

DOLPHIN DICOM IMAGING

DICOM CONFORMANCE STATEMENT

## NOTICE

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9200 Eton Avenue  
Chatsworth, CA 91311  
Phone: 818.435.1368  
Fax: 818.435.1369

[www.dolphinimaging.com](http://www.dolphinimaging.com)

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## 1. INTRODUCTION

### 1.1. OVERVIEW

This document is the DICOM Conformance Statement for Dolphin DICOM Imaging, the image acquisition component of the client-server software applications Dolphin Imaging from Dolphin Imaging & Management Solutions. In its primary role, Dolphin DICOM Imaging will request access, storage, and retrieval of images from a DICOM 3.0 conformant server.

### 1.2. 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 3.0 Standard and the terminology and concepts employed in those documents. Readers wishing to obtain more familiarity with the content and terminology of DICOM 3.0 Standard are encouraged to obtain and review the standard prior to reading this Conformance Statement. More information on acquiring this document and its updates on the DICOM standard may be found on the website of the National Electrical Manufacturer's Association (NEMA) at <http://www.nema.com>.

### 1.3. SCOPE AND FIELD OF APPLICATION

It is the intent of this document to describe the appropriate and decided communication of data between Dolphin DICOM Imaging and a DICOM 3.0 conformant server application.

### 1.4. IMPORTANT REMARKS

The use of the Dolphin DICOM Imaging Conformance Statement, in conjunction with DICOM 3.0 Standard, is intended to facilitate communication between Dolphin software and other applications. These standards, by themselves, should not be the sole source for, or guarantee of, interoperability between Dolphin software and other non-Dolphin applications or equipment. Responsibility for the correct design and integration of Dolphin software within the framework of other systems remains with the user and should not be minimized or overlooked. Users are strongly urged to test and validate the proper interaction between Dolphin Imaging and other non-Dolphin applications or devices before declaring operability.

### 1.5. REFERENCES

In preparing this conformance statement, frequent reference to the DICOM Standard, particularly PS 3.1 through PS 3.5, PS 3.7, PS 3.8, and PS 3.10 through PS 3.12 was made.

### 1.6. ACRONYMS

The following acronyms appear in this document and are defined below.

AE	Application Entity
CT	Computerized Tomography
CUID	Class Unique Identifier
DICOM	Digital Imaging and Communications in Medicine
MR	Magnetic Resonance
NEMA	National Electrical Manufacturers' Association

SCP	Service Class Provider
SCU	Service Class User
TCP/IP	Transmission Control Protocol / Internet Protocol
UID	Unique Identifier
VL	Visible Light

## 2. IMPLEMENTATION MODEL

### 2.1. APPLICATION DATA FLOW DIAGRAM

The Dolphin DICOM Imaging Application Entity (AE) is an application that initiates requests for the storage and retrieval of stored images and access to patient information. These requests originate with Dolphin DICOM Imaging which interfaces with the server by DICOM association. The implementation model of the Dolphin DICOM Imaging AE is shown in the following figure.

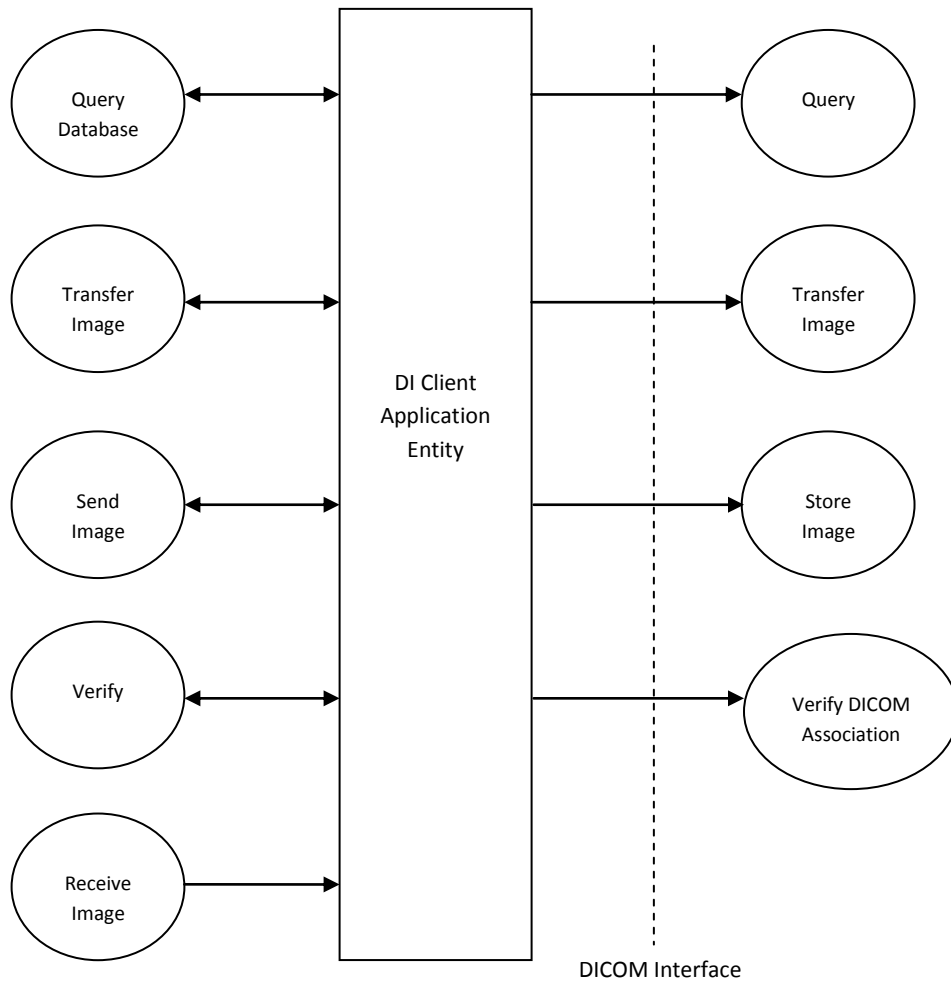


Figure 1. Implementation Model for Dolphin DICOM Imaging Application Entity

## 2.2. FUNCTIONAL DEFINITIONS

The Dolphin DICOM Imaging AE is an application initiating requests for image storage and retrieval from a DICOM 3.0 conformant server. Dolphin DICOM Imaging acts as a service class provider (SCP) in the following role:

1. SCP for C-Store operations to Storage service class users (during MOVE operations only)

Dolphin DICOM Imaging acts as a service class user (SCU) in the following roles:

1. SCU of C-Store operations from Storage service class providers
2. SCU of C-Echo operations from Verification service class providers
3. SCU of C-Find operations from Query / Retrieve service class providers
4. SCU of C-Move operations from Query / Retrieve service class providers

### 2.2.1. QUERY DATABASE

Dolphin DICOM Imaging can initiate a request (C-Find-RQ) for patient, study, and image queries. Dolphin DICOM Imaging provides in this request all the values for the attributes it wishes to match.

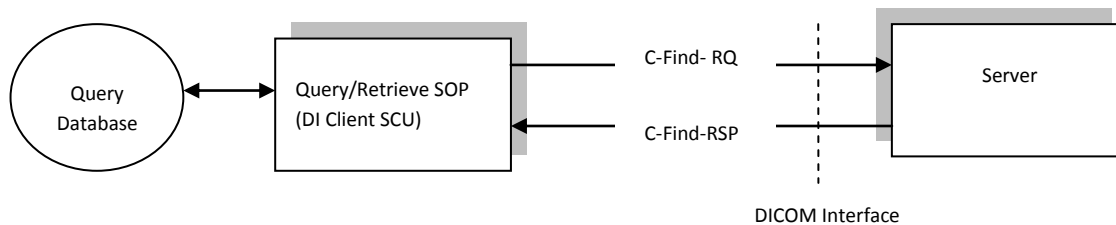


Figure 2. Query Database Model

### 2.2.2. TRANSFER IMAGE

Dolphin DICOM Imaging can initiate an image move request (C-Move-RQ) and supplies unique values that identify the move destination to the server (AE name, IP address, and port number). Dolphin DICOM Imaging also receives a status message confirming the operation.

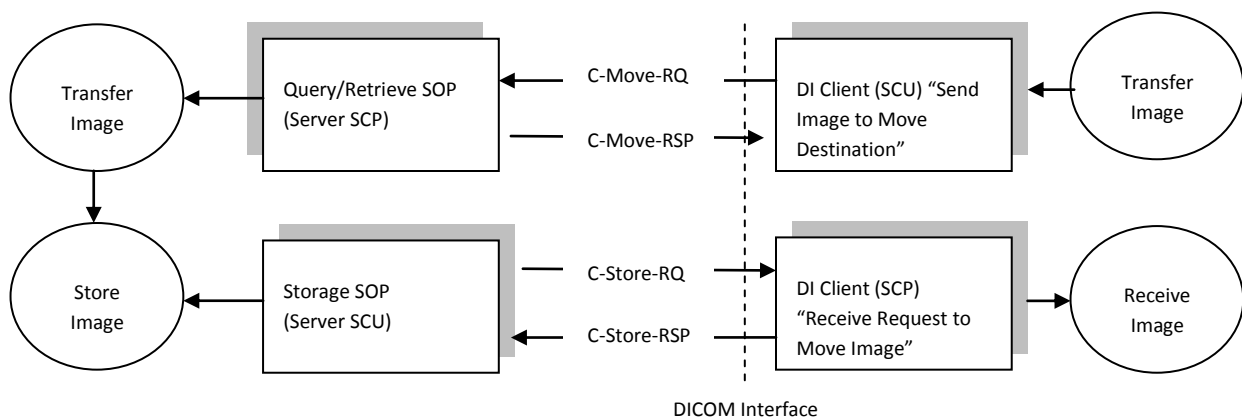


Figure 3. Transfer Image Model

### 2.2.3. SEND AND STORE IMAGE

Dolphin DICOM Imaging can initiate a request (C-Store-RQ) to store images it has acquired. Dolphin DICOM Imaging also receives a status message confirming the operation.

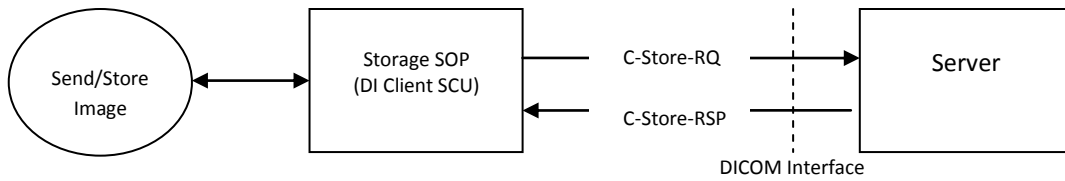


Figure 4. Send / Store Image Model

### 2.2.4. VERIFY

Dolphin DICOM Imaging can initiate a request (C-Echo-RQ) to verify a current DICOM association.

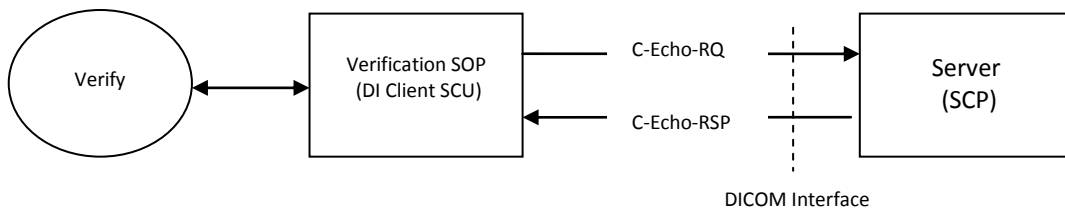


Figure 5. Verify Model

## 2.3. SEQUENCING OF REAL WORLD ACTIVITIES

Not applicable

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### 3. DOLPHIN IMAGING AE SPECIFICATIONS

#### 3.1. DOLPHIN DICOM IMAGING AE SPECIFICATION

##### 3.1.1. STORAGE-SPECIFICATION

Dolphin DICOM Imaging provides Standard Conformance to the following DICOM 3.0 Standard SOP Class as a SCU.

Table 1. Storage SOP Classes Supported by Dolphin DICOM Imaging

SOP Class Name	SOP Class UID
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1
CT Image Storage	1.2.840.10008.5.1.4.1.1.2
MR Image Storage	1.2.840.10008.5.1.4.1.1.4
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Ultrasound Multi Frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1
X-ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1
X-ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Digital X-ray Image Storage for Presentation	1.2.840.10008.5.1.4.1.1.1.1
Digital X-ray Image Storage for Processing	1.2.840.10008.5.1.4.1.1.1.1.1
Digital Intra-oral X-ray Image Storage for Presentation	1.2.840.10008.5.1.4.1.1.1.3
Digital Intra-oral X-ray Image Storage for Processing	1.2.840.10008.5.1.4.1.1.1.3.1
Digital Mammography X-ray Image Storage for Presentation	1.2.840.10008.5.1.4.1.1.1.2
Digital Mammography X-ray Image Storage for Processing	1.2.840.10008.5.1.4.1.1.1.2.1
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2
VL Slide Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4
Patient Root Find	1.2.840.10008.5.1.4.1.2.1.1
Patient Root Move	1.2.840.10008.5.1.4.1.2.1.2
Study Root Find	1.2.840.10008.5.1.4.1.2.2.1
Study Root Move	1.2.840.10008.5.1.4.1.2.2.2
Patient Study Only Root Find	1.2.840.10008.5.1.4.1.2.3.1
Patient Study Only Root Move	1.2.840.10008.5.1.4.1.2.3.2

##### 3.1.2. QUERY / RETRIEVE -SPECIFICATION

Dolphin DICOM Imaging provides Standard Conformance to the following DICOM 3.0 Standard SOP Class as a SCU.

Table 2. Query / Retrieve SOP Classes Supported by Dolphin DICOM Imaging

SOP Class Name	SOP Class ID
Patient Root Find	1.2.840.10008.5.1.4.1.2.1.1
Patient Root Move	1.2.840.10008.5.1.4.1.2.1.2
Study Root Find	1.2.840.10008.5.1.4.1.2.2.1
Study Root Move	1.2.840.10008.5.1.4.1.2.2.2
Patient Study Only Root Find	1.2.840.10008.5.1.4.1.2.3.1
Patient Study Only Root Move	1.2.840.10008.5.1.4.1.2.3.2

### 3.1.3. VERIFICATION -SPECIFICATION

Dolphin DICOM Imaging provides Standard Conformance to the following DICOM 3.0 Standard SOP Class as a SCU.

Table 3. Verification SOP Class Supported by Dolphin DICOM Imaging

SOP Class Name	SOP Class ID
Verification	1.2.840.10008.1.1

### 3.1.4. ASSOCIATION ESTABLISHMENT POLICIES FOR DOLPHIN DICOM IMAGING AE

#### 3.1.4.1. GENERAL

All associations with Dolphin DICOM Imaging are established using the DICOM 3.0 Standard application context.

1. Dolphin DICOM Imaging initiates an association for verification.
2. Dolphin DICOM Imaging initiates an association to query database.
3. Dolphin DICOM Imaging initiates an association to send and store images.
4. Dolphin DICOM Imaging initiates an association to transfer images.
5. Dolphin DICOM Imaging accepts an association to receive and store images transferred by the C-Move SCP

#### 3.1.4.2. NUMBER OF ASSOCIATIONS

Only one instance of Dolphin DICOM Imaging can be running at a time. Dolphin DICOM Imaging opens only one association.

#### 3.1.4.3. ASYNCHRONOUS NATURE

Not supported.

#### 3.1.4.4. IMPLEMENTATION IDENTIFYING INFORMATION

Dolphin's DICOM Imaging implementation provides a single Class Unique Identifier (CUID) of "1.2.840.114257.1123456" and a Version Name of "1".

### 3.1.5. ASSOCIATION INITIATION POLICIES FOR DOLPHIN DICOM IMAGING AE

#### 3.1.5.1.

Real World Activity: Request for Verification

#### 3.1.5.1.1. ASSOCIATED REAL WORLD ACTIVITY

Dolphin DICOM Imaging initiates an association with the server to verify the current DICOM association

#### 3.1.5.1.2. PRESENTATION CONTEXTS

Table 4. Presentation Contexts to Verify DICOM Association

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	SCU	None

### 3.1.5.2. REAL WORLD ACTIVITY: REQUEST TO GET WORKLIST / QUERY DATABASE

#### 3.1.5.2.1. ASSOCIATED REAL WORLD ACTIVITY

Dolphin DICOM Imaging initiates an association with Server to get the patient worklist or to send query requests and to receive the appropriate C-Find status code.

#### 3.1.5.2.2. PRESENTATION CONTEXTS

Table 5. Presentation Contexts to Query Database

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Patient Root Query/Retrieve (Find)	1.2.840.10008.5.1.4.1.2.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Study Root Query/Retrieve (Find)	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Patient/Study Only Query/Retrieve (Find)	1.2.840.10008.5.1.4.1.2.3.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

### 3.1.5.3. READ WORLD ACTIVITY: REQUEST TO SEND AND STORE IMAGES

#### 3.1.5.3.1. ASSOCIATED REAL WORLD ACTIVITY

Dolphin DICOM Imaging initiates an association with the server to send and store images and to receive the appropriate C-Store status code.

#### 3.1.5.3.2. PRESENTATION CONTEXTS

Table 6. Presentation Contexts to Send and Store Images

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Digital X-ray Image Storage (Presentation)	1.2.840.10008.5.1.4.1.1.1.1	Explicit VR Little Endian Uncompressed	1.2.840.10008.1.2.1	SCU	None
Digital Intra-oral X-ray Image Storage (Presentation)	1.2.840.10008.5.1.4.1.1.1.3	Explicit VR Little Endian Uncompressed	1.2.840.10008.1.2.1	SCU	None

### 3.1.5.4. REAL WORLD ACTIVITY: REQUEST TO TRANSFER IMAGES

#### 3.1.5.4.1. ASSOCIATED REAL WORLD ACTIVITY

Dolphin DICOM Imaging initiates an association with the server to transfer images and to issue the appropriate C-Move status code.

### 3.1.5.4.2. PRESENTATION CONTEXTS

Table 7. Presentation Contexts to Transfer Images

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Patient Root Query/Retrieve (Move)	1.2.840.10008.5.1.4.1.2.1.2	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Study Root Query/Retrieve (Move)	1.2.840.10008.5.1.4.1.2.2.2	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Patient/Study Only Query/Retrieve (Move)	1.2.840.10008.5.1.4.1.2.3.2	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

### 3.1.6. ASSOCIATION ACCEPTANCE POLICIES FOR DOLPHIN DICOM IMAGING AE

#### 3.1.6.1. REAL WORLD ACTIVITY: RESPOND TO STORE IMAGES REQUEST

##### 3.1.6.1.1. ASSOCIATED REAL WORLD ACTIVITY

Dolphin DICOM Imaging accepts an association to store images as a result of a C-Move request.

##### 3.1.6.1.2. PRESENTATION CONTEXTS

Table 8. Transfer Syntaxes to Store Images

Name	UID
Implicit VR Little Endian	1.2.840.10008.1.2
Explicit VR Little Endian	1.2.840.10008.1.2.1
Implicit VR Big Endian	1.2.840.10008.1.2.2
JPEG Baseline	1.2.840.10008.1.2.4.50
JPEG Extended	1.2.840.10008.1.2.4.51
JPEG 2000 Lossless	1.2.840.10008.1.2.4.90
JPEG 2000	1.2.840.10008.1.2.4.91
RLE Lossless	1.2.840.10008.1.2.5

Table 9: Presentation Contexts to Store Images

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	All from Table 8	SCP	None
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	All from Table 8	SCP	None
MR Image Storage	1.2.840.10008.5.1.4.1.4	All from Table 8	SCP	None
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	All from Table 8	SCP	None
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	All from Table 8	SCP	None
Ultrasound Multi-Frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	All from Table 8	SCP	None

X-ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	All from Table 8	SCP	None
X-ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	All from Table 8	SCP	None
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	All from Table 8	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	All from Table 8	SCP	None
Digital X-ray Image Storage (Presentation)	1.2.840.10008.5.1.4.1.1.1.1	All from Table 8	SCP	None
Digital X-ray Image Storage (Processing)	1.2.840.10008.5.1.4.1.1.1.1.1	All from Table 8	SCP	None
Digital Intra-oral X-ray Image Storage (Presentation)	1.2.840.10008.5.1.4.1.1.1.3	All from Table 8	SCP	None
Digital Intra-oral X-ray Image Storage (Processing)	1.2.840.10008.5.1.4.1.1.1.3.1	All from Table 8	SCP	None
Digital Mammography X-ray Image Storage (Presentation)	1.2.840.10008.5.1.4.1.1.1.2	All from Table 8	SCP	None
Digital Mammography X-ray Image Storage (Processing)	1.2.840.10008.5.1.4.1.1.1.2.1	All from Table 8	SCP	None
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	All from Table 8	SCP	None
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	All from Table 8	SCP	None
VL Slide Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3	All from Table 8	SCP	None
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	All from Table 8	SCP	None

## 4. COMMUNICATION PROFILES

### 4.1. SUPPORTED COMMUNICATION STACKS

Dolphin DICOM Imaging provides TCP/IP Network Communication Support in accordance with DICOM 3.0 Standard.

### 4.2 TCP/IP STACK

Dolphin DICOM Imaging communicates over the TCP/IP protocol stack on any physical interconnection supporting the TCP/IP stack.

### 4.3. PHYSICAL MEDIA SUPPORT

Dolphin DICOM Imaging is indifferent to the physical medium over which the TCP/IP executes.

## 5. CONFIGURATION

### 5.1. CONFIGURABLE SETTINGS

The following settings are configurable at the Dolphin DICOM Imaging Configuration dialog box.

1. Remote IP Address
2. Remote Port Number
3. Remote Application Entity Title (Called AE)
4. Local Application Entity Title (Calling AE)
5. Local IP Address
6. Local Port Number

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