AGFA HEALTHCARE
DICOM Conformance Statement

Drystar 5503, SW version 5.0

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Revision Record

Revision Number	Date	Remark
1.0	February 14, 2006	Initial revision
1.1	May 2, 2006	DCS imited to Drystar 5503 (version 5.0) only

1 INTRODUCTION

1.1 Intended Audience

The user of this document is involved with system integration and/or software design. We assume that the reader is familiar with the terminology and concepts that are used in the DICOM 3.0 standard.

Although the use of this conformance statement in conjunction with the DICOM 3.0 standard is intended to facilitate communication with imaging equipment, it is not sufficient to guarantee, by itself, the interoperability of the connection. The following issues need to be considered:

- Integration: The integration of any device into a system of interconnected devices goes beyond the scope of the DICOM 3.0 standard and this conformance statement with respect to *interoperability*. The responsibility for analyzing the applications requirements and developing a solution that integrates the Agfa equipment with other vendors' systems is the user's responsibility.

- Validation: Testing the complete range of possibilities between the Agfa equipment and non-Agfa devices, before the connection is declared operational, is deemed to be a necessity. The user should ensure that any non-Agfa provider accepts full responsibility for all validation required for their connection with the Agfa equipment. The accuracy of image data once it has crossed the interface between the Agfa equipment and the non-Agfa device as well as the stability of the image data for the intended applications is the responsibility of the non-Agfa provider.

A validation is required before any clinical use (diagnosis and/or treatment) is performed. It applies when images acquired on Agfa imaging equipment are processed/displayed on a non-Agfa device, as well as when images acquired on non-Agfa equipment are processed/displayed on an Agfa workstation.

- Future Evolution: As the DICOM 3.0 standard evolves to meet the user's growing requirements and to incorporate new features and technologies, Agfa will follow the evolution of the standard. This evolution of the standard may require changes to devices that have implemented DICOM 3.0. The user should ensure that any non-Agfa provider, who connects with Agfa devices, also plans future evolution of the DICOM standard. A refusal to do so may reflect in the loss of functionality and/or connectivity between the different products.

1.2 Purpose of this Document

This DICOM Conformance statement specifies the compliance of the Agfa Dicom Print Module (ADPM) with the DICOM standard. The Agfa Dicom Print Module is an implementation of the DICOM 3.0 standard for Print Management. The Agfa Dicom Print Module is used to send images to a hardcopy printer for printing on film or paper.

The Agfa Dicom Print Module is a network print server for the following Agfa printers: Drystar 4500, Drystar 4500M, Drystar 5500, Drystar 5500M, Drystar 5300, Drystar 5302, Drystar 5503 and Drystar 5503M.

From release 4.0 the Mammo functionality is an option which is available via a licence key.

The SCU is responsible for providing the necessary image quality-related attributes to the SCP.

1.3 Scope

This DICOM Conformance Statement refers to the Agfa Drystar 5503 printer using software 5.0.

2 IMPLEMENTATION MODEL

2.1 Application Data Flow Diagram

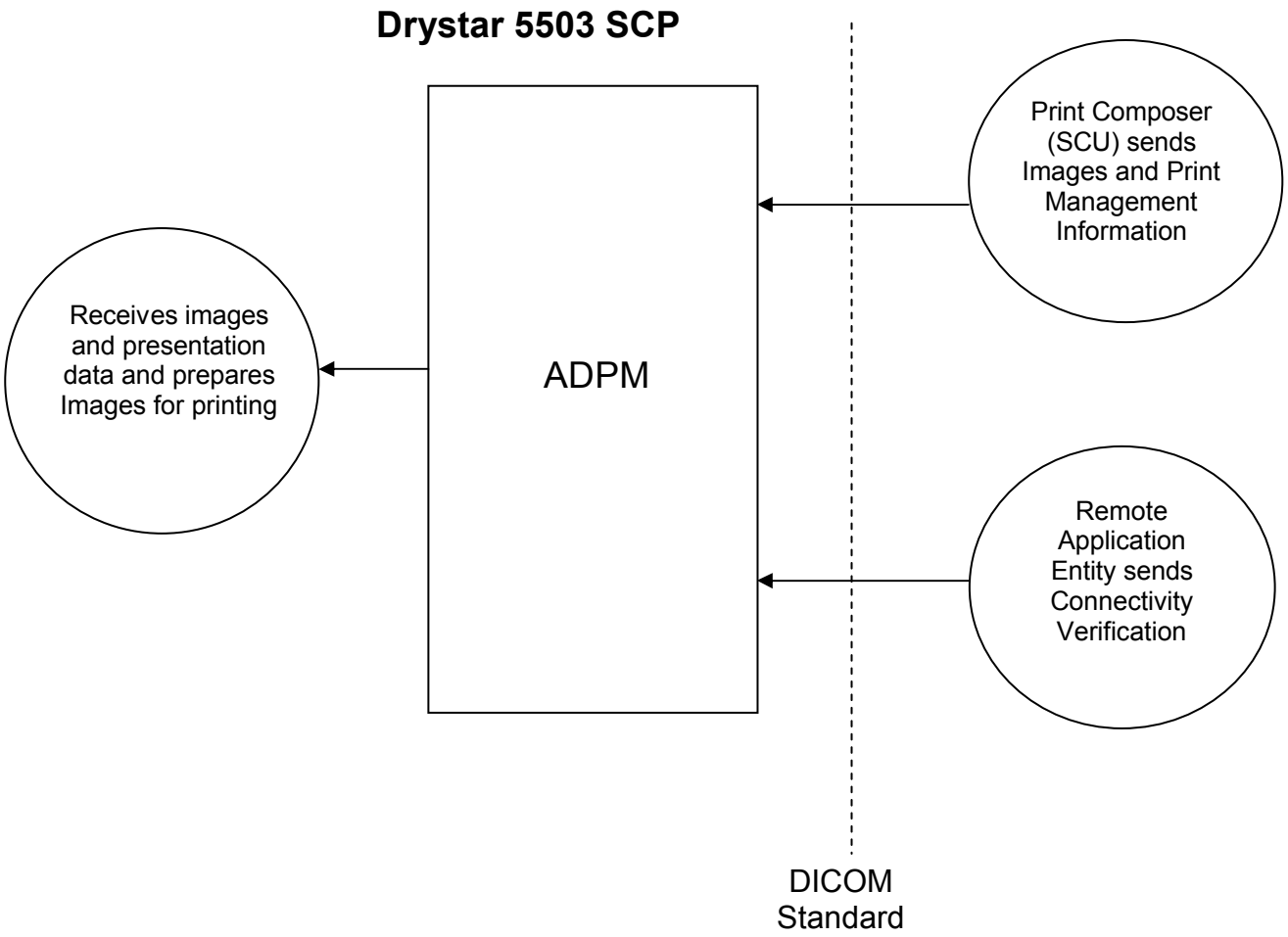

Figure 2.1 Functional overview – Application Data Flow

2.2 Functional Definitions of AEs

When the printing is invoked by the SCU AE, the SCU will make use of the SOP classes defined for Print Management which allow the definition of a Film Session with one or more subordinate Film Boxes, which in turn contain one or more subordinate Image Boxes. The SCU controls the printing by manipulating the Print Management SOP Classes by means of DIMSE services.

The Print Management SOP Classes are managed by the ADPM (SCP). The ADPM (SCP) waits for another DICOM Print Management Service application AE (SCU) to connect. ADPM (SCP) will accept Associations with Presentation Context for the Print Management Service Class. Only one printer is connected to a single ADPM.

2.3 Sequencing of Real World Activities

Not applicable for Real World Activities.

However, a Film Session has to be created before one or more subordinate Film Boxes can be created. Also, the Film Box has to be created before one or more subordinate Image Boxes can be created.

3 AE SPECIFICATIONS

The ADPM accepts printing associations.

3.1 Print Management Drystar 5503 – Specifications

The ADPM provides standard conformance to the following DICOM 3.0 Meta SOP Classes and DICOM 3.0 Optional SOP Classes as SCP:

Meta SOP Class Name	SOP Class UID
Basic Grayscale Print Management Meta SOP class	1.2.840.10008.5.1.1.9
Basic Color Print Management Meta SOP class	1.2.840.10008.5.1.1.18
Optional SOP Class Name	**SOP Class UID**
Verification SOP Class	1.2.840.10008.1.1
Basic Annotation Box SOP Class	1.2.840.10008.5.1.1.15
Print Job SOP Class	1.2.840.10008.5.1.1.14
Presentation LUT SOP Class	1.2.840.10008.5.1.1.23
Print Queue Management SOP Class	1.2.840.10008.5.1.1.26

Table 3.1: META SOP Classes & SOP Classes.

Support for Basic Grayscale Print Management as SCP also implies support for the following SOP Classes as SCP:

SOP Class Name	SOP Class UID
Basic Film Session SOP Class	1.2.840.10008.5.1.1.1
Basic Film Box SOP Class	1.2.840.10008.5.1.1.2
Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4
Printer SOP Class	1.2.840.10008.5.1.1.16

Table 3.2: Supported SOP Classes for Basic Grayscale Print Management Meta SOP Class.

Support for Basic Color Print Management as SCP also implies support for the following SOP Classes as SCP:

SOP Class Name	SOP Class UID
Basic Film Session SOP Class	1.2.840.10008.5.1.1.1
Basic Film Box SOP Class	1.2.840.10008.5.1.1.2
Basic Color Image Box SOP Class	1.2.840.10008.5.1.1.4.1
Printer SOP Class	1.2.840.10008.5.1.1.16

Table 3.3: Supported SOP Classes for Basic Color Print Management Meta SOP Class.

3.1.1 Association Establishment Policies

3.1.1.1 General

Before any SOP Class can be exchanged between the SCU AE and the ADPM (SCP), an association stage takes place to negotiate and exchange the capabilities of the SCU and SCP. The Print Management SCU and SCP establish an Association by using the Association Services of the DICOM Upper Layer. During association establishment, the DICOM Print Management AE negotiates the supported SOP classes.

Only the SCU AE shall release an Association. The Association may be aborted by the SCU or the SCP.

The SCU AE attempts to initiate a new Association for each print session. This means that when no operation is done on the Association, the SCU should release the Association.

One can only send DIMSE messages to instances that are created on the same association.

The Maximum PDU length for the PDU's offered by the ADPM (SCP) is 65542 bytes. This means that the maximum value for a PDU-length field is 65542 bytes.

3.1.1.2 Number of Associations

The number of supported Associations as a SCP is in principle unlimited. However, the practical amount of supported Associations is determined out of the amount of system resources (CPU, hard disk size, memory).

3.1.1.3 Asynchronous Nature

ADPM (SCP) will only allow one outstanding operation on an Association. The ADPM (SCP) can, however, issue an asynchronous N-EVENT message as defined in the supported SOP Classes.

3.1.1.4 Implementation Identifying Information

For ADPM the following identifying information is valid:

- Implementation Version Name: AGFA DTF1.0.82 (or higher)
  - This is the Release Version Sequence Number: Prefix (AGFA DTF1) .version (0) . version (82)
- Implementation Class UID: 1.3.51.0.1.3
  - This is the version of the Agfa Dicom library (fixed number)
- DICOM Application Context Name: 1.2.840.10008.3.1.1.1
  - This a reference to the Dicom standard 3.0 (fixed number)

3.1.2 Association Initiation Policy

Not applicable to the Print Management Service component, because the ADPM (SCP) can not initiate an Association. The ADPM as SCU is not implemented.

3.1.3 Association Acceptance Policy

The ADPM (SCP) 'AETitle' is configurable and is part of the Drystar installation and configuration procedures. The ADPM (SCP) accepts only associations if the 'called AETitle' matches the ADPM 'AETitle'. It is not requested that the 'calling AETitle' be known by the ADPM application. All Associations must use the same destination TCP/IP port number.

3.1.3.1 Printing Encoded with Implicit or Explicit VR

3.1.3.1.1 Associated Real World Activity

The associated Real World Activity is the printing of a set of images which is encoded with any VR and requested over the network.

3.1.3.1.2 Proposed Presentation Contexts

Any of the Presentation Contexts shown in the following table are acceptable for ADPM as SCP:

Name-list	UID-list
DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2
DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1
DICOM Explicit VR Big Endian Transfer Syntax	1.2.840.10008.1.2.2

Table 3.4: Supported Transfer Syntaxes.

The following Presentation Contexts are acceptable for ADPM:

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Verification	1.2.840.10008.1.1	all Transfer Syntaxes of Table 3.4	SCP	None
Basic Grayscale Print Management *	1.2.840.10008.1.1.9	all Transfer Syntaxes of Table 3.4	SCP	None
Basic Color Print Management *	1.2.840.10008.1.1.18	all Transfer Syntaxes of Table 3.4	SCP	None
Basic Annotation Box	1.2.840.10008.5.1.1.15	all Transfer Syntaxes of Table 3.4	SCP	None
Print Job	1.2.840.10008.5.1.1.14	all Transfer Syntaxes of Table 3.4	SCP	None
Presentation LUT	1.2.840.10008.5.1.1.23	all Transfer Syntaxes of Table 3.4	SCP	None
Print Queue Management SOP Class	1.2.840.10008.5.1.1.26	all Transfer Syntaxes of Table 3.4	SCP	None
** Meta SOP Class*				

Table 3.5: Presentation Context Table.

Note:

Presentation Context shall use Abstract Syntax IDs that correspond to the SOP Classes UID of the Meta SOP Class, specified in the first column of the Presentation Context Table or included SOP Classes. None of the included SOP Classes supports extended negotiation.

3.1.3.2 SOP Specific Conformance to Basic Grayscale Print Management Meta SOP Class

Standard conformance is also provided to the DICOM Basic Grayscale Print Management Class as SCP.

Received attributes that are not supported will not issue an error or failure status code.

3.1.3.2.1 Basic Film Session SOP Class

The following DIMSE services are supported:

- N-CREATE
- N-SET
- N-DELETE
- N-ACTION

All other DIMSE services return status code 0211H.

3.1.3.2.1.1 N-CREATE

Sent by the SCU AE , to create a Basic Film Session SOP instance, after an Association has been established. The N-CREATE causes the Basic Film Session to be created and its attributes initialized. The Basic Film session has to be created before the Basic Film Boxes are created. If “N-CREATE” fails, an error message will be returned by the SCP AE.

ADPM only supports one Basic Film Session instance on an Association. No other concurrent Film Session shall be created on one Association. However, a sequential Film Session on the same Association is allowed after deleting the previous Film Session.

Tag	Name	Supported	Default
(2000,0010)	Number of Copies	1-100	1
(2000,0020)	Print Priority	• HIGH, • LOW, • (MED=LOW)	LOW
(2000,0030)	Medium Type	• CLEAR FILM • BLUE FILM	refer to explanation below
(2000,0040)	Film Destination	PROCESSOR BIN_I (*)	PROCESSOR BIN_1 (*) upper tray
(2000,0050)	Film Session Label		“”
(2000,0060)	Memory Allocation		
(2100,0160)	Owner ID		
(2130,00A0)	Proposed Study Seq.		
(0010,0010)	>Patient’s Name		
(0010,0020)	>Patient ID		
(0010,0030)	>Patient’s Birth Date		
(0010,0032)	>Patient’s Birth Time		
(0010,0040)	>Patient’s Sex		
(0010,1000)	>Other Patient ID		
(0010,1001)	>Other Patient Names		

Tag	Name	Supported	Default
(0010,1010)	>Patient's Age		
(0010,1020)	>Patient's Size		
(0010,1030)	>Patient Weight		
(0010,2160)	>Ethnic Group		
(0010,2180)	>Occupation		
(0010,21B0)	>Add. Patient's History		
(0010,4000)	>Patient Comments		
(0020,0010)	>Study ID		
(0020,0011)	>Series Number		
(0020,000D)	>Study Instance UID		
(0008,0020)	>Study Date		
(0008,0030)	>Study Time		
(0008,0050)	>Accession Number		
(0008,0090)	>Ref. Physician's Name		
(0008,1030)	>Study Description		
(0008,1060)	>Name of Physician Reading Study		
(0008,1080)	>Admitting Diagnosis Description		
(*)The exposed film is deposited in a sorter bin where "i" represents the bin number. Film sorter BINs shall be numbered sequentially starting from one till four (with default =1= upper tray). The encoding of the BIN number shall not contain leading zeros.			

Table 3.6: Supported Attributes Basic Film Session.

➞ Medium Type:

Requested 'Medium Type' Supported?	'Medium Type'Available?	Behavior
YES	YES	Requested Medium Type is used
YES	NO	Film is not printed, print job is queued
NO	-	**Default**, this print job will be printed on the available 'Medium Type'. This behavior can be configured differently (refer to Section **6**).

Table 3.7: Medium Type.

➞ The ADPM will return one of the following 'Status Codes':

Status	Code	Description
Success	0000H	**Success**, is normally returned.
Warning (*)	0116H	**Attribute Value Out of Range.** Returned warning if an attribute value is out of range. The instance UID is created.
Failure	0106H	**Invalid Attribute Value**
Failure	0117H	**Invalid Object Instance** Returned if a given instance UID has violated the UID construction rules.
Failure	0122H	**SOP Class Not Supported** Returned if the SOP Class specified in the DIMSE command does not match the SOP Class UID.
Failure	0213H	**Resource Limitation** Returned to indicate that the requested allocation can temporarily not be provided.
(*) **default**, 'warnings' are not returned. Enabling warnings is explained in Section **6**.		

Table 3.8: Status Codes N-CREATE BFS.

3.1.3.2.1.2 N-SET

"N-SET" is used to update a Basic Film Session SOP instance.

The ADPM will return one of the following 'Status Codes':

Status	Code	Description
Success	0000H	**Success**, is normally returned.
Warning (*)	0116H	**Attribute Value Out of Range.** Returned warning if an attribute value is out of range. The instance UID is created.
Failure	0106H	**Invalid Attribute Value**
Failure	0110H	**Processing failure** Returned if no Data Set is provided by the SCU for the Basic Film Session SOP Class.
Failure	0119H	**Class-Instance Conflict** Returned if the SOP Class Instance UID is not defined for the given SOP Class.
Failure	0122H	**SOP Class Not Supported** Returned if the SOP Class specified in the DIMSE command does not match the SOP Class UID.
Failure	0213H	**Resource Limitation** Returned to indicate that the requested allocation can temporarily not be provided.
(*) **default**, 'warnings' are not returned. Enabling warnings is explained in Section **6**.		

Table 3.9: Status Codes N-SET BFS.

3.1.3.2.1.3 N-DELETE

"N-DELETE" is used to delete the complete Basic Film Session SOP instance.

The ADPM will return one of the following 'Status Codes':

Status	Code	Description
Success	0000H	**Success**, is normally returned.
Failure	0110H	**Processing failure** Returned if no Data Set is provided by the SCU for the Basic Film Session SOP Class.
Failure	0119H	**Class-Instance Conflict** Returned if the SOP Class Instance UID is not defined for the given SOP Class.
Failure	0122H	**SOP Class Not Supported** Returned if the SOP Class specified in the DIMSE command does not match the SOP Class UID.

Table 3.10: Status Codes N-DELETE BFS.

3.1.3.2.1.4 N-ACTION

"N-ACTION" is used to print a Basic Film Session.

The ADPM will return one of the following 'Status Codes':

Status	Code	Description
Success	0000H	**Success**, is normally returned.
Warning (*)	B602H	**Film Session SOP Instance hierarchy does not contain Image Box SOP Instances (empty page).**
Failure	0110H	**Processing failure** Returned if no Data Set is provided by the SCU for the Basic Film Session SOP Class.
Failure	0115H	**Invalid Argument Value**

Status	Code	Description
		Returned if the Action Type provided by the SCU is not recognized.
Failure	0119H	**Class-Instance Conflict** Returned if the SOP Class Instance UID is not defined for the given SOP Class.
Failure	0122H	**SOP Class Not Supported** Returned if the SOP Class specified in the DIMSE command does not match the SOP Class UID.
Failure	C600H	**Film Session SOP Instance hierarchy does not contain Film Box SOP Instances.**
Failure	C601H	**Returned if the support for the Print Job Class was negotiated and the creation of the Print Job Instance failed.**
(*) **default**, 'warnings' are not returned. Enabling warnings is explained in Section **6**.		

Table 3.11: Status Codes N-ACTION BFS.

3.1.3.2.2 Basic Film Box SOP Class

The following DIMSE services are supported:

- N-CREATE
- N-SET
- N-DELETE
- N-ACTION

All other DIMSE services return status code 0211H.

3.1.3.2.2.1 N-CREATE

Sent by the SCU AE to create a Basic Film Box, after a Film Session has been successfully created. If N-CREATE fails, an error message is returned by the SCP AE. The creation of a Basic Film Box also causes the subordinate Basic Image Boxes to be created for each location in the film format. The Basic Film Box contains the presentation parameters common for all images on a given sheet of film.

Tag	Name	Supported	Default
(2010,0010)	Image Display Format	• STANDARD\ • ROW\ • COL\ • SLIDE • SUPERSLIDE	
(2010,0030)	Annotation Display Format ID	**ANNOTATION** supported when the Annotation SOP Class is accepted during Association set-up (Refer to Section 3.1.3.5)	""
(2010,0040)	Film Orientation	• PORTRAIT • LANDSCAPE	PORTRAIT
(2010,0050)	Film Size ID	• 8INX10IN • 10INX12IN • 11INX14IN • 14INX14IN • 14INX17IN	refer to explanation below

Tag	Name	Supported	Default
(2010,0060)	Magnification Type	• REPLICATE • BILINEAR • CUBIC • NONE	CUBIC
(2010,0080)	Smoothing Type	0 / 100…199 / 200…299	125 or 143 (for printers with A#Sharp)
(2010,0100)	Border Density	• BLACK • WHITE • i, where i represents the desired density in hundredths of OD	BLACK
(2010,0110)	Empty Image Density	• BLACK • WHITE • I, where i represents the desired density in hundredths of OD	BLACK
(2010,0120)	Minimum Density	Refer to explanation below	
(2010,0130)	Maximum Density	Refer to explanation below	
(2010,0140)	Trim	YES, NO	NO
(2010,0150)	Configuration Information	Refer to explanation below	KANAMORI
(2010,015E)	Illumination	1 … 10.000	2000
(2010,0160)	Reflective Ambient Light	0 … 10.000	10
(2010,0500)	Ref. Film Session Seq.		
(0008,1150)	>Ref. SOP Class UID		
(0008,1155)	>Ref. SOP Instance UID		
(2010,0510)	Ref. Image Box Seq.		
(0008,1150)	>Ref. SOP Class UID		
(0008,1155)	>Ref. SOP Instance UID		
(2010,0520)	Ref. Basic Annotation Box Seq.		
(0008,1150)	>Ref. SOP Class UID		
(0008,1155)	>Ref. SOP Instance UID		
(2050,0500)	Ref. Presentation LUT Seq.		
(0008,1150)	>Ref. SOP Class UID		
(0008,1155)	>Ref. SOP Instance UID		

Table 3.12: Supported Attributes Basic Film Box.

3.1.3.2.2.1.1 Film Size ID

- Supported Film Sizes: Both trays can handle multi-format films: 14”x17”, 14”x14”, 11”x14”, 10”x12” and 8”x10”.
- Pixel Size: 50µm (20pixels/mm)
- Pixel Matrices: The following printable areas, without TRIM, are valid:

Drystar 5503							
		NO annotations		WITH annotations			
		Portr.&Landsc.		Portrait		Landscape	
Modality Type	Film Size	Width & Height		Width	Height	Width	Height
all	8INX10IN	3852	4880	3852	4300	4880	3272
	10INX12IN	4880	5760	4880	5280	5860	4300

Drystar 5503							
		NO annotations		WITH annotations			
		Portr.&Landsc.		Portrait		Landscape	
Modality Type	Film Size	Width & Height		Width	Height	Width	Height
	11INX14IN	5376	6922	5376	6342	6922	4796
	14INX14IN	6882	6882	6882	6302	6882	6302
	14INX17IN	6922	8368	6922	7788	8368	6342

Table 3.13: Pixel Matrices.

Drystar 5503 Mammo printing							
		NO annotations		WITH annotations			
		Portr.&Landsc.		Portrait		Landscape	
Modality Type	Film Size	Width & Height		Width	Height	Width	Height
mammo	8INX10IN	3828	4958	3828	4378	4958	3248
mammo	10INX12IN	4892	5810	4892	5230	5810	4312
mammo	11INX14IN	5376	6922	5376	6342	6922	4796

Table 3.14: Pixel Matrices for Mammo printing.

If a TRIM is applied, then 10 pixels are used for this purpose on each side of the image. This results in a printable area that has 20 pixels less rows and columns.

For the Drystar 5503 printer the 'Modality Type' of a modality sending print jobs can be defined in a Dicom User Profile. By default the Drystar 5503 handles print jobs as 'No Mammo', unless the modality was configured as 'mammo' modality in a Dicom User Profile.

'Supported' and 'Not Supported' Film Sizes: With respect to selected film sizes, the following rules are applicable:

Requested 'Film Size ID' Supported?	'Film Size' Available?	Behavior
YES	YES	Requested film size is used
YES	NO	Film is not printed, print job is queued
NO	-	**Default**, this print job will be printed on the available 'Film Size ID'. This behavior can be configured differently (seeSection **6**).

Table 3.15: 'Supported' and 'Not Supported' Film Sizes.

3.1.3.2.2.1.2 Magnification Type/Smoothing Type

If the Magnification Type attribute value is "CUBIC" and no Smoothing Type attribute is defined, the default Smoothing Type value is used.

For magnification type "CUBIC", following Smoothing Type values are special:

Value	Meaning
0	**Cubic B**, very smooth, but less smooth than LINEAR
100-199	**Cubic High Resolution**, very sharp (100) – smooth (199) Remark: For this interpolation type, the value which usually gives the best interpolation results is 125

Value	Meaning
	(=default).
200-299	**CubicBell,** very sharp (200) – smooth (299) Remark: For this interpolation type, the value which usually gives the best interpolation results is 218 (=default).

Table 3.16: Smoothing Type Values.

Choosing the correct interpolation type according the type of application:

The default interpolation for this device is 'CUBIC 125' or 'CUBIC 143' (for printers with A#Sharp functionality). However, depending on the type of application, other interpolation settings can be preferred by the user.

For images with a pixel matrix which exactly matches the pixel matrix of the printable area, in principle no interpolation is done. However, an exception is made with the interpolation setting CubicBell. With this setting, these images are processed in order to obtain a better perception of the image.

3.1.3.2.2.1.3 Configuration Information

This attribute can be used to define the Perception LUT and the contents of the Annotation Boxes. The individual parameters defined are separated by the "\"(BACKSLASH) character.

Example: "PERCEPTION_LUT=LINEAR\ANNOTATION1=PATIENTID\ANNOTATION2=AGFA.TIF"

Perception LUT: The following values are supported:

- PERCEPTION_LUT=LINEAR: Linear Perception LUT
- PERCEPTION_LUT=KANAMORI: Kanamori Perception LUT
- PERCEPTION_LUT=n: Kanamori Like Perception LUT

When "PERCEPTION_LUT=n" is used, 'n' is defined in the range 75 to 220 as follows:

N	Kanamori Like Perception LUT meaning
< 100	Hyper-Kanamori Curve
100	Exact Kanamori Curve(same as "PERCEPTION_LUT=KANAMORI")
100…200	Curve between Kanamori and Linear
200	Exact Linear Curve (same as "PERCEPTION_LUT=LINEAR")
> 200	Hypo-Linear Curve

Table 3.17: Kanamori Like values.

If Perception LUT is not defined by the SCU AE, the default Perception LUT value is used.

Annotation: each Annotation boxes can be initialized with the word 'ANNOTATION' followed by a number 1 to 6 an equal sign (=) and an information indication.

The information indication can be:

the contents of a TIFF formatted file:
is used to print a logo, symbol or icon in the annotation box

<filename>.TIF	Is used to print a logo on a film. The annotation file '<filename>.TIF' has to be present on the hardcopy device at the following location: **'c:/logos/'**
%logo:<filename>.TIF%	An extension '.TIF' has to be added to each annotation filename. The annotation file '<filename>.TIF' has to be present on the hardcopy device at the following location: **'c:/logos/'**

Note:

A 'logo' has to be in a separate annotation box. It cannot be combined with other annotation information.

e.g.: ANNOTATION3=%logo:/logos/agfa.TIF%

Variable demographic data: is used to print one of the attribute values as provided in the N-CREATE Film Session SOP under "Proposed Study Sequence". The following values are defined:

Field Names	Attribute
Patid	(0010,0020)
Patientid %PATIENTID%	(0010,0020) (0010,0020)
Patientname %PATIENTNAME%	(0010,0010) (0010,0010)
%ACCESSIONNR%	(0008,0050)
%PATIENTNAME%	(0010,0010)
%PATIENTBIRTHDATE%	(0010,0030)
%PATIENTBIRTHTIME%	(0010,0032)
%PATIENTSEX%	(0010,0040)
%PATIENTCOMMENTS%	(0010,4000)
%STUDYID%	(0020,0010)
%STUDYIUID%	(0020,000D)
%STUDYDATE%	(0008,0020)
%STUDYTIME%	(0008,0030)
%STUDYDESCRIPTION%	(0008,1030)
%READINGPHYSICIAN%	(0008,1060)
%REFERRINGPHYSICIAN%	(0008,0090)

Table 3.18: Annotation Field Names.

Fixed text: any text that does not refer to one of the other possibilities is printed.
e.g. ANNOTATION4= Medical Center Radiology department

System variable attribute: is used to print any of the following system controlled variable:

%date%	actual date and time will be printed
%nickname%	the nick name as specified in the system configuration will be printed
%modalitypagenumber%	the actual page number within the film session will be printed

Combination of 'fixed text'' with 'variable demographic data' and/or 'system variables':
e.g. ANNOTATION3=Patient ID: %patientid% Patient Name: %patientname%
ANNOTATION4=Registration: %accessionnr%
ANNOTATION5=Film nr. %modalitypagenumber%

3.1.3.2.2.1.4 Densities.

The following default behavior is applicable for attributes 'Border Density' (2010,0100), 'Empty Image Density' (2010,0110), 'Minimum Density' (2010,0120) (Db_{min}) and/or 'Maximum Density' (2010,0130) (Db_{max}):

If the attribute is not sent or no attribute value ("") is sent, then the values are mapped to the Dmin and Dmax values that are valid for the corresponding film (Film Size ID and Medium Type).

If a value is present, and the value is within the range for the corresponding film, then the send value is applied.

If a Dbmin or Dbmax value is present, but the value is outside the range for the corresponding film, then default behavior is that the value is mapped to the respective Dmin or Dmax value that is valid for the corresponding film type.

If a Dbmin value is present, but the value is outside the range of the corresponding film, then the value is mapped to the respective Dmin value of the corresponding film type.

If a Dbmax value is present, but the value is outside the range of the corresponding film, then the behavioris as follows:

- For Drystar 5503, the Dbmax value is mapped to the respective Dmax value of the corresponding film type.
- For Drystar 5503 Mammo printing:
  • for modality type 'mammo': the Dbmax value is mapped to the respective Dmax value of the corresponding mammo film type.
  • for modality type 'non-mammo': the Dbmax value is mapped to the respective Dmax value of the corresponding non-mammo film type.

The ADPM will return one of the following 'Status Codes':

Status	Code	Description
Success	0000H	**Success**, is normally returned.
Warning (*)	0116H	**Attribute Value Out of Range.** Returned warning if an attribute value is out of range. The instance UID is created.
Warning (*)	B605H	**Requested Dmin or Dmax Value Outside of Printer's Operating Range.** Returned warning if requested density value is out of range. The instance UID is created.
Failure	0106H	**Invalid Attribute Value**
Failure	0110H	**Processing failure** Returned if no Data Set is provided by the SCU for the Basic Film Box SOP Class.
Failure	0117H	**Invalid Object Instance** Returned if a given instance UID has violated the UID construction rules.
Failure	0119H	**Class-Instance Conflict** Returned if the SOP Class Instance UID is not defined for the given SOP Class.
Failure	0120H	**Missing Attribute** Returned if a mandatory attribute of the Data Set, provided by the SCU AE, is missing.
Failure	0122H	**SOP Class Not Supported** Returned if the SOP Class specified in the DIMSE command does not match the SOP Class UID.

Status	Code	Description
Failure	C602H	**Returned if the support for the Print Job Class was negotiated and the creation of the Print Job Instance failed.**
Failure	C651H	**Print Queue is Halted** New jobs are not accepted.
(*) **default**, 'warnings' are not returned. Enabling warnings is explained in Section **6**.		

Table 3.19: Status Codes N-CREATE BFB.

3.1.3.2.2.2 N-SET

"N-SET" is used to update a Basic Film Box SOP instance.

The ADPM will return one of the following 'Status Codes':

Status	Code	Description
Success	0000H	**Success**, is normally returned.
Warning (*)	0116H	**Attribute Value Out of Range.** Returned warning if an attribute value is out of range. The instance UID is created.
Warning (*)	B605H	**Requested Dmin or Dmax value Outside of Printer's operating Range.** Returned warning if requested density value is out of range. The instance UID is created.
Failure	0106H	**Invalid Attribute Value**
Failure	0110H	**Processing failure** Returned if no Data Set is provided by the SCU for the Basic Film Box SOP Class.
Failure	0117H	**Invalid Object Instance** Returned if a given instance UID has violated the UID construction rules.
Failure	0119H	**Class-Instance Conflict** Returned if the SOP Class Instance UID is not defined for the given SOP Class.
Failure	0120H	**Missing Attribute** Returned if a mandatory attribute of the Data Set, provided by the SCU AE, is missing.
Failure	0122H	**SOP Class Not Supported** Returned if the SOP Class specified in the DIMSE command does not match the SOP Class UID.
(*) **default**, 'warnings' are not returned. Enabling warnings is explained in Section **6**.		

Table 3.20: Status Codes N-SET BFB.

3.1.3.2.2.3 N-DELETE

"N-DELETE" is used to delete the complete Basic Film Box SOP instance.

The ADPM will return one of the following 'Status Codes':

Status	Code	Description
Success	0000H	**Success**, is normally returned.
Failure	0110H	**Processing failure** Returned if no Data Set is provided by the SCU for the Basic Film Box SOP Class.
Failure	0119H	**Class-Instance Conflict** Returned if the SOP Class Instance UID is not defined for the given SOP Class.

Status	Code	Description
Failure	0122H	**SOP Class Not Supported** Returned if the SOP Class specified in the DIMSE command does not match the SOP Class UID.

Table 3.21: Status Codes N-DELETE BFB.

3.1.3.2.2.4 N-ACTION

"N-ACTION" is used to print one or more copies of a single film of the Film Session. A Print Job SOP Instance is also created by the N-ACTION operation, if the Print Job SOP Class is accepted during the Association set-up.

The ADPM will return one of the following 'Status Codes':

Status	Code	Description
Success	0000H	**Success**, is normally returned.
Warning (*)	B603H	**Film Box SOP Instance hierarchy does not contain Image Box SOP Instances (empty page).**
Failure	0115H	**Invalid Argument Value** Returned if the Action Type provided by the SCU is not recognized.
Failure	0119H	**Class-Instance Conflict** Returned if the SOP Class Instance UID is not defined for the given SOP Class.
Failure	0122H	**SOP Class Not Supported** Returned if the SOP Class specified in the DIMSE command does not match the SOP Class UID.
Failure	C602H	**Returned if the support for the Print Job Class was negotiated and the creation of the Print Job Instance failed.**
(*) **default**, 'warnings' are not returned. Enabling warnings is explained in Section **6**.		

Table 3.22: Status Codes N-ACTION BFB.

3.1.3.2.3 Basic Grayscale Image Box SOP Class

The Basic Grayscale Image Box SOP instance is created by the ADPM at the time the N-CREATE of the Basic Film Box is processed. The Basic Grayscale Image Box contains the presentation parameters and image pixel data that apply to a single image.

The following DIMSE services are supported:

- N-SET

All other DIMSE services return status code 0211H.

3.1.3.2.3.1 N-SET

For each image in the Basic Film Box, the desired attributes of the Basic Image Box should be set. The SCU shall issue an N-SET for the Image Box. The SCP returns a status code. A print command can be issued by the SCU if at least one Basic Image Box is set. Empty image box positions are allowed. By using N-SET, the SCU can instruct the SCP to erase the image in the image position by setting a zero length and no value in the attribute 'Basic Grayscale Image Sequence'.

Tag	Name	Supported	Default
(2010,0060)	Magnification Type	Refer to Basic Film Box	
(2010,0080)	Smoothing Type	Refer to Basic Film Box	
(2010,0120)	Minimum Density	Refer to Section 3.1.3.2.2.1	
(2010,0130)	Maximum Density	Refer to Section 3.1.3.2.2.1	
(2020,0010)	Image Position	1 - x (depending layout)	
(2020,0020)	Polarity	NORMAL REVERSE	NORMAL
(2020,0030)	Requested Image Size		
(2020,0110)	Basic Grayscale Image Sequence		
(0028,0002)	>Samples Per Pixel	1	
(0028,0004)	>Photometric Interpretation	MONOCHROME1 MONOCHROME2	
(0028,0010)	>Rows	> 0	
(0028,0011)	>Columns	> 0	
(0028,0034)	>Pixel Aspect Ratio		1\1
(0028,0100)	>Bits Allocated	8, 16	
(0028,0101)	>Bits Stored	8 to 12	
(0028,0102)	>High Bit	7 to 15	
(0028,0103)	>Pixel Representation	0, 1	0
(7FE0,0010)	>Pixel Data		
(2050,0500)	Ref. Presentation LUT Seq.		
(0008,1150)	>Ref. SOP Class UID		
(0008,1155)	>Ref. SOP Instance UID		

Table 3.23: Supported Attributes Basic Image Box.

➞ The ADPM will return one of the following 'Status Codes':

Status	Code	Description
Success	0000H	**Success**, is normally returned.
Warning (*)	0116H	**Attribute Value Out of Range.** Returned warning if an attribute value is out of range. The instance UID is created.
Warning (*)	B605H	**Requested Min Density or Max Density outside of printer's operating range** The printer will use its respective minimum or maximum density value instead.
Failure	0106H	**Invalid Attribute Value**
Failure	0110H	**Processing failure** Returned if no Data Set is provided by the SCU for the Basic Image Box SOP Class.
Failure	0117H	**Invalid Object Instance** Returned if a given instance UID has violated the UID construction rules.
Failure	0119H	**Class-Instance Conflict** Returned if the SOP Class Instance UID is not defined for the given SOP Class.
Failure	0120H	**Missing Attribute** Returned if a mandatory attribute of the Data Set, provided by the SCU AE, is missing.
Failure	0122H	**SOP Class Not Supported** Returned if the SOP Class specified in the DIMSE command does not match the SOP Class UID.
Failure	C605H	**Insufficient memory in printer to store images.**
(*) **default**, 'warnings' are not returned. Enabling warnings is explained in Section **6**.		

Table 3.24: Status Codes N-SET BIB.

3.1.3.2.4 Printer SOP Class

The Printer SOP Class is used to monitor the status of the printer. The Printer SOP instance is created by the SCP during the start-up of the device and has a well-known SOP instance UID: **1.2.840.10008.5.1.1.17**.

The following DIMSE services are supported:

- N-EVENT-REPORT
- N-GET

All other DIMSE services return status code 0211H.

3.1.3.2.4.1 N-EVENT-REPORT

At any time during the Association, the SCU application may receive an N-EVENT-REPORT from the ADPM (SCP). It is used by the SCP to report the changes of the printer status in an asynchronous way. N-EVENT-REPORT is default disabled.

Tag	Name	Supported	Default
(2110,0010)	Printer Status	NORMAL WARNING FAILURE	
(2110,0020)	Printer Status Info	Refer to Table 3.27 and Table 3.28	

Table 3.25: Supported Attributes.

3.1.3.2.4.2 N-GET

"N-GET" retrieves an instance of the Printer SOP class.

Tag	Name	Supported	Default
(2110,0010)	Printer Status	NORMAL WARNING FAILURE	
(2110,0020)	Printer Status Info	Refer to Table 3.27 and Table 3.28	
(2110,0030)	Printer Name		Drystar
(0008,0070)	Manufacturer		Agfa-Gevaert N.V.
(0008,1090)	Manufacturer Model Name		5364
(0018,1000)	Device Serial Number		*serial number*
(0018,1020)	Software Versions		*software version*
(0018,1200)	Date Last Calibration		*last cal. date*
(0018,1201)	Time Last Calibration		*last cal. time*

Table 3.26: Supported Attributes N-GET Printer SOP Class.

The printer status will be returned as a combination of the Printer Status attribute (2110,0010) and the Printer Status Info attribute (2110,0020) of the Printer SOP Class.

The following printer status returns are possible:

Printer Status	Printer Status Info	Meaning
"NORMAL"	"NORMAL"	Printer OK
"FAILURE"	"PRINTER DOWN"	The printer is not able to print. This can have several reasons. (E.g. a mechanical or electrical problem, powering on or off, …)

Table 3.27: Default Printer Status Information.

It is possible to configure (status level = 1) so that the following printer status are also generated (refer to Section 6):

Printer Status	Printer Status Info	Meaning
"WARNING"	"PRINTER INIT"	Printer is not ready at this moment of time. It is expected to become available after initialization procedure is finished. No intervention is required. Possible conditions: • self diagnose • warming up • initializing tray • initializing densitometer Spooling of print jobs to disk is possible.
"WARNING"	"CALIBRATING"	The printer is performing self calibration. It is expected to become available for normal operation shortly. Possible conditions: • thermal head calibration • drum calibration • densitometer calibration Spooling of print jobs is possible.
"WARNING"	"SUPPLY EMPTY"	All of the printer trays are empty. (for devices with two or three trays, all trays have to be empty) Spooling of print jobs is still possible.
"WARNING"	"COVER OPEN"	One of the covers is open. Spooling of print jobs to disk is still possible.
"WARNING"	"BAD SUPPLY MGZ"	A film tray is not closed. Spooling of print jobs to disk is still possible.
"WARNING"	" FILM JAM"	A film jam occurred. An intervention is required. Spooling of print jobs to disk is still possible.

Table 3.28: Additional Printer Status Information.

Detailed information on 'Printer Status' and 'Printer Status Info' in relation to the printer condition can be found in appendix 6.1.1.2.

➞ The ADPM will return one of the following 'Status Codes':

Status	Code	Description
Success	0000H	**Success**, is normally returned.
Failure	0110H	**Processing failure** Returned if no Data Set is provided by the SCU for the Basic Film Box SOP Class.
Failure	0119H	**Class-Instance Conflict** Returned if the SOP Class Instance UID is not defined for the given SOP Class.
Failure	0122H	**SOP Class Not Supported** Returned if the SOP Class specified in the DIMSE command does not match the SOP Class UID.

Table 3.29: Status Codes.

3.1.3.3 SOP Specific Conformance to Basic Color Print Management Meta SOP Class

Standard conformance is also provided to the DICOM Basic Color Print Management Class.

Any attributes sent, other than those mentioned as supported, will not be flagged with an error or warning status code.

3.1.3.3.1 Basic Film Session SOP Class

Refer to the 'Basic Film Session SOP Class' for 'Basic Grayscale Print Management'.

3.1.3.3.2 Basic Film Box SOP Class

Refer to the 'Basic Film Box SOP Class' for 'Basic Grayscale Print Management'.

3.1.3.3.3 Basic Color Image Box SOP Class

The Basic Color Image Box SOP instance is created by the SCP at the time the N-CREATE of the Basic Film Box is processed. The Basic Color Image Box contains the presentation parameters and image pixel data that applies to a single image.

The following DIMSE services are supported:

- N-SET

All other DIMSE services return status code 0211H.

3.1.3.3.3.1 N-SET

For each image in the Basic Film Box, the desired attributes of the Basic Color Image Box should be set. The SCU shall issue an N-SET for the Image Box. The SCP returns a status code. A print command can be issued by the SCU if at least one Basic Image Box is set. Empty image box positions are allowed. By using N-SET, the SCU can instruct the SCP to erase the image in the image position by setting a zero length and no value in the attribute 'Basic Color Image Sequence'.

Tag	Name	Supported	Default
(2010,0060)	Magnification Type	• REPLICATE • BILINEAR • CUBIC • NONE	CUBIC
(2010,0080)	Smoothing Type	Refer to Section 3.1.3.2.2.1	
(2010,0120)	Minimum Density	Refer to Section 3.1.3.2.2.1	
(2010,0130)	Maximum Density	Refer to Section 3.1.3.2.2.1	

Tag	Name	Supported	Default
(2020,0010)	Image Position	1 - x (depending layout)	
(2020,0020)	Polarity	• NORMAL • REVERSE	NORMAL
(2020,0030)	Requested Image Size		
(2020,0111)	Basic Color Image Sequence		
(0028,0002)	>Samples Per Pixel	3	
(0028,0004)	>Photometric Interpretation	• RGB • PALETTE COLOR	
(0028,0006)	>Planar Configuration	0000, 0001 (frame interleave)	
(0028,0010)	>Rows	> 0	
(0028,0011)	>Columns	> 0	
(0028,0034)	>Pixel Aspect Ratio		
(0028,0100)	>Bits Allocated	8	
(0028,0101)	>Bits Stored	8	
(0028,0102)	>High Bit	7	
(0028,0103)	>Pixel Representation	0	
(7FE0,0010)	>Pixel Data		

Table 3.30: Supported Attributes.

➞ The ADPM will return one of the following 'Status Codes':

Status	Code	Description
Success	0000H	**Success**, is normally returned.
Warning	0116H	**Attribute Value Out of Range.** Returned warning if an attribute value is out of range. The instance UID is created.
Warning (*)	B605H	**Requested Min Density or Max Density outside of printer's operating range.** The printer will use it's respective minimum or maximum density value instead.
Failure	0106H	**Invalid Attribute Value**
Failure	0110H	**Processing failure** Returned if no Data Set is provided by the SCU for the Basic Film Box SOP Class.
Failure	0117H	**Invalid Object Instance** Returned if a given instance UID has violated the UID construction rules.
Failure	0119H	**Class-Instance Conflict** Returned if the SOP Class Instance UID is not defined for the given SOP Class.
Failure	0120H	**Missing Attribute** Returned if a mandatory attribute of the Data Set, provided by the SCU AE, is missing.
Failure	0122H	**SOP Class Not Supported** Returned if the SOP Class specified in the DIMSE command does not match the SOP Class UID.
Failure	C605H	**Insufficient memory in printer to store images.**

Table 3.31: Status Codes.

3.1.3.3.4 Printer SOP Class

Refer to the 'Printer SOP Class' for Basic Grayscale Print Management'.

3.1.3.4 SOP Specific Conformance to Verification SOP Class

ADPM provides standard conformance to the DICOM Verification Service Class (1.2.840.10008.1.1).

Any attributes sent, other than those mentioned as supported, will not be flagged with an error or warning status code.

C-ECHO: The Verification Service Class defines a service that verifies the application level communication between DICOM Application Entities. The verification is accomplished on an established Association using C-ECHO.

The ADPM will return one of the following 'Status Codes':

Status	Code	Description
Success	0000H	**Success**, is normally returned.
Failure	0122H	**SOP Class Not Supported** Returned if the SOP Class specified in the DIMSE command does not match the SOP Class UID.

Table 3.32: Status Codes.

3.1.3.5 SOP Specific Conformance to Basic Annotation Box SOP Class

ADPM provides standard conformance to the DICOM Basic Annotation Box Service Class.

If the DICOM Basic Annotation Box Service Class is supported, the annotation data is provided via Basic Annotation Box Instance. This data is ignored if the 'Configuration Information' attribute (2010, 0150) contains annotation data. If this is not the case, the Basic Annotation Box data is used.

The Basic Annotation Box SOP Instance is created by a N-CREATE of the Film Box SOP Class, and the attribute 'Annotation Display Format ID' has the value "ANNOTATION".

The following DIMSE service is supported:

- N-SET

All other DIMSE services return status code 0211H.

3.1.3.5.1 N-SET

"N-SET" is used to update the Basic Annotation Box SOP Instance. Each Film Box has its own annotation boxes.

Tag	Name	Supported
(2030,0010)	Annotation Position	1-6 (for each Film Box)
(2030,0020)	Text String	Refer to explanation below

Table 3.33: Supported Attributes.

For each Film Box, 6 annotation boxes are available. Each annotation boxes can be filled with following information:

The contents of a TIFF formatted file: is used to print a logo, symbol or icon in the annotation box.

%logo:<filename>.TIF%	An extension '.TIF' has to be added to each annotation filename. The annotation file '<filename>.TIF' has to be present on the hardcopy device at the following location: **'c:/logos/'**

Note:

A 'logo' has to be in a separate annotation box. It cannot be combined with other annotation information e.g.: "%logo:xxx.TIF%".

Variable demographic data: is used to print one of the attribute values as provided in the N-CREATE Film Session SOP under "Proposed Study Sequence". The following values are defined:

Field Names	Attribute
Patid	(0010,0020)
Patientid %PATIENTID%	(0010,0020) (0010,0020)
Patientname %PATIENTNAME%	(0010,0010) (0010,0010)
%ACCESSIONNR%	(0008,0050)
%PATIENTNAME%	(0010,0010)
%PATIENTBIRTHDATE%	(0010,0030)
%PATIENTBIRTHTIME%	(0010,0032)
%PATIENTSEX%	(0010,0040)
%PATIENTCOMMENTS%	(0010,4000)
%STUDYID%	(0020,0010)
%STUDYIUID%	(0020,000D)
%STUDYDATE%	(0008,0020)
%STUDYTIME%	(0008,0030)
%STUDYDESCRIPTION%	(0008,1030)
%READINGPHYSICIAN%	(0008,1060)
%REFERRINGPHYSICIAN%	(0008,0090)

Table 3.34: Annotation Field Names.

Fixed text: any text that does not refer to one of the other possibilities is printed.
e.g. "Medical Center Radiology department"

System variable attribute: is used to print any of the following system controlled variable:

%date%	actual date and time will be printed
%nickname%	the nick name as specified in the system configuration will be printed
%modalitypagenumber%	the actual page number within the film session will be printed

Combination of 'fixed text" with 'variable demographic data' and/or 'system variables':
e.g. "Patient ID: %patientid% Patient Name: %patientname%"

➞ The ADPM will return one of the following 'Status Codes':

Status	Code	Description
Success	0000H	**Success**, is normally returned.
Warning (*)	0116H	**Attribute Value Out of Range** Returned warning if an attribute value is out of range. The instance UID is created.
Failure	0110H	**Processing failure** Returned if no Data Set is provided by the SCU for the Basic Film Box SOP Class.
Failure	0119H	**Class-Instance Conflict** Returned if the SOP Class Instance UID is not defined for the given SOP Class.
Failure	0120H	**Missing Attribute** Returned if a mandatory attribute of the Data Set, provided by the SCU AE, is missing.

Status	Code	Description
Failure	0122H	**SOP Class Not Supported** Returned if the SOP Class specified in the DIMSE command does not match the SOP Class UID.

Table 3.35: Status Codes.

3.1.3.6 SOP Specific Conformance to Print Job SOP Class

ADPM provides standard conformance to the DICOM Print Job Service Class (1.2.840.10008.5.1.1.14).

Any attributes sent, other than those mentioned as supported, will not be flagged with an error or warning status code.

The Print Job SOP Instance is created by an “N-ACTION” of the Film Session SOP Class or an “N-ACTION” of the Film Box SOP Class. After printing all films or in case of an error, the Print Job Instance is deleted.

The SCP returns status code C602H for the N-ACTION command in case the creation of the Print Job failed.

The following DIMSE services are supported:

- N-EVENT-REPORT
- N-GET

All other DIMSE services return status code 0211H.

3.1.3.6.1 N-EVENT-REPORT

“N-EVENT-SUPPORT” is used to report execution status changes to the SCU in an asynchronous way. N-EVENT-REPORT is default disabled.

Following Event Type ID's are supported:

Event Type Name	Event Type ID	Description
PENDING	1	the print job is pending
PRINTING	2	the print job is being printed
DONE	3	the print job is printed
FAILURE	4	the print job failed

Table 3.36: Supported Attributes.

Following attributes are supported:

Tag	Name	Supported
(2100,0030)	Execution Status Info	refer to table Table 3.38: Execution Status Info .
(2100,0010)	Print Job ID	
(2000,0050)	Film Session Label	
(2110,0030)	Printer Name	Drystar

Table 3.37: Supported Attributes.

Execution Status	Execution Status Info	Meaning
“PRINTING”	“NORMAL”	
"DONE"	“NORMAL”	
“FAILURE”	“INVALID PAGE DES”	The specified page layout cannot be printed or other page description errors have been detected.
“FAILURE”	“INSUFFIC MEMORY”	There is not enough memory available to complete this.

Table 3.38: Execution Status Info .

3.1.3.6.2 N-GET

“N-GET” is used to retrieve an instance of the Print Job SOP Class.

Tag	Name	Supported
(2100,0020)	Execution Status	• PENDING • PRINTING • DONE • FAILURE
(2100,0030)	Execution Status Info	refer to table Table 3.38: Execution Status Info .
(2000,0020)	Print Priority	HIGH, LOW
(2100,0040)	Creation Date	*date of print job creation*
(2100,0050)	Creation Time	*time of print job creation*
(2100,0070)	Originator	*calling AETitle*
(2110,0030)	Printer Name	refer to Table 3.26: Supported Attributes N-GET Printer SOP Class.

Table 3.39: Supported Attributes.

3.1.3.7 SOP Specific Conformance to Presentation LUT SOP Class

ADPM provides standard conformance to the DICOM Presentation LUT Service Class.

The following DIMSE services are supported:

- N-CREATE
- N-DELETE

3.1.3.7.1 N-CREATE

“N-CREATE” is used to create a Presentation LUT SOP Instance.

Tag	Name	Supported
(2050,0010)	Presentation LUT sequence	
(0028,3002)	>LUT Descriptor	
(0028,3003)	>LUT Explanation	
(0028,3006)	>LUT Data	
(2050,0020)	Presentation LUT Shape	IDENTITY, LIN OD

Table 3.40: Supported Attributes.

If both Presentation LUT Sequence and Presentation LUT Shape are specified, failure 0106H is returned, indicating the creation of the Presentation LUT has failed.

➞ The ADPM will return one of the following 'Status Codes':

Status	Code	Description
Success	0000H	**Success**, is normally returned.
Failure	0106H	**Invalid Attribute Value**
Failure	0117H	**Invalid Object Instance** Returned if a given instance UID has violated the UID construction rules.
Failure	0120H	**Missing Attribute**

Table 3.41: Status Codes.

3.1.3.7.2 N-DELETE

"N-DELETE" is used to delete a Presentation LUT SOP Instance.

The ADPM will return one of the following 'Status Codes':

Status	Code	Description
Success	0000H	**Success**, is normally returned.
Failure	0110H	**Processing failure** Returned if no Data Set is provided by the SCU for the Basic Film Box SOP Class.
Failure	0117H	**Invalid Object Instance** Returned if a given instance UID has violated the UID construction rules.

Table 3.42: Status Codes.

3.1.3.8 SOP Specific Conformance to Print Queue Management SOP Class

ADPM provides standard conformance to the DICOM Queue Management Service Class.

The Printer Queue Management SOP Class is used to monitor and manipulate the print queue of the printer. The Printer Queue Management SOP instance is created by the SCP during the start-up of the device and has a well-known SOP instance UID: **1.2.840.10008.5.1.1.25**.

The print queue is restored after power-on.

The following DIMSE services are supported:

- N-GET
- N-ACTION

3.1.3.8.1 N-EVENT-REPORT

"N-EVENT-REPORT" is used to report execution status changes to the SCU in an asynchronous way. N-EVENT-REPORT is default disabled. Following Event Type ID's are supported:

Event Type Name	Event Type ID	Description
HALTED	1	Queue operation is halted
FULL	2	Queue is full
NORMAL	3	Queue is operational

Table 3.43: Supported Attributes.

3.1.3.8.2 N-GET

The N-GET is used by the SCU to retrieve an SCP instance of the Print Queue Management SOP Class.

Tag	Name	Supported
(2120,0010)	Queue Status	FULL HALTED NORMAL
(2120,0050)	Print Job Description Sequence	
(2100,0010)	>Print Job ID	
(2100,0020)	>Execution Status	PENDING PRINTING DONE FAILURE
(2100,0030)	>Execution Status Info	refer to table Table 3.38: Execution Status Info .
(2100,0040)	>Creation Date	*date of print job creation*
(2100,0050)	>Creation Time	*time of print job creation*
(2000,0020)	>Print Priority	refer to table Table 3.6: Supported Attributes Basic Film Session.
(2100,0070)	>Origin AE	*called AETitle*
(2100,0140)	>Destination AE	*calling AETitle*
(2110,0030)	>Printer Name	refer to Table 3.26: Supported Attributes N-GET Printer SOP Class.
(2000,0040)	>Film Destination	refer to Table 3.6: Supported Attributes Basic Film Session.
(2000,0050)	>Film Session Label	refer to Table 3.6: Supported Attributes Basic Film Session.
(2000,0030)	>Medium Type	refer to Table 3.6: Supported Attributes Basic Film Session.
(2100,0170)	>Number Of Films	
(2120,0070)	>Referenced Print Job Sequence	
(0008,1150)	>>Referenced SOP Class UID	
(0008,1155)	>>Referenced SOP Instance UID	

➞ The ADPM will return one of the following ‘Status Codes’:

Status	Code	Description
Success	0000H	**Success**, is normally returned.
Failure	0122H	**SOP Class Not Supported** Returned if the SOP Class specified in the DIMSE command does not match the SOP Class UID.

Table 3.44: Status Codes.

3.1.3.8.3 N-ACTION

“N-ACTION” is used by the SCU to manipulate the SCP queue content.

Following 'Event Types' are supported:

Event type Name	Event type ID	Description
PRIORITIZE	1	Change priority of queue entry
DELETE	2	Delete queue entry

Table 3.45: Supported 'Event types'

➞ Following attributes are supported:

Tag	Name	Supported
(2100,0010)	Print Job ID	
(2000,0020)	Print Priority	HIGH, LOW
(2100,0160)	Owner ID	

Table 3.46: Supported Attributes.

➞ The ADPM will return one of the following 'Status Codes':

Status	Code	Description
Success	0000H	**Success**, operation successfully completed.
Failure	C651H	**Print Queue is Halted** New jobs are not accepted.
Failure	C652H	**Mismatch of owner ID's**
Failure	C653H	**Action failed, Print Job in process**

Table 3.47: Status Codes.

4 COMMUNICATIONS PROFILES

4.1 Supported Communications Stacks

ADPM uses TCP/IP for the protocol stacks.

ADPM (SCP) listens by default to port number 104, unless this is configured differently.

5 EXTENSIONS / SPECIALIZATIONS / PRIVATIZATIONS

The following extensions to DICOM attributes are supported by the Print Management Server:

SOP Class: Basic Film Box

Attribute: Configuration Information

Extensions: A specific perception LUT is selected using the 'configuration information' attribute. Also 'Annotations' can be put on film using this same attribute.

6 CONFIGURATION

6.1 SCU specific ADPM configuration

A SCU dependent configuration is possible. This (Calling) AETitle specific configuration is saved in a 'DICOMUserProfile'. With this 'DICOMUserProfile' mechanism it is possible to customize the printer for a specific user.

Configuration is done by linking a 'basic profile' with the Calling AETitle for which the configuration is done. If necessary, the parameter values can be changed.

6.1.1 'DICOMUserProfile' settings.

6.1.1.1 Not supported "Film Size ID" and "Medium Type".

If the requested 'Film Size ID' and/or 'Medium Type' are 'not supported' or 'available', the default behavior is that the printer will print this film on the available film.

In case the film has to be printed, this can be defined in more detail.

For 'Film Size ID' the following configurations are possible:

➞ default behavior: print on "8INX10IN" or "10INX12IN" or "11INX14IN" or "14INX14IN" or "14INX17IN". (in this case a 'best fit' algorithm is applied)

➞ always print on "8INX10IN"

➞ always print on "10INX12IN"

➞ always print on "11INX14IN"

➞ always print on "14INX14IN"

➞ always print on "14INX17IN"

➞ For 'Medium Type' the following configurations are possible:

- default behavior: print on either "BLUE FILM" or "CLEAR FILM"
- always print on "BLUE FILM"
- always print on "CLEAR FILM"

It is also possible to configure that the film will not be printed. In this case, a failure status code will be returned to the SCU.

6.1.1.2 'Status information' Levels.

Two printer 'status information' levels are defined:

Level 0: default setting

➞ Status Codes: 'Failure' status codes are activated.

➞ Printer Status Info: the values in Table 3.27: Default Printer Status Information' (refer to 'Printer SOP Class') are active.

➞ Level 1: this level activates the following additional functionality:

➞ Status Codes: 'Warning" status codes are activated and will be returned, in case a SCU attribute value is replaced by the default value.

➞ Printer Status Info: the values of Table 3.28: Additional Printer Status Information (refer to 'Printer SOP Class') are also active.

Drystar 5503			DICOM print message communication			
			Conformance/Status Level 0		Conformance/Status Level 1	
Printer Condition	**spool print jobs ?**	**Printing?**	**Printer Status**	**Printer Status Info**	**Printer Status**	**Printer Status Info**
Start-up	NO	NO	FAILURE	PRINTER DOWN	FAILURE	PRINTER DOWN
Ready	**YES**	**YES**	**NORMAL**	**NORMAL**	**NORMAL**	**NORMAL**
Waiting	YES(**)	YES	NORMAL	NORMAL	NORMAL	NORMAL
Calculating	YES(**)	YES	NORMAL	NORMAL	NORMAL	NORMAL
Printing	YES(**)	YES	NORMAL	NORMAL	NORMAL	NORMAL
Warning	YES	YES(***)	NORMAL	NORMAL	NORMAL	NORMAL
Incident						
- empty tray	YES	YES(*)/NO	NORMAL	NORMAL	WARNING	SUPPLY EMPTY
- tray open	YES	NO	NORMAL	NORMAL	WARNING	BAD SUPPLY MGZ
- film jam	YES	NO	NORMAL	NORMAL	WARNING	FILM JAM
- cover open	YES	NO	NORMAL	NORMAL	WARNING	COVER OPEN
- RF-TAG error	YES	YES(*)/NO	NORMAL	NORMAL	WARNING	SUPPLY EMPTY
Error	NO	NO	FAILURE	PRINTER DOWN	FAILURE	PRINTER DOWN
Key Operator						
- Show Settings	NO	NO	FAILURE	PRINTER DOWN	FAILURE	PRINTER DOWN
- Change Settings	NO	NO	FAILURE	PRINTER DOWN	FAILURE	PRINTER DOWN
- Print Image	NO	NO	FAILURE	PRINTER DOWN	FAILURE	PRINTER DOWN
- Save Config.	NO	NO	FAILURE	PRINTER DOWN	FAILURE	PRINTER DOWN
- Restore Config	NO	NO	FAILURE	PRINTER DOWN	FAILURE	PRINTER DOWN
- Calibration (*film*)	NO	NO	FAILURE	PRINTER DOWN	FAILURE	PRINTER DOWN
- Service Actions	NO	NO	FAILURE	PRINTER DOWN	FAILURE	PRINTER DOWN
- Quality Control	NO	NO	FAILURE	PRINTER DOWN	FAILURE	PRINTER DOWN
- Installation	NO	NO	FAILURE	PRINTER DOWN	FAILURE	PRINTER DOWN
Service-remote UI	NO	NO	FAILURE	PRINTER DOWN	FAILURE	PRINTER DOWN

(*)	before entering this mode, spooling of print jobs is halted and all queued print jobs are printed.
(**)	can receive image(s) until available print spooling memory is filled.
(***)	depending on warning / incident nature

6.1.1.3 N-EVENT-REPORT messages.

Default, the asynchronous N-EVENT-REPORT messages are disabled for both 'Printer SOP Class' and 'Print Job SOP Class'.

With a specific SCU configuration it is possible to enable asynchronous N-EVENT-REPORT messages.

6.1.1.4 Association time-out.

It is possible to limit the time an association is open. This can be done two ways:

- A general association time-out: the association will be closed automatically if no activity took place for the defined time-out period.
- An image time-out: if no activity took place for the defined time-out period during the image transfer, the association will be closed automatically

Default no time-out period is activated.

7 ACRONYMS AND ABBREVIATIONS

The following acronyms and abbreviations are used in this document:

ADPM	Agfa Dicom Print Module
AE	Application Entity
DICOM	Digital Imaging and Communications in Medicine
DIMSE	DICOM Message Service Element
ADPM	Agfa Dicom Print Management
SCP	Service Class Provider
SCU	Service Class User
SOP	Service-Object Pair
TCP/IP	Transmission Control Protocol/Internet Protocol
UID	Unique Identifier

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