DICOM Conformance Statement

Philips MicroDose L30

Software 8.4

PHILIPS

DICOM Conformance Statement - Philips MicroDose L30, Software 8.4

Issued by:

Philips Medical Systems Nederland BV, a Philips Healthcare company
P.O. Box 10.000
5680 DA Best
The Netherlands
Email: dicom@philips.com
Internet: http://www.healthcare.philips.com/connectivity
Document number 1019005 rev. E
Date: June 14 2012

CE 0434

This Medical Device meets the provisions of the transposition of the Medical Device Directive 93/42/EEC within the country of the EU Authorized Representative for the device concerned.

Manufacturer's address:

Philips Digital Mammography Sweden AB

Smidesvägen 5

SE–171 41 Solna

Sweden

Document Title	DICOM Conformance Statement – Philips MicroDose L30 Software 8.4
Document ID	1019005 E
Date	2012-06-14

Contents

1. Introduction

1.1 Purpose

This is the DICOM Conformance Statement of Philips MicroDose L30. It is written according to part PS 3.2 of ref [1] for Philips MicroDose L30.

1.2 Scope

This DICOM Conformance Statement refers to Philips MicroDose L30 using software version 8.3.

1.3 Intended readers

This document is written for personnel requiring information regarding DICOM conformance for Philips MicroDose L30. The reader needs a basic knowledge in DICOM.

1.4 Language

This document was originally written in English (UK).
In case of uncertainties regarding the content in translated versions of this document, it is the English (UK) version that is to be regarded as the original.

1.5 Chapter overview

Chapter 1 – Introduction to this document
Chapter 2 – Describes the implementation model
Chapter 3 – Information regarding the AE specifications
Chapter 4 – Describes the communication profiles
Chapter 5 – Information about transfer syntaxes and private attributes
Chapter 6 – Configuration of Storage SCU, MWL SCU and Print SCU
Chapter 7 – Support of Extended Character Sets
Chapter 8 – Documentation of Private Attributes
Chapter 9 – Description of Exported Presentation States

1.6 Symbols Used in This Document

Warning!

Warning is used when severe danger for patient, personnel or system exists.

Caution!   *Caution is used when danger for patient, personnel or system exists.*

Notice   *Notice is used to underline information of importance.*

Exposure
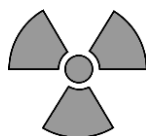
The exposure symbol is used when an exposure is made.

1.7   Definitions, acronyms and abbreviations

AE	Application Entity
DA	Date
DICOM	Digital Imaging and Communications in Medicine
DS	Decimal String (16 bytes maximum)
DX	Digital X-Ray Image (DICOM IOD name)
FD	Floating Point Double
FS	Floating Point Single
IOD	DICOM Information Object Definition
IS	Integer String (12 bytes maximum)
LO	Long String (64 characters maximum)
LT	Long Text (10240 characters maximum)
MG	Digital Mammography X-Ray Image (DICOM IOD name)
MWL	Modality Worklist
PDU	DICOM Protocol Data Unit
RIS	Radiology Information System
SCP	DICOM Service Class Provider
SCU	DICOM Service Class User
SH	Short String (16 characters maximum)
SOP	DICOM Service-Object Pair
SQ	Sequence of Items
ST	Short Text (1024 characters maximum)
TM	Time
UI	Unique ID (Same as UID)
UID	Unique ID
UL	Unsigned Long (4 bytes fixed)
US	Unsigned Short
VM	Value Multiplicity
VR	Value Representation

1.8   References

Ref.	Document title
[1]	Digital Imaging and Communications in Medicine (DICOM). NEMA Standard Publications PS 3.1-18 and Supplements.

1.9   Related documents

Ref.	Document title
[2]	System Installation Manual, Philips MicroDose L30
[3]	User Manual, Philips MicroDose L30
[4]	Acquisition Workstation System Administrator Guide, Philips MicroDose L30

1.10   DICOM standard

This document should be read together with the DICOM standard [1]. Definitions and terms are used in this document according to the DICOM standard. It is assumed that the reader is familiar with the DICOM standard.

1.11 System Overview

Philips MicroDose L30 is a FFDM (Full Field Digital Mammography) modality. It consists of a mammography stand and an acquisition workstation. The application on the acquisition workstation, the Philips MicroDose application, controls the stand and displays the acquired images. The QA-check is done on the acquisition workstation. The acquired images are stored locally on the acquisition workstation and can be sent to remote DICOM nodes as mammography images.

Philips MicroDose L30 is available for use with Windows XP.

2. Implementation model

2.1 Application Data Flow Diagram

Application data flow diagrams for the following three applications are explained in the following sections.

2.1.1 Philips MicroDose Application Flow Diagram
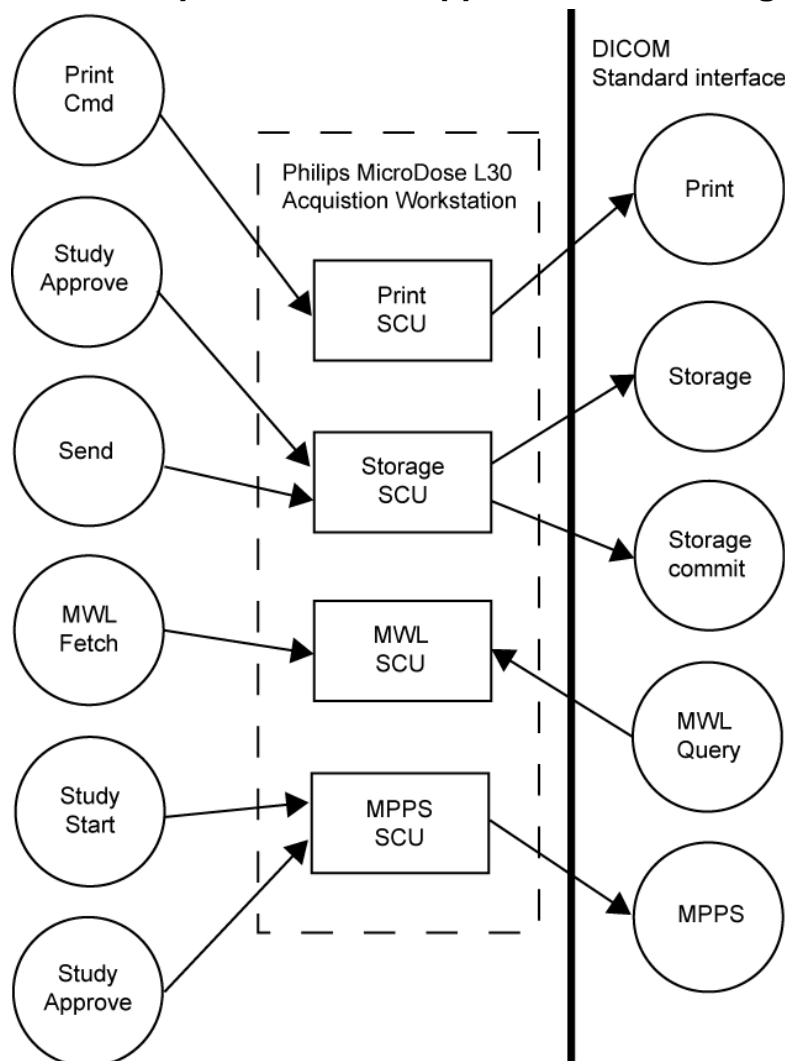
Philips MicroDose L30 is an acquisition workstation for Mammogram DICOM images. It provides (among other things) the following features:

- Print images
- Query a Radiology Information System (RIS) for a modality worklist
- Send information to a RIS regarding Performed Procedure Steps
- Send and commit images to a DICOM archive

Philips MicroDose L30 contains four different Application Entities (AE), Print SCU, Storage SCU, MWL SCU and MPPS SCU. Each AE only has one instance.

Note: MPPS and Storage Commit are not available when Philips MicroDose L30 is used as a stand-alone (offline) system.

2.1.2 MicroDose Mobile Sync Tool Application Flow
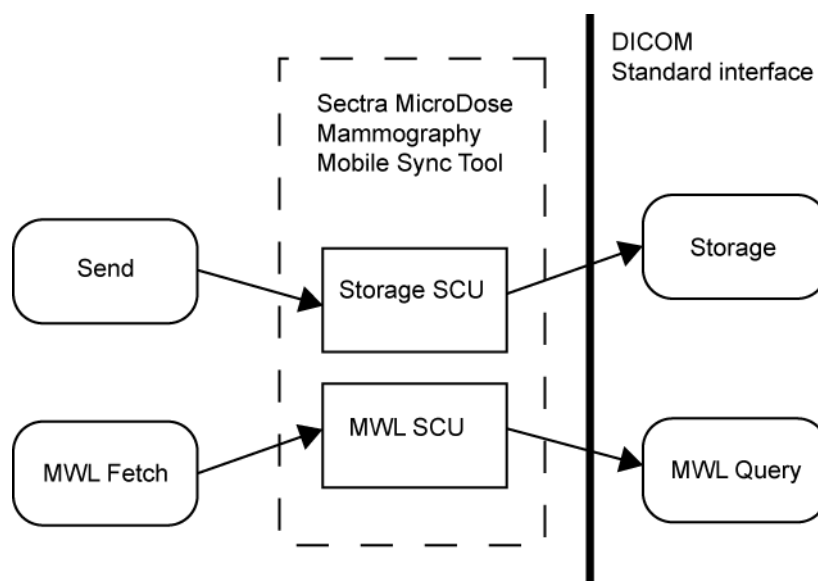
MicroDose Mobile Sync is a tool used to transfer Mammogram DICOM images to a remote storage area and retrieve worklist data. It provides the following feature:

- Send images to a DICOM archive
- Query a Radiology Information System (RIS) for a modality worklist

MicroDose Mobile Sync contains two Application Entities (AE), Storage SCU and MWL SCU. Each AE only has one instance.

MicroDose Mobile Sync is used mainly when the Philips MicroDose L30 is used as a stand-alone (off-line) system.

Images in a stand-alone system (off-line environment)
In a stand-alone system, the Philips MicroDose Application is configured to store the images locally. Images will be stored on a local storage drive. The user configures the location of the storage. The images are then transferred to a portable drive from which the images then may be imported to a DICOM Storage SCP using MicroDose Mobile Sync and a network connection.

Worklist in a stand-alone system (off-line environment)
Philips MicroDose Application will be configured to read worklist data from disk. Worklist data is retrieved from a MWL SCP and stored on a portable drive MicroDose Mobile Sync and a network connection. The stored worklist data is then moved to the storage location which Philips MicroDose Application is configured to read.

2.1.3 MicroDose Verification Tool Application Flow
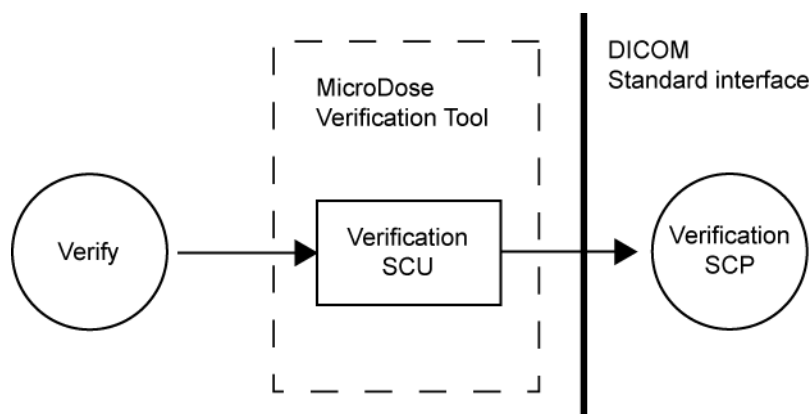
MicroDose Verification Tool is a tool for verifying the communication with a DICOM SCP AE. It provides following feature:

- Send C_ECHO to DICOM server

MicroDose Verification Tool contains one Application Entity (AE), Verification SCU. The AE has only one instance.

MicroDose Verification Tool is used mainly for verifying the connection to the DICOM Storage SCP AE and the DICOM MWL SCP when configuring the Philips MicroDose L30, but it can be used for verifying connections to any DICOM SCP supporting C-ECHO.

2.2 Functional Definitions of AE's

2.2.1 Philips MicroDose L30 - SOP Classes and Transfer syntaxes supported

The two following tables (Table 1 and 2) use these abbreviations to identify AEs:

Storage SCU	SU
MWL SCU	MWU
Print SCU	PU
MPPS SCU	MU

SOP Class Name	SOP Class UID	Supported for AE Y/- (Yes/No)			
		SU	MWU	PU	MU
Digital Mammography XRay Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	Y			
Digital Mammography XRay Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.2	Y			
Digital X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Y			
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Y			
Storage Commitment Push Model	1.2.840.10008.1.20.1	Y			
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	Y			
Modality Worklist Info. Model – FIND	1.2.840.10008.5.1.4.31	-	Y	-	
Basic Grayscale Print Mgm Meta	1.2.840.10008.5.1.1.9	-	-	Y	
> Basic Film Session	1.2.840.10008.5.1.1.1	-	-	Y	
> Basic Film Box	1.2.840.10008.5.1.1.2	-	-	Y	
> Basic Grayscale Image Box	1.2.840.10008.5.1.1.4	-	-	Y	
> Printer	1.2.840.10008.5.1.1.16	-	-	Y	
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	-	-	-	Y

Table 1. Supported SOP classes as SCU.

The " > " character for next to the Print Management SOP Classes indicates that the SOP Class is mandatory part of the above mentioned meta SOP Class.

Transfer Syntax Name	Transfer Syntax UID	Supported for AE Y/- (Yes/No)			
		SP	MWU	PU	MU
Sectra Compression (Private Syntax)	1.2.752.24.3.7.6	Y	-	-	-
Explicit VR Little Endian	1.2.840.10008.1.2.1	Y	-	-	-
Explicit VR Big Endian	1.2.840.10008.1.2.2	Y	-	-	-
Implicit VR Little Endian	1.2.840.10008.1.2	Y	Y	Y	Y

Table 2. Supported transfer syntaxes.

2.2.2 Philips MicroDose L30 - AE descriptions

Storage SCU
Storage SCU is the AE responsible for sending images to remote applications. The Storage SCU is used for sending images to a DICOM Storage service for long-term storage.

Each time a study is approved in Philips MicroDose L30, the images that belong to this examination are sent, see ref [3]. All sent images are removed by a configurable cleanup schedule.

Furthermore, if Philips MicroDose L30 is a part of a mobile unit, the MicroDose Mobile Sync Tool performs the actual send. This tool should be configured to the same AE as the Philips MicroDose L30 system itself.

Read more about this functionality in [4] and in section 3.

MWL SCU
MWL handles queries and retrieve requests from a Philips MicroDose L30 user. User can define search criteria and request information from a MWL SCP.

When responses are received from a MWL SCP the user can select examinations and perform them. The images are displayed on the Philips MicroDose L30 system as received from the Philips MicroDose L30 during the examination.

Read more about this functionality in [4] and in section 3.2.

Print SCU
Print SCU is the AE responsible for sending print request to DICOM printers. There is only one Print SCU AE per Philips MicroDose L30.

As described in the *User Manual, Philips MicroDose L30* ref. [3] the Philips MicroDose L30 user chooses images to print from the Philips MicroDose application main window. The user selects an image, i.e. it is displayed in the large image area, and issues the print command. This will activate the Print SCU AE is, which acts as a SCU and initiates an association with the remote AE, supporting DICOM Print Management as SCP (a DICOM printer).

Read more about this functionality in [4] and in section 3.3.

MPPS SCU
MPPS SCU is the AE responsible for sending Modality Performed Procedure Step to a Performed Procedure step Manager

When a study is started, MPPS N-CREATE is sent with status CREATED. After acquiring images and the user approves the study, MPPS N-SET is sent with status COMPLETED.

Read more about this functionality in [4] and in section 3.4.

2.3 Sequencing of Real-World Activities

2.3.1 Philips MicroDose L30

Philips MicroDose L30 will perform operations (Print, Send) on images received from the Philips MicroDose L30 stand. It will add image information regarding generator settings, dose, operator, current patient, date and time etc. It will also apply image improvement algorithms and allow the user to adapt window level settings before the image is sent.

2.3.2 MicroDose Mobile Sync Tool

Philips MicroDose Mobile Sync Tool is used for sending images on a removable storage that have not yet been sent to DICOM Storage. This tool is suitable for mobile Philips MicroDose L30 systems that do not have continuous network access to a DICOM Storage.

3. Philips MicroDose L30 AE Specifications

3.1 Storage SCU AE Specifications

3.1.1 Association Establishment Policies

General

The maximum PDU-length, which a Storage SCU AE will use, is 28672 bytes (28 kB).

Number of Associations

The Storage SCU AE can only handle one association at a time.

Asynchronous Nature

The Storage SCU AE does not support asynchronous operations and will not perform asynchronous window negotiation.

Implementation Identifying Information

A Storage SCU AE will provide an Implementation Class UID that is 1.2.752.24.3.3.25.7. The implementation version name is "NTSTORE_SCU_1.0".

3.1.2 Association Initiation Policy

The Storage SCU will initiate associations, i.e. make a Store request to a DICOM Storage server when a user has approved a study.

Real-World Activity - Send Command

Associated Real-World Activity

Philips MicroDose L30 sends images to one or several DICOM Storage SCP when the user approves an examination or when the user manually sends or resends an image or images in one or several examinations. Philips MicroDose L30 then acts as a Storage SCU AE. The Storage SCU AE will then initiate an association with the remote AE, hopefully supporting DICOM Storage as SCP.

Proposed Presentation Contexts

The proposed abstract syntaxes and transfer syntaxes are found by investigating Table 1 and Table 2. Role is SCU.

SOP-Specific Conformance

The Storage SCU provides standard conformance to the SOP Classes of the Storage Service Class.

If annotations have been made in the images on the AWS, this information will be exported as Standard Grayscale Presentation State if the receiving side supports such (see section 9 for details), otherwise the annotations will be ignored and thus lost.

Real-World Activity – Storage Commit

Associated Real-World Activity

Storage Commitment can be used when images are sent from Philips MicroDose L30 and the remote DICOM archive supports Storage Commitment as SCP.

Proposed Presentation Contexts

The proposed abstract syntaxes and transfer syntaxes are found by investigating Table 1 and Table 2. Role is SCU.

SOP Specific Conformance

The Storage SCU will send the N-ACTION-RQ message and wait for the N-ACTION-RSP. The association will then be closed. An SCP of the same Philips MicroDose L30 will accept and handle the associated N-EVENT-REPORT-RQ with the same Transaction UID.

3.1.3 Association Acceptance Policy

The Storage SCU AE does not handle incoming associations.

3.1.4 SOP Specific Conformance Statement, general attributes

The following table lists the general supported attributes in the Philips MicroDose L30 computed mammography.

Tag	Name	VR	VM	Type	Description
(0008,0005)	Specific Character Set	CS	1	1C	Configurable, Default: "ISO_IR 100"
(0008,0008)	Image Type	CS	2	3	"ORIGINAL\PRIMARY"
(0008,0018)	SOP Instance UID	UI	1	1	SOP Instance UID.
(0008,0020)	Study Date	DA	1	2	Date when study was started.
(0008,0022)	Acquisition Date	DA	1	3	Date when this image was acquired.
(0008,0023)	Content Date	DA	1	2C	Date when this image was acquired.
(0008,0030)	Study Time	TM	1	2	Time of day when the study was done.
(0008,0032)	Acquisition Time	TM	1	3	Time when this image was acquired.
(0008,0033)	Content Time	TM	1	2C	Time when this image was acquired.
(0008,0050)	Accession Number	SH	1	2	Study accession number. Received from MWL.
(0008,0060)	Modality	CS	1	1	Constant, "MG"
(0008,0068)	Presentation Intent Type	CS	1	1	"FOR PROCESSING" or "FOR PRESENTATION"
(0008,0070)	Manufacturer	LO	1	2	Constant, "Philips Digital Mammography Sweden AB"
(0008,0080)	Institution Name	LO	1	3	Configurable. Empty by default.
(0008,0081)	Institution Address	ST	1	3	Configurable. Empty by default.
(0008,0090)	Referring Physician's Name	PN	1	2	Empty
(0008,1010)	Station Name	SH	1	3	Configurable, "MicroDose"
(0008,1030)	Study Description	LO	1	3	Examination code.
(0008,1040)	Institutional Department Name	LO	1	3	Configurable. Empty by default.
(0008,1070)	Operators' Name	PN	1	3	Name of the operator.

Tag	Name	VR	VM	Type	Description
(0008,1090)	Manufacturer's Model Name	LO	1	3	Name of the model.
(0008,103E)	Series Description	LO	1	3	Special label for the image. If the image shall be labeled, one of the configurable labels is selected. If no label is selected, this tag is empty.
(0008,1110)	Referenced Study Sequence	LO	1	3	Empty
(0008,2112)	Image Source Sequence	SQ	1	3	If 0008,0068 specifies FOR PRESENTATION, this sequence specifies original image
>(0008,1150)	Referenced SOP Class UID	UI	1	1C	SOP Class UID of original image.
>(0008,1155)	Referenced SOP Instance UID	UI	1	1C	SOP Instance UID of original image.
>(0028,135A)	Spatial Locations Preserved	CS	1	3	Spatial location preserved.
(0010,0010)	Patient Name	PN	1	2	Received from MWL.
(0010,0020)	Patient ID	LO	1	2	Received from MWL.
(0010,0030)	Patient Birth Date	DA	1	2	Received from MWL.
(0010,0040)	Patient Sex	CS	1	2	Received from MWL.
(0010,1000)	Other Patient IDs	LO	1-n	3	Received from MWL.
(0010,1010)	Patient Age	AS	1	3	Received from MWL.
(0010,2000)	Medical Alerts	LO	1	3	Received from MWL.
(0010,4000)	Patient Comments	LT	1	3	Information/comments about the patient.
(0018,0060)	KVP	DS	1	3	Peak kV value.
(0018,1000)	Device Serial Number	LO	1	3	Serial number.
(0018,1110)	Distance Source To Detector	DS	1	3	Configurable, "660.0"
(0018,1111)	Distance Source To Patient	DS	1	3	Configurable, "640.5"
(0018,1114)	Estimated Radiographic Magnification Factor	DS	1	3	Configurable by configuring (0018,1111) and (0018,1110). Defined as "Distance Source To Detector" / "Distance Source To Patient"
(0018,1120)	Software Versions	LO	1-n	3	Software versions.
(0018,1130)	Table Height	DS	1		Table height in mm.

Tag	Name	VR	VM	Type	Description
(0018,1150)	Exposure Time	DS	1	3	Exposure time in ms
(0018,1151)	X-ray Tube Current	IS	1	3	X-ray Tube Current in mA.
(0018,1152)	Exposure	IS	1	3	Exposure expressed in mAs.
(0018,1153)	Exposure In µAs	IS	1	3	Exposure expressed in µAs.
(0018,1164)	Imager Pixel Spacing	DS	2	1	Configurable, "0.05\0.05"
(0018,1191)	Anode Target Material	CS	1	3	Constant, "TUNGSTEN"
(0018,11A0)	Body Part Thickness	DS	1	3	Thickness of compressed breast in mm.
(0018,11A2)	Compression Force	DS	1	3	Compression force in Newton.
(0018,1405)	Relative X-Ray Exposure	IS	1	3	Glandular dose in mGy
(0018,1508)	Positioner Type	CS	1	1	Constant, "MAMMOGRAPHIC"
(0018,1510)	Positioner Angle	DS	1	3	Positioner primary angle.
(0018,1600)	Shutter Shape	CS	1-3	3	If present, "RECTANGULAR"
(0018,1602)	Shutter Left Vertical Edge	IS	1	1C	Left vertical edge of display shutter. Present only if 0018,1600 is set to "RECTANGULAR".
(0018,1604)	Shutter Right Vertical Edge	IS	1	1C	Right vertical edge of display shutter. Present only if 0018,1600 is set to "RECTANGULAR".
(0018,1606)	Shutter Upper Horizontal Edge	IS	1	1C	Upper horizontal edge of display shutter. Present only if 0018,1600 is set to "RECTANGULAR".
(0018,1608)	Shutter Lower Horizontal Edge	IS	1	1C	Lower horizontal edge of display shutter. Present only if 0018,1600 is set to "RECTANGULAR".
(0018,5101)	View Position	CS	1	3	Radiographic view of the image relative to the imaging subject's orientation, e.g MLO. Consistent with View Code Sequence (0054,0220)
(0018,7004)	Detector Type	CS	1	2	Constant, "DIRECT"
(0018,7005)	Detector Configuration	CS	1	3	Constant, "SLOT"
(0018,700A)	Detector ID	CS	1	3	Detector ID. Empty if no detector ID is present.
(0018,700C)	Detector Calibration Date	DA	1	3	Date of last detector calibration.

Tag	Name	VR	VM	Type	Description
(0018,700E)	Detector Calibration Time	TM	1	3	Time of last detector calibration.
(0018,7020)	Detector Element Physical Size	DS	2	3	Constant, "0.05\0.05"
(0018,7022)	Detector Element Spacing	DS	2	3	Constant, "0.05\0.05"
(0018,7050)	Filter Material	CS	1-n	3	Constant, "ALUMINUM"
(0020,000D)	Study Instance UID	UI	1	1	Instance UID of study to which image belong.
(0020,000E)	Series Instance UID	UI	1	1	Series UID.
(0020,0010)	Study ID	SH	1	2	From a configurable tag from MWL. Default from (0040,1001)
(0020,0011)	Series Number	IS	1	2	
(0020,0013)	Image Number	IS	1	2	
(0020,0020)	Patient Orientation	CS	2	2C	Patient direction of the rows and columns of the image.
(0020,0052)	Frame Of Reference UID	UI	1	1	
(0020,0062)	Image Laterality	CS	1	1	Laterality of body part, "R" or "L"
(0020,1040)	Position Reference Indicator	LO	1	2	Empty.
(0020,4000)	Image Comments	LT	1	3	Comments on an individual image.
(0028,0002)	Samples Per Pixel	US	1	1	Constant, "1"
(0028,0004)	Photometric Interpretation	CS	1	1	Constant, "MONOCHROME1"
(0028,0010)	Rows	US	1	1	Number of rows in the image.
(0028,0011)	Columns	US	1	1	Number of columns in the image.
(0028,0100)	Bits Allocated	US	1	1	Number of bits allocated for each pixel.
(0028,0101)	Bits Stored	US	1	1	Number of bits stored for each pixel.
(0028,0102)	High Bit	US	1	1	Most significant bit for pixel sample data.
(0028,0103)	Pixel Representation	US	1	1	Data representation of the pixel samples. Constant, "0"(= unsigned integer)

Tag	Name	VR	VM	Type	Description
(0028,0120)	Pixel Padding Value	US	1	3	Single pixel value or one limit (inclusive) of a range of pixel values used in an image to pad to rectangular format or to signal background that may be suppressed.
(0028,0300)	Quality Control Image	CS	1	3	"YES" Present only in phantom images.
(0028,0301)	Burned In Annotation	CS	1	1	Constant, "NO"
(0028,1040)	Pixel Intensity Relationship	CS	1	1	Constant, "LIN"
(0028,1041)	Pixel Intensity Relationship Sign	SS	1	1	Constant, "1"
(0028,1050)	Window Center	DS	1-n	1	Present only if Presentation Intent Type is FOR PRESENTATION.
(0028,1051)	Window Width	DS	1-n	1	Present only if Presentation Intent Type is FOR PRESENTATION.
(0028,1052)	Rescale Intercept	DS	1	1	Constant, "0"
(0028,1053)	Rescale Slope	DS	1	1	Constant, "1"
(0028,1054)	Rescale Type	LO	1	1	Constant, "US"
(0028,1055)	Window Center and Width Explanation	LO	1-n	3	Present only if Presentation Intent Type is FOR PRESENTATION.
(0028,1056)	VOI LUT Function	CS	1	3	"", "LINEAR", "SIGMOID" or might not be present. Assume linear VOI LUT function if this tag is not present or if the value is empty.
(0028,2110)	Lossy Image Compression	CS	1	1	Constant, "00"
(0040,0275)	Request Attribute Sequence	SQ	1	3	Worklist information received from Modality Worklist.
>(0040,0007)	Scheduled Step Description	LO	1	3	From MWL. Examination code.
>(0040,0009)	Scheduled Procedure Step ID	SH	1	1C	From MWL. Examination ID.
>(0040,1001)	Requested Procedure ID	SH	1	1C	From MWL. Procedure ID.
(0040,0253)	Performed Procedure Step ID	SH	1	3	Same as Scheduled Procedure Step ID. Not present if Scheduled Procedure Step ID is not present.

Tag	Name	VR	VM	Type	Description
(0040,0254)	Performed Procedure Step Description	LO	1	3	Same as Scheduled Step Description. Not present if Scheduled Step Description is not present.
(0040,0316)	Mean Glandular Dose	DS	1	3	Glandular dose in dGy
(0040,0555)	Acquisition Context Sequence	SQ	1	2	Empty
(0040,8302)	Entrance Dose	DS	1	3	Entrance dose in mGy
(0054,0220)	View Code Sequence	SQ	1	1	
>(0008,0100)	Code Value	SH	1	1	Code value, e.g. R-10242
>(0008,0102)	Designator	SH	1	1	Designator, e.g. SNM3
>(0008,0104)	Code Meaning	LO	1	1	Code meaning, e.g. cranio-caudal
>(0054,0222)	NMI View Angulation Modifier Code Sequence	SQ	1	2	Empty if not spot compression.
>>(0008,0100)	Code Value	SH	1	3	Present only if spot compression was used, "R-102D7"
>>(0008,0102)	Coding Scheme Designator	SH	1	3	Present only if spot compression was used, "SNM3"
>>(0008,0104)	Code Meaning	LO	1	3	Present only if spot compression was used, "Spot Compression"
(2050, 0020)	Presentation LUT Shape	CS	1	1	Constant, "INVERSE"

Table 3.

3.1.5 SOP Specific Conformance Statement, breast specific attributes

The following table lists additional supported attributes in the Philips MicroDose L30 computed mammography images. These attributes are added to the general attributes, specified in 3.1.4.

Tag	Name	VR	VM	Type	Description
(0008,0016)	SOP Class UID	UI	1	1	"1.2.840.10008.5.1.4.1.1.1.2.1" if (0008,0068) is "FOR PROCESSING" "1.2.840.10008.5.1.4.1.1.1.2" if (0008,0068) is "FOR PRESENTATION"
(0008,2218)	Anatomic Region Sequence	SQ	1	1	Anatomic region
>(0008,0100)	Code Value	SH	1	1C	"T-04000 "
>(0008,0102)	Designator	SH	1	1C	"SNM3"
>(0008,0104)	Code Meaning	LO	1	1C	"Breast"
(0018,0015)	Body Part Exposed	CS	1	3	"BREAST"
(0028,1300)	Implant Present	CS	1	3	"YES" if implant is present, else "NO".
(0028,1350)	Partial View	CS	1	3	"NO" if partial view is not selected. "YES" if partial view is selected.
(0028,1351)	Partial View Description	ST	1	3	Present only if 0028,1350 is set to "YES". Free text description of the portion of the breast captured in a partial view image. E.g. Anterior.
(0028,1352)	Partial View Code Sequence.	SQ	1	3	Present only if 0028,1350 is set to "YES". Sequence that describes the portion or section of the breast captured in a partial view image. One or two items may be present.
>(0008,0100)	Code Value	SH	1	1C	Code value, e.g. R-404CC
>(0008,0102)	Designator	SH	1	1C	Designator, e.g. SRT
>(0008,0104)	Code Meaning	LO	1	1C	Code meaning, e.g. Anterior
(0040,0318)	Organ Exposed	CS	1	1	"BREAST"

Table 4.

3.2 MWL SCU AE Specification

3.2.1 Association Establishment Policies

General
The maximum PDU size that the MWL SCU AE will use is 16384 bytes (16kB).

Number of Associations
The MWL SCU AE can only handle one association at a time. One MWL request is finished before the next is started. The user selects which MWL SCP to associate with by selecting worklist definition.

Asynchronous Nature
The MWL SCU AE does not support asynchronous operations and will not perform asynchronous window negotiation.

Implementation Identifying Information
The MWL SCU AE will provide an implementation class UID that is 1.2.752.24.3.3.25.7 and an implementation version name of "WIQRSCU_11_10".

3.2.2 Association Initiation Policy

Real-World Activity – MWL Find

Associated Real-World Activity
Worklists are defined in the configuration. Only Philips authorized personnel are allowed to do configuration. The definition of a worklist contains information about which MWL SCP to use and also search criteria. The user selects a worklist and the MWL SCU AE associates to the MWL SCP that is specified in the worklist definition.

Proposed Presentation Contexts
The proposed abstract syntaxes and transfer syntaxes are found by investigating Table 1 and Table 2. Role is SCU.

SOP-Specific Conformance
The MWL SCU provides standard conformance to the MWL SOP class.
Following attributes can be used by the MWL SCU

Attribute Name	Tag	Used for matching	Required in response	Remarks
Accession Number	(0008,0050)	No	Yes	
Referring Physician's Name	(0008,0090)	No	No	Configurable if this should be added to query.
Patient's Name	(0010,0010)	No	Yes	
Patient ID	(0010,0020)	No	Yes	
Patient's Birth Date	(0010,0030)	No	Yes	
Patient's Sex	(0010,0040)	No	Yes	
Patient's Age	(0010,1010)	No	No	
Other Patient IDs	(0010,1000)	No	No	Configurable if this should be added to query.
Other Patient IDs	(0010,1000)	No	No	
Medical alerts	(0010,2000)	No	No	
Additional Patient History	(0010,21B0)	No	No	
Study Instance UID	(0020,000D)	No	Yes	
Requested Procedure Description	(0032,1060)	No	Yes	
Patient State	(0038,0500)	No	Yes	
Scheduled Procedure Step Sequence	(0040,0100)			
>Modality	(0008,0060)	Yes	Yes	
>Scheduled Station AE Title	(0040,0001)	Yes	Yes	
>Scheduled Procedure Step Start Date	(0040,0002)	Yes	Yes	
>Scheduled Procedure Step Start Time	(0040,0003)	Yes	Yes	
>Scheduled Performing Physician's Name	(0040,0006)	Yes	No	
>Scheduled Procedure Step Description	(0040,0007)	No	Yes	
>Scheduled Procedure Step ID	(0040,0009)	No	Yes	
>Scheduled Station Name	(0040,0010)	Yes	Yes	
>Scheduled Procedure Step Location	(0040,0011)	No	Yes	
Requested Procedure ID	(0040,1001)	No	Yes	

Table 6.

3.2.3 Association Acceptance Policy

The MWL SCU AE does not handle incoming associations.

3.3 Print SCU AE Specification

3.3.1 Association Establishment Policies

General
The maximum PDU size that the Print SCU AE will use is 16384 bytes (16 kB).

Number of Associations
The Print SCU AE can only handle one association at a time.

Asynchronous Nature
The Print SCU AE does not support asynchronous operations and will not perform asynchronous window negotiation.

Implementation Identifying Information
The Print SCU AE will provide an implementation class UID that is 1.2.752.24.3.3.25.7 and an implementation version name of "WIPRISCU_11_10".

3.3.2 Association Initiation Policy

Real-World Activity - Print Command
Associated Real-World Activity
As described in the *User Manual, Philips MicroDose L30* ref. [3] the Philips MicroDose L30 user chooses an image to print by selecting corresponding icon image and then issues the print command. Then the Print SCU AE is activated, acts as an SCU and initiates an association with a remote AE that is supporting DICOM Print Management as SCP (a DICOM printer). Philips MicroDose L30 associates to the AE specified in the configuration. Only Philips authorized personnel can do configuration.

Proposed Presentation Contexts
The proposed abstract syntaxes and transfer syntaxes are found by investigating Table 1 and Table 2. Role is SCU.

SOP-Specific Conformance
The Print SCU AE supports the mandatory SOP classes, which are defined under the Basic Grayscale Print Management Meta SOP Class, see Table 1. No optional SOP classes are supported.

The Print SCU AE uses the following DIMSE Service Elements:

SOP Class	DIMSE Service Element
Basic Film Session SOP Class	N-CREATE, N-DELETE
Basic Film Box SOP Class	N-CREATE, N-DELETE, N-ACTION
Basic Grayscale Image Box SOP Class	N-SET
Printer SOP Class	N-GET

Table 7. DIMSE Service Elements

N-EVENT-REPORT is not supported.

Immediately after establishing an association, the Print SCU AE will execute an N-GET on the Printer SOP Class. This operation can be configured into two modes, one for fetching all available printer attributes and one for fetching a minimal set of printer attributes.

If configured to fetch all attributes, the following attributes will be requested:

Attribute name	Tag	Optional according to standard
Printer Status	(2110,0010)	NO
Printer Status Info	(2110,0020)	NO
Printer Name	(2110,0030)	YES
Manufacturer	(0008,0070)	YES
Manufacturer Model Name	(0008,1090)	YES
Device Serial Number	(0018,1000)	YES
Software Versions	(0018,1020)	YES
Date Of Last Calibration	(0018,1200)	YES
Time Of Last Calibration	(0018,1201)	YES

Table 8. Attributes, when fetching all available attributes

If configured to fetch a minimum set of attributes, the following attributes will be requested:

Attribute name	Tag	Optional according to standard
Printer Status	(2110,0010)	NO
Printer Status Info	(2110,0020)	NO
Printer Name	(2110,0030)	YES

Table 9. Attributes, when fetching minimum set of attributes

If the Printer Status tag is returned as NORMAL, the print job will continue immediately.

If the status is WARNING, the user will be notified and the value of the Printer Status Info tag will be displayed. The print job is then continued.

If the status is FAILURE, the user will be notified and the value of the Printer Status Info tag will be displayed. The print job is then aborted.

The Print SCU AE supports the following SOP class attributes:

SOP Class, DIMSE Service Element	Attribute name	Tag	Optional according to standard	Con-figu-rable	Default value
Basic Film Session N-CREATE	Number of Copies	(2000,0010)	YES	YES	1
Basic Film Session N-CREATE	Print Priority	(2000,0020)	YES	YES	MED
Basic Film Session N-CREATE	Medium Type	(2000,0030)	YES	YES	BLUE FILM
Basic Film Session N-CREATE	Film Destination	(2000,0040)	YES	YES	MAGAZINE

SOP Class, DIMSE Service Element	Attribute name	Tag	Optional according to standard	Con-figu-rable	Default value
Basic Film Box N-CREATE	Image Display Format	(2010,0010)	NO	NO	STANDARD\ 1,1
Basic Film Box N-CREATE	Film Orientation	(2010,0040)	YES	YES	PORTRAIT
Basic Film Box N-CREATE	Film Size ID	(2010,0050)	YES	YES	14INX17IN
Basic Film Box N-CREATE	Magnification Type	(2010,0060)	YES	YES	(none)
Basic Film Box N-CREATE	Max Density	(2010,0130)	YES	YES	(none)
Basic Film Box N-CREATE	Configuration Information	(2010,0150)	YES	YES	(none)
Basic Film Box N-CREATE	Smoothing Type	(2010,0080)	YES	YES	(none)
Basic Film Box N-CREATE	Border Density	(2010,0100)	YES	YES	BLACK
Basic Film Box N-CREATE	Empty Image Density	(2010,0110)	YES	YES	BLACK
Basic Film Box N-CREATE	Min Density	(2010,0120)	YES	YES	(none)
Basic Film Box N-CREATE	Trim	(2010,0140)	YES	YES	YES
Basic Grayscale Image Box N-SET	Polarity	(2020,0020)	YES	YES	NORMAL

Table 10. SOP Class Attributes

3.3.3 Association Acceptance Policy

The Print SCU AE does not handle incoming associations.

3.4 MPPS SCU AE Specification

3.4.1 Association Establishment Policies

General

The maximum PDU size that the MPPS SCU AE will use is 16384 bytes (16kB).

Number of Associations

The MPPS SCU AE can only handle one association at a time. One MPPS request is finished before the next is started. The Philips MicroDose L30 application selects the MPPS SCP to associate with that corresponds to the worklist definition that was used when the study was received.

Asynchronous Nature

The MPPS SCU AE does not support asynchronous operations and will not perform asynchronous window negotiation.

Implementation Identifying Information

The MPPS SCU AE will provide an implementation class UID that is 1.2.752.24.3.3.25.7 and an implementation version name of "WIMPPSSCU_1_5".

3.4.2 Association Initiation Policy

Real-World Activity – MPPS Create

Associated Real-World Activity

Worklists are defined in the configuration. Only Philips authorized personnel are allowed to do configuration. The definition of a worklist contains information about which MPPS SCP to use for studies received from corresponding MWL SCP. The user selects a worklist and the MPPS SCU AE associates to the MPPS SCP that is specified in the worklist definition. MPPS Create is sent when the study is started.

Proposed Presentation Contexts

The proposed abstract syntaxes and transfer syntaxes are found by investigating Table 1 and Table 2. Role is SCU.

SOP-Specific Conformance

The MPPS SCU provides standard conformance to the MPPS SOP class.

Following attributes can be used by the MPPS SCU

Attribute Name	Tag	VR	VM	Type	Description
Specific Character Set	(0008,0005)	CS	1	1C	Configurable, Default: "ISO_IR 100"
Scheduled Step Attribute Sequence	(0040,0270)	SQ	1	1	
>Study Instance UID	(0020,000D)	UI	1	1	Study Instance UID received from Modality Worklist.
>Accession Number	(0008,0050)	SH	1	2	Accession Number received from Modality Worklist.
>Scheduled Step Description	(0040,0007)	LO	1	2	Scheduled Step Description received from Modality Worklist.
>Scheduled Procedure Step ID	(0040,0009)	SH	1	2	Scheduled Procedure Step ID received from Modality Worklist.
>Requested Procedure ID	(0040,1001)	CH	1	2	Requested Procedure ID received from Modality Worklist.
>Requested Procedure Description	(0032,1060)	LO	1	2	Requested Procedure Description ID received from Modality Worklist.
>Referenced Study Sequence	(0008,1110)	SQ	1	2	Empty sequence.
>Scheduled Protocol Code Sequence	(0040,0008)	SQ	1	2	Empty sequence.
Patient Name	(0010,0010)	PN	1	2	Name of the patient received from Modality Worklist.
Patient ID	(0010,0020)	LO	1	2	Patient ID received from Modality Worklist.
Patient Birth date	(0010,0030)	DA	1	2	Patient birth date received from Modality Worklist.
Patient Sex	(0010,0010)	CS	1	2	Patient sex received from Modality Worklist.
Referenced Patient Sequence	(0008,1120)	SQ	1	2	Empty sequence.
Performed Station AE Title	(0040,0241)	AE	1	1	Performed Station AE Title received from configuration.
Performed Station Name	(0040,0242)	SH	1	2	Performed Station Name received from configuration.
Performed Location	(0040,0243)	SH	1	2	Empty
Performed Procedure Step Start Date	(0040,0244)	DA	1	1	Start date of the procedure step.
Performed Procedure Step Start Time	(0040,0245)	TM	1	1	Start time of the procedure step.
Performed Procedure Step Stop Date	(0040,0250)	DA	1	2	Empty
Performed Procedure Step Stop Time	(0040,0251)	TM	1	2	Empty
Performed Procedure Step Status	(0040,0252)	CS	1	1	"IN PROGRESS"

Attribute Name	Tag	VR	VM	Type	Description
Performed Procedure Step ID	(0040,0253)	SH	1	1	Performed Procedure Step ID.
Performed Procedure Step Description	(0040,0254)	LO	1	2	Same as Scheduled Step Description.
Procedure Type Description	(0040,0255)	LO	1	2	Empty
Procedure Code Sequence	(0008,1032)	SQ	1	2	Empty sequence.
Modality	(0008,0060)	CS	1	1	"MG"
Study ID	(0020,0010)	SH	1	2	Study ID received from Modality Worklist.
Performed Protocol Code Sequence	(0040,0260)	SQ	1	2	Empty sequence.
Performed Series Sequence	(0040,0340)	SQ	1-n	2	Empty sequence.
Total Number of Exposures	(0040,0301)	US	1	3	Empty
Entrance Dose in mGy	(0040,8302)	DS	1	3	Empty
Exposure Dose Sequence	(0040,030E)	SQ	1-n	3	Empty sequence.
Standard extended					
Organ Dose	(0040,0316)	DS	1	3	Empty or not present if not enabled in configuration.

Table 11.

Real-World Activity – MPPS Set

Associated Real-World Activity
MPPS Set is sent when the study is approved.

Proposed Presentation Contexts
The proposed abstract syntaxes and transfer syntaxes are found by investigating Table 1 and Table 2. Role is SCU.

SOP-Specific Conformance
The MPPS SCU provides standard conformance to the MPPS SOP class.

Following attributes can be used by the MPPS SCU

Attribute Name	Tag	VR	VM	Type	Description
Performed Procedure Step Status	(0040,0252)	CS	1	3	"COMPLETED"
Performed Procedure Step Stop Date	(0040,0250)	DA	1	3	Stop date of the procedure step.
Performed Procedure Step Stop Time	(0040,0251)	TM	1	3	Stop time of the procedure step.
Performed Series Sequence	(0040,0340)	SQ	1-n	3	
>Performed Physician's Name	(0008,1050)	PN	1	2C	Empty
>Performed Operator's Name	(0008,1070)	PN	1	2C	Empty
>Protocol Name	(0018,1030)	LO	1	1C	Empty
>Performed Series Instance UID	(0020,000E)	UI	1	1C	Performed Series Instance UID.
>Performed Series Description	(0020,103E)	LO	1	2C	Performed Series Description.
>Retrieve AE	(0008,0054)	AE	1		Empty
>Referenced Image Sequence	(0008,1140)	SQ	0-n	2C	
>>Referenced SOP Class UID	(0008,1150)	UI	1	1C	SOP Class UID.
>>Referenced SOP Instance UID	(0008,1155)	UI	1	1C	SOP Instance UID.
>Referenced Non Image Sequence	(0040,0220)	SQ	0-n	2C	Empty sequence.
Total Number of Exposures	(0040,0301)	US	1	3	Number of exposures.
Entrance Dose in mGy	(0040,8302)	DS	1	3	Total entrance dose in mGy.
Exposure Dose Sequence	(0040,030E)	DS	1-n	3	
>Radiation Mode	(0018,115A)	CS	1	3	"CONSTANT"

Attribute Name	Tag	VR	VM	Type	Description
>kVp	(0018,0060)	DS	1	3	kVp
>X-Ray Tube Current	(0018,1151)	IS	1	3	X-Ray Tube Current in mA.
>Exposure Time	(0018,1150)	IS	1	3	Exposure Time in ms.
Standard extended					
Organ Dose	(0040,0316)	DS	1	3	Total organ dose or not present if not enabled in configuration.

Table 12.

3.4.3 Association Acceptance Policy

The MWL SCU AE does not handle incoming associations.

4. Communication Profiles

4.1 Supported Communication Stacks

All AEs described in this conformance statement provide DICOM 3.0 TCP/IP Network Communication Support as defined in part eight of the DICOM Standard.

4.2 TCP/IP Stack

The AEs uses the TCP/IP stack built into their respective operating system. For more information about operating systems consult their manuals.

4.2.1 Physical Media Support

All AEs are neutral to the physical medium over which TCP/IP executes. They can e.g. be used with fiber optics, token ring, Ethernet and twisted pair.

4.3 OSI Stack

Not supported.

4.4 Point-To-Point Stack

Not supported.

5. Extensions / Specializations / Privatizations

5.1 Transfer Syntaxes

The Sectra Compression Transfer Syntax can be used between the modality and a Sectra PACS. The UID of the Transfer Syntax is 1.2.752.24.3.7.6.

5.2 Private Attributes

See chapter 8.

5.3 MPPS

It is possible to configure the Philips MicroDose application to extend the Modality Performed Procedure Step SOP Class to include optional attributes. See section 3.4.2. The default configuration is to not include optional attributes.

6. Configuration

6.1 Philips MicroDose L30

Configuration files are found in the XXX\Sectra\AW \Config\… directory where XXX is specified at installation. See *Acquisition Workstation System Administrator Guide, Philips MicroDose L30* ref. [4]. The Philips MicroDose Mobile Sync Tool is configured using the options dialog of the tool itself.

6.1.1 Storage SCU

More information about configuration for Storage SCU can be found in *Acquisition Workstation System Administrator GuideI* ref. [4].

Configuration file
The file system_configuration.def contains configuration for Storage SCP.

AE title
Default calling AE Title is MDM_AE

Remote AE
The default remote AE title is DICOM_STORAGE.

6.1.2 MWL SCU

More information about configuration for MWL SCU can be found in *Acquisition Workstation System Administrator Guide* ref. [4].

Configuration file
The file system_configuration.def contains configuration for MWL SCU.

AE title
Default calling AE Title is MICRODOSE.

6.1.3 Print SCU

More information about configuration for Print SCU can be found in *Acquisition Workstation System Administrator Guide* ref. [4].

Configuration file
The file dicom_printer.def contains configuration for Print SCU.

AE Title
The default AE title is DICOM_PRINT_SCU.

Remote AE
The remote Applications Entity's AE-title, host name and port number are specified the above-mentioned configuration file. Each remote AE is specified in its own section of the file. Default AE title is PRINT_SERVER_SCP.

7. Support of Extended Character Sets

All AE provide support for ISO_IR 100 extended character set except Print SCU AE.

However, note that all text in the images is passed to the printer in the image data itself. This means that all overlay text appears on the printed medium in the same way as on the screen. Philips MicroDose L30 handles most character repertoires used in Western Europe.

8. Private Attributes

The Storage SCU AE includes some Private Attributes in exported images. This table documents these attributes.

Notice	*Tag 0019:1024 is necessary for the Detector Linearity Test in "Quality Control Procedures". This tag contains a factor used for recalculation in order to make the squared signal-to-noise ratio linear with the input dose (mAs).*

Tag	Name	VR	VM	Description
(0019,0010)	Private creator code	LO	1	Value: PHILIPS_MICRODOSE_L30_01
(0019,1020)	Region mean	IS	1	
(0019,1021)	Region expected mean	IS	1	
(0019,1022)	Image statistics evaluation	IS	1	
(0019,1023)	Background counts	UL	1	
(0019,1024)	Pixel to Photon ratio	FD	1	Contains the ratio of pixel values to photons detected by the detector at the centre of the image field.
(0019,1025)	Target SNR	FD	1	
(0019,1026)	Target CNR	FD	1	
(0019,1027)	Exposure accuracy	FD	1	
(0019,1028)	Response accuracy	FD	1	
(0019,1029)	PMMA pixel values	DS	1-n	
(0019,102A)	PMMA thickness	DS	1-n	
(0019,1030)	Breast density	IS	1	
(0019,1031)	Calculated breast glandularity	IS	1	
(0019,1040)	CCS version	LO	1	Version of Stand Control computer software.
(0019,1041)	ASIC trim date	LO	1	Date of the Stand ASIC trim.
(0019,1042)	Grayscale trim date	LO	1	Date of Stand grayscale trim.
(0019,1043)	Geometry trim date	LO	1	Date of Stand geometry trim.
(0019,1044)	Configuration	LO	1	System configuration description.
(0019,1045)	Stand id	LO	1	Identity of Stand.
(0019,1046)	Generator id	LO	1	Identity of Stand Generator.
(0019,1047)	Exposure mode	LO	1	Exposure mode.
(0019,1048)	Detector id	LO	1	Identity of the Detector.
(0019,1049)	System version	LO	1	System version.
(0019,1050)	Expected uAs	IS	1	Expected uAs.
(0019,1051)	Image geometry	LO	1	Image geometry.
(0019,1052)	AEC mode	LO	1	AEC mode
(0019,1080)	Image Processing ID	LT	1	Image Processing ID.
(0019,10A0)	Projection code value	SH	1	
(0019,10A1)	Projection meaning	LO	1	
(0019,10A2)	Spot compression code value	SH	1	Is set to R-102D7 if spot compression is used.

Tag	Name	VR	VM	Description
(0019,10A3)	Compression paddle lable.	LO	1	Translated label of the selected compression paddle.
(0019,10A4)	Exposure in mAs with 1 decimal	SH	1	
(0019,10A5)	AGD in mGy with 2 decimals	SH	1	Organ Dose in mGy, with 2 decimals.
(0019,10A6)	RIS type	LO	1	If the examination is created locally on Philips MicroDose L30, this is set to "INTERNAL".
(0019,10A7)	Object type	CS	1	
(0019,10A8)	Image setting	LO	1	Name of selected image setting.
(0019,10A9)	Translated image setting name.	LO	1	Translated name of selected image setting.
(0019,10AA)	Compression paddle name.	LO	1	Name of the compression paddle.

Table 13.

9. Exported Presentation States

If annotations have been made in the images on the AWS, this information will be exported as DICOM Standard Grayscale Presentation State if the Storage SCP supports this. The presentation states modules contain the following information generated from the AWS settings and annotations.

Module	AWS correspondence	Note
Presentation State	-	Label: "MDM Default" Description: "MDM Default Setting"
Mask	-	Not used
Display Shutter	-	Not used
Bitmap Display Shutter	-	Not used
Overlay Plane	-	Not used
Overlay/Curve Activation	-	Not used
Displayed Area	Zoom	The display area is always sent as "SCALE TO FIT"
Graphic Annotation	All graphic annotations and measurements	We always use annotation units "PIXEL", i.e. image relative coordinates
Spatial Transformation	-	Not used
Graphic Layer	-	One single layer (0)
Modality LUT	-	Copied from original image
Softcopy VOI LUT	-	Copied from original image
Softcopy Presentation LUT	-	Always use "INVERSE"

Table 14.