

DICOM Paper Print Server

1.1

DICOM Conformance Statement

V 1.0

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1 Introduction

1.1 Purpose

A DICOM Conformance Statement is intended to describe which components, optional components or extensions of the DICOM standard are supported by a particular implementation. The Conformance Statement of one implementation can be compared with the Conformance Statement of another implementation to determine which capabilities are commonly supported.

DICOM does not, by itself, guarantee interoperability. Furthermore, the identification of common capabilities by comparing DICOM Conformance Statements is also not sufficient to guarantee connectivity between two devices.

A DICOM Conformance Statement cannot replace validation and cross-vendor testing with other devices. Validation and cross-vendor testing are still required to ensure that both devices are performing as intended.

The reader should be aware of a number of important issues:

- Even when the comparison this Conformance Statement with the Conformance Statement of another device indicates that connectivity is possible, the system integrator is responsible for carrying out test procedures to ensure that the required connectivity is actually met.
- Neither the DICOM Standard nor this Conformance Statement can ensure interoperability when integrating devices from different vendors. It is the system integrator's responsibility to ensure that the application requirements of all devices within the complete system are met.
- The DICOM standard undergoes continual review and improvement in order to meet changing requirements. Corrections, extensions and additional services are added from time to time. Medigration reserves the right to make changes to the product described in this conformance statement in order to cover changes in the DICOM standard. Readers should be aware that connected devices should also follow changes in the DICOM standard in order to retain connectivity.

The intended audience for this Conformance Statement is hospital technical staff, system integrators and software engineers. The reader is assumed to have good understanding of the DICOM standard.

1.2 Scope

This conformance statement describes the DICOM capabilities of the medigration DICOM Paper Print Server (DPPS). DPPS is designed for integrating a conventional paper printer into a PACS-network. It supports those DICOM services needed to receive images for printing.

DPPS enables radiologists to capture images at any networked DICOM modality and print them on any postscript printer connected to the network.

1.3 Definitions, Acronyms and Abbreviations

1.3.1 Definitions

System Integrator	A person or organization responsible for integrating devices into a new or existing system. The System Integrator takes responsibility for ensuring that the system works as
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	a whole.
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Table 1: Definitions

Other definitions can be found within the different parts of the DICOM standard [1].

1.3.2 Acronyms and Abbreviations

ACR-NEMA	A merican C ollege of R adiology - N ational E lectrical M anufacturers A ssociation.
AE	A pplication E ntity
DCO	D ICOM C omposite O bject. A DICOM object such as an image, overlay, lookup-table, waveform, presentation state or radiotherapy plan which can be stored using the Storage Service Class.
DIMSE	D ICOM M essage S ervice E lement
DIMSE-C	D ICOM M essage S ervice E lement - C omposite
DIMSE-N	D ICOM M essage S ervice E lement - N ormalized
DPPS	D ICOM P aper P rint S erver (this product)
IOD	I nformation O bject D efinition
LUT	L ook- U p T able
PACS	P icture A rchiving and C ommunication S ystem
PDU	P rotocol D ata U nit
SCP	S ervice C lass P rovider
SCU	S ervice C lass U ser
SOP	S ervice O bject P air
UID	U nique I dentifier
VR	V alue R epresentation

Table 2: Acronyms and abbreviations

Other acronyms and abbreviations used within this document are defined within the different parts of the DICOM standard [1].

1.4 References

- [1] DICOM, PS3.(1-14)-2000, National Electrical Manufacturers Association, 1300 N. 17th Street Rosslyn, Virginia 22209, USA.
- [2] DICOM Paper PrintServer 1.0, Configuration Manual V 1.0, medigration GmbH.

1.5 Credits and Trademarks

ACR/NEMA and DICOM are registered trademarks of the American College of Radiology (ACR) and the National Electrical Manufacturers Association (NEMA).

This product is based on the **DICOM PostScript Print Server** written by Marco Eichelberg, OFFIS - Oldenburger F&E-Institut für Informatik-Werkzeuge und –Systeme, Escherweg 2, D-26121 Oldenburg, Germany.

2 Implementation Model

The **DICOM Paper Print Server (DPPS)** is a single Application Entity which provides the services of the DICOM Print Management Service Class as SCP. It accepts print parameters from Print Management Service Class Users and prints on any postscript printer. The DPPS software provides a configuration file [2] for configuring and managing operating parameters.

2.1 Application Data Flow Diagram

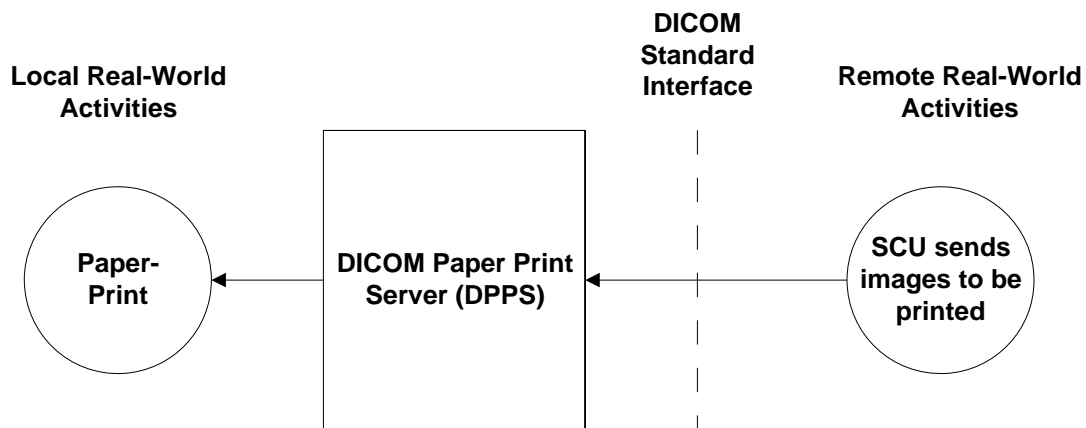


Figure 1 : DPPS Implementation Model

Figure 1 illustrates the relationship between the DPPS Application Entity and its associated Real-World Activities. The **Remote Real-World Activities** are shown on the right and the **Local Real-World Activities** are shown on the left.

SCU sends images to be printed is an activity performed by a remote device to send images to DPPS to be printed by the Paper-Print local activity.

Paper-Print is the activity of generating postscript files and sending them to a postscript printer.

2.2 Functional Definition of Application Entities

The DPPS Application Entity is designed to print images received from one or more SCU's. It acts as an SCP of the following DICOM Service Classes:

- DICOM Print Management Service Class

2.3 Sequencing of Real World Activities

No sequencing of Real-World Activities is relevant.

3 DPPS Application Entity Specification

The DPPS software acts as a single Application Entity (AE). DPPS provides standard conformance to the DICOM Print Management Service Class by supporting the SOP Classes and roles listed in Table 3.

SOP Class Name	UID	Role
Basic Grayscale Print Management Meta	1.2.840.10008.5.1.1.9	SCP
Basic Film Session	1.2.840.10008.5.1.1.1	SCP
Basic Film Box	1.2.840.10008.5.1.1.2	SCP
Basic Grayscale Image Box	1.2.840.10008.5.1.1.4	SCP
Printer	1.2.840.10008.5.1.1.16	SCP
Basic Color Print Management Meta	1.2.840.10008.5.1.1.18	SCP
Basic Film Session	1.2.840.10008.5.1.1.1	SCP
Basic Film Box	1.2.840.10008.5.1.1.2	SCP
Basic Color Image Box	1.2.840.10008.5.1.1.4.1	SCP
Printer	1.2.840.10008.5.1.1.16	SCP
Presentation LUT	1.2.840.10008.5.1.1.23	SCP
Verification	1.2.840.10008.1.1	SCP

Table 3: Supported Print Management SOP Classes and Roles

3.1 Association Establishment Policies

3.1.1 General

All relevant DICOM communication parameters (AE-Title, port numbers, etc.) are configurable. See section 5 for more information on configurable parameters.

A maximum PDU size of 16 kB will be offered when establishing associations. Any maximum PDU size will be accepted although PDU sizes larger than 128k will never be sent.

3.1.2 Number of Associations

The number of concurrent associations which can be accepted is configurable. See section 5 for more information on configurable parameters.

No fixed limit exists on the number of associations which can be initiated other than the resource limits imposed by the underlying operating system.

3.1.3 Asynchronous Nature

The DPPS does not support asynchronous transactions.

3.1.4 Implementation Identifying Information

Implementation Class UID:	1.2.276.0.7230010.3.0.3.5.0
Implementation Version Name:	OFFIS_DCMTK_350

3.2 Association Initiation Policy

DPPS will never initiate an association.

3.3 Association Acceptance Policy

The DPPS will always accept legal associations to support the Print Management Services. Associations can be accepted at any time the DPPS application entity is active.

Associations are rejected if one of the following conditions is true:

- a) The DPPS is configured to check the AE Titles and the calling or the called AE Title is not recognized.
- b) The DICOM Application Context Name is not 1.2.840.10008.3.1.1.1.
- c) The set of presentation contexts is inappropriate.

An appropriate set of presentation contexts is given, if a combination of the following SOP Classes is provided:

- Basic Grayscale Print Management Meta SOP Class
- Basic Color Print Management Meta SOP Class
- Basic Film Session SOP Class, Basic Film Box SOP Class and Basic Grayscale SOP Class
- Basic Film Session SOP Class, Basic Film Box SOP Class and Basic Color SOP Class

3.3.1 Print Management

3.3.1.1 Associated Real-World Activity

An association will be accepted from a remote Application Entity in order to receive images and image related data for printing on a postscript paper printer. The local real-world activity is **Paper-Print** and the remote real world activity is **SCU sends images to be printed**.

3.3.1.2 Acceptable Presentation Contexts

The DPPS supports the Abstract Syntaxes and Transfer Syntaxes listed in Table 4.

Presentation Context Table							
Abstract Syntax			Transfer Syntax			Role	Extended Negotiation
Name	UID		Name	UID			
Basic Grayscale Print Management Meta	1.2.840.10008.5.1.1.9		Implicit VR Little Endian	1.2.840.10008.1.2		SCP	None
Basic Color Print Management Meta	1.2.840.10008.5.1.1.18		Implicit VR Little Endian	1.2.840.10008.1.2		SCP	None
Basic Film Session	1.2.840.10008.5.1.1.1		Implicit VR Little Endian	1.2.840.10008.1.2		SCP	None
Basic Film Box	1.2.840.10008.5.1.1.2		Implicit VR Little Endian	1.2.840.10008.1.2		SCP	None
Basic Grayscale Image Box	1.2.840.10008.5.1.1.4		Implicit VR Little Endian	1.2.840.10008.1.2		SCP	None
Basic Color Image Box	1.2.840.10008.5.1.1.4.1		Implicit VR Little Endian	1.2.840.10008.1.2		SCP	None
Printer	1.2.840.10008.5.1.1.16		Implicit VR Little Endian	1.2.840.10008.1.2		SCP	None
Presentation LUT	1.2.840.10008.5.1.1.23		Implicit VR Little Endian	1.2.840.10008.1.2		SCP	None
Verification	1.2.840.10008.1.1		Implicit VR Little Endian	1.2.840.10008.1.2		SCP	None

Table 4: Supported presentation contexts for Print Management

3.3.1.3 SOP Specific Conformance

3.3.1.3.1 Basic Grayscale Print Management

The DPPS supports the SOP classes defined by the Basic Grayscale Print Management Meta SOP Class listed in Table 5.

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

Table 5: SOP Classes of Basic Grayscale Print Management Meta SOP Class

The SOP specific conformance of the classes listed above is described in the subsequent sections.

3.3.1.3.2 Basic Color Print Management

The DPPS supports the SOP classes defined by the Basic Color Print Management Meta SOP Class listed in Table 6.

SOP Class Name	SOP Class UID
----------------	---------------

Basic Film Session	1.2.840.10008.5.1.1.1
Basic Film Box	1.2.840.10008.5.1.1.2
Basic Color Image Box	1.2.840.10008.5.1.1.4.1
Printer	1.2.840.10008.5.1.1.16

Table 6: SOP Classes of Basic Color Print Management Meta SOP Class

The SOP specific conformance of the classes listed above is described in the subsequent sections.

3.3.1.3.3 Basic Film Session

3.3.1.3.3.1 Supported DIMSE Services

Name	Usage	Description
N-CREATE	M/M	Creates a new film session.
N-SET	U/M	Updates attribute values of the film session.
N-DELETE	U/M	Deletes the film session including all associated film boxes, images and annotations.
N-ACTION	U/U	Receipt of the N-ACTION will print all films of the film session in the order they were received.

Table 7: Supported DIMSE Services for Basic Film Session

3.3.1.3.3.2 Supported SOP Class Elements

Attribute Name	Tag	Valid Range	Default Value ¹	Response to Invalid Value
Number of Copies	(2000,0010)	1 - 999	1	0x106
Print Priority	(2000,0020)	LOW MED HIGH	MED	0x106
Medium Type	(2000,0030)	Up to 16 characters.	PAPER	0x0
Film Destination	(2000,0040)	MAGAZINE PROCESSOR	MAGAZINE	0x106
Film Session Label	(2000,0050)	Up to 64 characters.	Remote DICOM Printserver Session #1	0x0

Table 8: Supported SOP Class Elements for Basic Film Session

3.3.1.3.3.3 N-CREATE response status codes

¹ All values are configurable.

Status Code	Meaning	Detail
0000	Success	Film session is successfully created. Some attributes may have values different from what was requested. The actual values of attributes are returned.
B600	Warning	Memory allocation not supported.
0106	Failure	Invalid attribute value.
0105	Failure	The requested attribute is not known.

Table 9: N-CREATE response status codes for Basic Film Session

3.3.1.3.3.4 N-SET response status codes

Status Code	Meaning	Detail
0000	Success	Some attributes may have values different from what was requested. The actual values of attributes are returned.
0116	Warning	Attribute out of range. The attribute in question is returned in the responses data set.
B600	Warning	Memory allocation not supported. A data set is returned with valid attributes/values.
0106	Failure	Invalid attribute value.
0110	Failure	Processing failure.
0112	Failure	No such object instance: the instance UID given does not exist.

Table 10: N-SET response status codes for Basic Film Session

3.3.1.3.3.5 N-DELETE response status codes

Status Code	Meaning	Detail
0000	Success	Film session has been successfully deleted.
0112	Failure	No such object instance: the instance UID given does not exist.

Table 11: N-DELETE response status codes for Basic Film Session

3.3.1.3.3.6 N-ACTION response status codes

Status Code	Meaning	Detail
0000	Success	A postscript file for all films of the film session was generated and sent to the printer.
B602	Warning	Film Session SOP instance hierarchy does not contain Image Box SOP instances (empty page).

0112	Failure	No such object instance: the instance UID given does not exist.
C600	Failure	Film Session SOP instance hierarchy does not contain Film Box SOP instances.
C604	Failure	The positions of the image boxes of one film box could not be resolved.

Table 12: N-ACTION response status codes for Basic Film Session

There are no restrictions on the maximum number of collated films for a film session.

3.3.1.3.4 Basic Film Box

3.3.1.3.4.1 Supported DIMSE Services

Name	Usage	Description
N-CREATE	M/M	Creates a new film box.
N-SET	U/M	Updates attribute values of the film box.
N-DELETE	U/M	Deletes the film box including all associated images and annotations.
N-ACTION	U/U	Receipt of the N-ACTION will print all films of the film box in the order they are received.

Table 13: Supported DIMSE Services for Basic Film Box

3.3.1.3.4.2 Supported SOP Class Elements

Attribute Name	Tag	Valid Range	Default Value	Response to Invalid Value
Image Display Format	(2010,0010)	Details below.	---	0x106
Annotation Display Format Id	(2010,0030)	Values from configuration file.	---	0x110
Film Orientation	(2010,0040)	PORTRAIT LANDSCAPE	configurable	0x110
Film Size Id	(2010,0050)	Values from configuration file. Details below.	configurable	0x110
Magnification Type	(2010,0060)	BILINEAR ²	BILINEAR	0x0 or 0x110
Smoothing Type	(2010,0080)	ignored	---	0x0
Border Density	(2010,0100)	BLACK , WHITE or an integer number (hundreds of OD).	configurable	0x0
Empty Image Display Density	(2010,0110)	BLACK , WHITE or an integer number (hundreds	configurable	0x0

² Value can be ignored.

		of OD).		
Min Density	(2010,0120)	must be \geq than configured min density and \leq than max density and \leq than configured max density	Configurable, depends on the printer	0x0
Max Density	(2010,0130)	must be \leq than configured max density and \geq than min density and \geq than configured min density	Configurable, depends on the printer	0x0
Trim	(2010,0140)	YES, NO	configurable	0x106
Configuration Information	(2010,0150)	Values from configuration file ² . Details below.	empty string	0x0 or 0x110
Illumination	(2010,015E)	0 – 10000	150	0x0
Reflected Ambient Light	(2010,0160)	0	0	0x0
Referenced Film Session Sequence	(2010,0500)	---	---	---
> Referenced SOP Class UID	(0008,1150)	1.2.840.10008.5.1.1.1	---	0x117
> Referenced SOP Instance UID	(0008,1155)	SOP Instance UID from creation of Basic Film Session.	---	0x117
Referenced Image Box Sequence	(2010,0510)	---	---	---
> Referenced SOP Class UID	(0008,1150)	1.2.840.10008.5.1.1.4 or 1.2.840.10008.5.1.1.4.1	---	---
> Referenced SOP Instance UID	(0008,1155)	---	---	---

Table 14: Supported SOP Class Elements for Basic Film Box

Image Display Format

DICOM defines the Image Display Formats **STANDARD, ROW, COL, SLIDE, SUPERSLIDE** and **CUSTOM**. The DPPS supports only the layout **STANDARD**. To support a specific layout it must be configured in the configuration file (see section 5) of the DPPS. At least one layout must be configured in the configuration file.

The configuration of the DPPS for the Image Display Format is fully described in [2].

Configuration Information

The DPPS supports the attribute **Configuration Information** for basic film boxes. The client may assign one or more settings to this attribute which are transmitted as a value representation of CodeString with value multiplicity. The names are free but must conform to the CodeString syntax. If the client sends one or more settings, the postscript code in the section **Configuration Information** of the configuration file (see section 5) is included in the output of the print server.

The configuration of the DPPS for the Configuration Information is fully described in [2].

Border Density

The Border Density attribute allows the density of the areas surrounding and between images on the film to be either dark or white.

Trim

The Trim attribute specifies whether a trim box should be printed around each image on film. The properties of the trim box (density/width) are configured by the values TrimGray/TrimWidth of the configuration file (see section 5).

Film Size Id

The attribute **Film Size Id** allows the client to select a page format (e.g A4, 10INX14IN) for the film box. The page format must be known by the DPPS. The server will reject all create requests for a film box with a Film Size Id value different from those which are listed in the configuration file (see section 5) of the DPPS. The names may be chosen freely. Lowercase letters in the configuration file are mapped to uppercase.

There are no restrictions except the resource limits imposed by the underlying operating system on the minimum and maximum number of printable pixel matrix per supported film size.

The configuration of the DPPS for the Film Size Id is fully described in [2].

3.3.1.3.4.3 N-CREATE response status codes

Status Code	Meaning	Detail
0000	Success	Film box is successfully created. Some attributes may have values different from what was requested. The actual values of attributes are returned.
B605	Warning	Requested Min Density or Max Density outside of printer's operating range. The printer will use its respective minimum or maximum density value instead.
0105	Failure	The requested attribute is not known.
0106	Failure	Invalid attribute value.
0110	Failure	Processing failure.
0111	Failure	Duplicate SOP instance: instance UID given is already in use.
0112	Failure	No such object instance: the instance UID given does not exist.
0117	Failure	Invalid object instance: instance UID given had incorrect syntax.
0120	Failure	One or more mandatory attributes are missing.
0213	Failure	Resource limitation: film box cannot be opened.

Table 15: N-CREATE response status codes for Basic Film Box

3.3.1.3.4.4 N-SET response status codes

Status Code	Meaning	Detail
0000	Success	Some attributes may have values different from what was requested. The actual values of attributes are returned.
B605	Warning	Requested Min Density or Max Density outside of printer's operating range. The printer will use its respective minimum or maximum density value instead.

0105	Failure	The requested attribute is not known.
0106	Failure	Invalid attribute value.
0110	Failure	Processing failure.
0112	Failure	No such object instance: the instance UID given does not exist.

Table 16: N-SET response status codes for Basic Film Box

3.3.1.3.4.5 N-DELETE response status codes

Status Code	Meaning	Detail
0000	Success	Film box has been successfully deleted.
0112	Failure	No such object instance: the instance UID given does not exist.

Table 17: N-DELETE response status codes for Basic Film Box

3.3.1.3.4.6 N-ACTION response status codes

Status Code	Meaning	Detail
0000	Success	A postscript file for the film box was generated and sent to the printer.
B603	Warning	Film Box SOP instance hierarchy does not contain Image Box SOP instances (empty page).
0112	Failure	No such object instance: the instance UID given does not exist.
C604	Failure	The positions of the image boxes of the film box could not be resolved.

Table 18: N-ACTION response status codes for Basic Film Box

3.3.1.3.5 Basic Grayscale Image Box

3.3.1.3.5.1 Supported DIMSE Services

Name	Usage	Description
N-SET	M/M	Updates attribute values of the image box.

Table 19: Supported DIMSE Services for Basic Grayscale Image Box

3.3.1.3.5.2 Supported SOP Class Elements

Attribute Name	Tag	Valid Range	Default Value	Response to Invalid Value
Magnification Type	(2010,0060)	BILINEAR ³	BILINEAR	0x0 or 0x110
Smoothing Type	(2010,0080)	ignored	---	0x0
Min Density	(2010,0120)	ignored	---	0x0
Max Density	(2010,0130)	ignored	---	0x0
Image Position	(2020,0010)	1 - max number of images for Image Display Format	---	0x0
Polarity	(2020,0020)	NORMAL REVERSE	---	0x110
Requested Image Size	(2020,0030)	ignored	---	0x0106
Basic Grayscale Image Sequence	(2020,0110)	---	---	---
>Samples Per Pixel	(0028,0002)	1	---	0x0106
>Photometric Interpretation	(0028,0004)	MONOCHROME1 MONOCHROME 1 MONOCHROME2 MONOCHROME 2	---	0x0106
>Rows	(0028,0010)	0 < Rows < 10000	---	0x0106
>Columns	(0028,0011)	0 < Columns < 10000	---	0x0106
>Pixel Aspect Ratio	(0028,0034)	Any pair of valid positive integers (1 to 2 ¹⁵ -1).	1\1	0x0106
>Bits Allocated	(0028,0100)	8 or 16	---	0x0106
>Bits Stored	(0028,0101)	8 or 12	---	0x0106
>High Bit	(0028,0102)	BitsStored-1	---	0x0106
>Pixel Representation	(0028,0103)	0 = unsigned	---	0x0106
>Pixel Data	(7FE0,0010)	---	---	---

Table 20: Supported SOP Class Elements for Basic Grayscale Image Box

3.3.1.3.5.3 N-SET response status codes

Status Code	Meaning	Detail
0000	Success	Some attributes may have values different from what was requested. The actual values of attributes are returned.
0106	Failure	Invalid attribute value.

³ Value can be ignored.

0110	Failure	Processing failure.
0112	Failure	No such object instance: the instance UID given does not exist.
0120	Failure	One or more mandatory attributes are missing.

Table 21: N-SET response status codes for Basic Grayscale Image Box

3.3.1.3.6 Basic Color Image Box

3.3.1.3.6.1 Supported DIMSE Services

Name	Usage	Description
N-SET	M/M	Updates attribute values of the image box.

Table 22: Supported DIMSE Services for Basic Color Image Box

3.3.1.3.6.2 Supported SOP Class Elements

Attribute Name	Tag	Valid Range	Default Value	Response to Invalid Value
Magnification Type	(2010,0060)	BILINEAR ⁴	BILINEAR	0x0 or 0x110
Smoothing Type	(2010,0080)	ignored	---	0x0
Image Position	(2020,0010)	1 - max number of images for Image Display Format	---	0x0
Polarity	(2020,0020)	NORMAL REVERSE	---	0x110
Requested Image Size	(2020,0030)	ignored	---	0x0106
Basic Color Image Sequence	(2020,0110)	---	---	---
>Samples Per Pixel	(0028,0002)	3	---	0x0106
>Photometric Interpretation	(0028,0004)	RGB	---	0x0106
>Planar Configuration	(0028,0006)	1	---	0x106
>Rows	(0028,0010)	0 < Rows < 10000	---	0x0106
>Columns	(0028,0011)	0 < Columns < 10000	---	0x0106
>Pixel Aspect Ratio	(0028,0034)	Any pair of valid positive integers (1 to 2 ¹⁵ -1).	1\1	0x0106
>Bits Allocated	(0028,0100)	8	---	0x0106

⁴ Value can be ignored.

>Bits Stored	(0028,0101)	8	---	0x0106
>High Bit	(0028,0102)	7	---	0x0106
>Pixel Representation	(0028,0103)	0 = unsigned	---	0x0106
>Pixel Data	(7FE0,0010)	---	---	---

Table 23: Supported SOP Class Elements for Basic ColorImage Box

The DPPS can be configured to generate grayscale images even if the Print SCU only supports the Basic Color Print Management. Therefore the parameter **SupportsColorImage** in the configuration file has to be set to NO. Also it is possible that postscript printers print grayscale images even if the postscript file contains colored images. The behavior of how colored images are converted to grayscale images is printer dependend.

3.3.1.3.6.3 N-SET response status codes

Status Code	Meaning	Detail
0000	Success	Some attributes may have values different from what was requested. The actual values of attributes are returned.
0106	Failure	Invalid attribute value.
0110	Failure	Processing failure.
0112	Failure	No such object instance: the instance UID given does not exist.
0120	Failure	One or more mandatory attributes are missing.

Table 24: N-SET response status codes for Basic Color Image Box

3.3.1.3.7 Printer

3.3.1.3.7.1 Supported DIMSE Services

Name	Usage	Description
N-EVENT-REPORT	M/M	The N-EVENT-REPORT is used to report the changes of the printer status in an asynchronous way.
N-GET	U/M	The N-GET is used to retrieve information about the printer.

Table 25: Supported DIMSE Services for Printer

3.3.1.3.7.2 Supported SOP Class Elements

Attribute Name	Tag	Valid Range	Default Value
Printer Status	(2110,0010)	NORMAL WARNING	NORMAL

		FAILURE	
Printer Status Info	(2110,0020)	See Table 27.	Empty string.
Printer Name	(2110,0030)		Configurable.
Manufacturer	(0008,0070)		Configurable.
Manufacturer's Model Name	(0008,1090)		Configurable.
Device Serial Number	(0018,1000)		Configurable.
Software Version(s)	(0018,1020)		Configurable.
Date of Last Calibration	(0018,1200)		Configurable.
Time of Last Calibration	(0018,1201)		Configurable.

Table 26: Supported SOP Class Elements for Printer

3.3.1.3.7.3 Printer Status Information

Printer Status	Printer Status Information
NORMAL	<empty string>
WARNING	<empty string>
	SUPPLY EMPTY
	SUPPLY LOW
	RECEIVER FULL
FAILURE	FILM JAM
	<empty string>

Table 27: Printer Status Information

3.3.1.3.8 Presentation LUT

3.3.1.3.8.1 Supported DIMSE Services

Name	Usage	Description
N-CREATE	M/M	The N-CREATE Service Element is used to create an instance of the Presentation LUT SOP Class.
N-DELETE	U/M	The N-DELETE Service Element is used to delete the Presentation LUT SOP Instance.

Table 28: Supported DIMSE Services for Printer

3.3.1.3.8.2 Supported SOP Class Elements

Attribute Name	Tag	Valid Range	Default Value	Response to Invalid Value
Presentation LUT Sequence	(2050,0010)	---	---	---
>LUT Descriptor	(0028,3002)	---	---	---
>LUT Explanation	(0028,3003)	---	---	---
>LUT Data	(0028,3006)	---	---	---
Presentation LUT Shape	(2050,0020)	IDENTITY	IDENTITY	0x0106

Table 29: Supported SOP Class Elements for Presentation LUT

3.3.1.3.8.3 N-CREATE response status codes

Status Code	Meaning	Detail
0000	Success	Presentation LUT successfully created.
0106	Failure	Invalid attribute value.
B605	Warning	Requested Min Density or Max Density outside of printer's operating range. The printer will use its respective minimum or maximum density value instead.

Table 30: N-CREATE response status codes for Presentation LUT

3.3.1.3.8.4 N-DELETE response status codes

Status Code	Meaning	Detail
0000	Success	Presentation LUT successfully deleted.

Table 31: N-DELETE response status codes for Presentation LUT

3.3.1.4 Presentation Context Acceptance Criteria

Presentation Contexts for any of the supported Print Management SOP Classes will be accepted if the transfer syntax selection policy is met. At the time of association establishment, the DPPS returns a list of Presentation Contexts specified by the SCU, that will be supported.

The DPPS does not support extended negotiation.

3.3.1.5 Transfer Syntax Selection Policies

The DPPS always accepts the Transfer Syntax **Implicit VR Little Endian**.

4 Communication Profiles

4.1 Supported Communication Stacks

TCP/IP Network Communication is supported as defined in Part 8 of the DICOM Standard.

4.1.1 TCP/IP Stack

The TCP/IP stack is inherited from the underlying operating system.

4.1.1.1 Physical Network Media Support

No dependency exists on the physical network medium over which TCP/IP executes. The supported physical network media are inherited from the underlying operating system. Typical physical network media options include 10BASE-T Ethernet, 100BASE-TX Ethernet, FDDI and ATM.

5 Configuration

Configuration should only be performed by staff with administrative training.

There are many features which can be configured. The most important groups are

- **Network Configuration**
 - The number of concurrent associations which can be accepted (default 20). This limit is bound only by the availability of underlying operating system resources.
- **DICOM Configuration**
 - Printer properties which describe the printer attached to the DPPS
 - DICOM behaviour of the DPPS
 - Default values for Basic Film Session
 - TCP/IP properties
 - Application Entity Title, TCP/IP address and port number of the DPPS.
- **Printer Configuration**
 - Page size settings
 - Configuration Information for Basic Film Boxes allowing postscript code to be attached
 - Film Destination for Basic Film Sessions allowing postscript code to be attached
 - Medium Type for Basic Film Session
- **Layouts**
- **Fonts**
- **Color**
 - The DPPS can be configured to generate grayscale images even if the Print SCU only supports the Basic Color Print Management. Therefore the parameter **SupportsColorImage** has to be set to NO.

Detailed information is given in a separate configuration instruction [2].

6 Support of Extended Character Sets

The extended character sets listed in Table 32 are supported:

ISO-IR 100	Latin Alphabet Supplementary Set No. 1 (ISO 8859-1)

Table 32: Extended character sets

Note, the DICOM default character set (ISO-IR 6) is a subset of ISO-IR 100.

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