisition system or received from any other DICOM compliant system, to another DICOM station. In this situation eNTEGRA is providing the DICOM C-STORE service as a service class user (SCU). eNTEGRA is capable of receiving DICOM Data Sets from another DICOM compliant station. eNTEGRA also allows query and retrieve of data stored in its local database from a remote station and can query and retrieve images stored in a remote DICOM station. In this situation eNTEGRA is providing the DICOM C-FIND and C-MOVE services as a service class provider (SCP) and that of a DICOM C-FIND and C-MOVE service class user (SCU).

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

For more information about eNTEGRA DICOM implementation see:

eNTEGRA™ Processing & Review R2.0

Conformance Statement for DICOM V3.0

Direction 2281484-100

2.2 Implementation Model

All DICOM functionality on the Discovery LS product is handled by four DICOM Server Application Entities (AE):

1. **LightSpeed QX/i DICOMServer AE.** The DICOM Server AE handles all DICOM functionality on the CT subsystem. It is commanded to perform DICOM services through the buttons and menu selections on the CT main user interface panel. The DICOM Server AE is also listening to a pre-defined port on the CT for incoming connections.
2. **PET Advance DicomRecv Server AE.** The DicomRecv server AE handles all CT/MR DICOM Receive (C-STORE SCP) functionality on the PET Advance subsystem. It is listening to a pre-defined port (4050) for incoming connections. The Specific Application model for this device is described in:

Advance 5.1

Conformance Statement for DICOM v3.0

Direction 2293013-100

3. **PET Advance ADVANCE_DICOM Server AE.** The ADVANCE_DICOM Server AE handles all PET-DICOM / CT/MR DICOM Query functionality on the PET subsystem. It is commanded to perform DICOM services through the use of the PET Network Operations User Interface. The ADVANCE_DICOM Server AE also listens on a pre-defined port on the PET for incoming connections from remote DICOM AEs.
4. **eNTEGRA CIPIC_DICOM Server AE.** The CIPIC_DICOM Server logically provides all DICOM functionality on the eNTEGRA P&R subsystem. It is commanded to perform DICOM services through the use of the eNTEGRA user interface. The CIPIC_DICOM Server AE also listens on a pre-defined port on the eNTEGRA for incoming connections from remote DICOM AEs.

For more information see the DICOM conformance statement for each system.

2.2.1 Support of Extended Character Sets

LightSpeed QX/I and eNTEGRA sub systems support only the ISO_IR 100 (ISO 8859-1:1987 Latin alphabet N 1. supplementary set) as extended character sets. PET Advance sub system does not support any extended character sets.

Section 3 - Media Storage Conformance Statement

3.1 Introduction

This section specifies the Discovery LS 1.0 conformance to DICOM 3.0 media interchange. This functionality exists only when performed on the **CT LightSpeed QX/i**.

For more information about LightSpeed Plus DICOM implementation see:

*LightSpeed Plus 2.0
Conformance Statement for DICOM v3.0 (ID/Net v3.0)
Direction 2288570-100*

Section 4 - Print SCU Performance

4.1 Introduction

This section specifies the Discovery LS 1.0 conformance to DICOM print SCU application profile. This profile is relevant only when used from the **CT LightSpeed QX/i** or from *eNTEGRA™*.

For more information about LightSpeed Plus DICOM implementation see:

LightSpeed Plus 2.0
Conformance Statement for DICOM v3.0 (ID/Net v3.0)
Direction 2288570-100

For more information about eNTEGRA DICOM implementation see:

eNTEGRA™ Processing & Review R2.0
Conformance Statement for DICOM V3.0
Direction 2281484-100