

**PHILIPS**

A D A C

**DICOM 3.0  
CONFORMANCE  
STATEMENT**

**ENsphere  
Physician's Workstation**

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## Disclaimer

The ENSphere DICOM software is in compliance with the ACR-NEMA DICOM 3.0 standard; however, due to the inherent nature of DICOM, the user must perform acceptance testing to verify that the ENSphere DICOM software meets the requirements for your configuration. The acceptance testing must include all representative datasets (images) that you intend to transfer, all types of transfers desired for a type of dataset, and clinical evaluation of each representative dataset on the receiving end after each desired type of transfer.

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# INTRODUCTION

## Scope

This document states the conformance of ADAC ENsphere product to DICOM 3.0 standard. It only applies to the ENsphere DICOM software version 1.0 or higher. The DICOM conformance of other medical devices manufactured by ADAC Laboratories is detailed in separate documents.

## Important Notes

The ENsphere DICOM software is in compliance with ACR-NEMA DICOM 3.0 standard; however, due to the inherent nature of DICOM, the user must perform acceptance testing to verify that the ENsphere DICOM software meets requirements for their configuration.

The acceptance testing should include all representative datasets (images) that the user intends to transfer, all types of transfers desired for a type of dataset, and clinical evaluation of each representative dataset on the receiving end after the transfer of the desired type. Please read the following sections carefully prior to using any of the DICOM software products.

## Why Conformance Statement

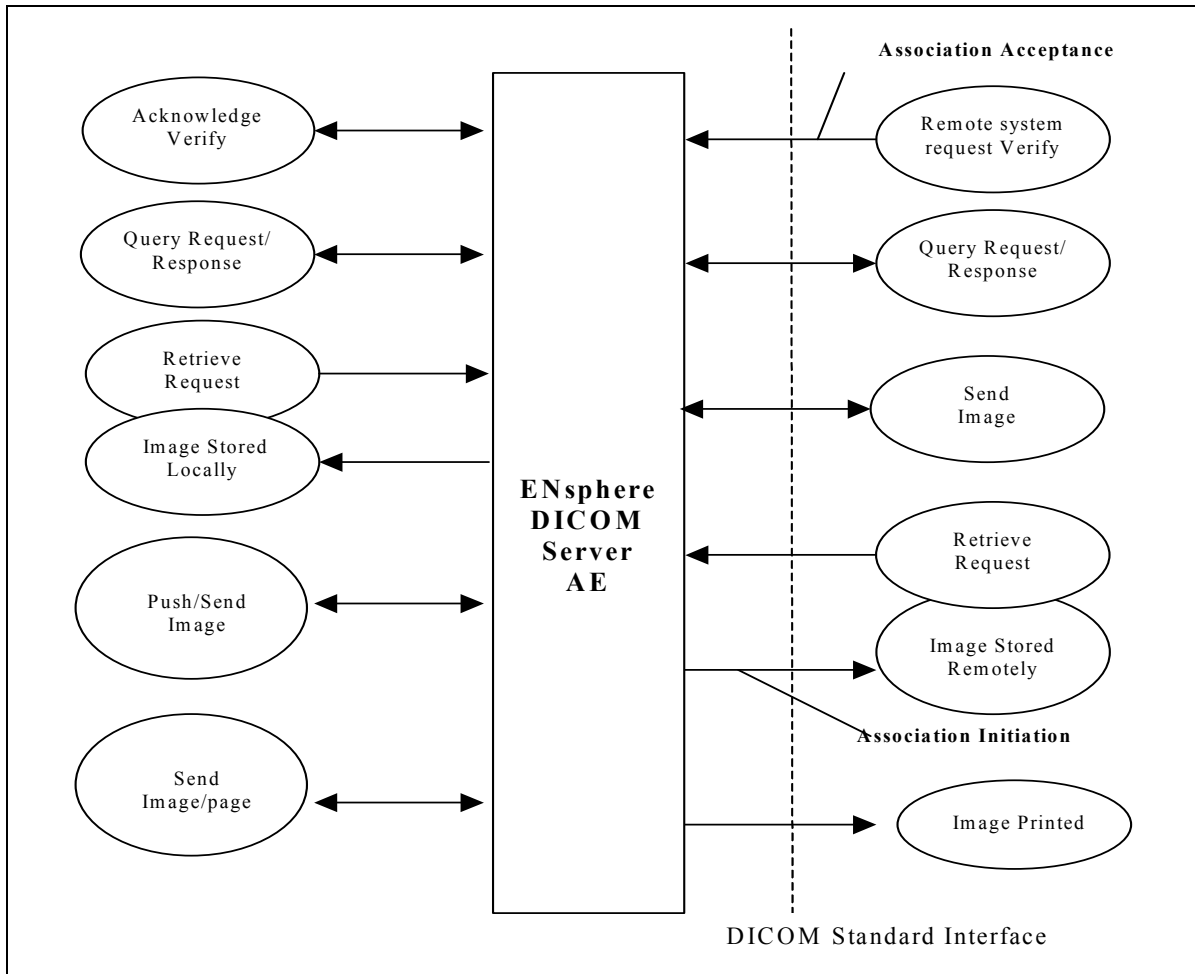
DICOM 3.0 standard enables vendors to implement systems in such a way that an imaging device can exchange patient and image data with another imaging device of the same or different modality, a Radiology Information System (RIS), a Hospital Information System (HIS), a Review/PACS station, an Archive or Hardcopy device over a standard network. It also permits data exchange via removable media, such as a Magneto-Optical disk, and through DICOM proprietary 50-pin point-to-point physical connection. As of the NEMA printing in 1993, DICOM 3.0 standard supports at least five diagnostic imaging modalities, i.e., CT, MRI, Nuclear Medicine, Ultrasound, and Digital/Computed Radiography.

Because of the broadness and extensibility of the DICOM standard, each DICOM conforming system would normally support only a subset of DICOM 3.0. Each pair of DICOM peer devices, or Application Entities (AE), can only communicate over the intersection of commonly supported parts of DICOM. Fortunately, DICOM 3.0 standard requires some minimum conformance.

This conformance statement can help the user understand the level of connectivity between ENsphere and other DICOM compatible devices. This conformance statement is written in accordance with Part 2 of DICOM, NEMA Standards Publication No. PS3.2 - 1993. It is assumed that readers of this document are familiar with the DICOM standard and with the terminology and concepts used in that standard.

# IMPLEMENTATION MODEL

## Application Data Flow Diagram



**Figure 1: ENSphere DICOM Server AE**

### Functional Definitions of AE's

The ENSphere DICOM server AE (**Figure 1**) illustrates the full DICOM option supported by ENSphere. This AE is started when the main ENSphere Application is started. The DICOM Server is listening indefinitely on a predefined port, which is terminated when the main application is stopped.

The DICOM Server AE is able to establish a DICOM Association with any remote host, which supports the DICOM Verify, Storage, Query-Retrieve and Print Management Service Classes. This AE is able to acknowledge and establish a DICOM Association initiated by a remote server for DICOM Verify, Storage and Query Retrieve Services only.

All the images received by this entity, either by way of DICOM Query-Retrieve Service class or by way of an independent Storage request by the remote host, is stored in the ENSphere Local Database.

Any remote server can query the ENSphere Local Database using DICOM Query-Retrieve Service Class. The images stored in the Local Database can also be pushed to the configured DICOM host using the DICOM Storage Service Class.

ENSphere can send the results/report “page” created by the application to the DICOM printer. The DICOM printer can be configured via the tray icon.

## Sequencing of Real-Word Activities

Not Applicable.

## AE SPECIFICATIONS

The ENSphere DICOM Server AE provides standard conformance to the following DICOM V3.0 SOP classes in the SCU and SCP role:

SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Nuclear Medicine Image Information Object -Storage	1.2.840.10008.5.1.4.1.1.20
Query/Retrieve Study Root FIND	1.2.840.10008.5.1.4.1.2.2.1
Query/Retrieve Study Root MOVE	1.2.840.10008.5.1.4.1.2.2.2

The ENSphere DICOM AE provides standard conformance to the following DICOM V3.0 SOP Class in the SCU role:

SOP Class Name	SOP Class UID
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18

## Association Establishment Policies

### General

The ENSphere DICOM AE can initiate and/or accept DICOM association only under the standard DICOM Application Context Name (ACN):

Application Context Name	1.2.840.10008.3.1.1.1
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### **Number of Associations**

The number of simultaneous associations that will be accepted by ENSphere DICOM server is configurable. However, the default is 2.

### **Asynchronous Nature**

Not Applicable

### **Implementation Identifying Information**

The AE Title used by the ENSphere DICOM Server is set in a configuration file. The AE Title, by default is the station name where the server is running.

The ENSphere DICOM Server uses an implementation UID identifying the different DICOM services it supports.

Implementation UID	1.2.840.116519.1.0.1
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### **Association Initiation Policy**

The ENSphere DICOM Server initiates the establishment of DICOM association to issue the following DICOM requests:

- Verification (C-Echo)
- Storage (C-STORE)
- Query (C-FIND)
- Retrieve (C-MOVE)
- Print (N-Create, N-Action, N-Get, N-Delete, N-Set)

### **Associated Real-Word Activity**

The ENSphere DICOM Server User can verify the existence of the remote DICOM Server by sending a C-Echo request on a successful established Association. The user also initiates the establishment of an Association when a particular image from the local database is to be transferred to the remote host. ENSphere DICOM Server also initiates the opening of the Association when the user issues a query/retrieve request to the remote database. Finally, the server also initiates the opening of the Association with a DICOM printer when invoked by the user to print the images.

### **Presentation context table**

The ENSphere DICOM server will propose a single Presentation Context for the Association as defined by Table 1:

<b>Presentation context table</b>					
<b>Abstract Syntax</b>		<b>Transfer Syntax</b>		<b>Role</b>	<b>Extended Negotiation</b>
<b>Name</b>	<b>UID</b>	<b>Name</b>	<b>UID</b>		
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Nuclear Medicine Image	1.2.840.10008.5.1.4.1.1.20	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Nuclear Medicine Image	1.2.840.10008.5.1.4.1.1.20	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Nuclear Medicine Image	1.2.840.10008.5.1.4.1.1.20	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Study Root FIND	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Study Root Move	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Basic Grayscale Print Management	1.2.840.10008.5.1.1.9	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Basic Color Print Management	1.2.840.10008.5.1.1.18	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

**Table 1: Proposed Presentation Context**

*Note: Other modalities (CT, MR...) presentation contexts are accepted but without any guaranty about completeness of the mapping once imported in ENSphere patient database.*

**SOP Specific Conformance to Basic Grayscale Print Management Meta SOP Class**

ENSphere DICOM print server supports the following mandatory SOP classes, which are defined under the Basic Grayscale Print Management Meta SOP Class:

<b>SOP Class Name</b>	<b>SOP Class UID</b>
Basic Film Session SOP Class	1.2.840.10008.5.1.1.1
Basic Film Box SOP Class	1.2.840.10008.5.1.1.2
Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4
Printer SOP Class	1.2.840.10008.5.1.1.14

**SOP Specific Conformance to Basic Color Print Management Meta SOP Class**

ENSphere DICOM print server supports the following mandatory SOP classes which are defined under the Basic Color Print Management Meta SOP Class:



<b>SOP Class Name</b>	<b>SOP Class UID</b>
Basic Film Session SOP Class	1.2.840.10008.5.1.1.1
Basic Film Box SOP Class	1.2.840.10008.5.1.1.2
Basic Color Image Box SOP Class	1.2.840.10008.5.1.1.4.1
Printer SOP Class	1.2.840.10008.5.1.1.14

## **SOP Specific Conformance**

ENSphere conforms to the definition of an SCU of the Verification SOP Class in accordance with the DICOM Standard.

ENSphere as an SCU of the Storage SOP Class enables the transfer of images, including secondary capture from its local database to the selected remote host. Any unsuccessful is reported and no action is taken upon the receipt of a C-STORE successful message or warning response status.

The ENSphere DICOM Server conforms to the definition of an SCU of the Query (C-FIND) and Retrieve (C-Move) Service in accordance with the DICOM standard. ENSphere supports queries against the Study Root Information Model. ENSphere can send queries at Study, Series and Image Level in the Study Root FIND SOP Class.

ENSphere can also send a Retrieve (C-MOVE) request in the SCU role requesting the remote host to transfer a particular Image. All the images received in entirety will be updated and mapped to the ENSphere Local database and a successful C-STORE message sent to the requester. However, if the image cannot be received properly due to insufficient disk space or other protocol errors, ENSphere sends back an unsuccessful C-STORE message.

ENSphere can send the bitmap (bmp) file created by the application to the DICOM printer using the N-Set, N-Create, N-Get, N-Delete and N-Action services. The N-Get service is used to get the printer parameters while N-Create service is used to create the Film Session and Film Box. N-Set service is used to set the Image Box and N-action to print the images. Finally N-Delete service is used to delete the print object/instance on the printer.

## **Association Acceptance Policy**

The ENSphere DICOM server accepts an association to acknowledge the DICOM Verify (C-Echo) service, to respond to the DICOM Query (C-FIND) Service, to respond to Retrieve (C-MOVE) Service. ENSphere also accepts an association to receive (C-STORE) the images sent from the remote host.

## **Associated Real-Word Activity**

The ENSphere DICOM Server will acknowledge and establish an Association whenever any remote DICOM server wants to verify its existence and transfer some images using the standard DICOM C-STORE request. ENSphere will also accept Association to service the query/retrieve requests against its local database.

## Presentation context table

The Presentation Context accepted by ENSphere DICOM server, while trying to acknowledge the establishment of the Association, are shown in Table 2.

Presentation context table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Nuclear Medicine Image	1.2.840.10008.5.1.4.1.1.20	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Nuclear Medicine Image	1.2.840.10008.5.1.4.1.1.20	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Nuclear Medicine Image	1.2.840.10008.5.1.4.1.1.20	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Study Root FIND	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Study Root Move	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

**Table 2: Acceptable Presentation Context**

*Note: Other modalities (CT, MR...) presentation contexts are accepted but without any guaranty about completeness of the mapping once imported in ENSphere patient database.*

## SOP Specific Conformance

ENSphere DICOM Server conforms to the definition of a SCP of the Verification SOP Class in accordance with the DICOM Standard.

ENSphere DICOM server provides standard conformance to the DICOM Storage Service Class in the SCP role. All the images received in entirety will be updated and mapped to the ENSphere Local database, with the restriction that elements having no mapping in ENSphere patient database are discarded. However, if the image cannot be received properly due to insufficient disk space or other protocol errors, ENSphere sends back an unsuccessful C-STORE message.

## Presentation Context Acceptance Criterion

ENSphere DICOM server accepts Presentation Contexts specified in Table 2.

It examines proposed Presentation Contexts in the order proposed. The first acceptable Presentation Context determines the Abstract Syntax, which will be used for association, as well as the transfer syntax that will be used.

## **Transfer Syntax Selection Policies**

ENsphere accepts the transfer syntax in the order they are proposed. By default, however, the DICOM default Transfer Syntax is accepted.

# **COMMUNICATION PROFILES**

## **Supported Communication Stacks**

ENsphere DICOM server implementation provides DICOM V3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM standard.

## **TCP/IP Stack**

ENsphere DICOM server implementation is indifferent to the physical medium over which TCP/IP executes.

# **EXTENSION/SPECIALIZATION/PRIVATIZATION**

There is no Extension, Specialization nor Privatization in ENsphere DICOM server implementation.

# **CONFIGURATION**

ENsphere DICOM server fetches the serving port number and the AE title from ENsphere configuration files. However, these parameters are modify-able by the user from the Tray Icon. The total number of simultaneous Associations acceptable is also configurable from this Tray Icon.

# **SUPPORT OF EXTENDED CHARACTER SETS**

Extended character sets are not supported by the current implementation.