



EPISS LITE

DICOM Conformance Statement

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INTRODUCTION

This document specifies the DICOM 3.0 conformance statement of the DICOM Services provided by EPISSLite 1.0.

EPISSLite is software interface used by Cathlab personnel to transfer Patient demographic Data from Hospital Information System onto Remote EP Recording System and send back Investigation Reports.

Intended Audience

This conformance statement is intended for:

- (Potential) Customers
- System Integrators of Medical Equipment
- Marketing Staff interested in the system functionality
- Software designers implementing DICOM interfaces

It is assumed that the reader has understanding of the DICOM standard.

Scope

The scope of this DICOM Conformance statement is to enable data exchange to take place between EPISSLite and other DICOM devices.

Used Definitions and Abbreviations

Definitions, terms and abbreviations used in this document are defined within the different parts of the DICOM standard.

AE	Application Entity
AET	Application Entity Title
ASCII	American Standard Code for Information Interchange
CIS	Cardiology Information System
CR	Cardioreport System
DB	Database
DICOM	Digital Imaging and Communications in Medicine
DIMSE	DICOM Message Service Element
DIMSE-C	DICOM Message Service Element-Composite
DIMSE-N	DICOM Message Service Element-Normative
GUI	Graphical User Interface
HIS	Hospital Information System
IOD	Information Object Definition
ISO	International Standard Organization

NEMA	National Electrical Manufacturers
OSI	Open Systems Interconnection
PACS	Picture Archive & Communication System
PDU	Protocol Data Unit
RGB	Red Green Blue
ROI	Region of Interest
SCU	Service Class User (DICOM Client)
SCP	Service Class Provider (DICOM Server)
SOP	Service-Object Pair
Tag Pair	A 32 bit integer consisting of a group/element
TCP/IP	Transmission Control Protocol/Internet Protocol
UID	Unique Identifier Attribute
VR	Value Representation
VM	Value Multiplicity

How To Use This Document

This Conformance Statement consists of the following sections:

Implementation model: The first section describes the Implementation Model. It explains the functional relation between the device and the DICOM services. A DICOM service is implemented on a device by a software process, which is called an “Application Entity” (AE). Each AE has a unique name called the “AE Title” which is used to identify it to other AEs. The AE Title is configurable to avoid two devices with the same name on a network. The “bubble diagram” (Application Data Flow Diagram) shows the interaction of the AE with the outside world across the dashed line, i.e. the DICOM interface. This Application Data Flow Diagram depicts graphically the relationship of the DICOM AE with local functions at the workstation as well as the relationship with external activities.

One should compare this implementation model and its description with the model of the other devices that the EPISS Lite software will connect to in order to determine connectivity.

Network Service Specifications: Each AE supports one or more Service Object Pair (SOP) classes. A SOP class consists of a combination of an object or information model with specific DICOM services. An example of such a SOP class is the CT Image Storage Class, which consists of the combination of the DICOM C_STORE command with the CT image object. Each of these classes is uniquely identified by an Identification number (UID), which is issued by the NEMA. The role of the AE is specified, which can be a client or server (compare with a speaker or listener). In DICOM terms, this is called a Service Class User or Service Class Provider (SCU or SCP).

In order to interconnect with another device, the SOP classes as well as their role (SCU or SCP) have to be matched, i.e. a SCU has to match a SCP at another device with an identical SOP class. Make sure to compare the UID itself, not the description because there are SOP classes which have the same name, but support a different (newer) object. Each SOP class supports a particular presentation context which is the combination of the SOP Class and the transfer syntax. The transfer syntax defines the encoding of the DICOM basic elements, i.e. its attributes and how the data is represented. The encoding of the data type, or Value Representation (VR), can be done in two ways – implicitly or explicitly. Explicit VR means that the transmitted data will include the VR information along with data and attribute tags. Implicit VR means the VR information will not be included, and the receiving application must determine the VR type from the Attribute Tag.

In addition, the data can be communicated in the Little Endian or Big Endian byte ordering. This means that for certain multi-byte words, the bytes might have to be swapped to be able to interpret the information by a different device. The transfer syntaxes of two devices have to match in order to communicate.

Communication Profiles: This section specifies the communication options. There are two levels that have to be compared. The first one is the supported communication stack that the device supports, which usually is the TCP/IP stack. In addition, the physical media has to match. Note that in general, matching physical media can be achieved by standard off-the-shelf devices. For example, if one device supports standard Ethernet 10BaseT, it can be bridged to a Fast Ethernet, ATM, or whatever is supported.

Extensions/Specializations/Privatizations: This section specifies implementation specific extensions to the Standard SOP classes as well as so-called specialized and private SOP classes, which are essentially proprietary services that make use of the underlying DICOM infrastructure such as DICOM network communication and association negotiation.

Configuration: This section specifies how the system configuration of an implementation affects its behavior at the DICOM network interface. DICOM implementations often support a multitude of configuration options which might be helpful in solving communication or interoperability problems.

Support of Extended Character Sets: DICOM supports a large number of character sets, including ASCII (the default), some of the ISO 8859 character sets for use with most European languages and a number of character sets for use in the Far East. This section of the conformance statement specifies the character sets that an implementation actually supports. The supported character sets should be compared carefully if extended character sets are to be used, since the inability of a system to handle extended characters might affect the way names and identifiers can be entered, displayed, queried etc.

User Warning

If another device matches this Conformance Statement based on the comparison with its own Conformance Statement, there is a chance, but no guarantee that they interoperate. DICOM only deals with communication; it is not a standard which specifies what is needed for certain applications to run on a device.

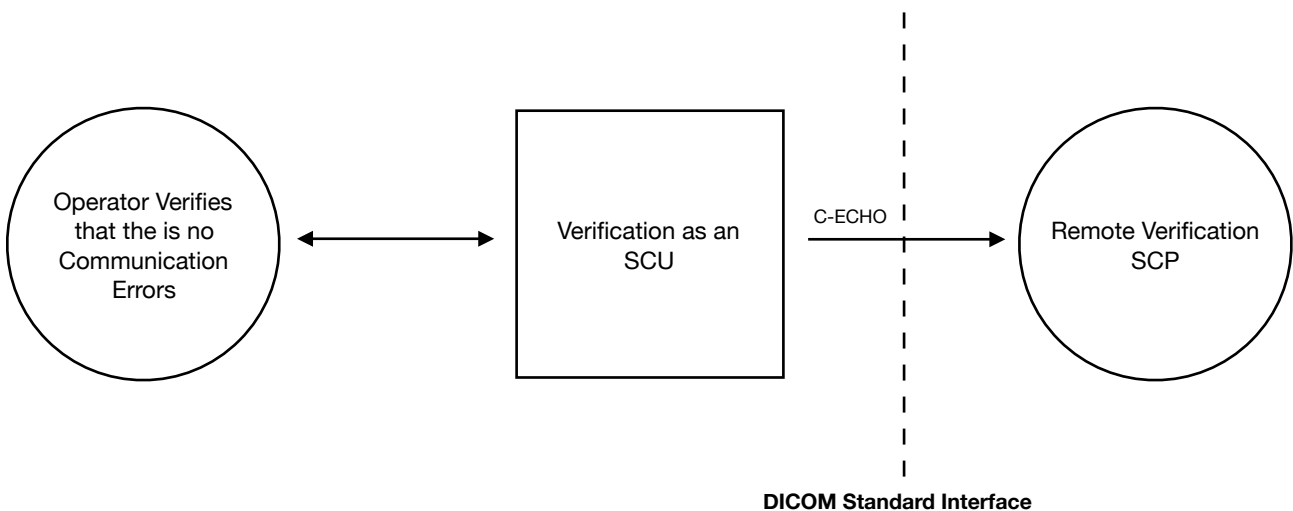
IMPLEMENTATION MODEL

Application Data Flow Diagram

The Real world activities are shown on the left. These represent user interaction with the system or integrating system. The activities to the right are connecting to DICOM devices outside the scope of this document.

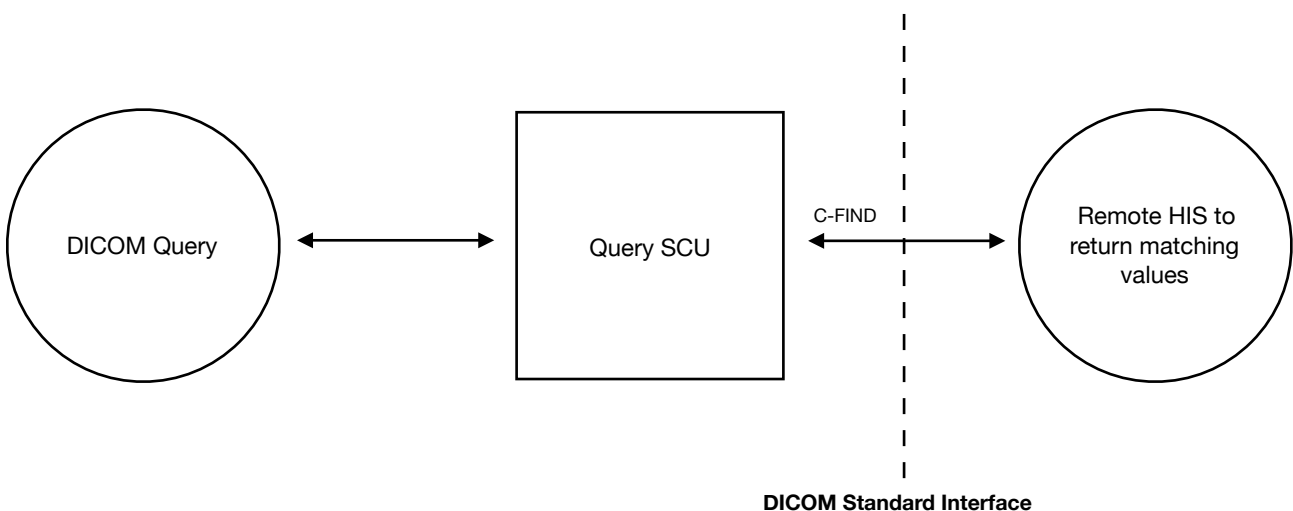
Remote SCU Verification.

This function is used to check that a DICOM device is available for connection. The C-Echo is sometimes referred to as a “DICOM Ping”.



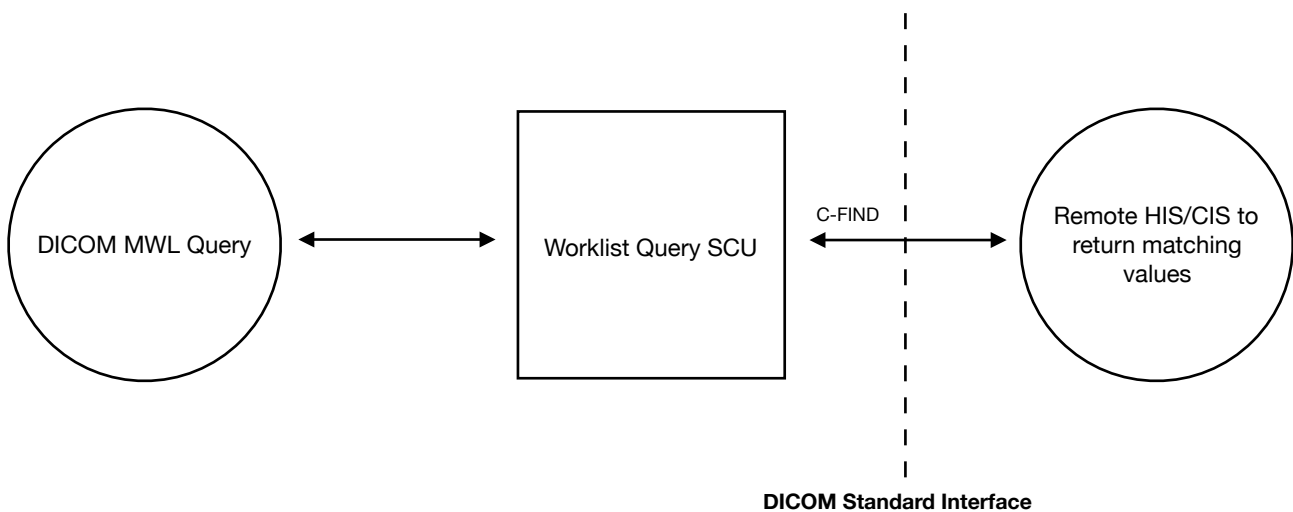
Query/Retrieve SCU.

Query and retrieve is used by EPISSLite to obtain Patient Demographics Information. The query (C-FIND) is performed by the user through a GUI.



Worklist Query SCU

Worklist Query is used to obtain Patient Demographics and study information from HIS or CIS. the Query is performed by user via GUI.



AE Functional Definitions

Separate AETitles can be specified for EPISSLite for defining the Local connection for Incoming and Outgoing DICOM operations. The AETitle used does not in itself define the operations that can be performed but merely define the means for DICOM devices to address EPISSLite when sending to it or to authorize the connection when receiving from it.

Sequencing of Real World Activities

All Real World activities specified here may occur independently but the transfer of files will always occur sequentially, any data will be queued.

NETWORK SERVICE SPECIFICATIONS

The network services supported by this software are specified in the following table.

SOP Class	SOP Name	SCU	SCP
1.2.840.10008.1.1	Verification C-ECHO	YES	NO
1.2.840.10008.5.1.4.1.2.1.1	Patient Root C-FIND	YES	NO
1.2.840.10008.5.1.4.31	MWL C-FIND	YES	NO

Association Establishment Policies

Number of Associations

There is no concurrent associations.

Asynchronous Nature

EPISSLite does not support asynchronous communication (multiple outstanding transactions over a single association).

Implementation identifying Information

SOP Class	SOP Name
1.2.826.0.1.3680043.2.875.0.x.y.z	Implementation Class UID
SinusTec-xyz	Implementation Version Name

Where x.y.z = the software version number.

Association Initiation Policy

Association creation:

- Verification happens automatically when the application starts, to be sure that it runs in a correctly established context.
- The Operator requests Query-Retrieve Operation

Verification C-ECHO

The verification C-ECHO is supported in the SCU role. It is treated as a standalone function to be used in verifying the HIS/CIS System or DICOM proxy availability.

SOP Class Verification - 1.2.840.10008.1.1

Associated Real World Activity

The DICOM Ping (C-Echo) functionality is available as a command from the hosting application.

The operation will result in a C-Echo being generated and sent to any connected HIS or proxy.

Please note that when passed to a proxy the C-Echo only determines the availability of the proxy and does not guarantee the availability of any connected HIS/CIS system.

Proposed Presentation Contexts

EPISSLite proposes 2 default transfer syntaxes

1.2.840.10008.1.2 (Implicit VR Little Endian)

1.2.840.10008.1.2.1 (Explicit VR Big Endian)

Query/Retrieve C-FIND

EPISS Lite supports both the Patient Query Model and Study Query model as an SCU

SOP Class	SOP Name
1.2.840.10008.5.1.4.1.2.1.1	Patient Root Find
1.2.840.10008.5.1.4.1.2.2.1	Study Root Find
1.2.840.10008.5.1.4.31	MWL C-FIND

Associated Real World Activity

The Query (C-Find) functionality is available as a command from the hosting application. The operation will result in a query being generated and being passed through to the connecting DICOM system. The results of the query will then be displayed to allow selection of the files to be requested.

Proposed Presentation Contexts

EPISSLite proposes 2 default transfer syntax

1.2.840.10008.1.2 (Implicit VR Little Endian)

1.2.840.10008.1.2.1 (Explicit VR Big Endian)

Implementation Model

The EPISS Lite GUI allows for the setting of query filters, display of the query results and some customization of the results. The actual set of query parameters supported will be determined as the intersecting set of elements supported by the EPISS Lite and those supported by the connecting PACS. To provide the best possible capability the EPISS Lite supports as rich a set of attributes as possible.

C-FIND:

Element ID	Name	Level	Support
(0010,0010)	Patient Name	Patient/Study	Mandatory
(0010,0020)	Patient ID	Patient/Study	Mandatory
(0010,0030)	Patient DOB	Patient/Study	Mandatory
(0010,0040)	Patient Sex	Patient/Study	Mandatory
(0020,0010)	Study ID	Study	Mandatory
(0008,0020)	Study Date	Study	Optional
(0008,0050)	Accession Number	Study	Optional
(0008,0060)	Modality	Study	Optional
(0008,1080)	Admission diagnosis	Study	Mandatory

MWL QUERY:

Element ID	Name	Level	Support
(0010,0010)	Patient Name	Patient/Study	Mandatory
(0010,0020)	Patient ID	Patient/Study	Mandatory
(0010,0030)	Patient DOB	Patient/Study	Mandatory
(0010,0040)	Patient Sex	Patient/Study	Mandatory
(0020,0010)	Study ID	Study	Mandatory
(0040,0100)	SQ	Study	Mandatory
(0040,0001)	>Study Equipment AET	Study	Mandatory
(0040,0002)	>Study Date	Study	Mandatory
(0040,0003)	>Study Time	Study	Mandatory
(0008,1080)	Admission diagnosis	Study	Mandatory

COMMUNICATION PROFILES

Supported Communication Stacks

The EPISSLite supports DICOM V3.0 TCP/IP Network Communication as defined in Part 8 of the DICOM standard.

TCP/IP Stack

This application inherits its TCP/IP stack from the platform on which it executes.

EXTENSIONS/SPECIALIZATIONS/ PRIVATIZATIONS

There are no extensions or specializations to the standard SOP classes. There are no special uses of private tags.

CONFIGURATION

EPISSLite has a number of preferences to allow configuration of its DICOM communications. These settings can be found in a separate configuration file - "EPISSLite.INI".

EPISSLite allows the definition of maximum 2 simultaneous DICOM connections. One to define the server to get Patient Demographics information, called “**DemographicsServer**” and 2nd one to define server for study result “**ReportsServer**”.

Each connections has:

SCPAE – Application Entity Title of the remote device

SCUAE –The AETitle for remote devices to use when addressing this device.

Port – Port on which remote device located

Host – Address on which remote device located

Application Settings

EPISSLite can be configured to use with different clinical systems in different countries.

Language - Definition of GUI Language. Currently supported: English (EN), French(FR), Dutch(NL), German(DE)

Hospital Name - a name used for display and reference purposes only

Reports Dir - the path where study reports are saved by clinical system

EPRSType - Type of Clinical System, this parameter is used to configure EPISSLite for particular Clinical System

SUPPORT OF EXTENDED CHARACTER SETS

Supported Character Set	
Supported Language	ISO Designation
LATIN_1	ISO_IR_100
LATIN_2	ISO_IR_101
LATIN_3	ISO_IR_109
LATIN_4	ISO_IR_110
LATIN_5	ISO_IR_148
UNICODE	ISO_IR_192
ASCII	ISO_IR_6