

AGFA MEDICAL IMAGING DICOM Conformance Statement

→ **ADC Print Management Service Class
(PMS)**

PS5000

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Document Information

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Revision Record

Revision Number	Date	Author	Reason for Change
1.0	20/11/96	Fjpaauw	Initial revision
1.1	27/01/99	Amorris	Company name changed
1.2	9/07/99	Amorris	New introduction incorporated
1.3	21/12/99	Amorris	New style implemented
1.4	18/1/00	Amorris	Returned to old style
2.0	15/02/00	Amorris	To be re-imported into mPower
2.1	15/02/00	Amorris	Re-imported into mPower
2.2	16/02/00	Amorris	Released 16.2.00
2.3	8/03/00	Amorris	Date/Time field corrected
3.0	7/09/00	Cweise	New conventions to be implemented
3.1	7/09/00	Cweise	New conventions implemented

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.

Readers not familiar with DICOM 3.0 terminology should first read the appropriate parts of the DICOM standard itself, prior to reading this conformance statement.

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

1.1.1 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 when *interoperability* is desired. 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 and should not be underestimated.

1.1.2 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.

1.1.3 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

The printing operations in ADC systems using the DICOM protocol only create instances of the Basic Grayscale Print Management Meta SOP Class (UID: 1.2.840.10008.5.1.1.9).

This document describes the flow of control (command) and data between the Service Class User (SCU) (the ADC component requesting printing) and the Service Class provider (SCP) (the component performing the printing).

A list of all the DICOM data items transmitted by the SCU to the SCP is also given, indicating possible default or fixed values.

All DICOM items are identified by their group, element attribute tag, where both numbers are written in hexadecimal notation.

2 IMPLEMENTATION MODEL

2.1 Application Data Flow Diagram

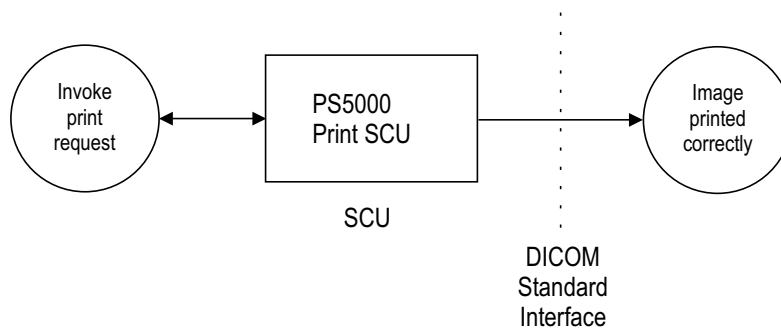


Figure 2.1 Implementation model.

2.2 Functional Definitions of AEs

ADC Print Application Entity acts as a Service Class User (SCU) for the Basic Grayscale Print Management Meta SOP Class. The ADC Print AE will open an association with the remote SCP. The image will be printed using the following command order:

1. **N-GET** (PRINTER SOP INSTANCE)
2. **N-CREATE** (FILM SESSION SOP INSTANCE)
3. **N-CREATE** (FILM BOX SOP INSTANCE)
4. **N-SET** (GRAYSCALE IMAGE BOX SOP INSTANCE)
5. **N-ACTION** (FILM BOX SOP INSTANCE)

The film session hierarchy should be automatically deleted by the SCP when the ADC Print AE releases the association.

2.3 Sequencing of Real World Activities

Not applicable.

2.4 AE Specifications

ADC will act as a single Application Entity.

2.4.1 ADC AE – DICOM Print Specification

The ADC Application Entity provides Standard Conformance to the following DICOM 3.0 SOP class as an SCU:

SOP Class Name	SOP Class UID
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9

Table 2.1 SOP classes.

2.4.2 Association Establishment Policies

2.4.2.1 General

ADC will offer a maximum PDU size of 32768 bytes.

2.4.2.2 Number of Associations

There can be several simultaneous associations active at any one time, each generated by a different component of an ADC system, or by different instances of one of its software modules. Theoretically, the total number of associations is not limited in any way. In practice, the number of associations is limited to three.

2.4.2.3 Asynchronous Nature

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

2.4.2.4 Implementation Identifying Information

The Implementation Class UID is: "1.3.51.0.7.6290.3.1". The Implementation Version Name is: "PS5000-SW3.1".

2.4.3 Association Initiation by Real-World Activity

ADC initiates associations as a result of the following events:

The basic processor of an ADC system automatically generates print requests (autorouting).

The user of an (optional) PS requests one or more images to be printed, thus generating print requests.

2.4.3.1 ADC Real-World Activity

2.4.3.1.1 Associated Real-World Activity

The ADC print function is available automatically, as part of the basic image processing functionality, and is available on demand via the PS and its user interface.

2.4.3.1.1.1 Flow of Control

- ▶ **N-GET:** (Printer SOP Instance). Except for the command itself, no data is transmitted to the SCP. The command is sent only once.
 - A response from the SCP is expected containing the DICOM item:
 - 2110,0010 CS Printer status.
 - If the received value is equal to the string WARNING, the item:
 - 2110,0020 CS Printer status info must also be present.
 - The association is aborted if the status: SUCCESS is not received.
- ▶ **N-CREATE:** (Film Session SOP Instance). Section 3.1 gives a list of DICOM items transmitted with this command. The command is sent only once.
 - A response without any data but with the status SUCCESS is expected.

- ▶ **N-CREATE:** (Film Box SOP Instance). Section 3.2 gives a list of DICOM items transmitted with this command. The command is sent only once.
 - A response with the status SUCCESS is expected from the SCP containing the following items:
 - 2110,0510 SQ Referenced Image box sequence.
 - 0008,1150 UI SOP Class UID (Ignored by the SCU)
 - 0008,1155 UI SOP Instance UID
 - The received SOP Instance UIDs are stored in an array and later used when sending individual images.
- ▶ **N-SET:** (Grayscale Image Box SOP Instance). Section 3.3 gives a list of DICOM items transmitted with this command. The command is sent once for each image on the film.
 - A response without any data but with the status SUCCESS is expected.
- ▶ **N-ACTION:** (Film Box SOP Instance)
 - The command is transmitted to the SCP without any data but indicating that a PRINT operation is to be performed. The command is sent only once.
 - A response without any data but with status SUCCESS is expected.

2.4.3.1.2 Proposed Presentation Contexts

ADC will propose the following presentation contexts:

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None

Table 2.2 Presentation contexts.

3 DICOM ITEMS TRANSMITTED TO THE SCP

3.1 N-CREATE (Film Session SOP Instance)

Group	Element	VR	TE	Description
2000	0010	IS	1	Copycount (Default value is 1)
2000	0020	CS	1	Priority (Default value is LOW)
2000	0030	CS	1	Medium type (Default value is BLUE FILM)
2000	0040	CS	1	Destination (Fixed value is PROCESSOR)
2000	0050	LO	3	Film session label

3.2 N-CREATE (Film Box SOP Instance)

Group	Element	VR	TE	Description
2010	0010	ST	1	Display format
2010	0040	CS	3	Film orientation (Default is PORTRAIT)
2010	0050	CS	3	Film size (Default is 8INX10IN)
2010	0060	CS	3	Magnification type (Fixed value is CUBIC)
2010	0080	CS	3	Smoothing type (Fixed value is 150)
2010	0100	CS	3	Border density (1) (2)
2010	0110	CS	3	Empty image density (1) (2)
2010	0120	US	3	Minimum density (1)
2010	0130	US	3	Maximum density (1)
2010	0140	CS	3	Trim (Fixed value NO)
2010	0150	ST	3	Configuration info (Fixed value PERCEPTION_LUT=LINEAR)
2010	0500	SQ	1	Referenced film session
>0008	1150	UI	1	Referenced SOP class
>0008	1155	UI	1	Referenced SOP Instance

Notes:

1. Only values between density 0.0 and 5.0 are accepted.
2. Both items are set to the same value.

3.3 N-SET (Grayscale Image Box SOP Instance)

Group	Element	VR	TE	Description
0010	0020	LO	3	Patient ID
2020	0010	US	1	Image position
2020	0020	CS	1	Polarity (Default value is NORMAL)
2020	0030	DS	3	Requested Image Size (1)
2020	0110	SQ	1	Preformatted grayscale image sequence
>0028	0002	US	1	Samples per pixel (Fixed value 1)
>0028	0004	CS	1	Photometric interpretation (Fixed value MONOCHROME1)
>0028	0010	US	1	Rows
>0028	0011	US	1	Columns
>0028	0034	IS	3	Pixel Aspect Ratio (2)
>0028	0100	US	1	Bits allocated (Values 8 or 16)
>0028	0101	US	1	Bits stored (Values 8 or 12)
>0028	0102	US	1	High bit (Values 7 or 11)
>0028	0103	US	1	Pixel representation (Fixed value 0 for unsigned)
>7FE0	0010		1	Pixel data (VR is OB or OW)

Notes:

1. Only provided if truesize printing is requested.
2. Only provided if truesize printing is requested and if the pixel aspect ratio is different from 1:1.

4 AGFA USAGE

The item 2000,0050 and for the time being each item 0010,0020 (one with each image) contains the Patient ID (Patient Code in AGFA terminology).

For each real image to be printed on the film two images are created and transmitted:

- ▶ The actual image.
- ▶ A Flat field with superimposed text consisting of patient and image information, and some processing parameters.

The images are always 8-bit deep, transmitted as VR OB in item 7FE0,0010.

5 COMMUNICATION PROFILES

5.1 Supported Communication Stacks

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

5.1.1 API

The Berkeley Socket API is used.

5.1.2 Physical Media Support

The physical media support is ISO 8802 Ethernet.

6 EXTENSIONS / SPECIALIZATIONS / PRIVATIZATIONS

Not applicable.

7 CONFIGURATION

7.1 AE Title/Presentation Address Mapping

The Calling AE Title has the default value PS5000 (configurable per system).

7.2 Configuration Parameters

- need more info from ADC

8 SUPPORT OF EXTENDED CHARACTER SETS

Not applicable.

9 ACRONYMS AND ABBREVIATIONS

The following symbols and abbreviations are used in this conformance statement:

ADC	Agfa Diagnostic Center
AE	Application Entity
DICOM	Digital Imaging and Communications in Medicine
LUT	Look-up Table
SCP	Service Class Provider
SCU	Service Class User
SOP	Service-Object Pair
UID	Unique Identifier
VR	Value Representation

