

SONY UP-DF750

DICOM Conformance Statement

Revision 1.1

September 22, 2008

Sony Corporation

1. Conformance Statement Overview

This document provides the conformance statement for PrintServer application software incorporated in Sony UP-DF750.

The PrintServer implements the necessary DICOM services to facilitate the Print (SCP) Imaging Management in the healthcare departments.

Table 1-1 provides an overview of the network services supported by PrintServer.

Table 1-1 Network Services

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Print Management		
Grayscale Print Management Meta	No	Yes
Presentation LUT	No	Yes
Basic Annotation	No	Yes

PrintServer software incorporated in Sony UP-DF750 was developed by EBM Technologies, Inc. for Sony Corporation. The software is protected by copyright law and international treaties. © 2008 EBM Technologies, Inc.

2. Table of Contents

1. Conformance Statement Overview	2
2. Table of Contents.....	3
3. Revision History.....	4
4. Implementation Model.....	5
4.1 Application Data Flow	5
4.2 Functional Definitions.....	5
4.3 Sequencing of Real-World Activities.....	6
5. AE Specifications	7
5.1 Association Establishment Policy	7
5.1.1 General	7
5.1.2 Number of Associations.....	7
5.1.3 Asynchronous Nature.....	8
5.1.4 Implementation Identifying Information.....	8
5.2 Association Initiation Policy	9
5.3 Association Acceptance Policy.....	9
5.3.1 Description and Sequencing of Activities.....	9
5.3.2 Accepted Presentation Context.....	10
5.3.3 Presentation Context Acceptance Criterion.....	10
5.3.4 Transfer Syntax Selection Policy.....	10
5.3.5 SOP Specific Conformance.....	10
5.3.5.1 Verification Service Class	10
5.3.5.2 Basic Grayscale Print Management Meta SOP Class.....	10
5.3.5.3 Basic Annotation Box SOP Class.....	22
5.3.5.4 Presentation LUT SOP Class	24
6. Network Interfaces	25
6.1 Physical Network Interface	25
6.2 Additional Protocols	25
6.3 IPv4 and IPv6	25
7. Extensions / Specializations / Privatizations	25
8. Configuration.....	25
9. Support of Extended Character Sets.....	25
10. Security	25

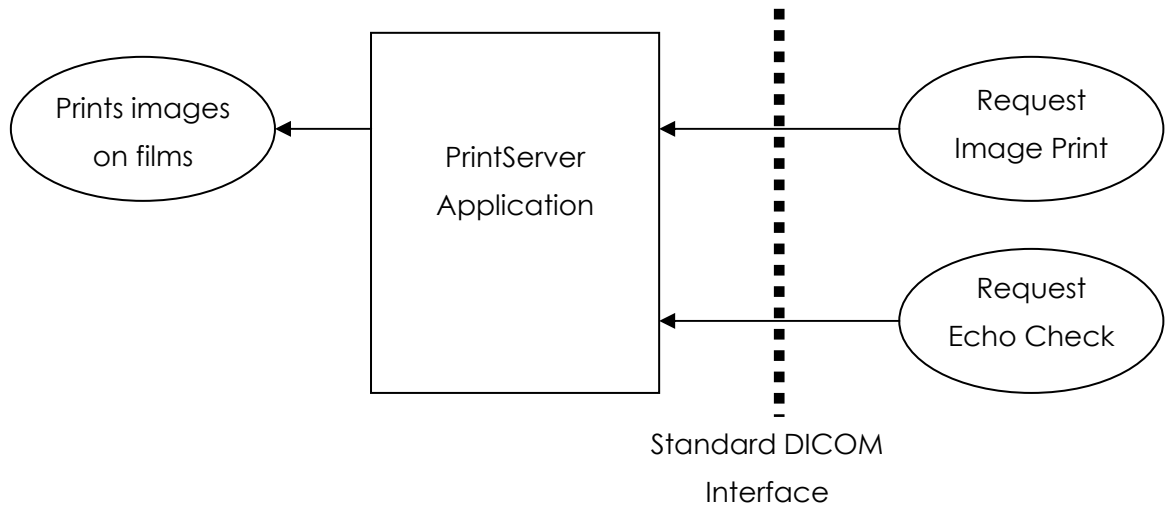
3. Revision History

Document Revision	Date	Description
1.0	August 25, 2008	Initial
1.1	September 22, 2008	Minor corrections

4. Implementation Model

PrintServer is an Application Entity that provides standard DICOM Verification Service Class and Print Management Service Class interface.

4.1 Application Data Flow



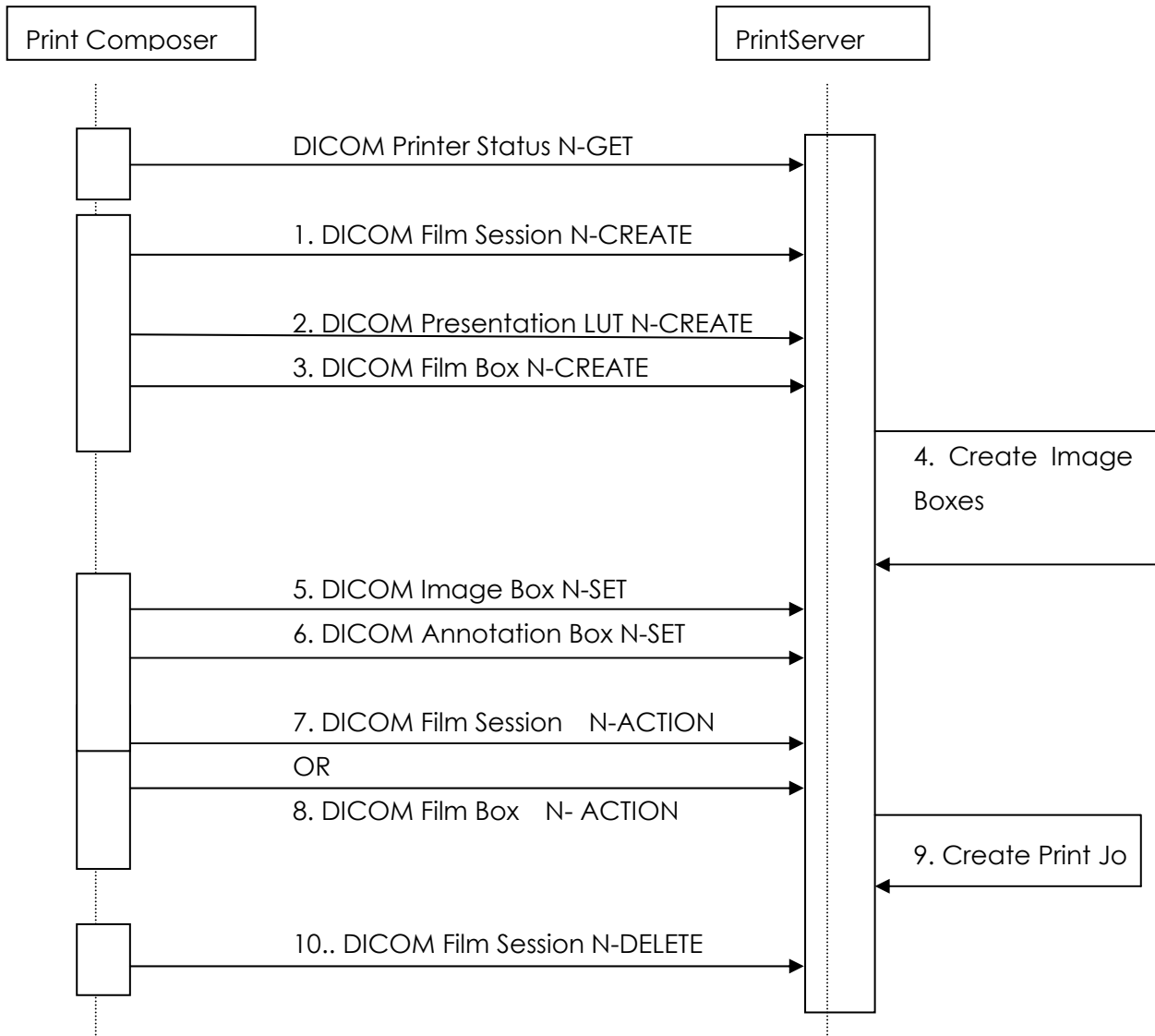
4.2 Functional Definitions

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 the printer and notifying Printer Status.
- Respond to Echo Check requests.

4.3 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.



5. AE Specifications

PrintServer provides standard conformance to the Verification Service Class and Print Management Service Class as shown in Table 5-1.

Table 5-1 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

5.1 Association Establishment Policy

5.1.1 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 30 minutes while association is being established, PrintServer will send A-ABORT and disconnect network connection.

The DICOM standard application context name for DICOM 3.0 is always accepted.

Table 5-2 DICOM Application Context

Application Context Name	1.2.840.10008.3.1.1.1
--------------------------	-----------------------

5.1.2 Number of Associations

PrintServer supports maximum 8 associations simultaneously. If an attempt is made to open more than 8 simultaneous Associations, PrintServer will reject the additional Associations (A-ASSOCIATE-RJ).

Table 5-3

Maximum number of simultaneous Associations	8
---	---

5.1.3 Asynchronous Nature

Print Server does not support negotiation of multiple outstanding transactions. Multiple outstanding transactions are not supported. It allows up to one invoked and one performed operation on an Association.

Table 5-4

Maximum number of outstanding asynchronous transactions	1
---	---

5.1.4 Implementation Identifying Information

The implementation information for this Application Entity is:

Table 5-5

Implementation Class UID	1.2.840.113820.81.40
Implementation Version Name	EBM_DICOM_81_40

5.2 Association Initiation Policy

PrintServer does not initiate associations.

5.3 Association Acceptance Policy

5.3.1 Description and Sequencing of Activities

A remote peer DICOM Application Entity, acting as an Print SCU, establishes an association with the PrintServer AE that accepts these Associations for the purpose of receiving images and image presentation related data for image processing and printing on a hard copy medium.

PrintServer may reject association attempts as shown in Table 5-6.

Table 5-6 Association Reject Reasons

Result	Source	Reason/Diag	Explanation
2 – rejected transient	3 – DICOM UL service-provider (Presentation related function)	1 – temporally congested	The maximum number of simultaneous associations has been reached. An association request with the same parameters may succeed at a later time.
1 – rejected permanent	1 – DICOM UL service-user	7 – called AE title not recognized	The association request contained an unrecognized Called AE Title. An association request with the same parameters will not succeed at a later time unless

After Association is successfully established, Print SCU may send requests for various services.

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.

5.3.2 Accepted Presentation Context

Table 5-7 Acceptable Presentation Context

Proposed Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
All SOP Classes listed in Table 2-1		Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

5.3.3 Presentation Context Acceptance Criterion

PrintServer accepts any combination of the SOP Classes listed in Table 5-1.

5.3.4 Transfer Syntax Selection Policy

PrintServer accepts only Implicit VR Little Endian transfer syntax.

5.3.5 SOP Specific Conformance

5.3.5.1 Verification Service Class

PrintServer provides standard conformance to the DICOM Verification Service Class.

5.3.5.2 Basic Grayscale Print Management Meta SOP Class

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

5.3.5.2.1 Basic Film Session SOP Class for Grayscale Printers

Table 5-8 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 5-9 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 MAMMO BLUE FILM	BLUE FILM
Film Destination	(2000,0040)	U/M	CS	(See Note 1)	MAGAZINE

Note 1

PrintServer does not rely on the value specified by SCU.

Table 5-10 N-CREATE / N-SET Status Code

Status Code	Status	Meaning
0000H	Success	Film Session is successfully created or set.
0106H	Failure	Invalid attribute value
0116H	Warning	Value out of range.

Table 5-11 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 5-12 N-DELETE Status Code

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

5.3.5.2.2 Basic Film Box SOP Class for Grayscale printers

Table 5-13 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 5-14 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 \neq C,R where C is 1 to 10 and R is 1 to 10	STANDARD \neq 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 11INX14IN 10INX12IN 8INX10IN	14INX17IN

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	22 to 320 (BLUE FILM) 22 to 400 (MAMMO BLUE FILM)	22
Max Density	(2010,0130)	U/M	US	22 to 320 (BLUE FILM) 22 to 400 (MAMMO BLUE FILM)	320
Trim	(2010,0140)	U/U	CS	YES NO	NO
Configuration Information	(2010,0150)	U/M	ST	"1" to "36" (See Note 2)	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 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 "36" 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 5-15 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	Min/Max Density out of range

Table 5-16 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	22 to 320 (BLUE FILM) 22 to 400 (MAMMO BLUE FILM)	22
Max Density	(2010,0130)	U/M	US	22 to 320 (BLUE FILM) 22 to 400 (MAMMO BLUE FILM)	320
Trim	(2010,0140)	U/U	CS	YES NO	NO
Configuration Information	(2010,0150)	U/M	ST	"0" to "36" (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 100	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 "36" 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 5-17 N-SET Status Code

Status Code	Status	Meaning
0000H	Success	Film Box successfully set.
0116H	Warning	Value out of range.
B605H	Warning	Min/Max Density out of range

Table 5-18 N-ACITON Status Code

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

Table 5-19 N-DELETE Status Code

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

5.3.5.2.3 Basic Grayscale Image Box SOP Class

Table 5-20 Basic Grayscale Image Box SOP Class DIMSE Service Group

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

Table 5-21 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 5-22 Matrix (Recommended values for STANDARD¥1,1 format)

Film Size (Orientation)	(0028,0010) Rows	(0028,0011) Columns
14x17 (Portrait)	9888	8256
14x17 (Landscape)	8256	9888
11x14 (Portrait)	8096	6464
11x14 (Landscape)	6464	8096
10x12 (Portrait)	6864	5856
10x12 (Landscape)	5856	6864
8x10 (Portrait)	5680	4640
8x10 (Landscape)	4640	5680

Note 2

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

Table 5.23 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.

5.3.5.2.4 Printer SOP Class for Grayscale printers

Table 5-24 Printer SOP Class DIMSE Service Group

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

Table 5-25 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 5-26 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 2.3.5.2.4.5)
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 5-27 N-GET Status Code

Status Code	Status	Meaning
0000H	Success	Success.

Table 5-28 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 11X14 BLUE EMPTY 10X12 BLUE EMPTY 8X10 BLUE
Stack full	WARNING	RECEIVER FULL
Ready to print	NORMAL	NORMAL

5.3.5.3 Basic Annotation Box SOP Class

Table 5-29 Basic Annotation Box SOP Class DIMSE Service Group

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

Table 5-30 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 5-31 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 5-32 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 5-33 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 5-34 N-SET Status Code

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

5.3.5.4 Presentation LUT SOP Class

Table 5-35 Presentation LUT SOP Class DIMSE Service Group

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

Table 5-36 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 5-37 N-CREATE Status Code

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

Table 5-38 N-DELETE Status Code

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

6. Network Interfaces

6.1 Physical Network Interface

PrintServer supports a single network interface. The following physical network interface can be used.

Ethernet 100Base-TX

6.2 Additional Protocols

No additional protocol is supported.

6.3 IPv4 and IPv6

PrintServer supports only IPv4.

7. Extensions / Specializations / Privatizations

Not applicable.

8. Configuration

The following parameters are configurable using Web browser interface.

- Local IP Address, Sub-net mask and default gateway IP Address
- AE Title of PrintServer
- Default values used when SCU does not provide attributes.

9. Support of Extended Character Sets

No extended character sets are supported.

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

10. Security

PrintServer does not support any specific security measures.