KONICA MINOLTA

PRINT MANAGEMENT SYSTEM

Printlink III - IN/SV

DICOM 3.0 Conformance Statement

Ver. 1.00 2004. 08

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-IN/SV with DICOM 3.0.

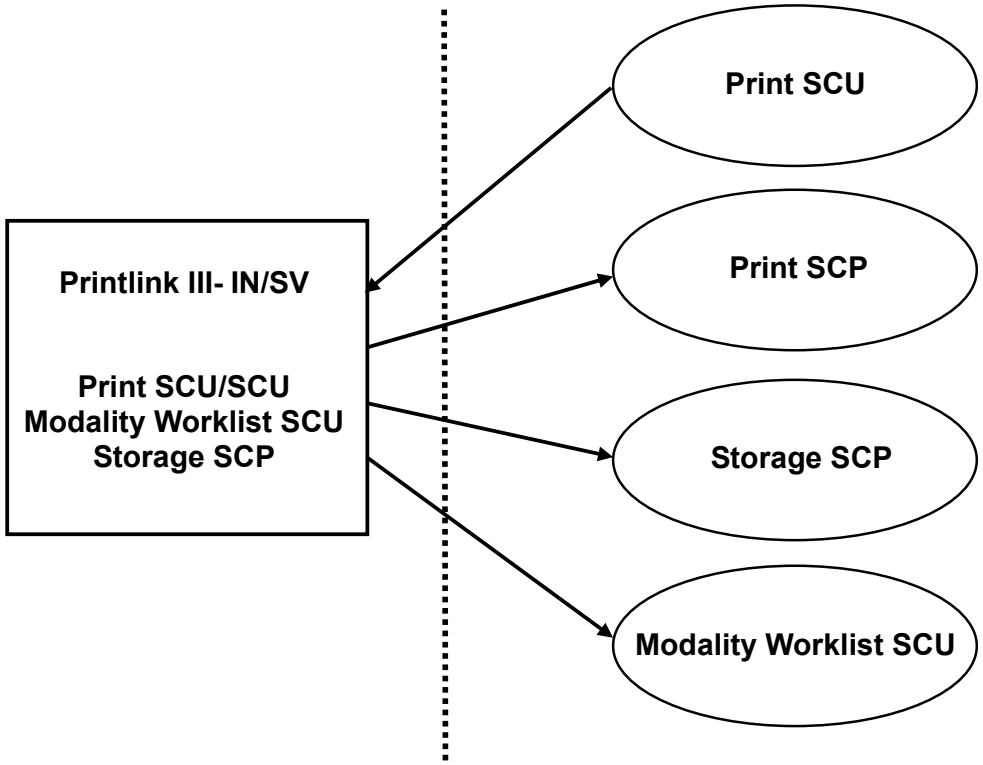
0.1 Abbreviations

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-IN/SV operates as a DICOM Print Service Class SCU/SCP, DICOM Storage Service Class SCU, and Modality Worklist Management Service Class SCU.

1.1 Application Data Flow Diagram



DICOM Standard Inerface

1.2 Functional Definitions of AEs

1.2.1 Print SCP

When the Host (SCU) sends a request to Printlink III-IN/SV (SCP) to print an image, it operates the SOP class defined by the Print Management Service Class.
DIMSE service, which is defined in each SOP class, is used for operating the SOP class.
Printlink III-IN/SV (SCP) processes and makes hard copies of the image data according to the individual attribute values which were specified by the Host (SCU).

1.2.2 Print SCU

When Printlink III-IN/SV (SCU) sends a request to the imager (SCP) to print an image, it operates the SOP class defined by the Print Management Service Class.
DIMSE service, which is defined in each SOP class, is used for operating the SOP class.
The imager (SCP) processes and makes hard copies of the image data according to the individual attribute values which were specified by the Printlink III-IN/SV (SCU).

1.2.3 Storage SCU

The Storage SCU for Printlink III-IN/SV operates as a communication process and 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.

1.2.4 Modality Worklist Management SCU

The Modality Worklist Management SCU for Printlink III-IN/SV operates as a communication process and obtains patient / study data in response to a C-FIND-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 Print Service Class SCP Specification

Printlink III-IN/SV receives print request associations and operates as an application entity.
Printlink III-IN/SV conforms as an SCP to the following SOP classes.

Supported SOP Class and UID Value:

SOP Class name	SOP Class UID
Verification SOP Class	1.2.840.10008.1.1
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9
Presentation LUT SOP Class	1.2.840.10008.5.1.1.23

2.1.1 Association Establishment Policies

This section describes the conditions for establishing association.

2.1.1.1 General

The following value should be applied to the application text name.

Description	Value
Application Context Name	1.2.840.10008.3.1.1.1

Print Management SCU and SCP utilize the DICOM upper layer to establish association. In doing so, Printlink III-IN/SV (SCP) receives an association started by the Host (SCU). The maximum PDU size used is 64KB.

2.1.1.2 Number of Associations

The number of associations that Printlink III-IN can support at the same time is 8.
The number of associations that Printlink III-SV can support at the same time is 16.

2.1.1.3 Asynchronous Nature

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

2.1.1.4 Implementation Identification Information

The Implementation Class UID for Printlink III-IN is "1.2.392.200036.9107.500.517".
The Implementation Class UID for Printlink III-SV is "1.2.392.200036.9107.500.514".

The Implementation Version Name for Printlink III-IN/SV is "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-IN/SV (SCP) starts associations to publish asynchronous N-EVENT messages.

2.1.3 Association Acceptance Policy

Printlink III-IN/SV (SCP) establishes associations from the association establishment request from the HOST (SCU).

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 imager with the command from the HOST (SCU) in order to print image data on films.
C-ECHO, Film Session, Film Box, and Image BOX can be requested with a command from the HOST (SCU).

2.1.3.1.2 Presentation Context Table

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

Abstract syntax		Role
Name	UID	
Verification SOP Class	1.2.840.10008.1.1	SCP
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	
Presentation LUT SOP Class	1.2.840.10008.5.1.1.23	

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

2.1.4 SOP Class Adaptability

2.1.4.1 Verification SOP Class

Printlink III-IN/SV provides adaptability to the Verification SOP Class.
C-ECHO Response is returned when C-ECHO Request is received.

2.1.5 Basic Grayscale Print Management Meta SOP Class

Printlink III-IN/SV provides adaptability to the Basic Grayscale Print Management Meta SOP Class.
Printlink III-IN/SV supports the following SOP classes.

Supported SOP Classes and UID values

SOP Class	UID Value
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

2.1.5.1 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.
(2010, 015E)	Illumination	US	1	Illumination
(2010, 0160)	Reflected Ambient Light	US	1	Reflected Ambient Light

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

2.1.5.2 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 (Dependent to the imager)
(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 (Dependent to the imager) 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 Mag. Type (2010, 0060) = Only for CUBIC
(2010, 0100)	Borders	CS	1	Border Density BLACK WHITE
(2010, 0120)	Min Density	US	1	20-400 (Dependent to the imager)
(2010, 0130)	Max Density	US	1	20-400 (Dependent to the imager)
(2010, 0140)	Trim	US	1	Trim YES = With trim frame NO = Without trim frame
(2010, 0150)	Configuration Information	ST	1	Imager LUT is indicated as KC_LUT=1-7

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

2.1.5.3 Basic Grayscale Image Box SOP Class

Tag	Name	VR	VM	Permitted Value
(0028, 0002)	Samples per Pixel	US	1	Samples per Pixel
(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
(2020, 0030)	Requested Image Size	CS	1	Requested Image Size (dependent to the imager)
(2020, 0040)	Requested Decimate/Crop Behavior	CS	1	Requested Decimate/Crop Behavior (dependent to the imager)
(7fe0, 0010)	Pixel Data	OW OB	1	Pixel Data

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

2.1.5.4 Printer SOP Class

Tag	Name	VR	VM	Permitted Value
(0008, 0070)	Manufacture	LO	1	Manufacture KONICAMINOLTA
(0008, 1090)	Manufacture's Model Name	LO	1	Manufacture's Model Name PRINTLINK-SV
(0018, 1000)	Device Serial Number	LO	1	Serial Number of Printlink III-IN/SV
(0018, 1020)	Software Version	LO	1	Software Version of Printlink III-IN/SV
(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 DRYPRO DRYPRO771

2.1.6 Presentation LUT SOP Class

Tag	Name	VR	VM	Permitted Value
(2050, 0010)	Presentation LUT Sequence	SQ	1	Presentation LUT Sequence
(0028, 3002)	LUT Descriptor	US¥ US	1	LUT Descriptor
(0028, 3003)	LUT Explanation	LO	1	LUT Explanation
(0028, 3006)	LUT Data	US or SS	1-n	LUT Data
(2110, 0030)	Presentation LUT Shape	CS	1	IDENTITY/LIN OD

2.2 Storage Service Class SCU SPECIFICATION

Printlink III-IN/SV 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

The Storage SCU for Printlink III-IN/SV identifies and uses the following application context name.

Description	Value
Application Context Name	1.2.840.10008.3.1.1.1

The maximum and initial PDU size is 64KB.

2.2.1.2 Number of Associations

The Storage SCU for Printlink III-IN/SV issues a request to establish a maximum of 16 associations to an external AE which is a different device.
Parallel processing is perform to each AE in which an association has been established.

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 value of the identification data is issued by Konica Minolta.

Description	Value
Implementation Class UID	Printlink III-IN 1.2.392.200036.9107.500.517 Printlink III-SV 1.2.392.200036.9107.500.514
Implementation Version Name	KC_PLNK3_X.XXXXX X.XXXXX indicates the software version. e.g. KC_PLNK3_1.00R00

* "X.XXXXX" indicates the software version.

2.2.1.5 Real World Activities - STORE

2.2.1.5.1 Associated Real World Activities - C-STORE

The Storage SCU for Printlink III-IN/SV sends a C-STORE request to the Remote Storage SCP and sends image data in a real world where associations are established.

2.2.1.5.2 Presentation Context Table

The Storage SCU for Printlink III-IN/SV accepts presentation context that are listed in the following table.

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Expansion Negotiation
Name	UID	Name List	UID List		
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
X-Ray Radio Fluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

2.3 Modality Worklist Management Service Class SCU Specifications

Printlink III-IN/SV supports the following SOP class as a Modality Worklist Management Service Class SCU.

SOP Class Name	SOP Class UID
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31

2.3.1 Association Establishment Policies

2.3.1.1 General

The Modality Worklist Management SCU for Printlink-IM identifies and uses the following application context name.

Description	Value
Application Context Name	1.2.840.10008.3.1.1.1

The maximum and initial PDU size is 64KB.

2.3.1.2 Number of Associations

The Modality Worklist Management SCU for Printlink III-IN/SV issues a request to establish a maximum of one association at one time to an external AE which is a different device.

2.3.1.3 Asynchronous Nature

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

2.3.1.4 Implementation Identification Information

The value of the identification data is issued by Konica Minolta.

Description	Value
Implementation Class UID	Printlink III-IN 1.2.392.200036.9107.500.517 Printlink III-SV 1.2.392.200036.9107.500.514
Implementation Version Name	KC_PLNK3_X.XXXXX X.XXXXX indicates the software version. e.g. KC_PLNK3_1.00R00

* "X.XXXXX" indicates the software version.

2.3.1.5 Real World Activities - FIND

2.3.1.5.1 Associated Real World Activities - FIND Request

The Modality Worklist SCU for Printlink III-IN/SV sends a C-FIND request to the Remote Modality Worklist SCP and receives patient data.

2.3.1.5.2 Presentation Context Table

The Modality Worklist SCU for Printlink III-IN/SV makes requests in the presentation context shown in the following table.

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Expansion Negotiation
Name	UID	Name List	UID List		
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.3.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

2.3.2 Verification keys to request

The Modality Worklist SCU for Printlink III-IN/SV combines the following verification keys arbitrarily and obtains patient data.

Indication / Module	Tag	Verification Key Type	Note / Type of Verification
Reserved procedural step			
Sequence of reserved procedural step	(0040,0100)	R	The attribute of a reserved procedural step is only obtained with a matched sequence. A sequence of a reserved procedural step contains only a single item.
> AE name of reserved station	(0040,0001)	R	The AE name of a reserved station is obtained only with a matched single value.
> Starting date of reserved procedural step	(0040,0002)	R	The starting date of a reserved procedural step is obtained with a matched single value.
> Starting time of reserved procedural step	(0040,0003)	R	The starting time of a reserved procedural step is obtained with a matched single value.
> Modality	(0008,0060)	R	A modality is obtained with a matched single value.
> Name of reserved consulting doctor	(0040,0006)	R	The name of the reserved consulting doctor is obtained with a matched single value or wildcard verification.
Image service request			
Receipt number	(0008,0050)	O	A receipt number is obtained with a matched single value.
Requested procedure			
Requested procedure ID	(0040,1001)	O	A requested procedure ID is obtained with a matched single value.
Patient identity			
Patient name	(0010,0010)	R	A patient name is obtained with a matched single value or wildcard verification.
Patient ID	(0010,0020)	R	A patient ID is obtained with a matched single value.

2.3.3 Response keys to request

The Modality Worklist SCU for Printlink III-IN/SV combines the following response keys arbitrarily and obtains or requests for patient data.

Indication / Module	Tag	Verification Key Type	Note
Same for SOP			
Specific character group	(0008,0005)	1C	
Reserved procedural step			
Sequence of reserved procedural step	(0040,0100)	1	
> AE name of reserved station	(0040,0001)	1	
> Starting date of reserved procedural step	(0040,0002)	1	
> Starting time of reserved procedural step	(0040,0003)	1	
> Modality	(0008,0060)	1	
> Name of reserved consulting doctor	(0040,0006)	2	
Requested procedure			
Requested procedure ID	(0040,1001)	1	
Image service request			
Receipt number	(0008,0050)	2	
Patient identity			
Patient name	(0010,0010)	1	
Patient ID	(0010,0020)	1	
Patient description			
Patient date of birth	(0010,0030)	2	
Patient gender	(0010,0040)	2	
Patient weight	(0010,1030)	2	
Patient height	(0010,1040)	2	
Patient consultation			
Patient status	(0038,0500)	2	
Pregnancy status	(0010,21C0)	2	
Medical precautions	(0010,2000)	2	
Contrast medium allergy	(0010,2110)	2	
Special care	(0038,0050)	2	

3 COMMUNICATION PROFILES

3.1 Supported Communication Stack

The upper-layer protocol for DICOM TCP/IP defined in DICOM PS3.8 is provided.

3.2 TCP/IP Stack

Printlink III-IN/SV succeeds the TCP/IP stack from the Windows XP system.

3.2.1 Support of physical media

10BaseT and 100BaseTX are supported in the execution of TCP/IP.

4 EXTENSIONS / SPECIALIZATIONS / PRIVATIZATIONS

4.1Standard Expansion / Specialization / Privatization SOP

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)

4.2 Personal Transfer Syntax

Not in use.

5 CONFIGURATION

5.1 AE Title / Presentation Address Mapping

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

5.2 Configurable Parameters

5.2.1 Number of simultaneous associations

Printlink III-IN/SV accepts a maximum of 16 associations from an external AE simultaneously.

5.2.2 Maximum PDU size

The following is the maximum PDU size supported by Printlink III-IN/SV.

Maximum PDU Size (Byte)	Setting Range
65535	4096 - 65535

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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