FUJIFILM

DICOM Conformance Statement

CR Console

(Standard)

June 2007
10th Edition

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Revision History

History	Date	Revision Description
1st Edition	April, 2002	
2nd Edition	October, 2002	
3rd Edition	January, 2003	
4th Edition	May, 2003	
5th Edition	April, 2004	
6th Edition	July, 2005	
7th Edition	June, 2006	
8th Edition	October, 2006	The corporate name was changed.
9th Edition	March, 2007	
10th Edition	June, 2007	

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1. Introduction

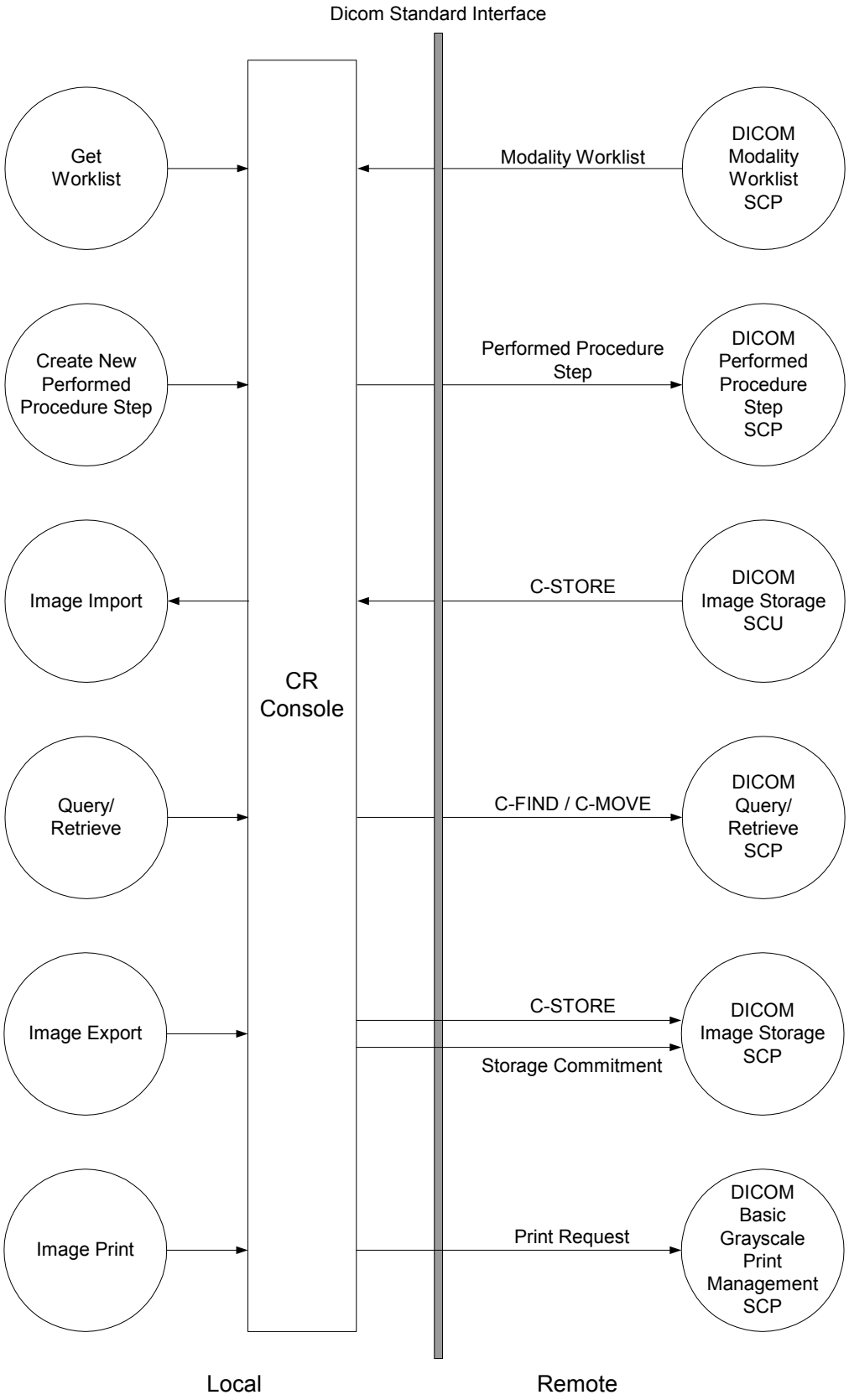
This document provides the DICOM conformance statement for the CR Console.

2. Implementation Mode

Connected to the Fuji Computed Radiography, the CR Console constitutes an X-ray imaging generating modality and contains the following service classes.

- Modality Worklist Management
- Modality Performed Procedure Step
- CR Storage and Storage Commitment
- Basic Grayscale Print Management
- Digital Mammography Image Storage
- Query/Retrieve

2.1 Data Flow Diagram



2.2 Functional Definitions of Application Entities

- The CR Console has a DICOM interface with the HIS/RIS, archives, and printers.
- The CR Console retrieves the actual worklist from the HIS/RIS.
- The CR Console informs the HIS/RIS that a particular procedure step has started/completed.
- The CR Console transmits acquired image data to the Archive.
- The CR Console prints acquired image data with the Printer.
- The CR Console retrieves the requested images from the Image Server.

2.3 Sequencing of Real World Activities

Not applicable to Real World Activities.

3. AE Specification

3.1 CR Console AE Specification

The CR Console Application Entity provides Standard Conformance to the following DICOM SOP classes.

SOP Class Name	SOP Class UID	Role
Verification SOP Class	1.2.840.10008.1.1	SCU / SCP
Modality Worklist Information Model – FIND SOP Class	1.2.840.10008.5.1.4.31	SCU
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3	SCU
Computed Radiography Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.1	SCU / SCP
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.2.1	SCU
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	SCU
Digital Mammography Image Storage-for Presentation	1.2.840.10008.5.1.4.1.1.1.2	SCU / SCP
Digital Mammography Image Storage-for Processing	1.2.840.10008.5.1.4.1.1.1.2.1	SCU / SCP
Study Root Query/Retrieve Information Model – FIND SOP Class	1.2.840.10008.5.1.4.1.2.2.1	SCU
Study Root Query/Retrieve Information Model – MOVE SOP Class	1.2.840.10008.5.1.4.1.2.2.2	SCU

3.1.1 Association Establishment Policies

3.1.1.1 General

- N-CREATE and N-SET of Modality Performed Procedure Step will be issued through different associations established as time elapses.
- N-EVENT-REPORT of Storage Commitment can be received either through the association that has issued N-ACTION or any other associations. The CR Console accepts a request for establishing an association so that it is available for the latter case and functions as the SCU in SCP/SCU ROLE SELECTION NEGOTIATION.
- The maximum PDU size is 32K Bytes.

3.1.1.2 Number of Associations

The CR Console will establish the following associations at a time.

- Three associations as Computed Radiography Image Storage SOP Class SCU.
- One association as MWM and MPPS SCU.
- One association as Basic Grayscale Print Management Meta SOP Class SCU.
- Four associations as Study Root Query/Retrieve Information Model – FIND SOP Class SCU.
- One association as Study Root Query/Retrieve Information Model – MOVE SOP Class SCU.
- One association as Computed Radiography Image Storage SOP Class SCP.

3.1.1.3 Asynchronous Nature

Does not support negotiation of multiple outstanding transactions.

3.1.1.4 Implementation ID information

Implementation Class UID is 1.2.392.200036.9125.5342.1

3.1.2 Association Initiation Policy

The CR Console initiates associations as a result of the following local Real-World activities.

a) Transmission of acquired images to the remote host.
b) Confirmation that images thus sent to the remote host have been stored successfully.
c) Printing of acquired images.
d) Request for a remote Worklist.
d) Notice informing that a particular procedure step has been started or completed.
e) Querying/Retrieving images from the remote host.

3.1.2.1 Send Image(s) to Remote AE

3.1.2.1.1 Associated Real-World Activity

The CR Console will acquire images and send those images automatically to the pre-set remote host or select images from the list of images thus stored and send them to the specified destination.

3.1.2.1.2 Proposed Presentation Context

Presentation Context

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
CR Image Storage	1.2.840.10008.5.1.4.1.1.1	See next table.	SCU	None
MG Image Storage For Presentation	1.2.840.10008.5.1.4.1.1.1.2		SCU	None
MG Image Storage For Processing	1.2.840.10008.5.1.4.1.1.1.2.1		SCU	None

Transfer Syntax

Name	UID
Implicit VR Little Endian	1.2.840.10008.1.2
Explicit VR Little Endian	1.2.840.10008.1.2.1
JPEG Lossless Hierarchical First-Order Prediction	1.2.840.10008.1.2.4.70

3.1.2.1.3 SOP Specific Conformance

This implementation tries to send all images that belong to a single study over a single association. If some of the images could not be sent successfully, this implementation will terminate the association and try to resend all images over another association.

3.1.2.2 Print Image(s)

3.1.2.2.1 Associated Real-World Activity

The CR Console acquires images and prints those images automatically with a pre-set printer or selects images from the list of images thus stored and prints them by specifying the destination.

3.1.2.2.2 Proposed Presentation Context

Presentation Context

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	See next table.	SCU	None
Printer SOP Class	1.2.840.10008.5.1.1.16		SCU	None

Transfer Syntax

Name	UID
Implicit VR Little Endian	1.2.840.10008.1.2

3.1.2.2.3 SOP Specific Conformance

The CR Console uses the Basic Grayscale Print Management Meta SOP Class for image printing. Absolutely asynchronously with this, the CR Console will use only the Printer SOP Class periodically for monitoring status of the printer.

3.1.2.3 Query/Retrieve Image(s)

3.1.2.3.1 Associated Real-World Activity

The CR Console queries images stored in the Image Server and display the Study List. It retrieves images in the studies selected from the Study List.

3.1.2.3.2 Proposed Presentation Context

Presentation Context

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Study Root Query/Retrieve Information Model – Find	1.2.840.10008.5.1.4.1.2.2.1	See next table.	SCU	None
Study Root Query/Retrieve Information Model – Move	1.2.840.10008.5.1.4.1.2.2.2		SCU	None

Transfer Syntax

Name	UID
Implicit VR Little Endian	1.2.840.10008.1.2

3.1.2.3.3 SOP Specific Conformance

The CR Console supports following attributes as query keys.

Description	Tag	Type
Specific Character Set	(0008,0005)	NONE
Query/Retrieve Level	(0008,0052)	NONE
Retrieve AE Title	(0008,0054)	NONE

Study Level Keys

Description	Tag	Type
Patient's Name	(0010,0010)	R
Patient ID	(0010,0020)	R
Patient Birth Date	(0010,0030)	O
Patient Sex	(0010,0040)	O
Study Date	(0008,0020)	R
Study Time	(0008,0030)	R
Accession Number	(0008,0050)	R
Study ID	(0020,0010)	R (Not used)
Study Instance UID	(0020,000D)	U

Series Level Keys

Description	Tag	Type
Modality	(0008,0060)	R
Series Number	(0020,0011)	R
Series Instance UID	(0020,000E)	U

Image Level Keys

Description	Tag	Type
SOP Instance UID	(0008,0018)	U
Instance Number	(0020,0013)	R
Acquisition Device Processing Description	(0018,1400)	O

3.1.2.4 Get Worklist

3.1.2.4.1 Associated Real-World Activity

The CR Console regularly acquires a worklist stored in the HIS/RIS. The CR Console also acquires it as instructed manually.

3.1.2.4.2 Proposed Presentation Context

Presentation Context

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	See next table.	SCU	None

Transfer Syntax

Name	UID
Implicit VR Little Endian	1.2.840.10008.1.2

3.1.2.4.3 SOP Specific Conformance

The CR Console can use both Procedure Step and Patient Information or only Patient Information.

3.1.2.5 Inform Procedure State

3.1.2.5.1 Associated Real-World Activity

When a procedure is started, the CR Console informs the HIS/RIS of it. Also when it is completed (at time of completion of image acquisition), the CR Console informs of it to the HIS/RIS.

3.1.2.5.2 Proposed Presentation Context

Presentation Context

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3	See next table.	SCU	None

Transfer Syntax

Name	UID
Implicit VR Little Endian	1.2.840.10008.1.2

3.1.2.5.3 SOP Specific Conformance

None.

3.1.2.6 Storage Commitment

3.1.2.6.1 Associated Real-World Activity

When all images that belong to a certain study have been completely recorded, the CR Console sends those images to the pre-specified image archive. Once all the images are transferred, the commitment request will be sent to the archive on a separate association.

3.1.2.6.2 Proposed Presentation Context

Presentation Context

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	See next table.	SCU	None

Transfer Syntax

Name	UID
Implicit VR Little Endian	1.2.840.10008.1.2

3.1.2.6.3 SOP Specific Conformance

When all images that belong to a study have been completely acquired, those images will be marked "Undeletable." The CR Console will then send them to the pre-specified image archive. Once all of the images are transferred, the commitment request will be sent to the archive on a separate association. The CR Console waits for the response from the archive on the same association for a configurable amount of time. If it does not receive the response during this time, it will close the association. The CR Console can, however, accept a response from the archive at any time on another association.
Once the N-EVENT-REPORT response is received, the following actions will be taken depending on the status of response.
Complete success: The images in the study will be marked "Deletable" and deleted automatically as necessary.
Other cases: The images in the study will remain marked "Undeletable." The images will be deleted manually and not will be deleted automatically.
Image retransmission for a storage commitment that was unsuccessful and reissuance of the storage commitment will both be instructed manually.

3.1.2.7 Verification

3.1.2.7.1 Associated Real-World Activity

The C-ECHO message will be issued if the operator selects remote DICOM AE and issues a verification message.

3.1.2.7.2 Proposed Presentation Context

Presentation Context

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Verification	1.2.840.10008.1.1	See next table.	SCU	None

Transfer Syntax

Name	UID
Implicit VR Little Endian	1.2.840.10008.1.2

3.1.2.7.3 SOP Specific Conformance

The CR Console provides standard conformance to the DICOM Verification Service Class.

3.1.3 Association Acceptance Policy

A single association will be accepted at any time to receive Storage Commitment responses.
A single association will be accepted at any time to verify application level communication by using the C-EHO service.

3.1.3.1 Verification Request from Remote AE

3.1.3.1.1 Associated Real-World Activity

The CR Console is indefinitely listening for associations. No operator action is required to respond to a verification message.

3.1.3.1.2 Presentation Context

Presentation Context

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Verification	1.2.840.10008.1.1	See next table.	SCP	None

Transfer Syntax

Name	UID
Implicit VR Little Endian	1.2.840.10008.1.2

3.1.3.1.3 SOP Specific Conformance

The CR Console provides standard conformance to the DICOM Verification Service Class.

4. Communication Profiles

4.1 Supported Communication Stacks

DICOM Upper Layer is supported using TCP/IP.

4.2 TCP/IP Stack

The TCP/IP stack is inherited from the Windows 2000/XP Operating System.

4.3 Physical Media Support

IEEE 802.3 (10BASE-T) / IEEE 802.3U (100BASE-TX)

5. Standard Extended / Specialized / Privatization

- The CR Console uses some private IOD modules.
- The CR Console optionally allows Pixel Spacing (0028,0030) attribute to be used. If this field is used, the actual size of any objects displayed on the workstation may not be accurate.

See “8. Information Object Definitions”.

6. Configuration

The CR Console can be configured on the DICOM characteristics specified below.

Local
- IP Address
- Host name
- AE Title
- Port number

Remote
- IP Address
- Host name
- AE Title
- Port number

7. Support of Extended Character Sets

ISO-IR 100 (Latin Alphabet #1)
ISO-IR 101 (Latin Alphabet #2)
ISO-IR 13/14 (Japanese Katakana: JIS X 0201)
ISO-IR 87 (Japanese Kanji: JIS X 0208)
ISO-IR 192 (Unicode: UTF-8)
GB18030

8. CR IOD Overview

This section describes the CR IOD that the CR Console handles.

8.1 CR Image IOD Module Table

Following is a list of the modules used for the CR image storage SOP class.

Information Entity	Module	Usage Method	Reference
Patient	Patient	M	8.2.1.1
Study	General Study	M	8.2.2.1
	Patient Study	U	8.2.2.2
Series	General Series	M	8.2.3.1
	CR Series	M	8.2.6.1
Equipment	General Equipment	M	8.2.4.1
Image	General Image	M	8.2.5.1
	Image Pixels	M	8.2.5.2
	Contrast/Bolus	C	8.2.5.3
	CR Image	M	8.2.6.2
	Overlay	U	Not supported.
	Curve	U	Not supported.
	Modality LUT	U	8.2.6.3
	VOI LUT	U	8.2.6.5
	Common SOP	M	8.2.7.1
	DX Positioning	U	9.2.5.4
	X-ray Acquisition Dose	U	9.2.4.1
	X-ray Generation	U	9.2.4.2
	X-ray Grid	U	9.2.4.3
Other	Study Classification	U	8.2.6.4
	Private Control Information	U	8.2.8.1
	Private Exposure Information	U	8.2.8.2
	Private Print Information	U	8.2.8.3
	Private Image Information	U	8.2.8.4

8.2 Information Module Definitions

Tags not specifically mentioned in notes are handled in the same way as DICOM definitions.

8.2.1 Patient IE Module

8.2.1.1 Patient Module

Attribute Name	Tag	Type	DICOM Definition	Implementation on CR Console
Patient's Name	(0010,0010)	2	Patient's name	Multi-byte base
Patient ID	(0010,0020)	2	Main hospital ID no. or code for patient	
Patient's Birth Date	(0010,0030)	2	Patient's date of birth	
Patient's Sex	(0010,0040)	2	Patient's sex. Enumerated values: M =Male F =Female O =Other	If not set, Length = 0.

Other Patient IDs	(0010,1000)	3	Other identification numbers or codes are used to identify the patient.	
Ethnic Group	(0010,2160)	3	Ethnic group or race of the patient.	
Patient Comments	(0010,4000)	3	User-defined additional information about the patient.	

8.2.2 Study IE Module

8.2.2.1 General Study Module

Attribute Name	Tag	Type	DICOM Definition	Implementation on CR Console
Study Instance UID	(0020,000D)	1	Identifier unique to study	An HIS/RIS-generated / IDT-generated / IR-generated number is set. When not obtained from HIS/RIS, CR Console will generate this information by one of the following methods. 1. Generate by Accession Number. 2. Generate by Accession Number & Study Date. 3. Generate by Study Date & Patient ID & Modality. 4. Generate by Study Date & Patient ID & Requesting Service. 5. Generate UID by each image.
Study Date	(0008,0020)	2	Date study began.	Date compilation of study information began
Study Time	(0008,0030)	2	Time study began.	Time compilation of study information began
Referring Physician's Name	(0008,0090)	2	Physician making referral	Due to the current lack of means of input, Length = 0 at the modality. Values received from another company's modalities will be stored.
Study ID	(0020,0010)	2	Study identifier issued by user or equipment	Information is set so that modalities can identify test types.
Accession Number	(0008,0050)	2	HIS/RIS-issued number for identifying order of study.	An HIS/RIS-issued study number is set. When not obtained from HIS/RIS, Length = 0.
Study Description	(0008,1030)	3	Institution-issued description or classification of study (component element) conducted	
Physician(s) of Record	(0008,1048)	3	Physician(s) who are responsible for overall patient care at time of Study.	

8.2.2.2 Patient Study Module

Attribute Name	Tag	Type	DICOM Definition	Implementation on CR Console
Additional Patient's History	(0010,21B0)	3	Additional information about the Patient's medical history.	

8.2.3 Series IE Module

8.2.3.1 General Series Module

Attribute Name	Tag	Type	DICOM Definition	Implementation on CR Console
Modality	(0008,0060)	1	Modality	CR
Operator's Name	(0008,1070)	3	Technologist supporting the Series	
Series Instance UID	(0020,000E)	1	Identifier unique to series	Generate UID by each image.
Series Number	(0020,0011)	2	Series ID number	
Laterality	(0020,0060)	2	Whether right or left of body part is to be examined. Necessary when part to be examined is pair-structured. Enumerated values: R = Right L = Left	Length = 0
Series Date	(0008,0021)	3	Date series began	
Series Time	(0008,0031)	3	Time series began	
Series Description	(0008,103E)	3	Description provided by series user	
Protocol Name	(0018,1030)	3	User-defined description of the conditions under which the Series was performed. Note: This attribute conveys series specific protocol identification and may or may not be identical to the one presented in the Performed Protocol Code Sequence (0040,0260).	Protocol Name
Referenced Study Component Sequence	(0008,1111)	3	Uniquely identifies the Study Component SOP Instance or Modality Performed Procedure step SOP Instance to which the series is related.The Sequence shall have one item.	Referenced Study Component Sequence
>Referenced SOP Class UID	(0008,1150)	1C	Uniquely identifies the referenced SOP Class. Required if Referenced Study Component Sequence (0008,1111) is sent.	>Referenced SOP Class UID
>Referenced SOP Instance UID	(0008,1155)	1C	Uniquely identifies the referenced SOP Instance. Required if Referenced Study Component Sequence (0008,1111) is sent.	>Referenced SOP Instance UID
Body Part Examined	(0018,0015)	3	Description of test of body part to be examined. Definitions: SKULL, CSPINE, TSPINE, LSPINE, SSPINE, COCCYX, CHEST, CLAVICLE, BREAST, ABDOMEN, PELVIS, HIP, SHOULDER, ELBOW, KNEE, ANKLE, HAND, FOOT, EXTREMITY	Values shown below are used for CR. Body part definitions not existing in the DICOM definitions will be added. HEAD, NECK, CHEST, BREAST, ABDOMEN, PELVIS, UP_EXM, LOW_EXM, TEST
Performed Procedure Step ID	(0040,0253)	3	Identification of that part of a Procedure that has been carried out within this step.	

Performed Procedure Step Start Date	(0040,0244)	3	Date on which the Performed Procedure Step started.	
Performed Procedure Step Start Time	(0040,0245)	3	Time on which the Performed Procedure Step started.	
Performed Procedure Step Description	(0040,0254)	3	Institution-generated description or classification of the Procedure Step that was performed.	
Performed Protocol Code Sequence	(0040,0260)	3	Sequence describing the Protocol performed for this Procedure Step. One or more Items may be included in this Sequence.	
>Code Value	(0008,0100)	1C	Required if a sequence item is present.	
>Coding Scheme Designator	(0008,0102)	1C	Required if a sequence item is present.	
>Coding Scheme Version	(0008,0103)	1C	Required if a sequence item is present.	
>Code Meaning	(0008,0104)	1C	Required if a sequence item is present.	
Request Attributes Sequence	(0040,0275)	3	Sequence that contains attributes from the Imaging Service Request. The sequence may have one or more Items.	
>Requested Procedure ID	(0040,1001)	1C	Identifier which identifies the Requested Procedure in the Imaging Service Request. Required if Sequence item is present.	
>Scheduled Procedure Step ID	(0040,0009)	1C	Identifier which identifies the Scheduled Procedure Step. Required if Sequence item is present.	
>Scheduled Procedure Step Description	(0040,0007)	3	Institution-generated description or classification of the Scheduled Procedure Step to be performed.	
>Scheduled Protocol Code Sequence	(0040,0008)	3	Sequence describing the Scheduled Protocol following a specific coding scheme. This sequence contains one or more items.	
>Code Value	(0008,0100)	1C	Required if a sequence item is present.	
>Coding Scheme Designator	(0008,0102)	1C	Required if a sequence item is present.	
>Coding Scheme Version	(0008,0103)	1C	Required if a sequence item is present.	
>Code Meaning	(0008,0104)	1C	Required if a sequence item is present.	

8.2.4 Equipment IE Module

8.2.4.1 General Equipment Module

Attribute Name	Tag	Type	DICOM Definition	Implementation on CR Console
Manufacturer	(0008,0070)	2	Name of manufacturer of equipment that generated the digital image.	FUJIFILM Corporation
Institution Name	(0008,0080)	3	Institution at which equipment that generated the digital image was installed.	
Station Name	(0008,1010)	3	User-defined name for identifying the equipment that generated the digital image.	Sets the host name of the equipment that generated the image (Image Reader's host name or the device name).
Institutional Department Name	(0008,1040)	3	Name of department at institution at which equipment that generated the digital image was installed.	
Manufacturer's Model Name	(0008,1090)	3	Manufacturer's model name for equipment that generated the digital image.	Model name given to the equipment by the manufacturer. Sets exposure model character strings.
Software Version(s)	(0018,1020)	3	Manufacturer's name of software version for the equipment that generated the digital image.	Sets the software version for the equipment (Image Reader) that generated the image.

8.2.5 Common Image IE Module

8.2.5.1 General Image Module

Attribute Name	Tag	Type	DICOM Definition	Implementation on CR Console
Image Number	(0020,0013)	2	Number that identifies the image	The Image number that generated by CR Image Reader.
Patient Orientation	(0020,0020)	2C	Direction patient faced for line or row of image. Necessary for series in which image does not require an image module.	Assumes Length = 0. Stores values received from other modalities.
Content Date	(0008,0023)	2C	Date on which image pixel data generation began. Necessary when image is part of a time-related series.	Sets the date of start of image generation.
Content Time	(0008,0033)	2C	Time at which image pixel data generation began. Necessary when image is part of a time-related series.	Sets the time of start of image generation.
Image Type	(0008,0008)	3	Image identification characteristic. For details, see DICOM PS3.3 C7.6.1.1.2.	See 8.2.5.1.1.
Acquisition Number	(0020,0012)	3	Number that identifies one continuous acquisition of data over a certain period of time that formed the image.	Issues numbers sequentially in units of IPs read at the Image Reader. The same number will be assigned to multiple images generated from one IP.

Acquisition Date	(0008,0022)	3	Date on which acquisition of data that formed the image began.	Sets date of start of IP reading.
Acquisition Time	(0008,0032)	3	Time at which acquisition of data that formed the image began.	Sets time of start of IP reading.
Derivation Description	(0008,2111)	3	Text description of image derivation method.	
Source Image Sequence	(0008,2112)	3	Sequence that identifies the set of image class/instance of the image used for deriving the image. Encoded as a sequence for the item (0008, 1150), (0008, 1155).	
>Referenced SOP Class UID	(0008,1150)	1C	Uniquely identifies the referenced SOP class. Necessary when (0008, 2112) will be transmitted.	
>Referenced SOP Instance UID	(0008,1155)	1C	Uniquely identifies the referenced SOP class. Necessary when (0008, 2112) will be transmitted.	
Lossy Image Compression	(0028,2110)	3	Clarifies whether image has been subjected to irreversible compression. Enumerated values: 00: Not subjected to irreversible compression 01: Subjected to irreversible compression	
Image Comments	(0020,4000)	3	User-defined comments about the image	
Pixel Spacing	(0028,0030)	3	Physical distance, within the patient, between the centers of each pixel. Expressed as a numerical set: space between adjoining rows (delimiter), space between adjoining columns. Unit: mm.	See Note 1 below.

Note 1: The CR image is a projected image and Imager Pixel Spacing (0018,1164) must be used for the distance between the centers of each pixel. However, because some workstations perform necessary processing based on Pixel Spacing (0028,0030), such distance on the IP surface is determined for it.
According to DICOM definitions, the Pixel Spacing (0028,0030) is to represent the distance between the centers of each pixel in the “patient’s body”. Because the CR image is a projected image, it is not possible to calculate the distance between the centers of each pixel “in the patient’s body”.
Therefore, the value determined here is not correct in the light of the DICOM definitions. Note that even if the distance, area or dimensions are calculated based on the value presented here, the resultant values thus calculated do not precisely reflect an object in the patient’s body.
(Remember that the CR image is a projected image, which disables measurements of the dimensions of the object precisely reflected by actual dimensions in the patient’s body.)

8.2.5.1.1 Image Type

The Image Type consists of the following elements as per DICOM definitions.

Value 1: Pixel data Characteristics
Value 2: Patient Examination Characteristics
Value 3: Modality Specific Characteristics
Value 4 or after: Other Value “n” (“n” represents a numeric value.)

On the FCR system, the above values should be interpreted as described below. Note that each of the elements may be omitted (only delimiters exist). When a portion after a certain element is fully omitted, even delimiters do not exist.

Because Value 1 and Value 2 have DICOM-defined meanings, they comply with the DICOM definitions. If omitted, they will be considered to be “ORIGINAL” or “PRIMARY”.

Value 3 determines image data types such as pre-normalized image, normalized image or processed image. If omitted, it will be considered to be “NORMALIZED”.

Value 4 (Other Value 1) represents processing purpose type of an image. When omitted, it will be considered to be “RT”.

Value 5 (Other Value 2) determines a types of change processing performed on an original image. Value 5 will not be determined if no changes have been made.

Value 6 (Other Value 3) determines a date of the change made on an image with Value 5 (Other Value 2) above. Value 6 will not be determined if no changes have been made.

Value 7 (Other Value 4) determines a type of special processing performed on an image, which will not be determined if no special image processing has been performed.

Value 8 (Other Value 5) determines a date of the special image processing performed with Value 7 (Other Value 4) above. Value 8 will not be determined if no special image processing has been performed.

Value 9 (Other Value 6) determines the distance (nm) between the centers of each pixel when an IP is read.

Each of the values mentioned above will represent the following specific meaning.

Value 1: (as per DICOM definitions)

ORIGINAL	An image whose pixel size is based on the original image (pre-normalized image or normalized image).
DERIVED	An image derived from pixel size of one or more images according to a specific method. (processed image).

Value 2: (as per DICOM definitions)

PRIMARY	An image generated as a direct result from a patient study.
SECONDARY	An image generated after the first patient study.

Value 3:

PRE_NORMALIZED	A pre-normalized image.
NORMALIZED	A normalized image.
POST_PROCESSED	An already processed image.

Value 4:

RT	Routine exposure image
ES_L	Low-pressure image for energy subtraction processing.
ES_H	High-pressure image for energy subtraction processing.

Value 5:

RENORMALIZED	A re-normalized image.
MODIFIED_PARAM	An image on which image processing parameters have been modified.

Value 6 and Value 8:

Determine in the "YYYYMMDDhhmmss" format a date when image processing was performed.

Value 7:

STICHED	Image composition processing that generates one image from multiple images.
BONE	A bone image based on the energy subtraction processing.
SOFT_TISSUE	Soft tissue image based on the energy subtraction processing.

Value 9:

The distance (nm) between the centers of each pixel when an IP is read.

When "RENORMALIZED" has been determined for Value 5, what is determined will not be changed even if parameters were modified.

8.2.5.2 Image Pixel Module

Attribute Name	Tag	Type	DICOM Definition	Implementation on CR Console
Samples per Pixel	(0028,0002)	1	Number of sample surfaces an image has.	Fixed at 1.
Photometric Interpretation	(0028,0004)	1	Specifies the intended interpretation of image data. MONOCHROME1 Indicates that pixel data has a single monochrome image surface. Minimum sample value is to be displayed in white following VOI gray scale conversion. MONOCHROME2 Indicates that pixel data has a single monochrome surface. Minimum sample value is to be displayed in black following VOI gray scale conversion. The following definitions also exist: PALETTE COLOR, RGB, HSV, ARCB, CMYK	Fixed at MONOCHROME1.
Rows	(0028,0010)	1	Number of rows in an image	
Columns	(0028,0011)	1	Number of columns in an image	
Bits Allocated	(0028,0100)	1	Number of bits allocated to each pixel sample. Each sample has the same number of bits allocated.	
Bit Stored	(0028,0101)	1	Number of bits to be stored for each pixel sample. Each sample will have the same number of bits stored.	
High Bit	(0028,0102)	1	High bit for each pixel sample. Each sample will have the same number of high bits.	
Pixel Representation	(0028,0103)	1	Data representation for pixel sample. Each sample will have the same pixel representation. Enumerated values: 0000H: Integer with no encoding 0001H: Complement of 2.	0000H.
Pixel Data	(7FE0,0010)	1	Stream of pixel samples that compose the image.	

8.2.5.3 Contrast/Bolus Module

This is necessary when a contrast medium or bolus has been used (and is not necessary when they have not). As there is no means for determining whether they have been used, a tag will be attached but no information set.

Attribute Name	Tag	Type	DICOM Definition	Implementation on CR Console
Contrast/Bolus Agent	(0018,0010)	2	Contrast or bolus agent	Length = 0

8.2.6 Computed Radiography Image

8.2.6.1 CR Series Module

Attribute Name	Tag	Type	DICOM Definition	Implementation on CR Console
Body Part Examined	(0018,0015)	2	Text description of body part examined. Definitions follow. SKULL, CSPINE, TSPINE, LSPINE, SSPINE, COCCYX, CHEST, CLAVICLE, BREAST, ABDOMEN, PELVIS, HIP, SHOULDER, ELBOW, KNEE, ANKLE, HAND, FOOT, EXTREMITY	Values shown below are used for CR. Body part definitions not existing in the DICOM definitions will be added. HEAD, NECK, CHEST, BREAST, ABDOMEN, PELVIS, UP_EXM, LOW_EXM, TEST
View Position	(0018,5101)	2	Visual field of X-ray related to patient's position. Definitions follow. AP = Anterior/Posterior PA = Posterior/Anterior LL = Left Lateral RL = Right Lateral RLD = Right Lateral Decubitus LLD = Left Lateral Decubit RLD = Right Lateral Oblique LLD = Left Lateral Oblique	Length = 0

8.2.6.2 CR Image Module

Attribute Name	Tag	Type	DICOM Definition	Implementation on CR Console
KVP	(0018,0060)	3	Peak KVP output of the X-ray-generator used.	
Plate ID	(0018,1004)	3	ID or serial no. of the sensing plate on which the image was collected.	Sets the IP bar code no. Format: "a********c"
Exposure Time	(0018,1150)	3	X-ray exposure time. Unit: msec.	
X-ray Tube Current	(0018,1151)	3	X-ray tube current. Unit: mA.	
Exposure	(0018,1152)	3	The exposure in mAs, for example calculated from Exposure Time and X-ray Tube Current.	
Exposure in µAs	(0018,1153)	3	The exposure expressed in µAs, for example calculated from Exposure Time and X-ray Tube Current.	
Imager Pixel Spacing	(0018,1164)	3	Physical distance measured at the front of the detector housing between the center of each image pixel specified by a numeric pair – row spacing value (delimiter) column spacing value in mm.	See Note 1 below.
Acquisition Device Processing Description	(0018,1400)	3	Processing descriptions particular to image-related equipment. (Ex.: description of internal organ.)	Sets menu name. Exposure menu name.

Acquisition Device Processing Code	(0018,1401)	3	Code indicating processing particular to image-related equipment. (Ex.: CR internal organ filter code.)	Sets menu code. Codifies the body part, exposure method and exposure menu. Taken to be FFFF if no value exists.
Sensitivity	(0018,6000)	3	Reading sensitivity	

Note 1: Note that the implementation differs depending on the used CR Console software version.

Software Ver.	Implementation on CR Console
All the A versions and V1.0 (B) to V1.2 (B) (HotFix and service pack for those versions are included.)	The distance between the centers of each pixel when an IP is read. Variations in the distance between the centers of each pixel, due to the change made in the pixel density after an IP has been read accordingly, will not be reflected. Therefore, it is not possible to calculate the distance between the two points using this data.
V2.0 (B) or later	When the pixel density was subjected to change after an IP has been read, it was adjusted appropriately so that the influence of such a change is reflected accordingly. It will always be the distance between the centers of each pixel on the IP surface of the pixel data determined to be the PixelData (7FE0,0010).

8.2.6.3 Modality LUT Module

Attribute Name	Tag	Type	DICOM Definition	Implementation on CR Console
Rescale Intercept	(0028,1052)	1C	Output unit specified within Storage Value (SV) and Rescale Type (0028,1054) is m *SV + b. Necessary when Modality LUT Sequence (0028,3000) does not exist.	0
Rescale Slope	(0028,1053)	1C	This is the “m” within the formula given in terms of Rescale Intercept (0028,1052). Necessary when Rescale Intercept exists.	1
Rescale Type	(0028,1054)	1C	Specifies the output values for Rescale Slope (0028,1053) and Rescale Intercept (0028,1052). Necessary when Rescale Intercept exists.	US
Modality LUT Sequence	(0028,3000)	1C	Defines a sequence of Modality LUTs.	
>LUT Descriptor	(0028,3002)	1C	Specifies the format of the LUT Data in this Sequence. See C.11.1.1 for further explanation. Required if the Modality LUT Sequence (0028,3000) is sent.	2^n\0\16 n :Bit Depth of image
>LUT Explanation	(0028,3003)	3	Free form text explanation of the meaning of the LUT.	CRTLUT
>Modality LUT Type	(0028,3004)	1C	Specifies the output values of this Modality LUT. See C.11.1.1.2 for further explanation. Required if the Modality LUT Sequence (0028,3000) is sent.	US

>LUT Data	(0028,3006)	1C	LUT Data in this Sequence. Required if the Modality LUT Sequence (0028,3000) is sent.	

8.2.6.4 Study Classification Module

Attribute Name	Tag	Type	DICOM Definition	Implementation on CR Console
Study Comments	(0032,4000)	3	User-defined comments about the study	

8.2.6.5 VOI LUT Module

Attribute Name	Tag	Type	DICOM Definition	Implementation on CR Console
VOI LUT Sequence	(0028,3010)	3	Defines a sequence of VOI LUTs.	
>LUT Descriptor	(0028,3002)	1C	Specifies the format of the LUT Data in this Sequence. See PS3.3 C.11.2.1.1 for further explanation. Required if the VOI LUT Sequence (0028,3010) is sent.	
>LUT Explanation	(0028,3003)	3	Free from text explanation of the meaning of the LUT.	
>LUT Data	(0028,3006)	1C	LUT Data in this Sequence. Required if the VOI LUT Sequence (0028,3010) is sent.	

8.2.7 General Module

8.2.7.1 SOP Common Module

Attribute Name	Tag	Type	DICOM Definition	Implementation on CR Console
SOP Class UID	(0008,0016)	1	Uniquely identifies the SOP class.	
SOP Instance UID	(0008,0018)	1	Uniquely identifies the SOP instance.	
Specific Character Set	(0008,0005)	1C	Used to expand the basic figure set or when using a substitute character set. Necessary in expansion or when using a substitute character set.	Alphanumerics: No tag European languages: ISO_IR 100 \ ISO_IR 101 Japanese (backslash is half-size) Half-size kana only: ISO_IR 13 Half-size kana + kanji: ISO 2022 IR 13 \ ISO 2022 IR 87 Unicode (UTF-8): ISO_IR 192 Chinese Simplified: GB18030

8.2.8 Private Module

8.2.8.1 Private Control Information Module

Attribute Name	Tag	VR	Type	Implementation on CR Console
Image Control Unit	(0009,xx04)	SH	3	Host name of the image control unit (archiver).
Image UID	(0009,xx05)	OW	3	Fuji's specific number that identifies an image uniquely.
Route Image UID	(0009,xx06)	OW	3	Original image UID that is changed when an image is subjected to correction.
Image Display Information Version No.	(0009,xx08)	UL	3	Image parameter version number.
Patient Information Version No.	(0009,xx09)	UL	3	Patient ID information version number.
Film UID	(0009,xx0C)	OW	3	ID assigned to each film.
Exposure Unit Type Code	(0009,xx10)	CS	3	Code that identifies an exposure unit used.
Kanji Hospital Name	(0009,xx80)	LO	3	Kanji hospital name (0008,0080).
Distribution Code	(0009,xx90)	ST	3	Code used to determine a destination for image distribution.
Kanji Department Name	(0009,xx92)	SH	3	Kanji requesting department.
Blackening Process Flag	(0009,xxF0)	CS	3	A flag that identifies an image subjected to blackening process. 00: Not subjected to blackening process. 01: Subjected to blackening process.
Processing Information Flag	(0009,xxF1)	ST	1C	A flag that determines contents of the information on image data, which are described in the "ABCD" format. A: Whether LUT correction processing is applied or not. (0=Not applied/1=Already applied, Other=Not applied) B: Whether GPR processing is applied or not. (0=OFF/1=ON1/2=ON2, Other=OFF) C: Whether FNC processing is applied or not. (0=OFF/1=ON, Other=OFF) D: Whether chest wall paint-out processing is applied or not. (0=OFF/1=ON, Other=OFF)
FCR Image ID	(0021,xx10)	CS	3	ID of an image generated by the Fuji system, consisting of the four characters. For a CR image, the first one character constitutes an ID that identifies each device, and the remaining three characters constitute a serial number for an image generated by a certain device. Numbers from 000 to 999 are used cyclically.
Image Processing Modification Flag	(50F1,xx20)	CS	3	Information that indicates whether image processing parameters have been modified or not. First byte : Left-side image parameter Second byte : Right-side image parameter
Data Compression Code	(0029,xx50)	CS	3	Code that indicates to what extent an image data piece has been compressed previously. 00: Not compressed. 21: 10-bit data 2/5 lossy compression. 8-bit data 1/2 lossless compression. 22: 1/2 lossless compression. 23: 1/12 lossy compression. 25: New 1/2 lossless compression. 31: 1/20 lossy compression. 41: 1/5 lossy compression.
Requesting Physician	(0032,1032)	PN	3	A physician who requested a study.

Requesting Service	(0032,1033)	LO	3	A hospital department that issued a request for service

8.2.8.2 Private Exposure Information Module

Attribute Name	Tag	VR	Type	Implementation on CR Console
Relative Light Emission Amount Sk	(0025,xx10)	US	3	EDR normalization conditions. A relative light emission amount when 2.00 is presumed to be an IP light emission amount, with no object for exposures at 80KVP0.5mR. Set a ×100 value. The range of values is from 0 to 600.
Term of Correction for Each IP Type St	(0025,xx11)	US	3	EDR normalization conditions. Timing correction value for each IP quality type. Set a ×100 value. The range of values is from 0 to 400.
Reading Gain Gp	(0025,xx12)	US	3	EDR normalization conditions. Dynamic range to be read as image signals out of X rays that have been recorded. Set a ×100 value. The range of values is from 100 to 1500.
Kanji Body Part for Exposure	(0019,xx15)	LO	3	Kanji body part to be exposed for study. Convert it from the body part menu code and set accordingly.
Kanji Menu Name	(0019,xx32)	LO	3	Kanji exposure menu name.
Image Processing Type	(0019,xx40)	CS	3	Indicates what type of function processing was performed on an image.
EDR Mode	(0019,xx50)	CS	3	Code that indicates EDR mode. Defined values: 0: AUTO MODE 1: SEMI AUTO MODE 2: FIX MODE 3: MANUAL (AUTO) MODE 4: MANUAL (SEMI AUTO) MODE 5: MANUAL (FIX) MODE Numbers from 6 thereafter are reserved for SEMI-XMODE.
Radiographer's Code	(0019,xx60)	SH	3	Code that identifies a radiographer.
Split Exposure Format	(0019,xx70)	IS	3	Split exposure formats. Defined values: 0: Front 1: Right-and-left two divisions 2: Top-and-bottom two divisions 3: Three divisions 4: Four divisions
No. of Split Exposure Frames	(0019,xx71)	IS	3	The number of frames exposed on one IP. When there is no such element, handle it to be one frame.
Reading Position Specification	(0019,xx80)	IS	3	Reference position for starting image reading process on an IP when it is read by an Image Reader. 00: Right top reference 01: Center top reference 02: Center reference 03: Bottom center reference
Reading Sensitivity Center	(0019,xx81)	IS	3	Controls the sensitivity center when reading an IP on an Image Reader. 0: Standard sensitivity 1: Semi-high sensitivity 2: High sensitivity

Set No.	(0021,xx30)	CS	3	A number that identifies function processing in the FCR system. Note, however, that the available range is from “1” to “ZZ”.
Image No. in the Set	(0021,xx40)	IS	3	Serial numbers from “01” to “99” within the set number (0021, xx30).
Pair Processing Information	(0021,xx50)	CS	3	Information available when an operation is performed between images.
Equipment Type-Specific Information	(0021,xx80)	OB	3	Image generator-specific information.
Energy Subtraction Param.	(50F1,xx06)	CS	3	The four coefficient table types, Ta, Tb, Tc and Td, used for energy subtraction processing. Each parameter is represented by one character from A to T. Characters other than A to T are illegal. Note that each parameter is represented by one byte, four bytes in totality.
Subtraction Registration Result	(50F1,xx07)	CS	3	Indicates the result of image positioning by energy subtraction processing. 0: OK 1: NG
Energy Subtraction Param. 2	(50F1,xx08)	CS	1C	Parameters to be used by new energy subtraction processing. These parameters are indispensable for images generated by new energy subtraction processing and for original images that will be subjected to new energy subtraction processing. For the former, the images imply to have been subjected to processing using these parameters, and for the latter, the images imply that they are to be subjected to processing using these parameters.
Afin Conversion Coefficient	(50F1,xx09)	SL	1C	The parameter that controls the afin conversion coefficient information for the purpose of image positioning during new energy subtraction processing. This parameter is stored to be VM=4 and is indispensable for images generated by new energy subtraction processing and for original images that will be subjected to new energy subtraction processing. For the former, the images imply to have been subjected to processing using this parameter, and for the latter, the images imply that they are to be subjected to processing using this parameter.
FNC Parameters	(50F1,xx0A)	SH	1C	FNC parameters to be determined as character strings in order of FNL (A to Z), FRB (A to Z), FRT (A to Z) and FRE (0.0 to 1.0). Example: ABC0.7 When FNC is applied (when FNC is ON according to the processing information flag), this tag will be required. When FNC is OFF, this tag will not be output.

8.2.8.3 Private Print Information Module

Attribute Name	Tag	VR	Type	Implementation on CR Console
Film Annotation Character String 1	(0019,xx90)	SH	3	Film annotation character string 1.
Film Annotation Character String 2	(0019,xx91)	SH	3	Film annotation character string 2.
Image Display Format	(2010,0010)	ST	3	Image display format type. A format based on which an image is output on film can be stored only when the four-frame format is used.

Annotation Display Format ID	(2010,0030)	CS	3	Identifies an annotation display format, which is described as follows. "CR"+A+B "CR": A character string that identifies a modality. A: Date of birth 0: Date of birth 1: Age B: Film annotation character format (for identification of frontal/lateral) 0: Other than frontal/lateral 1: Frontal/lateral
Film Orientation	(2010,0040)	CS	3	Film orientation. Enumerated values are as follows. PORTRAIT and LANDSCAPE
Border Density	(2010,0100)	CS	3	The density between an image and its surroundings on film. Shown below are the densities defined by DICOM. BLACK WHITE
Trim	(2010,0140)	CS	3	Specifies whether to print images with trimming frame or not. Enumerated values: YES or NO.
Image Position Specifying Flag	(2011,xx11)	CS	3	Specifies an image display position within an area assigned for an image. The default value determined for each device prevails when no such information is set up. 00: Default position 01: Right-justified position 02: Left-justified position
Image Position	(2020,0010)	US	3	Image position on film according to a specified image display format.
Film Output Format	(50F1,xx10)	CS	3	Pre-set parameters used for CR image output format and image processing. Either "A" or "B" format is available. A 0: For previous models. Single for the 8"´10" format. LR for others. 1: Single 2: L/R B 0: Parameters for the left-side image are used. 1: Parameters for ht right-side image are used. Other : Parameters for the left-side image are used.

8.2.8.4 Private Image Information Module

Attribute Name	Tag	VR	Type	Implementation on CR Console
Image Scanning Direction	(0029,xx20)	CS	3	Information that indicates a position where image data starts and to which direction the image data is scanned, assuming to be a reference a scanning direction where an image is scanned from top right to the left, when an exposed image is seen as a non-reverse image. This four-byte information has the following formats. First byte : 180° image rotation Second byte : Right-and-left image reversal in the main scanning direction Third byte : 90° image rotation Fourth byte : Space
Extended Reading Size Value	(0029,xx30)	CS	3	Image reading size.

Mag./Reduc. Ratio	(0029,xx34)	US	3	Image magnification/reduction ratio applied when an image is generated.
Line Density Code	(0029,xx44)	CS	3	Code that indicates CR image reading density. Defined values are as follows. K0: 5 lines/mm K1: 6.7 lines/mm K2: 10 lines/mm K3: 2.5 lines/mm K4: 20 lines/mm
Plate ID	(0018,1004)	LO	3	ID or serial no. of the sensing plate on which the image was collected. Sets the IP barcode no. Format: “a********c”

8.2.8.5 Private Creator List

Attribute Name	Tag	VR	Type	Implementation on CR Console
Private Creator	(0009,00xx)	LO	1C	Necessary if the “FDMS□1.0” 0009 group is available.
Private Creator	(0019,00xx)	LO	1C	Necessary if the “FDMS□1.0” 0019 group is available.
Private Creator	(0021,00xx)	LO	1C	Necessary if the “FDMS□1.0” 0021 group is available.
Private Creator	(0023,00xx)	LO	1C	Necessary if the “FDMS□1.0” 0023 group is available.
Private Creator	(0025,00xx)	LO	1C	Necessary if the “FDMS□1.0” 0025 group is available.
Private Creator	(0027,00xx)	LO	1C	Necessary if the “FDMS□1.0” 0027 group is available.
Private Creator	(0029,00xx)	LO	1C	Necessary if the “FDMS□1.0” 0029 group is available.
Private Creator	(2011,00xx)	LO	1C	Necessary if the “FDMS□1.0” 2011 group is available.
Private Creator	(50F1,00xx)	LO	1C	Necessary if the “FDMS□1.0” 50F1 group is available.

9. Digital Mammography X-ray Image Information Overview

This section describes the Digital Mammography X-ray Image IOD that the CR Console handles.

9.1 Digital Mammography X-ray Image Information IOD Module Table

Digital Mammography Image Storage

Information Entity	Module	Usage Method	Reference
Patient	Patient	M	8.2.1.1
	Specimen Identification	U	Not supported.
Study	General Study	M	8.2.2.1
	Patient Study	U	8.2.2.2
Series	General Series	M	8.2.3.1
	DX Series	M	9.2.5.1
	Mammography Series	M	9.2.6.1
Frame of Reference	Frame of Reference	U	Not supported.
Equipment	General Equipment	M	8.2.4.1
Image	General Image	M	8.2.5.1
	Image Pixels	M	8.2.5.2
	Contrast/Bolus	U	8.2.5.3
	Display Shutter	U	Not supported.
	Device	U	Not supported.
	Therapy	U	Not supported.
	DX Anatomy Image	M	Included in the Mammography Image Module.
	DX Image	M	9.2.5.2
	DX Detector	M	9.2.5.3
	X-ray Collimator	U	Not supported.
	DX Positioning	U	9.2.5.4
	X-ray Tomo Acquisition	U	Not supported.
	X-ray Acquisition Dose	U	9.2.4.1
	X-ray Generation	U	9.2.4.2
	X-ray Filtration	U	Not supported.
	X-ray Grid	U	9.2.4.3
	Mammography Image	M	9.2.6.2
	Overlay Plane	C	Not supported.
	Curve	U	Not supported.
	Modality LUT	U	8.2.6.3
	VOI LUT	C	8.2.6.5
	Image Histogram	U	Not supported.
	Acquisition Context	M	9.2.7.1
	Common SOP	M	8.2.7.1
Other	Study Classification	U	8.2.6.4
	Private Control Information	U	8.2.8.1
	Private Exposure Information	U	8.2.8.2
	Private Print Information	U	8.2.8.3
	Private Image Information	U	8.2.8.4

9.2 Information Module Definitions

Tags not specifically mentioned in notes are handled the same as DICOM definitions.

9.2.1 Series IE Module

9.2.1.1 General Series Module

See 8.2.3.1.

9.2.2 Equipment IE Module

9.2.2.1 General Equipment Module

See 8.2.4.1.

9.2.3 Common Image IE Module

See 8.2.5.

9.2.4 X-ray Module

9.2.4.1 X-ray Acquisition Dose Module

Attribute Name	Tag	Type	DICOM Definition	Implementation on CR Console
KVP	(0018,0060)	3	Peak kilo voltage output of the X-ray generated used.	
Distance Source to Detector	(0018,1110)	3	Distance in mm from source to detector center. Note: This value is traditionally referred to as Source Image Distance (SID).	
X-ray Tube Current	(0018,1151)	3	X-ray Tube Current in mA	
Exposure Time	(0018,1150)	3	X-ray Tube Current in μA	
Exposure	(0018,1152)	3	The exposure in mAs, for example calculated from Exposure Time and X-ray Tube Current.	
Exposure in μAs	(0018,1153)	3	The exposure expressed in μAs, for example calculated from Exposure Time and X-ray Tube Current.	
Image Area Dose Product	(0018,115E)	3	X-ray dose, measured in dGy*cm*cm, to which the patient was exposed for the acquisition of this image plus any nondigitally recorded fluoroscopy which may have been performed to prepare for the acquisition of this image. Notes: 1. The sum of the Image Area Dose Product of all images of a Series or a Study may not result in the actual area dose product to which the patient was exposed. 2. This may be an estimated value based on assumptions about the patient's body size and habitus.	

Anode Target Material	(0018,1191)	3	The primary material in the anode of the Xray source. Defined Terms: TUNGSTEN MOLYBDENUM RHODIUM	
Body Part Thickness	(0018,11A0)	3	The average thickness in mm of the body part examined when compressed if compression has been applied during exposure.	
Filter Material	(0018,7050)	3	The X-ray absorbing material used in the filter. May be multi-valued. Defined Terms: MOLYBDENUM ALUMINUM COPPER RHODIUM NIOBIUM EUROPIUM LEAD	
Entrance Dose	(0040,0302)	3	Average entrance dose value measured in dGy at the surface of the patient during the acquisition of this image. Note: This may be an estimated value based on assumptions about the patient's body size and habitus.	
Entrance Dose in mGy	(0040,8302)	3	Average entrance dose value measured in mGy at the surface of the patient during the acquisition of this image. Note: This may be an estimated value based on assumptions about the patient's body size and habitus.	
Organ Dose	(0040,0316)	3	Average organ dose value measured in dGy during the acquisition of this image. Note: This may be an estimated value.	For mammography, this represents mammary gland absorption dose.

9.2.4.2 X-ray Generation Module

Attribute Name	Tag	Type	DICOM Definition	Implementation on CR Console
KVP	(0018,0060)	3	Peak kilo voltage output of the X-ray generated used.	
X-ray Tube Current	(0018,1151)	3	X-ray Tube Current in mA	
Exposure Time	(0018,1150)	3	Duration of X-ray exposure in msec.	
Exposure	(0018,1152)	3	The exposure in mAs,for example calculated from Exposure Time and X-ray Tube Current.	
Exposure in µAs	(0018,1153)	3	The exposure expressed in µAs, for example calculated from Exposure Time and X-ray Tube Current.	
Exposure Control Mode	(0018,7060)	3	Type of exposure control. Defined Terms: MANUAL AUTOMATIC	

Exposure Control Mode Description	(0018,7062)	3	Text description of the mechanism of exposure control. May describe the number and type of exposure sensors or position of the sensitive area of the imaging detector.	
Anode Target Material	(0018,1191)	3	The primary material in the anode of the Xray source. Defined Terms: TUNGSTEN MOLYBDENUM RHODIUM	

9.2.4.3 X-ray Grid Module

Attribute Name	Tag	Type	DICOM Definition	Implementation on CR Console
Grid	(0018,1166)	3	Identifies the grid. May be multi-valued. Defined Terms are: FIXED FOCUSED RECIPROCATING PARALLEL CROSSED NONE	Sets whether the grid is used or not. USED: Grid is used. NONE: Grid is not used.

9.2.5 DX Module

9.2.5.1 DX Series Module

Attribute Name	Tag	Type	DICOM Definition	Implementation on CR Console
Modality	(0008,0060)	1	Type of equipment that originally acquired the data used to create the image in this series. Enumerated Values: DX,PX,IO,MG	MG
Referenced Study Component Sequence	(0008,1111)	1C	Uniquely identifies the Study Component SOP Instance or Modality Performed Procedure step SOP Instance to which the series is related. The Sequence shall have one item. Required if Study Component SOP Class or Modality Performed Procedure Step SOP Class is supported.	
>Referenced SOP Class UID	(0008,1150)	1C	Uniquely identifies the referenced SOP Class. Required if Referenced Study Component Sequence (0008,1111) is sent.	
>Referenced SOP Instance UID	(0008,1155)	1C	Uniquely identifies the referenced SOP Instance. Required if Referenced Study Component Sequence (0008,1111) is sent.	

Presentation Intent Type	(0008,0068)	1	Identifies the intent of the images that are contained within this Series. Enumerated Values: FOR PRESENTATION FOR PROCESSING	FOR PRESENTATION or FOR PROCESSING

9.2.5.2 DX Image Module

Attribute Name	Tag	Type	DICOM Definition	Implementation on CR Console
Image Type	(0008,0008)	1	Image identification characteristics. See DICOM PS3-3 C.8.11.3.1.1 for specialization.	See 9.2.5.2.1.
Samples per Pixel	(0028,0002)	1	Number of samples in this image. Shall have an Enumerated Value of 1.	1
Photometric Interpretation	(0028,0004)	1	Specifies the intended interpretation of the pixel data. Enumerated Values: MONOCHROME1 MONOCHROME2	MONOCHROME1
Bits Allocated	(0028,0100)	1	Number of bits allocated for each pixel sample. Enumalated Values: 8, 16	
Bits Stored	(0028,0101)	1	Number of bits stored for each pixel sample. Enumerated Values: 6 to 16	
High Bit	(0028,0102)	1	Most significant bit for pixel sample data. Shall have an Enumerated value of one less than the value in Bits Stored (0028,0101).	
Pixel Presentation	(0028,0103)	1	Data representation of the pixel samples. Shall have an Enumerated value: 0000H = Unsigned Integer	0000H
Pixel Intensity Relationship	(0028,1040)	1		LOG
Pixel Intensity Relationship Sign	(0028,1041)	1	The sign of the relationship between the Pixel sample values stored in Pixel Data (7FE0,0010) and the X-ray beam intensity. Enumerated Values: 1 = Lower pixel values correspond to less X-ray beam intensity -1 = Higher pixel values correspond to less X-ray beam intensity. See DICOM PS3.3 C.8.11.3.1.2 for further explanation.	-1
Rescale Intercept	(0028,1052)	1	The value b in the relationship between stored values (SV) in Pixel Data (7FE0,0010) and the output units specified in Rescale Type (0028,1054). Output units = m*SV + b. Enumerated Value: 0 See DICOM PS3.3 C.8.11.3.1.2 for further explanation.	0

Rescale Slope	(0028,1053)	1	m in the equation specified by Rescale intercept (0028,1052). Enumerated Value: 1 See DICOM PS3.3 C.8.11.3.1.2 for further explanation.	1
Rescale Type	(0028,1054)	1	Specifies the output units of Rescale Slope (0028,1053) and Rescale Intercept (0028,1052). Enumarated Value: US = Unspecified. See DICOM PS3.3 C.8.11.3.1.2 for further explanation.	US
Presentation LUT Shape	(2050,0020)	1	Specifies an identity transformation of the presentation LUT, other than to account for the value of Photometric Interpretation (0028,0004), such that the output of all grayscale transformations defined to be P-Values. Enumerated Values: IDENTITY INVERSE See DICOM PS3.3 C.8.11.3.1.2 for further explanation.	INVERSE
Lossy Image Compression	(0028,2110)	1	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. See PS3.3 C.7.6.1.1.5 for further explanation.	Either of 00 or 01.
Lossy Image Compression Ratio	(0028,2112)	1C	See DICOM PS3.3 C.7.6.1.1 for further explanation. Required if Lossy Compression has been performed on the image.	Compression ratio
Acquisition Device Processing Description	(0018,1400)	3	Indicates any visual processing performed on the images prior to exchange. See DIOM PS 3.3 C.8.11.3.1.3 for further explanation.	Sets menu name. Exposure menu name.
Acquisition Device Processing Code	(0018,1401)	3	Code representing the device-specific processing associated with the image.	Sets menu code. Codifies the body part, exposure method and exposure menu. Taken to be FFFF if no value exists.
Patient Orientation	(0020,0020)	1	Patient direction of the rows and columns of the image. See DICOM PS3.3 C.7.6.1.1.1 for further explanation.	

Burned In Annotation	(0028,0301)	1	Indicates whether or not image contains sufficient burned in annotation to identify the patient and date the images acquired. Enumerated Values: YES NO	NO
Window Center	(0028,1050)	1C	Defines a Window Center for display. See DICOM PS3.3 C.8.11.3.1.5 for further explanation. Required if Presentation Intent Type (0008,0068) is FOR PRESENTATION and VOI LUT Sequence (0028,3010) is not present. May be present if VOI LUT Sequence (0028,3010) is present.	This tag type is 1C, but CR Console keeps this attribute with any condition.
Window Width	(0028,1051)	1C	Window Width for display. See DICOM PS3.3 C.8.11.3.1.5 for further explanation. Required if Window Center (0028,1050) is sent.	This tag type is 1C, but CR Console keeps this attribute with any condition.
VOI LUT Sequence	(0028,3010)	3	Defines a sequence of VOI LUTs.	
>LUT Descriptor	(0028,3002)	1C	Specifies the format of the LUT Data in this Sequence. See PS3.3 C.11.2.1.1 for further explanation. Required if the VOI LUT Sequence (0028,3010) is sent.	
>LUT Explanation	(0028,3003)	3	Free from text explanation of the meaning of the LUT.	
>LUT Data	(0028,3006)	1C	LUT Data in this Sequence. Required if the VOI LUT Sequence (0028,3010) is sent.	

9.2.5.2.1 Image Type

See 8.2.5.1.1. Note however that Value 1 and Value 3 are as follows.

Value 1:

ORIGINAL Normalized image (an exposed image that has been subjected to image processing, such as gradation processing.)

DERIVED An image created through morphological processing (long-view image, energy subtraction image).

Value 3:

Not determined.

9.2.5.3 DX Detector Module

Attribute Name	Tag	Type	DICOM Definition	Implementation on CR Console
Detector Type	(0018,7004)	2	The Type of detector used to acquire this image. Defined Terms; DIRECT = X-ray photoconductor SCINTILATOR = Phosphor used STORAGE = Storage Phosphor FILM = Scanned film/Screen	STORAGE
Detector Configuration	(0018,7005)	3	The physical configuration of the detector. Defined Terms; AREA = single or tiled detector SLOT = scanned slot, slit or spot	SLOT
Sensitivity	(0018,6000)	3	Detector sensitivity in manufacturer specific units.	Reading sensitivity
Field of View Shape	(0018,1147)	3	Shape of the Field of View, that is the image pixels stored in Pixels Data(7FE0,0010). Enumerated Value; RECTANGLE ROUND HEXALGONAL	RECTANGLE
Field of View Dimension	(0018,1149)	3	Dimensions in mm of the Field of View , that is the image pixels stored in Pixel Data (7FE,0010). If Field of View Shape (0018,1147) is ; RECTANGLE: row dimension followed by column. ROUND: diameter HEXAGONAL: diameter of a circumscribed circle.	Sets image size.
Imager Pixel Spacing	(0018,1164)	1	Physical distance measured at the front place of the detector housing between the center of each image pixel specified by a numeric pair – row spacing value (delimiter) column spacing value in mm.	Same as for Imager Pixel Spacing (0018,1164) defined in 8.2.6.2 CR Image Module.

9.2.5.4 DX Positioning Module

Attribute Name	Tag	Type	DICOM Definition	Implementation on CR Console
Estimated Radiographic Magnification Factor	(0018,1114)	3	Ratio of Source Image Distance (SID) over Source Object Distance (SOD).	Set a 1/100 SID/SOD value.
Positioner Type	(0018,1508)	2	Defined Terms: CARM COLUMN MAMMOGRAPHIC PANORAMIC CEPHALOSTAT RIGID NONE Notes: 1. The term CARM can apply to any positioner with 2 degrees of freedom of rotation of the X-ray beam about the Imaging Subject. 2. The term COLUMN can apply to any positioner with 1 degree of freedom of rotation of the X-ray beam about the Imaging Subject.	When CR or DX is used for Modality (0008,0060) and the following value is determined for mammography. MAMMOGRAPHIC NONE When MG is used for Modality (0008,0060), determine the following value. MAMMOGRAPHIC
Positioner Primary Angle	(0018,1510)	3	Position of the X-ray beam about the patient from the RAO to LAO direction where movement from RAO to vertical is positive, if Positioner Type (0018,1508) is CARM.	
Body Part Thickness	(0018,11A0)	3	The average thickness in mm of the body part examined when compressed if compression has been applied during exposure.	
Compression Force	(0018,11A2)	3	The compression force applied to the body part during exposure, measured in Newtons.	

9.2.6 Mammography Module

9.2.6.1 Mammography Series Module

Attribute Name	Tag	Type	DICOM Definition	Implementation on CR Console
Modality	(0008,0060)	1	Type of equipment that originally acquired the data used to create the image in this series. Enumerated Values: MG	MG

9.2.6.2 Mammography Image Module

Attribute Name	Tag	Type	DICOM Definition	Implementation on CR Console
Positioner Type	(0018,1508)	1	Enumerated Values: MAMMOGRAPHIC NONE	When MG is used for Modality (0008,0060), determine the following value. MAMMOGRAPHIC
Positioner Primary Angle	(0018,1510)	3	Position in degrees of th X-ray beam in the coronal anatomical plane as if the patient were standing where movement of te X-ray source from anterior to posterior, is positive and vertical is zero.	
Positioner Secondary Angle	(0018,1511)	3	Position in degrees of the X-ray beam in the sagittal anatomical plane as if the patient were standing where movement of the X-ray source from anterior to posterior, is positive, and certical is zero.	
Image Laterality	(0020,0062)	1	Laterality of the region examined. Enumerated Values: R = right L = left B = both	
Organ Exposed	(0040,0318)	1	Organ to which Organ Dose (0040,0316) applies. Enumarated Value: BREAST	BREAST
Anatomic Region Sequence	(0008,2218)	1	Sequence that describes the projection of the anatomic region of interest in this image. Only a single item shall be permitted in this sequence.	
>Code Value	(0008,0100)	1C		T-04000
>Coding Scheme Designator	(0008,0102)	1C		SNM3
>Code Meaning	(0008,0104)	1C		BREAST
View Code Sequence	(0054,0220)	1	Sequence that describes the projection of the anatomic region of interest on the image receptor. Only a single item shall be permitted in this sequence.	
>Include Code Sequence Macro				
>View Modifier Code Sequence	(0054,0222)	2	View modifier. Zero and more Items may be included in this Sequence.	Length = 0

9.2.6.2.1 View Code Sequence

Attribute Name	Tag	Type	DICOM Definition	Implementation on CR Console
>Code Value	(0008,0100)	1C		*
>Code Scheme Designator	(0008,0102)	1C		SNM3
>Code Meaning	(0008,0104)	1C		*

* Select one item from the table below to set.

Code Value (0008,0100)	Code Meaning (0008,0104)	ACR BI-RADS Equivalent
R-10224	medio-lateral	ML
R-10226	medio-lateral oblique	MLO
R-10228	latero-medial	LM
R-10230	latero-medial oblique	LMO
R-10242	cranio-caudal	CC
R-10244	caudo-cranial (from below)	FB
R-102D0	superolateral to inferomedial oblique	SIO
R-102CF	exaggerated cranio-caudal	XCC
Y-X1770	cranio-caudal exaggerated laterally	XCCL
Y-X1771	cranio-caudal exaggerated medially	XCCM

9.2.7 General Module

9.2.7.1 Acquisition Context

Attribute Name	Tag	Type	DICOM Definition	Implementation on CR Console
Acquisition Context Sequence	(0040,0555)	2	A sequence of repeating items that describes the conditions present during the acquisition of an Image. Zero or more items may be included in this sequence.	Length = 0

9.2.7.2 SOP Common Module

See 8.2.7.1.

10. Modality Worklist Query/Retrieve Attribute Overview

10.1 Matching Key Attributes

The CR Console supports two types of queries.

The Patient Based Query

The CR Console supports all combinations of the matching key attributes listed in the next table.

Matching key attributes	Tag	Matching key type	Matching type
Patient's Name	0010,0010	R	Single / Wild Card
Patient ID	0010,0020	R	Single
Accession Number	0008,0050	O	Single
Requested Procedure ID	0040,1001	O	Single

The Broad Query

The CR Console supports all combinations of the matching key attributes listed in the next table.

Matching key attributes	Tag	Matching key type	Matching type
Scheduled Procedure Step Start Date	0040,0002	R	Single / Range
Modality	0008,0060	R	Single
Scheduled Station AE-Title	0040,0001	R	Single

10.2 Return Key Attributes

The CR Console requests the Return Key Attributes listed in the next table.
However, the CR Console is allowed to use the C-FIND extension function to subject all DICOM MWL-supported tags to the C-FIND process. It is also possible for the CR Console to output obtained tag information for Storage purpose.

Attribute Name	DICOM Tag	VR	MK	RK	Note
SOP Common Module					
Specific Character Set	(0008,0005)	CS	O	1C	Note 5
Scheduled Procedure Step Module					
Scheduled Procedure Step Sequence	(0040,0100)	SQ	R	1	
>Scheduled Station AE Title	(0040,0001)	AE	R	1	
>Scheduled Procedure Step Start Data	(0040,0002)	DA	R	1	
>Scheduled Procedure Step Start Time	(0040,0003)	TM	R	1	
>Scheduled Performing Physician's Name	(0040,0006)	PN	R	2	
>Scheduled Procedure Step Description	(0040,0007)	LO	O	1C	
>Scheduled Protocol Code Sequence	(0040,0008)	SQ	O	1C	Note 3
>>Code Value	(0008,0100)	SH	O	1C	
>>Coding Scheme Designator	(0008,0102)	SH	O	1C	
>>Coding Scheme Version	(0008,0103)	SH	O	3	
>>Code Meaning	(0008,0104)	LO	O	3	Note 9
>Scheduled Procedure Step ID	(0040,0009)	SH	O	1	Note 7
>Modality	(0008,0060)	CS	R	1	
Requested Procedure Module					
Requested Procedure ID	(0040,1001)	SH	O	1	
Requested Procedure Code Sequence	(0032,1064)	SQ	O	1C	
>Code Value	(0008,0100)	SH	O	1C	
>Coding Scheme Designator	(0008,0102)	SH	O	1C	
>Coding Scheme Version	(0008,0103)	SH	O	3	
>Code Meaning	(0008,0104)	LO	O	3	
Study Instance UID	(0020,000D)	UI	O	1	Note 7
Referenced Study Sequence	(0008,1110)	SQ	O	2	
>Referenced SOP Class UID	(0008,1150)	UI	O	1C	
>Referenced SOP Instance UID	(0008,1155)	UI	O	1C	
Requested Procedure Description	(0032,1060)	LO	O	1C	
Names of Intended Recipients of Results	(0040,1010)	PN	O	3	
Imaging Service Request Module					
Referring Physician's Name	(0008,0090)	PN	O	2	Note 8
Referring Physician	(0032,1032)	PN	O	2	Note 8
Requesting Service	(0032,1033)	LO	O	3	Note 1 Note 2
Accession Number	(0008,0050)	SH	O	2	
Order Enterer's Location	(0040,2009)	SH	O	3	Note 1 Note 2
Visit Identification Module					
Visit Status Module					
Visit Relationship Module					

Referenced Patient Sequence	(0008,1120)	SQ	O	2	
>Referenced SOP Class UID	(0008,1150)	UI	O	2	
>Referenced SOP Instance UID	(0008,1155)	UI	O	2	
Visit Admission Module					
Patient Relationship Module					
Patient Identification Module					
Patient's Name	(0010,0010)	PN	R	1	Note 4
Patient ID	(0010,0020)	LO	R	1	
Other Patient IDs	(0010,1000)	LO	O	3	
Patient Demographic Module					
Patients Birth Date	(0010,0030)	DA	O	3	
Patient's Sex	(0010,0040)	CS	O	2	
Ethnic Group	(0010,2160)	SH	O	3	
Patient Comments	(0010,4000)	LT	O	3	
Patient Medical Module					
Patient State	(0038,0500)	LO	O	2	
Pregnancy Status	(0010,21C0)	US	O	2	
Additional Patient History	(0010,21B0)	LT	O	3	
Radiation Dose Module					Note 6
Radiation Dose Sequence	(0040,030E)	SQ	O	3	Note 6
>Exposure Type	(0018,115A)	CS	O	3	Note 6
>KVp	(0018,0060)	DS	O	1C	Note 6
>X-ray Tube Current in μA	(0018,8151)	DS	O	1C	Note 6
>Exposure Time	(0018,1150)	IS	O	1C	Note 6
>Filter Type	(0018,1160)	LO	O	3	Note 6
>Filter Material	(0018,7050)	CS	O	3	Note 6
Study Component Acquisition					Note 8
Study Description	(0008,1030)	LO	O	3	Note 8
Image Acquisition Results Module					Note 8
Study ID	(0020,0010)	SH	O	3	Note 8
Private					Note 8
Distribution Code	(0009,xx90)	ST	O	3	Note 8
Number of Films	(2000,0010)	IS	O	3	Note 10

Note 1 How to set up a requesting department name.

1) When setting up a requesting department name both in 1- and 2-byte characters.
   Requesting department name in 1-byte characters: (0040, 2009) Order Enterer's Location - A maximum of 64 characters
   Requesting department name in 2-byte characters: (0032, 1033) Requesting Service - A maximum of 8 characters
2) When setting up a requesting department name only in 2-byte characters.
   Requesting department name in 2-byte characters: (0032, 1033) Requesting Service - A maximum of 8 characters
3) When setting up a requesting department name only in 1-byte characters.
   Requesting department name in 1-byte characters: (0032, 1033) Requesting Service - A maximum of 64 characters
   * Note that for 1) and 2) above, characters can be corrupted on output devices, such as filer or printer.

Note 2 1- and 2-byte characters cannot be used mixed at the same time.

Note 3 JJ1017-compliance rules

A set of three items consisting of (1) study details, (2) target body part and (3) exposure direction is equivalent to one exposure (one exposure menu) in the "Scheduled Protocol Code Sequence". Components included in (1), (2) and (3) cannot be omitted or repeated.

Item	No. of Items
(1) Study details	1
(2) Target body part	1
(3) Exposure direction	1

The length of Code Value character string in (1), (2) and (3) must not exceed a maximum of 16 characters.

The Scheduled Protocol Code Sequence complies with the JJ1017 Guidelines Ver. 1.1.

Note 4 How to handle a patient name (PN) with the Japanese environment.

Element	Character Type	Window Display	Film Display	Distribution
1st element (notational representation)	1-byte characters only.	○	○	○
2nd element (ideographic representation)	2-byte characters only.	○	○	○
3rd element (phonetic representation)	Only 1- or 2-byte characters.	×	×	○

Note 5 "ISO 2022 IR 13\ISO 2022 IR 87" will be transmitted using "C-FIND-RQ" with the Japanese environment. "ISO IR100" can be set up within the English environment.

Note 6 These items will not be set up with the JJ1017 Guidelines.

Note 7 How to identify the same studies.

Orders for which (0020, 000D) Study Instance UID and (0040, 0100)>(0040, 0009) Scheduled Procedure Step ID match with each other will be identified to be the same study.

When studies for which the above two items match with each other have already been performed on the CR Console, a study cannot be started after receiving a relevant order.

Note 8 Tag information that has been set up according to the MWL support version for the IDT is now added.

Note 9 Can be set up for the name of a body part to be exposed and displayed on the study window.

Note 10 Film count to be set up for all Scheduled Protocol items.

11. Modality Performed Procedure Step IOD Attribute Overview

The CR Console provides the attributes listed in the next table.

Performed Procedure Step

Attribute Name	Tag	N-CREATE	N_SET	Final	from Modality Worklist
Common					
SOP Class UID					
Instance UID					
Specific Character Set	(0008,0005)	1C/1C	Not allowed		0008,0005
Performed Procedure Step Relationship					
Scheduled Step Attribute Sequence	(0040,0270)	1/1	Not allowed		-
>Study Instance UID	(0020,000D)	1/1	Not allowed		0020,000D
>Referenced Study Sequence	(0008,1110)	2/2	Not allowed		0008,1110
>>Referenced SOP Class UID	(0008,1150)	1C/1	Not allowed		0008,1150
>>Referenced SOP Instance UID	(0008,1155)	1C/1	Not allowed		0008,1155
>Accession Number	(0008,0050)	2/2	Not allowed		0008,0050
>Requested Procedure ID	(0040,1001)	2/2	Not allowed		0040,1001
>Requested Procedure Description	(0032,1060)	2/2	Not allowed		0032,1060
>Scheduled Procedure Step ID	(0040,0009)	2/2	Not allowed		0040,0009
>Scheduled Procedure Step Description	(0040,0007)	2/2	Not allowed		0040,0007
>Scheduled Action Item Code Sequence	(0040,0008)	2/2	Not allowed		0040,0008
>>Code Value	(0008,0100)	1C/1	Not allowed		0008,0100
>>Coding Scheme Designator	(0008,0102)	1C/1	Not allowed		0008,0102
>>Coding Scheme Version	(0008,0103)	3/3	Not allowed		0008,0103
>>Code Meaning	(0008,0104)	3/3	Not allowed		0008,0104
Patient's Name	(0010,0010)	2/2	Not allowed		0010,0010
Patient ID	(0010,0020)	2/2	Not allowed		0010,0020
Patient's Birth Data	(0010,0030)	2/2	Not allowed		0010,0030
Patient's Sex	(0010,0040)	2/2	Not allowed		0010,0040
Referenced Patient Sequence	(0008,1120)	2/2	Not allowed		0008,0120
>Referenced SOP Class UID	(0008,1150)	1C/1	Not allowed		0008,1150
>Referenced Instance UID	(0008,1155)	1C/1	Not allowed		0008,1155
Performed Procedure Step Information					
Performed Procedure Step ID	(0040,0253)	1/1	Not allowed		
Performed Station AE Title	(0040,0241)	1/1	Not allowed		
Performed Station Name	(0040,0242)	2/2	Not allowed		
Performed Location	(0040,0243)	2/2	Not allowed		
Performed Procedure Step Start Data	(0040,0244)	1/1	Not allowed		
Performed Procedure Step Start Time	(0040,0245)	1/1	Not allowed		
Performed Procedure Step Status	(0040,0252)	1/1	3/1		
Performed Procedure Step End Data	(0040,0250)	2/2	3/1	1	
Performed Procedure Step End Time	(0040,0251)	2/2	3/1	1	
Performed Procedure Step	(0040,0254)	2/2	3/2		
Performed Procedure Type	(0040,0255)	2/2	3/2		
Comments on the Performed Procedure Step	(0040,0280)	3/3	3/3		
Procedure Code Sequence	(0008,1032)	2/2	3/2		
>Code Value	(0008,0100)	1C/1	1C/1		
>Coding Scheme Designator	(0008,0102)	1C/1	1C/1		
>Coding Scheme Version	(0008,0103)	3/3	3/3		
>Code Meaning	(0008,0104)	3/3	3/3		

Image Acquisition Results						
	Modality	(0008,0060)	1/1	Not allowed		0008,0060
	Study ID	(0020,0010)	2/2	Not allowed		0040,1001
	Performed Action Item Code Sequence	(0040,0260)	2/2	3/2		0040,0008
	>Code Value	(0008,0100)	1C/1	1C/1		0008,0100
	>Coding Scheme Designator	(0008,0102)	1C/1	1C/1		0008,0102
	>Coding Scheme Version	(0008,0103)	1C/1	1C/1		0008,0103
	>Code Meaning	(0008,0104)	3/3	3/3		0008,0104
	Performed Series Sequence	(0040,0340)	2/2	3/1	1	
	>Series Description	(0008,103E)	2C/2	2C/2	2	
	>Retrieve AE Title	(0008,0054)	2C/2	2C/2	2	
	>Performed Physisian's Name	(0008,1050)	2C/2	2C/2		
	>Operator's Name	(0008,1070)	2C/2	2C/2		
	>Protocol Name	(0018,1030)	1C/1	1C/1	1	
	>Series Instance UID	(0020,000E)	1C/1	1C/1	1	
	>Referenced Image Sequence	(0008,1140)	2C/2	2C/2	1C	
	>>Referenced SOP Class UID	(0008,1150)	1C/1	1C/1		
	>>Referenced SOP Instance UID	(0008,1155)	1C/1	1C/1		
	>Referenced Non-Image Composite SOP Instance Sequence	(0040,0220)	2C/2	2C/2	1C	
	>>Referenced SOP Class UID	(0008,1150)	1C/1	1C/1		
	>>Referenced SOP Instance UID	(0008,1155)	1C/1	1C/1		
Radiation Dose						
	Radiation Dose Sequence	(0040,030E)	3/3	3/3		
	>Exposure Type	(0018,115A)	3/3	3/3		
	>KVp	(0018,0060)	3/3	3/3		
	>X-ray Tube Current in µA	(0018,8151)	3/3	3/3		
	>Exposure Time	(0018,1150)	3/3	3/3		
	>Filter Type	(0018,1160)	3/3	3/3		
	>Filter Material	(0018,7050)	3/3	3/3		
Billing and Material Management Code						
	Film Consumption Sequence	(0040,0321)	3/3	3/3		
	>Number of Films	(2100,0170)	3/3	3/3		
	>Film Size ID	(2010,0050)	3/3	3/3		
	Billing Supplies and Devices Sequence	(0040,0324)	3/3	3/3		
	>Billing Item Sequence	(0040,0296)	3/3	3/3		
	>>Code Value	(0008,0100)	1C/1	1C/1		
	>>Coding Scheme Designator	(0008,0102)	1C/1	1C/1		
	>>Coding Scheme Version	(0008,0103)	3/3	3/3		
	>>Code Meaning	(0008,0104)	3/3	3/3		
	>Quantity Sequence	(0040,0293)	3/3	3/3		
	>>Quantity	(0040,0294)	3/3	3/3		
Exposure Status (Private Tag)						
	Exposure Status Sequence	(0019,XXA0)	3/3	3/3		
	>Distance Source to Detector	(0018,1110)	3/3	3/3		
	>Exposure	(0018,1152)	3/3	3/3		
	>Exposure in µAs	(0018,1153)	3/3	3/3		
	>Grid	(0018,1166)	3/3	3/3		
	>Estimated Radiographic Magnification Factor	(0018,1114)	3/3	3/3		
	>Image Area Dose Product	(0018,115E)	3/3	3/3		
	>Anode Target Material	(0018,1191)	3/3	3/3		
	>Body Part Thickness	(0018,11A0)	3/3	3/3		
	>Compression Force	(0018,11A2)	3/3	3/3		
	>Positioner Primary Angle	(0018,1510)	3/3	3/3		
	>Exposure Division Count	(0019,YY71)	1C/1	1C/1		
	>Exposure Status	(0019,YYA1)	1C/1	1C/1		
	>Exposure Kind	(0019,YYA2)	1C/1	1C/1		
	>Entrance Dose	(0040,0302)	3/3	3/3		
	>Organ Dose	(0040,0316)	3/3	3/3		
	>Entrance Dose in mGy	(0040,8302)	3/3	3/3		

■ X-ray Acquisition Dose Module

Name	Tag	VR	VM	Description of Attributes
Radiation Dose Sequence	(0040,030E)	SQ	1	Exposure Dose Sequence will contain Total Number of Exposures (0040, 0301) items plus an item for each fluoroscopy episode not already counted as an exposure.
>KVp	(0018,0060)	DS	1	Peak kilo voltage output of the x-ray generator used. An average in the case of fluoroscopy (continuous radiation mode).
>Exposure Time	(0018,1150)	IS	1	Time of x-ray exposure or fluoroscopy in msec.
>Exposure Type	(0018,115A)	CS	1	Specifies X-Ray radiation mode. Enumerated Values: CONTINUOUS PULSED
>Filter Type	(0018,1160)	LO	1	Type of filter(s) inserted into the X-Ray beam (e.g. wedges).
>Filter Material	(0018,7050)	CS	1	The X-Ray absorbing material used in the filter. May be multi-valued. Values: MOLYBDENUM RHODIUM ALUMINUM
>X-ray Tube Current in µA	(0018,8151)	DS	1	X-ray Tube Current in µA. An average in the case of fluoroscopy (continuous radiation mode).

■ Attributes of Exposure Status Sequence

Name	Tag	VR	VM	Description of Attributes
Exposure Status Sequence	(0019,XXA0)	SQ	1	Sequence that indicates exposure status.
>Distance Source to Detector	(0018,1110)	DS	1	Distance in mm from the source to detector center;
>Exposure	(0018,1152)	IS	1	The exposure expressed in mAs, for example alculated from Exposure Time and X-ray Tube Current.
>Exposure in µAs	(0018,1153)	IS	1	The exposure expressed in µAs, for example calculated from Exposure Time and X-ray Tube Current.
>Grid	(0018,1166)	CS	1	Identify the grid. Only a single value shall be present. Defined Terms: USED : Grid is used. NONE : Grid is not used.
>Estimated Radiographic Magnification Factor	(0018,1114)	DS	1	Ratio of Source Image Distance (SID) over Source Object Distance (SOD).

>Image Area Dose Product	(0018,115E)	DS	1	X-ray dose, measured in dGy*cm*cm, to which the patient was exposed for the acquisition of this image plus any nondigitally recorded fluoroscopy which may have been performed to prepare for the acquisition of this image. Notes: 1. The sum of the Image Area Dose Product of all images of a Series or a Study may not result in the actual area dose product to which the patient was exposed. 2. This may be an estimated value based on assumptions about the patient's body size and habitus.
>Anode Target Material	(0018,1191)	CS	1	The primary material in the anode of the X-ray source. Defined Terms: MOLYBDENUM RHODIUM TUNGSTEN
>Body Part Thickness	(0018,11A0)	DS	1	The average thickness in mm of the body part examined when compressed if compression has been applied during exposure.
>Compression Force	(0018,11A2)	DS	1	The compression force applied to the body part during exposure, measured in Newtons.
>Positioner Primary Angle	(0018,1510)	DS	1	Position of the X-ray beam about the patient from the RAO to LAO direction where movement from RAO to vertical is positive, if Positioner Type (0018,1508) is CARM.
>Exposure Division Count	(0019,YY71)	IS	1	Number of exposures by split exposure process (1 to n).
>Exposure Status	(0019,YYA1)	CS	1	Identifies exposure status. "NORMAL": Normal/"MIS": Mis-exposure
>Exposure Kind	(0019,YYA2)	CS	1	Identifies whether added exposure or re-exposure. "NORMAL": Normal/"ADD": Added exposure/"AGAIN": Re-exposure
>Entrance Dose	(0040,0302)	US	1	Average entrance dose value measured in dGy at the surface of the patient during the acquisition of this image. Note : This may be an estimated value based on assumptions about the patient's body size and habitus.
>Organ Dose	(0040,0316)	DS	1	Average organ dose value measured in dGy during the acquisition of this image. Note: This may be an estimated value.
>Entrance Dose in mGy	(0040,8302)	DS	1	Average entrance dose value measured in mGy at the surface of the patient during the acquisition of this image. Note : This may be an estimated value based on assumptions about the patient's body size and habitus.

Relationship with “Performed Protocol Code Sequence”

MPPS stipulates that exposure menu information items (such as menu code, etc.) regarding one study be transmitted being listed in the “Performed Protocol Code Sequence”. For this purpose, the number of components within a sequence and order of those components must be the same with those within the “Exposure Status Sequence”.
Components within the “Radiation Dose Sequence” will be set up for the actual number of radiation, according to order of radiation. The actual number of radiation must be the same with the number of frames by split exposures (0019, XX71) within the “Exposure Status Sequence”.

The table below presents the relationship between the “Performed Protocol Code Sequence”, “Exposure Status Sequence” and the “Exposure Dose Sequence”.

Performed Protocol Code Sequence	Exposure Status Sequence	Film Consumption Sequence	Radiation Dose Sequence
Menu (1) (Code, etc.)	Menu (1) (No. of split exposures: 1)	Menu (1) (No. of films: 1)	Menu (1) 1st radiation
Menu (2) (Code, etc.)	Menu (2) (No. of split exposures: 2)	Menu (2) (No. of films: 1)	Menu (2) 1st radiation
Menu (3) (Code, etc.)	Menu (3) (No. of split exposures: 1)	Menu (3) (No. of films: 1)	Menu (2) 2nd radiation
			Menu (3) 1st radiation

12. Modality Worklist for Patient Information (MWM PI) Query/Retrieve Attribute Overview

12.1 Matching Key Attributes

Matching key attributes	Tag	Matching key type	Matching type
Patient ID	0010,0020	R	Single
Accession Number	0008,0050	O	Single

12.2 Return Key Attributes

The CR Console requests the Return Key Attributes listed in the next table.

Attribute Name	DICOM Tag	VR	MK	RK	Note
SOP Common Module					
Specific Character Set	(0008,0005)	CS	O	1C	Note 1
Imaging Service Request Module					
Accession Number	(0008,0050)	SH	O	2	
Patient Identification Module					
Patient's Name	(0010,0010)	PN	R	1	Note 2
Patient ID	(0010,0020)	LO	R	1	
Patient Demographic Module					
Patients Birth Date	(0010,0030)	DA	O	3	
Patient's Sex	(0010,0040)	CS	O	2	

Note 1 “ISO 2022 IR 13\ISO 2022 IR 87” will be transmitted using “C-FIND-RQ” with the Japanese environment. “ISO IR100” can be set up within the English environment.

Note 2 How to handle a patient name (PN) with the Japanese environment.

Element	Character Type	Window Display	Film Display	Distribution
1st element (notational representation)	1-byte characters only.	○	○	○
2nd element (ideographic representation)	2-byte characters only.	○	○	○
3rd element (phonetic representation)	Only 1- or 2-byte characters.	×	×	○

13. Storage Commitment Attribute Overview

The CR Console sends the attributes listed in the next table.

Attribute	Tag	Note
Transaction UID	0008,1195	
Referenced SOP Sequence	0008,1199	
>Referenced SOP Class UID	0008,1150	References to the CR Image IOD
>Referenced SOP Instance UID	0008,1155	

Referenced Study Component Sequence Attribute (0008,1111) was retired on “DICOM Standard” since 2003. CR Console does not send the attribute (0008,1111).

14. DIMSE-Service and Attributes in the Basic Grayscale Print Management

14.1 DIMSE-Service

SOP Class	DIMSE	Usage SCU	Usage
Basic Film Session SOP Class	N-CREATE	M	Used.
	N-SET	U	Not used.
	N-DELETE	U	Used.
	N-ACTION	U	Not used.
Basic Film Box SOP Class	N-CREATE	M	Used.
	N-SET	U	Not used.
	N-DELETE	U	Used.
	N-ACTION	M	Used.
Image Box SOP Class	N-SET	M	Used.
Printer SOP Class	N-EVENT-REPORT	M	Used.
	N-GET	U	Used.

14.2 Basic Film Session SOP Class

☐ N-CREATE

Name	Tag	Value
Number of Copies	2000,0010	1-9
Print Priority	2000,0020	Specifies the priority of the print job. Enumerated Values: HIGH MED LOW
Medium Type	2000,0030	CLEAR FILM BLUE FILM
Film Destination	2000,0040	PROCESSOR BIN_i
Memory Allocation	2000,0060	39219, 71438

14.3 Basic Film Box SOP Class

☐ N-CREATE

Name	Tag	Value
Image Display Format	2010,0010	STANDARD \1,1
Film Orientation	2010,0040	PORTRAIT LANDSCAPE
Film Size ID	2010,0050	8INX10IN, 10INX12IN, 10INX14IN, 14INX14IN, 14INX17IN
Magnification Type	2010,0060	REPLICATE, BILINEAR, CUBIC, NONE
Smoothing Type	2010,0080	SHARP SMOOTH MEDIUM

Border Density	2010,0100	BLACK WHITE 0-300
Max Density	2010,0130	360,300
Trim	2010,0140	NO
Configuration Information	2010,0150	“1” - “8”, ”FINE1” - “FINE8”
Referenced Film Session Sequence	2010,0500	
Referenced SOP Class UID	>0008,1150	1.2.840.10008.5.1.1.1
Referenced SOP Instance UID	>0008,1155	From created Film Session SOP Instance.

14.4 Basic Grayscale Image Box SOP Class

☐ N-SET

Name	Tag	Value
Smoothing Type	2010,0080	SHARP SMOOTH MEDIUM
Max Density	2010,0130	360,300
Configuration Information	2010,0150	“1” - “8”, ”FINE1” - “FINE8”
Image Position	2020,0010	1
Requested Image Size	2020,0030	Depend on Image Size and Film Format.
Requested Decimate/Crop	2020,0040	“CROP” or with no tags.
Basic Grayscale Image Sequence	2020,0110	1
Photometric Interpretation	>0028,0004	MONOCHROME1
Rows	>0028,0010	Depend on Image Size and Film Format.
Columns	>0028,0011	Depend on Image Size and Film Format.
Bits Allocated	>0028,0100	16
Bits Stored	>0028,0101	10
High Bit	>0028,0102	9
Pixel Representation	>0028,0103	0
Pixel Data	>7FE0,0010	Pixels of rendered film sheet.

14.5 Printer SOP Class

☐ N-EVENT-REPORT

Event Type Name	Event Type ID	Attribute	Tag	Usage
Normal	1			
Warning	2	Printer Name	2110,0030	U
		Printer Status Info	2110,0020	U
Failure	3	Printer Name	2110,0030	U
		Printer Info	2110,0020	U

☐ N-GET

Name	Tag	Usage
Printer Status	2110,0010	U
Printer Status Info	2110,0020	U

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FUJIFILM Corporation

26-30, NISHIAZABU 2-CHOME, MINATO-KU, TOKYO 106-8620, JAPAN