



KONICA MINOLTA

**PRINT MANAGEMENT SYSTEM**

# **Printlink5-ID\_IV**

## **DICOM 3.0 Conformance Statement**



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**EN**

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## INTRODUCTION

This document describes the compatibility of the DICOM interface for Print Management System Printlink5-IC with DICOM 3.0.

## 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  |

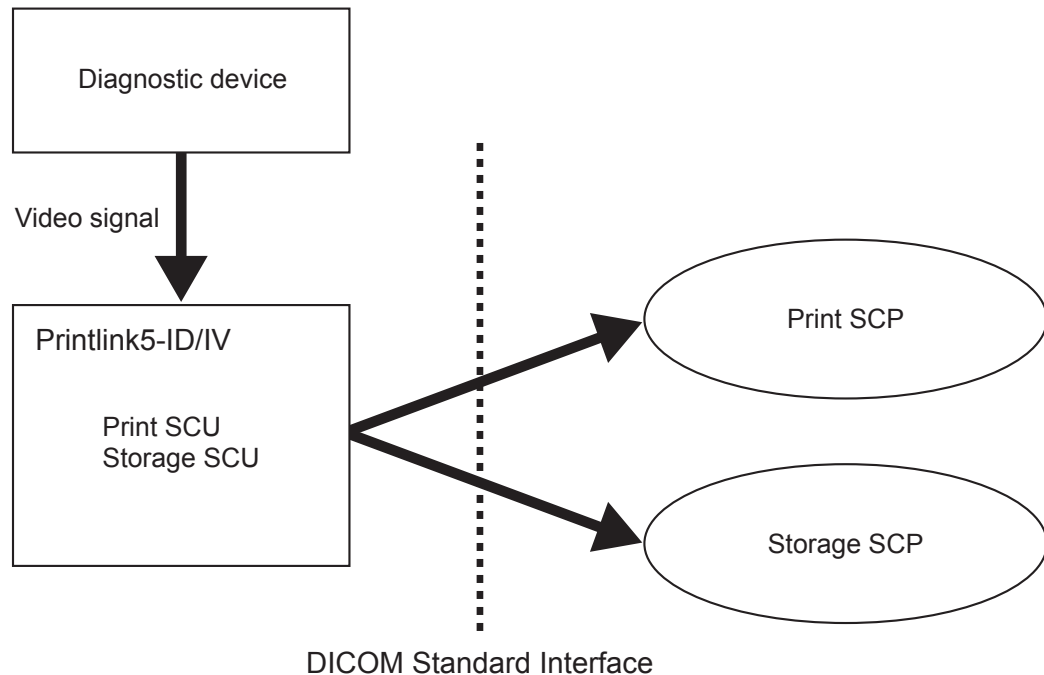
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# 1. IMPLEMENTATION MODEL

The DICOM interface for Print Management System Printlink5-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 Printlink5-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 Storage SCU

The Storage Service Class SCU for Printlink5-ID/IV starts to transfer 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 to the Sequencing of Real-World Activities.

## 2. AE SPECIFICATION

### 2.1 Printlink5-ID/IV Print Management Service Class Specification

Printlink5-ID/IV sends print request associations and operates as an application entity.

Printlink5-ID/IV supports the following SOP classes.

| 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 associations.

##### 2.1.1.1 General

Print Management SCU and SCP utilize the DICOM upper layer to establish associations.

In doing so, the imager (SCP) receives an association started by Printlink5-ID/IV (SCU).

The maximum PDU size used is 64KB.

##### 2.1.1.2 Number of Associations

The number of associations that Printlink5-ID/IV supports at the same time is 1.

##### 2.1.1.3 Asynchronous Nature

Printlink5-ID/IV manages asynchronous N-EVENT messages.

However, a message is sent whenever necessary.

##### 2.1.1.4 Implementation Identification Information

The Implementation Class UIDs are as follows:

| Description                 | Value   |
|-----------------------------|---|
| Implementation Class UID    | Printlink5-IV 1.2.392.200036.9107.500.523<br>Printlink5-ID 1.2.392.200036.9107.500.522  |
| Implementation Version Name | KC_PLNK5_X.XXXXX<br>"X.XXXXX" indicates the software version.<br>e.g. KC_PLINK5_1.00R00 |

#### 2.1.2 Associations in Real World Activities

Printlink5-ID/IV (SCU) starts associations to publish messages.

## 2.1.3 Association Acceptance Policy

Printlink5-ID/IV (SCU) establishes associations in response to a request to establish asynchronous N-EVENT message associations from 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 Table

Printlink5-ID/IV (SCU) publishes presentation contexts listed in the following table.

| Abstract Syntax                                 |                        | Role |
|---|------------------------|------|
| Name  | UID                    |      |
| Basic Grayscale Print Management Meta SOP Class | 1.2.840.10008.5.1.1.9  | SCU  |
| 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<br>1 to 99  |
| (2000, 0020) | Print Priority   | CS | 1  | Print Priority <ul style="list-style-type: none"> <li>• LOW</li> <li>• HIGH</li> <li>• MED</li> </ul>  |
| (2000, 0030) | Medium Type      | CS | 1  | Medium Type <ul style="list-style-type: none"> <li>• CLEAR FILM = Clear Base</li> <li>• BLUE FILM = Blue Base</li> <li>• DR CLEAR FILM = DR Clear Base</li> <li>• DR BLUE FILM = DR Blue Base</li> </ul> |
| (2000, 0040) | Film Destination | CS | 1  | Film Destination <ul style="list-style-type: none"> <li>• MAGAZINE</li> <li>• PROCESSOR</li> <li>• BIN_1 to BIN_6 = Sorters 1 to 6</li> </ul>  |



| Tag          | Name              | VR | VM | Permitted Value  |
|--------------|-------------------|----|----|--|
| (2000, 0060) | Memory Allocation | LO | 1  | Memory Allocation<br>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  | STANDARDC,R<br>ROWR1,R2,...<br>SLIDE  |
| (2010, 0030) | Annotation Display Format ID | CS | 1  | Annotation Display Format ID<br><ul style="list-style-type: none"> <li>• P1 = PORTRAIT</li> <li>• L1 = LANDSCAPE</li> <li>• TM = TIME</li> <li>• CC = Copy Count</li> <li>• ID = Modality ID</li> <li>• MS = Message</li> </ul> |
| (2010, 0040) | Film Orientation             | CS | 1  | Film Orientation<br><ul style="list-style-type: none"> <li>• PORTRAIT</li> <li>• LANDSCAPE</li> </ul>   |
| (2010, 0050) | Film Size ID                 | CS | 1  | Film Size<br>8IN × 10IN, 10IN × 12IN, 11IN × 14IN,<br>14IN × 14IN, and 14IN × 17IN  |
| (2010, 0060) | Magnification Type           | CS | 1  | Magnification Type<br><ul style="list-style-type: none"> <li>• REPLICATE= Replicate interpolation</li> <li>• CUBIC= Cubic B-Spline interpolation</li> </ul>   |
| (2010, 0080) | Smoothing Type               | CS | 1  | Smoothing Type ... 1 to 7   |
| (2010, 0100) | Borders                      | CS | 1  | Border Density ... BLACK/WHITE  |
| (2010, 0140) | Trim                         | US | 1  | Trim Frame ... YES = Used, NO = Not used  |
| (2010, 0150) | Configuration Information    | ST | 1  | Imager LUT (described as follows)<br>KC_LUT=1 to 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<br><ul style="list-style-type: none"> <li>• MONOCHROME1: Min. VOI pixel = White</li> <li>• MONOCHROME2: Min. VOI pixel = Black</li> </ul> |
| (0028, 0010) | Rows                       | US | 1  | Pixels in image Y orientation  |
| (0028, 0011) | Columns                    | US | 1  | Pixels in image X orientation  |

| Tag          | Name                 | VR       | VM | Permitted Value   |
|--------------|----------------------|----------|----|---|
| (0028, 0034) | Pixel Aspect Ratio   | IS       | 2  | Pixel Aspect Ratio  |
| (0028, 0100) | Bits Allocated       | US       | 1  | Bits allocated in pixel.<br>Non-used bits are included. <ul style="list-style-type: none"> <li>• 0008 : 8 (8 bits)</li> <li>• 0010 : 16 (12 bits)</li> </ul> Those other than the above result in an error. |
| (0028, 0101) | Bits Stored          | US       | 1  | Bits in 1 pixel <ul style="list-style-type: none"> <li>• 0008 : 8 bits</li> <li>• 000C : 12 bits</li> </ul>   |
| (0028, 0102) | High Bit             | US       | 1  | High Bit<br>Pixel data MBS (Most significant bit) <ul style="list-style-type: none"> <li>• 0007 : (Bits Stored = 8)</li> <li>• 000B : (Bits Stored = 12)</li> </ul>   |
| (0028, 0103) | Pixel Representation | US       | 1  | Pixel data representation <ul style="list-style-type: none"> <li>• 0000 = Integer with no marks</li> </ul>  |
| (2020, 0010) | Image Position       | US       | 1  | Image Position<br>Image position that structures a page.  |
| (2020, 0020) | Polarity             | CS       | 1  | Polarity <ul style="list-style-type: none"> <li>• NORMAL</li> <li>• REVERSE</li> </ul>  |
| (7fe0, 0010) | Pixel Data           | OW<br>OB | 1  | Pixel Data  |

#### 2.1.3.1.2.4 Printer SOP Class

| Tag          | Name                       | VR | VM | Permitted Value   |
|--------------|----------------------------|----|----|---|
| (0008, 1070) | Manufacture                | LO | 1  | Manufacturer  |
| (0008, 1090) | Manufacture's Model Name   | LO | 1  | Manufacture's Model Name  |
| (0008, 1000) | Device Serial Number       | LO | 1  | Serial Number   |
| (0008, 1020) | Software Version           | LO | 1  | Software Version  |
| (2110, 0010) | Printer Status             | CS | 1  | Printer Status <ul style="list-style-type: none"> <li>• NORMAL</li> <li>• WARNING</li> <li>• FAILURE</li> </ul> |
| (2110, 0020) | Printer Status Information | CS | 1  | Printer Status Information  |
| (2110, 0030) | Printer Name               | LO | 1  | Printer Name  |

## 2.2 Printlink5-ID/IV Storage Service Class Specification

Printlink5-ID/IV supports the following SOP classes as a Storage Service Class SCU.

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

Printlink5-ID/IV utilizes the Storage Service Class SCP and DICOM upper layer to establish associations.

The Storage Service Class SCP receives the associations started each time SC images are stored.

The maximum PDU size used is 64KB.

#### 2.2.1.2 Number of Associations

A request to establish a single association is generated.

#### 2.2.1.3 Asynchronous Nature

One or more images are managed in an association.

Asynchronous processing is not supported.

#### 2.2.1.4 Implementation Identification Information

The Implementation Class UIDs are as follows:

| Description                 | Value   |
|-----------------------------|---|
| Implementation Class UID    | Printlink5-IV 1.2.392.200036.9107.500.523<br>Printlink5-ID 1.2.392.200036.9107.500.522  |
| Implementation Version Name | KC_PLNK5_X.XXXXX<br>"X.XXXXX" indicates the software version.<br>e.g. KC_PLINK5_1.00R00 |

## 2.2.2 Relationships among Associations in Real World Activities

Associations are established in response to an association establishment request to the Storage Service Class SCP.

### 2.2.2.1 Associated Real World Activity

The Storage SCU for Printlink5-ID/IV sends a C-STORE request to the Remote Storage SCP and sends image data in a real world where associations are established.

### 2.2.2.2 Proposed Presentation Context

Printlink5-ID/IV accepts the following presentation context as a Storage Service Class SCU.

| Presentation Context Table      |                           |      |                       |
|---------------------------------|---------------------------|------|-----------------------|
| Abstract Syntax Name            |                           |      |                       |
| Name                            | UID                       | Role | Expansion Negotiation |
| Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7 | SCU  | None                  |

| Transfer Syntax Name      |                   |
|---------------------------|-------------------|
| Name                      | UID               |
| Implicit VR Little Endian | 1.2.840.10008.1.2 |

## 2.2.3 SOP Class

### 2.2.3.1 SC Image Storage SOP Class

Printlink5-ID/IV provides adaptability to the SC Image Storage SOP Class.

### 2.2.3.2 C-STORE

Printlink5-ID/IV utilizes C-STORE to request the Storage Service Class SOP to store image data.

### 2.2.3.3 Behavior of SCU

Printlink5-ID/IV executes the C-STORE DIMSE service of the SOP instance appropriate for the request from the SC Image IOD.

Printlink5-ID/IV recognizes the C-STORE response status and takes proper actions against normal/abnormal service termination.

### 2.2.3.4 Behavior of SCP

The Storage Service Class SOP acts the same as the DIMSE service user for the C-STORE service. By ensuring normal operation of this service, the Storage Service Class SOP indicates that the SOP instance has been recognized successfully.

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     |
|           | VOILUT            | U     |
|           | SOP Common        | M     |

Options for SC Image IOD are "Overlay Surface", "Modality LUT", and "VOI LUT".

However, they are sent whenever necessary.

List of SC Image IOD details

((M) in the Digit column means the maximum length.)

| Tag            | Item Length            | VR | VM | Digit   | Type |
|----------------|------------------------|----|----|---------|------|
| ID Information |                        |    |    |         |      |
| 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       | DA | 1  | 64(M)   | 1    |
| 0008 0020      | Study Date             | DA | 1  | 10      | 2    |
| 0008 0021      | Series Date            | DA | 1  | 10      | 3    |
| 0008 0023      | Image Date             | TM | 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             | CS | 1  | 16(M)   | 2C   |
| 0008 0060      | Modality               | CS | 1  | 16(M)   | 1    |
| 0008 0064      | Conversion Type        | CS | 1  | 16(M)   | 3    |
| 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    |

| Tag                       | Item Length                                       | VR | VM   | Digit    | Type |
|---------------------------|---|----|------|----------|------|
| Patient Information       |   |    |      |          |      |
| 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    |
| Acquisition Information   |   |    |      |          |      |
| 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 Information       |   |    |      |          |      |
| 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 Information |   |    |      |          |      |
| 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 Information   |   |    |      |          |      |
| 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**

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 Support of Physical Media**

The following physical media are supported as standard.

- 10 BaseT and 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)
- (2011,1011)
- (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 reserved in 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. CONFIGURATIONS

### 5.1 AE Title / Presentation Address Mapping

The conformance from a Printlink5-ID/IV AE title to a presentation address is performed by making indications to a configuration file.

### 5.2 Configurable Parameters

The following items are specified in the environment information file.

- AE title
- Printlink5-ID/IV AE name (KC\_PLINK5\_SCU default)
- IP address
- TCP port numbers 100 to 9999 (for transmission)
- TCP port numbers 100 to 9999 (for N-EVENT reception)

## 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, ISO 2022 IR13, or ISO 2022 IR87.







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