KONICA MINOLTA

PRINT MANAGEMENT SYSTEM

Printlink III - ID/IV

DICOM 3.0 Conformance Statement

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KONICA MINOLTA MEDICAL & GRAPHIC, INC.

Revision History

Date	Version	Description
20/08/2004	Ver. 1.00	First edition

NOTE: Descriptions in this document are subject to change without prior notice.

Contents

0 INTRODUCTION

This document describes the compatibility of the DICOM interface for Print Management System Printlink III-ID/IV with DICOM 3.0.

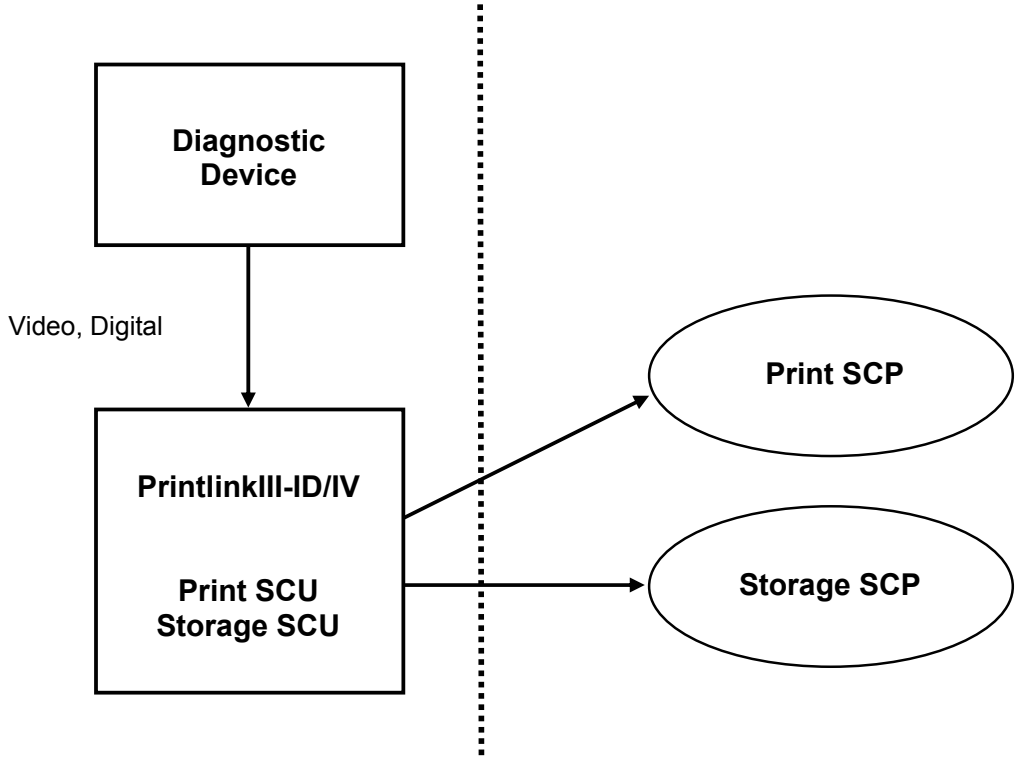
0.1 Abbreviations

AE ····· DICOM Application Entity
IOD ····· DICOM Information Object Definition
PDU ····· Protocol Data Unit
SCU ····· DICOM Service Class User(client using this DICOM service)
SCP ····· DICOM Service Class Provider(server providing this service)
SOP ····· Service/Object Pair
UID ····· Unique Identifier

1 IMPLEMENTATION MODEL

The DICOM interface for Print Management System Printlink III-ID/IV operates as a DICOM Print Service Class SCU and DICOM Storage Service Class SCU.

1.1 Application Data Flow Diagram



1.2 Functional Definitions of AEs

1.2.1 Print SCU

The Print Management Service Class SCU for Printlink III-ID/IV operates as a communication process and starts to send hard copies in response to an N-Create-RQ after a request to establish an association sent to an external AE is accepted.

1.2.2 Strage SCU

The Storage Service Class SCU for Printlink III-ID/IV starts to send images in response to a C-Store-RQ after a request to establish an association sent to an external AE is accepted.

1.3 Sequencing of Real World Activities

This model is not applicable with the Sequencing of Real-World Activities.

2 AE SPECIFICATION

2.1 Printlink III-ID/IV Print Management Service Class Specifications

Printlink III-ID/IV sends print request associations and operates as an application entity.
The following SOP classes are supported by Printlink III-ID/IV.

Description	Value
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
Printer SOP Class	1.2.840.10008.5.1.1.16

2.1.1 Association Establishment Policies

This section describes the conditions for establishing association.

2.1.1.1 General

Print Management SCU and SCP use the DICOM upper layer to establish associations. In doing so, Printlink III-ID/IV (SCU) starts an association which is accepted by the imager (SCP). 64KB is the maximum PDU size used.

2.1.1.2 Number of Associations

The number of associations supported by Printlink III-ID/IV at the same time is one association.

2.1.1.3 Asynchronous Nature

Printlink III-ID/IV manages asynchronous N-EVENT messages. However, a message is sent whenever necessary.

2.1.1.4 Implementation Identification Information

The following is a list of Implementation Class UID.

Description	Value
Implementation Class UID	Printlink III-IV 1.2.392.200036.9107.500.515 Printlink III-ID 1.2.392.200036.9107.500.516
Implementation Version Name	KC_PLNK3_X.XXXXX X.XXXXX indicates the software version. e.g. KC_PLNK3_1.00R00

2.1.2 Association in Real World Activities

Printlink III-ID/IV (SCU) starts an association when issuing a message.

2.1.3 Association Acceptance Policy

Printlink III-ID/IV (SCU) establishes an association in response to a request to establish an asynchronous N-EVENT message association for the laser imager (SCP).

2.1.3.1 Real World Activities

2.1.3.1.1 Associated Real World Activity

Image data and various parameters are sent to the laser imager in order to print image data on films.

2.1.3.1.2 Presentation Context

Printlink III-ID/IV (SCU) issues the presentation context that is indicated in the following table.

Abstract syntax		Role
Name	UID	
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	SCP
Basic Film Session SOP Class	1.2.840.10008.5.1.1.1	
Basic Film Box SOP Class	1.2.840.10008.5.1.1.2	
Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4	
Printer SOP Class	1.2.840.10008.5.1.1.16	

Extended negotiations can be conformed to as required.

The following transmission syntax is valid against the individual SOP classes mentioned above.

Name	UID
Implicit VR Little Endian	1.2.840.10008.1.2

2.1.3.1.2.1 Basic Film Session SOP Class

Tag	Name	VR	VM	Permitted Value
(2000, 0010)	Copies	IS	1	Copy Count 1-99
(2000, 0020)	Print Priority	CS	1	Print Priority LOW MED HIGH
(2000, 0030)	Medium Type	CS	1	Medium Type CLEAR FILM = Clear Base BLUE FILM = Blue Base DR CLEAR FILM = DR Clear Base DR BLUE FILM = DR Blue Base
(2000, 0040)	Film Destination	CS	1	Film Destination MAGAZINE PROCESSOR BIN_1 - BIN_6 = Sorter
(2000, 0060)	Memory Allocation	LO	1	Memory Allocation Set the required memory contents. Indicate in KB.

Tags other than those listed above will not be checked.
Furthermore, this model will conform to non-conforming header data as required.

2.1.3.1.2.2 Basic Film Box SOP Class

Tag	Name	VR	VM	Permitted Value
(0010, 0010)	Patient's Name	PN	1	Patient Name
(0010, 0020)	Patient ID	LO	1	Patient ID
(2010, 0010)	Image Display Format	ST	1	STANDARD¥C,R ROW¥R1,R2 SLIDE
(2010, 0030)	Annotation Display Format ID	CS	1	Annotation Display Format ID P1 = PORTRAIT L1 = LANDSCAPE TM = TIME CC = Copy Count ID = Modality ID MS = Message
(2010, 0040)	Film Orientation	CS	1	Film Orientation PORTRAIT LANDSCAPE
(2010, 0050)	Film Size ID	CS	1	Film Size 8INX10IN 10INX12IN 11INX14IN 14INX14IN 14INX17IN
(2010, 0060)	Magnification Type	CS	1	Magnification Type REPLICATE = Replicate interpolation CUBIC = Cubic B-Spline interpolation
(2010, 0080)	Smoothing Type	CS	1	Smoothing Type 1-7
(2010, 0100)	Borders	CS	1	Border Density BLACK WHITE
(2010, 0140)	Trim	US	1	Trim YES = With trim frame NO = Without trim frame
(2010, 0150)	Configuration Information	ST	1	Imager LUT Indicated as shown below. KC_LUT=1-7

2.1.3.1.2.3 Basic Grayscale Image Box SOP Class

Tag	Name	VR	VM	Permitted Value
(0028, 0004)	Photometric Interpretation	CS	1	Photometric Interpretation MONOCHROME1: Min. VOI pixel = White MONOCHROME2: Min. VOI pixel = Black
(0028, 0010)	Rows	US	1	Pixels in imager Y orientation
(0028, 0011)	Columns	US	1	Pixels in imager X orientation
(0028, 0034)	Pixel Aspect Ratio	IS	2	Pixel Aspect Ratio
(0028, 0100)	Bits Allocated	US	1	Bits allocated in pixel. Non-used bits are included. 0008:8 (8bits) 000A:16 (12bits) Those other than the above result in an error.
(0028, 0101)	Bits Stored	US	1	Bits in 1 pixel. 0008:8 (8bits) 000C:12 (12bits)
(0028, 0102)	High Bit	US	1	High Bit Pixel data MBS (Most significant bit) 0007:(Bits Stored = 8) 000B:(Bits Stored = 12)
(0028, 0103)	Pixel Representation	US	1	Pixel data representation 0000 = Integer with no marks
(2020, 0010)	Image Position	US	1	Image Position Image position that structures a page.
(2020, 0020)	Polarity	CS	1	Polarity NORMAL REVERSE
(7fe0, 0010)	Pixel Data	OW OB	1	Pixel data

2.1.3.1.2.4 Printer SOP Class

Tag	Name	VR	VM	Permitted Value
(0008, 0070)	Manufacture	LO	1	Manufacture
(0008, 1090)	Manufacture's Model Name	LO	1	Manufacture's Model Name
(0018, 1000)	Device Serial Number	LO	1	Serial Number
(0018, 1020)	Software Version	LO	1	Software version
(2110, 0010)	Printer Status	CS	1	Printer Status NORMAL WARNING FAILURE
(2110, 0020)	Printer Status Information	CS	1	Printer Status Information
(2110, 0030)	Printer Name	LO	1	Printer Name

2.2 Printlink III-ID/IV Storage Service Class Specification

Printlink III-ID/IV supports the following SOP classes as a Storage Service Class SCU.

SOP Class Name	SOP Class UID
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1
CT Image Storage	1.2.840.10008.5.1.4.1.1.2
MR Image Storage	1.2.840.10008.5.1.4.1.1.4
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1
X-Ray Radio Fluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7

2.2.1 Association Establishment Policies

2.2.1.1 General

Printlink utilizes the Store Service Class SCP and the DICOM upper layer to establish associations. Association is established for each SC image store and the Store Service Class SCP receives the association. The maximum PDU size used is 64KB.

2.2.1.2 Number of Associations

A request to establish a single association is sent.

2.2.1.3 Asynchronous Nature

One image or multiple images are managed in an association.
Asynchronous processing is not supported.

2.2.1.4 Implementation Identification Information

The following is a list of Implementation Class UID.

Description	Value
Implementation Class UID	Printlink III-IV 1.2.392.200036.9107.500.515 Printlink III-ID 1.2.392.200036.9107.500.516
Implementation Version Name	KC_PLNK3_X.XXXXX X.XXXXX indicates the software version. e.g. KC_PLNK3_1.00R00

2.2.2 Association in Real World Activities

Printlink establishes associations from the association establishment requests to the Store Service Class SCP.

2.2.2.1 Associated Real World Activity

In a Real World where an association is established, Printlink III-ID/IV sends a C-STORE request to the Remote Storage SCP and sends image data.

2.2.2.2 Presentation Context

Printlink III-ID/IV accepts the following presentation context as a Storage Service Class SCU.

Presentation Context			
Abstract syntax			
Name	UID	Role	Extended Negotiation
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	SCU	None

Transfer syntax	
Name	UID
Implicit VR Little Endian	1.2.840.10008.1.2

2.2.3 SOP Class

2.2.3.1 SC Image Store SOP Class

Printlink provides adaptability to the SC Image Store SOP Class.

2.2.3.2 C-STORE

Printlink III-ID/IV uses C-STORE to an image data store request in the Store Service Class SOP.

2.2.3.3 SCU Behavior

Printlink III-ID/IV performs the C-STORE DIMSE Service for an SOP instance that matches the SC image IOD request.
Printlink III-ID/IV recognizes the status of the C-STORE response and applies proper measures to a normal or abnormal shutdown the a service.

2.2.3.4 SCP Behavior

Store Service Class SOP operates in the same way as the DIMSE Service User operation for the C-STORE Service.
The Store Service Class SOP indicates that an SOP instance has been recognized properly by operating the above service properly.

2.2.3.5 SC Image IOD

List of SC Image IOD

IE	Module	Usage
Patient	Patient	M
Study	General Study	M
	Patient Study	U
Series	General Series	M
Equipment	General Equipment	U
	SC Equipment	M
Image	General Image	M
	Image Pixel	M
	SC Image	M
	Overlay Plane	U
	Modality LUT	U
	VOI LUT	U
	SOP Common	M

"Overlay Plane", "Modality LUT", and "VOI LUT" are the options in the SC Image IOD. However, these are transmitted as required.

List of SC Image IOD Details (The [M] under the Digit section stands for maximum length.)

Tag	Item	VR	VM	Digit	Type
ID Data					
(0008, 0000)	Group Length	UL	1	4	1
(0008, 0005)	Specific Character Set	CS	2	16(M)	1C
(0008, 0008)	Image Type	CS	2	16(M)	3
(0008, 0016)	SOP Class UID	UI	1	64(M)	1
(0008, 0018)	SOP Instance UID	UI	1	64(M)	1
(0008, 0020)	Study Date	DA	1	10	2
(0008, 0021)	Series Date	DA	1	10	3
(0008, 0023)	Image Date	DA	1	10	2C
(0008, 0030)	Study Time	TM	1	16(M)	2
(0008, 0031)	Series Time	TM	1	16(M)	3
(0008, 0033)	Image Time	TM	1	16(M)	2C
(0008, 0060)	Modality	CS	1	16(M)	1
(0008, 0064)	Conversion Type	CS	1	16(M)	1
(0008, 0070)	Manufacture	LO	1	64(M)	2
(0008, 0080)	Institution Name	LO	1	64(M)	3
(0008, 0081)	Institution Address	ST	1	1024(M)	3
Patient Data					
(0010, 0000)	Group Length	UL	1	4	1
(0010, 0010)	Patient's Name	PN	1	64(M)	2
(0010, 0020)	Patient ID	LO	1	64(M)	2

Tag	Item	VR	VM	Digit	Type
Collected Data					
(0018, 0000)	Group Length	UL	1	4	1
(0018, 1010)	Secondary Capture Device ID	CS	1	16(M)	3
(0018, 1012)	Date of Secondary Capture	DA	1	10	3
(0018, 1014)	Time of Secondary Capture	TM	1	16(M)	3
(0018, 1016)	Secondary Capture Device Manufacture	LO	1	64(M)	3
(0018, 1018)	Secondary Capture Device Manufacture's Model Name	LO	1	64(M)	3
(0018, 1019)	Secondary Capture Device Software Version	LO	1-n	64(M)	3
Related Data					
(0020, 0000)	Group Length	UL	1	4	1
(0020, 000D)	Study Instance UID	UI	1	64(M)	1
(0020, 000E)	Series Instance UID	UI	1	64(M)	1
(0020, 0013)	Image Number	IS	1	12(M)	2
Image Display Data					
(0028, 0000)	Group Length	UL	1	4	1
(0028, 0002)	Samples per Pixel	US	1	2	1
(0028, 0004)	Photometric Interpretation	CS	1	16(M)	1
(0028, 0010)	Rows	US	1	2	1
(0028, 0011)	Columns	US	1	2	1
(0028, 0100)	Bits Allocated	US	1	2	1
(0028, 0101)	Bits Stored	US	1	2	1
(0028, 0102)	High Bit	US	1	2	1
(0028, 0103)	Pixel Representation	US	1	2	1
(0028, 3010)	VOI LUT Sequence	SQ	1	2	1C
>(0028, 3002)	LUT Descriptor	US	3	2	1C
>(0028, 3003)	LUT Explanation	LO	1	64(M)	3
>(0028, 3006)	LUT Data	US	4096	2	1C
Image Pixel Data					
(7FE0, 0000)	Group Length	UL	1	4	1
(7FE0, 0010)	Pixel Data	OW	1	65536(M)	1

3 COMMUNICATION PROFILES

3.1 Supported Communication Stack

The DICOM TCP/IP Network Communication Support defined in DICOM PS3.8 is provided.

3.2 TCP/IP Stack

The TCP/IP stack is succeeded from the Windows XP system.

3.2.1 Physical Media Support

The following physical media is supported by standard.
- 10 BaseT, 100BaseTX

4 EXTENSIONS / SPECIALIZATIONS / PRIVATIZATIONS

The following attributes are reserved in the Basic Film Box SOP Class.
- (0010,0010) Patient's Name
- (0010,0020) Patient ID

The following attributes are reserved in the Basic Film Box SOP Class.
- (2011,0010)
- (2011,0010)
- (2011,1011)
- (2011,1021)
- (2011,1030)
- (2011,1031)
- (2011,1040)
- (2011,1050)
- (2011,1060)
- (2011,1070)
- (2011,1080)
- (2011,1090)

The following attributes are reserved in the Printer SOP Class.
- (2011,0010)
- (2011,10A0)
- (2011,10A1)
- (2011,10B0)
- (2011,10B1)
- (2011,10B2)
- (2011,10C0)
- (2011,10C1)
- (2011,10D0)
- (2011,10D1)
- (2011,10E0)
- (2011,10F0)

The following attributes are added in the SC Image IOD.
- (2010 0010)
- (2010 0040)
- (2010 0050)
- (2010 0060)
- (2010 0080)
- (2010 0100)
- (2010 0110)
- (2010 0140)
- (2010 0150)
- (2011 0010)
- (2011 1011)
- (2011 1021)
- (2011 1040)
- (2011 1080)
- (2020 0010)
- (2020 0020)

5 CONFIGURATION

5.1 AE Title / Presentation Address Mapping

The conformance from a Printlink III-ID/IV AE title to a presentation address is performed by making indications to a configuration file.

5.2 Configurable Parameters

Specify the following items to the environment data file.
- AE title
- Printlink III-ID/IV name (Default: KC_PLNK3_SCU)
- IP address
- TCP board number 100 - 9999 (for transmission)
- TCP board number 100 - 9999 (for receiving N-EVENT)

6 SUPPORT OF EXTENDED CHARACTER SETS

For elements in which the VR is SH (short column), LO (long column), ST (short text), LT (long text), or PN (person's name), extended characters can be used by specifying an extended character repertoire in the attribute specific character group (0008,0005) for SC Image IOD. The extended character repertoire uses ISO 2022 IR87 or ISO 2022 IR13 ISO2022 IR87.

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