KODAK Radiation Oncology

Software (KROS) 6.0

DICOM Conformance Statement

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Revision History

Document Version	Revision Date	Revision Author	Revision Description
1.0	9/29/1998	Joe Caso	Original
2.0	1/25/1999	Ray Deininger	Re-format; Added Modality Worklist and Print
3.0	7/20/2001	Ray Deininger	Modified for KODAK. Added Printer inf information
3.1	8/20/01	Ray Deininger	Cleaned up.
3.2	8/28/01	Ray Deininger	Capitalized all Company names.
6.0	06/08/05	Onega Zhang	Save scanned image as RTIMAGE Formatting Table 7 Reorganize the document New Implementation UID and version name

Contents

1. Introduction

1.1. Conformance Statement Overview

The application supports querying a remote system for a list of DICOM objects that may then be retrieved to the local system. It also supports sending locally loaded images across the network to another system.
Only grayscale images may be displayed.
NETWORK SERVICES

SOP Classes	User of Service(SCU)	Provider of Service(SCP)
Verification	Yes	Yes
Print	Yes	No
Storage	Yes	Yes
Query/Retrieve	Yes	No
Modality Worklist Query	Yes	No

1.2. Scope and Field of Application

This document describes the DICOM functionality of the Kodak Radiation Oncology Software. The Kodak Radiation Oncology Software acts as a DICOM Service Class User (SCU) and DICOM Service Provider (SCP). The Kodak Radiation Oncology Software performs transactions over a TCP/IP network via the DICOM messages exchange protocol.

1.3. Important Considerations for the Reader

This DICOM Conformance Statement by itself is not sufficient to guarantee successful connectivity between the Kodak Radiation Oncology Software 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 Kodak Radiation Oncology Software 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.

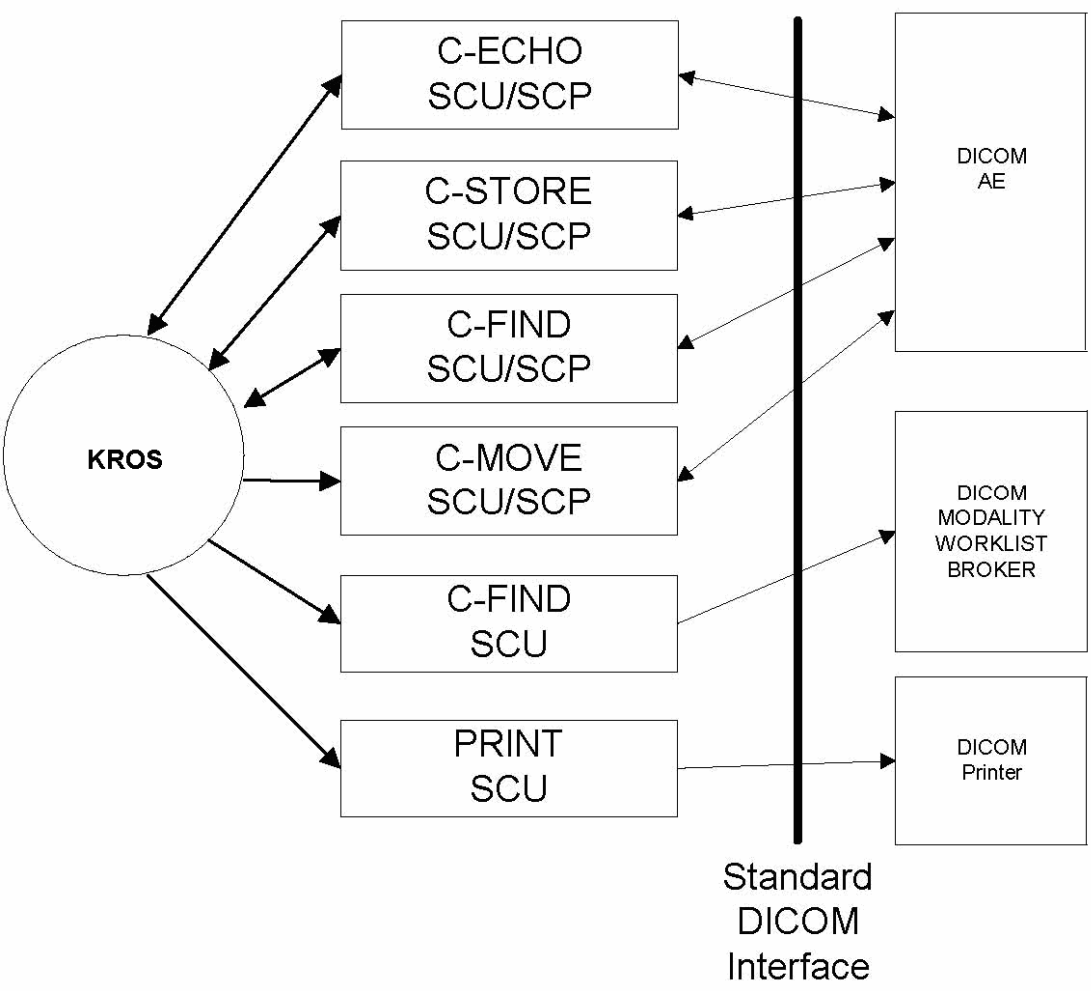
1.4. Definitions, Acronyms, Abbreviations

The following symbols and abbreviations are used in this document.

- AC - Accept
- ACR - The American College of Radiology
- AE - Application Entity
- ANSI - American National Standards Institute
- API - Application Programming Interface
- ASCII - American Standard Code for Information Interchange
- DICOM - Digital Imaging and Communications in Medicine
- DIMSE - DICOM Message Service Element
- DIMSE-C - DICOM Message Service Element - Composite
- DRR - Digitally reconstructed-radiograph
- IE - Information Entity
- IOD - Information Object Description
- NEMA - National Electrical Manufacturers Association
- PDU - Protocol Data Unit
- RJ - Reject
- RQ - Request
- RSP - Response
- RT - Radiotherapy
- SCP - Storage Class Provider
- SCU - Storage Class User
- SOP - Service-Object Pair
- TCP/IP - Transmission Control Protocol/Internet Protocol
- UCDMC - The University of California at Davis Medical Center
- UID - Unique Identifier

2. Implementation Model

Application Data Flow



2.1. Functional Definition

The Kodak 2000RT CR and CR Plus systems are desktop CR systems. The Kodak Radiation Oncology Software (KROS) is the application and user interface software for these systems. This software provides a means to input customer demographic information and allow digital image capture and processing of a radiation simulation or portal image.
The Software program functions as both an SCU and as an SCP as noted in the above diagram.

All DICOM transaction are performed when the software processes a DICOM request

that is created in response to user selections from the user interface. DICOM requests are stored by the software and executed in the background. If a transaction fails for any reason, the request will be re-queued and automatically processed after a pre-defined waiting time. This automatic re-queuing will happen 5 times before the transaction is considered failed. All this activity is displayed on the user interface and can be viewed by clicking the DICOM status button.

When the software starts, any requests that are pending will be re-queued automatically and processed in the background.

2.2. Sequencing of Real World Activities

N/A

3. APPLICATION ENTITY SPECIFICATIONS

This application provides Standard Conformance to the following DICOM V3.0 SOP Classes:

SOP Class Name	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	Yes	Yes
Modality Worklist	1.2.840.10008.5.1.4.31	Yes	No
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Yes	Yes
Computed Tomography Image Storage	1.2.840.10008.5.1.4.1.1.2	Yes	Yes
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3	Yes	Yes
Magnetic Resonance Image Storage	1.2.840.10008.5.1.4.1.1.4	Yes	Yes
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.5	Yes	Yes
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	Yes	Yes
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6	Yes	Yes
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Yes	Yes
Standalone Overlay Image Storage	1.2.840.10008.5.1.4.1.1.8	Yes	Yes
Standalone Curve Image Storage	1.2.840.10008.5.1.4.1.1.9	Yes	Yes
Standalone Modality LUT Image Storage	1.2.840.10008.5.1.4.1.1.10	Yes	Yes
Standalone VOI LUT Image Storage	1.2.840.10008.5.1.4.1.1.11	Yes	Yes
Patient Root Query/Retrieve – FIND	1.2.840.10008.5.1.4.1.2.1.1	Yes	Yes
Patient Root Query/Retrieve – MOVE	1.2.840.10008.5.1.4.1.2.1.2	Yes	Yes
Patient /Study Only Query/Retrieve – FIND	1.2.840.10008.5.1.4.1.2.3.1	Yes	No
Patient/Study Only Query/Retrieve – MOVE	1.2.840.10008.5.1.4.1.2.3.2	Yes	No
Basic Modality Worklist Management	1.2.840.10008.5.1.4.31	Yes	No
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	Yes	No
General Electric Magnetic Resonance Image Storage	1.2.840.113619.4.2	No	Yes
General Electric Computed Tomography Image Storage	1.2.840.113619.4.3	No	Yes

SOP CLASSES FOR AE KROS Table 4.2-1

3.1. Association Establishment Policies

SCU: The association-requester shall initiate an A-ASSOCIATE RQ. The A-ASSOCIATE RQ shall contain an abstract Syntax in a Presentation Context to satisfy the requirements of the Verification SOP Class.
SCP: The association acceptor shall respond with an A-ASSOCIATE response message. It will attempt to accept the Abstract Syntax in the Presentation Context and return an A-ASSOCIATE

AC. Otherwise it shall reject the association and return an A-ASSOCIATE RJ.

3.1.1. General

The only rule governing associations is that the attempted associations follow the parameters and specifications denoted by the DIMSE-C services. The maximum PDU sizes are as follows:

SCU: The maximum PDU size supported is 131072 bytes.

SCP: The maximum PDU size supported is 131072 bytes.

3.1.2. Number of Associations

SCU: The DICOM AE taking the role of the SCU may only perform one association at a time. Only one SCU may be running at one time.
SCP: The maximum number of associations that the DICOM AE acting as the SCP supports is 5. Only one SCP may be running at one time.

3.1.3. Asynchronous Nature

Asynchronous negotiation is not supported.

3.1.4. Implementation Identifying Information

Implementation Class UID is 1.2.840.113564.13.1
Implementation Version Name is KROS2005v6.0

3.2. Association Initiation Policy

When the DICOM AE takes the role of the SCU it will initiate an association. This will be the only way in which an association will be initiated.

3.3. Association Acceptance Policy

KROS will accept associations for the Store SCU as an SCP. The job runs in the background and

forks a new thread for a connection request from a Remote AE.

3.4. SOP SPECIFIC CONFORMANCE – VERIFICATION

KROS provides standard conformance to the DICOM Verification Class.

3.5. Real World Activity – Storage

3.5.1. ASSOCIATED REAL WORLD ACTIVITY – STORAGE

KROS will issue a storage request when the user performs a send of an image

3.5.2. PRESENTATION CONTEXT TABLE – STORAGE

KODAK applications support the transfer syntax listed in table 4 and presentation contexts in table 7.

Table 6: Transfer Syntax

Transfer Syntax	UID
DICOM Implicit VR Little Endian	1.2.840.10008.1.2
JPEG Baseline (Process 1): Default Transfer Syntax for Lossy 8 Bit Image Compression	1.2.840.10008.1.2.4.50
JPEG Extended (Process 2 & 4): Default Transfer Syntax for Lossy JPEG 12 Bit Image Compression [Process 4 Only]	1.2.840.10008.1.2.4.51
JPEG Lossless, Hierarchical, First-Order Prediction (Process 14 [Selection Value 1]): Default Transfer Syntax for Lossless JPEG Image Compression	1.2.840.10008.1.2.4.70

Table 7: Presentation Contexts

Presentation Context			
Abstract Syntax	Transfer Syntax	Role	Extended Negotiation

Name	UID			
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	All from Table 6	SCU SCP	NONE
Computed Tomography Image Storage	1.2.840.10008.5.1.4.1.1.2	All from Table 6	SCU SCP	NONE
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3	All from Table 6	SCU SCP	NONE
Magnetic Resonance Image Storage	1.2.840.10008.5.1.4.1.1.4	All from Table 6	SCU SCP	NONE
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.5	All from Table 6	SCU SCP	NONE
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	All from Table 6	SCU SCP	NONE
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6	All from Table 6	SCU SCP	NONE
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	All from Table 6	SCU SCP	NONE
Standalone Overlay Image Storage	1.2.840.10008.5.1.4.1.1.8	All from Table 6	SCU SCP	NONE
Standalone Curve Image Storage	1.2.840.10008.5.1.4.1.1.9	All from Table 6	SCU SCP	NONE
Standalone Modality LUT Image Storage	1.2.840.10008.5.1.4.1.1.10	All from Table 6	SCU SCP	NONE
Standalone VOI LUT Image Storage	1.2.840.10008.5.1.4.1.1.11	All from Table 6	SCU SCP	NONE
General Electric Magnetic Resonance Image Storage	1.2.840.113619.4.2	All from Table 6	SCP	NONE
General Electric Computed Tomography Image Storage	1.2.840.113619.4.3	All from Table 6	SCP	NONE

3.5.3. SOP SPECIFIC CONFORMANCE – STORAGE

KROS provides standard conformance to the DICOM Storage Class.

In the case of a successful C-STORE RSP, the SCU will return a message to the user. At this time, the database will be updated and new patient and study information will be displayed. The next C-STORE RSP will be attempted.

In the event of C-STORE RSP failure, the SCU will abort the association. Failure responses include: Out of Resources; Data Set does not match SOP Class; and Cannot Understand, etc.

In the event of C-STORE RSP warning, the SCU will return a message to the user. Warning responses are: Coercion of Data Elements; Data Set does not match SOP Class; and Elements Discarded, At this time, the database will be updated and new patient and study information shall be displayed. The next C-STORE RSP will be attempted if there are more files in the sending queue.

The SCU does not support extended negotiation for the C-STORE operation.
All of the elements that are listed in Part 6 Section 6 of the DICOM standard will be available.

The SCP of the DICOM AE follows Level 2 (Full) conformance as described by section B.4.1 of Part 4 of the DICOM standard.

There will not be any discarded or modified elements from the IODs for the Storage Service Class.

In the event of a successful C-STORE operation, the SCP will parse the DICOM image header for the SOP Instance UID (0008, 0018). If this instance currently exists, the existing image will not be overwritten. A C-STORE RSP of success will be returned to the SCU.

In the event of an unsuccessful C-STORE operation, the SCP will close the association and write an error message to the corresponding log file.

In the event of a C-STORE warning, the SCP will parse the DICOM image header for the SOP Instance UID (0008, 0018). If this instance currently exists, the existing image will not be overwritten. A C-STORE RSP of success will be returned to the SCU.

3.6. Real World Activity – Query/Retrieve

3.6.1. ASSOCIATED REAL WORLD ACTIVITY – QUERY/RETRIEVE

KODAK applications will issue a C-FIND request when the user queries a DICOM AE. If the user selects a returned patient, a C-MOVE request is issued.

3.6.2. PRESENTATION CONTEXT TABLE – QUERY/RETRIEVE

KODAK applications support the transfer syntax listed in table 8 and presentation contexts in table 9.
Table 8 Transfer Syntax

Transfer Syntax	UID
DICOM Implicit VR Little Endian	1.2.840.10008.1.2

Table 9 Presentation Contexts

Presentation Context				
Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Patient Root Query/Retrieve – FIND	1.2.840.10008.5.1.4.1.2.1.1	All from Table 8	SCU SCP	NONE
Patient Root Query/Retrieve – MOVE	1.2.840.10008.5.1.4.1.2.1.2	All from Table 8	SCU SCP	NONE

3.6.3. SOP SPECIFIC CONFORMANCE – QUERY/RETRIEVE

The DICOM implementation acting as an SCU or SCP supports the optional tag for Referring Physician, (0008, 0090), in a STUDY level search of the Patient Root SOP Class.

The DICOM implementation acting as an SCU or SCP does not have the ability to generate relational queries.

3.7. Real World Activity – Modality Worklist Query

3.7.1. ASSOCIATED REAL WORLD ACTIVITY – MODALITY WORKLIST QUERY

KROS will issue a C-FIND request when the user queries a DICOM AE. If the user selects a returned patient, a C-MOVE request is issued.

3.7.2. PRESENTATION CONTEXT TABLE – MODALITY WORKLIST QUERY

KROS supports the transfer syntax listed in table 10 and presentation contexts in table 11.

Table 10 Transfer Syntax

Transfer Syntax	UID

DICOM Implicit VR Little Endian	1.2.840.10008.1.2

Table 11 Presentation Contexts

Presentation Context				
Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Modality Worklist Information Model Find	1.2.840.10008.5.1.4.31	All from Table 10	SCU	NONE

3.7.3. SOP SPECIFIC CONFORMANCE – MODALITY WORKLIST QUERY

KROS will query a properly configured Modality worklist broker.

Matching Key Types	
SV	Single Value
WC	Wild Card
SQ	Sequence match
DR	Date Range Match

Table 12. Search attributes

Attribute	Tag	Search by
Scheduled Procedure Step Sequence	(0040, 0100)	SQ
Scheduled Station AE Title	(0040, 0001)	SV
Scheduled Procedure Step Start Date	(0040, 0002)	DR
Scheduled Procedure Step Start Time	(0040, 0003)	DR
Modality	(0008, 0060)	SV
Scheduled Performing Physician Name	(0040, 0006)	WC
Patient Name	(0010, 0010)	WC
Patient ID	(0010, 1020)	SV
Accession Number ** if supported by broker **	(0008, 0050)	SV

The results of a Modality worklist query are displayed in a list box from which a user can select patients from. Single or multiple selections are allowed. The patient information is retrieved from the broker and inserted into the local database. The attributes requested from the broker are listed in the following table. Note that not all attributes may be returned by the broker or used by the KODAK Software application.

Table 13: Attributes requested from broker.

Attribute	Tag
Patient Identification	

Patient Name	(0010,0010)
Patient ID	(0010,0020)
Other Patient ID	(0010,1000)
Patient Birthdate	(0010,0030)
Patient Sex	(0010,0040)
Patient Medical Alerts	(0010,2000)
Patient Ethnic Group	(0010,2160)
Patient Pregnancy Status	(0010,21C0)
Patient History	(0010,21B0)
Patient Comments	(0010,4000)
Imaging Service Request	
Accession Number	(0008,0050)
Referring Physician	(0008,0090)
Requesting Service	(0032,1033)
Requesting Physician	(0032,1032)
Scheduled Procedure Step Sequence	
Scheduled Station AE Title	(0040,0001)
Scheduled Procedure Start Date	(0040,0002)
Scheduled Procedure Start Time	(0040,0003)
Modality	(0008,0060)
Scheduled Performing Physician	(0040,0006)
Scheduled Procedure Step Description	(0040,0007)
Scheduled Procedure Step ID	(0040,0009)
Scheduled Procedure Step Location	(0040,0011)
Requested Procedure	
Requested Procedure ID	(0040,1001)
Procedure Description	(0032,1060)
Study Instance UID	(0020,000D)
Requested Procedure Priority	(0040,1003)
Miscellaneous	
Reading Physician	(0008,1060)
Current Location	(0038,0300)
Results Physician	(0040,1010)
Procedure Comments	(0040,1400)
Imaging Comments	(0040,2400)

3.8. Real World Activity – Print

3.8.1. ASSOCIATED REAL WORLD ACTIVITY – PRINT

KODAK applications will issue Print Management requests to an SCP supporting the DICOM V3.0 Print services to produce hard-copy representations of DICOM images.

3.8.2. PRESENTATION CONTEXT TABLE – PRINT

KODAK applications support the transfer syntax listed in table 13 and presentation contexts in table 14.

Table 14 Transfer Syntax

Transfer Syntax	UID
DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1
DICOM Explicit VR Big Endian	1.2.840.10008.1.2.2
DICOM Implicit VR Little Endian	1.2.840.10008.1.2

Table 15 Presentation Contexts

Presentation Context				
Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Basic Greyscale Print Management	1.2.840.10008.5.1.1.9	All from Table 10	SCU	NONE
Print Job	1.2.840.10008.5.1.1.14	All from Table 10	SCU	NONE

3.8.3. SOP SPECIFIC CONFORMANCE – PRINT

Table 16: Basic Film Session (UID: 1.2.840.10008.5.1.1.1)

Attribute	Tag	Value
Copies	(2000,0010)	1
Priority	(2000,0020)	MED

Table 17: Basic Film Box (UID: 1.2.840.10008.5.1.1.2)

Attribute	Tag	Value
Format	(2010,0010)	STANDARD\1,1
Format	(2010,0010)	STANDARD\1,2
Format	(2010,0010)	STANDARD\2,2
Format	(2010,0010)	STANDARD\3,3

Format	(2010,0010)	STANDARD\4,4
Orientation	(2000,0040)	PORTRAIT
Orientation	(2000,0040)	LANDSCAPE

Table 18: Basic Greyscale Image Box (UID: 1.2.840.10008.5.1.1.4)

Attribute	Tag	Value
Image Position	(2020,0010)	Depends on Image
Basic Grayscale Image Sequence	(2020,0110)	Depends on Image
Samples Per Pixel	(0028,0002)	Depends on Image
Photometric Interpretation	(0028,0004)	Depends on Image
Rows	(0028,0010)	Depends on Image
Columns	(0028,0011)	Depends on Image
Pixel Aspect Ratio	(0028,0034)	Depends on Image
Bits Allocated	(0028,0100)	Depends on Image
Bits Stored	(0028,0101)	Depends on Image
High Bit	(0028,0102)	Depends on Image
Pixel Representation	(0028,0103)	Depends on Image

The KODAK DICOM application supports the following print layouts. A dialog box is displayed when attempting to send more than one image to a defined DICOM printer. The dialog box allows the user to select the desired layout.

1x1
1x2
2x2
3x3
4x4

Portrait or landscape. Multiple copies of each film can be printed.

CONFIGURABLE PARAMETERS – PRINT

Certain parameters can be configured to send specific DICOM tags to the printer to allow the software to take advantage of printer features. This section will explain how the configuration works and the DICOM tags that can be modified. You must consult each printer manufacturer's DICOM conformance statement to see verify the specific parameters, what they mean and how they are used.

CAUTION: Changing these parameters can have an adverse affect on the quality of the printed image. You MUST consult the Printer Manufacturer's DICOM conformance statement for information on how each parameter can be used. Changing the information contained in the configuration files can have dramatic results if used incorrectly. Always make a copy of the original configuration file before making any change.

Operation

The software allows specific printer models to be selected as part of new address function of the communication pane. The list of printers reflects the files located in the printer configuration files directory under the application installation directory (C:\DI-3000 by default). The list contains files contained in that directory that have the extension .inf.

Table 6

File Name	Description
Generic.inf	Standard File. All defaults are NULL. [2010,0100]Border density=BLACK [2010,0110]Empty Image density=BLACK
Agfa.inf	Suitable for AGFA printers [2010,0150] Magnification type DEFAULT=PERCEPTION_LUT=LINEAR
agfa_true_size.inf	Same as agfa.inf except sends requested image size tag to the printer requesting true size printing. Requested image size is calculated from [0028,0030] image pixel spacing.
Codonics.inf	Same as Generic.inf
KODAK.inf	[Eight_Bit]=YES [2010,0060] Magnification type DEFAULT=CUBIC [2010,0140] TRIM DEFAULT=NO
KODAK_true_size.inf	Same as KODAK.inf except sends requested image size tag to the printer requesting true size printing. Requested image size is calculated from [0028,0030] image pixel spacing.
Seiko.inf	Same as Generic.inf

If the model of the printer that you are connecting to does not exist, select generic.

True Size Printing

True size printing is controlled by the DICOM tag (2020,0030) requested image size. The software calculates the size (width in MM) of the image, based on the pixel spacing and sends that value to the printer.

Configurable DICOM tags

This table shows the DICOM tags that can be modified by the user by editing the inf file. NULL settings indicate that the tag is not sent to the printer. The printer will respond according to the manufacturer's DICOM Conformance statement.

Table 7 - Printer Configuration file contents

Tag	Name	Comments	Default (Generic.inf)	Agfa	Agfa True size	Codonics	KODAK	KODAK true size	Seiko
2000,0030	Medium Type	PAPER/CLEAR FILM/BLUE FILM	NULL	NULL	NULL	NULL	NULL	NULL	NULL
2010,0030	AnnotationDisplay Format ID	NULL	NULL	NULL	NULL	NULL		NULL	NULL
2010,0050	Film Size ID	8INX10IN 10INX12IN 10INX14IN 11INX14IN 14INX14IN 14INX17IN 24CMX24CM 24CMX30CM	NULL	NULL	NULL	NULL	NULL	NULL	NULL
2010,0040	Orientation	PORTRAIT/LANDSCAPE	NULL	NULL	NULL	NULL	NULL	NULL	NULL
2020,0030	Requestedimage size	sends the width in mm. It is calculated based on pixel spacing.	0 (False)	0 (False)	0 (False)	0 (False).	0 (False).	0 (False).	0 (False)
2010,0060	Magnification type	Printer may support extensions, check printer conformance statement.	NONE	NONE	NONE	NONE	CUBIC	CUBIC	NONE
2010,0080	Smoothingtype	Printer may support extensions, check printer conformance statement	0	0	0	0	0	0	0
2010,0100	BorderDensity	BLACK/WHITE	BLACK	BLACK	BLACK	BLACK	BLACK	BLACK	BLACK
2010,0110	Empty imageDensity	BLACK/WHITE	BLACK	BLACK	BLACK	BLACK	BLACK	BLACK	BLACK
2010,0120	Minimumdensity		NULL	NULL	NULL	NULL	NULL	NULL	NULL
2010,0130	Maximumdensity		NULL	NULL	NULL	NULL	NULL	NULL	NULL
2010,0140	Trim	YES/NO	YES	YES	YES	YES	NO	NO	YES
2010,0150	Configuration information	1023 character string. Refer to conformance Description=statement for a description of the printer capabilities and meanings	NULL	DEFAULT=PERCEPTION_LUT=LINEAR	DEFAULT=PERCEPTION_LUT=LINEAR	NULL	NULL	NULL	NULL
KODAK Private configuration Settings									
SoftToHard_Conversion		Perform soft-copy to hard-copy conversion of the image.	YES	YES	YES	YES	YES	YES	YES
Eight_Bit		Force images sent to the printer to be scaled to 8 bits	NO	NO	NO	NO	YES	YES	NO
Suppress_Scale		Suppress_Scalemarkersfrom the printed image	NO	NO	NO	NO	NO	NO	NO

NETWORK INTERFACES
Physical Network Interface
The KROS application is indifferent to the physical medium over which TCP/IP executes.

4. Communication Profiles

4.1. Supported Communications Stacks

The Kodak Radiation Oncology Software provides TCP/IP Network Communication Support as defined in Part 8 of the DICOM standard.

4.2. Physical Media

The KROS application is indifferent to the physical medium over which TCP/IP executes.

5. Extensions/Specializations/Privatizations

N/A

6. Configuration

The following network attributes are configurable by a qualified service provider:
AE Title/Presentation Address Mapping
The AE Title and port of KROS is configurable by the user from a GUI-based configuration application. The IP Address is picked by the site and may be changed by a Field Engineer.

Application Entity	Default AE Title	Default TCP/IP Port
KROS	Host-name	104

Remote AE Title/Presentation Address Mapping
The AE Title, host name, port numbers and supported Presentation Contexts of remote applications are configured by GUI of KROS.

Parameters
KROS configuration parameters related to DICOM communications are below. A blank cell under the ‘Default Value’ heading indicates that there is no default value for the specific configuration attribute.

Parameter	Configurable	Default Value
Timeout for DICOM communications	YES	120

Maximum PDU size the AE can receive	NO	131072 bytes
Maximum PDU size the AE can send	NO	131072 bytes
Maximum Number of Associations to a given device	NO	1
Maximum Number of Simultaneous Associations	NO	5

7. Support of Extended Character Sets

There is no support for extended character sets.

8. Error Handling

The response of the Kodak Radiation Oncology Software 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.

Annex A IOD Contents

Created SOP Instances

UID Name	UID Value
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1

Usage of Attributes from received IOD's
Attributes in MWL IOD used by KROS Applications

Attribute	Tag	Search by
Scheduled Procedure Step Sequence	(0040, 0100)	SQ
Scheduled Station AE Title	(0040, 0001)	SV
Scheduled Procedure Step Start Date	(0040, 0002)	DR
Scheduled Procedure Step Start Time	(0040, 0003)	DR
Modality	(0008, 0060)	SV
Scheduled Performing Physician Name	(0040, 0006)	WC
Patient Name	(0010, 0010)	WC
Patient ID	(0010, 1020)	SV

Accession Number ** if supported by broker **	(0008, 0050)	SV

Annex B DATA DICTIONARY OF PRIVATE ATTRIBUTES

Private DICOM tags used to store Image Processing information, whether the pixels have been processed or not. All required if processing selected.
Note: Instead of 04B3, 0010, the ID may be at another location 04B3, 00xy. Then the tags themselves will be at 04B3, xy17 and following. This may happen if 04B3, 0010 contains a value other than private ID of this software (anything other than "Lumisys, Inc. 1999-2002").

DICOM Tag	Type	Description	Value
04B3, 0010	1C	Private ID	Lumisys Inc. 1999-2002
04B3, 1012	1C	Apply mask	
04B3, 1013	1C	Compressed mask	
04B3, 1014	1C	Acquisition Device Processing Description	
04B3, 1015	1C	KROS Processed Window Center	
04B3, 1016	1C	KROS Processed Window Width	
04B3, 1017	1C	Anatomy	-1, //Unknown 1, //Abdomen 2, //Ankle 3, //Arm 4, //Breast 5, //Chest 6, //Clavicle 7, //Coccyx 8, //C-spine 9, //Elbow 10, //Extremity - generic 11, //Foot 12, //Hand 13, //Head 14, //Heart 15, //Hip 16, //Knee 17, //Leg 18, //L-spine 19, //Neck 20, //Pelvis 21, //Shoulder 22, //Skull 23, //S-spine 24, //T-spine 25, //Pediatric 26, //C7-T1 Swimmers 27, //Femur 28, //Finger

DICOM Tag	Type	Description	Value
			29, //Forearm 30, //Humerous 31, //Lower-leg 32, //Odontoid 33, //Portable chest 34, //Sinus 35, //Wrist
04B3, 1018	1C	Projection	-1, //Unknown 1, //Anterior/posterior 2, //Posterior/Anterior 3, //Lateral 4, //Oblique 5 //Decubitus
04B3, 1019	1C	Grid Removal	-1, //None 1, //Horizontal 2, //Vertical
04B3, 1020	1C	Tonescale Brightness	0-10000
04B3, 1021	1C	Tonescale Contrast	0-10000
04B3, 1022	1C	Tonescale Toe	0-10000
04B3, 1023	1C	Tonescale Shoulder	0-10000
04B3, 1030	1C	Frequency Kernel Rank	
04B3, 1031	1C	Frequency Enh. Factor	
04B3, 1032	1C	Frequency Enh. Curve	
04B3, 1040	1C	SCE Kernel Rank	
04B3, 1041	1C	SCE Dark Gamma	
04B3, 1042	1C	SCE Bright Gamma	
04B3, 1043	1C	SCE Invariant	
04B3, 1044	1C	SCE Boost	
04B3, 1050	1C	Wavelet Denoising levels	
04B3, 1051	1C	Wavelet Denoising factor	
04B3, 1052	1C	Wavelet Denoising PMT Setting	
04B3, 1055	1C	KROS preprocessed SOP UID	
04B3, 1070	3	Read status change log	
04B3, 1071	3	Annotation change log	
04B3, 10A0	1C	Annotations data	
04B3, 10B0	1C	Self test results	
04B3, 10FF	1C	Max element	