

Sony Imager / Printer DICOM Conformance Statement

Revision 3.7

January 9, 2008

Sony Corporation

Revision History

Revision	Date	Reason for changes
0.0	November 3, 2002	Initial draft
1.0	January 17, 2003	Release with typographical error corrections
1.1	March 11, 2003	Revised minimum density default value
2.0	May 21, 2003	Presentation LUT SOP class support
3.0	May 9, 2005	Basic Color Print Management Meta SOP Class support (For software Ver 02.10 and after)
3.1	June 26, 2005	Annotation enhancements
3.2	October 17, 2005	Supporting additional printers
3.3	February 19, 2007	Additional printers included in the document
3.4	March 26, 2007	Additional printers included in the document
3.5	June 24, 2007	Some warning status codes added
3.6	December 19, 2007	Note 1) added on page 32
3.7	January 9, 2008	Note 2) added on page 32

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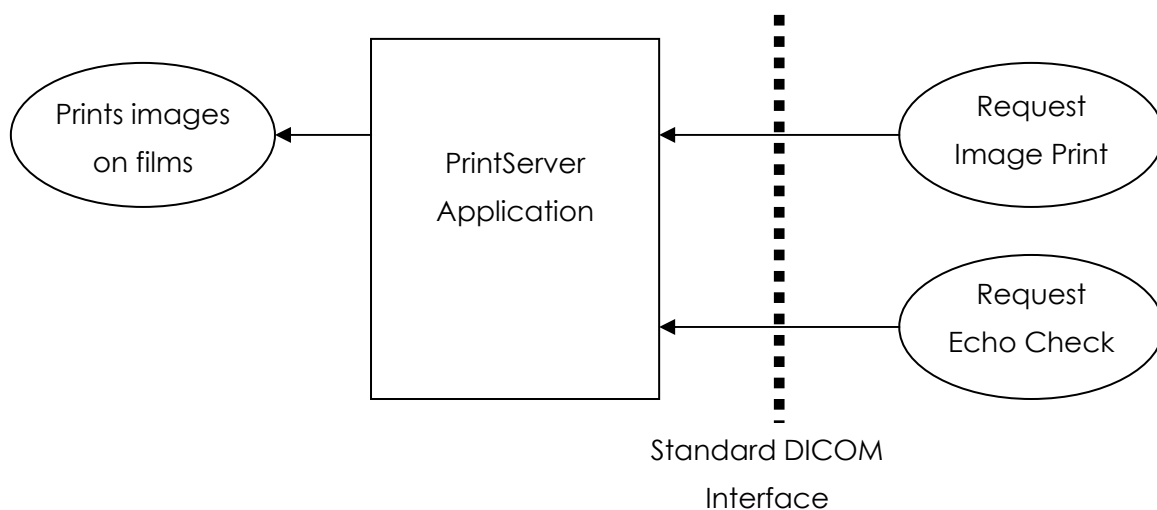
0. Introduction

This document provides the conformance statement for PrintServer application software incorporated in Sony Imager / Printer.

1. Implementation Model

PrintServer is either one Application Entity or two Application Entities having identical functionality. Print Server provides standard DICOM Verification Service Class and Print Management Service Class interface.

1.1 Application Data Flow Diagram



1.2 Functional Definitions

PrintServer can act as SCP for Verification Service Class and Print Management Service Class. The functionality includes:

- DICOM Association.
- Receiving images and formatting them.
- Printing on films.
- Managing one or two printers and notifying Printer Status.
- Respond to Echo Check requests.

1.3 Sequencing of Real-World Activities

Real world activities are sequenced as required in the definition of Print Management Service Class. There is no additional sequencing.

2. AE Specification

PrintServer provides standard conformance to the Verification Service Class and Print Management Service Class as shown in Table 2.1 or 2.2, depending on grayscale printer or color printer physically connected. It may have one or two AE Titles, depending on configuration. AE Titles are user programmable. If two AE Titles are programmed, two entities act independently with identical functionality. That is, two sets of printers share the same network hardware interface, but they are logically independent with separate AE Titles.

Table 2.1 SOP and Meta SOP Classes for Grayscale Printers

SOP Class Name	SOP Class UID
Verification SOP	1.2.840.10008.1.1
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9
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
Print SOP Class	1.2.840.10008.5.1.1.16
Basic Annotation Box SOP Class	1.2.840.10008.5.1.1.15
Presentation LUT SOP Class	1.2.840.10008.5.1.1.23

Table 2.2 SOP and Meta SOP Classes for Color Printers

SOP Class Name	SOP Class UID
Verification SOP	1.2.840.10008.1.1
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18
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
Print SOP Class	1.2.840.10008.5.1.1.16
Basic Annotation Box SOP Class	1.2.840.10008.5.1.1.15

2.1 Association Establishment Policy

2.1.1 General

PrintServer accepts associations from SCUs for the supported SOP classes.

The maximum PDU size negotiated during association establishment is 8192 bytes.

If SCU does not use DIMSE Service for more than 365 seconds while association is being established, PrintServer will send A-ABORT and disconnect network connection.

2.1.2 Number of Associations

PrintServer supports maximum 8 associations simultaneously.

2.1.3 Asynchronous Nature

Print Server does not support negotiation of multiple outstanding transactions.

2.1.4 Implementation Identifying Information

Implementation Class UID: 1.2.840.113820.81.11

Implementation Version Name: EBM_DICOM_81_11

2.2 Association Initiation Policy

PrintServer does not initiate associations.

2.3 Association Acceptance Policy

After system power-up sequence, PrintServer always accepts associations initiated by remote SCUs, unless number of simultaneous associations exceeds the limit. Besides the number of simultaneous associations, there is no limit or restriction.

2.3.1 Associated Real-World Activity

When SCU sends a request to create or set film session, film box and image box, PrintServer creates or changes them accordingly.

When SCU sends a queries the status of the printer, PrintServer responds with printer status information.

When SCU sends a verification request, PrintServer responds to the request.

2.3.2 Accepted Presentation Context

Table 2.3.2 Acceptable Presentation Context

Proposed Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
All SOP Classes listed in Table 2		Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

2.3.3 Presentation Context Acceptance Criterion

PrintServer accepts any combination of the SOP Classes listed in Table 2.1 or 2.2.

2.3.4 Transfer Syntax Selection Policy

PrintServer accepts only Implicit VR Little Endian transfer syntax.

2.3.5 SOP Specific Conformance

2.3.5.1 Verification Service Class

PrintServer provides standard conformance to the DICOM Verification Service Class.

2.3.5.2 Basic Grayscale Print Management Meta SOP Class

The Basic Grayscale Print Management Meta SOP Class consists of 4 subsequent SOP Classes.

2.3.5.2.1 Basic Film Session SOP Class for Grayscale Printers

Table 2.3.5.2.1.1 Basic Film Session SOP Class DIMSE Service Group

DIMSE Service Element	Usage SCU/SCP	
N-CREATE	M/M	Supported
N-SET	U/M	Supported
N-DELETE	U/M	Supported
N-ACTION	U/U	Supported

Table 2.3.5.2.1.2 Basic Film Session SOP Class N-CREATE / N-SET Attributes

Attribute Name	Tag	Usage SCU/SCP	VR	Valid Range	Default Value
Basic Film Session Presentation Module					
Number of Copies	(2000,0010)	U/M	IS	1 to 10	1
Print Priority	(2000,0020)	U/M	CS	HIGH MID LOW	HIGH
Medium Type	(2000,0030)	U/M	CS	BLUE FILM PAPER	BLUE FILM (UP-DF500, UP-D72XR, UP-D74XRD, UP-990AD) PAPER (UP-D897, UP-D72XR, UP-D74XRD, UP-990AD, UP-970AD, UP-D77MD)
Film Destination	(2000,0040)	U/M	CS	(See Note 1)	MAGAZINE

Note 1

PrintServer does not rely on the value specified by SCU.

Table 2.3.5.2.1.3 N-CREATE / N-SET Status Code

Status Code	Status	Meaning
0000H	Success	Film Session is successfully created or set.
0116H	Warning	Value out of range.

Table 2.3.5.2.1.4 N-ACITON Status Code

Status Code	Status	Meaning
0000H	Success	Film Session successfully accepted.
C600H	Failure	No Film Box SOP Instances.
C601H	Failure	Film Session queue full.

Table 2.3.5.2.1.5 N-DELETE Status Code

Status Code	Status	Meaning
0000H	Success	Film Session successfully deleted.

2.3.5.2.2 Basic Film Box SOP Class for Grayscale printers

Table 2.3.5.2.2.1 Basic Film Box SOP Class DIMSE Service Group

DIMSE Service Element	Usage SCU/SCP	
N-CREATE	M/M	Supported
N-ACTION	M/M	Supported
N-DELETE	U/M	Supported
N-SET	U/U	Supported

Table 2.3.5.2.2.2 Basic Film Box SOP Class N-CREATE Attributes

Attribute Name	Tag	Usage SCU/ SCP	VR	Valid Range	Default Value
Basic Film Box Presentation Module					
Image Format	Display (2010,0010)	M/M	ST	STANDARD¥C,R where C is 1 to 10 and R is 1 to 10	STANDARD¥1,1

Annotation Display Format ID	(2010,0030)	U/U	CS	"FORMAT6L" "FORMAT6M" "FORMAT6S" "FORMAT4L" "FORMAT4M" "FORMAT4S" "FORMAT2L" "FORMAT2M" "FORMAT2S" (See Note 1)	
Film Orientation	(2010,0040)	U/M	CS	PORTRAIT LANDSCAPE	PORTRAIT
Film Size ID	(2010,0050)	U/M	CS	14INX17IN 8X10IN A6 A4 8_5INX11IN	14INX17IN (UP-DF500) 8X10IN (UP-D72XR, UP-D74XRD) A6 (UP-D897) A4 (UP-990AD, UP-970AD, UP-D77MD) 8_5INX11IN (UP-D77MD)
Magnification Type	(2010,0060)	U/M	CS	REPLICATE BILINEAR CUBIC NONE	CUBIC
Smoothing Type	(2010,0080)	U/U	CS	(Not supported)	
Border Density	(2010,0100)	U/U	CS	BLACK WHITE i	BLACK
Empty Image Density	(2010,0110)	U/U	CS	BLACK WHITE i	BLACK

Min Density	(2010,0120)	U/U	US	<p>Valid range is printer and media dependent. It is from default Min Density value to default Max Density value of the printer used.</p>	<p>22 (UP-DF500) 17 (UP-D72XR & UP-D74XDR /Film) 21 (UP-990AD /Film) 9 (UP-D72XR & UP-D74XRD /Paper) 10 (UP-D897) 7 (UP-990AD & UP-970AD / UPP-210SE Paper) 11 (UP-990AD & UP-970AD / UPP-210HD Paper) 8 (UP-D77MD)</p>
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Max Density	(2010,0130)	U/M	US	Valid range is printer and media dependent. It is from default Min Density value to default Max Density value of the printer used.	320 (UP-DF500) 300 (UP-D72XR & UP-D74XRD /Film) 197 (UP-990AD /Film) 200 (UP-D72XR & UP-D74XRD /Paper) 200 (UP-D897) 145 (UP-990AD & UP-970AD / UPP-210SE Paper) 187 (UP-990AD & UP-970AD / UPP-210HD Paper) 230 (UP-D77MD)
Trim	(2010,0140)	U/U	CS	YES NO	NO
Configuration Information	(2010,0150)	U/M	ST	"1" to "10" (See Note 2)	Printer default table number
Illumination	(2010,015E)	U/MC	US	1 to 4000	2000 for film 150 for paper
Reflected Ambient Light	(2010,0160)	U/MC	US	1 to 4000	10 for film 1 for paper
Basic Film Box Relationship Module					
Referenced Film Session Sequence	(2010,0500)	M/M	SQ		
> Referenced SOP Class UID	(0008,1150)	M/M	UI		
> Referenced SOP Instance UID	(0008,1155)	M/M	UI		

Referenced Image Box Sequence	(2010,0510)	-/M	SQ		
> Referenced SOP Class UID	(0008,1150)	-/M	UI		
> Referenced SOP Instance UID	(0008,1155)	-/M	UI		
Referenced Basic Annotation Box Sequence	(2010,0520)	-/MC	SQ		
> Referenced SOP Class UID	(0008,1150)	-/MC	UI		
> Referenced SOP Instance UID	(0008,1155)	-/MC	UI		
Referenced Presentation LUT Sequence	(2050,0500)	U/MC	SQ		
> Referenced SOP Class UID	(0008,1150)	U/MC	UI		
> Referenced SOP Instance UID	(0008,1155)	U/MC	UI		

Note 1

String value "FORMAT6L" of (2010,0030) Annotation Display Format ID attribute enables Annotation text print at maximum 6 locations; top left, top center, top right, bottom left, bottom center and bottom right corners of the film. The last letter "L" specifies large font size to be used. It can be replaced with "M" for medium or "S" for small size.

String value "FORMAT4L" of (2010,0030) Annotation Display Format ID attribute enables Annotation text print at maximum 4 locations; top left, top right, bottom left and bottom right corners of the film. The last letter "L" specifies large font size to be used. It can be replaced with "M" for medium or "S" for small size.

String value "FORMAT2L" of (2010,0030) Annotation Display Format ID attribute enables Annotation text print at maximum 2 locations; top left and bottom left corners of the film. The last letter "L" specifies large font size to be used. It can be replaced with "M" for medium or "S" for small size.

Note 2

String value "1" to "10" of (2010,0150) Configuration Information attribute represents GAMMA correction table number to be used for printing. Table #1 (linear) through #5 are factory preset tables. Table #6 through #10 are user defined GAMMA tables. With any other values, the printer will use its own current default setting.

Table 2.3.5.2.2.3 N-CREATE Status Code

Status Code	Status	Meaning
0000H	Success	Film Box successfully created.
0106H	Failure	Invalid attribute value.
0120H	Failure	Missing attribute.
0116H	Warning	Value out of range.
B605H	Warning	Requested Min Density outside of printer's operating range.

Table 2.3.5.2.2.4 Basic Film Box SOP Class N-SET Attributes

Attribute Name	Tag	Usage SCU/ SCP	VR	Valid Range	Default Value
Basic Film Box Presentation Module					
Magnification Type	(2010,0060)	U/M	CS	REPLICATE BILINEAR CUBIC NONE	CUBIC
Smoothing Type	(2010,0080)	U/U	CS	(Not supported)	
Border Density	(2010,0100)	U/U	CS	BLACK WHITE i	BLACK
Empty Image Density	(2010,0110)	U/U	CS	BLACK WHITE i	BLACK

Min Density	(2010,0120)	U/U	US	<p>Valid range is printer and media dependent. It is from default Min Density value to default Max Density value of the printer used.</p>	<p>22 (UP-DF500) 17 (UP-D72XR & UP-D74XDR /Film) 21 (UP-990AD /Film) 9 (UP-D72XR & UP-D74XRD /Paper) 10 (UP-D897) 7 (UP-990AD & UP-970AD / UPP-210SE Paper) 11 (UP-990AD & UP-970AD / UPP-210HD Paper) 8 (UP-D77MD)</p>
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Max Density	(2010,0130)	U/M	US	Valid range is printer and media dependent. It is from default Min Density value to default Max Density value of the printer used.	320 (UP-DF500) 300 (UP-D72XR & UP-D74XRD /Film) 197 (UP-990AD /Film) 200 (UP-D72XR & UP-D74XRD /Paper) 200 (UP-D897) 145 (UP-990AD & UP-970AD / UPP-210SE Paper) 187 (UP-990AD & UP-970AD / UPP-210HD Paper) 230 (UP-D77MD)
Trim	(2010,0140)	U/U	CS	YES NO	NO
Configuration Information	(2010,0150)	U/M	ST	"0" to "10" (See Note 1)	Printer default table number
Illumination	(2010,015E)	U/MC	US	1 to 4000	2000
Reflected Ambient Light	(2010,0160)	U/MC	US	1 to 4000	10
Basic Film Box Relationship Module					
Referenced Presentation LUT Sequence	(2050,0500)	U/MC	SQ		
> Referenced SOP Class UID	(0008,1150)	U/MC	UI		
> Referenced SOP Instance UID	(0008,1155)	U/MC	UI		

Note 1

String value "1" to "10" of (2010,0150) Configuration Information attribute represents GAMMA correction table number to be used for printing. Table #1 (linear) through #5 are factory preset tables. Table #6 through #10 are user defined GAMMA tables. With any other values, the printer will use its own current default setting.

Table 2.3.5.2.2.5 N-SET Status Code

Status Code	Status	Meaning
0000H	Success	Film Box successfully set.
0116H	Warning	Value out of range.
B605H	Warning	Requested Min Density outside of printer's operating range.

Table 2.3.5.2.2.6 N-ACITON Status Code

Status Code	Status	Meaning
0000H	Success	Film Box successfully accepted.
C602H	Failure	Film Box queue full.

Table 2.3.5.2.2.7 N-DELETE Status Code

Status Code	Status	Meaning
0000H	Success	Film Box successfully deleted.

2.3.5.2.3 Basic Grayscale Image Box SOP Class

Table 2.3.5.2.3.1 Basic Grayscale Image Box SOP Class DIMSE Service Group

DIMSE Service Element	Usage SCU/SCP	
N-SET	M/M	Supported

Table 2.3.5.2.3.2 Basic Grayscale Image Box SOP Class N-SET Attributes

Attribute Name	Tag	Usage SCU/SCP	VR	Valid Range	Default Value
Image Box Pixel Presentation Module					
Magnification Type	(2010,0060)	U/U	CS	REPLICATE BILINEAR CUBIC NONE	CUBIC
Smoothing Type	(2010,0080)	U/U	CS	(Not supported)	
Min Density	(2010,0120)	U/U	US	(Not supported)	
Max Density	(2010,0130)	U/U	US	(Not supported)	
Configuration Information	(2010,0150)	U/U	ST	(Not supported)	
Image Position	(2020,0010)	M/M	US	1 to 100	
Polarity	(2020,0020)	U/M	CS	NORMAL REVERSE	NORMAL
Requested Image Size	(2020,0030)	U/U	DS		
Requested Decimate/Crop Behavior	(2020,0040)	U/U	CS	CROP	CROP
Basic Grayscale Image Sequence	(2020,0110)	M/M	SQ		
> Sample Per Pixel	(0028,0002)	M/M	US	1	
> Photometric Interpretation	(0028,0004)	M/M	CS	MONOCHROME1 MONOCHROME2	
> Rows	(0028,0010)	M/M	US	(See Note 1)	
> Columns	(0028,0011)	M/M	US	(See Note 1)	

> Pixel Aspect Ratio	(0028,0034)	MC/M	IS	(See Note 2)	1¥1
> Bits Allocated	(0028,0100)	M/M	US	8, 16	
> Bits Stored	(0028,0101)	M/M	US	8, 12	
> High Bit	(0028,0102)	M/M	US	7, 11	
> Pixel Representation	(0028,0103)	M/M	US	0000H	
> Pixel Data	(7FE0,0010)	M/M	OB		

Note 1

PrintServer does not limit value range for (0028,0010) Rows and (0028,0011) Columns. If SCU chooses to send scaled pre-formatted image in "STANDARD¥1,1" Image Display Format, it is recommended to set Rows and Columns values as below.

Table 2.3.5.2.3.3 Pixel Matrix (Recommended values for STANDARD¥1,1 format)

Printer	Film Size (Orientation)	(0028,0010) Rows	(0028,0011) Columns
UP-DF500	14x17 (Portrait)	5060	4224
	14x17 (Landscape)	4224	5060
UP-D72XR UP-D74XRD	8x10 (Portrait)	2743	2320
	8x10 (Landscape)	2320	2743
UP-D897	A6 (Portrait)	1920	1280
	A6 (Landscape)	1280	1920
UP-990AD UP-970AD	A4 (Portrait)	3414	2560
	A4 (Landscape)	2560	3414
UP-D77MD	A4 (Portrait)	3208	2400
	A4 (Landscape)	2400	3208
	8_5INX11IN (Portrait)	3000	2400
	8_5INX11IN (Landscape)	2400	3000

For the best printing performance, it is recommended not to pre-format. Sending scaled pre-formatted image (one scaled image per film) causes longer network transfer time and significantly slower printing performance.

Note 2

(0028,0034) Pixel Aspect Ratio value is ignored, if (2010,0060) Magnification Type specified for the Film Box is "NONE".

Table 2.3.5.2.3.3 N-SET Status Code

Status Code	Status	Meaning
0000H	Success	Image Box successfully set.
B604H	Warning	Image size is larger than image box size, the image has been demagnified.
B609H	Warning	Image size is larger than the Image Box size. The Image has been cropped to fit.

2.3.5.2.4 Printer SOP Class for Grayscale printers

Table 2.3.5.2.4.1 Printer SOP Class DIMSE Service Group

DIMSE Service Element	Usage SCU/SCP	
N-EVENT-REPORT	M/M	Disabled
N-GET	U/M	Supported

Table 2.3.5.2.4.2 Printer SOP Class N-EVENT-REPORT Attributes

Attribute Name	Tag	Usage SCU/SCP	VR	Return Value
Printer Module				
Printer Status Info	(2110,0020)	U/M	CS	
Film Destination	(2000,0040)	U/U	CS	
Printer Name	(2110,0030)	U/U	LO	

Table 2.3.5.2.4.3 Printer SOP Class N-GET Attributes

Attribute Name	Tag	Usage SCU/SCP	VR	Return Value
Printer Module				
Printer Status	(2110,0010)	U/M	CS	NORMAL WARNING FAILURE
Printer Status Info	(2110,0020)	U/M	CS	(See Table 2.3.5.6.5)
Printer Name	(2110,0030)	U/U	LO	(Printer Name)
Manufacturer	(0008,0070)	U/U	LO	(Printer Manufacturer)
Manufacturer Model Name	(0008,1090)	U/U	LO	(Printer Model)
Device Serial Number	(0018,1000)	U/U	LO	(Serial Number)
Software Versions	(0018,1020)	U/U	LO	(Software Version)
Date Of Last Calibration	(0018,1200)	U/U	DA	(Not supported)
Time Of Last Calibration	(0018,1201)	U/U	TM	(Not supported)

Table 2.3.5.2.4.4 N-GET Status Code

Status Code	Status	Meaning
0000H	Success	Success.

Table 2.3.5.2.4.5 Printer Status / Printer Status Info

Printer Status Meaning	N-GET Return Value	
	Printer Status (2110,0010)	Printer Status Info (2110,0020)
Unable to communicate with printer	FAILURE	UNKNOWN
Motor/Sensor error	FAILURE	PRINTER DOWN
Film Jamming	WARNING	FILM JAM
Cover is opened	WARNING	COVER OPEN
Film Tray is out	WARNING	NO SUPPLY MGZ
Invalid media in Film Tray	WARNING	BAD SUPPLY MGZ
Film is empty	WARNING	EMPTY 14X17 BLUE EMPTY 8X10 BLUE EMPTY 8X10 PAPER EMPTY A6 PAPER EMPTY A4 PAPER EMPTY 8_5X11 PAPER
Stack full	WARNING	RECEIVER FULL
Ready to print	NORMAL	NORMAL

2.3.5.3 Basic Color Print Management Meta SOP Class

The Basic Color Print Management Meta SOP Class consists of 4 subsequent SOP Classes.

2.3.5.3.1 Basic Film Session SOP Class for Color Printers

Table 2.3.5.3.1.1 Basic Film Session SOP Class DIMSE Service Group

DIMSE Service Element	Usage SCU/SCP	
N-CREATE	M/M	Supported
N-SET	U/M	Supported
N-DELETE	U/M	Supported
N-ACTION	U/U	Supported

Table 2.3.5.3.1.2 Basic Film Session SOP Class N-CREATE / N-SET Attributes

Attribute Name	Tag	Usage SCU/SCP	VR	Valid Range	Default Value
Basic Film Session Presentation Module					
Number of Copies	(2000,0010)	U/M	IS	1 to 10	1
Print Priority	(2000,0020)	U/M	CS	HIGH MID LOW	HIGH
Medium Type	(2000,0030)	U/M	CS	PAPER	PAPER
Film Destination	(2000,0040)	U/M	CS	(See Note 1)	MAGAZINE

Note 1

PrintServer does not rely on the value specified by SCU.

Table 2.3.5.3.1.3 N-CREATE / N-SET Status Code

Status Code	Status	Meaning
0000H	Success	Film Session is successfully created or set.
0116H	Warning	Value out of range.

Table 2.3.5.3.1.4 N-ACITON Status Code

Status Code	Status	Meaning
0000H	Success	Film Session successfully accepted.
C600H	Failure	No Film Box SOP Instances.

C601H	Failure	Film Session queue full.
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Table 2.3.5.3.1.5 N-DELETE Status Code

Status Code	Status	Meaning
0000H	Success	Film Session successfully deleted.

2.3.5.3.2 Basic Film Box SOP Class for Color printers

Table 2.3.5.3.2.1 Basic Film Box SOP Class DIMSE Service Group

DIMSE Service Element	Usage SCU/SCP	
N-CREATE	M/M	Supported
N-ACTION	M/M	Supported
N-DELETE	U/M	Supported
N-SET	U/U	Supported

Table 2.3.5.3.2.2 Basic Film Box SOP Class N-CREATE Attributes

Attribute Name	Tag	Usage SCU/SCP	VR	Valid Range	Default Value
Basic Film Box Presentation Module					
Image Display Format	(2010,0010)	M/M	ST	STANDARD $\{C,R\}$ where C is 1 to 10 and R is 1 to 10	STANDARD $\{1,1\}$
Annotation Display Format ID	(2010,0030)	U/U	CS	"FORMAT6" (See Note 1)	
Film Orientation	(2010,0040)	U/M	CS	PORTRAIT LANDSCAPE	PORTRAIT
Film Size ID	(2010,0050)	U/M	CS	A4, 8_5INX11IN A5	A4, 8_5INX11IN (UP-D77MD) A5 (UP-D55)
Magnification Type	(2010,0060)	U/M	CS	REPLICATE BILINEAR CUBIC NONE	CUBIC
Smoothing Type	(2010,0080)	U/U	CS	(Not supported)	

Border Density	(2010,0100)	U/U	CS	BLACK WHITE i	WHITE
Empty Image Density	(2010,0110)	U/U	CS	BLACK WHITE i	WHITE
Min Density	(2010,0120)	U/U	US	Valid range is printer dependent. It is from default Min Density value to default Max Density value of the printer used.	8 (UP-D77MD) 7 (UP-D55)
Max Density	(2010,0130)	U/M	US	Valid range is printer dependent. It is from default Min Density value to default Max Density value of the printer used.	230 (UP-D77MD) 195 (UP-D55)
Trim	(2010,0140)	U/U	CS	YES NO	NO
Configuration Information	(2010,0150)	U/M	ST	"1" to "10" (See Note 2)	Printer default table number
Basic Film Box Relationship Module					
Referenced Film Session Sequence	(2010,0500)	M/M	SQ		
> Referenced SOP Class UID	(0008,1150)	M/M	UI		
> Referenced SOP Instance UID	(0008,1155)	M/M	UI		

Referenced Image Box Sequence	(2010,0510)	-/M	SQ		
> Referenced SOP Class UID	(0008,1150)	-/M	UI		
> Referenced SOP Instance UID	(0008,1155)	-/M	UI		
Referenced Basic Annotation Box Sequence	(2010,0520)	-/MC	SQ		
> Referenced SOP Class UID	(0008,1150)	-/MC	UI		
> Referenced SOP Instance UID	(0008,1155)	-/MC	UI		

Note 1

String value "FORMAT6" of (2010,0030) Annotation Display Format ID attribute enables Annotation text print at maximum 6 locations; top left, top center, top right, bottom left, bottom center and bottom right corners of the film.

Note 2

String value "1" to "10" of (2010,0150) Configuration Information attribute represents GAMMA correction table number to be used for printing. Table #1 (linear) through #5 are factory preset tables. Table #6 through #10 are user defined GAMMA tables. With any other values, the printer will use its own current default setting.

Table 2.3.5.3.2.3 N-CREATE Status Code

Status Code	Status	Meaning
0000H	Success	Film Box successfully created.
0106H	Failure	Invalid attribute value.
0120H	Failure	Missing attribute.
0116H	Warning	Value out of range.
B605H	Warning	Requested Min Density outside of printer's operating range.

Table 2.3.5.3.2.4 Basic Film Box SOP Class N-SET Attributes

Attribute Name	Tag	Usage SCU/ SCP	VR	Valid Range	Default Value
Basic Film Box Presentation Module					
Magnification Type	(2010,0060)	U/M	CS	REPLICATE BILINEAR CUBIC NONE	CUBIC
Smoothing Type	(2010,0080)	U/U	CS	(Not supported)	
Border Density	(2010,0100)	U/U	CS	BLACK WHITE i	WHITE
Empty Image Density	(2010,0110)	U/U	CS	BLACK WHITE i	WHITE
Min Density	(2010,0120)	U/U	US	Valid range is printer dependent. It is from default Min Density value to default Max Density value of the printer used.	8 (UP-D77MD) 7 (UP-D55)
Max Density	(2010,0130)	U/M	US	Valid range is printer dependent. It is from default Min Density value to default Max Density value of the printer used.	230 (UP-D77MD) 195 (UP-D55)
Trim	(2010,0140)	U/U	CS	YES NO	NO

Configuration Information	(2010,0150)	U/M	ST	"0" to "10" (See Note 1)	Printer default table number
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Note 1

String value "1" to "10" of (2010,0150) Configuration Information attribute represents GAMMA correction table number to be used for printing. Table #1 (linear) through #5 are factory preset tables. Table #6 through #10 are user defined GAMMA tables. With any other values, the printer will use its own current default setting.

Table 2.3.5.3.2.5 N-SET Status Code

Status Code	Status	Meaning
0000H	Success	Film Box successfully set.
0116H	Warning	Value out of range.
B605H	Warning	Requested Min Density outside of printer's operating range.

Table 2.3.5.3.2.6 N-ACITON Status Code

Status Code	Status	Meaning
0000H	Success	Film Box successfully accepted.
C602H	Failure	Film Box queue full.

Table 2.3.5.3.2.7 N-DELETE Status Code

Status Code	Status	Meaning
0000H	Success	Film Box successfully deleted.

2.3.5.3.3 Basic Color Image Box SOP Class

Table 2.3.5.3.3.1 Basic Color Image Box SOP Class DIMSE Service Group

DIMSE Service Element	Usage SCU/SCP	
N-SET	M/M	Supported

Table 2.3.5.3.3.2 Basic Color Image Box SOP Class N-SET Attributes

Attribute Name	Tag	Usage SCU/SCP	VR	Valid Range	Default Value
Image Box Pixel Presentation Module					
Magnification Type	(2010,0060)	U/U	CS	REPLICATE BILINEAR CUBIC NONE	CUBIC
Smoothing Type	(2010,0080)	U/U	CS	(Not supported)	
Min Density	(2010,0120)	U/U	US	(Not supported)	
Max Density	(2010,0130)	U/U	US	(Not supported)	
Configuration Information	(2010,0150)	U/U	ST	(Not supported)	
Image Position	(2020,0010)	M/M	US	1 to 100	
Polarity	(2020,0020)	U/M	CS	(Not supported)	
Requested Image Size	(2020,0030)	U/U	DS		
Requested Decimate/Crop Behavior	(2020,0040)	U/U	CS	CROP	CROP
Basic Color Image Sequence	(2020,0111)	M/M	SQ		
> Sample Per Pixel	(0028,0002)	M/M	US	3	
> Photometric Interpretation	(0028,0004)	M/M	CS	RGB	
> Rows	(0028,0010)	M/M	US	(See Note 1)	
> Columns	(0028,0011)	M/M	US	(See Note 1)	
> Pixel Aspect Ratio	(0028,0034)	MC/M	IS	(See Note 2)	1¶1

> Bits Allocated	(0028,0100)	M/M	US	8	
> Bits Stored	(0028,0101)	M/M	US	8	
> High Bit	(0028,0102)	M/M	US	7	
> Pixel Representation	(0028,0103)	M/M	US	0000H	
> Pixel Data	(7FE0,0010)	M/M	OB		

Note 1

PrintServer does not limit value range for (0028,0010) Rows and (0028,0011) Columns. If SCU chooses to send scaled pre-formatted image in "STANDARD¥1,1" Image Display Format, it is recommended to set Rows and Columns values as below.

Table 2.3.5.2.3.3 Pixel Matrix (Recommended values for STANDARD¥1,1 format)

Printer	Film Size (Orientation)	(0028,0010) Rows	(0028,0011) Columns
UP-D55	A5 (Portrait)	2528	1920
	A5 (Landscape)	1920	2528
UP-D77MD	A4 (Portrait)	3208	2400
	A4 (Landscape)	2400	3208
	8_5INX11IN (Portrait)	3000	2400
	8_5INX11IN (Landscape)	2400	3000

For the best printing performance, it is recommended not to pre-format. Sending scaled pre-formatted image (one scaled image per film) causes longer network transfer time and significantly slower printing performance.

Note 2

(0028,0034) Pixel Aspect Ratio value is ignored, if (2010,0060) Magnification Type specified for the Film Box is "NONE".

Table 2.3.5.3.3.3 N-SET Status Code

Status Code	Status	Meaning
0000H	Success	Image Box successfully set.
B604H	Warning	Image size is larger than image box size, the image has been demagnified.
B609H	Warning	Image size is larger than the Image Box size. The Image has been cropped to fit.

2.3.5.2.4 Printer SOP Class for Color printers

Table 2.3.5.3.4.1 Printer SOP Class DIMSE Service Group

DIMSE Service Element	Usage SCU/SCP	
N-EVENT-REPORT	M/M	Disabled
N-GET	U/M	Supported

Table 2.3.5.3.4.2 Printer SOP Class N-EVENT-REPORT Attributes

Attribute Name	Tag	Usage SCU/SCP	VR	Return Value
Printer Module				
Printer Status Info	(2110,0020)	U/M	CS	
Film Destination	(2000,0040)	U/U	CS	
Printer Name	(2110,0030)	U/U	LO	

Table 2.3.5.3.4.3 Printer SOP Class N-GET Attributes

Attribute Name	Tag	Usage SCU/SCP	VR	Return Value
Printer Module				
Printer Status	(2110,0010)	U/M	CS	NORMAL WARNING FAILURE
Printer Status Info	(2110,0020)	U/M	CS	(See Table 2.3.5.6.5)
Printer Name	(2110,0030)	U/U	LO	(Printer Name)
Manufacturer	(0008,0070)	U/U	LO	(Printer Manufacturer)
Manufacturer Model Name	(0008,1090)	U/U	LO	(Printer Model)
Device Serial Number	(0018,1000)	U/U	LO	(Serial Number)
Software Versions	(0018,1020)	U/U	LO	(Software Version)
Date Of Last Calibration	(0018,1200)	U/U	DA	(Not supported)
Time Of Last Calibration	(0018,1201)	U/U	TM	(Not supported)

Table 2.3.5.3.4.4 N-GET Status Code

Status Code	Status	Meaning
0000H	Success	Success.

Table 2.3.5.3.4.5 Printer Status / Printer Status Info

Printer Status Meaning	N-GET Return Value	
	Printer Status (2110,0010)	Printer Status Info (2110,0020)
Unable to communicate with printer	FAILURE	UNKNOWN
Motor/Sensor error	FAILURE	PRINTER DOWN
Film Jamming	WARNING	FILM JAM
Cover is opened	WARNING	COVER OPEN
Film Tray is out	WARNING	NO SUPPLY MGZ (See Note 1)
Invalid media in Film Tray	WARNING	BAD SUPPLY MGZ
Film is empty	WARNING	EMPTY A5 PAPR EMPTY A4 PAPR EMPTY 8_5X11 PAPR (See Note 2)
Ribbon Error	WARNING	RIBBON ERROR
Stack full	WARNING	RECEIVER FULL
Ready to print	NORMAL	NORMAL

Note 1

UP-D77MD returns "SUPPLY EMPTY" instead of "NO SUPPLY MGZ", when the paper tray is removed from the printer.

Note 2

UP-D77MD returns "SUPPLY EMPTY", when the paper tray is empty.

2.3.5.4 Basic Annotation Box SOP Class

Table 2.3.5.4.1 Basic Annotation Box SOP Class DIMSE Service Group

DIMSE Service Element	Usage SCU/SCP	
N-SET	U/M	Supported

Table 2.3.5.4.2 Basic Annotation Box SOP Class N-SET Attributes

Attribute Name	Tag	Usage SCU/SCP	VR	Valid Range	Default Value
Basic Annotation Presentation Module					
Annotation Position	(2030,0010)	M/M	US	0 to 5 (See Table 2.3.5.4.3)	
Text String	(2030,0020)	U/M	LO		

Table 2.3.5.4.3.1 Definition of Annotation Position, when (2010,0030) value starts with "FORMAT6"

Annotation Position (2030,0010) Value	Location of Annotation Text to be printed
0	Top Left
1	Top Center
2	Top Right
3	Bottom Left
4	Bottom Center
5	Bottom Right

Table 2.3.5.4.3.2 Definition of Annotation Position, when (2010,0030) value starts with "FORMAT4"

Annotation Position (2030,0010) Value	Location of Annotation Text to be printed
0	Top Left
1	Top Right
2	Bottom Left
3	Bottom Right

**Table 2.3.5.4.3.3 Definition of Annotation Position,
when (2010,0030) value starts with "FORMAT2"**

Annotation Position (2030,0010) Value	Location of Annotation Text to be printed
0	Top Left
1	Bottom Left

Table 2.3.5.4.4 N-SET Status Code

Status Code	Status	Meaning
0000H	Success	Annotation Box successfully set.
0106H	Failure	Invalid attribute value.

2.3.5.5 Presentation LUT SOP Class

Table 2.3.5.5.1 Presentation LUT SOP Class DIMSE Service Group

DIMSE Service Element	Usage SCU/SCP	
N-CREATE	M/M	Supported
N-DELETE	U/M	Supported

Table 2.3.5.5.2 Presentation LUT SOP Class N-SET Attributes

Attribute Name	Tag	Usage SCU/SCP	VR	Valid Range	Default Value
Presentation LUT Module					
Presentation LUT Sequence	(2050,0010)	MC/M	SQ	Only 1 item is allowed	
> LUT Descriptor	(0028,3002)	MC/M	US	First value=256 or 4096 Second value=0 Third value=10 to 16	
> LUT Data	(0028, 3006)	MC/M	US		
Presentation LUT Shape	(2050, 0020)	MC/M	CS	"IDENTITY" "LIN OD"	

Table 2.3.5.5.4 N-CREATE Status Code

Status Code	Status	Meaning
0000H	Success	Presentation LUT successfully created.

Table 2.3.5.5.5 N-DELETE Status Code

Status Code	Status	Meaning
0000H	Success	Presentation LUT successfully deleted.

3. Communication Profiles

3.1 Supported Communication Stacks

PrintServer provides DICOM V3.0 TCT/IP Network Communication Support as defined in PS 3.8.

3.2 TCP/IP Stacks

3.2.1 Physical Media Support

PrintServer is indifferent to the physical medium over which TCP/IP executes.

The medium used is 10Base-T/100Base-TX Ethernet.

4. Extensions / Specializations / Privatizations

Not applicable.

5. Configuration

The following parameters are configurable using Web browser interface.

- Local IP Address, Sub-net mask and default gateway IP Address
- AE Title of the primary printer
- AE Title of the secondary printer (If blank, secondary printer share the same AE Title for the primary printer)

Port ID is fixed at 104 for primary printer and 4104 for secondary printer.

6. Support of Extended Character Sets

No extended character sets are supported.

PrintServer supports only DICOM default character set ISO 2022 IR 6.