

外科用X線テレビジョン装置 WHA-200

OPESCOPE PLENO
DICOM Conformormance Statement

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DICOM 3.0 Conformance Statement for WHA-200 Pleno

0.0 Revision History:

Revision	Date	Description
-	2004/02/23	New Release
A	2007/12/18	Add Modality Worklist

1.0 Purpose:

Define the DICOM Conformance statement associated with WHA-200.

2.0 Scope:

This document describes the DICOM Conformance statement in accordance with the document DICOM PS 3.2 Conformance.

3.0 References:

DICOM PS 3.2 Conformance
DICOM PS 3.3 Information Object Definitions
DICOM PS 3.4 Service Class Specifications
DICOM PS 3.5 Data Structures and Encoding
DICOM PS 3.6 Data Dictionary
DICOM PS 3.7 Message Exchange
DICOM PS 3.8 Network Communication Support for Message Exchange

4.0 Equipment/Materials:

N/A

5.0 Responsibilities:

N/A

6.0 Definitions:

AE – Application Entity
IOD – Information Object Definition
SCU – Service Class User
SCP – Service Class Provider
SOP – Service Object Pair
UID – Unique Identifier

7.0 Instructions:

The rest of this document is written in the format specified for DICOM Conformance statements in the DICOM PS 3.2 Conformance standard document.

8.0 Introduction

This conformance statement details the WHA-200 Pleno's compliance to DICOM 3.0. It covers all service class roles that are supported by this product:

Storage Service Class (SCU) roles
Verification Service Class (SCU) roles
Basic Grayscale Print Management Class (SCU) roles

8.1 Implementation Model

DICOM capabilities of the WHA-200 Pleno include:

The WHA-200 Pleno can send images to a remote AE by initiating the DICOM C-STORE request as a SCU.

The WHA-200 Pleno supports the DICOM Verification operation as an SCU.

The WHA-200 Pleno can send images to a DICOM Print Server AE by utilizing the services of the Basic Grayscale Print Management Meta SOP Class as an SCU.

The WHA-200 Pleno can query DICOM Modality Worklist SCP systems for patient information using the Modality Worklist Management Service Class as an SCU.

8.1.1 Application Data Flow Diagrams

See figures 8.1.1-1, 8.1.1-2, and 8.1.1-3

Figure 8.1.1-1 Storage SCU

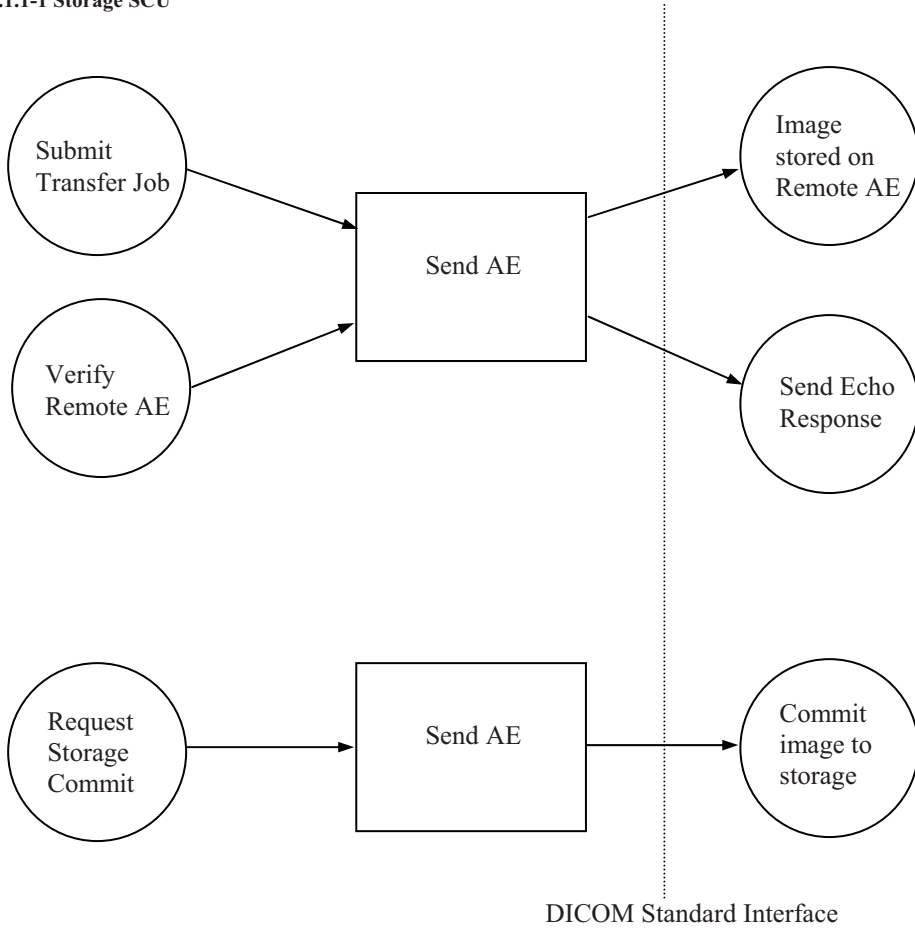


Figure 8.1.1-2 Print SCU

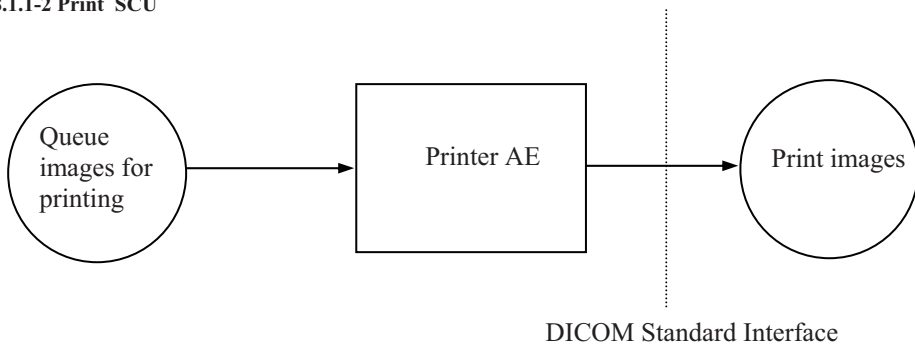
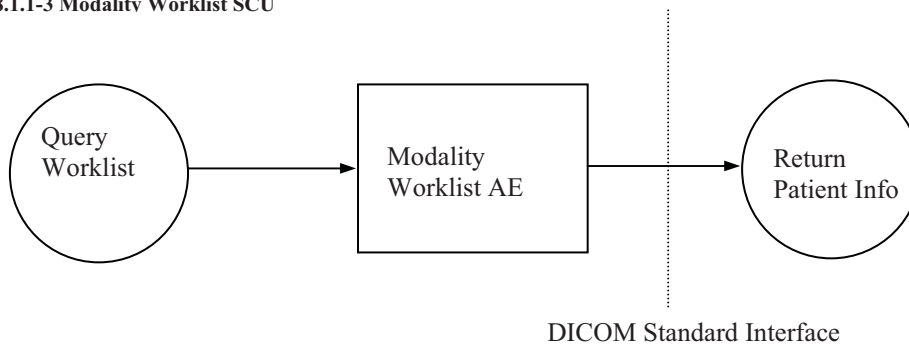


Figure 8.1.1-3 Modality Worklist SCU



8.1.2 Functional definition of Aes

Send AE:

The Send AE initiates an association with a remote AE and acts as a SCU of the Storage Service Class to store images on a remote AE that acts as a SCP of the Storage Service Class.

When the image transfer is completed, the send function waits for the DIMSE-C-STORE Response from the receiving AE to indicate the status of the transfer (success or fail).

When the Send AE system initiates the DICOM Echo Request, it first proposes an Association with the Verification Class Presentation Context. When the DICOM Association Accept message is received, the system sends the DIMSE-C-ECHO Request message to initiate the Verification function on the receiving AE. The status of the Verification response (success or fail) is displayed.

Print AE:

The Print AE initiates an Association with a user selected remote Print AE and acts as a SCU of the Basic Grayscale Print Management Service Class. When all of the images for a particular Film Session have been transferred, the Association is closed.

If the remote printer SCP supports the Print Job service then the Print AE can monitor the status of the Print Job on the remote printer SCP.

Modality Worklist AE:

The Modality Worklist AE initiates an Association with a user selected remote Worklist AE and acts as a SCU of the Modality Worklist Management Service Class. The Modality Worklist AE sends a C-FIND request based on parameters set by the user. The user can configure the Modality Worklist AE to query for any/all modalities supported by the local system. The user can configure the Worklist to query for exams scheduled for any AE configured in the system as a Worklist SCU. One request is sent for each modality/AE title pair configured by the user.

8.1.3 Sequencing of Real World Activities

NA

8.2 AE Specifications

8.2.1 Send AE - Specification

The Send AE provides Standard Conformance to the following DICOM V3.0 SOP Classes as a SCU:

SOP Class Name	SOP Class UID
Verification SOP Class	1.2.840.10008.1.1
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
X-Ray Angiographic Image Store	1.2.840.10008.5.1.4.1.1.12.1
X-Ray RF Image Store	1.2.840.10008.5.1.4.1.1.12.2

8.2.1.1 Association establishment policies

8.2.1.1.1 General

The DICOM Application Context name is 1.2.840.10008.3.1.1.1

The AE Title of the Send AE is a configurable parameter. The default title is "OEM_StoreSCU".

The Send AE establishes an association whenever a transfer job comes to the top of the transfer queue.

The Send AE establishes an association whenever the user attempts to verify the DICOM connection with a remote AE.

The maximum PDU size is 30720 bytes.

8.2.1.1.2 Number of Associations

The Send AE attempts only one Association establishment at a time.

8.2.1.1.3 Asynchronous nature

The Send AE does not perform asynchronous operations.

8.2.1.1.4 Implementation Identifying Information

The Send AE provides a single Implementation Class UID which is "1.2.840.113698.7.1".

8.2.1.2 Association initiation policy

The Send AE initiates a new association for the DIMSE-C-STORE service operation for each transfer job that comes to the top of the job queue.

The Send AE initiates a new association for the DIMSE-C-ECHO service operation.

8.2.1.2.1 Transfer Image Object to a Remote AE

8.2.1.2.1.1 Associated Real-World Activity – Queue image(s) for transfer to remote AE

The associated Real-World activity is a C-Store Request initiated by the Send AE when a transfer job comes to the top of the job queue. A transfer job is created by the user selecting an image or group of images to be sent to a remote AE.

8.2.1.2.1.2 Proposed presentation contexts

The Send AE proposes Presentation Contexts as shown in [table 8.2.1.2.1.2-1](#).

The receiving AE returns which Presentation Contexts it supports in the Association Accept message.

The Secondary Capture Abstract Syntax will only be used if the receiving AE does not support any of the other proposed Abstract Syntaxes. In this case, only the modules defined for the SC IOD in [Annex A](#) will be supported.

Table 8.2.1.2.1.2-1 Proposed Presentation Contexts for Send AE

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Secondary Capture Image Store	1.2.840.10008.5.1.4.1.1.7	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
X-Ray Angiographic Image Store	1.2.840.10008.5.1.4.1.1.12.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
X-Ray RF Image Store	1.2.840.10008.5.1.4.1.1.12.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Verification Service Class	1.2.840.10008.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

8.2.1.2.1.2.1 SOP Specific Conformance

When a successful response to a C-STORE operation is received, the status display is updated to indicate that the next image in the transfer job is being transferred.

If an Association request fails or if a Failed, Refused or Warning response to a C-STORE operation is received then the currently active transfer job is aborted from the Active transfer queue and moved to the Inactive queue.

Extended negotiation is not supported.

See [Annex A](#) for a description of the IOD modules supported.

8.2.1.2.2 Send Echo Request to Remote AE

8.2.1.2.2.1 Associated Real-World Activity - Verify DICOM connection with remote AE

The associated Real-World activity is a C-Echo Request initiated by the user to determine if a remote DICOM AE is responding.

8.2.1.2.2.2 Proposed presentation contexts

The Send AE proposes a Presentation Context as shown in [table 8.2.1.2.1.2-1](#).

8.2.1.2.2.2.1 SOP Specific Conformance

The Send AE provides standard conformance to the DICOM Verification Service Class as a SCU.

8.2.1.3 Association acceptance policy

The Send AE never accepts associations.

8.2.2 Print AE - Specification

The Print AE provides Standard Conformance to the following DICOM V3.0 SOP Classes as a SCU:

SOP Class Name	SOP Class UID
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9
Basic Film Session	1.2.840.10008.5.1.1.1
Basic Film Box	1.2.840.10008.5.1.1.2
Basic Grayscale Image Box	1.2.840.10008.5.1.1.4
Printer	1.2.840.10008.5.1.1.16
Presentation LUT	1.2.840.10008.5.1.1.23
Verification Service Class	1.2.840.10008.1.1
Print Job	1.2.840.10008.5.1.1.14

8.2.2.1 Association establishment policies

8.2.2.1.1 General

The DICOM Application Context name is 1.2.840.10008.3.1.1.1

The AE Title of the Print AE is a configurable parameter. The default title is “OEM_PrintSCU”.

The Print AE establishes an association whenever a local print job comes to the top of the print queue.

The Print AE establishes an association to define a Presentation LUT for a Printer SCP.

The Print AE establishes an association whenever the user attempts to verify the DICOM connection with a remote printer AE.

The maximum PDU size is 30720 bytes.

8.2.2.1.2 Number of Associations

The Print AE can have multiple associations open at a time:

1. One for the Basic Grayscale Print Management service.
2. One for the Presentation LUT service.
3. Multiple associations for the Verification service.

8.2.2.1.3 Asynchronous nature

The Print AE does not perform asynchronous operations.

8.2.2.1.4 Implementation Identifying Information

The Print AE provides a single Implementation Class UID which is “1.2.840.113698.7.1”.

8.2.2.2 Association initiation policy

The Print AE initiates a new association for the Print Service Class whenever a print job reaches the top of the print queue. The Association is closed when all of the images from the print job have been sent to the Print Server.

8.2.2.2.1 Print Image

8.2.2.2.1.1 Associated Real-World Activity – Queue images for printing

The user creates a local print job by selecting individual images or a group of images to be printed. When the local print job comes to the top of the print queue an Association Request is made. Once the Print Image Association has been established, the Print AE sends a Basic Film Session N_CREATE message to the Basic Print SCP. This is followed by a Basic Film Box N_CREATE message. The Print AE then sends a Basic Grayscale Image Box N_SET message. Finally, an N_ACTION message is sent to print images at the Basic Film Box level.

8.2.2.2.1.2 Proposed presentation contexts

The Presentation Contexts proposed by the Print AE are defined in [table 8.2.3.2.1.2-1](#).

Table 8.2.2.2.1.2-1 Proposed Presentation Contexts for Print AE

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Basic Grayscale Print Management (META)	1.2.840.10008.5.1.1.9	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Presentation LUT	1.2.840.10008.5.1.1.23	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Verification Service Class	1.2.840.10008.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Print Job	1.2.840.10008.5.1.1.14	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

8.2.2.2.1.2.1 SOP Specific Conformance

See [Annex B](#) for a description of the attribute values for SOP Classes proposed by the Print AE.

As individual images from the local print job are transferred to the Printer SCP the status display is updated to indicate how many images have been transferred.

If the Print Job service is supported then the Print AE can monitor the remote Print Job status and the local print job will not be removed from the print queue until a Success or Failed notification is received from the Printer SCP.

If the Print Job service is not supported then the local print job is considered completed when all of the images in the job have been transferred to the Printer SCP.

Extended negotiation is not supported.

8.2.2.2.2 Define Presentation LUT

8.2.2.2.2.1 Associated Real-World Activity – Select a Presentation LUT for a remote printer

The user can define a Presentation LUT that can be applied to images that are sent to the same Print AE SCP. Once the Association has been established, the Print AE sends a Presentation LUT N_CREATE message to the Basic Print SCP.

8.2.2.2.2.2 Proposed presentation contexts

The Presentation Contexts proposed by the Print AE are defined in [table 8.2.3.2.1.2-1](#).

8.2.2.2.2.2.1 SOP Specific Conformance

The Print AE provides standard conformance to the DICOM Presentation LUT Service Class as a SCU.

8.2.2.2.3 Send Echo Request to Remote Printer AE

8.2.2.2.3.1 Associated Real-World Activity – Verify DICOM connection with remote AE

The associated Real-World activity is a C-Echo Request initiated by the user to determine if a remote DICOM Printer AE is responding.

8.2.2.2.3.2 Proposed presentation contexts

The Presentation Contexts proposed by the Print AE are defined in [table 8.2.3.2.1.2-1](#).

8.2.2.2.3.2.1 SOP Specific Conformance

The Print AE provides standard conformance to the DICOM Verification Service Class as a SCU.

The status of a C-ECHO request message is displayed (SUCCESS or FAIL).

8.2.2.3 Association acceptance policy

The Print AE never accepts associations.

8.2.3 Modality Worklist AE - Specification

The Modality Worklist AE provides Standard Conformance to the following DICOM V3.0 SOP Classes as a SCU:

SOP Class Name	SOP Class UID
Modality Worklist Find	1.2.840.10008.5.1.4.31
Verification SOP Class	1.2.840.10008.1.1

8.2.3.1 Association establishment policies

8.2.3.1.1 General

The DICOM Application Context name is 1.2.840.10008.3.1.1.1

The AE Title of the Modality Worklist AE is a configurable parameter. The default title is “OEM_WorklistSCU”.

The Modality Worklist AE establishes associations under the following conditions:

1. When the user initiates a manual query.
2. Periodically, as set up in the Auto Query configuration
3. When the user attempts to verify the DICOM connection with a remote Worklist AE

The maximum PDU size is 30720 bytes.

8.2.3.1.2 Number of Associations

The Modality Worklist AE can have multiple Associations open at one time:

1. One association establishment for each SCP configured for automatic query, and one additional association if/when the user initiates a manual query.
2. One association to initiate a Verification Service Echo request.

8.2.3.1.3 Asynchronous nature

The Modality Worklist AE does not perform asynchronous operations.

8.2.3.1.4 Implementation Identifying Information

The Modality Worklist AE provides a single Implementation Class UID which is “1.2.840.113698.7.1”.

8.2.3.2 Association initiation policy

The Modality Worklist AE initiates a new association for the Worklist Management Class for each query session. A query session is defined as a group of queries required to completely satisfy the input from the user. The Association is closed when all of the results from the query session have been received.

The Modality Worklist AE initiates a new association to verify a DICOM connection with a remote Worklist AE when the user selects the verify option for the remote AE.

8.2.3.2.1 Worklist Query Operations

The Modality Worklist AE initiates associations to perform C-FINDs and Performed Procedure Step notifications. The association is closed after an error or when the initiator requests that it be closed.

8.2.3.2.1.1 Associated Real-World Activity – Query for Scheduled Procedure information

Once the Worklist Query association has been established, the Modality Worklist AE sends a series of Worklist C-FIND messages to the Worklist SCP. One C-FIND message is sent for each Modality selected by the user. One C-FIND message is also sent for each AE title selected by the user. After each C-FIND message is sent, the Modality Worklist AE waits for a C-FIND response from the SCP. If the total number of records received during the active association exceeds the maximum limit set by the user, a C-CANCEL-FIND message is sent to the SCP. Response messages are read in until a C-FIND response of Success is received. After receiving the C-FIND [Success] response, the Modality Worklist AE will send a C-FIND message for the next modality/AE Title pair. This sequence continues until all modality/AE Title pairs are queried, at which time the association is closed.

8.2.3.2.1.2 Proposed presentation contexts

The Presentation Contexts proposed by the Modality Worklist AE are defined in [table 8.2.4.2.1.2-1](#).

Table 8.2.3.2.1.2-1 Proposed Presentation Contexts for Modality Worklist AE

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Modality Worklist Find	1.2.840.10008.5.1.4.31	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Verification Service Class	1.2.840.10008.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

8.2.3.2.1.2.1 SOP Specific Conformance

The Modality Worklist AE provides standard conformance to the DICOM Modality Worklist Find Service Class as a SCU.

See Annex D for a description of the attribute values for the Modality Worklist Find operation proposed by the Modality Worklist AE.

Extended negotiation is not supported.

8.2.3.3 Association acceptance policy

The Modality Worklist AE never accepts associations.

8.3 Network Communication Profiles

8.3.1 Supported Communication Stacks

The WHA-200 Pleno system provides DICOM V3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard (PS 3.8).

8.3.2 OSI Stack

No OSI Stack communications are provided.

8.3.3 TCP/IP Stack

The WHA-200 Pleno system supports the TCP/IP stack.

8.3.3.2 Physical media support

The WHA-200 Pleno system is indifferent to the physical medium over which TCP/IP executes.

8.3.4 Point-to-Point Stack

No Point-to-Point Stack communications are provided.

8.4 Extensions/Specializations/Privatizations

The Storage AE (SendAE) support private attributes as defined in Annex C.

8.5 Configuration

The WHA-200 Pleno system obtains its configuration information from the following files:

merge.ini - Identifies the other three configuration files.

mergecom.pro - Defines run-time parameters.

mergecom.app - Defines services on remote AEs to which connections are possible.

mergecom.srv - Service and sequence definitions.

8.5.1 AE title/presentation address mapping

The presentation address mapping is defined in the 'mergecom.app' file. The destination AE title, host name, listen port and service list for each remote AE that the WHA-200 Pleno can connect to are defined in this file. The mapping of the hostname to an IP address is defined in the 'hosts' file.

8.5.2 Configurable Parameters

The following parameters may be configured:

In the 'mergecom.app' file:

1. Local AE Titles
2. Station name
3. Media storage File-Set ID
4. Remote AEs:
 - a. AE Title
 - b. Hostname
 - c. Port number

In the 'mergecom.pro' file:

1. Timeouts
 - a. Wait for Association request timeout
 - b. Wait for Association reply timeout
 - c. Wait for Association release timeout
 - d. Network write timeout
 - e. Network connect timeout
 - f. Network inactivity timeout
2. Maximum PDU size

In the 'hosts' file:

1. IP Addresses of remote AEs

The local network address, netmask and gateway are configured via the standard Windows Network configuration utility.

8.6 Support of Extended Character Sets

The WHA-200 Pleno supports the ISO_IR 100 Character set.

ANNEX A – DICOM Data Elements Supported

MODULES COMMON TO SC, XA and RF IODs

Patient Module			PS3.3 section C.7.1.1
Attribute Name	Tag	Type	Description
Patient's name	0010,0010	2	Patient's full legal name Value is loaded from a worklist, or entered by the user when creating or editing a patient list using the 'New' button or the 'Edit' button.
Patient ID	0010,0020	2	Primary hospital ID number or code for the patient. Value is loaded from a worklist, or entered by the user when creating or editing a patient list using the 'New' button or the 'Edit' button.
Patient's birth date	0010,0030	2	Birth date of patient Value is loaded from a worklist, or entered by the user when creating or editing a patient list using the 'New' button or the 'Edit' button.
Patient's sex	0010,0040	2	Sex of patient Value is loaded from a worklist, or entered by the user when creating or editing a patient list using the 'New' button or the 'Edit' button.

General Study Module			PS3.3 section C.7.2.1
Attribute Name	Tag	Type	Description
Study Instance UID	0020,000D	1	Unique identifier for study Value is loaded from worklist or generated by system when study is created.
Study Date	0008,0020	2	Date the Study started Value is loaded from worklist '(0040,0002) Scheduled Procedure Step Start date' or generated by system.
Study Time	0008,0030	2	Time the Study started Value is loaded from worklist '(0040,0003) Scheduled Procedure Step Start time' or generated by system.
Referring Physician's name	0008,0090	2	Patient's referring physician Value is loaded from a worklist.
Study ID	0020,0010	2	User or equipment generated Study Identifier
Accession Number	0008,0050	2	A RIS generated study number Value is loaded from a worklist, or entered by the user when creating or editing a patient list using the 'New' button or the 'Edit' button.
Study Description	0008,1030	3	User defined description of the Study
Physician of Record	0008,1048	3	Physician responsible for patient care at time of Study

Patient Study Module PS3.3 section C.7.2.2			
Attribute Name	Tag	Type	Description
Patient's Age	0010,1010	3	Age of the patient
Patient's Size	0010,1020	3	Height in meters
Patient's Weight	0010,1030	3	Weight in kilograms Value is loaded from worklist.
Occupation	0010,2180	3	Occupation of the Patient.

General Series Module PS3.3 section C.7.3.1			
Attribute Name	Tag	Type	Description
Modality	0008,0060	1	Type of equipment that acquired image data (XA) Value is loaded from worklist (RF or XA)
Series instance UID	0020,000E	1	Unique identifier of the Series
Series number	0020,0011	2	A number that identifies this Series
Laterality	0020,0060	2C	Laterality of (paired) body part examined
Series Date	0008,0021	3	Date the Series started
Series Time	0008,0031	3	Time the Series started
Performing physician's name	0008,1050	3	Name of physician administering the Series
Protocol Name	0018,1030	3	User defined description of conditions under which Series was performed
Series Description	0008,103E	3	User defined description of Series
Operator's Name	0008,1070	3	Technologist(s) supporting the Series
Body Part Examined	0018,0015	3	Text description of the part of the body examined
Patient Position	0018,5100	3	Patient position descriptor relative to the Equipment
Requested Procedure ID	0040,1001	3	ID of the Requested Procedure in the Imaging Service Request
Scheduled Procedure Step ID	0040,0009	3	ID of the Scheduled Procedure Step
Performed Procedure Step ID	0040,0253	3	ID of that part of a Procedure that has been carried out within this step

General Equipment Module PS3.3 section C.7.5.1			
Attribute Name	Tag	Type	Description
Manufacturer	0008,0070	2	Manufacturer of equipment that produced images
Institution name	0008,0080	3	Institution where equipment that produced images is located
Institution Address	0008,0081	3	Mailing address of the institution where the equipment is located that produced the digital images
Station name	0008,1010	3	User defined name identifying the machine that produced the images
Manufacturer's model name	0008,1090	3	Manufacturer's model number of the equipment that produced the images
Device Serial Number	0018,1000	3	Manufacturer's serial number of the equipment that produced the digital images
Software version	0018,1020	3	Manufacturer's designation of software version of equipment that produced images

General Image Module			PS3.3 section C.7.6.1
Attribute Name	Tag	Type	Description
Image (instance) number	0020,0013	2	A number that identifies the image
Patient Orientation	0020,0020	2C	Patient direction of the rows and columns of the image
Image (content) date	0008,0023	2C	Date the image pixel data creation started
Image (content) time	0008,0033	2C	Time the image pixel data creation started
Image type	0008,0008	3	See IOD specific Image Module
Acquisition Number	0020,0012	3	A number identifying the single continuous gathering of data over a period of time which resulted in this image
Acquisition Date	0008,0022	3	The date the acquisition of data that resulted in this image started
Acquisition Time	0008,0032	3	The time the acquisition of data that resulted in this image started
Images in Acquisition	0020,1002	3	Number of images that resulted from this acquisition of data
Image comments	0020,4000	3	User defined comments about image
Lossy Image Compression	0028,2110	3	Specifies whether an image has undergone lossy compression

Image Pixel Module			PS3.3 section C.7.6.3
Attribute Name	Tag	Type	Description
Samples per pixel	0028,0002	1	Number of samples (planes) in this image (1)
Photometric interpretation	0028,0004	1	Specifies the intended interpretation of the pixel data (MONOCHROME2)
Rows	0028,0010	1	Number of rows in image (512 or 1024)
Columns	0028,0011	1	Number of columns in image (512 or 1024)
Bits allocated	0028,0100	1	See IOD Image Module
Bits stored	0028,0101	1	See IOD Image Module
High bit	0028,0102	1	See IOD Image Module
Pixel representation	0028,0103	1	See IOD Image Module
Pixel data	7FE0,0010	1	Data stream of pixel samples which comprise the image

Modality LUT Module (Optional)			PS3.3 section C.11.1
Attribute Name	Tag	Type	Description
Modality LUT Sequence	0028,3000	1C	Sequence of Modality LUTs (Not present if Rescale Intercept (0028,1052) is present)
> LUT Descriptor	0028,3002	1C	Format of LUT Data in Sequence
> LUT Explanation	0028,3003	3	Free Form Text
> LUT Type	0028,3004	1C	Specifies output values of this Modality LUT
> LUT Data	0028,3006	1C	LUT Data (Mapping of pixel value to pixel intensity)
Rescale Intercept	0028,1052	1C	Required if Modality LUT sequence is not present.
Rescale Slope	0028,1053	1C	Required if Rescale Intercept is present.
Rescale Type	0028,1054	1C	Required if Rescale Intercept is present.

VOI LUT Module (Optional)		PS3.3 section C.11.2	
Attribute Name	Tag	Type	Description
Window center	0028,1050	3	Window center for display. (512)
Window width	0028,1051	1C	Window width for display. Required if Window center (0028,1050) is sent. (1024)
VOI LUT Sequence	0028,3010	3	Sequence of VOI LUT
> LUT Descriptor	0028,3002	1C	Format of LUT Data in Sequence
> LUT Explanation	0028,3003	3	Free Form Text
> LUT Data	0028,3006	1C	LUT Data (Mapping of pixel value to pixel intensity)

MODULES COMMON TO XA and RF IODs

Contrast/Bolus Module (Conditional) PS3.3 section C.7.6.4			
Required if contrast media used in this image			
Attribute Name	Tag	Type	Description
Contras/Bolus agent	0018,0010	2	Contrast or bolus agent

CINE Module (Conditional) PS3.3 section C.7.6.5			
Required if pixel data is Multi-Frame Cine data			
Attribute Name	Tag	Type	Description
Frame time	0018,1063	1C	Nominal time (msec) per individual frame. Required if Frame Increment Pointer (0028,0009) points to Frame Time.
Frame time vector	0018,1065	1C	An array which contains the real time increments (msec) between frames for a Multi-frame image. Required if Frame Increment Pointer (0028,0009) points to Frame Time Vector.
Cine Rate	0018,0040	3	Number of frames per second

Multi-Frame Module (Conditional) PS3.3 section C.7.6.6			
Required if pixel data is Multi-Frame Cine data			
Attribute Name	Tag	Type	Description
Number of frames	0028,0008	1	Number of frames in a Multi-frame image
Frame increment pointer	0028,0009	1	Contains the Data Element Tag of the attribute which is used as the frame increment in Multi-frame pixel data.

Mask Module (Conditional) PS3.3 section C.7.6.10			
Required if image may be subtracted			
Attribute Name	Tag	Type	Description
Mask Subtraction Sequence	0028,6100	1	Defines a sequence which describe mask subtraction operations for a multi-frame image.
>Mask Operation	0028,6101	1	Identify the type of mask operation to be performed (“AVG_SUB”).
>Mask Frame Numbers	0028,6110	1C	Specifies the frame numbers of the pixel data used to generate the mask.
Recommended Viewing Mode	0028,1090	2	Specifies recommended viewing protocols (“SUB”)

X-Ray Image Module		PS3.3 section C.8.7.1	
Attribute Name	Tag	Type	Description
Frame increment pointer	0028,0009	1C	Required if Multi-frame image. Contains Data Element Tag of the attribute which is used as the Frame increment in Multi-frame image pixel data
Image type	0008,0008	1	Image identification characteristics
Pixel intensity relationship	0028,1040	1	The relationship between the pixel sample values and the X-Ray beam intensity.
Samples per pixel	0028,0002	1	Number of samples (planes) in the image (1)
Photometric interpretation	0028,0004	1	Specifies the intended interpretation of the pixel data (MONOCHROME2)
Bits allocated	0028,0100	1	Number of bits allocated for each pixel sample (8 or 16)
Bits stored	0028,0101	1	Number of bits stored for each pixel sample (8 or 10)
High bit	0028,0102	1	Most significant bit for pixel sample data (7 or 9)
Pixel representation	0028,0103	1	Data representation of the pixel samples (0)

X-Ray Acquisition Module		PS3.3 section C.8.7.2	
Attribute Name	Tag	Type	Description
KVP	0018,0060	2	Peak kilo voltage output of the X-Ray generator used
Tube Current	0018,1151	2C	X-Ray Tube Current in mA
Exposure	0018,1152	2C	The product of exposure time and X-Ray tube current expressed in mAs. Required if either Exposure Time (0018,1150) or X-Ray Tube Current (0018,1151) are not present.
Radiation setting	0018,1155	1	Identify the general level of X-Ray dose exposure
Intensifier Size	0018,1162	3	Diameter of X-ray intensifier in mm

Display Shutter Module (Optional)		PS3.3 section C.7.6.11	
Attribute Name	Tag	Type	Description
Shutter shape	0018,1600	1	Shape of the shutter defined for display (CIRCULAR)
Center of circular shutter	0018,1610	1C	Required if shutter shape is CIRCULAR
Radius of circular shutter	0018,1612	1C	Required if shutter shape is CIRCULAR

X-Ray Collimator Module (Optional)		PS3.3 section C.8.7.3	
Attribute Name	Tag	Type	Description
Collimator shape	0018,1700	1	Shape of collimator (RECTANGULAR or POLYGONAL)
Collimator left vertical edge	0018,1702	1C	Required if collimator shape is RECTANGULAR
Collimator right vertical edge	0018,1704	1C	Required if collimator shape is RECTANGULAR
Collimator upper horizontal edge	0018,1706	1C	Required if collimator shape is RECTANGULAR
Collimator lower horizontal edge	0018,1708	1C	Required if collimator shape is RECTANGULAR
Vertices of polygonal shutter	0018,1720	1C	Required if collimator shape is POLYGONAL

SECONDARY CAPTURE IOD

Image Pixel Module		PS3.3 section C.7.6.3	
Attribute Name	Tag	Type	Description
Bits allocated	0028,0100	1	Number of bits allocated for each pixel sample
Bits stored	0028,0101	1	Number of bits stored for each pixel sample
High bit	0028,0102	1	Most significant bit for pixel sample data
Pixel representation	0028,0103	1	Data representation of the pixel samples (0)

SC Image Module		PS3.3 section C.8.6.2	
Attribute Name	Tag	Type	Description
Date of secondary capture	0018,1012	3	Date image was acquired
Time of secondary capture	0018,1014	3	Time image was acquired

SOP Common Module		PS3.3 section C.12.1	
Attribute Name	Tag	Description	
SOP class UID	0008,0016	Uniquely identifies the SOP class Secondary Capture Image Storage "1.2.840.10008.5.1.4.1.1.7"	
SOP instance UID	0008,0018	Uniquely identifies the SOP instance	

X-Ray XA IOD

X-Ray Table Module (Conditional)		PS3.3 section C.8.7.4	
Required if image is created with table motion			
Attribute Name	Tag	Type	Description
Table motion	0018,1134	2	Is table moving or not

XA Positioner Module		PS3.3 section C.8.7.7	
Attribute Name	Tag	Type	Description
Distance Source to Detector	0018,1110	3	Distance in mm from source to isocenter
Distance Source to Patient	0018,1111	3	Distance in mm from source to detector center
Positioner motion	0018,1500	2C	Used to describe activity of imaging device
Positioner primary angle	0018,1510	2	Position of the X-Ray image intensifier about the patient from the RAO to LAO direction
Positioner secondary angle	0018,1511	2	Position of the X-Ray image intensifier about the patient from the CAU to CRA direction

SOP Common Module		PS3.3 section C.12.1	
Attribute Name	Tag	Description	
SOP class UID	0008,0016	Uniquely identifies the SOP class X-Ray Angiographic Image Storage "1.2.840.10008.5.1.4.1.1.12.1"	
SOP instance UID	0008,0018	Uniquely identifies the SOP instance	

X-Ray RF IOD

SOP Common Module		PS3.3 section C.12.1	
Attribute Name	Tag	Description	
SOP class UID	0008,0016	Uniquely identifies the SOP class X-Ray Radiofluoroscopic Image Storage "1.2.840.10008.5.1.4.1.1.12.2"	
SOP instance UID	0008,0018	Uniquely identifies the SOP instance	

ANNEX B - Print AE Attributes

SOP Class Name	Command	Attribute Name	Valid Range	Default Value
Basic Film Session	N_CREATE	Number of Copies	1-99	1
		Print Priority	HIGH, MEDIUM, LOW	
Basic Film Session	N_ACTION	Referenced Print Job Sequence		None
Basic Film Box	N_CREATE	Image Display Format		
		Film Orientation	PORTRAIT, LANDSCAPE	PORTRAIT
		Magnification Type	REPLICATE, BILINEAR	None
		Min Density	Depends on Printer	None
		Max Density	Depends on Printer	None
		Border Density	WHITE, BLACK	BLACK
		Empty Image Density	WHITE, BLACK	BLACK
		Trim	YES, NO	NO
Basic Film Box	N_ACTION	Referenced Print Job Sequence		None
Basic Grayscale Image Box	N_SET	Image Position	1 - 12	Mandatory
		Samples Per Pixel	1	None
		Photometric Interpretation	MONOCHROME 1, MONOCHROME 2	None
		Rows	1024	None
		Columns	1024	None
		Pixel Aspect Ratio	1/1	None
		Bits Allocated	8/16	None
		Bits Stored	8/12	None
		High Bit	7/11	None
		Pixel Representation	0000	None
Printer	N_GET/ N_EVENT_ REPORT	Printer Status		
		Printer Status Info		
		Printer Name		
		Manufacturer		
		Manufacturer Model Name		
		Software Version		

ANNEX C – WHA-200 Pleno Private Attributes

Table C.1 Patient level private attributes

Attribute Name	Tag	VR	VM	Description
Patient UID	1011,1000	UI	1	Unique identifier for Patient record
Miscellaneous text	1011,1002	LO	1-4	Programmable text fields
Equipment ID	1011,1004	UL	1	Orion Acquisition Equipment ID
Acquisition type	1011,1006	UL	1	Orion Acquisition type

Table C.2 Frame attributes

Attribute Name	Tag	VR	VM	Description
Study/Series ID	1021,1000	UL	1	System generated ID
Image/Frame ID	1021,1002	UL	1	System generated ID
Status Flag	1021,1004	UL	1	Frame status attributes
Frame Instance UID	1021,1006	UI	1	Unique identifier for Frame record
Date	1021,1008	DA	1	Date that the frame was acquired
Time	1021,100A	TM	1	Time the the frame was acquired
DateTime	1021,100C	FD	1	Floating point representation of Frame Date/Time
Horizontal pixel shift	1021,100E	FL	1	Sub-pixel shift of frame (column direction)
Vertical pixel shift	1021,1010	FL	1	Sub-pixel shift of frame (row direction)
Min AIO window	1021,1012	UL	1	Auto Image Optimization minimum window value
Max AIO window	1021,1014	UL	1	Auto Image Optimization maximum window value
Avg AIO window	1021,1016	UL	1	Auto Image Optimization average window value
Tag Fields	1021,1018	UL	1	Acquisition system generated bit settings
Original Study/Series ID	1021,101A	UL	1	Acquisition system generated ID
Original Image/Frame ID	1021,101C	UL	1	Acquisition system generated ID
Acquisition Rate	1021,101E	FL	1	Rate at which frame was acquired
Supplemental data sequence	1021,1020	SQ	1	Sequence of supplemental data associated with frame
> Annotation	1021,1022	OB	1	Orion frame annotation information
> Graphic	1021,1024	OB	1	Orion frame graphical information
Positioner Angle	1021,1026	UL	1	Primary positioner angle in 1/10 degrees
Positioner Skew	1021,1028	UL	1	Secondary positioner angle in 1/10 degrees

Table C.3 Acquisition attributes

Attribute Name	Tag	VR	VM	Description
Next available Study ID	1031,1000	UL	1	System generated ID
Next available DMF ID	1031,1002	UL	1	System generated ID
Study ID	1031,1004	UL	1	System generated Study ID
Next available Series ID	1031,1006	UL	1	System generated ID
Acquisition type	1031,1008	UL	1	Orion acquisition type
Series ID	1031,100A	UL	1	System generated Series ID
Next available Image ID	1031,100C	UL	1	System generated ID
Original Study/Series ID	1031,100E	UL	1	System generated Study/Series ID
Image Type	1031,1020	UL	1	System generated image type
Integration level	1031,1022	UL	1	Integration level used for acquisition
Image Study/Series ID	1031,1024	UL	1	System generated Study/Series ID stored with image record
Image/Frame ID	1031,1026	UL	1	System generated Image/Frame ID stored with image record
Image status flags	1031,1028	UL	1	System generated image status bits
Image edge table	1031,102A	UL	1	Identifies edge table used at acquisition
Image landmarking	1031,102C	UL	1	Identifies landmarking used at acquisition
Image flip H/V	1031,102E	UL	1	Identifies Horizontal & Vertical flipping used at acquisition
Image processing default settings	1031,1030	UL	1	Identifies default processing applied to image at acquisition
Image AIO Average goal	1031,1032	UL	1	Auto Image Optimization average goal used during acquisition
Image AIO Maximum goal	1031,1034	UL	1	Auto Image Optimization maximum goal used during acquisition
Image AIO Minimum goal	1031,1036	UL	1	Auto Image Optimization minimum goal used during acquisition
LUT control points	1031,1038	UL	1-8	Control points for display LUT
Original image UID	1031,103A	UI	1	Original UID for image
Digital stepping information	1031,103C	UL	1	Bit settings for digital stepping information
Acquisition Angle	1031,103E	UL	1	Acquisition angle in 1/10 degrees
Acquisition Skew	1031,1040	UL	1	Acquisition skew in 1/10 degrees
APR value	1031,1042	UL	1	Anatomical Programmed Radiology value used at acquisition
APR table version	1031,1044	UL	1	Anatomical Programmed Radiology table version
Associated acquisition ID	1031,1046	UL	1	Loop/Frame ID value of an associated image (e.g. bi-plane images would reference each other)
Rotate degrees	1031,1048	UL	1	Degrees of rotation during acquisition
Patient position	1031,104A	SH	1	Orion code for patient position during acquisition
Procedure description	1031,104C	LO	1	Procedure description for Orion Study record
Magnification Factor	1031,104E	US	1	Magnification factor of acquisition system
Target to image distance	1031,1050	FL	1	Distance from target to imaging plane in millimeters.
Accumulated Dose Area Product	1031,1052	UL	1	Study level attribute related to dosage exposure
Accumulated Dose per Area	1031,1054	UL	1	Study level attribute related to dosage exposure
Body Surface Area	1031,1056	UL	1	Study level attribute related to dosage exposure
Heart Rate	1031,1058	UL	1	Heart rate in Beats per Minute (image level attribute)

Table C.4 Review attributes

Attribute Name	Tag	VR	VM	Description
Shutter type	1041,1000	UL	1	Indicate type of shutter to apply to image (Auto low, Auto med, Auto high, manual)
Polarity	1041,1002	UL	1	Indicate if image is displayed normal or inverted
Edge level	1041,1004	UL	1	Edge enhancement level to apply to image
Zoom level	1041,1006	UL	1	Zoom factor to apply to image (2x, 3x, ...)
Zoom x/y	1041,1008	UL	1	Center point of zoom region (x in high word, y in low word)
Mask Image/Frame ID	1041,100A	UL	1	System generated Image/Frame ID for mask image
Region of Interest	1041,100C	UL	2	Upper/Left and Lower/Right coordinates of ROI
Flip Horizontal/Vertical	1041,100E	UL	1	Indicate flip to apply to image (vertical in high word, horizontal in low word)
Loop Begin/End frames	1041,1020	UL	2	First element is start frame, second element is end frame for loop replay
Supplemental data sequence	1041,1030	SQ	1	Sequence of supplemental data associated with image
> Annotation	1041,1032	OB	1	Orion image annotation information
> Graphic	1041,1034	OB	1	Orion image graphical information
Image description	1041,1036	ST	1	User defined description of image

ANNEX D - Worklist AE Attributes

Table D.1: Type 1 Fields Requested From Provider

DICOM Tag	Description	Field Use
0040,0100	Scheduled Procedure Step Sequence	Sequence
0040,0001	Scheduled Station AE Title	Match
0040,0002	Scheduled Procedure Step Start Date	Match
0040,0003	Scheduled Procedure Step Start Time	Match
0008,0060	Modality	Match
0040,0007	Scheduled Procedure Step Description	Match/Return
0040,0009	Scheduled Procedure Step ID	Match/Return
0040,1001	Requested Procedure ID	Return
0020,000D	Study Instance UID	Return
0010,0010	Patient Name	Match
0010,0020	Patient ID	Match

Table D.2: Type 2 and 3 Fields Requested From Provider*

DICOM Tag	Description	Field Use
0010,0030	Patient's Birth Date	Return
0010,0040	Patient's Sex	Return
0010,1030	Patient's Weight	Return
0040,0006	Scheduled Performing Physician Name	Match/Return
0008,0050	Accession Number	Match
0032,1032	Requesting Physician	Return
0008,0090	Referring Physician	Match/Return