

*Philips Medical Systems*

**DICOM**

Conformance Statement

DSI R 6.1.1

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## OVERVIEW

The DSI (Analog) System in a DICOM Network environment exists of an application to retrieve a Worklist from a Radiology Information System and transfer Image data to a remote system.

The DSI (Analog) System is an Analog Fluorography modality and is part of an X-Ray System.

The DSI System provides the following DICOM data exchange features:

- Request Worklist / Study Component Management functionality
- Issue Procedure information to RIS / HIS System
- Image acquisition and display
- Image review and processing
- Image handling, storage and networking,
- Administration of patient, physician and examination data.
- Copy images from the local database to remote databases.
- Can send out images either as raw data or as processed data.

The main application areas are:

- R/F examinations
- Vascular examinations
- interventional procedures

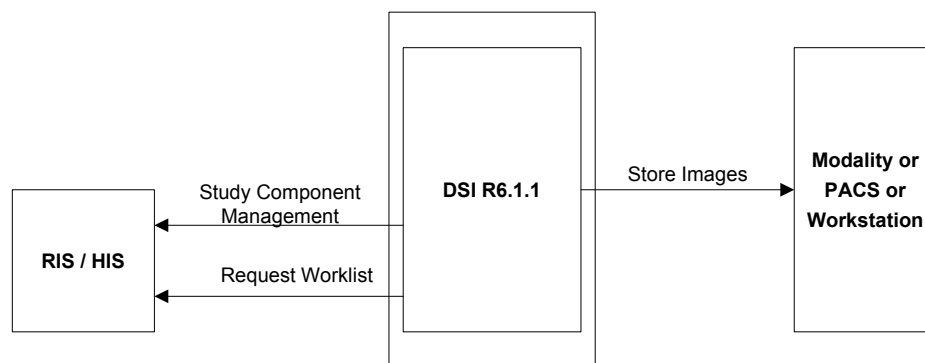


Figure 1: DSI (Analog) System in a DICOM Network environment

The DSI system allows the operator also to view, analyze and process the images stored in the database. Some advanced analysis and processing applications are primarily designed for images generated by Philips equipment when sent to the DSI.

This document describes the DICOM conformance of the DSI platform. Application package specific DICOM conformance is described in separate Conformance Statements.

Table 1 presents an overview of all network services and the applicable SOP classes as provided by DSI.

**Table 1: Network Services for the DSI (Analog)**

SOP Class		User of Service (SCU)	Provider of Service (SCP)
Name	UID		
<b>Storage for the PROCESSED Mode (RF + SC, SC only)</b>			
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Yes	No
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	Yes	No
<b>Storage for (NON) AUTOPUSH Mode</b>			
Specialized X-Ray	1.3.46.670589.2.3.1.1	Yes	No
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	Yes	No
<b>Workflow Management</b>			
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Yes	No
Study Component Management SOP Class	1.2.840.10008.3.1.2.3.2	Yes	No

## TABLE OF CONTENTS

<b>OVERVIEW</b> .....	<b>0</b>
<b>TABLE OF CONTENTS</b> .....	<b>2</b>
<b>1. INTRODUCTION</b> .....	<b>4</b>
1.1. Revision History.....	4
1.2. Scope and Field of Application.....	4
1.3. Intended Audience.....	4
1.4. Contents and Structure.....	4
1.5. Used Definitions, Terms and Abbreviations.....	4
1.6. References.....	5
1.7. Important Note to the Reader.....	5
1.8. General Acronyms and Abbreviations.....	6
<b>2. NETWORKING</b> .....	<b>7</b>
2.1. IMPLEMENTATION MODEL.....	7
2.1.1. Application Data Flow Diagram.....	7
2.2. Functional definition of Application Entities.....	9
2.2.1. DSI DICOM AE.....	9
2.3. Sequencing of Real World Activities.....	9
<b>3. AE SPECIFICATIONS</b> .....	<b>11</b>
3.1. DSI DICOM AE.....	11
3.1.1. Association Establishment Policies.....	12
3.1.1.1. General.....	12
3.1.1.2. Number of Associations.....	12
3.1.1.3. Asynchronous Nature.....	12
3.1.1.4. Implementation Identifying Information.....	12
3.1.2. Association Acceptance Policy.....	12
3.1.2.1. Export from DSI system.....	13
3.1.2.2. Request for a Modality Worklist.....	17
3.1.2.3. Create a Study Component.....	19
3.1.3. Association Acceptance Policy.....	20
<b>4. COMMUNICATION PROFILES</b> .....	<b>21</b>
4.1. Physical Network Interface.....	21
<b>5. EXTENSIONS/SPECIALIZATIONS/PRIVATIZATIONS</b> .....	<b>22</b>
<b>6. CONFIGURATION</b> .....	<b>23</b>
6.1. AE Title/Presentation Address mapping.....	23
6.1.1. Local AE Titles and Presentation Addresses.....	23
6.1.2. Remote AE Titles and Presentation Addresses.....	23
6.2. Configurable parameters.....	23
<b>7. SUPPORT OF EXTENDED CHARACTER SETS</b> .....	<b>24</b>
<b>8. ANNEX</b> .....	<b>25</b>
8.1. IOD CONTENTS.....	25
8.1.1. Created Secondary Capture Image Storage SOP Class (PROCESSED).....	26
8.1.2. Created RF Image Storage SOP Class (PROCESSED).....	29



# 1. INTRODUCTION

## 1.1. Revision History

**Table 2: Revision History**

Document Version	Date of Issue	Author	Description
01	25-11-2005	PMS MIT-IO	Final version DICOM Conformance Statement DSI R6.1.1

This chapter provides general information about the purpose, scope and contents of this Conformance Statement.

## 1.2. Scope and Field of Application

The scope of this DICOM Conformance Statement is to facilitate data exchange with equipment of Philips Medical Systems. 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) 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 [DICOM].

## 1.3. Intended Audience

This Conformance Statement is intended for:

- (potential) customers
- system integrators of medical equipment
- software designers implementing DICOM interfaces

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

## 1.4. Contents and Structure

The DICOM Conformance Statement is contained in chapter 2 through 7 and follows the contents and structuring requirements of DICOM PS 3.2.

## 1.5. 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 and PS 3.4. The word Philips in this document refers to Philips Medical Systems.



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## 1.6. References

- [ DICOM] The Digital Imaging and Communications in Medicine (DICOM) standard Part 1 – 16 (NEMA PS 3.1 – PS 3.16), National Electrical Manufacturers Association (NEMA) Publication Sales 1300 N. 17<sup>th</sup> Street, Suite 1847 Rosslyn, Va. 22209, United States of America

## 1.7. 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 IT 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 analyze 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).

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## 1.8. General Acronyms and Abbreviations.

The following acronyms and abbreviations are used in the document.

- AE Application Entity
- ACP Archiving / Connectivity and Print
- ACR American College of Radiology
- ANSI American National Standard Institute
- ATR Automatic Text Recognition
- CD-R CD Recordable
- SCM Study Component Management SOP Class
- 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
- DSI Digital Spot Imaging
- ELE Explicit VR Little Endian
- EBE Explicit VR Big Endian
- EV EasyVision
- GUI Graphic User Interface
- HIS Hospital Information System
- HL7 Health Level Seven
- ILE Implicit VR Little Endian
- IOD Information Object Definition
- ISIS Information System - Imaging System
- MWL Modality Worklist
- NEMA National Electrical Manufacturers Association
- PACS Picture Archiving Communication System
- PDU Protocol Data Unit
- RIS Radiology Information System
- RF X-Ray Radiofluoroscopic Image
- RWA Real World Activity
- SC Secondary Capture Image
- SCM Study Component Management SOP Class
- SCP Service Class Provider
- SCU Service Class User
- SOP Service Object Pair
- TCP/IP Transmission Control Protocol/Internet protocol
- UID Unique Identifier
- WLM Worklist Management

## 2. NETWORKING

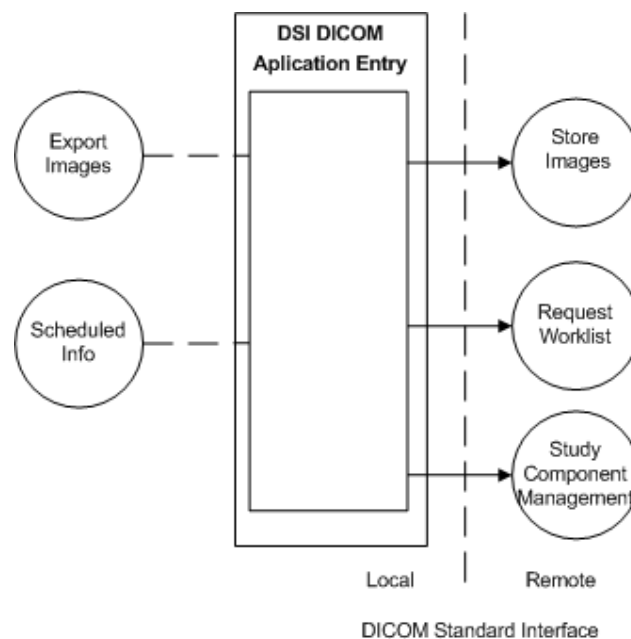
This section contains the networking related services (vs. the media related ones).

### 2.1. IMPLEMENTATION MODEL

The implementation model consists of the Application Data Flow Diagram, specifying the relationship between the DSI Application Entity and the "external world".

#### 2.1.1. Application Data Flow Diagram

The DSI contains one Application Entity able to export DICOM images and handle Modality Worklists. The related Implementation Model is shown in Figure 2.



**Figure 2. Networking Application Data Flow Diagram of the DSI R 6.1.1**

As documented in the PS 3.4, the arrows in the diagram on the previous page have the following meanings:

- An arrow pointing to the right indicates the local application entity initiates an association.

The DSI DICOM Export transfers a complete examination to a remote DICOM node. The transfer of a subset of images in an examination is possible. During the DICOM store operation it is possible to perform a cancel operation on the store. Image data to be transferred are instances of the DICOM X-Ray Radiofluoroscopic (RF) or Secondary Capture (SC) classes.

The following cases can be distinguished:

- The system is configured to supports both RF and SC classes.  
Result will be that all fluoroscopy and exposure images are exported as RF images and all other images (like external video) as SC images.
- If the system is configured to support SC class only, than all images are exported as SC images.
- If SCP system doesn't support RF images, the images are exported as SC images.

## **2.2. Functional definition of Application Entities**

### **2.2.1. DSI DICOM AE**

The DSI DICOM Application Entity acts as a Service Class User (SCU) of the Storage Service Class. After invoking it will open an Association to the remote system. For each image to be transported a retrieve action from the DSI storage will take place followed by the conversion to a DICOM message to be transferred to the remote system.

The DSI DICOM Application Entity acts also as a Service Class User (SCU) of the Basic Worklist Management Service Class and the Study Component Management Service Class. After invoking it will open an Association to the remote system (usually a RIS) to request for the up-to-date modality Worklist.

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

The Request for Worklist should be done first, before a Study Component Management can be created.

Then the generated images may be exported. However, export of DICOM images is also possible without the Worklist and Study Component Management activities.

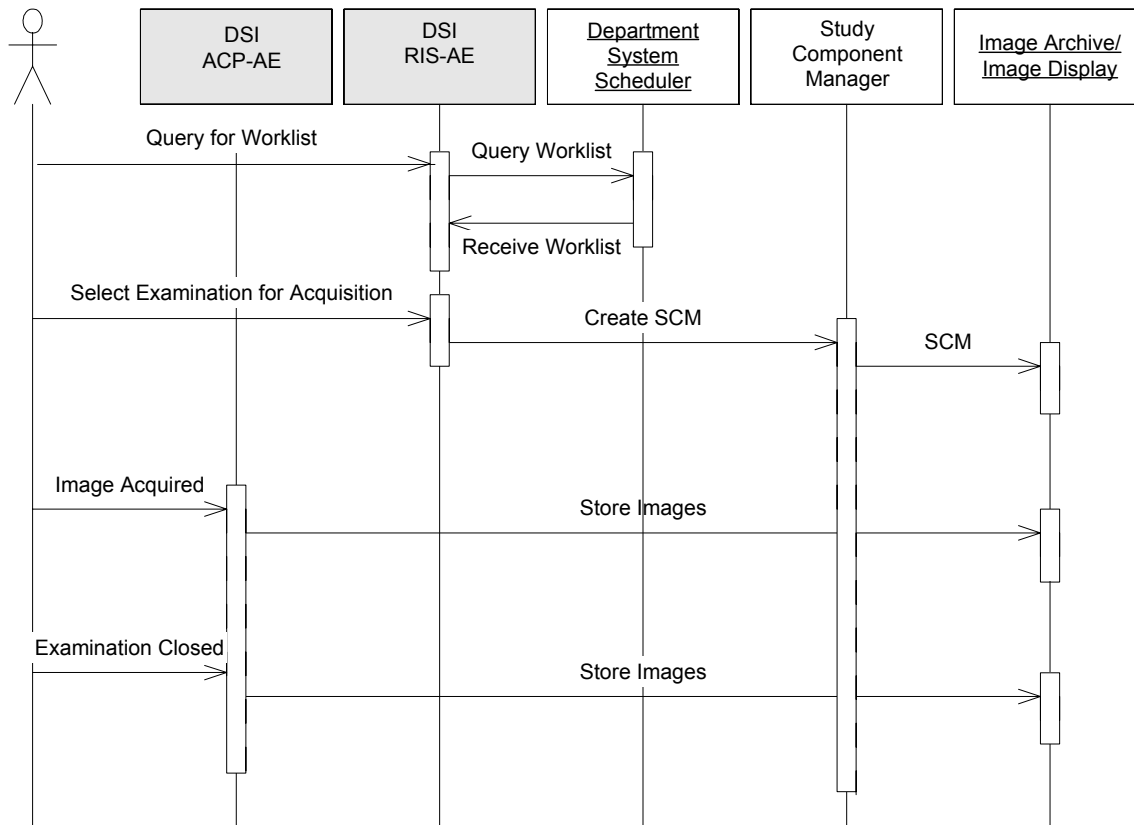


Figure 3. Sequencing of the Real Word Activities of the DSI System.

## 3. AE SPECIFICATIONS

The Digital Spot Imaging Application contains one Application Entity AE.

### 3.1. DSI DICOM AE

The DSI DICOM Application Entity provides Standard Conformance to the following DICOM 3.0 SOP classes as an SCU specified in Table 1.

**Table 1. Supported SOP Classes as SCU by the DSI DICOM AE**

SOP Class		User of Service (SCU)	Provider of Service (SCP)
Name	UID		
<b>Storage for the PROCESSED Mode (RF + SC, SC only)</b>			
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Yes	No
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	Yes	No
<b>Storage for (NON) AUTOPUSH Mode</b>			
Specialized X-Ray	1.3.46.670589.2.3.1.1	Yes	No
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	Yes	No
<b>Workflow Management</b>			
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Yes	No
Study Component Management SOP Class	1.2.840.10008.3.1.2.3.2	Yes	No

The DSI DICOM Application Entity does not support DICOM 3.0 SOP classes as a SCP.

### 3.1.1. Association Establishment Policies

#### 3.1.1.1. General

The maximum PDU size of the DSI is fixed on 28K (is 28672 Bytes). See also the important remark about the PDU size of the remote systems in chapter 6.

#### 3.1.1.2. Number of Associations

The DSI will attempt to establish two Associations at a time. One Association for storage and one to receive the Worklist. DSI does not accept Associations.

#### 3.1.1.3. Asynchronous Nature

The DSI does not support asynchronous operations and will not perform asynchronous window negotiation.

#### 3.1.1.4. Implementation Identifying Information

THE IMPLEMENTATION CLASS UID:	1.3.46.670589.6.1.2.1.1.1
THE IMPLEMENTATION VERSION NAME:	R2.3.1.0000

### 3.1.2. Association Acceptance Policy

The DSI initiates Associations as a result of the following events:

- The DSI operator requests for DICOM export, see section 3.1.2.1;
- The DSI operator requests for the DSI Worklist, see section 3.1.2.2;
- The DSI operator has selected a Worklist item from the received DSI Worklist (i.e. an examination to perform).



### 3.1.2.1. Export from DSI system

#### 3.1.2.1.1. Associated Real-World Activity

The DSI operator is able to request for export of one examination or a list of examinations to a remote system. The complete examination or a subset is transferred to the remote system.

The DSI DICOM Export function will be accessible through the DSI F2 Copy page. With the F4 Config page the remote DICOM system is selected from a list of maximum of five configurable nodes.

The current transfer can be aborted by the DSI F2 Cancel function. DSI can't abort during exporting an image, the system will abort the job after the image is export correctly.

After the transfer the Association is released.

#### 3.1.2.1.2. Proposed Presentation Contexts

DSI will propose the following presentation contexts:

**Table 2. Proposed Presentation Contexts at Image Export**

Abstract Syntax Name	UID	Transfer Syntax	UID List	Role	Ext. Neg.
Secondary Capture Image Storage	1.2.840.10008.5.2.1.4.1.1.7	ILE	1.2.840.10008.1.2	SCU	None
		ELE	1.2.840.10008.1.2.1	SCU	None
		EBE	1.2.840.10008.1.2.2	SCU	None
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	ILE	1.2.840.10008.1.2	SCU	None
		ELE	1.2.840.10008.1.2.1	SCU	None
		EBE	1.2.840.10008.1.2.2	SCU	None
Specialized X-Ray	1.3.46.670589.2.3.1.1	ILE	1.2.840.10008.1.2	SCU	None
		ELE	1.2.840.10008.1.2.1	SCU	None
		EBE	1.2.840.10008.1.2.2	SCU	None

#### 3.1.2.1.3. SOP Specific Conformance to Storage SOP Classes

DSI provides standard conformance.

Extended Negotiation is not supported.

During the DICOM export of an exposure or fluoroscopy image as **RF image** the following image processing is performed by DSI: video invert, subtraction, pixel shift.

During the DICOM export of an exposure or fluoroscopy image as **SC image** the following image processing is performed by DSI: video invert, contrast, brightness, edge enhancement, subtraction, pixel shift.

During the DICOM export of an external video image as SC image the following image processing is performed by DSI: video invert, contrast, brightness, edge enhancement.

In case of a subtracted run the DICOM Export first stores the mask image, followed by the subtracted images from that run. No explicit indication is sent with the subtracted images, as to which image was used as the mask image. The image number in the run can be used as an implicit indication.

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Other remarks:

- Images shown zoomed on the DSI are exported as normal (i.e. non zoomed) images. Annotations on zoomed images are not sent. DSI annotations on normal images are exported as Image Comments.
- The images are intended for viewing purpose only.
- The compatibility of image data re-imported (by media exchange) of the exported DICOM image data in an earlier stage is not defined.
- DSI logs certain events related to the DICOM export at three different levels, see the service manual of the DSI system.
- Measurement data is not exported during AUTOPUSH Mode.

During the selection and export of an examination, the user interface shows the status:

- Export **flag** examination flagged for DICOM export
- Export **busy** examination being exported
- Export **done** examination exported successfully
- Export **error** while exporting examination
- Export **cancel** export of examination being cancelled
- **Not exported** export of examination cancelled

DSI will stop the transfer of the image data and release the Association as soon as it receives an unsuccessful or warning C-STORE Response status, or when the Association is aborted by the remote system. The reason will be logged, the user interface of the DSI console will show the status "Export Error".

If a RIS connection is present, Patient and Study related information will be retrieved by DSI from the RIS and will be put in the image headers of the exported images.

The UID's in the composite images are generated when the related Study, Series and Image are created.

The Image UID's will be different if processing took place.

The Study UID may be retrieved from the RIS via the Worklist.

**3.1.2.1.3.1. Overview of the applied X-Ray Fluoroscopy (RF) Image IOD**

Table 3 gives an overview of the applied optional modules and attributes in the RF images.

**Table 3. Applied optional Modules and Attributes of the RF Image IOD**

IE	Module	Conditional Attributes	Optional Attributes
Patient	Patient		-
Study	General Study		Study Description
Series	General Series	Laterality.	Series Date, Series Time, Performing Physician's Name, Protocol Name
Equipment	General Equipment		Institution Name, Station Name, Manufacturer's Model name, Device Serial Number, Software Version(s)
Image	General Image Image Pixel Display Shutter (applied optional Module) X-Ray Image X-Ray Acquisition VOI LUT (applied optional Module) SOP Common	Image Date, Image Time, Patient Orientation Shutter Left Vertical Edge, Shutter Right Vertical Edge, Shutter Upper Horizontal Edge, Shutter Lower Horizontal Edge, Center of Circular Shutter, Radius of Circular Shutter. Exposure Window Width	Acquisition Date, Acquisition Time, Acquisition Number, Image Comments - - - - Window Center Specific Character Set

The modules selected from the IOD module table of DICOM 3.0 are given in the table below.

**Table 4. Applied Modules in the RF IOD**

Information Entity	Module
Patient	Patient
Study	General Study
Series	General Series
Equipment	General Equipment
Image	General Image Image Pixel Display Shutter X-Ray Image X-Ray Acquisition VOI LUT SOP Common

The details of these applied modules are given in the tables in Annex.

**3.1.2.1.3.2. Overview of the applied Secondary Capture (SC) Image IOD**

Table 5 gives an overview of the applied optional modules and attributes in the SC images.

**Table 5. Applied optional Modules and Attributes of the SC Image IO**

IE	Module	Conditional Attributes	Optional Attributes
Patient	Patient		-
Study	General Study		Study Description
Series	General Series	Laterality	Series Date, Series Time, Performing Physician's Name, Protocol Name
Equipment	SC Equipment		Secondary Capture Device Manufacturer, Secondary Capture Device Manufacturer's Model Name, Secondary Capture Software Version(s)
Image	General Image Image Pixel SC Image SOP Common	Image Date, Image Time, Patient Orientation.	Acquisition Date, Acquisition Time, Acquisition Number, Image Comments - Date of Secondary Capture, Time of Secondary Capture Specific Character Set

The modules selected from the IOD module table of DICOM 3.0 are given in the table below.

**Table 6. Applied Modules in the SC IOD**

Information Entity	Module
Patient	Patient
Study	General Study
Series	General Series
Equipment	SC Equipment
Image	General Image Image Pixel SC Image VOI LUT SOP Common

The details of these applied modules are given in the tables in ANNEX.

### 3.1.2.2. Request for a Modality Worklist

#### 3.1.2.2.1. Associated Real-World Activity

This DSI function will be triggered at request of the operator. An Association will be set-up to the pre-configured remote system (the RIS). After receiving the Worklist the Association is released.

#### 3.1.2.2.2. Proposed Presentation Contexts

DSI will propose the following presentation contexts:

**Table 7. Proposed Presentation Contexts for Request for Modality Worklist**

Abstract Syntax Name	UID	Transfer Syntax	UID List	Role	Ext. Neg.
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	ILE	1.2.840.10008.1.2	SCU	None
		ELE	1.2.840.10008.1.2.1	SCU	None
		EBE	1.2.840.10008.1.2.2	SCU	None

#### 3.1.2.2.3. SOP Specific Conformance to Modality Worklist Management

DSI provides standard conformance.

No optional Matching keys are supported (i.e. no optional Matching Keys will be present in the C-FIND Requests).

No optional Return Keys are supported (i.e. no optional Return Keys will be present in the C-FIND Requests).

If more than 42 Worklist items are received (via C-FIND Responses) as result of a worklist request, DSI will cancel the request by sending a C-CANCEL-FIND Request.

The status of the C-FIND Responses (Success, Refused, Error, Warning) is logged. Only general status messages are displayed on the user interface, like "RIS not responding" and "No patient available from RIS".

The following non-printable characters (hexa-decimal coded) are not supported in the received Worklist data:

- 00H through 1FH,
- 7FH
- 80H through 9FH,
- A0H, A6H, A8H, A9H, AAH, AEH
- B1H, B4H, B8H, B9H, BEH
- C0H, C1H, C2H, C3H, C8H, CAH, CBH, CCH, CDH, CEH, CFH
- D0H, D2H, D3H, D4H, D5H, D9H, DAH, DBH, DDH, DEH
- E3H
- F0H, F5H, FDH, FEH

If one or more of these non-printable characters are present in the strings of received Worklist data, the string is not accepted. If non-printable characters are

present in the Patient Name or if this attribute is empty, the worklist entry is not accepted. In case the Patient Name only contains spaces, this Worklist entry and all succeeding Worklist entries will be skipped.

DSI is able to retrieve the modality Worklist from a RIS. This is done at request of the operator. From the received list a selection of one Worklist item is made; the examination to be performed.

After selecting a Worklist item, the RIS is informed about this creation of the study component.

The DSI can only display a maximum of 42 patients in the worklist. When the system receive more then 42 patients in the worklist the system acts as a FIFO system (First In First Out), so information about the first patient in the worklist is lost.

This chapter specifies in detail the applied attributes in the C-FIND Service Element of this supported SOP Class.

**Table 8. Modality Worklist Information Model - Patient Identification Module**

Attribute Name	Tag	Note
Patient's Name	0010,0010	
Patient ID	0010,0020	

**Table 9. Modality Worklist Information Model - Patient Demographic Module**

Attribute Name	Tag	Note
Patient's Birth Date	0010,0030	
Patient's Sex	0010,0040	

**Table 10. Modality Worklist Information Model - Scheduled Procedure Step Module**

Attribute Name	Tag	Note
Scheduled Procedure Step Sequence	0040,0100	
>Modality	0008,0060	Can be used as matching key.
>Scheduled Station AE Title	0040,0001	Can be used as matching key.
>Scheduled Procedure Step Start Time	0040,0003	
>Scheduled Performing Physician's Name	0040,0006	
>Scheduled Procedure Step Description	0040,0007	

**Table 11. Modality Worklist Information Model - Requested Procedure Module**

Attribute Name	Tag	Note
Study Instance UID	0020,000D	
Requested Procedure Code Sequence	0032,1064	

**Table 12. Modality Worklist Information Model - Imaging Service Request Module**

Attribute Name	Tag	Note
Accession Number	0008,0050	
Referring Physician's Name	0008,0090	

### 3.1.2.3. Create a Study Component

#### 3.1.2.3.1. Associated Real-World Activity

This DSI function will be triggered when a Worklist item is selected, i.e. a Study Component will be created. An Association will be set-up to the pre-configured remote system (usually a RIS). After informing the remote system about the created Study Component, the Association is released.

#### 3.1.2.3.2. Proposed Presentation Contexts

DSI will propose the following presentation contexts:

**Table 13. Proposed Presentation Contexts for Create a Study Component**

Abstract Syntax Name	UID	Transfer Syntax	UID List	Role	Ext. Neg.
Study Component Management SOP Class	1.2.840.10008.3.1.2.3.2	ILE	1.2.840.10008.1.2	SCU	None
		ELE	1.2.840.10008.1.2.1	SCU	None
		EBE	1.2.840.10008.1.2.2	SCU	None

#### 3.1.2.3.3. SOP Specific Conformance to Study Component Management

DSI provides standard conformance.

Only the N-CREATE Service Element is used (as SCU), so no use of the N-GET and N-SET Service Elements.

No optional attributes are applied in the N-CREATE Service Element. The Specific Character Set (conditional in DICOM) will always be present.

The status of the DIMSE Responses (Success, Refused, Error, Warning) is logged. No status messages are displayed on the user interface.

This chapter specifies in detail the applied attributes in the N-CREATE Service Element of this supported SOP Class.

**Table 14. Study Component Management SOP Class - Study Component Module**

Attribute Name	Tag	Note
Referenced Series Sequence	0008,1115	Is always empty
Study ID	0020,0010	Is always empty

**Table 15. Study Component Management SOP Class - Study Component Relationship Module**

Attribute Name	Tag	Note
Referenced Study Sequence	0008,1110	
>Referenced SOP Class UID	0008,1150	Applied Value(s): 1.2.840.10008.3.1.2.3.1
>Referenced SOP Instance UID	0008,1155	Value from Study Instance UID in C-FIND Response of Modality Worklist.

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**Table 16. Study Component Management SOP Class -Study Component Acquisition Module**

Attribute Name	Tag	Note
Modality	0008,0060	Applied Value: RF
Study Description	0008,1030	Description of the classification of the Study (Component) performed, entered by institution.
Study Component Status ID	0032,1055	Applied Value(s): COMPLETED

**Table 17. Study Component Management SOP Class - Sop Common Module**

Attribute Name	Tag	Note
Specific Character Set	0008,0005	Applied Value(s): ISO_IR 100

### 3.1.3. Association Acceptance Policy

DSI does not accept Associations.



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## 4. COMMUNICATION PROFILES

### 4.1. Physical Network Interface

DSI provides DICOM 3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM 3.0 Standard.

The DSI System supports a single network interface: Ethernet ISO 8802-3. With standard supported physical medium include:

- IEEE 802.3 10BASE-TX
- IEEE 802.3 100BASE-TX (Fast Ethernet)

## 5. EXTENSIONS/SPECIALIZATIONS/PRIVATIZATIONS

**Table 18. Mapping between UI elements and DICOM attributes**

UI Element	DICOM NAME	Service
Patient	Patient's Name	RIS and Export
	Patient's Birth Date	RIS and Export
	Patient's Sex	RIS and Export
	Patient ID	RIS and Export
Exam	Scheduled Procedure Step Description	RIS
	Study Description	Export
	Protocol Name	Export
Physician's Name	Referring Physician's Name	RIS
	Referring Physician's name	Export
	Performing Physician's Name	Export

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## 6. CONFIGURATION

The configuration of a DSI system is done by means of a configuration program. It is intended to be used by Philips service engineers only.

### 6.1. AE Title/Presentation Address mapping

#### 6.1.1. Local AE Titles and Presentation Addresses

The local (so of DSI itself) Application Entity Title, local System Name and local (System) IP Address are selected by the service configuration program.

#### 6.1.2. Remote AE Titles and Presentation Addresses

All remote applications to be selected as image export destination or as Worklist supplier are configurable for the following items:

- The Application Entity Title of the remote application.
- The IP Address and Port Number at which the remote application should accept Association requests.
- The Remote Host Name (i.e. System name) of the system on which the remote application resides.
- The Remote Host Name is used in the remote DICOM system list with the F4 Config page.

### 6.2. Configurable parameters

Configurable parameters are:

- The PDU size of DSI (i.e. the maximum allowed size of PDU messages received by DSI) is fixed on 28K.  
For optimal performance of the communication DSI - remote system, it is advised to configure the PDU size on the remote system as large as possible: unlimited and 64K are preferred (in that order). PDU size of 32K on the remote system should not be taken due to an implementation restriction of DSI.
- The "Hospital Name" (configurable) is mapped on "Institution Name".
- The "System Name" (configurable) is mapped on "Station Name".

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## 7. SUPPORT OF EXTENDED CHARACTER SETS

DSI supports the Extended Character Set "ISO\_IR 100" (Latin alphabet No 1, supplementary set) for the Image Export function.

The following non-printable characters (hexa-decimal coded) are not supported in the received Worklist data:

- 00H through 1FH,
- 7FH
- 80H through 9FH,
- A0H, A6H, A8H, A9H, AAH, AEH
- B1H, B4H, B8H, B9H, BEH
- C0H, C1H, C2H, C3H, C8H, CAH, CBH, CCH, CDH, CEH, CFH
- D0H, D2H, D3H, D4H, D5H, D9H, DAH, DBH, DDH, DEH
- E3H
- F0H, F5H, FDH, FEH

## 8. ANNEX

### 8.1. IOD CONTENTS

The following tables give a detailed overview of all supported attributes of the SC Storage SOP Class. The list of possible values are given (if applicable). The situation that an attribute is present conditionally/optionally or that an attribute may contain a zero length value, is indicated too. Conditions and Defined/Enumerated Values of DICOM 3.0 are applicable but are not shown in the tables.

Note: The shaded attributes are received from the RIS with the Worklist Management Query.

#### Used Presentation Values:

ALWAYS	the module or attribute shall always be present with value
ANAP	Attribute Not Always Present
ANAPC	Attribute Not Always Present, Present under Condition
VNAP	Value Not Always Present (attribute sent zero length if no value is present)
EMPTY	Attribute is sent without a value
MAYBE	the Attribute may be present under specified condition
OPTIONAL	the module may be available, depending on source object

#### Used Source Items:

AUTO	the attribute value is generated automatically
CONF	the attribute value source is a configurable parameter
IMPL	the attribute value source is a user-implicit configuration setting
MPPS	the attribute value source is a modality performed procedure step
MWL	the attribute value source is a modality Worklist
SPEC	the attribute value source is a specific DICOM object
USER	the attribute value source is explicit user input

### 8.1.1. Created Secondary Capture Image Storage SOP Class (PROCESSED)

The following tables give a detailed overview of all supported attributes of the create SC Storage SOP Class. The lists of possible values are given. The situation that an attribute is present conditionally/optionally or that an attribute may contain a zero length value, is indicated too. Conditions and Defined/Enumerated Values of DICOM 3.0 are applicable but are not shown in the tables.

**Table 3: SC Image Storage SOP Class - Patient Module (M)**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Patient's Name	0010,0010	PN	Received from RIS or Entered by Operator	ALWAYS	AUTO
Patient ID	0010,0020	LO	Received from RIS or Entered by Operator	VNAP	AUTO
Patient's Birth Date	0010,0030	DA	Received from RIS or Entered by Operator	VNAP	AUTO
Patient's Sex	0010,0040	CS	Received From RIS or Entered by Operator. F,M,O	VNAP	AUTO

**Table 4: SC Image Storage SOP Class - General Study Module (M)**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Study Date	0008,0020	DA		VNAP	AUTO
Study Time	0008,0030	TM		VNAP	AUTO
Accession Number	0008,0050	SH	Zero length if not received from RIS	VNAP	AUTO
Referring Physician's Name	0008,0090	PN	Zero length if not received from RIS	VNAP	AUTO
Study Description	0008,1030	LO		VNAP	AUTO
Study Instance UID	0020,000D	UI	Generated at the creation of the study or received from RIS.	ALWAYS	AUTO
Study ID	0020,0010	SH	Undefined	VNAP	AUTO

**Table 5: SC Image Storage SOP Class – General Equipment Module ( O )**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Manufacturer	0008,0070	LO	Philips Medical Systems	ALWAYS	AUTO

**Table 6: SC Image Storage SOP Class – SC Image Equipment Module (M)**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Conversion Type	0008,0064	CS	DV (Digitized Video)	ALWAYS	AUTO
Modality	0008,0060	CS	RF	ANAP	AUTO
Secondary Capture Device Manufacturer	0018,1016	LO	Philips Medical Systems	ANAP	AUTO
Secondary Capture Device Manufacturer's Model Name	0018,1018	LO	Digital Imaging	ANAP	AUTO
Secondary Capture Device Software Version(s)	0018,1019	LO	DSI R2.3.1 LUT 05-06-27 R6.1.3.0120	ANAP	AUTO

**Table 7: SC Image Storage SOP Class – SC Image Module (M)**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Date of Secondary Capture	0018,1012	DT		ANAP	AUTO
Time of Secondary Capture	0018,1014	TM		ANAP	AUTO

**Table 8: SC Image Storage SOP Class - General Series Module (M)**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Series Date	0008,0021	DA		ANAP	AUTO
Series Time	0008,0031	TM		ANAP	AUTO
Protocol Name	0018,1030	LO		ANAP	AUTO
Performing Physicians' Name	0008,1050	PN	Received from RIS, entered by user or is empty if not known. Exported only first 3 characters of name.	ANAP	USER
Series Instance UID	0020,000E	UI	Generated at creation of the series	ALWAYS	AUTO
Series Number	0020,0011	IS		ALWAYS	AUTO
Laterality	0020,0060	CS	Always zero length value.	VNAP	AUTO
Performed Procedure Step Start Date	0040,0244	DA		VNAP	AUTO
Performed Procedure Step Start Time	0040,0245	TM		VNAP	AUTO
Performed Procedure Step Description	0040,0254	LO		VNAP	AUTO

**Table 9: SC Image Storage SOP Class - General Image Module (M)**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Acquisition Date	0008,0022	DA		ANAP	AUTO
Content Date	0008,0023	DA		MAYBE	AUTO
Acquisition Time	0008,0032	TM		ANAP	AUTO
Content Time	0008,0033	TM		MAYBE	AUTO
Acquisition Number	0020,0012	IS		ANAP	AUTO
Instance Number	0020,0013	IS		VNAP	AUTO
Patient Orientation	0020,0020	CS	Always zero length value.	MAYBE	AUTO
Image Comments	0020,4000	LT	present if entered by user	ANAP	USER

**Table 10: SC Image Storage SOP Class - Image Pixel Module (M)**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Samples per Pixel	0028,0002	US	1	ALWAYS	AUTO
Photometric Interpretation	0028,0004	CS	MONOCHROME2	ALWAYS	AUTO
Row	0028,0010	US	1024, 512	ALWAYS	AUTO
Columns	0028,0011	US	1024, 512	ALWAYS	AUTO
Bits Allocated	0028,0100	US	8	ALWAYS	AUTO
Bits Stored	0028,0101	US	8	ALWAYS	AUTO
High Bit	0028,0102	US	7	ALWAYS	AUTO
Pixel Representation	0028,0103	US	0x0000=0	ALWAYS	AUTO
Pixel Data	7FE0,0010	OW		ALWAYS	AUTO

**Table 11: SC Image Storage SOP Class – VOI LUT Module (O)**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Window Center	0028,1050	DS		ANAP	AUTO
Window Width	0028,1051	DS		ANAP	AUTO

**Table 12: SC Image Storage SOP Class – SOP Common Module (M)**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Specific Character Set	0008,0005	CS	ISO_IR 100	ANAPC	AUTO
SOP Class UID	0008,0016	UI	1.2.840.10008.5.1.4.1.1.7	ALWAYS	AUTO
SOP Instance UID	0008,0018	UI		ALWAYS	AUTO



## 8.1.2. Created RF Image Storage SOP Class (PROCESSED)

The following tables give a detailed overview of all supported attributes of the RF Storage SOP Class. The list of possible values are given. The situation that an attribute is present conditionally/optionally or that an attribute may contain a zero length value, is indicated too. Conditions and Defined/Enumerated Values of DICOM 3.0 are applicable but are not shown in the tables.

Note: The shaded attributes are received from the RIS with the Worklist Management Query.

**Table 19. XRF Image Storage SOP Class -Patient Module (M)**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Patient's Name	0010,0010	PN	Received From RIS or Entered by Operator.	ALWAYS	AUTO
Patient ID	0010,0020	LO	Received From RIS or Entered by Operator	VNAP	AUTO
Patient's Birth Date	0010,0030	DA	Received From RIS or Entered by Operator	VNAP	AUTO
Patient's Sex	0010,0040	CS	Received From RIS or Entered by Operator	VNAP	AUTO

**Table 20. XRF Image Storage SOP Class -General Study Module (M)**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Study Date	0008,0020	DA		VNAP	AUTO
Study Time	0008,0030	TM		VNAP	AUTO
Accession Number	0008,0050	SH	Zero length if not received from RIS.	VNAP	AUTO
Referring Physician's Name	0008,0090	PN	Zero length if not received from RIS.	VNAP	AUTO
Study Description	0008,1030	LO	Received from RIS as "Scheduled Proc. Step Desc." or entered by user.	VNAP	AUTO
Study Instance UID	0020,000D	UI	Generated at the creation of the study or received from RIS.	ALWAYS	AUTO
Study ID	0020,0010	SH	Always zero.	VNAP	AUTO

**Table 21. XRF Image Storage SOP Class -General Series Module (M)**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Series Date	0008,0021	DA		ANAP	AUTO
Series Time	0008,0031	TM		ANAP	AUTO
Modality	0008,0060	CS	Applied Value(s): RF	ALWAYS	AUTO
Performing Physician's Name	0008,1050	PN	Received from RIS, entered by user or is empty if not known.	ANAP	AUTO
Performed Procedure Step Start Date	0040,0244	DA		VNAP	AUTO
Performed Procedure Step Start Time	0040,0245	TM		VNAP	AUTO
Performed Procedure Step Description	0040,0254	LO		VNAP	AUTO
Protocol Name	0018,1030	LO	Filled with the Exam type, limited to a maximum of 6 characters. This Exam type is received from RIS as	ANAP	AUTO

Attribute Name	Tag	VR	Value	Presence of Value	Source
			"Scheduled Proc. Step Desc.", or entered by the user.		
Series Instance UID	0020,000E	UI		ALWAYS	AUTO
Series Number	0020,0011	IS		VNAP	AUTO
Laterality	0020,0060	CS	Always zero length value.	MAYBE	AUTO

**Table 22. XRF Image Storage SOP Class -General Equipment Module (M)**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Manufacturer	0008,0070	LO	Philips Medical Systems	VNAP	AUTO
Institution Name	0008,0080	LO		ANAP	AUTO
Station Name	0008,1010	SH		ANAP	AUTO
Manufacturer's Model Name	0008,1090	LO	Digital Imaging	ANAP	AUTO
Device Serial Number	0018,1000	LO	Applied value: 98611000	ANAP	AUTO
Software Version(s)	0018,1020	LO	DSI R2.3.1 LUT 05-06-27 R6.1.3.0120	ANAP	AUTO

**Table 23. XRF Image Storage SOP Class -General Image Module**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Acquisition Date	0008,0022	DA		ALWAYS	AUTO
Content Date	0008,0023	DA		ALWAYS	AUTO
Acquisition Time	0008,0032	TM		ALWAYS	AUTO
Content Time	0008,0033	TM		ALWAYS	AUTO
Acquisition Number	0020,0012	IS		ALWAYS	AUTO
Instance Number	0020,0013	IS		ALWAYS	AUTO
Patient Orientation	0020,0020	CS	Always zero length value.	ALWAYS	AUTO
Image Comments	0020,4000	LT	Present if entered by user	ANAP	USER

**Table 24. XRF Image Storage SOP Class -Image Pixel Module**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Samples per Pixel	0028,0002	US	Applied Value(s): 1	ALWAYS	AUTO
Photometric Interpretation	0028,0004	CS	Applied Value(s): MONOCHROME2	ALWAYS	AUTO
Rows	0028,0010	US	Equal to the value of Rows (512 or 1024). The actual image size in 60 Hz DSI system is smaller: 470 or 960. Applied Value(s): 1024, 512	ALWAYS	AUTO
Columns	0028,0011	US	Equal to the value of Rows (512 or 1024). The actual image size in 60 Hz DSI system is smaller: 470 or 960. Applied Value(s): 1024, 512	ALWAYS	AUTO
Bits Allocated	0028,0100	US	Applied Value(s): 8	ALWAYS	AUTO
Bits Stored	0028,0101	US	Applied Value(s): 8	ALWAYS	AUTO
High Bit	0028,0102	US	Applied Value(s): 7	ALWAYS	AUTO
Pixel Representation	0028,0103	US	Applied Value(s): 0	ALWAYS	AUTO
Pixel Data	7FE0,0010	OW		ALWAYS	AUTO

**Table 25. XRF Image Storage SOP Class - Display Shutter Module (O)**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Shutter Shape	0018,1600	CS	CIRCULAR RECTANGULAR	ALWAYS	USER
Shutter Left Vertical Edge	0018,1602	IS		ANAPC	USER
Shutter Right Vertical Edge	0018,1604	IS		ANAPC	USER
Shutter Upper Horizontal Edge	0018,1606	IS		ANAPC	USER
Shutter Lower Horizontal Edge	0018,1608	IS		ANAPC	USER
Center of Circular Shutter	0018,1610	IS		ANAPC	USER
Radius of Circular Shutter	0018,1612	IS		ANAPC	USER

**Table 26. XRF Image Storage SOP Class -Image Pixel Module (M)**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Rows	0028,0010	US	512, 1024	ALWAYS	AUTO
Columns	0028,0011	US	512, 1024	ALWAYS	AUTO
Pixel Data	7FE0,0010	OW		ALWAYS	AUTO

**Table 27. XRF Image Storage SOP Class -X-ray Image Module (M)**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Image Type	0008,0008	CS	ORIGINAL, PRIMARY, SINGLE PLANE	ALWAYS	AUTO
Samples per Pixel	0028,0002	US	1	ALWAYS	AUTO
Photometric Interpretation	0028,0004	CS	MONOCHROME2	ALWAYS	AUTO
Bits Allocated	0028,0100	US	8	ALWAYS	AUTO
Bits Stored	0028,0101	US	8	ALWAYS	AUTO
High Bit	0028,0102	US	7	ALWAYS	AUTO
Pixel Representation	0028,0103	US	0000H	ALWAYS	AUTO
Pixel Intensity Relationship	0028,1040	CS	DISP	ALWAYS	AUTO

**Table 28. XRF Image Storage SOP Class -X-ray Acquisition Module (M)**

Attribute Name	Tag	VR	Value	Presence of Value	Source
KVP	0018,0060	DS	Always zero length value.	VNAP	AUTO
Exposure Time	0018,1150	IS	Required if Exposure (0018,1152) is not present.	ANAP	AUTO
X-Ray Tube Current	0018,1151	IS	Required if Exposure (0018,1152) is not present.	ANAP	AUTO
Exposure	0018,1152	IS	Required if either Exposure Time (0018,1150) or X-RayTube Current (0018,1151) are not present.	MAYBE	AUTO
Radiation Setting	0018,1155	CS	Applied Value(s): GR, SC	ALWAYS	AUTO

**Table 29. XRF Image Storage SOP Class -VOI LUT Module (O)**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Window Center	0028,1050	DS	This attribute is related to the DSI Contrast / Brightness.	ALWAYS	AUTO
Window Width	0028,1051	DS	This Attribute is related to the DSI Contrast / Brightness.	ALWAYS	AUTO

**Table 30. XRF Image Storage SOP Class -SOP Common Module (M)**

Attribute Name	Tag	VR	Value	Presence of Value	Source
Specific Character Set	0008,0005	CS	Applied Value(s): ISO_IR 100	ALWAYS	AUTO
SOP Class UID	0008,0016	UI	Applied Value(s): 1.2.840.10008.5.1.4.1.1.12.2	ALWAYS	AUTO
SOP Instance UID	0008,0018	UI		ALWAYS	AUTO