Philips Medical Systems
DICOM Conformance Statement

Integris Systems
with
High Speed DICOM Image Interface MCV 2974
MCV 3621 Cardiac DICOM XA
MCV 3761 Vascular DICOM XA
MCV 3031 DICOM RIS Interface
and
MCV 7011 VISUB DICOM PRINT upgrade

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**Philips
Medical
Systems**

PHILIPS

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1 Introduction

This section provides general information about the scope, intended audience and contents of this Conformance Statement and how to use it.

1.1 Scope and field of application

The scope of this DICOM Conformance Statement is to facilitate data exchange between equipment of Philips Medical Systems and with equipment of other vendors. This document specifies the compliance to the DICOM standard, formally called the NEMA PS 3.X standards. It contains a short description of the applications involved and provides technical information about the data exchange capabilities of the equipment. The main elements describing these capabilities are: the supported DICOM Service Object Pair (SOP) Classes, Roles, Information Object Definitions (IOD), Service Elements and Transfer Syntaxes.

The field of application is the integration of the Philips Medical Systems equipment into an environment of medical devices.
This Conformance Statement should be read in conjunction with the DICOM standard and its addenda. The conformance to the DICOM standard is a key element of the Inturis Programme (see [INTURIS]).

1.2 Intended audience

This Conformance Statement is intended for:
• (potential) clients,
• marketing staff interested in data exchange functionality,
• system integrators and Customer Support Engineers of medical equipment,
• software engineers implementing DICOM interfaces.

It is assumed that the reader is familiar with the DICOM standard.

1.3 Contents and structure

The DICOM Conformance Statement is contained in section 2 through 7 and follows the contents and structuring requirements of DICOM PS 3.2.
Additionally, the sections following 7 (if present) specify the details of the applied IODs and Service Elements.

1.4 Used definitions, terms and abbreviations

DICOM definitions, terms and abbreviations are used throughout this Conformance Statement. For a description of these, see NEMA PS 3.3.
The word Philips in this document refers to Philips Medical Systems.

1.5 References

[DICOM]   The Digital Imaging and Communications in Medicine (DICOM) standard:
             NEMA PS 3.X (X refers to the part 1 - 13)
             National Electrical Manufacturers Association (NEMA) Publication Sales
             1300 N. 17th Street, Suite 1847

Rosslyn, Va. 22209, United States of America

[INTURIS]   Philips Inturis Programme
             Integrated Clinical Solutions
             Philips Medical Systems Nederland B.V. (see address at page ii)

1.6 Important note to the reader

This Conformance Statement by itself does not guarantee successful interoperability of Philips equipment with non-Philips equipment. The user (or user's agent) should be aware of the following issues:

- **Interoperability**
  Interoperability refers to the ability of application functions, distributed over two or more systems, to work successfully together. The integration of medical devices into a networked environment may require application functions that are not specified within the scope of DICOM. Consequently, using only the information provided by this Conformance Statement does not guarantee interoperability of Philips equipment with non-Philips equipment. It is the user's responsibility to analyse thoroughly the application requirements and to specify a solution that integrates Philips equipment with non-Philips equipment.

- **Validation**
  Philips equipment has been carefully tested to assure that the actual implementation of the DICOM interface corresponds with this Conformance Statement.
  Where Philips equipment is linked to non-Philips equipment, the first step is to compare the relevant Conformance Statements. If the Conformance Statements indicate that successful information exchange should be possible, additional validation tests will be necessary to ensure the functionality, performance, accuracy and stability of image and image related data. It is the responsibility of the user (or user's agent) to specify the appropriate test suite and to carry out the additional validation tests.

- **New versions of the DICOM Standard**
  The DICOM Standard will evolve in future to meet the user's growing requirements and to incorporate new features and technologies. Philips is actively involved in this evolution and plans to adapt its equipment to future versions of the DICOM Standard. In order to do so, Philips reserves the right to make changes to its products or to discontinue its delivery.
  The user should ensure that any non-Philips provider linking to Philips equipment, also adapts to future versions of the DICOM Standard. If not, the incorporation of DICOM enhancements into Philips equipment may lead to loss of connectivity (in case of networking) and incompatibility (in case of media).

1.7 Acronyms and Abbreviations.

The following acronyms and abbreviations are used in the document.

- ACC   American College of Cardiology
- AE   Application Entity
- ACR   American College of Radiology
- ANSI   American National Standard Institute
- BOT   Basic Offset Table
- CD-R   CD Recordable
- DCI   Digital Cardio Imaging
- DCR   Dynamic Cardio Review
- DICOM   Digital Imaging and Communication in Medicine
- DIMSE   DICOM Message Service Element
- DIMSE-C   DICOM Message Service Element-Composite
- DIMSE-N   DICOM Message Service Element-Normalized
- EBE   Explicit VR Big Endian
- ELE   Explicit VR Little Endian
- HIS   Hospital Information System
- HL7   Health Level Seven
- ILE   Implicit VR Little Endian
- IOD   Information Object Definition
- ISIS   Information System - Imaging System
- MPPS   Modality Performed Procedure Step
- NEMA   National Electrical Manufacturers Association
- PACS   Picture Archiving and Communication System
- PDU   Protocol Data Unit
- RIS   Radiology Information System
- RWA   Real World Activity
- SC   Secondary Capture
- SCM   Study Component Management
- SCP   Service Class Provider
- SCU   Service Class User
- SOP   Service Object Pair
- STC   Storage Commitment.
- TCP/IP   Transmission Control Protocol/Internet protocol
- UID   Unique Identifier
- WLM   Worklist Management

2 Implementation model

2.1 Implementation model for Integris

The Integris system (including the following option: High Speed DICOM Image Interface MCV 2974, MCV 3621 Cardiac DICOM XA, MCV 3761 Vascular DICOM XA, DICOM RIS MCV 3031 and MCV 7011 VISUB DICOM PRINT) system of Philips Medical System is an X-Ray imaging generating system. The System contains functionality for:

- transfer of DICOM Cardiac images (Multiframe XA (un)processed (un)compressed, and Secondary Capture);
- transfer of DICOM Vascular images (Single and Multi Frame XA processed, and Secondary Capture);
- Storage Commitment;
- Modality Worklist Management;
- Modality Performed Procedure Step;
- Print Service
- Verification service.

The above DICOM functionality is described in this document.
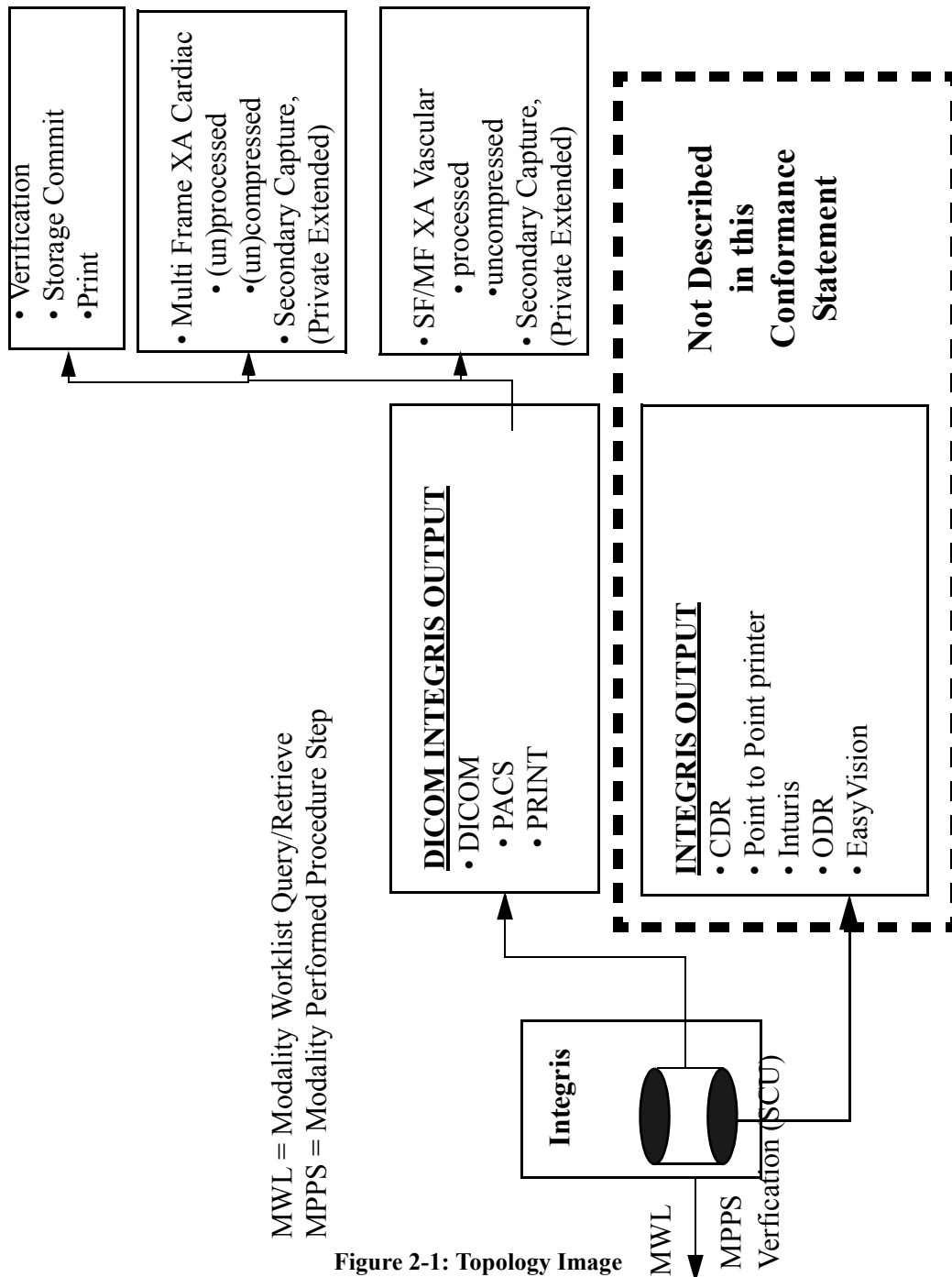
Figure 2-1: Topology Image

2.1.1 Application Data Flow Diagram for Integris

The Integris behaves as a system with two Application Entities (AE). The related Implementation Model is shown in Figure 2-2 on page 10.

The images to be sent are selected from one examination. At export request the images will be

converted into DICOM format and sent out to a remote destination.
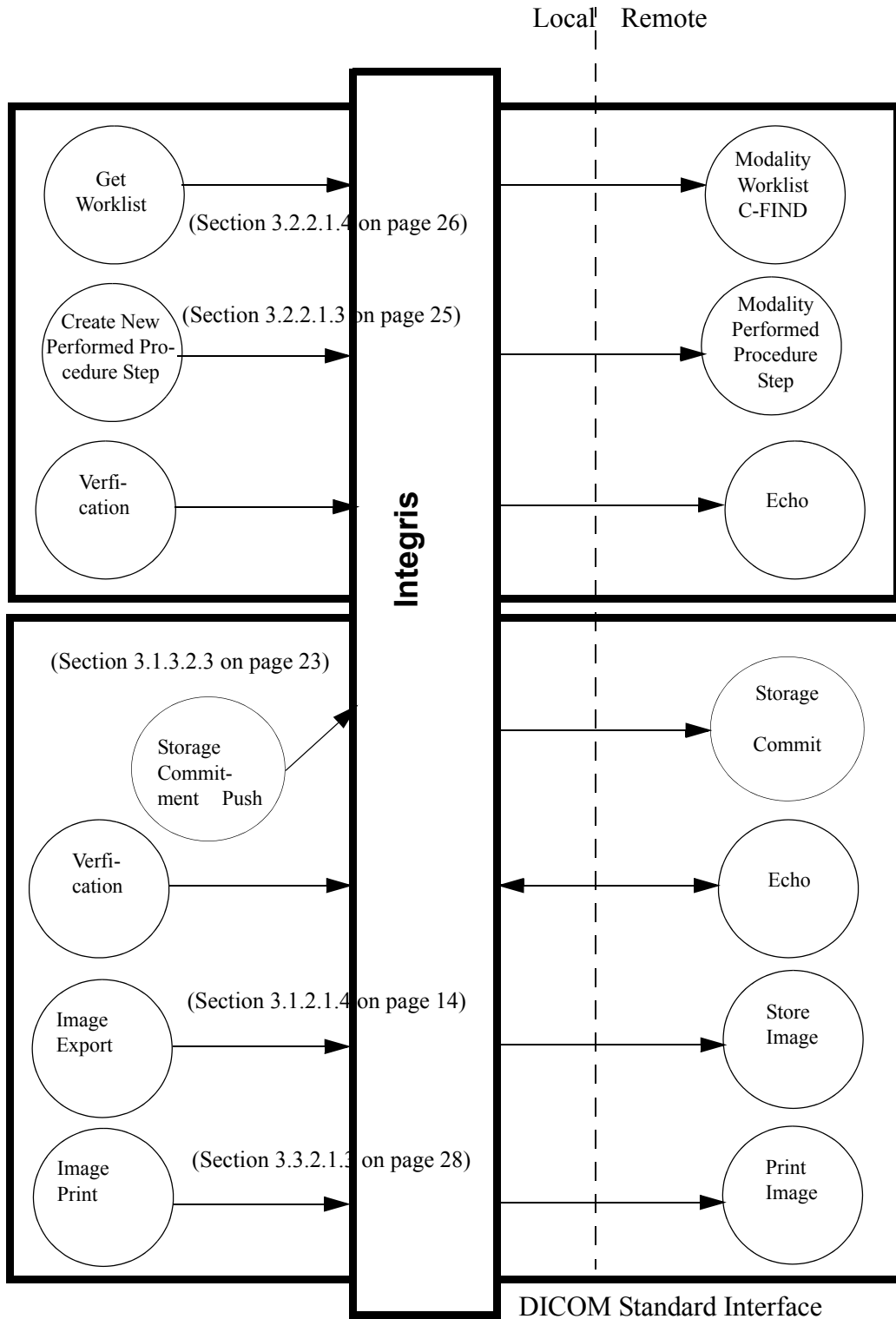
Figure 2-2: The Integris DICOM Implementation Model (with references to the related sections. Within the Integris the user interface can be used to export the images.)

2.1.2 Functional definition of Application Entities

The Integris DICOM Image Export AE acts as a Service Class User (SCU) of the Storage Service Class. When the export is initiated, the AE will open an association to the remote system. The selected images and related image data are converted into a DICOM message to be send to the remote system.

The Integris DICOM Storage Commit, WLM and MPPS acts as a SCU.

The Integris DICOM Verification acts as a SCU/SCP for Image Interface.

2.2 Sequencing of Real World Activities

All Real-World Activities as specified in Figure 2-1 on page 9 and Figure 2-2 on page 10 may occur independently from each other.

3 AE Specifications

3.1 DICOM AE Specification

The Integris DICOM Storage Application Entity provides Standard Conformance to the following DICOM V3.0 SOP Classes as an SCU:

Table 3-1: SOP Classes supported by the Integris AE as SCU

SOP Class Name	UID
Verification	1.2.840.10008.1.1
Storage Commit Push Model	1.2.840.10008.1.20.1
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7
X-Ray Angiographic Image Storage SOP Class (Single and Multi-frame	1.2.840.10008.5.1.4.1.1.12.1

Table 3-2: SOP Classes supported by the Integris AE as SCP

SOP Class Name	UID
Verification	1.2.840.10008.1.1

3.1.1 Association Establishment Policies for C-Store

3.1.1.1 General

Integris has a fixed PDU size of 28672 bytes.

3.1.1.2 Number of Associations

Integris will establish one association at a time.

3.1.1.3 Asynchronous Nature

Integris does not support asynchronous operations and will not perform asynchronous window negotiation.

3.1.1.4 Implementation Identifying Information

Concerning the SC and X-Ray STORE:
The Implementation Class UID is: 1.3.46.670589.7.5.1.5
The implementation version name is: VISUB_FNIB_3_0

3.1.2 Association Initiation Policy

Integris initiates associations as a result of the following local real-world activities:
- The Image Export Request to send the selected photo-file images and X-Ray Angiographic runs from the Integris to a remote system (Section 3.1.2.1 on page 13).
- The Integris operator requests for Association (i.e. application level communication) verification Section 3.1.2.2 on page 20.

3.1.2.1 Request to send images from Integris to a remote system

3.1.2.1.1   Associated Real-World Activity

After selection of a photo-file and/or one or more runs, these images will be sent when initiating the Send command. Integris initiates one association to the pre-configured peer system and uses it to check the acceptance of the association. After releasing this association Integris initiates this association again to send the selected images via C-STORE requests (and receive the associated C-STORE responses). The association is released by Integris after successful transfer of the images or when an error occurred.

Integris handles each send request one after another.

3.1.2.1.2   Proposed Presentation Contexts

Integris will propose the following presentation contexts:

Table 3-3: Proposed Presentation Contexts

Presentation Context table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotia-tion
Name	UID	Name List	UID List		
Verification	1.2.840. 10008. 1.1	ILE ELE EBE	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
Storage Commit Push Model	1.2.840. 10008. 1.20.1	ILE ELE EBE	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
Secondary Capture Image Storage - STORE	1.2.840. 10008. 5.1.4.1.1.7	ILE ELE EBE	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
X-Ray Angiographic Image Storage - STORE **Vascular** **(Single-frame & Multi-frame)**	1.2.840. 10008. 5.1.4.1.1.12.1	ILE ELE EBE	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
X-Ray Angiographic Image Storage - STORE **Cardiac** **(Multi-frame)**	1.2.840. 10008. 5.1.4.1.1.12.1	JPEG Lossless, non-hierarchi-cal, First Order Prediction	1.2.840.10008.1.2.4.70	SCU	None

3.1.2.1.3   C-STORE SCU Conformance

Integris has the following behaviour on transfer of images:
- Success (return status 0000)
  The successful transfer is indicated on the console: 'Done'.
- Refused (return status A7xx), Error (return status A9xx or Cxxx) and Warning (return status B00x)
  A failed transfer is indicated on the console.

Extended negotiation is not supported.

3.1.2.1.4   SC SCU Conformance

Table 3-4 lists the applied modules and involved conditional (DICOM type 1C and 2C) and optional (DICOM type 3) attributes in the SC Image IOD.

Table 3-4: Applied Conditional and Optional Attributes of the SC Image IOD

IE	Module	Conditional Attributes	Optional Attributes
Patient	Patient	-	-
Study	General Study	-	-
Series	General Series	-	Series Date, Series Time, Performing Physicians' Name, Referenced Performed Procedure Step Sequence, Request Attributes Sequence, Scheduled Procedure Step Description, Scheduled Protocol Code Sequence, Performed Procedure Step Start Date, Performed Procedure Step Start Time, Performed Procedure step ID, Performed Procedure Step Description
Equipment	General Equipment	-	Institution Name, Station Name, Manufacturer's Model Name, Software Versions
	SC Equipment	-	-
Image	General Image	Patient Orientation	Image Type
	Image Pixel	-	-
	SC Image	-	-
	SOP Common	Specific Character Set	-
	VOI LUT	Window Width	Window Center

3.1.2.1.5   Single-frame Vascular XA SCU Conformance

Table 3-5 lists the applied modules and involved conditional (DICOM type 1C and 2C) and optional (DICOM type 3) attributes in the Single-frame Vascular XA Image IOD.

Table 3-5: Applied Conditional and Optional Attributes of the Single-frame Vascular XA Image IOD

IE	Module	Conditional Attributes	Optional Attributes
Patient	Patient	-	-
Study	General Study	-	-
Series	General Series	-	Series Date, Series Time, Performing Physicians' Name, Protocol Name, Operators' Name, Referenced Performed Procedure Step Sequence, Request Attributes Sequence, Scheduled Procedure Step Description, Scheduled Protocol Code Sequence, Performed Procedure Step Start Date, Performed Procedure Step Start Time, Performed Procedure Step ID, Performed Procedure Step Description
Equipment	General Equipment	-	Institution Name, Institution Address, Station Name, Manufacturer's Model Name, Software Versions
Image	General Image	Patient Orientation	Acquisition Number, Acquisition Date, Acquisition Time, Images in Acquisition
	Image Pixel **Extended**	Pixel Aspect Ratio	**Pixel Spacing**
	Display Shutter (applied optional Module)	Shutter Left Vertical Edge, Shutter Right Vertical Edge, Shutter Upper Horizontal Edge, Shutter Lower Horizontal Edge	-
	X-Ray Image **Extended**	Reference Image Sequence	Calibration Image
	X-Ray Acquisition	X-Ray Tube Current, Exposure Time	Intensifier Size
	XA Positioner	-	Distance Source to Detector
	VOI LUT	Window Width	Window Center
	SOP Common	Specific Character Set	-
	Image Blanking **Private**	Image Blanking Left Vertical Edge, Image Blanking Right Vertical Edge, Image Blanking Upper Horizontal Edge, Image Blanking Lower Horizontal Edge, Center of Circular Image Blanking., Radius of Circular Image Blanking	-

3.1.2.1.6   Multi-frame Vascular XA SCU Conformance

Table 3-6 lists the applied modules and involved conditional (DICOM type 1C and 2C) and optional (DICOM type 3) attributes in the Multi-frame Vascular XA Image IOD.

Table 3-6: Applied Conditional and Optional Attributes of the Multi-frame Vascular XA Image IOD

IE	Module	Conditional Attributes	Optional Attributes
Patient	Patient	-	-
Study	General Study	-	-
Series	General Series	-	Series Date, Series Time, Performing Physicians' Name, Referenced Performed Procedure Step Sequence, Request Attributes Sequence, Scheduled Procedure Step Description, Scheduled Protocol Code Sequence, Performed procedure Step Start Date, Performed Procedure Step Start Time, Performed Procedure Step ID, Performed Procedure Step Description
Equipment	General Equipment	-	Institution Name, Institution Address, Station Name, Manufacturer's Model Name, Software Versions

Table 3-6: Applied Conditional and Optional Attributes of the Multi-frame Vascular XA Image IOD (Continued)

IE	Module	Conditional Attributes	Optional Attributes
Image	General Image	Patient Orientation	Acquisition Number, Acquisition Date, Acquisition Time, Images in Acquisition
	Image Pixel **Extended**	Pixel Aspect Ratio	**Pixel Spacing**
	Cine	Frame Time, Frame Time Vector	Frame Delay
	Multi-frame	-	-
	Display Shutter (applied optional Module)	Shutter Left Vertical Edge, Shutter Right Vertical Edge, Shutter Upper Horizontal Edge, Shutter Lower Horizontal Edge	-
	X-Ray Image **Extended**	Frame Increment Pointer, Reference Image Sequence, **Edge Enhancement sequence**	Scan Options, Calibration Image
	X-Ray Acquisition	X-Ray Tube Current, Exposure Time	Intensifier Size
	XA Positioner	Positioner Motion, Positioner Primary Angle Increment, Positioner Secondary Angle Increment	Distance Source to Detector
	VOI LUT	Window Width	Window Center
	SOP Common	Specific Character Set	-
	Image Blanking **Private**	Image Blanking Left Vertical Edge, Image Blanking Right Vertical Edge, Image Blanking Upper Horizontal Edge, Image Blanking Lower Horizontal Edge, Center of Circular Image Blanking., Radius of Circular Image Blanking	-

3.1.2.1.7   Cardiac XA Multi Frame SCU Conformance

Table 3-7 lists the applied modules and involved conditional (DICOM type 1C and 2C) and optional (DICOM type 3) attributes in the Cardiac XA Multi Frame Image IOD.

Table 3-7: Applied Conditional and Optional Attributes of the Cardiac XA Multi Frame Image IOD

IE	Module	Conditional Attributes	Optional Attributes
Patient	Patient	-	-
Study	General Study	-	-
Series	General Series	-	Series Date, Series Time, Performing Physicians' Name, Referenced Performed Procedure Step Sequence, Request Attributes Sequence, Scheduled Procedure Step Description, Scheduled Protocol Code Sequence, Performed Procedure Step ID, Performed procedure Step Start Date, Performed Procedure Step Start Time, Performed Procedure Step Description
Equipment	General Equipment	-	Institution Name, Institution Address, Station Name, Manufacturer's Model Name, Software Versions

Table 3-7: Applied Conditional and Optional Attributes of the Cardiac XA Multi Frame Image IOD (Continued)

IE	Module	Conditional Attributes	Optional Attributes
Image	General Image	Patient Orientation	Acquisition Number, Acquisition Date, Acquisition Time, Images in Acquisition
	Image Pixel **Extended**	Pixel Aspect Ratio	**Pixel Spacing**
	Cine	Frame Time, Frame Time Vector	Frame Delay
	Multi-frame	-	-
	Display Shutter (applied optional Module)	Shutter Left Vertical Edge, Shutter Right Vertical Edge, Shutter Upper Horizontal Edge, Shutter Lower Horizontal Edge	-
	X-Ray Image **Extended**	Frame Increment Pointer, Reference Image Sequence, **Edge Enhancement Sequence**	Scan Options, Calibration Image
	X-Ray Acquisition	X-Ray Tube Current, Exposure Time	Intensifier Size
	XA Positioner	Positioner Motion, Positioner Primary Angle Increment, Positioner Secondary Angle Increment	Distance Source to Detector
	Curve	Curve Data Descriptor, Coordinate Start Value, Coordinate Step Value	Axis Units, Curve Label
	Modality LUT	Modality LUT Sequence	-
	VOI LUT	Window Width	Window Center
	SOP Common	Specific Character Set	-
	Image Blanking **Private**	Image Blanking Left Vertical Edge, Image Blanking Right Vertical Edge, Image Blanking Upper Horizontal Edge, Image Blanking Lower Horizontal Edge, Center of Circular Image Blanking., Radius of Circular Image Blanking	-

3.1.2.2 Verify Application Level Communication

3.1.2.2.1   Associated Real-World Activity

The Integris DICOM Export AE supports the Verification requests from the operator (usually the service engineer). This results in trying to setup an association to the selected remote system. The association is released after the verification.

3.1.2.2.2   Proposed Presentation Contexts

See Table 3-3.

3.1.2.2.3   SOP Specific Conformance to the Verification SOP Class

The Integris provides standard conformance.

3.1.2.3 Storage Commitment

3.1.2.3.1   Associated Real-World Activity

The Integris (when configured) requests a Storage Commitment after a C-STORE.

3.1.2.3.2   Presentation Context Table

See Table 3-3.

3.1.2.3.3   Storage Commitment Push SCP Conformance

The Integris provides standard conformance.

3.1.2.3.4   Presentation Context Acceptance Criterion

The Integris will propose the presentation context as given in Table 3-3.

3.1.3 Association Acceptance Policy

The Integris accepts Associations for the following purposes:
- To allow remote applications to verify application level communication with the Integris.
- To allow remote applications to respond on a storage commitment.

3.1.3.1 Verify Application Level Communication

3.1.3.1.1   Associated Real-World Activity

The Integris accepts Associations from systems that wish to verify application level communication using the C-ECHO command.

3.1.3.1.2   Presentation Context Table

See Table 3-3.

3.1.3.1.3   C-ECHO SCP Conformance

The Integris provides standard conformance.

3.1.3.1.4   Presentation Context Acceptance Criterion

3.1.3.1.5   Transfer Syntax Selection Policies

Any of the presentation context shown in Table 3-3 are acceptable.

3.1.3.2 Storage Commitment

3.1.3.2.1   Associated Real-World Activity

The Integris accepts Associations from systems that wish to respond to a Storage Commitment.

3.1.3.2.2   Presentation Context Table

See Table 3-3.

3.1.3.2.3   Storage Commitment Push SCP Conformance

The Integris provides standard conformance.

3.1.3.2.4   Presentation Context Acceptance Criterion

3.1.3.2.5   Transfer Syntax Selection Policies

Any of the presentation context shown in Table 3-3 are acceptable.

3.2 DICOM AE Specification for the MPPS, WLM and Verification

The Integris DICOM WLM and MPPS Application Entity provides Standard Conformance to the following DICOM V3.0 SOP Classes as an SCU:

Table 3-8: SOP Classes supported by the Integris AE as SCU

SOP Class Name	UID
Verification	1.2.840.10008.1.1
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3
Modality Worklist Information Model - FIND SOP Class	1.2.840.10008.5.1.4.31

3.2.1 Association Establishment Policies for MPPS, WLM and Verification

3.2.1.1 General.

Integris has a fixed PDU size of 16k.

3.2.1.2 Number of Associations

Integris will establish one association at a time.

3.2.1.3 Asynchronous Nature

Integris does not support asynchronous operations and will not perform asynchronous window negotiation.

3.2.1.4 Implementation Identifying Information

Concerning the WLM and MPPS:
The Implementation Class UID is: 1.3.46.670589.7.5.1.6
The Implementation version name is: VISUB_WLM_2_0

3.2.2 Association Initiation Policy for MPPS, WLM and Verification

Integris initiates associations as a result of the following local Real-World activities:
• WLM   Get Worklist
• MPPS   Send Report

3.2.2.1 Request to send MPPS and receive WLM data

3.2.2.1.1 Associated Real-World Activity

Integris handles each request one after another.

3.2.2.1.2 Proposed Presentation Contexts

Integris will propose the following presentation contexts (see Table 3-9 on page 25).

Table 3-9: Proposed Presentation Contexts (SCU)

Presentation Context table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotia-tion
Name	UID	Name List	UID List		
Verification	1.2.840.1000.8.1.1	ILE ELE EBE	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3	ILE ELE EBE	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
Modality Worklist Information Model - FIND SOP Class	1.2.840.10008.5.1.4.31	ILE ELE EBE	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None

3.2.2.1.3   Modality Performed Procedure Step Conformance

The Modality Performed procedure Step signals the RIS/HIS that a procedure has been finished and will provide the HIS/RIS with data concerning this Performed procedure.

Table 3-10 lists the applied modules and involved conditional (DICOM type 1C and 2C) and optional (DICOM type 3) attributes in the MPPS IOD N-CREATE.

Table 3-10: Applied Conditional and Optional Attributes of the MPPS IOD N-CREATE

Module	Conditional Attributes	Optional Attributes
SOP Common	Specific Character Set	-
Performed Procedure Step Relationship	-	Code Meaning
Performed Procedure Step Information	-	Code Meaning
Image Acquisition Results	-	Code Meaning
Radiation Dose **Extended**	-	Total Time of Fluoroscopy, Total Number of Exposures, **Accumulated Fluoroscopy Dose, Accumulated Exposure Dose, Total Dose, Total Number of Frames**
Billing and Material Management Codes	-	-
Private Exposure Information **Private**	-	Exposure Start Time, Scan Options, Distance Source to Detector (SID), Intensifier Size, APR name, Frame Rate

Table 3-11 lists the applied modules and involved conditional (DICOM type 1C and 2C) and optional (DICOM type 3) attributes in the MPPS IOD N-SET

Table 3-11: Applied Conditional and Optional Attributes of the MPPS IOD N-SET

Module	Conditional Attributes	Optional Attributes
SOP Common	Specific Character Set	-
Performed Procedure Step Information	-	Performed Procedure Step Status

3.2.2.1.4   Modality Worklist Management Conformance

The Modality Worklist Query/Retrieve C-FIND will issue a request for a Worklist to the HIS/RIS and will behave as defined in the standard. Data returned from the HIS/RIS will be exported in the Store XA as well as the SC and will also be used to provide the Modality Performed Procedure Step with data. See chapter 8 for a detailed list concerning the requested attributes.

3.2.2.1.5   Verification Conformance

The Integris provides standard conformance.

3.3 DICOM AE Specification for Basic Grayscale Print Management

The Integris DICOM PRINT Application Entity provides Standard Conformance to the following DICOM V3.0 (Meta) SOP Classes as an SCU:

Table 3-12: (Meta) SOP Classes supported by the Integris AE as SCU

SOP Class Name	UID
Verification	1.2.840.10008.1.1
Basic Grayscale Print Management	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

3.3.1 Association Establishment Policies for PRINT and Verification

3.3.1.1 General.

Integris has a fixed PDU size of 16k.

3.3.1.2 Number of Associations

Integris will establish one association at a time.

3.3.1.3 Asynchronous Nature

Integris does not support asynchronous operations and will not perform asynchronous window negotiation.

3.3.1.4 Implementation Identifying Information

Concerning the DICOM PRINT:
The Implementation Class UID is: 1.3.46.670589.7.5.1.5
The Implementation version name is: VISUB_FNIB_3_0

3.3.2 Association Initiation Policy for PRINT and Verification

Integris initiates associations as a result of the following local Real-World activities:
• PRINT   Print Images

3.3.2.1 Request to Print Images

3.3.2.1.1   Associated Real-World Activity

After selection of an examination, the photo-file(s) of this examination will be sent to a DICOM printer when initiating the Print command. Integris initiates one association to the pre-configured peer system per sheet that has to be printed and uses it to check the acceptance of the association (each sheet contains a pre-defined number of "photos" (photo-files) depending on the film layout and format). Also the status of the printer is checked during this association.

In case of a printer warning or error situation, the user has the ability to recover this situation and continue the print job. After releasing this association Integris initiates an association again to send the selected images via the Basic Grayscale Print Management Service. The association is released by Integris after successful transfer of the images or when an error occurred.

Integris handles each send request one after another.

3.3.2.1.2   Proposed Presentation Contexts

Integris will propose the following presentation contexts (see Table 3-13 on page 28).

Table 3-13: Proposed Presentation Contexts (SCU)

Presentation Context table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotia-tion
Name	UID	Name List	UID List		
Verification	1.2.840.1000.8.1.1	ILE ELE EBE	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	ILE ELE EBE	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None

3.3.2.1.3   Basic Grayscale Print Management Conformance

Integris has the following behaviour on transfer of images to the selected Printer:
* Success (return status 0000)
  The successful print job status is indicated on the console: 'Done'.
* Warning (return status 0000, 0107, 0116, B6xx)
  The successful print job status is indicated on the console: 'Done'.
* Error (return status 0105, 0106, C6xx)
  The failed print job status is indicated on the console: 'Error'.

4 Communication Profiles

4.1 Profile for Image Export.

4.1.1 Supported Communication Stacks

Integris provides DICOM V3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard.

4.1.2 TCP/IP Stack

Integris uses the TCP/IP program stack of VxWorks for the image transport.

4.1.2.1 Physical Media Support

Integris supports Ethernet (ISO 8802-3),10/100-BaseT for the High Speed DICOM Image Interface.

4.2 Profile for MPPS and WLM

4.2.1 Supported Communication Stacks

Integris provides DICOM V3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard.

4.2.2 TCP/IP Stack

Integris uses the TCP/IP program stack of RMX.

4.2.2.1 Physical Media Support

Integris supports Ethernet (ISO 8802-3), 10-BaseT for the DICOM RIS Interface.

5 Extensions/Specialization/Privatization

The standard extended attributes are specified in the sections below.

All private attributes mentioned below are marked in *italic* in chapter 8.

5.1 Single-frame Vascular XA Image IOD

5.1.1 Image Blanking Module
The Image Blanking Module is required if the image is to be displayed with image blanking.

Table 5-1 : Image Blanking Module (see Table 8-25)

Attribute Name	Tag	Type	Attribute Description
Image Blanking Shape	(0019,xx00)	1	Shape(s) of the image blanking defined for display. The following shapes are supported: RECTANGULAR CIRCULAR This multi-valued attribute shall contain at most one of each enumerated value (so combinations are supported).
Image Blanking Left Vertical Edge	(0019,xx02)	1C	Location of the left edge of the rectangular image blanking with respect to pixels in the image given as column. Required if Image Blanking Shape (0019,xx00) contains RECTANGULAR.
Image Blanking Right Vertical Edge	(0019,xx04)	1C	Location of the right edge of the rectangular image blanking with respect to pixels in the image given as column. Required if Image Blanking Shape (0019,xx00) contains RECTANGULAR.
Image Blanking Upper Horizontal Edge	(0019,xx06)	1C	Location of the upper edge of the rectangular image blanking with respect to pixels in the image given as row. Required if Image Blanking Shape (0019,xx00) contains RECTANGULAR.
Image Blanking Lower Horizontal Edge	(0019,xx08)	1C	Location of the lower edge of the rectangular image blanking with respect to pixels in the image given as row. Required if Image Blanking Shape (0019,xx00) contains RECTANGULAR.
Center of Circular Image Blanking	(0019,xx10)	1C	Location of the center of the circular image blanking with respect to pixels in the image given as number of pixels. Required if Image Blanking Shape (0019,xx00) contains CIRCULAR.

Table 5-1 : Image Blanking Module (see Table 8-25) (Continued)

Radius of Circular Image Blanking	(0019,xx12)	1C	Radius of the circular image blanking with respect to pixels in the image given as row and column. Required if Image Blanking Shape (0019,xx00) contains CIRCULAR.

5.1.2 Image Pixel Module

The attribute Image Pixel Spacing (0028,0030) is an extension to the Image Pixel Module (see Table 8-18).

5.2 Multi-frame Vascular XA Image IOD

5.2.1 Edge Enhancement Sequence

The Edge Enhancement Sequence is an extension to the X-Ray Image Module. Each frame may be edge enhanced by applying the formula and the values specified in the Edge Enhancement Sequence (see Table 5-2). Whether the edge enhancement is performed or not depends on the values of the edge enhancement attributes.

Table 5-2 : Edge Enhancement Sequence (see Table 8-36)

Attribute Name	Tag	Type	Attribute Description
Edge Enhancement Sequence	(0029,xx00)	1C	Edge Enhancement Sequence describing the Edge Enhancement Filter to be applied to the image. *Formula: $E=F+((F-C)*G)$* *E: pixel value of enhanced frame* *F: pixel value of source frame* *C: pixel value of convoluted region* *G: edge enhancement gain* Required if edge enhancement is performed.
> Convolution Kernel Size	(0029,xx01)	1	Number of rows and columns in the convolution kernel. The first value specifies the number of rows; the second value specifies the number of columns. Values shall be equal or greater than 3.
> Convolution Kernel Coefficients	(0029,xx02)	1	The coefficients of the convolution kernel organized by row from left to right starting with the top row. The number of values shall be equal to the number of rows times the number of columns specified in the Convolution Kernel Size.
> Edge Enhancement Gain	(0029,xx03)	1	Edge Enhancement Gain to be used.

5.2.2 Image Blanking Module

The Image Blanking Module is required if the image is to be displayed with image blanking.

Table 5-3 : Image Blanking Module (see Table 8-41)

Attribute Name	Tag	Type	Attribute Description
Image Blanking Shape	(0019,xx00)	1	Shape(s) of the image blanking defined for display. The following shapes are supported: RECTANGULAR CIRCULAR This multi-valued attribute shall contain at most one of each enumerated value (so combinations are supported).
Image Blanking Left Vertical Edge	(0019,xx02)	1C	Location of the left edge of the rectangular image blanking with respect to pixels in the image given as column. Required if Image Blanking Shape (0019,xx00) contains RECTANGULAR.
Image Blanking Right Vertical Edge	(0019,xx04)	1C	Location of the right edge of the rectangular image blanking with respect to pixels in the image given as column. Required if Image Blanking Shape (0019,xx00) contains RECTANGULAR.
Image Blanking Upper Horizontal Edge	(0019,xx06)	1C	Location of the upper edge of the rectangular image blanking with respect to pixels in the image given as row. Required if Image Blanking Shape (0019,xx00) contains RECTANGULAR.
Image Blanking Lower Horizontal Edge	(0019,xx08)	1C	Location of the lower edge of the rectangular image blanking with respect to pixels in the image given as row. Required if Image Blanking Shape (0019,xx00) contains RECTANGULAR.
Center of Circular Image Blanking	(0019,xx10)	1C	Location of the center of the circular image blanking with respect to pixels in the image given as number of pixels. Required if Image Blanking Shape (0019,xx00) contains CIRCULAR.
Radius of Circular Image Blanking	(0019,xx12)	1C	Radius of the circular image blanking with respect to pixels in the image given as row and column. Required if Image Blanking Shape (0019,xx00) contains CIRCULAR.

5.2.3 Image Pixel Module

The attribute Image Pixel Spacing (0028,0030) is an extension to the Image Pixel Module (see Section Table 8-32: on page 56).

5.3 Multi-frame Cardiac XA Image IOD

5.3.1 Edge Enhancement Sequence

The Edge Enhancement Sequence is an extension to the X-Ray Image Module. Each frame may be edge enhanced by applying the formula and the values specified in the Edge Enhancement Sequence (see Table 5-4). Whether the edge enhancement is performed or not depends on the values of the edge enhancement attributes.

Table 5-4 : Edge Enhancement Sequence (see Table 8-52)

Attribute Name	Tag	Type	Attribute Description
Edge Enhancement Sequence	(0029,xx00)	1C	Edge Enhancement Sequence describing the Edge Enhancement Filter to be applied to the image. *Formula: $E=F+((F-C)*G)$* *E: pixel value of enhanced frame* *F: pixel value of source frame* *C: pixel value of convoluted region* *G: edge enhancement gain* Required if edge enhancement is performed.
> Convolution Kernel Size	(0029,xx01)	1	Number of rows and columns in the convolution kernel. The first value specifies the number of rows; the second value specifies the number of columns. Values shall be equal or greater than 3.
> Convolution Kernel Coefficients	(0029,xx02)	1	The coefficients of the convolution kernel organized by row from left to right starting with the top row. The number of values shall be equal to the number of rows times the number of columns specified in the Convolution Kernel Size.
> Edge Enhancement Gain	(0029,xx03)	1	Edge Enhancement Gain to be used.

5.3.2 Image Blanking Module

The Image Blanking Module is required if the image is to be displayed with image blanking.

Table 5-5 : Image Blanking Module (see Table 8-59)

Attribute Name	Tag	Type	Attribute Description

Image Blanking Shape	(0019,xx00)	1	Shape(s) of the image blanking defined for display.
			The following shapes are supported:
			    RECTANGULAR
			    CIRCULAR
			This multi-valued attribute shall contain at most one of each enumerated value (so combinations are supported).

Table 5-5 : Image Blanking Module (see Table 8-59) (Continued)

Image Blanking Left Vertical Edge	(0019,xx02)	1C	Location of the left edge of the rectangular image blanking with respect to pixels in the image given as column. Required if Image Blanking Shape (0019,xx00) contains RECTANGULAR.
Image Blanking Right Vertical Edge	(0019,xx04)	1C	Location of the right edge of the rectangular image blanking with respect to pixels in the image given as column. Required if Image Blanking Shape (0019,xx00) contains RECTANGULAR.
Image Blanking Upper Horizontal Edge	(0019,xx06)	1C	Location of the upper edge of the rectangular image blanking with respect to pixels in the image given as row. Required if Image Blanking Shape (0019,xx00) contains RECTANGULAR.
Image Blanking Lower Horizontal Edge	(0019,xx08)	1C	Location of the lower edge of the rectangular image blanking with respect to pixels in the image given as row. Required if Image Blanking Shape (0019,xx00) contains RECTANGULAR.
Center of Circular Image Blanking	(0019,xx10)	1C	Location of the center of the circular image blanking with respect to pixels in the image given as number of pixels. Required if Image Blanking Shape (0019,xx00) contains CIRCULAR.
Radius of Circular Image Blanking	(0019,xx12)	1C	Radius of the circular image blanking with respect to pixels in the image given as row and column. Required if Image Blanking Shape (0019,xx00) contains CIRCULAR.

5.3.3 Image Pixel Module

The attribute Image Pixel Spacing (0028,0030) is an extension to the Image Pixel Module (see Section Table 8-48: on page 66).

5.4 Modality Performed Procedure Step IOD

5.4.1 Radiation Dose Module

The Radiation Dose Module (Table 8-78 on page 81) contains several private attributes that are an extension to the standard.

5.4.2 Private Exposure Information

The Private Exposure Information Module (Table 8-80 on page 83) is a private extension to the standard.

5.4.3 Quantitative Analysis Results

The Quantitative Analysis Results Module (Table 8-80 on page 83) is a private extension to the standard.

It contains results of various Quantitative Analysis programmes related to the Performed Procedure Step.

6 Configurations.

6.1 AE Title/Pres. Address mapping for Image Store, WLM, MPPS and STC

6.1.1 Local AE Titles and Presentation Addresses

The four Integris AE titles are configurable (Section 6.2 on page 36).

6.1.2 Remote AE Titles and Presentation Addresses

For remote applications that act as Service Class Provider the following additional information must be provided:
- AE Title.
- Host name on which the application resides.
- IP address.
- Port number.

6.2 Configurable parameters

For the Integris (Image Store, WLM, MPPS and STC) the following parameters can be configured.
- AE Title.
- Host Name.
- IP address.
- Port number.

7 Support of Extended Character Set

Integris supports the extended character set "ISO_IR 100"
(i.e. ISO Latin alphabet Nr. 1: ISO-IR 100).

8 Overview applied IOD's for the Integris

8.1 Attributes of Integris SC Image IOD

The shaded boxes contain attributes of which contents are obtained from the RIS/HIS via Modality Worklist Query/Retrieve.

Table 8-1: Applied Modules in the Secondary Capture Image IOD for the Integris

Information Entity	Module	Usage	Reference
Patient	Patient	M	Table 8-2
Study	General Study	M	Table 8-3
Series	General Series	M	Table 8-4
Equipment	General Equipment	U	Table 8-5
	SC Equipment	M	Table 8-6
Image	General Image	M	Table 8-7
	Image Pixel	M	Table 8-8
	SC Image	M	Table 8-9
	SOP Common	M	Table 8-10
	VOI LUT	U	Table 8-11

Table 8-2: Secondary Capture Image Storage SOP Class - Patient Module

Attribute Name	Tag	Note
Patient's Name	0010,0010	Patient's full legal name.
Patient ID	0010,0020	Primary hospital identification number or code for the patient.
Patient's Birth Date	0010,0030	Birth date of the patient.
Patient's Sex	0010,0040	Sex of the named patient. Enumerated value(s): F, M, O

Table 8-3: Secondary Capture Image Storage SOP Class - General Study Module

Attribute Name	Tag	Note
Study Date	0008,0020	Date the study started.

Table 8-3: Secondary Capture Image Storage SOP Class - General Study Module (Continued)

Attribute Name	Tag	Note
Study Time	0008,0030	Time the study started.
Accession Number	0008,0050	A RIS generated number which identifies the order for the Study.
Referring Physician's Name	0008,0090	Patient's referring physician.
Study Description	0008,1030	Institution-generated description or classification of the Study (component) performed.
Study Instance UID	0020,000D	Unique identifier for the Study.
Study ID	0020,0010	User or equipment generated Study identification.

Table 8-4: Secondary Capture Image Storage SOP Class - General Series Module

Attribute Name	Tag	Note
Series Date	0008,0021	Date the Series started.
Series Time	0008,0031	Time the Series started.
Modality	0008,0060	Type of equipment that originally acquired the data used to create the Image. Enumerated value(s): XA
Performing Physicians' Name	0008,1050	Name of the physicians administering the Series.
Referenced Performed Procedure Step Sequence	0008,1111	Uniquely identifies the Performed Procedure Step SOP Instance to which the Series is related.
> Referenced SOP Class UID	0008,1150	Uniquely identifies the referenced Modality Performed Procedure SOP Class. Enumerated value(s): 1.2.840.10008.3.1.2.3.3
> Referenced SOP Instance UID	0008,1155	Uniquely identifies the referenced SOP Instance.
Series Instance UID	0020,000E	Unique identifier of the Series.
Series Number	0020,0011	A number that identifies this series. Enumerated value(s): 1
Performed Procedure Step Start Date	0040,0244	Date on which the Performed procedure Step Started.
Performed Procedure Step Start Time	0040,0245	Time on which the Performed Procedure Step Started.

Table 8-4: Secondary Capture Image Storage SOP Class - General Series Module (Continued)

Attribute Name	Tag	Note
Performed Procedure Step ID	0040,0253	Identification of that part of a Procedure that has been carried out within this step.
Performed Procedure Step Description	0040,0254	Institution-generated description or classification of the Procedure Step that was performed.
Request Attributes Sequence	0040,0275	Sequence that contains attributes from the Imaging Service Request.
> Scheduled Procedure Step Description	0040,0007	Institution-generated description or classification of the Scheduled Procedure Step to be performed.
> Scheduled Protocol Code Sequence	0040,0008	Sequence describing the Scheduled Protocol following a specific coding scheme.
>> Code Value	0008,0100	Identifier that is unambiguous within the Coding Scheme.
>> Coding Scheme Designator	0008,0102	Designator that identifies the Coding Scheme.
>> Code Meaning	0008,0104	Text that conveys the meaning of the Coding Scheme.
> Scheduled Procedure Step ID	0040,0009	Identifier which identifies the requested Procedure in the Imaging Service request.
> Requested Procedure ID	0040,1001	Identifier which identifies the Scheduled Procedure Step.

Table 8-5: Secondary Capture Image Storage SOP Class - General Equipment Module

Attribute Name	Tag	Note
Manufacturer	0008,0070	Manufacturer of the Equipment that produced the images. Enumerated value(s): Philips Medical Systems (Netherlands)
Institution Name	0008,0080	Institution where the equipment is located that produced the digital images.
Station Name	0008,1010	User defined name identifying the machine that produced the digital images.
Manufacturer's Model Name	0008,1090	Manufacturer's model number of the equipment that produced the digital images. Enumerated value(s): P H I L I P S INTEGRIS H, P H I L I P S INTEGRIS V

Table 8-5: Secondary Capture Image Storage SOP Class - General Equipment Module (Continued)

Attribute Name	Tag	Note
Software Versions	0018,1020	Manufacturer's designation of software version of the equipment that produced the digital images.

Table 8-6: Secondary Capture Image Storage SOP Class - SC Equipment Module

Attribute Name	Tag	Note
Conversion Type	0008,0064	Describes the kind of image conversion. Enumerated value(s): WSD

Table 8-7: Secondary Capture Image Storage SOP Class - General Image Module

Attribute Name	Tag	Note
Image Type	0008,0008	Image identification characteristics. Enumerated value(s): DERIVED \ SECONDARY \ BIPLANE A, BIPLANE B, SINGLE PLANE \ SINGLE A, SINGLE B
Image Number	0020,0013	A number that identifies the images.
Patient Orientation	0020,0020	Patient direction of the rows and columns of the image.

Table 8-8: Secondary Capture Image Storage SOP Class - Image Pixel Module

Attribute Name	Tag	Note
Samples per Pixel	0028,0002	Number of samples (planes) in this image. Enumerated value(s): 1
Photometric Interpretation	0028,0004	Specifies the intended interpretation of the pixel data. Enumerated value(s): MONOCHROME2
Rows	0028,0010	Number of rows in the image. Enumerated value(s): 1024
Columns	0028,0011	Number of columns in the image. Enumerated value(s): 1280

Table 8-8: Secondary Capture Image Storage SOP Class - Image Pixel Module (Continued)

Attribute Name	Tag	Note
Bits Allocated	0028,0100	Number of bits allocated for each pixel sample. Each sample shall have the same number of bits allocated. Enumerated value(s): 8
Bits Stored	0028,0101	Number of bits stored for each pixel sample. Enumerated value(s): 8
High Bit	0028,0102	Most significant bit for pixel sample data. Each sample shall have the same high bit. Enumerated value(s): 7
Pixel Representation	0028,0103	Data representation of the pixel samples. Each sample shall have the same pixel representation. Enumerated value(s): 0000
Pixel Data	7FE0,0010	A data stream of the pixel samples which comprise the Image.

Table 8-9: Secondary Capture Image Storage SOP Class - SC Image Module

Attribute Name	Tag	Note
-	-	-

Table 8-10: Secondary Capture Image Storage SOP Class - SOP Common Module

Attribute Name	Tag	Note
Specific Character Set	0008,0005	Character Set that expands or replaces the Basic Graphic Set Enumerated value(s): ISO_IR 100
SOP Class UID	0008,0016	Uniquely identifies the SOP Class. Enumerated value(s): 1.2.840.10008.5.1.4.1.1.7
SOP Instance UID	0008,0018	Uniquely identifies the SOP Instance.

Table 8-11: Secondary Capture Image Storage SOP Class - VOI LUT Module

Attribute Name	Tag	Note
Window Center	0028,1050	Enumerated value(s): 127.5
Window Width	0028,1051	Enumerated value(s): 255

8.2 Attributes of Integris Single-frame Vascular XA Image IOD

Table 8-12: Single-frame Vascular XA Image IOD for Integris

Information Entity	Module	Usage	Reference
Patient	Patient	M	Table 8-13
Study	General Study	M	Table 8-14
Series	General Series	M	Table 8-15
Equipment	General Equipment	M	Table 8-16
Image	General Image	M	Table 8-17
	Image Pixel (Extended)	M	Table 8-18
	Display Shutter	U	Table 8-19
	X-Ray Image	M	Table 8-20
	X-Ray Acquisition	M	Table 8-21
	XA Positioner	M	Table 8-22
	VOI LUT	U	Table 8-23
	SOP Common	M	Table 8-24
	Image Blanking (Private)	C	Table 8-25

The shaded boxes contain values which contents are obtained from the RIS/HIS

Table 8-13: Single-frame Vascular XA Image Storage SOP Class - Patient Module

Attribute Name	*Tag*	*Note*
Patient's Name	0010,0010	Patients's full legal name.
Patient ID	0010,0020	Primary hospital identification number or code for the patient.
Patient's Birth Date	0010,0030	Birth date of the patient.
Patient's Sex	0010,0040	Sex of the named patient. Enumerated value(s): F, M, O

Table 8-14: Single-frame Vascular XA Image Storage SOP Class - General Study Module

Attribute Name	Tag	Note
Study Date	0008,0020	Date the study started.
Study Time	0008,0030	Time the study started.
Accession Number	0008,0050	A RIS generated number which identifies the order for the study.
Referring Physician's Name	0008,0090	Patient's referring physician.
Study Description	0008,1030	Institution-generated description or classification of the Study (component) performed.
Study Instance UID	0020,000D	Unique identifier for the Study.
Study ID	0020,0010	User or equipment generated Study identifier.

Table 8-15: Single-frame Vascular XA Image Storage SOP Class - General Series Module

Attribute Name	Tag	Note
Series Date	0008,0021	Date the Series started.
Series Time	0008,0031	Time the Series started.
Modality	0008,0060	Type of equipment that originally acquired the data used to create the image. Enumerated value(s): XA
Performing Physicians' Name	0008,1050	Name of the physicians administering the Series.
Operator's name	0008,1070	Name of the physicians administering the Series.
Referenced Performed Procedure Step Sequence	0008,1111	Uniquely identifies the Performed Procedure Step SOP Instance to which the Series is related.
> Referenced SOP Class UID	0008,1150	Uniquely identifies the referenced Modality Performed Procedure SOP Class. Enumerated value(s): 1.2.840.10008.3.1.2.3.3
> Referenced SOP Instance UID	0008,1155	Uniquely identifies the referenced SOP Instance.
Protocol Name	0018,1030	User-defined description of the condition under which the Series was performed.
Series Instance UID	0020,000E	Unique identifier of the Series.

Table 8-15: Single-frame Vascular XA Image Storage SOP Class - General Series Module (Continued)

Attribute Name	Tag	Note
Series Number	0020,0011	A number that identifies the Series. Defined value(s): 1
Performed Procedure Step Start Date	0040,0244	Date on which the Performed Procedure Step started.
Performed Procedure Step Start Time	0040,0245	Time on which the Performed Procedure Step started.
Performed Procedure Step ID	0040,0253	Identification of that part of a procedure that has been carried out within this step.
Performed Procedure Step Description	0040,0254	Institution-generated description or classification of the procedure step that was performed.
Request Attributes Sequence	0040,0275	Sequence that contains attributes from the Imaging Service Request.
> Scheduled Procedure Step Description	0040,0007	Institution-generated description or classification of the Scheduled Procedure Step to be performed.
> Scheduled Protocol Code Sequence	0040,0008	Sequence describing the Scheduled Protocol following a specific coding scheme.
>> Code Value	0008,0100	Identifier that is unambiguous within the Coding Scheme.
>> Coding Scheme Designator	0008,0102	Designator that identifies the Coding Scheme.
>> Code Meaning	0008,0104	Text that conveys the meaning of the Coding Scheme.
> Scheduled Procedure Step ID	0040,0009	Identifier that identifies the Scheduled Procedure Step.
> Requested Procedure ID	0040,1001	Identifier that identifies the Requested Procedure in the Imaging Service Request.

Table 8-16: Single-frame Vascular XA Image Storage SOP Class - General Equipment Module

Attribute Name	Tag	Note
Manufacturer	0008,0070	Manufacturer of the equipment that produced the digital images. Enumerated value(s): Philips Medical Systems (Netherlands)
Institution Name	0008,0080	Institution where the equipment is located that produced the digital images.
Institution Address	0008,0081	Mailing address of the institution where the equipment that produced the composite instances is located.
Station Name	0008,1010	User defined name identifying the machine that produced the digital images.
Manufacturer's Model Name	0008,1090	Manufacturer's model number of the equipment that produced the digital images. Enumerated value(s): P H I L I P S INTEGRIS H, P H I L I P S INTEGRIS V
Software Versions	0018,1020	Manufacturer's designation of software version of the equipment that produced the digital images.

Table 8-17: Single-frame Vascular XA Image Storage SOP Class - General Image Module

Attribute Name	Tag	Note
Acquisition Date	0008,0022	The date the acquisition of data that resulted in this image started. Only for mixed examinations.
Acquisition Time	0008,0032	The time the acquisition of data that resulted in this image started. Only for mixed examinations.
Acquisition Number	0020,0012	A number identifying the single continuous gathering of data over a period of time which resulted in this Image.
Instance Number	0020,0013	A number that identifies this image.
Patient Orientation	0020,0020	Patient direction of the rows and columns of the image.
Images in Acquisition	0020,1002	Number of images that resulted from this acquisition of data. Defined value(s): 1

The italic attributes in the next table are an extension to the standard.

Table 8-18: Single-frame Vascular XA Image Storage SOP Class - Image Pixel Module (Extended)

Attribute Name	Tag	Note
Samples per Pixel	0028,0002	Number of samples (planes) in this image. Enumerated value(s): 1
Photometric Interpretation	0028,0004	Specifies the intended interpretation of the pixel data. Enumerated value(s): MONOCHROME2
Rows	0028,0010	Number of rows in the image. Enumerated value(s): 512, 1024 All combinations with Columns are possible.
Columns	0028,0011	Number of columns in the image. Enumerated value(s): 512, 1024 All combinations with Rows are possible.
Pixel Spacing *Section 5.1.2 on page 31*	*0028,0030*	*Physical distance in the patient between the center, specified by a numeric pair- adjacent row spacing (delimeter) adjacent column spacing in mm.* *Only present if SID is available.*
Pixel Aspect Ratio	0028,0034	Ratio of the vertical size and horizontal size of the pixels in the image specified by a numeric pair: vertical pixel size (delimeter) horizontal pixel size. Defined value(s): 1, 2 \ 1, 2
Bits Allocated	0028,0100	Number of bits allocated for each pixel sample. Each sample shall have the same number of bits allocated.
Bits Stored	0028,0101	Number of bits stored for each pixel sample.
High Bit	0028,0102	Most significant bit for pixel sample data. Each sample shall have the same high bit.
Pixel Representation	0028,0103	Data representation of the pixel samples. Each sample shall have the same pixel representation. Enumerated value(s): 0000, 0001
Pixel Data	7FE0,0010	A data stream of the pixel samples that comprise the image.

Table 8-19: Single-frame Vascular XA Image Storage SOP Class - Display Shutter Module

Attribute Name	Tag	Note
Shutter Shape	0018,1600	Shape(s) of the shutter defined for display. Enumerated value(s): RECTANGULAR
Shutter Left Vertical Edge	0018,1602	Location of the left edge of the rectangular shutter with respect to pixels in the image given as column.
Shutter Right Vertical Edge	0018,1604	Location of the right edge of the rectangular shutter with respect to pixels in the image given as column.
Shutter Upper Horizontal Edge	0018,1606	Location of the upper edge of the rectangular shutter with respect to pixels in the image given as row.
Shutter Lower Horizontal Edge	0018,1608	Location of the lower edge of the rectangular shutter with respect to pixels in the image given as row.

Table 8-20: Single-frame Vascular XA Image Storage SOP Class - X-Ray Image Module

Attribute Name	Tag	Note
Image Type	0008,0008	Image identification characteristics. Enumerated value(s): ORIGINAL \ PRIMARY \ BIPLANE A, BIPLANE B, SINGLE PLANE \ SINGLE A, SINGLE B
Reference Image Sequence	0008,1140	A sequence which provides reference to a set of Image SOP Class/Instance identifying other images significantly related to this image. Shall be used to relate each plane to the corresponding plane if Image Type (0008,0008) value 3 is BIPLANE A or BIPLANE B.
> Reference SOP Class UID	0008,1150	Uniquely identifies the referenced SOP Class. Enumerated value(s): 1.2.840.10008.5.1.4.1.1.12.1
> Reference SOP Instance UID	0008,1155	Uniquely identifies the referenced SOP Instance.
Samples per Pixel	0028,0002	Number of samples (color planes) in this image. Enumerated value(s): 1

Table 8-20: Single-frame Vascular XA Image Storage SOP Class - X-Ray Image Module (Continued)

Attribute Name	Tag	Note
Photometric Interpretation	0028,0004	Specifies the intended interpretation of the pixel data. Enumerated value(s): MONOCHROME2
Bits Allocated	0028,0100	Number of bits allocated for each pixel sample. Enumerated value(s): 8, 16
Bits Stored	0028,0101	Number of bits stored for each pixel sample. Enumerated value(s): 8, 10
High Bit	0028,0102	Most significant bit for pixel sample data. Enumerated value(s): 7, 9
Pixel Representation	0028,0103	Data representation of the pixel samples. Enumerated value(s): 0000
Pixel Intensity Relationship	0028,1040	The relationship between the pixel sample values and the X-Ray beam intensity. Enumerated value(s): DISP
Calibration Image	0050,0004	Indicates whether a reference object (phantom) of known size is present in the image and was used for calibration. Always Empty.

Table 8-21: Single-frame Vascular XA Image Storage SOP Class - X-Ray Acquisition Module

Attribute Name	Tag	Note
KVP	0018,0060	Peak kilo voltage output of the X-Ray generator used.
Exposure Time	0018,1150	Duration of X-Ray exposure in ms.
X-ray Tube Current	0018,1151	X-Ray Tube Current in mA.
Radiation Setting	0018,1155	Identifies the general level of X-Ray dose exposure. Enumerated value(s): GR, SC
Intensifier Size	0018,1162	Diameter of X-Ray intensifier in mm.

Table 8-22: Single-frame Vascular XA Image Storage SOP Class - XA Positioner Module

Attribute Name	Tag	Note
Distance Source to Detector	0018,1110	Distance in mm from source to detector center. Only present if SID is available.
Positioner Primary Angle	0018,1510	Position of the X-Ray Image Intensifier about the patient from the RAO to LAO direction where movement from RAO to vertical is positive (specified in degrees).
Positioner Secondary Angle	0018,1511	Position of the X-Ray Image Intensifier about the patient from the CAU to CRA direction where movement from CAU to vertical is positive (specified in degrees).

Table 8-23: Single-frame Vascular XA Image Storage SOP Class - VOI LUT Module

Attribute Name	Tag	Note
Window Center	0028,1050	Window center for display.
Window Width	0028,1051	Window width for display.

Table 8-24: Single-frame Vascular XA Image Storage SOP Class - SOP Common Module

Attribute Name	Tag	Note
Specific Character Set	0008,0005	Character Set that expands or replaces the Basic Graphic Set. Enumerated value(s): ISO_IR 100
SOP Class UID	0008,0016	Uniquely indentifies the SOP Class. Enumerated value(s): 1.2.840.10008.5.1.4.1.1.12.1
SOP Instance UID	0008,0018	Uniquely identifies the SOP Instance.

The italic attributes in the next table are an extension to the standard.

**Table 8-25: Single-frame Vascular XA Image Storage SOP Class - Image Blanking Module (Private)
(see Section 5.1.1 on page 30)**

Attribute Name	Tag	Note
Private Creator Group 0019	*0019,0010*	*Private Creator for Private Data Elements with Group Number 0019.*
Image Blanking Shape	*0019,1000*	Enumerated value(s): CIRCULAR, RECTANGULAR
Image Blanking Left Vertical Edge	*0019,1002*	*If Image Blanking Shape (0019,1000) is RECTANGULAR.*
Image Blanking Right Vertical Edge	*0019,1004*	*If Image Blanking Shape (0019,1000) is RECTANGULAR.*
Image Blanking Upper Horizontal Edge	*0019,1006*	*If Image Blanking Shape (0019,1000) is RECTANGULAR.*
Image Blanking Lower Horizontal Edge	*0019,1008*	*If Image Blanking Shape (0019,1000) is RECTANGULAR.*
Center Of Circular Image Blanking	*0019,1010*	*If Image Blanking Shape (0019,1000) is CIRCULAR.*
Radius Of Circular Image Blanking	*0019,1012*	*If Image Blanking Shape (0019,1000) is CIRCULAR.*

8.3 Attributes of Integris Multi-frame Vascular XA Image IOD

Table 8-26: Multi-frame Vascular XA Image IOD for Integris

Information Entity	Module	Usage	Reference
Patient	Patient	M	Table 8-27
Study	General Study	M	Table 8-28
Series	General Series	M	Table 8-29
Equipment	General Equipment	M	Table 8-30
Image	General Image	M	Table 8-31
	Image Pixel (Extended)	M	Table 8-32
	Cine	C	Table 8-33
	Multi-frame	C	Table 8-34
	Display Shutter	U	Table 8-35
	X-Ray Image (Extended)	M	Table 8-36
	X-Ray Acquisition	M	Table 8-37
	XA Positioner	M	Table 8-38
	VOI LUT	U	Table 8-39
	SOP Common	M	Table 8-40
	Image Blanking (Private)	C	Table 8-41

The shaded boxes contain values which contents are obtained from the RIS/HIS

Table 8-27: Multi-frame Vascular XA Image Storage SOP Class - Patient Module

Attribute Name	*Tag*	*Note*
Patient's Name	0010,0010	Patients's full legal name.
Patient ID	0010,0020	Primary hospital identification number or code for the patient.
Patient's Birth Date	0010,0030	Birth date of the patient.
Patient's Sex	0010,0040	Sex of the named patient. Enumerated value(s): F, M, O

Table 8-28: Multi-frame Vascular XA Image Storage SOP Class - General Study Module

Attribute Name	Tag	Note
Study Date	0008,0020	Date the study started.
Study Time	0008,0030	Time the study started.
Accession Number	0008,0050	A RIS generated number which identifies the order for the study.
Referring Physician's Name	0008,0090	Patient's referring physician.
Study Description	0008,1030	Institution-generated description or classification of the Study (component) performed.
Study Instance UID	0020,000D	Unique identifier for the Study.
Study ID	0020,0010	User or equipment generated Study identifier.

Table 8-29: Multi-frame Vascular XA Image Storage SOP Class - General Series Module

Attribute Name	Tag	Note
Series Date	0008,0021	Date the Series started.
Series Time	0008,0031	Time the Series started.
Modality	0008,0060	Type of equipment that originally acquired the data used to create the image. Enumerated value(s): XA
Performing Physicians' Name	0008,1050	Name of the physicians administering the Series.
Operator's name	0008,1070	Name of the physicians administering the Series.
Referenced Performed Procedure Step Sequence	0008,1111	Uniquely identifies the Performed Procedure Step SOP Instance to which the Series is related.
> Referenced SOP Class UID	0008,1150	Uniquely identifies the referenced Modality Performed Procedure SOP Class. Enumerated value(s): 1.2.840.10008.3.1.2.3.3
> Referenced SOP Instance UID	0008,1155	Uniquely identifies the referenced SOP Instance.
Protocol Name	0018,1030	User-defined description of the condition under which the Series was performed.
Series Instance UID	0020,000E	Unique identifier of the Series.

Table 8-29: Multi-frame Vascular XA Image Storage SOP Class - General Series Module (Continued)

Attribute Name	Tag	Note
Series Number	0020,0011	A number that identifies the Series. Enumerated value(s): 1
Performed Procedure Step Start Date	0040,0244	Date on which the Performed Procedure Step started.
Performed Procedure Step Start Time	0040,0245	Time on which the Performed Procedure Step started.
Performed Procedure Step ID	0040,0253	Identification of that part of a procedure that has been carried out within this step.
Performed Procedure Step Description	0040,0254	Institution-generated description or classification of the procedure step that was performed.
Request Attributes Sequence	0040,0275	Sequence that contains attributes from the Imaging Service Request.
> Scheduled Procedure Step Description	0040,0007	Institution-generated description or classification of the Scheduled Procedure Step to be performed.
> Scheduled Protocol Code Sequence	0040,0008	Sequence describing the Scheduled Protocol following a specific coding scheme.
>> Code Value	0008,0100	Identifier that is unambiguous within the Coding Scheme.
>> Coding Scheme Designator	0008,0102	Designator that identifies the Coding Scheme.
>> Code Meaning	0008,0104	Text that conveys the meaning of the Coding Scheme.
> Scheduled Procedure Step ID	0040,0009	Identifier that identifies the Scheduled Procedure Step.
> Requested Procedure ID	0040,1001	Identifier that identifies the Requested Procedure in the Imaging Service Request.

Table 8-30: Multi-frame Vascular XA Image Storage SOP Class - General Equipment Module

Attribute Name	Tag	Note
Manufacturer	0008,0070	Manufacturer of the equipment that produced the digital images. Enumerated value(s): Philips Medical Systems (Netherlands)
Institution Name	0008,0080	Institution where the equipment is located that produced the digital images.
Institution Address	0008,0081	Mailing address of the institution where the equipment that produced the composite instances is located.
Station Name	0008,1010	User defined name identifying the machine that produced the digital images.
Manufacturer's Model Name	0008,1090	Manufacturer's model number of the equipment that produced the digital images. Enumerated value(s): P H I L I P S INTEGRIS H, P H I L I P S INTEGRIS V
Software Versions	0018,1020	Manufacturer's designation of software version of the equipment that produced the digital images.

Table 8-31: Multi-frame Vascular XA Image Storage SOP Class - General Image Module

Attribute Name	Tag	Note
Acquisition Date	0008,0022	The date the acquisition of data that resulted in this image started.
Acquisition Time	0008,0032	The time the acquisition of data that resulted in this image started.
Acquisition Number	0020,0012	A number identifying the single continuous gathering of data over a period of time which resulted in this Image.
Instance Number	0020,0013	A number that identifies this image.
Patient Orientation	0020,0020	Patient direction of the rows and columns of the image.
Images in Acquisition	0020,1002	Number of images that resulted from this acquisition of data. Defined value(s): 1

The italic attributes in the next table are an extension to the standard.

Table 8-32: Multi-frame Vascular XA Image Storage SOP Class - Image Pixel Module (Extended)

Attribute Name	Tag	Note
Samples per Pixel	0028,0002	Number of samples (planes) in this image. Enumerated value(s): 1
Photometric Interpretation	0028,0004	Specifies the intended interpretation of the pixel data.
Rows	0028,0010	Number of rows in the image. Enumerated value(s): 512, 1024 All combinations with Columns are possible.
Columns	0028,0011	Number of columns in the image. Enumerated value(s): 512, 1024 All combinations with Rows are possible.
Pixel Spacing *Section 5.2.3 on page 32*	*0028,0030*	*Physical distance in the patient between the center, specified by a numeric pair- adjacent row spacing (delimeter) adjacent column spacing in mm.* *Only present if SID is available.*
Pixel Aspect Ratio	0028,0034	Ratio of the vertical size and horizontal size of the pixels in the image specified by a numeric pair: vertical pixel size (delimeter) horizontal pixel size. Defined value(s): 1, 2 \ 1, 2
Bits Allocated	0028,0100	Number of bits allocated for each pixel sample. Each sample shall have the same number of bits allocated.
Bits Stored	0028,0101	Number of bits stored for each pixel sample.
High Bit	0028,0102	Most significant bit for pixel sample data. Each sample shall have the same high bit.
Pixel Representation	0028,0103	Data representation of the pixel samples. Each sample shall have the same pixel representation. Enumerated value(s): 0000, 0001
Pixel Data	7FE0,0010	A data stream of the pixel samples that comprise the image.

Table 8-33: Multi-frame Vascular XA Image Storage SOP Class - Cine Module

Attribute Name	Tag	Note
Frame Time	0018,1063	Nominal time (ms) per individual frames of a Multi-frame Image.
Frame Time Vector	0018,1065	An array that contains the time increments (ms) between frames for a multi-frame image.
Frame Delay	0018,1066	Time (ms) from Content Time (0008,0033) to the start of the first frame in a multi-frame image.

Table 8-34: Multi-frame Vascular XA Image Storage SOP Class - Multi-frame Module

Attribute Name	Tag	Note
Number of Frames	0028,0008	Number of frames in a Multi-frame Image.
Frame Increment Pointer	0028,0009	Contains the Data Element Tag of the attribute that is used as the frame increment in multi-frame pixel data.

Table 8-35: Multi-frame Vascular XA Image Storage SOP Class - Display Shutter Module

Attribute Name	Tag	Note
Shutter Shape	0018,1600	Shape(s) of the shutter for the display. Enumerated value(s): RECTANGULAR
Shutter Left Vertical Edge	0018,1602	Location of the left edge of the rectangular shutter with respect to pixels in the image given as column.
Shutter Right Vertical Edge	0018,1604	Location of the right edge of the rectangular shutter with respect to pixels in the image given as column.
Shutter Upper Horizontal Edge	0018,1606	Location of the upper edge of the rectangular shutter with respect to pixels in the image given as row.
Shutter Lower Horizontal Edge	0018,1608	Location of the lower edge of the rectangular shutter with respect to pixels in the image given as row.

The italic attributes in the next table are an extension to the standard.

Table 8-36: Multi-frame Vascular XA Image Storage SOP Class - X-Ray Image Module (Extended)

Attribute Name	Tag	Note
Image Type	0008,0008	Image identification characteristics. Enumerated value(s): ORIGINAL \ PRIMARY \ BIPLANE A, BIPLANE B, SINGLE PLANE \ SINGLE A, SINGLE B
Reference Image Sequence	0008,1140	A sequence that provides reference to a set of Image SOP Class/Instance identifying other images significantly related to this image. Shall be used to relate each plane to the corresponding plane if Image Type (0008,0008) value 3 is BIPLANE A or BIPLANE B.
> Reference SOP Class UID	0008,1150	Uniquely identifies the referenced SOP Class. Enumerated value(s): 1.2.840.10008.5.1.4.1.1.12.1
> Reference SOP Instance UID	0008,1155	Uniquely identifies the referenced SOP Instance.
Scan Options	0018,0022	Parameters of scanning sequence. Enumerated value(s): EKG
Samples per Pixel	0028,0002	Number of samples (color planes) in this image. Enumerated value(s): 1
Photometric Interpretation	0028,0004	Specifies the intended interpretation of the pixel data. Enumerated value(s): MONOCHROME2
Frame Increment Pointer	0028,0009	Contains the Data Element Tag of the attribute that is used as the frame increment in multi-frame image pixel data. Enumerated value(s): 0x00181063, 0x00181065
Bits Allocated	0028,0100	Number of bits allocated for each pixel sample. Enumerated value(s): 8, 16
Bits Stored	0028,0101	Number of bits stored for each pixel sample. Enumerated value(s): 8, 10
High Bit	0028,0102	Most significant bit for pixel sample data. Enumerated value(s): 7, 9
Pixel Representation	0028,0103	Data representation of the pixel samples. Enumerated value(s): 0000
Pixel Intensity Relationship	0028,1040	The relationship between the pixel sample values and the X-Ray beam intensity. Enumerated value(s): DISP, LIN, LOG

Table 8-36: Multi-frame Vascular XA Image Storage SOP Class - X-Ray Image Module (Extended)

Attribute Name	Tag	Note
Calibration Image	0050,0004	Indicates whether a reference object (phantom) of known size is present in the image and was used for calibration. Always Empty
Private Creator Group 0029	*0029,0010*	*Private Creator for Edge Enhancement Sequence (Group Number 0029).* *Enumerated value(s): INTEGRIS 1.0*
Edge Enhancement Sequence	*0029,1000*	*Edge enhancement sequence describing the Edge Enhancement Filter to be applied to this Image.*
> Private Creator Group 0029	*0029,0010*	*Private Creator for Private Data Elements with Group Number 0029 (in Edge Enhancement Sequence).* *Enumerated value(s): INTEGRIS 1.0*
> Convolution Kernel Size	*0029,1001*	-
> Convolution Kernel Coefficients	*0029,1002*	-
> Edge Enhancement Gain	*0029,1003*	-

Table 8-37: Multi-frame Vascular XA Image Storage SOP Class - X-Ray Acquisition Module

Attribute Name	Tag	Note
KVP	0018,0060	Peak kilo voltage output of the X-Ray generator used.
Exposure Time	0018,1150	Duration of X-Ray exposure in ms.
X-ray Tube Current	0018,1151	X-Ray Tube Current in mA.
Radiation Setting	0018,1155	Identifies the general level of X-Ray dose exposure. Enumerated value(s): GR, SC
Intensifier Size	0018,1162	Diameter of X-Ray intensifier in mm.

Table 8-38: Multi-frame Vascular XA Image Storage SOP Class - XA Positioner Module

Attribute Name	Tag	Note
Distance Source to Detector	0018,1110	Distance in mm from source to detector center. Only present if SID is available.

Table 8-38: Multi-frame Vascular XA Image Storage SOP Class - XA Positioner Module (Continued)

Attribute Name	Tag	Note
Positioner Motion	0018,1500	Used to describe the activity of the imaging devices. Enumerated value(s): DYNAMIC, STATIC
Positioner Primary Angle	0018,1510	Position of the X-Ray Image Intensifier about the patient from the RAO to LAO direction where movement from RAO to vertical is positive (specified in degrees).
Positioner Secondary Angle	0018,1511	Position of the X-Ray Image Intensifier about the patient from the CAU to CRA direction where movement from CAU to vertical is positive (specified in degrees).
Positioner Primary Angle Increment	0018,1520	Incremental change in primary positioner angle for each frame (specified in degrees).
Positioner Secondary Angle Increment	0018,1521	Incremental change in secondary positioner angle for each frame (specified in degrees).

Table 8-39: Multi-frame Vascular XA Image Storage SOP Class - VOI LUT Module

Attribute Name	Tag	Note
Window Center	0028,1050	Window center for display.
Window Width	0028,1051	Window width for display.

Table 8-40: Multi-frame Vascular XA Image Storage SOP Class - SOP Common Module

Attribute Name	Tag	Note
Specific Character Set	0008,0005	Character Set that expands or replaces the Basic Graphic Set. Enumerated value(s): ISO_IR 100
SOP Class UID	0008,0016	Uniquely indentifies the SOP Class. Enumerated value(s): 1.2.840.10008.5.1.4.1.1.12.1
SOP Instance UID	0008,0018	Uniquely identifies the SOP Instance.

The italic attributes in the next table are an extension to the standard.

**Table 8-41: Multi-frame Vascular XA Image Storage SOP Class - Image Blanking Module (Private)
(see Section 5.2.2 on page 32)**

Attribute Name	Tag	Note
Private Creator Group 0019	*0019,0010*	*Private Creator for Private Data Elements with Group Number 0019.*
Image Blanking Shape	*0019,1000*	Enumerated value(s): CIRCULAR, RECTAN-GULAR
Image Blanking Left Vertical Edge	*0019,1002*	*If Image Blanking Shape (0019,1000) is REC-TANGULAR.*
Image Blanking Right Vertical Edge	*0019,1004*	*If Image Blanking Shape (0019,1000) is REC-TANGULAR.*
Image Blanking Upper Horizontal Edge	*0019,1006*	*If Image Blanking Shape (0019,1000) is REC-TANGULAR.*
Image Blanking Lower Horizontal Edge	*0019,1008*	*If Image Blanking Shape (0019,1000) is REC-TANGULAR.*
Center Of Circular Image Blanking	*0019,1010*	*If Image Blanking Shape (0019,1000) is CIR-CULAR.*
Radius Of Circular Image Blanking	*0019,1012*	*If Image Blanking Shape (0019,1000) is CIR-CULAR.*

8.4 Attributes of Integris Multi-frame Cardiac XA Image IOD

Table 8-42: Multi-frame Cardiac XA Image IOD for Integris

Information Entity	Module	Usage	Reference
Patient	Patient	M	Table 8-43
Study	General Study	M	Table 8-44
Series	General Series	M	Table 8-45
Equipment	General Equipment	M	Table 8-46
Image	General Image	M	Table 8-47
	Image Pixel (Extended)	M	Table 8-48
	Cine	C	Table 8-49
	Multi-frame	C	Table 8-50
	Display Shutter	U	Table 8-51
	X-Ray Image (Extended)	M	Table 8-52
	X-Ray Acquisition	M	Table 8-53
	XA Positioner	M	Table 8-54
	Curve	U	Table 8-55
	Modality LUT	C/U	Table 8-56
	VOI LUT	U	Table 8-57
	SOP Common	M	Table 8-58
	Image Blanking (Private)	C	Table 8-59

The shaded boxes contain values which contents are obtained from the RIS/HIS

Table 8-43: Multi-frame Cardiac XA Image Storage SOP Class - Patient Module

Attribute Name	*Tag*	*Note*
Patient's Name	0010,0010	Patients's full legal name.
Patient ID	0010,0020	Primary hospital identification number or code for the patient.
Patient's Birth Date	0010,0030	Birth date of the patient.
Patient's Sex	0010,0040	Sex of the named patient. Enumerated value(s): F, M, O

Table 8-44: Multi-frame Cardiac XA Image Storage SOP Class - General Study Module

Attribute Name	Tag	Note
Study Date	0008,0020	Date the study started.
Study Time	0008,0030	Time the study started.
Accession Number	0008,0050	A RIS generated number which identifies the order for the study.
Referring Physician's Name	0008,0090	Patient's referring physician.
Study Description	0008,1030	Institution-generated description or classification of the Study (component) performed.
Study Instance UID	0020,000D	Unique identifier for the Study.
Study ID	0020,0010	User or equipment generated Study identifier.

Table 8-45: Multi-frame Cardiac XA Image Storage SOP Class - General Series Module

Attribute Name	Tag	Note
Series Date	0008,0021	Date the Series started.
Series Time	0008,0031	Time the Series started.
Modality	0008,0060	Type of equipment that originally acquired the data used to create the image. Enumerated value(s): XA
Performing Physicians' Name	0008,1050	Name of the physicians administering the Series.
Operator's name	0008,1070	Name of the physicians administering the Series.
Referenced Performed Procedure Step Sequence	0008,1111	Uniquely identifies the Performed Procedure Step SOP Instance to which the Series is related.
> Referenced SOP Class UID	0008,1150	Uniquely identifies the referenced Modality Performed Procedure SOP Class. Enumerated value(s): 1.2.840.10008.3.1.2.3.3
> Referenced SOP Instance UID	0008,1155	Uniquely identifies the referenced SOP Instance.
Protocol Name	0018,1030	User-defined description of the condition under which the Series was performed.
Series Instance UID	0020,000E	Unique identifier of the Series.

Table 8-45: Multi-frame Cardiac XA Image Storage SOP Class - General Series Module (Continued)

Attribute Name	Tag	Note
Series Number	0020,0011	A number that identifies the Series. Enumerated value(s): 1
Performed Procedure Step Start Date	0040,0244	Date on which the Performed Procedure Step started.
Performed Procedure Step Start Time	0040,0245	Time on which the Performed Procedure Step started.
Performed Procedure Step ID	0040,0253	Identification of that part of a procedure that has been carried out within this step.
Performed Procedure Step Description	0040,0254	Institution-generated description or classification of the procedure step that was performed.
Request Attributes Sequence	0040,0275	Sequence that contains attributes from the Imaging Service Request.
> Scheduled Procedure Step Description	0040,0007	Institution-generated description or classification of the Scheduled Procedure Step to be performed.
> Scheduled Protocol Code Sequence	0040,0008	Sequence describing the Scheduled Protocol following a specific coding scheme.
>> Code Value	0008,0100	Identifier that is unambiguous within the Coding Scheme.
>> Coding Scheme Designator	0008,0102	Designator that identifies the Coding Scheme.
>> Code Meaning	0008,0104	Text that conveys the meaning of the Coding Scheme.
> Scheduled Procedure Step ID	0040,0009	Identifier that identifies the Scheduled Procedure Step.
> Requested Procedure ID	0040,1001	Identifier that identifies the Requested Procedure in the Imaging Service Request.

Table 8-46: Multi-frame Cardiac XA Image Storage SOP Class - General Equipment Module

Attribute Name	Tag	Note
Manufacturer	0008,0070	Manufacturer of the equipment that produced the digital images. Enumerated value(s): Philips Medical Systems (Netherlands)
Institution Name	0008,0080	Institution where the equipment is located that produced the digital images.
Institution Address	0008,0081	Mailing address of the institution where the equipment that produced the composite instances is located.
Station Name	0008,1010	User defined name identifying the machine that produced the digital images.
Manufacturer's Model Name	0008,1090	Manufacturer's model number of the equipment that produced the digital images. Enumerated value(s): P H I L I P S INTEGRIS H, P H I L I P S INTEGRIS V
Software Versions	0018,1020	Manufacturer's designation of software version of the equipment that produced the digital images.

Table 8-47: Multi-frame Cardiac XA Image Storage SOP Class - General Image Module

Attribute Name	Tag	Note
Acquisition Date	0008,0022	The date the acquisition of data that resulted in this image started.
Acquisition Time	0008,0032	The time the acquisition of data that resulted in this image started.
Acquisition Number	0020,0012	A number identifying the single continuous gathering of data over a period of time which resulted in this Image.
Instance Number	0020,0013	A number that identifies this image.
Patient Orientation	0020,0020	Patient direction of the rows and columns of the image.
Images in Acquisition	0020,1002	Number of images that resulted from this acquisition of data. Defined value(s): 1

The italic attributes in the next table are an extension to the standard.

Table 8-48: Multi-frame Cardiac XA Image Storage SOP Class - Image Pixel Module (Extended)

Attribute Name	Tag	Note
Samples per Pixel	0028,0002	Number of samples (planes) in this image. Enumerated value(s): 1
Photometric Interpretation	0028,0004	Specifies the intended interpretation of the pixel data.
Rows	0028,0010	Number of rows in the image. Enumerated value(s): 512, 1024 All combinations with Columns are possible.
Columns	0028,0011	Number of columns in the image. Enumerated value(s): 512, 1024 All combinations with Rows are possible.
Pixel Spacing *Section 5.3.3 on page 34*	*0028,0030*	*Physical distance in the patient between the center, specified by a numeric pair- adjacent row spacing (delimeter) adjacent column spacing in mm.* *Only present if SID is available.*
Pixel Aspect Ratio	0028,0034	Ratio of the vertical size and horizontal size of the pixels in the image specified by a numeric pair: vertical pixel size (delimeter) horizontal pixel size. Defined value(s): 1, 2 \ 1, 2
Bits Allocated	0028,0100	Number of bits allocated for each pixel sample. Each sample shall have the same number of bits allocated.
Bits Stored	0028,0101	Number of bits stored for each pixel sample.
High Bit	0028,0102	Most significant bit for pixel sample data. Each sample shall have the same high bit.
Pixel Representation	0028,0103	Data representation of the pixel samples. Each sample shall have the same pixel representation. Enumerated value(s): 0000, 0001
Pixel Data	7FE0,0010	A data stream of the pixel samples that comprise the image.

Table 8-49: Multi-frame Cardiac XA Image Storage SOP Class - Cine Module

Attribute Name	Tag	Note
Frame Time	0018,1063	Nominal time (ms) per individual frames of a Multi-frame Image.
Frame Time Vector	0018,1065	An array that contains the time increments (ms) between frames for a multi-frame image.
Frame Delay	0018,1066	Time (ms) from Content Time (0008,0033) to the start of the first frame in a multi-frame image.

Table 8-50: Multi-frame Cardiac XA Image Storage SOP Class - Multi-frame Module

Attribute Name	Tag	Note
Number of Frames	0028,0008	Number of frames in a Multi-frame Image.
Frame Increment Pointer	0028,0009	Contains the Data Element Tag of the attribute that is used as the frame increment in multi-frame pixel data.

Table 8-51: Multi-frame Cardiac XA Image Storage SOP Class - Display Shutter Module

Attribute Name	Tag	Note
Shutter Shape	0018,1600	Shape(s) of the shutter for the display. Enumerated value(s): RECTANGULAR
Shutter Left Vertical Edge	0018,1602	Location of the left edge of the rectangular shutter with respect to pixels in the image given as column.
Shutter Right Vertical Edge	0018,1604	Location of the right edge of the rectangular shutter with respect to pixels in the image given as column.
Shutter Upper Horizontal Edge	0018,1606	Location of the upper edge of the rectangular shutter with respect to pixels in the image given as row.
Shutter Lower Horizontal Edge	0018,1608	Location of the lower edge of the rectangular shutter with respect to pixels in the image given as row.

The italic attributes in the next table are an extension to the standard.

Table 8-52: Multi-frame Cardiac XA Image Storage SOP Class - X-Ray Image Module (Extended)

Attribute Name	*Tag*	*Note*
Image Type	0008,0008	Image identification characteristics. Enumerated value(s): ORIGINAL \ PRIMARY \ BIPLANE A, BIPLANE B, SINGLE PLANE \ SINGLE A, SINGLE B
Reference Image Sequence	0008,1140	A sequence that provides reference to a set of Image SOP Class/Instance identifying other images significantly related to this image. Shall be used to relate each plane to the corresponding plane if Image Type (0008,0008) value 3 is BIPLANE A or BIPLANE B.
> Reference SOP Class UID	0008,1150	Uniquely identifies the referenced SOP Class. Enumerated value(s): 1.2.840.10008.5.1.4.1.1.12.1
> Reference SOP Instance UID	0008,1155	Uniquely identifies the referenced SOP Instance.
Scan Options	0018,0022	Parameters of scanning sequence. Enumerated value(s): EKG
Samples per Pixel	0028,0002	Number of samples (color planes) in this image. Enumerated value(s): 1
Photometric Interpretation	0028,0004	Specifies the intended interpretation of the pixel data. Enumerated value(s): MONOCHROME2
Frame Increment Pointer	0028,0009	Contains the Data Element Tag of the attribute that is used as the frame increment in multi-frame image pixel data. Enumerated value(s): 0x00181063, 0x00181065
Bits Allocated	0028,0100	Number of bits allocated for each pixel sample. Enumerated value(s): 8, 16
Bits Stored	0028,0101	Number of bits stored for each pixel sample. Enumerated value(s): 8, 10
High Bit	0028,0102	Most significant bit for pixel sample data. Enumerated value(s): 7, 9
Pixel Representation	0028,0103	Data representation of the pixel samples. Enumerated value(s): 0000
Pixel Intensity Relationship	0028,1040	The relationship between the pixel sample values and the X-Ray beam intensity. Enumerated value(s): DISP, LIN, LOG

Table 8-52: Multi-frame Cardiac XA Image Storage SOP Class - X-Ray Image Module (Extended)

Attribute Name	Tag	Note
Calibration Image	0050,0004	Indicates whether a reference object (phantom) of known size is present in the image and was used for calibration. Always Empty
Private Creator Group 0029	*0029,0010*	*Private Creator for Edge Enhancement Sequence (Group Number 0029).* *Enumerated value(s): INTEGRIS 1.0*
Edge Enhancement Sequence	*0029,1000*	*Edge enhancement sequence describing the Edge Enhancement Filter to be applied to this Image.*
> Private Creator Group 0029	*0029,0010*	*Private Creator for Private Data Elements with Group Number 0029 (in Edge Enhancement Sequence).* *Enumerated value(s): INTEGRIS 1.0*
> Convolution Kernel Size	*0029,1001*	*-*
> Convolution Kernel Coefficients	*0029,1002*	*-*
> Edge Enhancement Gain	*0029,1003*	*-*

Table 8-53: Multi-frame Cardiac XA Image Storage SOP Class - X-Ray Acquisition Module

Attribute Name	Tag	Note
KVP	0018,0060	Peak kilo voltage output of the X-Ray generator used.
Exposure Time	0018,1150	Duration of X-Ray exposure in ms.
X-ray Tube Current	0018,1151	X-Ray Tube Current in mA.
Radiation Setting	0018,1155	Identifies the general level of X-Ray dose exposure. Enumerated value(s): GR, SC
Intensifier Size	0018,1162	Diameter of X-Ray intensifier in mm.

Table 8-54: Multi-frame Cardiac XA Image Storage SOP Class - XA Positioner Module

Attribute Name	Tag	Note
Distance Source to Detector	0018,1110	Distance in mm from source to detector center. Only present if SID is available.
Positioner Motion	0018,1500	Used to describe the activity of the imaging devices. Enumerated value(s): DYNAMIC, STATIC
Positioner Primary Angle	0018,1510	Position of the X-Ray Image Intensifier about the patient from the RAO to LAO direction where movement from RAO to vertical is positive (specified in degrees).
Positioner Secondary Angle	0018,1511	Position of the X-Ray Image Intensifier about the patient from the CAU to CRA direction where movement from CAU to vertical is positive (specified in degrees).
Positioner Primary Angle Increment	0018,1520	Incremental change in primary positioner angle for each frame (specified in degrees).
Positioner Secondary Angle Increment	0018,1521	Incremental change in secondary positioner angle for each frame (specified in degrees).

Table 8-55: Multi-frame Cardiac XA Image Storage SOP Class - Curve Module

Attribute Name	Tag	Note
Curve Dimensions	5000,0005	Number of dimensions for the data. Enumerated value(s): 2
Number of Points	5000,0010	Number of data points in this Curve.
Type of Data	5000,0020	Type of data in this Curve. Enumerated value(s): ECG, PHYSIO, PRESSURE
Axis Units	5000,0030	Units of measure for the axes. Enumerated value(s): DPPS, NONE
Data Value Representation	5000,0103	Data representation of the curve data points. Enumerated value(s): 0000
Curve Data Descriptor	5000,0110	Specifies the format of the Curve Data. Enumerated value(s): 0000, 0001
Coordinate Start Value	5000,0112	The starting point of a one dimensional data list. Enumerated value(s): 0000
Coordinate Step Value	5000,0114	The interval spacing between two successive points.

Table 8-55: Multi-frame Cardiac XA Image Storage SOP Class - Curve Module (Continued)

Attribute Name	Tag	Note
Curve Label	5000,2500	A user defined text string that may be used to label or name this curve.
Curve Data	5000,3000	Curve Data.

Table 8-56: Multi-frame Cardiac XA Image Storage SOP Class - Modality LUT Module

Attribute Name	Tag	Note
Modality LUT Sequence	0028,3000	Defines a sequence of Modality LUTs.
> LUT Descriptor	0028,3002	Specifies the format of the LUT Data in this Sequence.
> Modality LUT Type	0028,3004	Specifies the output values of this Modality LUT. Enumerated value(s): US
> LUT Data	0028,3006	LUT Data in this Sequence.

Table 8-57: Multi-frame Cardiac XA Image Storage SOP Class - VOI LUT Module

Attribute Name	Tag	Note
Window Center	0028,1050	Window center for display.
Window Width	0028,1051	Window width for display.

Table 8-58: Multi-frame Cardiac XA Image Storage SOP Class - SOP Common Module

Attribute Name	Tag	Note
Specific Character Set	0008,0005	Character Set that expands or replaces the Basic Graphic Set. Enumerated value(s): ISO_IR 100
SOP Class UID	0008,0016	Uniquely indentifies the SOP Class. Enumerated value(s): 1.2.840.10008.5.1.4.1.1.12.1
SOP Instance UID	0008,0018	Uniquely identifies the SOP Instance.

The italic attributes in the next table are an extension to the standard.

Table 8-59: Multi-frame Cardiac XA Image Storage SOP Class - Image Blanking Module (Private) (see Section 5.3.2 on page 33)

Attribute Name	Tag	Note
Private Creator Group 0019	*0019,0010*	*Private Creator for Private Data Elements with Group Number 0019.*
Image Blanking Shape	*0019,1000*	Enumerated value(s): CIRCULAR, RECTANGULAR
Image Blanking Left Vertical Edge	*0019,1002*	*If Image Blanking Shape (0019,1000) is RECTANGULAR.*
Image Blanking Right Vertical Edge	*0019,1004*	*If Image Blanking Shape (0019,1000) is RECTANGULAR.*
Image Blanking Upper Horizontal Edge	*0019,1006*	*If Image Blanking Shape (0019,1000) is RECTANGULAR.*
Image Blanking Lower Horizontal Edge	*0019,1008*	*If Image Blanking Shape (0019,1000) is RECTANGULAR.*
Center Of Circular Image Blanking	*0019,1010*	*If Image Blanking Shape (0019,1000) is CIRCULAR.*
Radius Of Circular Image Blanking	*0019,1012*	*If Image Blanking Shape (0019,1000) is CIRCULAR.*

8.5 Attributes of Integris Modality Worklist Query/Retrieve

Table 8-60: Modality Worklist Query/Retrieve Information Model for Integris

Module	Reference
SOP Common	Table 8-61
Scheduled Procedure Step	Table 8-62
Requested Procedure	Table 8-63
Imaging Service Request	Table 8-64
Visit Identification	Table 8-65
Visit Status	Table 8-66
Visit Relationship	Table 8-67
Visit Admission	Table 8-68
Patient Relationship	Table 8-69
Patient Identification	Table 8-70
Patient Demographic	Table 8-71
Patient Medical	Table 8-72

Table 8-61: Modality Worklist Information Model - FIND SOP Class - SOP Common Module

Attribute Name	Tag	Note
Specific Character Set	0008,0005	ISO_IR 100

Table 8-62: Modality Worklist Information Model - FIND SOP Class - Scheduled Procedure Step Module

Attribute Name	Tag	Note
Scheduled Procedure Step Sequence	0040,0100	The attributes of the Scheduled Procedure Step shall only be retrieved with sequence matching. The Scheduled Procedure Step Sequence shall contain only a single item.
> Modality	0008,0060	User interface item. The Modality shall be retrieved with Single Value Matching.

Table 8-62: Modality Worklist Information Model - FIND SOP Class - Scheduled Procedure Step Module

Attribute Name	Tag	Note
> Scheduled Station AE Title	0040,0001	User interface item. The Scheduled Station AE Title shall be retrieved with Single Value Matching only.
> Scheduled Procedure Step Start Date	0040,0002	User interface item. The Scheduled Procedure Step Start Date shall be retrieved with Single Value Matching or Range Matching.
> Scheduled Procedure Step Start Time	0040,0003	Always zero length, so match all for the query response.
> Scheduled Performing Physician's Name	0040,0006	Always zero length, so match all for the query response.
> Scheduled Procedure Step Description	0040,0007	Always zero length, so match all for the query response.
> Scheduled Protocol Code Sequence	0040,0008	Always zero length, so match all for the query response.
> Scheduled Procedure Step ID	0040,0009	User interface item.
> Scheduled Station Name	0040,0010	Always zero length, so match all for the query response.

Table 8-63: Modality Worklist Information Model - FIND SOP Class - Requested Procedure Module

Attribute Name	Tag	Note
Referenced Study Sequence	0008,1110	Always zero length, so match all for the query response.
Study Instance UID	0020,000D	Always zero length, so match all for the query response.
Requested Procedure Description	0032,1060	Always zero length, so match all for the query response.
Requested Procedure ID	0040,1001	User interface item.

Table 8-64: Modality Worklist Information Model - FIND SOP Class - Imaging Service Request Module

Attribute Name	Tag	Note
Accession Number	0008,0050	User interface item.

Table 8-64: Modality Worklist Information Model - FIND SOP Class - Imaging Service Request Module

Attribute Name	Tag	Note
Referring Physician's Name	0008,0090	Always zero length, so match all for the query response.

Table 8-65: Modality Worklist Information Model - FIND SOP Class - Visit Identification Module

Attribute Name	Tag	Note
Institution Name	0008,0080	Always zero length, so match all for the query response

Table 8-66: Modality Worklist Information Model - FIND SOP Class - Visit Status Module

Attribute Name	Tag	Note
-	-	-

Table 8-67: Modality Worklist Information Model - FIND SOP Class - Visit Relationship Module

Attribute Name	Tag	Note
Referenced Patient Sequence	0008,1120	Always zero length, so match all for the query response.

Table 8-68: Modality Worklist Information Model - FIND SOP Class - Visit Admission Module

Attribute Name	Tag	Note
-	-	-

Table 8-69: Modality Worklist Information Model - FIND SOP Class - Patient Relationship Module

Attribute Name	Tag	Note
-	-	-

Table 8-70: Modality Worklist Information Model - FIND SOP Class - Patient Identification Module

Attribute Name	Tag	Note
Patient's Name	0010,0010	User interface item. Patient Name shall be retrieved with Single Value Matching or Wild Card Matching.
Patient ID	0010,0020	User interface item. Patient ID shall be retrieved with Single Value Matching.

Table 8-71: Modality Worklist Information Model - FIND SOP Class - Patient Demographic Module

Attribute Name	Tag	Note
Patient's Birth Date	0010,0030	Always zero length, so match all for the query response.
Patient's Sex	0010,0040	Always zero length, so match all for the query response.

Table 8-72: Modality Worklist Information Model - FIND SOP Class - Patient Medical Module

Attribute Name	Tag	Note
-	-	-

8.6 Attributes of Integris Modality Performed Procedure Step IOD, N-CREATE

The shaded boxes contain values which contents are obtained from the RIS/HIS via the Modality Worklist Query/Retrieve.

Table 8-73: Modality Performed Procedure Step IOD N-CREATE for Integris

Module	Reference
SOP Common	Table 8-74
Performed Procedure Step Relationship	Table 8-75
Performed Procedure Step Information	Table 8-76
Image Acquisition Results	Table 8-77
Radiation Dose (Extended)	Table 8-78
Billing and Material Management Codes	Table 8-79
Private Exposure Information (Private)	Table 8-80

Table 8-74: Modality Performed Procedure Step SOP Class - SOP Common Module

Attribute Name	Tag	Note
Specific Character Set	0008,0005	Enumerated Value(s): ISO_IR 100
SOP Class UID	0008,0016	Uniquely identifies the Modality Performed Procedure Step SOP Class. Enumerated value(s): 1.2.840.10008.3.1.2.3.3
SOP Instance UID	0008,0018	-

Table 8-75: Modality Performed Procedure Step SOP Class - Performed Procedure Step Relationship Module

Attribute Name	Tag	Note
Referenced Patient Sequence	0008,1120	Uniquely identifies the Patient SOP Instance.
> Referenced SOP Class UID	0008,1150	-
> Referenced SOP Instance UID	0008,1155	-
Patient's Name	0010,0010	Patient's full legal name.
Patient ID	0010,0020	Primary hospital identification number or code for the patient.
Patient's Birth Date	0010,0030	Birth date of the patient.

Table 8-75: Modality Performed Procedure Step SOP Class - Performed Procedure Step Relationship Module (Continued)

Attribute Name	Tag	Note
Patient's Sex	0010,0040	Sex of the named patient. Enumerated value(s): F, M, O
Scheduled Step Attributes Sequence	0040,0270	Sequence containing attributes that are related to the scheduling of the Procedure Step.
> Accession Number	0008,0050	A departemental IS generated number which identifies the order for the Study.
> Referenced Study Sequence	0008,1110	Uniquely identifies the Study SOP Instance associated with this Scheduled Procedure Step.
>> Referenced SOP Class UID	0008,1150	Uniquely identifies the referenced SOP Class.
>> Referenced SOP Instance UID	0008,1155	Uniquely identifies the referenced SOP Instance.
> Study Instance UID	0020,000D	Unique identifier for the Study.
> Requested Procedure Description	0032,1060	Institution-generated administrative description or classification of the Requested procedure.
> Scheduled Procedure Step Description	0040,0007	Institution-generated description or classification of the Scheduled Procedure Step to be performed.
> Scheduled Protocol Code Sequence	0040,0008	Sequence describing the Scheduled Action Item(s) following a specified coding scheme.
>> Code Value	0008,0100	-
>> Coding Scheme Designator	0008,0102	-
>> Code Meaning	0008,0104	-
> Scheduled Procedure Step ID	0040,0009	Identifier which identifies the Scheduled Procedure Step.
> Requested Procedure ID	0040,1001	Identifier which identifies the Requested Procedure in the Imaging Service Request.

Table 8-76: Modality Performed Procedure Step SOP Class - Performed Procedure Step Information Module

Attribute Name	Tag	Note
Procedure Code Sequence	0008,1032	A sequence that conveys the (single) type of procedure performed. Always zero length.

Table 8-76: Modality Performed Procedure Step SOP Class - Performed Procedure Step Information Module (Continued)

Attribute Name	Tag	Note
Performed Station AE Title	0040,0241	AE Title of the modality in which the preformed procedure Step was performed.
Performed Station Name	0040,0242	An institution defined name for the modality on which the Performed Procedure was performed.
Performed Location	0040,0243	Description of the location at which the Performed Procedure Step was performed. Always zero length.
Performed Procedure Step Start Date	0040,0244	Date on which the Performed Procedure Step started.
Performed Procedure Step Start Time	0040,0245	Time on which the Performed Procedure Step started.
Performed Procedure Step End Date	0040,0250	Date on which the Performed Procedure Step ended.
Performed Procedure Step End Time	0040,0251	Time on which the Performed Procedure Step ended.
Performed Procedure Step Status	0040,0252	Contains the state of the Performed Procedure Step. Enumerated value(s): IN PROGRESS
Performed Procedure Step ID	0040,0253	User or equipment generated identifier of that part of a Procedure that has been carried out within this step. Always "Unknown".
Performed Procedure Step Description	0040,0254	A description of the type of procedure performed. Always "Unknown".
Performed Procedure Type Description	0040,0255	Institution-generated description or classification of the Procedure Step that was performed. Always zero length.

Table 8-77: Modality Performed Procedure Step SOP Class - Image Acquisition Results Module

Attribute Name	Tag	Note
Modality	0008,0060	Type of equipment that originally acquired the data used to create the images associated with this Modality Performed Procedure Step. Enumerated value(s): XA
Study ID	0020,0010	Equals Requested Procedure ID when available otherwise timestamp.

Table 8-77: Modality Performed Procedure Step SOP Class - Image Acquisition Results Module

Attribute Name	Tag	Note
Performed Protocol Code Sequence	0040,0260	Sequence describing the Action Items performed for this Procedure Step. Always zero length.
Performed Series Sequence	0040,0340	Attributes of the Series that comprise this Modality Performed Procedure Step.
> Retrieve AE Title	0008,0054	Title of the DICOM Application Entity where the Images and Standalone SOP Instances in this Series may be retrieved on the Network.
> Series Description	0008,103E	User provided description of the Series. Always zero length.
> Performing Physician's Name	0008,1050	Name of the physician administering this Series.
> Operator's name	0008,1070	Name of the physicians administering the Series.
> Referenced Image Sequence	0008,1140	A Sequence that provides reference to zero or more sets of Image SOP Class/Sop Instance pairs.
>> Referenced SOP Class UID	0008,1150	Enumerated value(s): 1.2.840.10008.5.1.4.1.1.12.1 1.2.840.10008.5.1.4.1.1.7
>> Referenced SOP Instance UID	0008,1155	Uniquely identifies the referenced SOP Instance.
> Protocol Name	0018,1030	User-defined description of the conditions under which the Series was performed.
> Series Instance UID	0020,000E	Unique identifier of the Series.
> Referenced Non-Image Composite SOP Instance Sequence	0040,0220	Uniquely identifies Standalone IODs such as LUTs, Curves or Overlays related to these images. Always zero length.

The italic attributes in the next table are an extension on the standard.

Table 8-78: Modality Performed Procedure Step SOP Class - Radiation Dose Module (Extended) Section 5.4.1 on page 34

Attribute Name	Tag	Note
Image Area Dose Product	0018,115E	Total area-dose-product to which the patient was exposed, accumulated over the complete Modality Performed Procedure step in dGY*cm*cm, including fluoroscopy. Notes: 1. The sum of the Image Area Dose Product of all images of a Series or a Study may not result in the actual area dose product to which the patient was exposed. 2. This may be an estimated value based on assumptions about the patientís body size and habitus.
Total Time of Fluoroscopy	0040,0300	Total duration of X-Ray exposure during fluoroscopy in seconds (pedal time) during this Performed Procedure Step.
Total Number of Exposures	0040,0301	Total number of exposures made during this Performed Procedure Step. The number includes non-digital and digital images.
Entrance Dose	0040,0302	Average Entrance Dose value measured in dGy measured at the surface of the patient during this Modality Performed Procedure Step. Note: This may be an estimated value based on assumptions about the patient's body size and habitus.
Entrance Dose in mGy	0040,8302	Average Entrance Dose value measured in mGy measured at the surface of the patient during this Modality Performed Procedure Step. Note: This may be an estimated value based on assumptions about the patient's body size and habitus.
Private Creator Group 0041	*0041,0010*	*Private Creator for Private Data Elements with Group Number 0041.* *Enumerated value(s): INTEGRIS 1.0*
Accumulated Fluoroscopy Dose	*0041,1020*	*Dose measured in dGy to which the patient has been exposed during fluoroscopy during this Performed Procedure Step.*
Accumulated Exposure Dose	*0041,1030*	*Dose measured in dGy to which the patient has been exposed during this Performed Procedure Step.*

Table 8-78: Modality Performed Procedure Step SOP Class - Radiation Dose Module (Extended) Section 5.4.1 on page 34 (Continued)

Attribute Name	Tag	Note
Total Dose	0041,1040	Total dose measured in dGy to which the patient has been exposed during this Performed Procedure Step.
Total Number of Frames	0041,1041	Total number of images (frames) acquired during this Performed Procedure Step.

Table 8-79: Modality Performed Procedure Step SOP Class - Billing and Material Management Codes Module

Attribute Name	Tag	Note
-	-	-

The italic attributes in the next table are an extension on the standard.

Table 8-80: Modality Performed Procedure SOP Class - Private Exposure Information Module (Private)

Attribute Name	Tag	Note
Private Creator Group 0041	*0041, 0010*	*Private Creator for Private Data Elements with Group Number 0041.* *Enumerated value(s): INTEGRIS 1.0*
Exposure Information Sequence	*0041,1050*	*A Sequence which provides additional information related to the exposures made during this Performed Procedure Step.*
> Private Creator Group 0009	*0009,0010*	*Private Creator for Private Data Elements with Group Number 0009.* *Enumerated value(s): INTEGRIS 1.0*
> Exposure Channel	*0009,1008*	*Exposure Channel in which the pixel data is acquired.* *Enumerated value(s): BIPLANE A, BIPLANE B, SINGLE PLANE \ SINGLE A, SINGLE B*
> Exposure Start Time	*0009,1032*	*The time this exposure started.*
> Scan Options	*0018,0022*	*Acquisition technique used during the exposure.* *Enumerated value(s): EKG*
> KVP	*0018,0060*	*Peak kilo voltage output of the X-Ray generator used.*
> Distance Source to Detector(SID)	*0018,1110*	*Distance in mm from the source to detector center.*
> Exposure Time	*0018,1150*	*Duration of X-Ray exposure in ms.*
> X-ray Tube Current	*0018,1151*	*X-Ray Tube Current in mA.*
> Intensifier Size	*0018,1162*	*Diameter of X-Ray intensifier in mm.*
> Positioner Primary Angle	*0018,1510*	*Position of the X-Ray Image intensifier about the patient from RAO to LAO direction where movement from RAO to vertical is positive.*
> Positioner Secondary Angle	*0018,1511*	*Position of the X-Ray Image Intensifier about the patient from the CAU to CRA direction where movement from CAU to vertical is positive. Specified in degrees.*
> Private Creator Group 0019	*0019,0020*	*Private Creator for Private Data Elements with Group Number 0019.* *Enumerated value(s): INTEGRIS 1.0*
> APR Name	*0019,2000*	*Name of Anatomical Programmed Radiographic used for the exposure.*
> Frame Rate	*0019,2040*	*Number of frames per second.*

Table 8-80: Modality Performed Procedure SOP Class - Private Exposure Information Module (Private)

Attribute Name	Tag	Note
> Private Creator Group 0021	0021,0010	Private Creator for Private Data Elements with Group Number 0021. Enumerated value(s): INTEGRIS 1.0
> Exposure Number	0021,1012	A number identifying the exposure.
> Private Creator Group 0029	0029,0030	Private Creator for Private Data Elements with Group Number 0029. Enumerated value(s): INTEGRIS 1.0
> Number of Exposure Results	0029,3008	Number of X-Ray images acquired during the exposure. In case of non-digital exposure: 0.

8.7 Attributes of Integris Modality Performed Procedure Step IOD, N-SET

Table 8-81: Modality Performed Procedure Step IOD N-SET for Integris

Module	Reference
SOP Common	Table 8-82
Performed Procedure Step Information	Table 8-83

Table 8-82: Modality Performed Procedure Step SOP Class - SOP Common Module

Attribute Name	Tag	Note
SOP Class UID	0008,0016	Enumerated value(s): 1.2.840.10008.3.1.2.3.3
SOP Instance UID	0008,0018	
Specific Character Set	0008,0005	Enumerated value(s): ISO-IR 100

Table 8-83: Modality Performed Procedure Step SOP Class - Performed Procedure Step Information Module

Attribute Name	Tag	Note
Performed Procedure Step Status	0040,0252	Enumerated value(s): COMPLETED

8.8 Attributes of the Basic Film Session SOP Class

Table 8-84: Basic Film Session SOP Class - N-CREATE

Attribute Name	Tag	Note
Number of Copies	2000,0010	Number of copies to be printed for each film of the film session.
Print Priority	2000,0020	Specifies the priority of the print job. Enumerated values: HIGH MED LOW
Medium Type	2000,0030	Type of medium on which the print job will be printed. Defined Terms: PAPER CLEAR FILM BLUE FILM
Film Destination	2000,0040	Defined Terms: MAGAZINE PROCESSOR BIN_i (where i represents the bin number of the film sorter - supported range: 1-10)

8.9 Attributes of the Basic Film Box SOP Class

Table 8-85: Basic Film Box SOP Class - N-CREATE

Module	Reference
Basic Film Box Presentation	Table 8-86
Basic Film Box Relationship	Table 8-87
Basic Film Box Create Response Argument	Table 8-88

Table 8-86: Basic Film Box SOP Class - Basic Film Box Presentation Module

Attribute Name	Tag	Note
Image Display Format	2010,0010	Enumerated Values: STANDARD\1,1 STANDARD\1,2 STANDARD\2,2 STANDARD\2,3
Film Orientation	2010,0040	Enumereted Values: PORTRAIT LANDSCAPE
Film Size ID	2010,0050	Defined Terms: 8INX10IN, 8_5INX11IN, 10INX12IN 10INX14IN, 11INX14IN, 11INX17IN 14INX14IN, 14INX17IN 24CMX24CM, 24CMX30CM A4, A3

Table 8-87: Basic Film Box SOP Class - Basic Film Box Relationship Module

Attribute Name	Tag	Note
Referenced Film Session Sequence	2010,0500	A sequence which provides references to a Film Session SOP Class/Instance pair. Only a single item is permitted in this sequence.
>Referenced SOP Class UID	0008,1150	Defined Value: 1.2.840.10008.5.1.1.1 (Basic film session)
>Referenced SOP Instance UID	0008,1155	Uniquely identifies the referenced SOP Instance.

Table 8-88: Basic Film Box SOP Class - Response Argument Attributes

Attribute Name	Tag	Note
Image Display Format	2010,0510	A sequence which provides references to a Film Session SOP Class/Instance pair. One or more items are permitted in this sequence.
>Referenced SOP Class UID	0008,1150	Defined Value: 1.2.840.10008.5.1.1.4 (Basic film Box)
>Referenced SOP Instance UID	0008,1155	Uniquely identifies the referenced SOP Instance.

8.10 Attributes of the Basic Grayscale Image Box SOP Class

Table 8-89: Basic Grayscale Image Box SOP Class - N-SET

Attribute Name	Tag	Note
Number of Copies	2020,0010	The position of the image on the film.
Basic Grayscale Image Sequence	2020,0110	A sequence which provides the content of the grayscale image pixel data to be printed.
> Samples per Pixel	0028,0002	Defined Value: 1
> Photometric Interpretation	0028,0004	Defined Value: MONOCHROME2
> Rows	0028,0010	Defined Value: 1024
> Columns	0028,0011	Defined Value: 1280
> Bits Allocated	0028,0100	Defined Value: 8
> Bits Stored	0028,0101	Defined Value: 8
> High Bit	0028,0102	Defined Value: 7
> Pixel Representation	0028,0103	Emumerated Value: 0000H
> Pixel Data	7FE0,0010	A data stream of the pixel samples.

8.11 Attributes of the Printer SOP Class

Table 8-90: Printer SOP Class - N-EVENT-REPORT

Attribute Name	Tag	Note
Printer Status Info	2110,0020	Enumerated Values: NORMAL WARNING FAILURE
Film Destination	2000,0040	Defined Terms: MAGAZINE PROCESSOR BIN_i (where i represents the bin number of the film sorter)
Printer Name	2110,0030	User defined name identifying the printer.

Table 8-91: Printer SOP Class - N-GET

Attribute Name	Tag	Note
Printer Status Info	2110,0010	Enumerated Values: NORMAL WARNING FAILURE
Printer Status	2110,0020	Additional Information about printer status.

9 Remarks and Specializations

- Data received from the RIS can not be modified on the Integris, only the Performing Physician can be changed.
- Patient data information entered locally in the Integris can be changed.
- Before any images are transferred, the HSDII will open an association and immediately closes it without sending any information.
- The SCP must accept associations for both SC and XA images at any time, even when one of them will not be sent.
- Compressed pixel data does not contain a Basic Offset Table.

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