



**MultiScan G-Arm System**  
**Versions DigiArc 100AU/100AE**

**DICOM CONFORMANCE STATEMENT**

**Whale Imaging**

## REVISION HISTORY

REVISION	DATE
1.0	August 5.2013

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## **1. INTRODUCTION**

### **1.1 Purpose of this Manual**

This statement accurately describes the DICOM conformance of the DigiArc 100AE/AU X-ray system and includes the DICOM information objects, service classes, and communication protocol supported by the implementation.

When reading this statement, please refer to the second part of the DICOM 3.0 protocol (Conformance).

This document is intended for those competent with software design and/or system integration. The reader of this document should be familiar with the DICOM Standard and with the terminology and concepts used in that Standard. The use of these DICOM Conformance Statements should be made in conjunction with the DICOM Standards.

This document is intended to facilitate communication with Whale imaging equipment. It is not sufficient on its own to ensure that inter-operation will be successful. The user should proceed with caution and consider i) integration of the system beyond the scope of the DICOM 3.0 standards ii) Testing and validation of the device prior to completion iii) future evolution of the DICOM standard with respect to future integrated devices. iv) any deleterious effects on system performance due to integration of the system, which are the responsibility of the user.

### **1.2 References**

2009 version of the DICOM standard.

### 1.3 Definitions

2009 version of the DICOM standard .

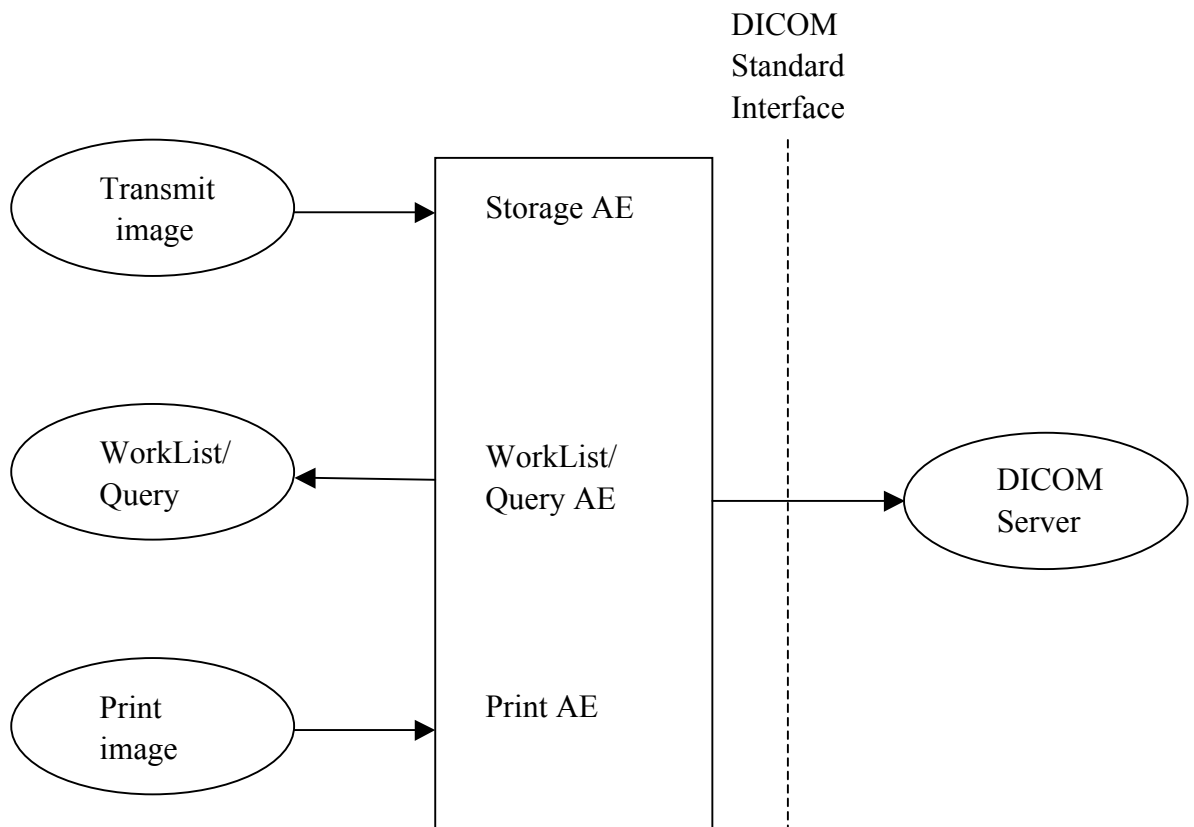
### 1.4 Symbols and Abbreviations

2009 version of the DICOM standard .

## 2. IMPLEMENTATION MODEL

DigiArc 100A X-ray facility has three kinds of DICOM service: DICOM transmit, WorkList, DICOM print.

### 2.1 Application Data Flow Diagram



When the user selects a study to transmit and clicks the transmit button the storage application

entity will create an association and after the connection is successful will start transmitting images. When all images of this study are transmitted to the server the release request will be sent and the association is closed.

When the user opens the WorkList interface or clicks on the query button the WorkList application entity will create an association, and after the connection is successful patient and study information that satisfy the query conditions on the server will be obtained and displayed. Choose one patient item and double-click to enter Fluoroscopy mode.

After selecting the images and format to print, click on the print button. The printer application entity will create a connection and after the connection is successful will start sending all the print images. When all images of this study are sent to the server the release request will be sent and the association is closed.

## **2.2 Functional definitions of AE**

Storage Application Entity supports the following functions:

- Initiates a DICOM association to send images.
- Transmits DICOM images to the DICOM Storage SCP.

Printer Application Entity supports the following functions:

- Initiates a DICOM association to print images.
- Transmits images data to DICOM Print SCP.

Query Application Entity supports the following functions:

- Initiate a DICOM association to ask for remote patient and study information.
- Initiates a DICOM Worklist Query to research patient and study information that satisfy the query conditions.

## **2.3 Sequencing of Real-World Activities**

No sequencing of Real-World activities is required.

# **3 AE Specifications**

## **3.1 Storage 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
Digital X-Ray Image Storage -For Presentation	1.2.840.10008.5.1.4.1.1.1.1

### 3.1.1 Association Establishment Policy

#### 3.1.1.1 General

The maximum length PDU for the DICOM Storage SCU is: 16384

#### 3.1.1.2 Number of Associations

DICOM Storage SCU AE can receive only one association at one time.

#### 3.1.1.3 Asynchronous Nature

DICOM Storage SCU AE does not support asynchronous mode. All operations will be performed synchronously.

#### 3.1.1.4 Implementation Identify Information

Implementation Version Name: "WHALE Beluga v2.0"

Implementation Class UID: 1.2.156.8772657669.7145658277

### 3.1.2 Association Initiation Policy

The Storage AE will initiate an association when the transmit button in the user interface is clicked.

#### 3.1.2.1 Real -World Activity

##### 3.1.2.1.1 Associated Really-World Activity

The DICOM Storage AE initiates an association for the user to send studies.

##### 3.1.2.1.2 Proposed Presentation Context Table

Presentation Context Table – Proposed			
Abstract Syntax	Transfer Syntax	Role	Extended Negotiation

Name	UID	Name List	UID List		
Digital X-Ray Image Storage For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

3.1.2.1.3 SOP Specific Conformance to Digital X-Ray Image Storage SOP Class

When the SCU invokes a C-STORE requirement, the server will send the success or failure status, the SCU take diffident action according to these statuses.

The following IOD Modules tables specify information about Real-World Objects.

IE	Module	Usage
Patient	Patient	M
Study	General Study	M
	Patient Study	U
Series	General Series	M
	CR Series	M
Equipment	General Equipment	M
Image	General Image	M
	Image Pixel	M
	CR Image	M
	VOI LUT	U
	SOP Common	M

The following Module Attribute tables contain the supported elements for each module in the Module table above.

Name	Tag	Type	VR
Patient's Name	0010,0010	2	PN
Patient ID	0010,0020	2	LO
Patient's Birth Date	0010,0030	2	DA



Patient's Sex	0010,0040	2	CS
Study Instance UID	0020,000D	1	UI
Study Date	0008,0020	2	DA
Study Time	0008,0030	2	TM
Study ID	0020,0010	2	SH
Accession Number	0008,0050	2	SH
Referenced SOP Class UID	0008,1150	1C	UI
Referenced SOP Instance UID	0008,1155	1C	UI
Modality	0008,0060	1	CS
Manufacturer	0008,0070	2	LO
SOP Class UID	0008,0016	see PS3.3 C.12.1.1.1	UI
SOP Instance UID	0008,0018	see PS3.3 C.12.1.1.1	UI
Series Instance UID	0020,000E	1	UI
KVP	0018,0060	2	DS
Exposure Time	0018,1150	2C	IS
X-ray Tube Current	0018,1151	2C	IS
View Position	0018,5101	2C	CS
Pixel Data	7FE0,0010	1	OW/OB

The following Status tables contain the status codes that are more specifically processed when receiving messages from a Storage SCP equipment:

<b>Service Status</b>	<b>Status Codes</b>	<b>Further Meaning</b>	<b>Application Behavior When receiving Status Codes</b>	<b>Related Fields Processed if received</b>
Refused	A7XX	Out of resources	Association is closed with Remote AE. Appropriate message is displayed to the user.	(0000,0902)

Error	A9XX	Data Set does not match SOP Class	General Warning message is logged. Association is not closed with Remote AE. Error message is displayed to the user.	(0000,0901) (0000,0902)
	CXXX	Cannot Understand	General Warning message is logged. Association is not closed with Remote AE. Error message is displayed to the user.	(0000,0901) (0000,0902)
Warning	B000	Coercion of Data Elements	General Warning message is logged. Association is not closed.	(0000,0901) (0000,0902)
	B007	Data Set does not match SOP Class	General Warning message is logged. Association is not closed.	(0000,0901) (0000,0902)
	B006	Elements Discarded	General Warning message is logged. Association is not closed.	(0000,0901) (0000,0902)
Success	0000			None

### 3.2 Query 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
Study Root Query SOP Class	1.2.840.10008.5.1.4.1.2.2.1

#### 3.2.1 Association Initiation Policy

The Query AE will initiate an association when the WorkList interface is opened or the Query button is clicked.

3.2.1.1 Real -World Activity

3.2.1.1.1 Associated Really-World Activity

The DICOM Query AE initiates an association for the user to query a remote database.

3.2.2.1.2 Proposed Presentation Context Table

<b>Presentation Context Table – Proposed</b>					
<b>Abstract Syntax</b>		<b>Transfer Syntax</b>		<b>Role</b>	<b>Extended Negotiation</b>
<b>Name</b>	<b>UID</b>	<b>Name List</b>	<b>UID List</b>		
Modality Worklist SOP Class	1.2.840.10008.5.1.4.31	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

The following table contains the keys contained in the C-FIND Request.

<b>Name</b>	<b>Tag</b>	<b>Type</b>	<b>VR</b>
Patient's Name	0010,0010	2	PN
Patient ID	0010,0020	2	LO
Patient's Birth Date	0010,0030	2	DA
Patient's Sex	0010,0040	2	CS
Scheduled Procedure Study Date	0040,0002	2	DA
Scheduled Procedure Study Time	0040,0003	2	TM
Accession Number	0008,0050	2	SH
Modality	0008,0060	1	CS

The following Status tables contain the status codes when receiving messages from a Query SCP:

<b>Service Status</b>	<b>Status Codes</b>	<b>Further Meaning</b>	<b>Application Behavior When receiving Status Codes</b>	<b>Related Fields Processed if received</b>

Refused	A700	Out of resources	Association is closed. Appropriate message is displayed to the user.	(0000,0902)
Failed	A900	Identifier does not match SOP Class	Association is closed. Error message is displayed to the user.	(0000,0901) (0000,0902)
	Cxxx	Unable to process	Association is closed. Error message is displayed to the user.	(0000,0901) (0000,0902)
Cancel	FE00	Matching terminated due to cancellation	Association is closed. Error message is displayed to the user.	None
Success	0000	Matching is complete - No final identifier is supplied		None
Pending	FF00	Matches are continuing-Current Match is supplied and any Optional Keys are supported in the same manner as Required Keys.		Identifier
	FF01	Matches are continuing -Warning that one or more Optional Keys were not supported for existence and/or matching for this Identifier		Identifier

### 3.3 Printer 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
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9

### 3.3.1 Association Establishment Policy

#### 3.3.1.1 General

The maximum length PDU for the DICOM Printer SCU is: 16384

#### 3.3.1.2 Number of Associations

DICOM Printer SCU AE can receive only one association at one time.

#### 3.3.1.3 Asynchronous Nature

DICOM Printer SCU AE does not support asynchronous mode. All operations will be performed synchronously.

#### 3.3.1.4 Implementation Identify Information

Implementation Version Name: “WHALE Beluga v2.0”

Implementation Class UID: 1.2.156.8772657669.7145658277

### 3.3.2 Association Initiation Policy

The Printer AE will initiate an association when you click the print button in user interface.

#### 3.3.2.1 Real -World Activity

##### 3.3.2.1.1 Associated Really-World Activity

The DICOM Printer AE initiates an association for the user to print image.

##### 3.3.2.1.2 Proposed Presentation Context Table

Presentation Context Table – Proposed					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID List		

		<b>List</b>			
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5 .1.1.9	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

### 3.3.2.1.3 SOP Specific Conformance to Basic Grayscale Print Management Meta SOP Class

The following Module Attribute tables contain the supported elements for each module in the Module table above.

<b>Name</b>	<b>Tag</b>	<b>VR</b>	<b>Usage SCU/SCP</b>
Number of Copies	2000,0010	IS	U/M
Print Priority	2000,0020	CS	U/M
Annotation Display Format ID	2010,0030	CS	U/U
Border Density	2010,0100	CS	U/U
Empty Image Density	2010,0110	CS	U/U
Film Orientation	2010,0040	CS	U/M“PORTRAIT”
Film Size ID	2010,0050	CS	U/M
Image Display Format	2010,0010	ST	M/M
Magnification Type	2010,0060	ST	U/M
Referenced SOP Class UID	0008,1150	UI	M/M
Referenced SOP Instance UID	0008,1155	UI	M/M
Image Position	2020,0010	US	M/M
Pixel Data	7FE0,0010	OW/OB	M/M

## **4 Communication Profile**

### **4.1 Supported Communication Stacks**

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

### **4.2 Physical Media Support**

The product is provided with a 1000 Mb/s auto-sensing Ethernet interface.

## **5 Extensions / specializations / privatizations**

Not use

## **6 Configuration**

### **6.1 AE Title/Presentation Address Mapping**

The default local AE Title is “WHALE” and is user configurable.

The modality is DXW and is not user configurable.

### **6.2 Configurable Parameters**

The user can change the following configuration in the DICOM setup interface.

- AE Title
- DICOM Port Number
- IP Address
- Film Size
- Image Layout

The user can specify the following Query keys.

- Patient Name

- Patient ID
- Study Time
- Modality

## **7 Support of the Extended Character Sets**

All applications will support only the ISO\_IR 100 as extended characteristic sets. Any incoming SOP instance that is encoded using another extended character set will not be validating.