

# DICOM Conformance Statement for Kodak QC 2.2, 2.3, 2.4, 2.4.2

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|              |                                    |             |

|              | Name            | Position    | Signature | Date |
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## Revision History

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## Acronyms, Abbreviations and Symbols

|         |                                                    |
|---------|----------------------------------------------------|
| ACC     | American College of Cardiology                     |
| ACR     | American College of Radiology                      |
| ASCII   | American Standard Code for Information Interchange |
| AE      | Application Entity                                 |
| ANSI    | American National Standards Institute              |
| CD      | Compact Disc                                       |
| CR      | Computed Radiography                               |
| DICOM   | Digital Imaging and COmmunications in Medicine     |
| DIMSE   | DICOM Message Service Element                      |
| DIMSE-C | DICOM Message Service Element-Composite            |
| DIMSE-N | DICOM Message Service Element-Normalized           |
| HD      | Hard Disc                                          |
| HIS     | Hospital Information System                        |
| HL7     | Health Level 7                                     |
| IE      | Information Entity                                 |
| IOD     | Information Object Definition                      |
| ISO     | International Standard Organization                |
| MOD     | Magneto Optical Disk                               |
| MWL     | Modality Worklist                                  |
| MWM     | Modality Worklist Management                       |
| NEMA    | National Electrical Manufacturers Association      |
| PDU     | Protocol Data Unit                                 |
| RIS     | Radiology Information System                       |
| SC      | Secondary Capture                                  |
| S.COMM  | Storage Commitment                                 |
| SCP     | Service Class Provider                             |
| SCU     | Service Class User                                 |
| SOP     | Service Object Pair                                |
| TCP/IP  | Transmission Control Protocol/Internet Protocol    |
| UID     | Unique Identifier                                  |

# 1.Introduction

This document is a DICOM Conformance Statement for the KodakQC system.

This document is intended to provide the reader with the knowledge of how to integrate this product within a DICOM compliant hospital network. It details DICOM Service Classes and Communication Protocols that are supported in KodakQC.

KodakQC supports following service classes:

- Storage Service Class (SCU)
- Modality Worklist Management Service Class (SCU)

If reader is unfamiliar with DICOM, it is recommended to read the DICOM Specification (referenced in section 1.2) prior to reading this conformance statement.

## 1.1. Overview

This document contains 10 sections (including this Section 1 – Introduction).

Section 2 presents the DICOM implementation model of the KodakQC, supported by detailed application data flow diagrams.

Section 3 provides definition of the Image Transfer Application Entity (AE) that is part of KodakQC. Details are given in the AE Specification.

Section 4 provides definition of the Modality Worklist AE that is part of KodakQC. Details are given in the AE Specification.

Communication Profiles are discussed in section 7, and configuration required by KodakQC is provided in Section 8. Section 9 indicates support for Extended Character Sets.

Annex A provides Information Object Definitions for the modalities supported by KodakQC.

## 1.2.References

ACR-NEMA Digital Imaging and Communications in Medicine, DICOM V3.0, 1999-2000.

## 1.3.Definitions

- **Association Establishment** - An Association Establishment is the first phase of communication between two DICOM Application Entities. The AEs use the Association Establishment to negotiate how data will be encoded and the type of data to be exchanged.
- **Called Application Entity Title** - The Called AE Title defines the intended receiver of an Association.
- **Calling Application Entity Title** - The Calling AE Title defines the requestor of an Association.
- **DICOM Message Service Element (DIMSE)** - A DIMSE defines the services and protocols utilized by an Application Entity to exchange messages.
- **Information Object Definition (IOD)** - An IOD is a data model, which is an abstraction of real-world information. This data model defines the nature and attributes relevant to the class of real-world objects represented.

- **Service Class Provider (SCP)** - A Service Class Provider plays the "server" role to perform operations and invoke notifications during an Association. An example of a Storage Service Class Provider would be an image storage device. In this case, the image storage device is storing the image that was sent by a Service Class User.
- **Service Class User (SCU)** - A Service Class User plays the "client" role to invoke operations and perform notifications during an Association. An example of a Storage Service Class User would be an image acquisition device. In this case, the image acquisition device will create and send a DICOM image by requesting that a Service Class Provider store that image.
- **Service/Object Pair (SOP) Class** - A SOP Class is defined by the union of an Information Object Definition and a set of DIMSE Services. A DICOM Application Entity may support one or more SOP Classes. Each SOP Class is uniquely identified by a SOP Class UID.
- **SOP Instance** - A specific occurrence of an Information Object.
- **Transfer Syntax** - The Transfer Syntax is a set of encoding rules that allow DICOM Application Entities to negotiate the encoding techniques (e.g. data element structure, byte ordering, compression) they are able to support. The Transfer Syntax is negotiated during Association Negotiation.
- **Unique Identifier (UID)** - A Unique Identifier is a globally unique, ISO compliant, ASCII-numeric string. It guarantees uniqueness across multiple countries, sites, vendors and equipment.
- **DICOM File** – A DICOM File is a File with a content of formatted according to the requirements of Part 10 of the DICOM standard.

## 2.Implementation Model

KodakQC is a medical acquisition system that supports Computed Radiography (CR). KodakQC encompasses the following DICOM Application Entities:

- KODAKQC IMAGE TRANSFER AE - to exchange images with other Application Entities by the means of DICOM network exchange. It implements the following Service Class:
  - Storage as SCU
- KODAKQC STORAGE COMMITMENT AE - to ask for safe storage approval of images that where already sent to other Application Entities in previous associations by the means of DICOM network exchange. It implements the following Service Class:
  - Storage Commitment as SCU
- KODAKQC MWL AE - to fetch modality worklists from a worklist manager. It implements the following Service Class:
  - DICOM Modality Worklist SCU
- KODAKQC PRINT AE - to exchange print pages with other Application Entities by the means of DICOM network exchange. It implements the following Service Class:
  - Print as SCU

### 2.1.Image Transfer

KODAKQC IMAGE TRANSFER AE is implemented as a single application entity and performs the following services:

- sends/exports images to remote DICOM storage devices (acts as Storage SCU)

#### 2.1.1.Application Data Flow

Figure 1 illustrates the following scenarios:

- Send a **STORE Request** to a remote DICOM AE in case of automatic or manual sending request.

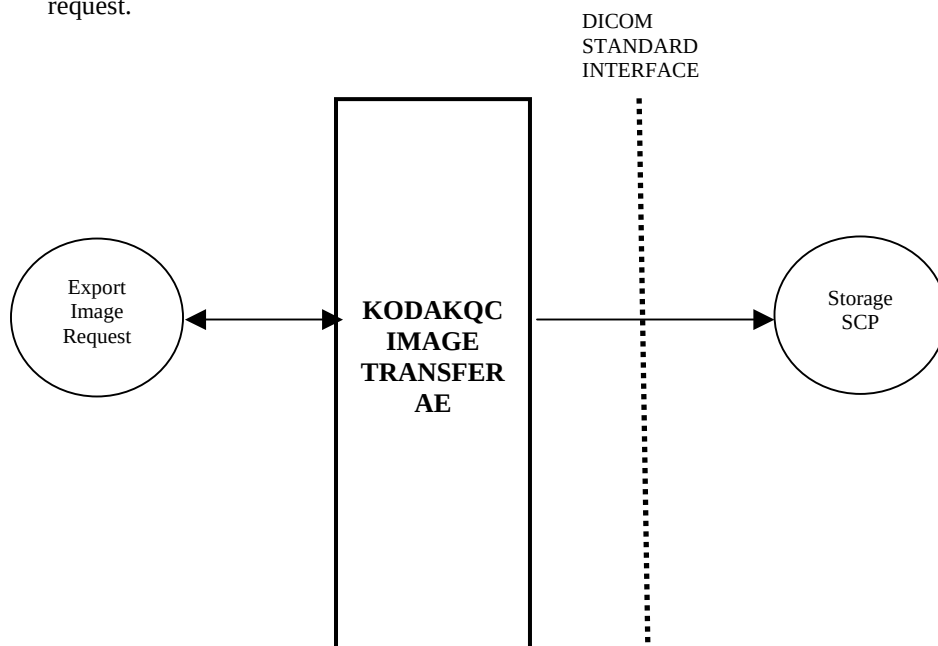


Figure 1: Image Transfer Data Flow Diagram

### 2.1.2.Functional Definitions of Application Entities

The KODAKQC IMAGE TRANSFER AE component operates as a service. The startup sequence of the KodakQC system initiates its execution. The service is NOT shut down when the KodakQC application is closed

### 2.1.3.Sequencing of Real-World Activities

- Automatic sending of images - When an Image is accepted in the scan mode and a default DICOM store SCP (like PACS etc.) is configured than the image is being sent to it.
- Manual sending of images - the user can enter the Archive tool and select images to be sent to the storage device.

## 2.2.Storage Commitment

KODAKQC Storage Commitment AE is implemented as a single application entity and performs the following services:

- sends/exports N\_ACTION requests to remote DICOM storage device (acts as S.Comm SCU).
- receives N\_EVENT\_REPORT requests from storage device

### 2.2.1.Application Data Flow

Figure 1 illustrates the following scenarios:

- Send an **N\_ACTION request** to a remote DICOM AE in case the preceding image transfer request was successful and associated to the storage commitment destination.

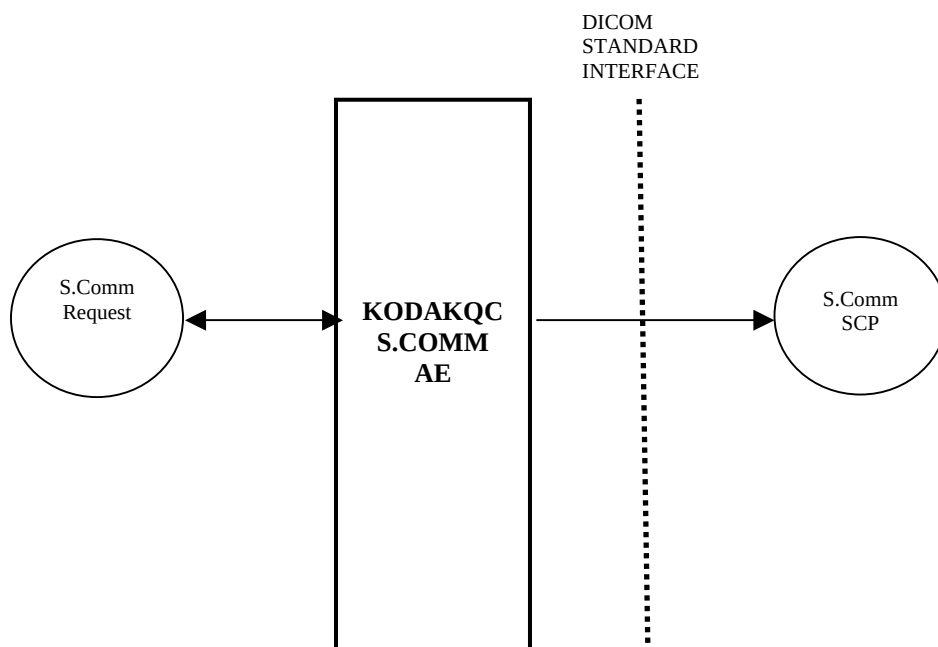


Figure 1: Storage Commitment Data Flow Diagram



### 2.2.2.Functional Definitions of Application Entities

The KODAKQC S.COMM AE component operates as a service. The startup sequence of the KodakQC system initiates its execution. The service is NOT shut down when the KodakQC application is closed

### 2.2.3.Sequencing of Real-World Activities

- After a successful transfer of image (as described at 2.1.3 ) to a device with S.Comm SCP capability then the AE initiates a new association for sending N\_ACTION request using above image SOP Class/Instance UID pair.
- The service always listens (waits for association, on local port 104) to a different association initiated by the S.Comm SCP to receive the outcome of the commitment requests (N\_EVENT\_REPORT) and updates its as Success/Failure in the KodakQC database.

## 2.3.Modality Worklist

### 2.3.1.Application Data Flow

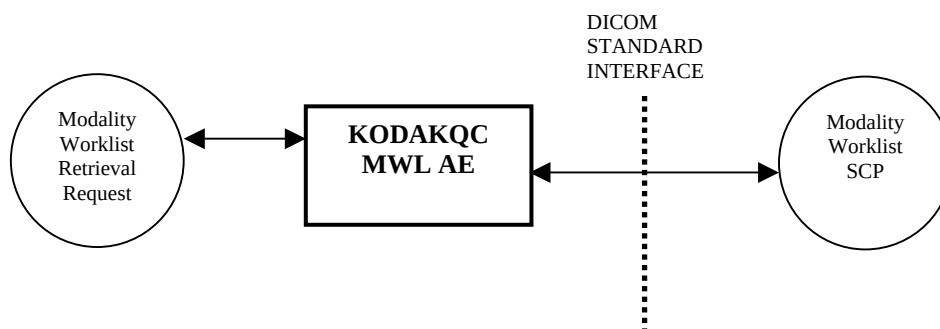


Figure 2: Modality Worklist Data Flow Diagram

### 2.3.2.Functional Definitions of Application Entities

KODAKQC MWL AE is used to query modality worklist information from a remote DICOM device. It therefore performs the following tasks:

- Establishes a DICOM Association with a remote DICOM device.
- Issues a request for a worklist to a remote DICOM device.
- Retrieves Modality Worklist from a remote DICOM device.

KODAKQC MWL AE component operates as part of the KodakQC application. It is shut down when the application terminates.

### 2.3.3.Sequencing of Real-World Activities

Not applicable.

## 2.4.Print

KODAKQC PRINT AE is implemented as a single application entity and performs the following services:

- sends/exports print film boxes to remote DICOM Print device as laser imagers etc. (acts as Print SCU)

### 2.4.1.Application Data Flow

Figure 1 illustrates the following scenarios:

- Send a **PRINT Request** to a remote DICOM AE in case of automatic or manual printing request.

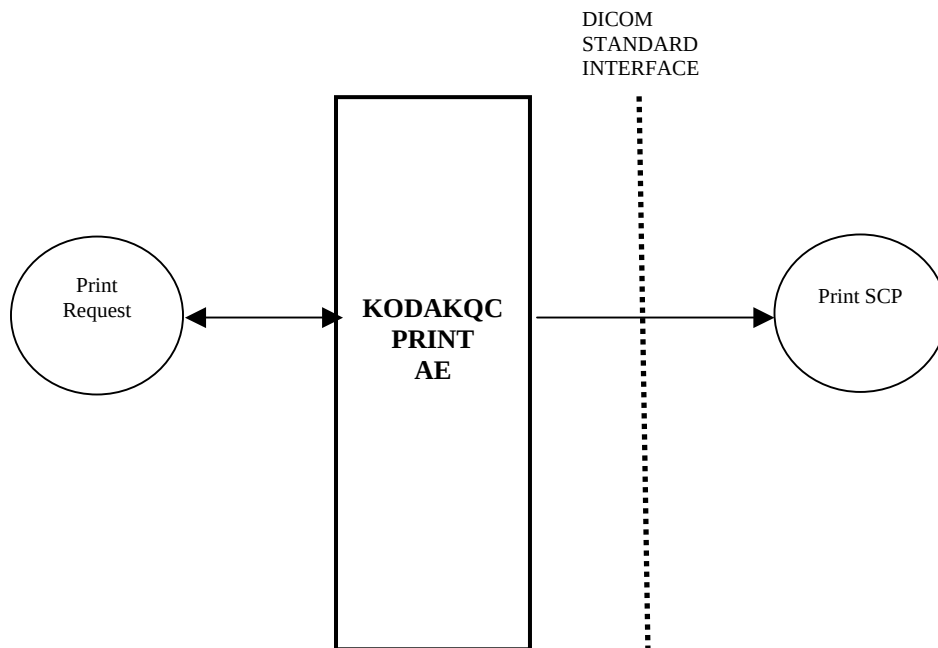


Figure 1: Print Data Flow Diagram

### 2.4.2.Functional Definitions of Application Entities

The KODAKQC PRINT AE component operates as a service. The startup sequence of the KodakQC system initiates its execution. The service is NOT shut down when the KodakQC application is closed

KODAKQC PRINT AE uses a configuration file that contains information used to describe both local as well as remote Application Entities.

#### 2.4.3. Sequencing of Real-World Activities

- Automatic sending of single image print page - When an Image is accepted in the scan mode and a default DICOM Print SCP is configured then the print page of the image is being sent to it.
- Manual printing of images - the user can enter the Viewer tool and select images to be printed.

### 3. KODAKQC IMAGE TRANSFER AE Specification

KODAKQC IMAGE TRANSFER AE provides Standard Conformance to the following DICOM SOP Class as an SCU:

| SOP Class Name   | SOP Class UID             |
|------------------|---------------------------|
| CR Image Storage | 1.2.840.10008.5.1.4.1.1.1 |

#### 3.1. Association Establishment Policy

##### 3.1.1. General

The maximum length of PDU that the KODAKQC IMAGE TRANSFER AE will receive is 16384.

##### 3.1.2. Number of Associations

The KODAKQC IMAGE TRANSFER AE can initiate one association concurrently..

##### 3.1.3. Asynchronous nature

The KODAKQC IMAGE TRANSFER AE allows a single outstanding operation on any association. Therefore, KodakQC AE does not support asynchronous operations and will not perform asynchronous window negotiation, other than the default as specified by the DICOM specification.

##### 3.1.4. Implementation Identifying Information

The KODAKQC IMAGE TRANSFER AE is identified by the following ids:  
Implementation Class UID: 1.2.3  
Implementation Version Name: ver 1

#### 3.2. Association Initiation by Real World Activity

This section details the action of the KODAKQC IMAGE TRANSFER AE SCU component as a result of user initiated activity on the KodakQC Application User Interface.

##### 3.2.1. Export Image Request

###### 3.2.1.1. Associated Real World Activity

Automatic export:

The user configures the KodakQC application to automatically export a study after it has been performed. The user sets up the default destination and no further intervention on the user part is required. The KODAKQC IMAGE TRANSFER AE transfers the images in the background.

###### 3.2.1.2. Proposed Presentation Contexts

| Presentation Context Table |
|----------------------------|
|----------------------------|

| Abstract Syntax  |                           | Transfer Syntax           |                   | Role | Extended Negotiation |
|------------------|---------------------------|---------------------------|-------------------|------|----------------------|
| Name             | UID                       | Name List                 | UID List          |      |                      |
| CR Image Storage | 1.2.840.10008.5.1.4.1.1.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU  | None                 |

### 3.2.1.3.SOP-Specific Conformance

This implementation supports transfers as an SCU as described in NEMA PS3.4 (2000) Annex B.

The Information Object attributes that are encapsulated in a dataset and sent with the C-STORE request are specified in Annex A of this document.

### 3.3.Association Acceptance Policy

NA.

## 4.KODAKQC STORAGE COMMITMENT AE Specification

KODAKQC S.COMM AE provides Standard Conformance to the following DICOM SOP Class as an SCU:

| SOP Class Name                      | SOP Class UID        |
|-------------------------------------|----------------------|
| Storage Commitment Push Model Class | 1.2.840.10008.1.20.1 |

### 4.1.Association Establishment Policy

#### 4.1.1.General

The maximum length of PDU that the KODAKQC S.COMM AE will receive is 16384.

#### 4.1.2.Number of Associations

The KODAKQC S.COMM AE can initiate one association concurrently..

#### 4.1.3.Asynchronous nature

The KODAKQC S.COMM AE allows a single outstanding operation on any association. Therefore, KodakQC AE does not support asynchronous operations and will not perform asynchronous window negotiation, other than the default as specified by the DICOM specification.

#### 4.1.4.Implementation Identifying Information

The KODAKQC S.COMM AE is identified by the following ids:

Implementation Class UID: 1.2.3

Implementation Version Name: ver 1

### 4.2.Association Initiation by Real World Activity

This section details the action of the KODAKQC S.COMM AE SCU component as a result of user initiated activity on the KodakQC Application User Interface.

#### 4.2.1.Storage commitment Request

##### 4.2.1.1.Associated Real World Activity

Automatic N\_ACTION requests after sending images to storage device

##### 4.2.1.2.Proposed Presentation Contexts

| Presentation Context Table          |                      |                           |                   |      |                      |
|-------------------------------------|----------------------|---------------------------|-------------------|------|----------------------|
| Abstract Syntax                     |                      | Transfer Syntax           |                   | Role | Extended Negotiation |
| Name                                | UID                  | Name List                 | UID List          |      |                      |
| Storage Commitment Push Model Class | 1.2.840.10008.1.20.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU  | None                 |

##### 4.2.1.3.SOP-Specific Conformance

This implementation supports transfers as an SCU as described in NEMA PS3.4 (2000) Annex B.

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### **4.3.Association Acceptance Policy**

The KODAKQC S.COMM AE accepts Associations on port 104 for N\_EVENT\_REPORT requests as an SCU and C\_ECHO requests as an SCP.

## 5.KODAKQC MWL AE Specification

### 5.1.Association Establishment Policy

#### 5.1.1.General

When KodakQC Application issues a request to retrieve a Modality Worklist, it initiates an association to the Modality Worklist SCP through the KODAKQC MWL AE Component.

#### 5.1.2.Number of Associations

KODAKQC MWL AE initiates one association with the default remote Modality Worklist SCP. The association is released once the worklist has been fetched.

#### 5.1.3.Asynchronous nature

This release does not support asynchronous operations and will not perform asynchronous window negotiation.

#### 5.1.4.Implementation Identifying Information

The KODAKQC MWL AE is identified by the following ids:  
Implementation Class UID: 1.2.840.113564.3.2  
Implementation Version Name: not specified

### 5.2.Association Initiation by Real World Activity

#### 5.2.1.Modality Worklist Retrieval Request

##### 5.2.1.1.Associated Real World Activity

The user of the KodakQC Application selects the Retrieve Worklist operation button on the user interface.

##### 5.2.1.2.Proposed Presentation Contexts

| Presentation Context Table   |                        |                            |                   |      |                      |
|------------------------------|------------------------|----------------------------|-------------------|------|----------------------|
| Abstract Syntax              |                        | Transfer Syntax            |                   | Role | Extended Negotiation |
| Name                         | UID                    | Name                       | UID               |      |                      |
| Modality Worklist Model FIND | 1.2.840.10008.5.1.4.31 | Implicit VR, Little Endian | 1.2.840.10008.1.2 | SCU  | None                 |

### 5.3.Association Acceptance Policy

The KODAKQC MWL AE does not accept association requests.

## 6.KODAKQC PRINT AE Specification

KODAKQC S.COMM AE provides Standard Conformance to the following DICOM SOP Class as an SCU:

| SOP Class Name                                     | SOP Class UID           |
|----------------------------------------------------|-------------------------|
| Basic Grayscale Print Management<br>Meta SOP Class | 1.2.840.10008.5.1.1.9   |
| Basic Film Session SOP Class                       | 1.2.840.100008.5.1.1.1  |
| Basic Film Box SOP Class                           | 1.2.840.100008.5.1.1.2  |
| Basic Grayscale Image Box SOP Class                | 1.2.840.100008.5.1.1.4  |
| Printer SOP Class                                  | 1.2.840.100008.5.1.1.16 |

### 6.1.Association Establishment Policy

#### 6.1.1.General

The maximum length of PDU that the KODAKQC PRINT AE will receive is 16384.

#### 6.1.2.Number of Associations

The KODAKQC PRINT AE can initiate one association concurrently..

#### 6.1.3.Asynchronous nature

The KODAKQC PRINT AE allows a single outstanding operation on any association. Therefore, KodakQC AE does not support asynchronous operations and will not perform asynchronous window negotiation, other than the default as specified by the DICOM specification.

#### 6.1.4.Implementation Identifying Information

The KODAKQC PRINT AE is identified by the following ids:

Implementation Class UID: 1.2.3

Implementation Version Name: ver 1

### 6.2.Association Initiation by Real World Activity

This section details the action of the KODAKQC PRINT AE SCU component as a result of user initiated activity on the KodakQC Application User Interface.

#### 6.2.1.Print Request

##### 6.2.1.1.Associated Real World Activity

Automatic N\_ACTION requests after sending images to storage device

##### 6.2.1.2.Proposed Presentation Contexts

| Presentation Context Table |
|----------------------------|
|----------------------------|

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| Abstract Syntax                                    |                       | Transfer Syntax           |                   | Role | Extended Negotiation |
|----------------------------------------------------|-----------------------|---------------------------|-------------------|------|----------------------|
| Name                                               | UID                   | Name List                 | UID List          |      |                      |
| Basic Grayscale Print Management<br>Meta SOP Class | 1.2.840.10008.5.1.1.9 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU  | None                 |

#### 6.2.1.3.SOP-Specific Conformance for Basic Film Session SOP Class

| Attribute        | SCU Usage | Tag         | Possible Values                             |
|------------------|-----------|-------------|---------------------------------------------|
| Number of Copies | U         | (2000,0010) | 1                                           |
| Print Priority   | U         | (2000,0020) | MED                                         |
| Medium Type      | U         | (2000,0030) | PAPER, CLEAR FILM, BLUE FILM.               |
| Film Destination | U         | (2000,0040) | MAGAZINE, PROCESSOR, BIN_n (where n=1 to 5) |

#### 6.2.1.4.SOP-Specific Conformance for Basic Film box SOP Class

| Attribute                        | SCU Usage | Tag         | Possible Values                                               |
|----------------------------------|-----------|-------------|---------------------------------------------------------------|
| Image Display Format             | M         | (2010,0010) | STANDARD\C,R                                                  |
| Referenced Film Session Sequence | M         | (2010,0500) |                                                               |
| >Referenced SOP Class UID        | M         | (0008,1150) | 1.2.840.10008.5.1.1.1                                         |
| >Referenced SOP Instance UID     | M         | (0008,1155) |                                                               |
| Film Orientation                 | U         | (2010,0040) | PORTRAIT, LANDSCAPE                                           |
| Film Size ID                     | M         | (2010,0050) | 8INX10IN, 10INX12IN, 11INX14IN,14INX14IN, 14INX17IN,24CMX30CM |
| Magnification Type               | U         | (2010,0060) | REPLICATE, BILINEAR, CUBIC, NONE                              |
| Border Density                   | U         | (2010,0100) | BLACK, WHITE, 0-400                                           |
| Empty Image Density              | U         | (2010,0110) | BLACK, WHITE, 0-400                                           |
| Min Density                      | U         | (2010,0120) | 0-400                                                         |
| Max Density                      | U         | (2010,0130) | 0-400                                                         |
| Trim                             | U         | (2010,0140) | YES, NO                                                       |
| Configuration Information        | U         | (2010,0150) | User defined                                                  |
| Smoothing Type                   | U         | (2010,0080) | Valid only for Magnification                                  |

|  |  |  |             |
|--|--|--|-------------|
|  |  |  | Type CUBIC. |
|--|--|--|-------------|

#### 6.2.1.5.SOP-Specific Conformance for Basic Image Box SOP Class

| Attribute                             | SCU Usage | Tag         | Possible Values                          |
|---------------------------------------|-----------|-------------|------------------------------------------|
| Image Position                        | M         | (2020,0010) | 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) | MONOCHROME2                              |
| >Rows                                 | M         | (0028,0010) | Number of rows                           |
| >Columns                              | M         | (0028,0011) | Number of Columns                        |
| >Pixel Aspect Ratio                   | MC        | (0028,0034) | 1\1                                      |
| >Bits Allocated                       | M         | (0028,0100) | 16                                       |
| >Bits Stored                          | M         | (0028,0101) | 12                                       |
| >High Bit                             | M         | (0028,0102) | 11                                       |
| >Pixel Representation                 | M         | (0028,0103) | 0000H (unsigned integer)                 |
| >Pixel Data                           | M         | (7FE0,0010) | Image Data                               |
| Polarity                              |           | (2020,0020) | NORMAL                                   |
| Requested Image Size                  | U         | (2020,0030) | Row length in mm                         |
| Requested Decimate/Crop Behavior      |           | (2020,0040) | CROP                                     |

#### 6.3.Association Acceptance Policy

NA.

## **7.Communications Profiles**

### **7.1. Supported Communication Stacks**

The DICOM V3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard is supported.

### **7.2. OSI Stack**

Not applicable to this product.

### **7.3. TCP/IP Stack**

#### **7.3.1.API**

The KODAKQC IMAGE TRANSFER AE KODAKQC MWL AE implementations use Berkeley style sockets.

#### **7.3.2. Physical Media Support**

KodakQC is indifferent to the physical medium over which TCP/IP executes; it inherits the medium from the computer system upon which it executes.

### **7.4. Point to Point Stack**

Not applicable to this product.

## 8.Configuration

### 8.1.KODAKQC IMAGE TRANSFER AE Configuration

KodakQC Service Manual, supplied with the product, defines the available configuration parameters.

Application entity host names can be specified as either IP address or host name.

### 8.2.KODAKQC STORAGE COMMITMENT AE Configuration

KodakQC Service Manual, supplied with the product, defines the available configuration parameters.

Application entity host names can be specified as either remote IP address or host name. It will receive association requests only on local port 104.

### 8.3.KODAKQC MWL AE Configuration

KodakQC Service Manual, supplied with the product, defines the available configuration parameters.

Local AE title can be set.

Parameters of the remote MWL SCP can be set (i.e., AE title, host name or IP address)

### 8.4.KODAKQC PRINT AE Configuration

KodakQC Service Manual, supplied with the product, defines the available configuration parameters.

Application entity host names can be specified as either IP address or host name.

## 9.Support of Extended Character Sets

- ISO\_IR 100 (European Languages)
- GB18030 (Chinese)
- \ISO 2022 IR 87 (Japanese for Kanji, full **only** Katakana, Hiragana).
- ISO 2022 IR 13\ISO 2022 IR 87 (Japanese for Kanji, **full and half** Katakana, Hiragana).
- ISO\_IR 144 (Cyrillic – Russian).
- ISO\_IR 148(Turkish).

## 10. Annex A - Information Object Definitions

The Information Object Definitions for Digital Computed Radiography (CR) image is described in this section.

### 10.1. Computed Radiography (CR) Information Object Definition

KodakQC supports sending of CR images.

#### 10.1.1. Information Object Definitions For CR Image IOD

##### 10.1.1.1. Patient Module

| Attribute Name                     | Tag          | Type | Attribute Assignment                           |
|------------------------------------|--------------|------|------------------------------------------------|
| Patient's Name                     | (0010, 0010) | 2    | From User or MWL                               |
| Patient ID                         | (0010, 0020) | 2    | From User or MWL                               |
| Patient's Birth Date               | (0010, 0030) | 2    | From User or MWL                               |
| Patient's Sex                      | (0010, 0040) | 2    | From User or MWL                               |
| Referenced Patient Sequence        | (0008,1120)  | 3    | Not set                                        |
| >Referenced SOP Class UID          | (0008,1150)  | 1C   | Required if Referenced Patient Sequence is set |
| >Referenced SOP Class Instance UID | (0008,1155)  | 1C   | Required if Referenced Patient Sequence is set |

##### 10.1.1.2. General Study Module

| Attribute Name                     | Tag          | Type | Attribute Assignment                      |
|------------------------------------|--------------|------|-------------------------------------------|
| Study Instance UID                 | (0020, 000D) | 1    | Auto generated or from MWL                |
| Study Date                         | (0008, 0020) | 2    | Always set                                |
| Study Time                         | (0008, 0030) | 2    | Always set                                |
| Referring Physician's Name         | (0008, 0090) | 2    | From User or MWL                          |
| Study ID                           | (0020, 0010) | 2    | Length=0                                  |
| Accession Number                   | (0008, 0050) | 2    | From User or MWL                          |
| Study Description                  | (0008,1030)  | 3    | From User or MWL                          |
| Physician(s) of Record             | (0008,1048)  | 3    | Not set                                   |
| Name of Physician(s) Reading Study | (0008,1060)  | 3    | Not set                                   |
| Referenced Study Sequence          | (0008,1110)  | 3    | Not set                                   |
| >Referenced SOP Class UID          | (0008,1150)  | 1C   | Required Referenced Study Sequence is set |
| >Referenced SOP Class Instance UID | (0008,1155)  | 1C   | Required Referenced Study Sequence is set |
| Procedure Code Sequence            | (0008,1032)  | 3    | Not set                                   |
| >Code Value                        | (0008,0100)  | 1C   | Required if Procedure Code Sequence       |

|                           |             |    |                                                                        |
|---------------------------|-------------|----|------------------------------------------------------------------------|
|                           |             |    | present                                                                |
| >Coding Scheme Designator | (0008,0102) | 1C | Required if Procedure Code Sequence present                            |
| >Coding Scheme Version    | (0008,0103) | 1C | Required if Procedure Code Sequence present and its value is available |
| >Code Meaning             | (0008,0104) | 1C | Required if Procedure Code Sequence present                            |

#### 10.1.1.3. Patient Study Module

| Attribute Name                  | Tag          | Type | Attribute Assignment |
|---------------------------------|--------------|------|----------------------|
| Admitting Diagnoses Description | (0008,1080)  | 3    | Not set              |
| Patient's Age                   | (0010, 1010) | 3    | Not set              |
| Patient's Size                  | (0010,1020)  | 3    | Not set              |
| Patient's Weight                | (0010,1030)  | 3    | Not set              |
| Occupation                      | (0010,2180)  | 3    | Not set              |
| Additional Patient's History    | (0010,21B0)  | 3    | Not set              |

#### 10.1.1.4. General Series Module

| Attribute Name                      | Tag          | Type | Attribute Assignment                                  |
|-------------------------------------|--------------|------|-------------------------------------------------------|
| Modality                            | (0008, 0060) | 1    | CR                                                    |
| Series Instance UID                 | (0020, 000E) | 1    | Always set                                            |
| Series Number                       | (0020, 0011) | 2    | Always set                                            |
| Laterality                          | (0020,0060)  | 2C   | Length=0                                              |
| Series Date                         | (0008,0021)  | 3    | Not set                                               |
| Series Time                         | (0008,0031)  | 3    | Not set                                               |
| Performing Physician's Name         | (0008,1050)  | 3    | Not set                                               |
| Protocol Name                       | (0018,1030)  | 3    | Not set                                               |
| Series Description                  | (0018,103E)  | 3    | Not set                                               |
| Operator's Name                     | (0008,1070)  | 3    | Not set                                               |
| Referenced Study Component Sequence | (0008,1111)  | 3    | Not set                                               |
| >Referenced SOP Class UID           | (0008,1150)  | 1C   | Set if Referenced Study Component Sequence is present |
| >Referenced SOP Instance UID        | (0008,1155)  | 1C   | Set if Referenced Study Component Sequence is present |
| Body Part Examined                  | (0018,0015)  | 2    | Always set                                            |
| Patient Position                    | (0018,5100)  | 2    | Length=0                                              |
| Smallest Pixel Value in Series      | (0028,0108)  | 3    | Not set                                               |

|                                       |             |    |                                                                                       |
|---------------------------------------|-------------|----|---------------------------------------------------------------------------------------|
| Largest Pixel Value in Series         | (0028,0109) | 3  | Not set                                                                               |
| Request Attributes Sequence           | (0040,0275) | 3  | Not set                                                                               |
| >Requested Procedure ID               | (0040,1001) | 1C | Set if Request Attributes Sequence is present                                         |
| >Scheduled Procedure Step ID          | (0040,0009) | 1C | Set if Request Attributes Sequence is present                                         |
| >Scheduled Procedure Step Description | (0040,0007) | 1C | Set if Request Attributes Sequence is present and the value is available              |
| >Scheduled Action Item Code Sequence  | (0040,0008) | 3  | Not set                                                                               |
| >>Code Value                          | (0008,0100) | 1C | Required if Scheduled Action Item Code Sequence is present                            |
| >>Coding Scheme Designator            | (0008,0102) | 1C | Required if Scheduled Action Item Code Sequence is present                            |
| >>Coding Scheme Version               | (0008,0103) | 1C | Required if Scheduled Action Item Code Sequence is present and its value is available |
| >>Code Meaning                        | (0008,0104) | 1C | Required if Scheduled Action Item Code Sequence is present                            |
| Performed Procedure Step ID           | (0040,0253) | 3  | Not set                                                                               |
| Performed Procedure Step Start Date   | (0040,0244) | 3  | Not set                                                                               |
| Performed Procedure Step Start Time   | (0040,0245) | 3  | Not set                                                                               |
| Performed Procedure Step Description  | (0040,0254) | 3  | Not set                                                                               |
| Performed Action Item Code Sequence   | (0040,0260) | 3  | Not set                                                                               |
| >Code Value                           | (0008,0100) | 1C | Required if Performed Action Item Code Sequence is present                            |
| >Coding Scheme Designator             | (0008,0102) | 1C | Required if Performed Action Item Code Sequence is present                            |
| >Coding Scheme Version                | (0008,0103) | 1C | Required if Performed Action Item Code Sequence is present and its value is available |
| >Code Meaning                         | (0008,0104) | 1C | Required if Performed Action Item Code Sequence is present                            |

#### 10.1.1.5.CR Series Module

| Attribute Name      | Tag          | Type | Attribute Assignment |
|---------------------|--------------|------|----------------------|
| Body Part Examined  | (0018, 0015) | 2    | Always set           |
| View Position       | (0018,5101)  | 2    | Always set           |
| Filter Type         | (0018,1160)  | 3    | Not set              |
| Colimator/grid Name | (0018,1180)  | 3    | Not set              |
| Focal Spot          | (0018, 1190) | 3    | Not set              |
| Plate Type          | (0018, 1260) | 3    | Not set              |
| Phosphor Type       | (0018, 1261) | 3    | Not set              |

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#### 10.1.1.6.General Equipment Module

| Attribute Name                | Tag          | Type | Attribute Assignment          |
|-------------------------------|--------------|------|-------------------------------|
| Manufacturer                  | (0008, 0070) | 2    | Always set                    |
| Institution Name              | (0008, 0080) | 3    | Always set                    |
| Institution Address           | (0008, 0080) | 3    | Not set                       |
| Station Name                  | (0008,1010)  | 3    | Not set                       |
| Institutional Department Name | (0008,1040)  | 3    | Not set when no entry is made |
| Manufacturer's Model Name     | (0008,1090)  | 3    | Always set                    |
| Device Serial Number          | (0018,1000)  | 3    | Not set                       |
| Software Versions             | (0018,1020)  | 3    | Not set                       |

#### 10.1.1.7.General Image Module

| Attribute Name          | Tag          | Type | Attribute Assignment |
|-------------------------|--------------|------|----------------------|
| Instance Number         | (0020, 0013) | 2    | Always set           |
| Patient Orientation     | (0020,0020)  | 2C   | Length=0             |
| Content Date            | (0008, 0023) | 2C   | Not set              |
| Content Time            | (0008, 0033) | 2C   | Not set              |
| Image Type              | (0008, 0008) | 3    | Not set              |
| Image Comments          | (0020,4000)  | 3    | Not set              |
| Derivation Description  | (0008, 2111) | 3    | Not set              |
| Pixel Spacing           | (0028, 0030) | 3    | Always set           |
| Lossy Image Compression | (0028, 2110) | 3    | Not set              |

#### 10.1.1.8. Image Pixel Module

| Attribute Name             | Tag          | Type | Attribute Assignment |
|----------------------------|--------------|------|----------------------|
| Samples per Pixel          | (0028, 0002) | 1    | 1                    |
| Photometric Interpretation | (0028, 0004) | 1    | MONOCHROME2          |
| Rows                       | (0028, 0010) | 1    | Always set           |
| Columns                    | (0028, 0011) | 1    | Always set           |
| Bits Allocated             | (0028, 0100) | 1    | Always set ( 16 )    |
| Bits Stored                | (0028, 0101) | 1    | Always set ( 12 )    |
| High Bit                   | (0028, 0102) | 1    | Always set ( 11 )    |



|                            |              |    |                    |
|----------------------------|--------------|----|--------------------|
| Pixel Representation       | (0028, 0103) | 1  | Always set ( 0 )   |
| Pixel Data                 | (7FE0, 0010) | 1  | Always set         |
| Planar Configuration       | (0028, 0006) | 1C | Not set            |
| Pixel Aspect Ratio         | (0028, 0034) | 1C | Always set ( 1\1 ) |
| Smallest Image Pixel Value | (0028, 0106) | 3  |                    |
| Largest Image Pixel Value  | (0028, 0107) | 3  |                    |

#### 10.1.1.9.CR Image Module

| Attribute Name              | Tag          | Type | Attribute Assignment |
|-----------------------------|--------------|------|----------------------|
| KVP                         | (0018, 0060) | 3    | Set in Grayling mode |
| Plate ID                    | (0018,1004)  | 3    | Always set           |
| Distance Source to Detector | (0018,1110)  | 3    | Set in Grayling mode |
| X-Ray Tube Current          | (0018, 1151) | 3    | Not set              |
| Exposure Time               | (0018,1150)  | 3    | Not set              |
| Exposure                    | (0018,1152)  | 3    | Not set              |
| Exposure in uAs             | (0018,1153)  | 3    | Set in Grayling mode |
| Image Area Dose Product     | (0018,115E)  | 3    | Set in Grayling mode |
| Focal Spot                  | (0018,1190)  | 3    | Not set              |
| Relative X-Ray Exposure     | (0018,1405)  | 3    | Always set           |

#### 10.1.1.10.Modality LUT Module

| Attribute Name        | Tag          | Type | Attribute Assignment |
|-----------------------|--------------|------|----------------------|
| Modality LUT Sequence | (0028, 3000) | 1C   | Not set              |
| >LUT Descriptor       | (0028,3002)  | 1C   | Not set              |
| >LUT Explanation      | (0028,3003)  | 3    | Not set              |
| >Modality LUT Type    | (0028,3004)  | 1C   | Not set              |
| >LUT Data             | (0028,3006)  | 1C   | Not set              |
| Rescale Intercept     | (0028,1052)  | 1C   | Always set ( 0 )     |
| Rescale Slope         | (0028,1053)  | 1C   | Always set ( 1 )     |
| Rescale Type          | (0028, 1054) | 1C   | Always US            |

#### 10.1.1.11.VOI LUT Module

| Attribute Name   | Tag         | Type | Attribute Assignment |
|------------------|-------------|------|----------------------|
| VOI LUT Sequence | (0028,3010) | 3    | Not set              |
| >LUT Descriptor  | (0028,3002) | 1C   | Not set              |
| >LUT Explanation | (0028,3003) | 1C   | Not set              |

|               |             |    |            |
|---------------|-------------|----|------------|
| >LUT Data     | (0028,3006) | 1C | Not set    |
| Window Center | (0028,1050) | 1C | Always set |
| Window Width  | (0028,1051) | 1C | Always set |

#### 10.1.1.12.SOP Common Module

| Attribute Name         | Tag          | Type | Attribute Assignment                     |
|------------------------|--------------|------|------------------------------------------|
| SOP Class UID          | (0008, 0016) | 1    | Always set                               |
| SOP Instance UID       | (0008, 0018) | 1    | Always set                               |
| Specific Character Set | (0008, 0005) | 1C   | As in Support of Extended Character Sets |