



Kodak DirectView DR System
Software Version 3.0

DICOM Conformance Statement

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Revision History

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| 1.0 | 7/13/2005 | Victor Li | Updated DR Version 2 document for use with DR Version 3.0 (DR3000 software release). |
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1 Introduction

1.1 Executive Overview

This document applies to all *Kodak DirectView* DR products utilizing the version 3.0 software.

The following DICOM SOP Classes are supported:

| SOP Class Name | SOP Class UID | Service Class Role |
|--|---------------------------|--------------------|
| Verification SOP Class | 1.2.840.10008.1.1 | SCU, SCP |
| Basic Grayscale Print Management Meta SOP Class | 1.2.840.10008.5.1.1.9 | SCU |
| Modality Worklist Information Model – FIND | 1.2.840.10008.5.1.4.31 | SCU |
| Computed Radiography Image Storage | 1.2.840.10008.5.1.4.1.1.1 | SCU |
| Basic Annotation Box SOP Class | 1.2.840.10008.5.1.1.15 | SCU |
| Modality Performed Procedure Step Notification SOP Class | 1.2.840.10008.3.1.2.3.5 | SCU |
| Storage Commitment Push Model SOP Class | 1.2.840.10008.1.20.1 | SCU |

1.2 Scope and Field of Application

This document describes the DICOM functionality of the *Kodak DirectView* DR Systems. The *Kodak DirectView* DR Systems are capable of performing projection radiographic examinations and producing a digital image. Throughout the remainder of this document the term DR shall refer to the *Kodak DirectView* DR Systems. The *DirectView* DR System acts as a DICOM Service Class User (SCU). The *DirectView* DR System performs transactions over a TCP/IP network via the DICOM messages exchange protocol. The *DirectView* DR System uses *Kodak* PACS Link Medical Image Manager V6.2.b22 software as the application software to capture and distribute images and data.

1.3 Important Considerations for the Reader

This DICOM Conformance Statement by itself is not sufficient to guarantee successful connectivity between the *DirectView* DR System and equipment from other vendors. The following considerations should be made:

- The integration of equipment from different vendors (including Kodak) goes beyond the scope of the DICOM 3.0 standard and the DICOM Conformance Statements from Kodak and other vendors. It is the responsibility of the user (or user's agent) to assess the application requirements and to design a solution that integrates *Kodak* equipment with equipment from other vendors.

- When the comparison of this DICOM Conformance Statement with a DICOM Conformance Statement from another vendor indicates that connectivity should be possible, it is the responsibility of the user (or user's agent) to verify this by carrying out validation tests and to check whether all required functionality (such as cut lines) is met.
- With regard to the future evolution of the DICOM 3.0 standard Eastman Kodak Company reserves the right to make changes to the *DirectView* DR System architecture described in this document. The user (or user's agent) should ensure that any equipment connected via DICOM to *Kodak* equipment also follows the future evolution of the DICOM 3.0 standard. Failure to do so may result in (partial) loss of connectivity.
- This implementation is based on the DICOM Standard, publication PS 3.1-2004.

1.4 Accessing this Conformance Statement on the World Wide Web

As the *DirectView* DR System product changes, changes to this DICOM Conformance Statement are inevitable. To obtain the most recent revision of this DICOM Conformance Statement, access the following URL:

<http://www.kodak.com/global/en/health/serviceAndSupport/dicom.jhtml>

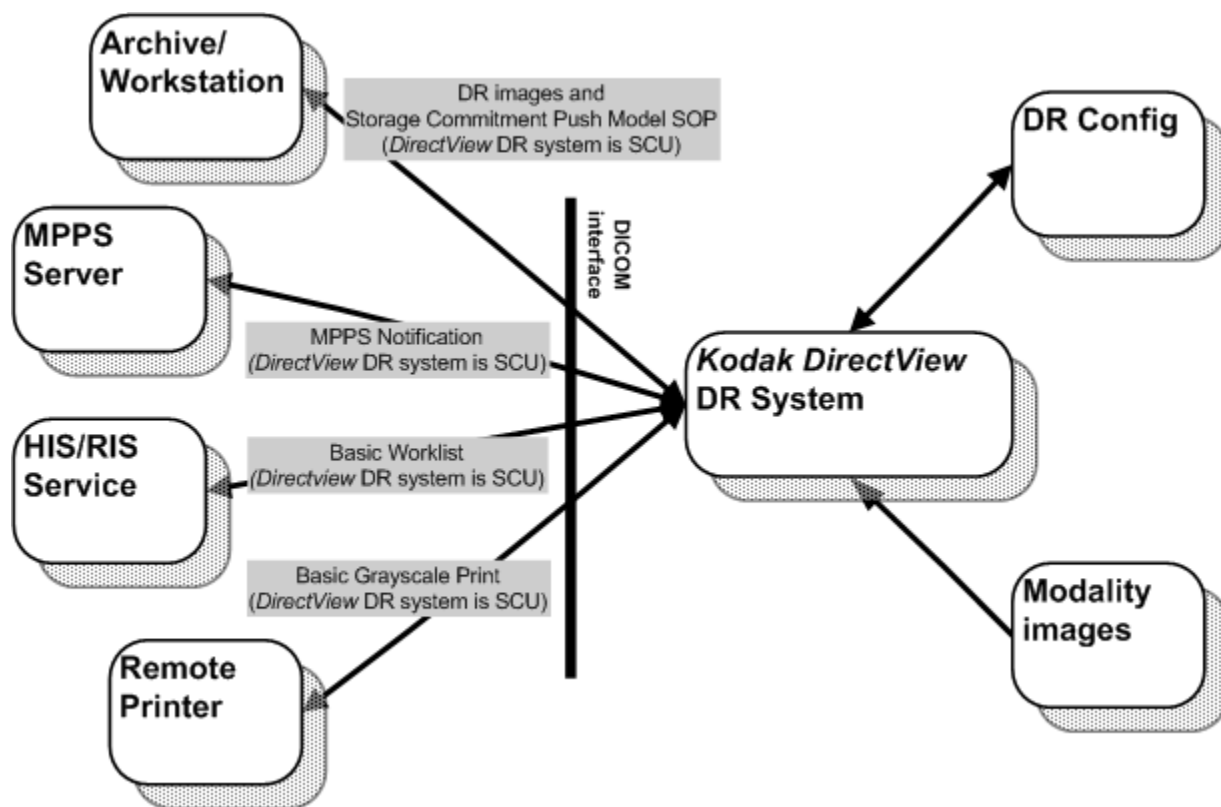
1.5 Definitions, Acronyms, Abbreviations

The following symbols and abbreviations are used in this document.

| | |
|---------|---|
| ASCII | American Standard Code for Information Interchange |
| AE | Application Entity |
| CR | Computed Radiography |
| DR | Digital Radiography |
| DICOM | Digital Imaging and Communications in Medicine |
| DIMSE | DICOM Message Service Element |
| DMI | Distributed Medical Imaging |
| HIS/RIS | Hospital Information System / Radiology Information System. |
| ISO | International Standards Organization |
| LUT | Look-up Table |
| MPPS | Modality Performed Procedure Step Notification SOP Class |
| PDU | Protocol Data Unit |
| PLUT | Presentation Look-up Table |
| SCU | Service Class User |
| SCP | Service Class Provider |
| SOP | Service-Object Pair |
| SC | Storage Commitment Push Model SOP Class |
| TCP/IP | Transmission Control Protocol/Internet Protocol |
| UID | Unique Identifier |

2 Implementation Model

This implementation model uses the DICOM Basic Print Management Meta SOP Class to deliver studies to remote printers. The CR Image Storage SOP Class is used to deliver studies to archives. Basic Worklist Management service is used for the acquisition of patient demographics.



2.1 Functional Definitions

The *DirectView* DR System is a projection radiographic image acquisition product utilizing storage phosphor technology. The system is capable of obtaining patient demographic information manually from the user interface or the *Kodak* Remote Operations Panel. An optional connection to the site's information system allows patient demographic information to be transferred automatically. The system temporarily stores acquired images on an internal hard drive until they are forwarded to the desired destinations.

2.2 Sequencing of Real-World Activities

If a HIS/RIS service is present, the *DirectView* DR System establishes an association when the *DirectView* DR System application is started to obtain a modality worklist. The worklist is used as a source of patient demographics. The *DirectView* DR System establishes an association with a selected SCP when *DirectView* DR System has collected sufficient information to begin sending images.

3 Application Entity Specifications

The *DirectView* DR System provides Standard Conformance to the following SOP Classes as an SCU.

| 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 |
| Modality Worklist Information Model – FIND | 1.2.840.10008.5.1.4.31 |
| Computed Radiography Image Storage | 1.2.840.10008.5.1.4.1.1.1 |
| Basic Annotation Box SOP Class | 1.2.840.10008.5.1.1.15 |
| Modality Performed Procedure Step Notification SOP Class | 1.2.840.10008.3.1.2.3.5 |
| Storage Commitment Push Model SOP Class | 1.2.840.10008.1.20.1 |

3.1 Association Establishment Policies

3.1.1 General

3.1.1.1 Delivery

An Association may be attempted whenever a valid destination is selected and at least one image has been acquired.

The maximum PDU size which the *DirectView* DR System will negotiate is 64Kbytes.

3.1.1.2 HIS/RIS

An Association for Basic Worklist will be attempted when the *DirectView* DR System application is started and then periodically thereafter.

3.1.2 Number of Associations

3.1.2.1 Delivery

Associations are initiated with the limitation that no more than three total SCU delivery associations may be open at any given time. If more destinations are desired, the requests are queued. The *DirectView* DR System will not create two associations to the same device, even if there are multiple jobs queued for delivery.

3.1.2.2 HIS/RIS

Only one association will be initiated at a time. The *DirectView* DR System will close the association after receiving a C-FIND response.

3.1.3 Asynchronous Nature

The *DirectView* DR System allows up to 1 invoked and 1 performed operation on an Association (it is synchronous).

3.1.4 Implementation Identifying Information

The *DirectView* DR System provides the Implementation Class UID of “1.2.840.113564.3.2”.

The implementation version name attribute is optional and is not used by the *DirectView* DR System.

The *DirectView* DR System establishes an Association using its network node name for the calling DICOM Application Entity title. The network node name is configurable through the *DirectView* DR System Service Application.

The *DirectView* DR System stores a called DICOM Application Entity Title and socket number for each DICOM compatible network destination it knows about.

3.2 Association Initiation Policy

3.2.1 Associated Real-World Activity

3.2.1.1 Delivery

The *DirectView* DR System initiates Associations for the purpose of sending images and associated information for printing to a Basic Grayscale Print Management SCP and archiving to an SC Image Storage SCP.

The default and well-known socket 5040 will be used for making the Association unless a different one is configured by a product service provider.

3.2.1.2 HIS/RIS

The *DirectView* DR System initiates Associations for the purpose of obtaining the current Modality Worklist IOD.

3.2.2 Presentation Context Table

The *DirectView* DR System proposes the Presentation Contexts shown below.

| Presentation Context Table | | | | | |
|--|---------------------------|---------------------------------|---------------------|-------------|-------------------|
| Abstract Syntax | | Transfer Syntax | | Role | Ext. Negot |
| Name | UID | Name List | UID | | |
| Verification | 1.2.840.10008.1.1 | DICOM Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| Basic Grayscale Print Management | 1.2.840.10008.5.1.1.9 | DICOM Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCU | None |
| Modality Worklist | 1.2.840.10008.5.1.4.31 | DICOM Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| Computed Radiography Image Storage | 1.2.840.10008.5.1.4.1.1.1 | DICOM Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCU | None |
| Basic Annotation Box | 1.2.840.10008.5.1.1.15 | DICOM Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCU | None |
| Modality Performed Procedure Step Notification SOP Class | 1.2.840.10008.3.1.2.3.5 | DICOM Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| Storage Commitment Push Model SOP Class | 1.2.840.10008.1.20.1 | DICOM Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |

3.2.3 SOP Specific Conformance

3.2.3.1 Verification

The *DirectView* DR System provides standard conformance to the DICOM Verification Service Class:

- When prompted by a user, the *DirectView* DR System will request verification of communication to a remote DICOM AE using the C-ECHO primitive.
- Upon receipt from an SCU of a verification of communication request, the DR will issue confirmation.

3.2.3.2 Delivery

Association attempts will be retried if the SCP rejects the request with the RESULT = 2 (rejected transient) and the REASON = 1 (temporary congestion). If all Association attempts fail, then the user will be notified and the Film Session or Study is saved for resending or deletion. No undelivered image files are deleted without manual user direction.

3.2.3.3 HIS/RIS

The *DirectView* DR System may be configured to poll the HIS/RIS broker at periodic intervals and/or asynchronously on demand from the user.

3.3 Association Acceptance Policy

Upon receipt from an SCU of a verification of communication request, the DR will issue confirmation.

3.4 Basic Print Management Meta SOP Class

The Meta SOP Class is defined by the following set of supported SOP Classes:

| 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 |

3.4.1 Basic Film Session SOP Class

3.4.1.1 DIMSE Service N-CREATE

| Attribute | SCU Usage | Tag | Possible Values |
|--------------------|-----------|-------------|---|
| Number of Copies | U | (2000,0010) | 1 -> 99 |
| Print Priority | U | (2000,0020) | HIGH, MED, LOW |
| Medium Type | U | (2000,0030) | PAPER, CLEAR FILM, BLUE FILM, NONE |
| Film Destination | U | (2000,0040) | MAGAZINE, PROCESSOR, BIN_n (where n=1 to 9) |
| Film Session Label | U | (2000,0050) | Up to 64 characters may be provided |
| Memory Allocation | U | (2000,0060) | Not used |

3.4.1.2 DIMSE Service N-Action

The *DirectView* DR System uses the N-ACTION to instruct the SCP to print all films in the session. The *DirectView* DR System is configurable (when the destination is installed) to issue the N-ACTION at the Film Session for destinations known to support this optional service. If the destination is not known to support collation, the *DirectView* DR System will only issue the N-ACTION on the Film Box. For Print SCPs that conform to the N-ACTION specification in Part 4 section H.4.1.2.4 of the DICOM standard, the *DirectView* DR System expects that all film boxes will be collated when printed.

3.4.1.3 DIMSE Service N-SET

All attributes supported in the N-CREATE are used with this command.

3.4.1.4 DIMSE Service N-DELETE

Once a Film Session is deleted, another will not be created on the same association. The Association will be released.

3.4.2 Basic Film Box SOP Class

3.4.2.1 DIMSE Service N-CREATE

| Attribute | SCU Usage | Tag | Possible Values |
|--|-----------|-------------|---|
| Image Display Format | M | (2010,0010) | <p>With no annotation being present, these formats may be used:</p> <p>STANDARD\C,R For LANDSCAPE Film Orientation, (C,R) may = (1,1), (1,2), (2,1), (2,2)</p> <p>For PORTRAIT Film Orientation, (C,R) may = (1,1), (1,2), (2,1), (2,2)</p> <p><u>With annotation, the ROW Symmetric format is being used as following:</u></p> <p>With Image annotations alone: ROW\n,m,..., (n,m..) may = (1,1), (1,1,1,1), (2,2), (2,2,2,2)</p> <p>With Page annotations alone: ROW\n,m,..., (n,m..) may = (1,1), (1,1,1,1), (2,2), (2,2,2,2)</p> <p>With Image and Page annotation combined: ROW\n,m,..., (n,m..) may = (1,1,1), (1,1,1,1,1), (2,2,1), (2,2,2,2,1)</p> |
| Referenced Film Session Sequence | M | (2010,0500) | |
| >Referenced SOP Class UID | M | (0008,1150) | |
| >Referenced SOP Instance UID | M | (0008,1155) | |
| Referenced Basic Image Box Sequence | - | (2010,0510) | Not used. |
| Referenced Basic Annotation Box Sequence | - | (2010,0520) | Not used. |
| Film Orientation | U | (2010,0040) | PORTRAIT, LANDSCAPE |
| Film Size ID | U | (2010,0050) | 8INX10IN 11INX14IN 14INX14IN 14INX17IN |
| Magnification Type | U | (2010,0060) | REPLICATE, BILINEAR, CUBIC, NONE Will be constant for the entire Film Box. |
| Max Density | U | (2010,0130) | 0-399 |

| Attribute | SCU Usage | Tag | Possible Values |
|------------------------------|-----------|-------------|---|
| Configuration Information | U | (2010,0150) | Curve Shape (CS): 000 to 999 Contrast Values (CN): -1 to -5 Lower contrast 0 Normal +1 to +5 Higher contrast Pivot Density (PD): 0 to 2.4 in increments of 0.2 Perception LUT Selection (LUT): LUT = m, n (m=string, n = 0 to 15) Text Macros (TM): %PRNTDAT%, %TIM%, %FOF%, %\$TIME\$%, %SES% Perception LUT cannot be used with Curve Shape, Contrast or Pivot Density. See Annex A for description |
| Annotation Display Format ID | U | (2010,0030) | Not used |
| Smoothing Type | U | (2010,0080) | NORMAL (minimum cubic convolution error) ENHANCED ENHANCED1 Valid only for Magnification Type CUBIC. 0-15 |
| Border Density | U | (2010,0100) | BLACK |
| Empty Image Density | U | (2010,0110) | Not used |
| Min Density | U | (2010,0120) | 0-399 (Value must be less than Max Density (2010,0130)) |
| Illumination | MC | (2010,015E) | Positive integer in units of cd/m ² |
| Reflective Ambient Light | MC | (2010,0160) | Positive integer in units of cd/m ² |
| Trim | U | (2010,0140) | YES and NO |

3.4.2.2 DIMSE Service N-ACTION

The *DirectView* DR System uses the N-ACTION to instruct the SCP to print the current film in the session.

3.4.2.3 DIMSE Service N-SET

This service is not used.

3.4.2.4 DIMSE Service N-DELETE

This service is not used.

3.4.3 Basic Image Box SOP Class

3.4.3.1 DIMSE Service N-SET

| Attribute & Usage | SCU Usage | Tag | Supported Values |
|---------------------------------------|-----------|-------------|--|
| Image Position | M | (2020,0010) | All values within the range of Image Display Format |
| Preformatted Grayscale Image Sequence | M | (2020,0110) | |
| >Samples Per Pixel | M | (0028,0002) | 1 |
| >Photometric Interpretation | M | (0028,0004) | MONOCHROME1, MONOCHROME2 |
| >Rows | M | (0028,0010) | Minimum Value 64 Maximum Values: Known for all <i>Kodak</i> printers, configurable for others. The aspect ratio is used with the printer's page extents, display format, etc. to calculate this value. |
| >Columns | M | (0028,0011) | Minimum Value 64 Maximum Values: Known for all <i>Kodak</i> printers, configurable for others. The aspect ratio is used with the printer's page extents, display format, etc. to calculate this value. |
| >Pixel Aspect Ratio | MC | (0028,0034) | R\C R, C = 1 to 9999 (Integer) Note: This attribute is always included, even if it is 1\1. It's value will always be 1\1 if Magnification Type is NONE |
| >Bits Allocated | M | | 16 |
| >Bits Stored | M | (0028,0101) | 12 |
| >High Bit | M | (0028,0102) | Bits Stored -1 |
| >Pixel Representation | M | (0028,0103) | 0000H (unsigned integer) |
| >Pixel Data | M | (7FE0,0010) | All values consistent with Bits Stored |
| Polarity | U | (2020,0020) | NORMAL, REVERSE |
| Magnification Type | U | (2010,0060) | REPLICATE, BILINEAR, CUBIC,NONE Note: Is always the same as the Magnification Type specified for the Film Box. |
| Smoothing Type | U | (2010,0080) | NORMAL, ENHANCED, ENHANCED1 Valid only for Magnification Type CUBIC. 0-15 Must be the same as the Smoothing Type specified for the Film Box. |

| Attribute & Usage | SCU Usage | Tag | Supported Values |
|---------------------------|-----------|-------------|--|
| Configuration Information | U | (2010,0150) | Setting these values will override film box settings for this image position. Curve Shape (CS): 000 to 999 Perception LUT Selection (LUT): LUT = m, n (m=string, n = 0 to 15) Curve Shape and Perception LUT are mutually exclusive. See Annex A for description |
| Requested Image Size | U | (2020,0030) | Row length in mm up to the size of the printable image, which is a function of Image Display Format and Film Size ID. |

3.4.4 Printer SOP Class

3.4.4.1 DIMSE Service N-EVENT-REPORT

The *DirectView* DR System will process the indication of the N-EVENT-REPORT operation. Any string sent by the SCP is accepted and displayed on the *DirectView* DR System user interface. In this translation, all characters that are not space characters or in the ASCII range “A” - “Z” are stripped.

The *DirectView* DR System translates Attributes as described in the following table. Other strings are not translated but may be displayed on a *DirectView* DR System user interface.

| Attribute | SCU Usage | Tag | Expected Values |
|---------------------|-----------|-------------|---|
| Printer Status | U | (2110,0010) | NORMAL WARNING FAILURE |
| Printer Status Info | U | (2110,0020) | for NORMAL conditions: “NORMAL” for WARNING conditions: “RECEIVER FULL”, “FILM JAM”, “PRINTER NOT RDY”, “PROCESSOR DOWN”, “CHECK PROCESSOR”, “PROC NOT READY”, “NO RECEIVE MGZ”, “NO SUPPLY MGZ”, “NO TONER”, “NO STATE”, “CHECK RIBBON”, “PRINTER BUSY”, “OFFLINE”, “PRINTER STOPPED”, “CHECK SUPPLY MAG”, “COVER OPEN”, “PRINTER OFFLINE”, “EXPOSURE FAILURE”, “CHECK R MAG”, “PROC NOT RDY”, “STATE UNKNOWN”, “CHECK INK CART”, “INK OUT”, “QUEUED”, “SUPPLY EMPTY”, “SUPPLY LOW”, “BAD RECEIVE MGZ”, “BAD SUPPLY MGZ”, “FILM TRANSP ERR”, “CHECK CHEMISTRY”, “CHECK SORTER”, “CHEMICALS LOW”, “CHEMICALS EMPTY”, |

| Attribute | SCU Usage | Tag | Expected Values |
|---|-----------|-------------|--|
| Printer Status Info (continued from previous page) | | | "FINISHER EMPTY", "FINISHER ERROR", "FINISHER LOW", "CHECK PROC", "PRINTER BUSY", "PROC DOWN", "PROC INIT", "PROC OVERFLOW FL", "PROC OVERFLOW HI", "PRINTER DOWN", "PRINTER INIT", "CALIBRATING", "CALIBRATION ERR", "ELEC CONFIG ERR", "ELEC DOWN", "ELEC SW ERROR", "EXPOSURE FAILURE", "REQ MED NOT INST", "REQ MED NOT AVAI", "RIBBON ERROR", "NO RIBBON", "UNKNOWN" for FAILURE conditions: "FATAL", "INVALID PAGE DES", "INSUFFIC MEMORY", "FATAL ERROR", "CHECK PRINTER", "PRINTER DOWN", "NO RESPONSE", "RIBBON MISMATCH", "TIME OUT", "UNKNOWN STATUS" |
| Printer Name | U | (2110,0030) | Any valid string |
| Printer Manufacturer | U | (0008,0070) | Any valid string |
| Printer Manufacturer Model Name | U | (0008,1090) | Any valid string |
| Printer Device Serial Number | U | (0018,1000) | Any valid string |
| Software Version | U | (0018,1020) | Any valid string |
| Date of Last Calibration | U | (0018,1200) | Ignored |
| Time of Last Calibration | U | (0018,1201) | Ignored |

3.5 Basic Annotation Box SOP Class

3.5.1 DIMSE Service N-SET

The Basic Annotation Box SOP Instance is created at the time of the Basic Film Box SOP Instance is created, based on the value of the Annotation Display Format ID attribute (2010,0030) of the Basic Film Box.

A single box is sent with text at position 0.

| Attribute & Usage | SCU Usage | Tag | Supported Values |
|---------------------|-----------|-------------|---------------------|
| Annotation Position | M | (2030,0010) | 0 |
| Text String | M | (2030,0020) | Up to 64 characters |

3.6 Store Service Class

DR Images are sent to the DICOM Storage SCP.

3.6.1 Computed Radiography IOD

The IOD sent from the *DirectView* DR System minimally contains the following attributes:

| Attribute Name | Tag | DICOM Type | <i>DirectView</i> DR System Type | Supported Values |
|--------------------------|-------------|------------|----------------------------------|------------------|
| Patient Module | | | | |
| Patient Name | (0010,0010) | 2 | 2 | Refer to Annex B |
| Patient ID | (0010,0020) | 2 | 2 | Refer to Annex B |
| Patient Birth Date | (0010,0030) | 2 | 2 | Refer to Annex B |
| Patient Sex | (0010,0040) | 2 | 2 | Refer to Annex B |
| Patient Birth Time | (0010,0032) | 3 | 3 | |
| Other Patient IDs | (0010,1000) | 3 | 3 | |
| Other Patient Names | (0010,1001) | 3 | 3 | |
| Ethnic Group | (0010,2160) | 3 | 3 | |
| Patient Comments | (0010,4000) | 3 | 3 | |
| General Study | | | | |
| Study Instance UID | (0020,000D) | 1 | 1 | |
| Study Date | (0008,0020) | 2 | 2 | Refer to Annex B |
| Study Time | (0008,0030) | 2 | 2 | Refer to Annex B |
| Referring Physician Name | (0008,0090) | 2 | 2 | Refer to Annex B |
| Study ID | (0020,0010) | 2 | 2 | |

| Attribute Name | Tag | DICOM Type | DirectView DR System Type | Supported Values |
|--|-------------|-------------------|----------------------------------|-------------------------|
| Accession Number | (0008,0050) | 2 | 2 | Refer to Annex B |
| Study Description | (0008,1030) | 3 | 2 | Refer to Annex B |
| Referenced Study Sequence | (0008,1110) | 3 | 3 | |
| >Referenced SOP Class UID | (0008,1150) | 1C | 1C | |
| >Referenced SOP Instance UID | (0008,1155) | 1C | 1C | |
| Procedure Code Sequence | (0008,1032) | 3 | 3 | |
| > Code Value | (0008,0100) | 1C | 1C | Refer to Annex B |
| > Coding Scheme Designator | (0008,0102) | 1C | 1C | |
| > Coding Scheme Version | (0008,0103) | 1C | 1C | |
| > Code Meaning | (0008,0104) | 1C | 1C | |
| Patient Study | | | | |
| Admitting Diagnoses Description | (0008,1080) | 3 | 3 | |
| Patient's Age | (0010,1010) | 3 | 3 | |
| Patient's Size | (0010,1020) | 3 | 3 | |
| Patient's Weight | (0010,1030) | 3 | 3 | |
| Occupation | (0010,2180) | 3 | 3 | |
| Additional Patient's History | (0010,21B0) | 3 | 3 | |
| General Series | | | | |
| Modality | (0008,0060) | 1 | 1 | CR or DX |
| Series Instance UID | (0020,000E) | 1 | 1 | |
| Series Number | (0020,0011) | 2 | 2 | |
| Laterality | (0020,0060) | 2C | 2C | L R |
| Series Date | (0008,0021) | 3 | 3 | |
| Protocol Name | (0008,1030) | 3 | 3 | Refer to Annex B |
| Series Time | (0008,0031) | 3 | 3 | |
| Series Description | (0008,103E) | 3 | 3 | |
| Operator Name | (0008,1070) | 3 | 3 | Refer to Annex B |
| Patient Position | (0018,5100) | 2C | 2C | Refer to Annex B |
| Referenced Performed Procedure Step Sequence | (0008,1111) | 3 | 3 | |
| >Referenced SOP Class UID | (0008,1150) | 1C | 1C | |
| >Referenced SOP Instance UID | (0008,1155) | 1C | 1C | |
| Performed Procedure Step | (0040,0244) | 3 | 3 | |

| Attribute Name | Tag | DICOM Type | DirectView DR System Type | Supported Values |
|---------------------------------------|-------------|-------------------|----------------------------------|---|
| Start Date | | | | |
| Performed Procedure Step Start Time | (0040,0245) | 3 | 3 | |
| Performed Procedure Step ID | (0040,0253) | 3 | 3 | |
| Performed Procedure Step Description | (0040,0254) | 3 | 3 | Refer to Annex B |
| Performed Protocol Code Sequence | (0040,0260) | 3 | 3 | |
| > Code Value | (0008,0100) | 1C | 1C | |
| > Coding Scheme Designator | (0008,0102) | 1C | 1C | |
| > Coding Scheme Version | (0008,0103) | 1C | 1C | |
| > Code Meaning | (0008,0104) | 1C | 1C | |
| Request Attributes Sequence | (0040,0275) | 3 | 3 | |
| >Requested Procedure Description | (0032,1060) | 3 | 3 | Refer to Annex B |
| >Scheduled Procedure Step Description | (0040,0007) | 3 | 3 | Refer to Annex B |
| >Scheduled Protocol Code Sequence | (0040,0008) | 3 | 3 | |
| >> Code Value | (0008,0100) | 1C | 1C | Refer to Annex B |
| >> Coding Scheme Designator | (0008,0102) | 1C | 1C | |
| >> Coding Scheme Version | (0008,0103) | 1C | 1C | |
| >> Code Meaning | (0008,0104) | 1C | 1C | Refer to Annex B |
| >Scheduled Procedure Step ID | (0040,0009) | 1C | 1C | |
| >Requested Procedure ID | (0040,1001) | 1C | 1C | Refer to Annex B |
| CR Series | | | | |
| Body Part Examined | (0018,0015) | 2 | 1 | Defined by user |
| View Position | (0018,5101) | 2 | 2 | Defined by user |
| General Equipment | | | | |
| Manufacturer | (0008,0070) | 2 | 2 | Kodak |
| Institution Name | (0008,0080) | 3 | 3 | Defined by user |
| Institution Address | (0008,0081) | 3 | 3 | Defined by user |
| Station Name | (0008,1010) | 3 | 3 | Defined by user |
| Institutional Department Name | (0008,1040) | 3 | 3 | Refer to Annex B |
| Manufacturer Model Name | (0008,1090) | 3 | 1 | DRXXXX – where x is equal to the model number of the device. i.e. DR3000 |

| Attribute Name | Tag | DICOM Type | DirectView DR System Type | Supported Values |
|----------------------------|-------------|------------|---------------------------|--|
| Device Serial Number | (0018,1000) | 3 | 3 | |
| Software Versions | (0018,1020) | 3 | 3 | |
| General Image | | | | |
| Instance Number | (0020,0013) | 2 | 1 | |
| Patient Orientation | (0020,0020) | 2C | 2 | |
| Image Type | (0008,0008) | 3 | 1 | |
| Content Date | (0008,0023) | 2C | 2C | |
| Content Time | (0008,0033) | 2C | 2C | |
| Acquisition Date | (0008,0022) | 3 | 3 | |
| Acquisition Time | (0008,0032) | 3 | 3 | |
| Derivation Description | (0008,2111) | 3 | 3 | |
| Acquisition Number | (0020,0012) | 3 | 3 | |
| Images In Acquisition | (0020,1002) | 3 | 1 | |
| Image Comments | (0020,4000) | 3 | 3 | Refer to Annex B |
| Lossy Image Compression | (0028,2110) | 3 | 1 | <i>This specifies whether an image has undergone lossy compression. Enumerated values: 00 = Image has NOT been subjected to lossy compression. 01 = Image has been subjected to lossy compression. DR will use 00.</i> |
| Image Plane * | | | | |
| Pixel Spacing * | (0028,0030) | 3 | 3 | "0.168\0.168" (35CMX43CM and 35CMX35CM) 0.171\0.171 (35CMX43CM & 35CMX35CM) "0.115\0.115" (24CMX30CM) "0.097\0.097" (18CMX24CM) |
| Image Pixel | | | | |
| Samples per Pixel | (0028,0002) | 1 | 1 | 1 |
| Photometric Interpretation | (0028,0004) | 1 | 1 | MONOCHROME1 MONOCHROME2 |
| Rows | (0028,0010) | 1 | 1 | 1250 1792 2048 2200 2392 2400 2500 |

| Attribute Name | Tag | DICOM Type | DirectView DR System Type | Supported Values |
|-----------------------------|-------------|------------|---|--|
| Columns | (0028,0011) | 1 | 1 | 1250 1792 2048 2200 2392 2400 2500 |
| Bits Allocated | (0028,0100) | 1 | 1 | 16 |
| Bits Stored | (0028,0101) | 1 | 1 | 12 |
| High Bit | (0028,0102) | 1 | 1 | 11 |
| Pixel Representation | (0028,0103) | 1 | 1 | 0 |
| Smallest Image Pixel Value | (0028,0106) | 1 | 1 | 0 |
| Largest Image Pixel Value | (0028,0107) | 1 | 1 | 4095 |
| Pixel Data | (7FE0,0010) | 1 | 1 | |
| CR Image | | | | |
| KVP | (0018,0060) | 3 | 3 | Refer to Annex B |
| Plate ID | (0018,1004) | 3 | 3 | |
| Distance Source to Detector | (0018,1110) | 3 | 1C - If the image is part of a long length image exposure then this value will be sent. | Refer to Annex B |
| Distance Source to Patient | (0018,1111) | 3 | 3 | Refer to Annex B |
| Exposure | (0018,1152) | 3 | 3 | Refer to Annex B |
| Imager Area Dose Product * | (0018,115E) | 3 | 3 | |
| Imager Pixel Spacing | (0018,1164) | 3 | 1 | 0.168\0.168 (35CMX43CM and 35CMX35CM) 0.171\0.171 171 (35CMX43CM & 35CMX35CM) 0.115\0.115 (24CMX30CM) 0.097\0.097 (18CMX24CM) |
| Cassette Orientation | (0018,1402) | 3 | 3 | LANDSCAPE PORTRAIT |
| Cassette Size | (0018,1403) | 3 | 1 | 15CMX30CM 18CMX24CM 24CMX30CM 35CMX35CM 35CMX43CM <i>The term "COMPOSITE" will be used for the cassette size of a</i> |

| Attribute Name | Tag | DICOM Type | DirectView DR System Type | Supported Values |
|-------------------------|-------------|------------|---------------------------|--|
| | | | | <i>combined image.</i> |
| Relative X-Ray Exposure | (0018,1405) | 3 | 3 | 0 to 4095 |
| Contrast/Bolus | | | | |
| Contrast/Bolus Agent | (0018,0010) | 2 | 2 | Refer to Annex B |
| Modality LUT | | | | |
| Modality LUT Sequence | (0028,3000) | 3 | 3 | |
| >LUT Descriptor | (0028,3002) | 1C | 1C | |
| >Modality LUT Type | (0028,3004) | 1C | 1C | |
| >LUT Data | (0028,3006) | 1C | 1C | |
| VOI LUT | | | | |
| Window Center | (0028,1050) | 3 | 3 | <ul style="list-style-type: none"> • When P-value Encoding configuration is OFF: All valid range from 0 to 4096. • When P-Value Encoding configuration is ON: <ul style="list-style-type: none"> ○ If VOI LUT configuration is OFF: not sent <p>If VOI LUT configuration is ON: 2048</p> |
| Window Width | (0028,1051) | 1C | 1C | <ul style="list-style-type: none"> • When P-value Encoding configuration is OFF: All valid range from 0 to 4096. • When P-Value Encoding configuration is ON: <ul style="list-style-type: none"> ○ If VOI LUT configuration is OFF: not sent <p>If VOI LUT configuration is ON: 4096</p> |
| SOP Common | | | | |
| SOP Class UID | (0008,0016) | 1 | 1 | |
| SOP Instance UID | (0008,0018) | 1 | 1 | |
| Specific Character Set | (0008,0005) | 1C | 1C | |

* Please see note on Section 5: Extensions/Specializations/Privatizations.

3.7 Basic Worklist Service

The C-FIND request for a Modality Worklist sends an Identifier object that contains all the attributes of the Modality Worklist Information Model. The Matching Key attributes that may optionally contain a non-NULL value in the request are:

| Attribute name | Tag |
|-------------------------------------|-------------|
| Accession Number | (0008,0050) |
| Modality | (0008,0060) |
| Patient's Name | (0010,0010) |
| Patient ID | (0010,0020) |
| Scheduled Station AE Title | (0040,0001) |
| Scheduled Procedure Step Start Date | (0040,0002) |
| Scheduled Procedure Step Start Time | (0040,0003) |
| Requested Procedure ID | (0040,0101) |
| Scheduled Station Name | (0040,0010) |

This is intended to produce a series of responses from the Worklist SCP for all matching Scheduled Procedures on the said Station.

The system can be configured to send this request periodically at an interval of 1 to 720 minutes. The user may also issue a non-periodic C-FIND request to obtain information for a patient recently added by the site's information system.

3.7.1 Modality Worklist IOD

For additional information on the Modality Worklist Information Model, refer to the DICOM specification, Part 4, Table K.6-1. The DR will only accept the ISO registration number ISO-IR 6, ISO-IR 100 and GB18030 character sets for the Specific Character Set attribute (0008,0005).

ATTRIBUTES FOR THE MODALITY WORKLIST INFORMATION MODEL

| Attribute | Tag |
|--------------------------------------|-------------|
| Accession Number | (0008,0050) |
| Referring Physicians Name | (0008,0090) |
| Referenced Study Sequence | (0008,1110) |
| >Referenced SOP Class UID | (0008,1150) |
| >Referenced SOP Instance UID | (0008,1155) |
| Patient's Name | (0010,0010) |
| Patient ID | (0010,0020) |
| Patient's Birth Date | (0010,0030) |
| Patient's Birth Time | (0010,0032) |
| Patient's Sex | (0010,0040) |
| Other Patient Ids | (0010,1000) |
| Other Patient Names | (0010,1001) |
| Patient's Age | (0010,1010) |
| Patient's Size | (0010,1020) |
| Patient's Weight | (0010,1030) |
| Ethnic Group | (0010,2160) |
| Occupation | (0010,2180) |
| Additional Patient's History | (0010,21B0) |
| Study Instance UID | (0020,000D) |
| Requesting Service | (0032,1033) |
| Requested Procedure Description | (0032,1060) |
| Requested Procedure Code Sequence | (0032,1064) |
| >Code Value | (0008,0100) |
| >Coding Scheme Designator | (0008,0102) |
| >Code Meaning | (0008,0104) |
| Requested Contrast Agent | (0032,1070) |
| Visit Status ID | (0038,0008) |
| Patient's Institution Residence | (0038,0400) |
| Scheduled Procedure Step Sequence | (0040,0100) |
| >Scheduled Station AE Title | (0040,0001) |
| >Scheduled Procedure Step Start Date | (0040,0002) |

| Attribute | Tag |
|---------------------------------------|-------------|
| >Scheduled Procedure Step Start Time | (0040,0003) |
| >Modality | (0008,0060) |
| >Scheduled Procedure Step D | (0040,0006) |
| >Scheduled Protocol Code Sequence | (0040,0010) |
| >>Code Value | (0008,0100) |
| >>Coding Scheme Designator | (0008,0102) |
| >>Code Meaning | (0008,0104) |
| >Scheduled Procedure Step Description | (0040,0007) |
| >Scheduled Station Name | (0040,0010) |
| Requested Procedure ID | (0040,1001) |
| Requested Procedure Priority | (0040,1003) |
| Requested Procedure Location | (0040,1005) |

3.7.2 Procedure Mapping

The procedure mapping feature of the DR products automatically builds the image icons and pre-populates fields such as body/part and projections from information supplied by the Modality Worklist. This eliminates the need for the technologists to supply this information for every image created.

For the procedure mapping to function properly the DR must receive the correct code in the correct DICOM tag element as configured in the DR product. The DR allows one of three DICOM tag/sequence choices to provide the procedure code (configured via the Key Operator His/Ris Options Menu):

- **Requested Procedure ID** (0040, 1001)
- Requested Procedure Code Sequence (0032, 1064) > **Code Value** (0008, 0100)
- Scheduled Procedure Step Sequence (0040, 0100) > Scheduled Protocol Code Sequence (0040, 0008) >> **Code Value** (0008, 0100)

Note: Although sequence tags allow sending more than one procedure code, the DR will accept only one procedure code per worklist entry

3.8 Modality Performed Procedure Step Notification SOP Class

The Modality Performed Procedure Step (MPPS) will be sent twice by the *DirectView* DR System operator to signal the start and to signal the completion of a study.

3.8.1 Modality Performed Procedure Step Notification IOD

| Attribute | Tag | Dicom Type | DirectView DR System Type | Value Yes – will have a value No – will be blank |
|--|-------------|------------|---------------------------|--|
| Performed Procedure Step Relationship | | | | |
| Scheduled Step Attribute Sequence | (0040,0270) | 1 | 1 | Yes |
| Study Instance UID | (0020,000D) | 1 | 1 | Yes |
| Referenced Study Sequence | (0008,1110) | 2 | 2 | No |
| Accession Number | (0008,0050) | 2 | 2 | Yes |
| Request Procedure ID | (0040,1001) | 2 | 2 | Yes |
| Requested Procedure Description | (0032,1060) | 2 | 2 | Yes |
| Scheduled Procedure Step ID | (0040,0009) | 2 | 2 | No |
| Scheduled Procedure Step Description | (0040,0007) | 2 | 2 | No |
| Scheduled Protocol Code Sequence | (0040,0008) | 2 | 2 | No |
| Patient's Name | (0010,0010) | 2 | 2 | Yes |
| Patient ID | (0010,0020) | 2 | 2 | Yes |
| Patient's Birth Date | (0010,0030) | 2 | 2 | Yes |
| Patient's Sex | (0010,0040) | 2 | 2 | Yes |
| Referenced Patient Sequence | (0008,1120) | 2 | 2 | No |
| Performed Procedure Step Information | | | | |
| Performed Procedure Step ID | (0040,0253) | 1 | 1 | Yes |
| Performed Station AE Title | (0040,0241) | 1 | 1 | Yes |
| Performed Station Name | (0040,0242) | 2 | 2 | Yes |
| Performed Location | (0040,0243) | 2 | 2 | No |
| Performed Procedure Step Start Date | (0040,0244) | 1 | 1 | Yes, configurable by the user |
| Performed Procedure Step Start Time | (0040,0245) | 1 | 1 | Yes, configurable by the user |
| Performed Procedure Step Status | (0040,0252) | 1 | 1 | Yes |
| Performed Procedure Step Description | (0040,0254) | 2 | 2 | Yes |
| Performed Procedure Type Description | (0040,0255) | 2 | 2 | No |
| Procedure Code Sequence | (0008,1032) | 2 | 2 | No |

| Attribute | Tag | Dicom Type | DirectView DR System Type | Value Yes – will have a value No – will be blank |
|-----------------------------------|-------------|-------------------|----------------------------------|---|
| Performed Procedure Step End Date | (0040,0250) | 2 | 2 | Yes, configurable by the user |
| Performed Procedure Step End Time | (0040,0251) | 2 | 2 | Yes, configurable by the user |
| Image Acquisition Results | | | | |
| Modality | (0080,0060) | 1 | 1 | Yes |
| Study ID | (0020,0010) | 2 | 2 | Yes |
| Performed Protocol Code Sequence | (0040,0260) | 2 | 2 | No |
| Performed Series Sequence | (0040,0340) | 2 | 2 | No |

3.9 Storage Commitment Push Model SOP Class

The Storage Commitment N-Action command is sent by the *DirectView* DR System at the end of a storage session. The Storage Commitment N-Event-Report is received and processed anytime providing the Port Number is configured correctly between the *DirectView* DR System and the Storage SCP.

3.9.1 DIMSE Service N-ACTION

The *DirectView* DR System uses the N-ACTION to instruct the Storage SCP to commit the images of the study.

3.9.1.1 Storage Commitment N-Action IOD

| Attribute | Tag |
|-------------------------------|-------------|
| Transaction UID | (0008,1195) |
| Referenced SOP Sequence | (0008,1199) |
| >Referenced SOP Class UID | (0008,1150) |
| > Referenced SOP Instance UID | (0008,1155) |

3.9.2 DIMSE Service N-EVENT-REPORT

The *DirectView* DR System will process the indication of the N-EVENT-REPORT from the Storage Commitment operation. These attributes are processed:

3.9.1.1 Storage Commitment N-EVENT-REPORT IOD

| Attribute | Tag |
|-------------------------------|--------------|
| Transaction UID | (0008,1195) |
| Failed SOP Sequence* | (0008,1198) |
| > Referenced SOP Class UID | (0008,1150) |
| > Referenced SOP Instance UID | (0008,1155) |
| > Failure Reason | (0008, 1197) |
| Referenced SOP Sequence | (0008,1199) |
| > Referenced SOP Class UID | (0008,1150) |
| > Referenced SOP Instance UID | (0008,1155) |

* For Event Type ID 2 only.

4 Communication Profiles

4.1 Supported Communications Stacks

The *DirectView* DR System provides TCP/IP Network Communication Support as defined in Part 8 of the DICOM standard.

The *DirectView* DR System normally issues a network ping prior to delivering a job to a qualified DICOM Print or DICOM Store destination to ensure that the device is active. The *DirectView* DR System does not issue a network ping to destinations for which this capability has not been previously verified by the Kodak's DICOM Verification and Validation group.

If a destination does not support a network ping, or if the customer has disabled this service on the network, the *DirectView* DR System configuration must be changed for each destination as appropriate to disable the issuing of the network ping.

4.2 Physical Media

The *DirectView* DR System supports Ethernet with the following physical connectors:

- Unshielded Twisted pair (10BaseT, 100BaseT and 1000BaseT).

5 Extensions/Specializations/Privatizations

The following extensions to DICOM Store Service Class are supported by *DirectView* DR System. The extensions are all optional attributes.

5.1 Computed Radiography IOD:

5.1.1 Specialization of Pixel Spacing:

The *DirectView* DR System optionally allows the Pixel Spacing (0028,0030) attribute to be used from the Image Plane Module. This is done to support workstations that incorrectly use this field rather than Imager Pixel Spacing (0018,1164), as defined in the DICOM standard. If this field is used, the actual size of any objects displayed on the workstation (scales, etc.) may be in error.

5.1.2 Specialization of Image Area Dose Product:

The Image Area Dose Product (0018,115E) is added to the CR Image Module as an interim solution to handle the dose area product information until the DX-IOD is supported in the Kodak *DirectView* DR Systems. This data is only available for those systems with a DAP meter hardware option installed. The data in this field represents the dose area product per image (it does not represent a cumulative value).

5.1.3 Private Tags:

These Private Tags are used to enhance the General Image Module. The *DirectView* DR System only sends these tags if the Storage SCP has been configured to support Private Tag.

| Attribute | Tag | VR | VM |
|--------------------------|--------------|----|----|
| privateDirectviewGroup | (0029, 0010) | LO | 1 |
| privatePtoneWindowCenter | (0029, 1002) | IS | 1 |
| privatePtoneWindowWidth | (0029, 1003) | IS | 1 |
| privateBodyPartExamined | (0029, 1004) | LO | 1 |
| privateViewPosition | (0029, 1005) | LO | 1 |
| privateReprocessedImage | (0029, 1006) | LO | 1 |
| privateSensitivityLabel | (0029, 1007) | LO | 1 |
| privateImagingData1 | (0029, 1008) | UN | 1 |
| privateImagingData2 | (0029, 1009) | UN | 1 |
| privateImagingData3 | (0029, 1010) | UN | 1 |
| privateDVMultibyteGroup | (0029, 0011) | LO | 1 |
| PrivatePatientSex | (0029, 1104) | LO | 1 |

5.1.4 Extension for P-Value Encoding:

When the Storage SCP has been configured to support P-Value Encoding, the *DirectView* DR System renders VOI LUT and Modality LUT into the image and converts all pixels into P-Values. The Photometric Interpretation will be always MONOCHROME2 and an additional tag of Presentation LUT Shape as IDENTITY will be sent.

| Attribute Name | Tag | DICOM Type | <i>DirectView</i> DR System Type | Supported Values |
|----------------------------|-------------|------------|----------------------------------|---|
| Photometric Interpretation | (0028,0004) | 1 | 1 | MONOCHROME2 Only MONOCHROME2 is sent when P-Value Encoding flag is turned on |
| Presentation LUT Shape | (2050,0020) | N/A | 1C | IDENTITY Sent only when P-Value Encoding flag is turned on |
| Modality LUT | | | | Modality LUT will not be sent when P-Value Encoding flag is turned on |
| VOI LUT | | | | VOI LUT will not be send when P-Value Encoding flag is turned on |

6 Configuration

The following network attributes are configurable by a qualified service provider:

IP address

Subnet Mask

Local Network Host Name (*DirectView* DR System AE Title)

SCP DICOM Called Application Entity Title

Socket number

Router Address (Gateway)

DICOM Service(s) available

Film Sizes available

Private Tag Support

P-Value Encoding Support

Other destination properties

7 Support of Extended Character Sets

The *DirectView* DR System supports the ISO-IR 100 Latin 1 character set as well as the ISO-IR 6 default character set.

The *DirectView* DR System also supports the ISO-IR 87 character set. This is part of the JIS X 0208 code table for 2-byte Japanese character sets that supports Kanji (ideograph), Hiragana (phonetic), and Katakana (phonetic).

The *DirectView* DR System also supports the ISO-IR 13 character set. This is part of the JIS X 0201 code table for single-byte Japanese Katakana (phonetic) characters.

The value set in the tag Specific Character Set (0008,0005) will be either:

- a) “ISO_IR 100” (Latin 1),
- b) “ISO_IR 13” (Katakana),
- c) “ISO 2022 IR 13\ISO 2022 IR 87” (Katakana, Hiragana, Kanji),
- d) “GB18030” (Chinese)
- e) or blank (ISO-IR 6 is the default character set).

Note: The Extended Character Sets mentioned above does not apply to the WORKLIST.

8 Error Handling

The response of the *DirectView* DR System to communication errors will depend on the specific nature of the error. Errors that do not prevent the completion of the communication will be logged only while all other errors will result in an aborted session (A-ABORT sent).

If a communication error occurs during the transmission of an image the system will flag the event as failed delivery. The user may then resend the image to the same or alternate destination.

The *DirectView* DR System has limited recovery from communication errors. Some specific warnings will be logged locally and communication will continue. All other DICOM status codes (warning or error) will result in an aborted session (A-ABORT sent).

Codes that will NOT cause A-ABORT:

| | |
|--------|---|
| 0x0000 | SUCCESS |
| 0xb602 | Film session does not contain Image |
| 0xb603 | Film Box does not contain Image |
| 0x0210 | Duplicate Invocation |
| 0x0107 | Attribute List Error. Interpreted as Value out of range, default used |
| 0x0116 | Attribute value is out of range, default used. |

Annex A - Configuration Information

The Configuration Information attribute contains the list of Kodak-specific values. These attributes are not DICOM standard attributes.

The Configuration Information value is an ordered list. The attribute is specified using the ASCII two-character key prefix in the following sequence:

- 1) Curve Shape, Contrast, Pivot Density
or Perception LUT
- 2) Text Macros.

The Film Box Curve Shape value applies to all images in the Film Box except when Curve Shape or Perception LUT is specified for the image in the Image Box.

| ATTRIBUTE | USAGE | DESCRIPTION | DEFAULT |
|---|-------|---|---|
| Curve Shape designated by the ASCII two- character prefix: CS | U/M | 000 to 999 Note: 000 = linear, 999 = highest curvature Curve Shape is a tone scale adjustment used to optimize the image on film compared to the image on the operator console monitor. Curve shape is not valid when a Perception LUT is specified. | Film Box: Value set in the Printer by the user Image Box: Basic Film Box Curve Shape |
| Contrast designated by the ASCII two- character prefix: CN | U/M | -5 to 5 Note: Integer values only. Negative Contrast settings are lower contrast where the amount of data that is represented by medium film densities is increased. Positive settings are higher contrast where the amount of data that is represented by high and low densities is increased. | Value set in the Printer by the user |
| Pivot Density designated by the ASCII two- character prefix: PD | U/M | 0.0 to 2.4 Note: Value must be specified in increments of 0.2. Densities above and below the pivot density will be adjusted up and down by an amount that is a function of the difference between the code value and the pivot density code value. | Value set in the Printer by the user |

| ATTRIBUTE | USAGE | DESCRIPTION | DEFAULT | | | | | | | | | | | | | | | |
|---|--------------------|--|-----------|------------------|-----------|-------|------------------|--------------------|-------|--------------------|-------|-------------|------------------|----------|-------|--------------------|--|------|
| Perception LUT Selection designated by the ASCII three-character prefix: LUT | U/M | LUT = m, n Allows selection of the LUT that best suits the user's images. M is the name of the TFT set and N specifies a contrast setting within the group. Curve shape will be ignored if the LUT parameter is used. m=string (0=default group) n=0 to 15 (0=use default value) | m=0, n=0 | | | | | | | | | | | | | | | |
| Text Macros designated by the ASCII two-character key prefix: TM | M/M | <table border="0"> <tr> <td>%PRNTDAT%</td> <td>Date of Printing</td> <td>DD-MMM-YY</td> </tr> <tr> <td>%TIM%</td> <td>Time of Printing</td> <td>HH:MM (HH=0-23)</td> </tr> <tr> <td>%FOF%</td> <td>Film of Film Count</td> <td>NN/MM</td> </tr> <tr> <td>;%\$TIME\$%</td> <td>Time of Printing</td> <td>HH:MM:SS</td> </tr> <tr> <td>%SES%</td> <td>Film Session Label</td> <td>AAAAAA (1-64 chars from the Film Session SOP Class)</td> </tr> </table> <p>Note: The text macros will be printed on the bottom of the film and will be truncated if necessary</p> | %PRNTDAT% | Date of Printing | DD-MMM-YY | %TIM% | Time of Printing | HH:MM (HH=0-23) | %FOF% | Film of Film Count | NN/MM | ;%\$TIME\$% | Time of Printing | HH:MM:SS | %SES% | Film Session Label | AAAAAA (1-64 chars from the Film Session SOP Class) | None |
| %PRNTDAT% | Date of Printing | DD-MMM-YY | | | | | | | | | | | | | | | | |
| %TIM% | Time of Printing | HH:MM (HH=0-23) | | | | | | | | | | | | | | | | |
| %FOF% | Film of Film Count | NN/MM | | | | | | | | | | | | | | | | |
| ;%\$TIME\$% | Time of Printing | HH:MM:SS | | | | | | | | | | | | | | | | |
| %SES% | Film Session Label | AAAAAA (1-64 chars from the Film Session SOP Class) | | | | | | | | | | | | | | | | |

Examples

"CS333"

The curve shape is set to 1/3 of the printers tone scale range and defaults are applied to contrast and pivot density.

"CS500\CN3\PD2.2"

The curve shape is set to 1/2 the printers tone scale range, Contrast is set to 3, and pivot density is set to 2.2.

"PD2.0"

The pivot density is set to 2.0., and defaults are applied to curve shape and contrast.

"CS333\CN3\PD2.2\TM%PRNTDAT%%TIM%%FOF%"

The curve shape is set to 1/3 of the range, Contrast is set to 3, and pivot density is set to 2.2. The following text macros will be printed on the bottom of the page:
 Date of Printing, Time of Printing, and Film of Film count.

"LUT=Ver693c0.w87,3"

The Perception LUT TFT set is "Ver693c0.w87" and the Contrast Setting is 3.

“LUT=0,3\ TM%PRNTDAT%%TIM%%FOF%”

The Perception LUT TFT set is 0 (default) and the Contrast Setting is 3.

The following text macros will be printed on the bottom of the page:

Date of Printing, Time of Printing, and Film of Film count.

“TM%PRNTDAT%%TIM%%FOF%”

The following text macros will be printed at the bottom of the page:

Date of Printing, Time of Printing, and Film of Film count.

"PD2.0\CN4\CS333"

This is **invalid** because the attributes are out of order, curve shape must precede pivot density and contrast, and contrast must precede pivot density. It should be "CS333\CN4\PD2.0".

"CS333\PD1.2\LUT=0,3"

This is **invalid** because Curve Shape and Pivot Density cannot be mixed with Perception LUT. In this case, the Perception LUT setting will be used

Annex B - DR Patient/Exam Input Field/DICOM Tag Cross Reference

The following table describes the patient/exam information flow through the product. The first two columns describe the patient/exam information fields supported by the product's user interface and the maximum number of characters that may be input via the interface. The third column indicates the worklist element that the system will use to populate the field if a DICOM WORKLIST SCP is present. The fourth column identifies the DICOM element containing the data in the system's output.

| User Interface Input field Label | Maximum number of input characters from user interface | Associated DICOM Worklist IOD Element | Associated DICOM CR IOD Element |
|-------------------------------------|--|--|--|
| Patient First Name | 30 (or 10 for Chinese) | Patient's Name (0010,0010) | Patient's Name (0010,0010) |
| Patient Last Name | 30 (or 10 for Chinese) | | |
| M.I. (middle initial) | 1 (no M.I for Chinese) | | |
| Exam Date & Time | N/A | Initial Value: Scheduled Procedure Step Start Date (0040,0002) Scheduled Procedure Step Start Time (0040,0003) These values will be updated to the the time/date that the technologist began the first procedure step for a study. | Study Date (0008,0020) Study Time (0008,0030) |
| Priority | N/A | Requested Procedure Priority (0040,1003) | N/A |
| Contrast/Bolus | 32 | Requested Contrast Agent (0032,1070) | Contrast/Bolus Agent (0018,0010) |
| Accession Number | 16 | Accession Number (0008,0050) | Accession Number (0008,0050) |
| Tech ID | 16 | NA | Operator's Name (0008,1070) |
| Date of Birth | 8 | Patient's Birth Date (0010,0030) | Patient's Birth Date (0010,0030) |
| Gender | N/A | Patient Sex (0010,0040) | Patient Sex (0010,0040) |

| | | | |
|---------------------|-----|--|--|
| Description | 32 | Requested Procedure Description (0032,1060) If scheduled workflow is used: Scheduled Protocol Code Sequence (0040,0008) > Code Meaning (0008,0104) | Study Description (0008,1030) If scheduled workflow is used: Scheduled Protocol Code Sequence (0040,0008) > Code Meaning (0008,0104) and Performed Series Sequence (0040,0340) > Protocol Name (0018,1030) |
| Patient ID | 16 | Patient ID (0010,0020) | Patient ID (0010,0020) |
| Referring Physician | 32 | Referring Physician's Name (0008,0090) | Referring Physician's Name (0008,0090) |
| Department | 32 | Requesting Service (0032,1033) | Institutional Department Name(0008,1040) |
| Patient Location | 32 | Patient's Institution Residence (0038,0400) | N/A |
| Cassette ID | 10 | NA | Plate ID (0018,1004) |
| Body Part | NA | NA | Body Part Examined (0018,0015) |
| Projection | NA | NA | View Position (0018,5101) Series Description (0008,103E) |
| Position | NA | NA | Patient Position (0018,5100) |
| Orientation | N/A | NA | Cassette Orientation (0018,1402) |
| Comments | 256 | NA | Image Comments (0020,4000) |
| KVP | 4 | NA | KVP (0018,0060) |
| MAS | 4 | NA | Exposure (0018,1152) |

| | | | |
|---------------------------------|-----|--|---|
| Source to Patient Distance | 4 | NA | Source to Patient Distance (0018,1111) |
| Source to Image Distance | 4 | NA | Source to Image Distance (SID) (0018,1110) |
| Patient Comments | 256 | NA | Patient Comments (0010,4000) |
| Code | 16 | Requested Procedure Code Sequence (0032,1064) > code value (0008,0100) Or Requested Procedure ID (0040,1001) Or If Scheduled work flow is used: Scheduled Procedure Step Sequence (0040,0100) > Scheduled Protocol Code Sequence(0040,0008) >> Code Value (0008,0100) | Procedure Code Sequence (0008,1032) > Code value (0008,0100) Or Requested Procedure ID (0040,1001) Or If Scheduled work flow is used: Scheduled Protocol Code Sequence(0040,0008) > Code Value (0008,0100) |
| Procedure Step Description | 64 | Scheduled Procedure Step Description (0040,0007) | Scheduled Procedure Step Description (0040,0007) If the Procedure Step Description field is modified by the user the changes will be stored in: Performed Procedure Step Description (0040,0254) |
| Requested Procedure ID | 16 | Requested Procedure ID (0040,1001) | Requested Procedure ID (0040,1001) |
| Requested Procedure Description | 64 | Requested Procedure Description (0032,1060) | Request Attributes Sequence (0040,0275) > Requested Procedure Description (0032,1060) |

Annex C - DR Internal Data/DICOM Tag Cross Reference

The following table describes the internal acquisition/hardware information flow through the product. The first two columns describe the nature of the information and possible values. The third column indicates the DICOM element containing the data in the DR's output.

| Acquisition/Hardware Data field | Possible Values | Associated DICOM CR IOD Element |
|--|--|------------------------------------|
| Collimator Filtration: Filter Type | “NONE”, “WEDGE”, or “MULTIPLE” | Filter Type (0018,1160) |
| Collimator Filtration: Filter Material | “NONE”, “ALUMINUM”, or “ALUMINUM ,COPPER” | Filter Material (0018,7050) |
| Collimator Filtration: Filter Thickness Minimum | <i>blank</i> (if NONE), “0.94” (if ALUMINUM), or “0.94,0.098” or “0.94,0.198” (if MULTIPLE) | Thickness Min (0018,7052) |
| Collimator Filtration: Filter Thickness Maximum | <i>blank</i> (if NONE), “1.06” (if ALUMINUM), or “1.06,0.102” or “1.06,0.202” (if MULTIPLE) | Thickness Max (0018,7054) |
| Detector Serial Number used | <i>varies</i> (usually 6 alphanumeric characters) | Detector ID (0018,700A) |