

NOTE: Some settings must be changed by the service person in order to use or change the function marked with a “”.*

1. Introduction

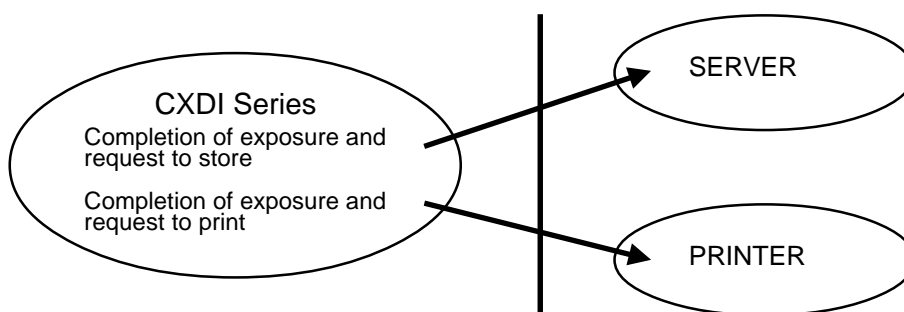
This Conformance Statement specifies the Canon X-ray Digital Camera CXDI series compliance to DICOM V3.0.

2. Implementational Model

Canon CXDI series directly digitizes the X-ray image data (CR image) by using the flat panel sensor, and sends the Digital Radiography image data by using DICOM Storage Service Class or DICOM Print Management Service Class.

2.1 Application Data Flow Diagram

Canon CXDI series sends acquired image data (CR image) to the server by using Storage Service Class, or to the printer by using Print Management Service Class.



2.2 Functional Definition of AE's

Canon CXDI series captures an image and processes the image by the operation from the LCD touch panel monitor of the operation unit.

When image data (CR image) is captured, it is sent to the server by using Storage Service Class, or it is sent to the printer by using Print Management Service Class.

2.3 Sequencing of Real-World Activities

Not applicable.

3. AE Specifications

Canon CXDI series generates a single association establishment request and operates as application entity.

3.1 AE Specifications

Canon CXDI series is defined by the following SOP:

SOP Class as SCU	
UID Name	UID Value
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9
Basic Annotation Box SOP Class	1.2.840.10008.5.1.1.15

Also, the SOP Class of the above Basic Grayscale Print Management Meta is defined as follows:

Basic Grayscale Print Management Meta SOP Class		
SOP Class Name	SOP Class UID	Comment
Basic Film Session SOP Class	1.2.840.10008.5.1.1.1	
Basic Film Box SOP Class	1.2.840.10008.5.1.1.2	
Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4	
Printer SOP Class	1.2.840.10008.5.1.1.16	Used for collecting printer information when DICOM Printer Service is used.

Canon CXDI series supports the following Transfer Syntax:

Transfer Syntax		
UID Name	UID Value	Comment
Implicit VR Little Endian	1.2.840.10008.1.2	
JPEG Extended (Process 2 & 4): Default Transfer Syntax for Lossy JPEG 12 Bit Image Compression (Process 4 only)*	1.2.840.10008.1.2.4.51	Settings need to be changed by the service person when they are going to be used in DICOM Storage Service.
JPEG Lossless, Non-Hierarchical, First- Order Prediction (Process 14 [Selection Value 1]): Default Transfer Syntax for Lossless JPEG Image Compression*	1.2.840.10008.1.2.4.70	

3.1.1 Association Establishment Policies

3.1.1.1 General

Canon CXDI series generates association establishment request for the server or the printer when image data (CR image) to be sent is acquired. Maximum size of PDU which is used is 128K*.

3.1.1.2 Number of Associations

Canon CXDI series generates association establishment request.

3.1.1.3 Asynchronous Nature

Asynchronous mode is not supported.

3.1.1.4 Implementation Identifying Information

Implementation Class UID for Canon CXDI series is:

1.2.392.200046.100.2.1.(S/N).(Internal study No.).(Year, month, day and time of study exposure).(Series No.).(Acquisition No.).(Image No.)

Implementation version name is "CANON_CCR"*.

3.1.2 Association Acceptance Policy

Canon CXDI series establishes association by sending establishment request to the server or printer when image data (CR image) to be sent is acquired.

3.1.2.1 Related Real-World Activity

Storage Service Class

When the study is completed, AE sends C-STORE request for sending image.

Print Service Class

When the study is completed, AE sends N-CREATE request for making film session and film box.

Then, it sends N-SET request for sending image data.

Finally, it sends N-ACTION request for printing the image on film, and N-DELETE for deleting the film session.

4. Communication Profiles

4.1 Supported Communication Stack

Canon CXDI series provides DICOM V3.0 TCP/IP network communication support as stated in DICOM Standard Part 8.

4.2 TCP/IP Stack

Canon CXDI series inherits TCP/IP stack.

4.3 Physical Media Support

Canon CXDI series supports 10BASE-T, 100BASE-TX, 10BASE-2 (option) and 10BASE-5 (option) of ETHERNET™.

- Ethernet is a trademark of Xerox Corporation.

5. Extension / Specialization / Privatization

Not applicable.

6. Configurable Parameters

Following environmental configuration information can be set from the LCD touch panel monitor of the Canon CXDI series:

CALLED APP TITLE

HOST NAME

PORT #

7. Support of Extended Character Sets

Canon CXDI series supports extended character sets.

DEFINED TERMS FOR SINGLE-BYTE CHARACTER SETS WITHOUT CODE EXTENSIONS

Character Set Description	Defined Term	ISO registration number	Number of characters	Code element	Character Set
Default repertoire	none	ISO-IR 6	94	G0	ISO 646:
Latin alphabet No.1	ISO_IR 100	ISO-IR 100	96	G1	Supplementary set
		ISO-IR 6	94	G0	ISO 646:
Latin alphabet No.2	ISO_IR 101	ISO-IR 101	96	G1	Supplementary set
		ISO-IR 6	94	G0	ISO 646:
Cyrillic	ISO_IR 144	ISO-IR 144	96	G1	Supplementary set
		ISO-IR 6	94	G0	ISO 646:

8. Entity

8.1 IOD Module

Canon CXDI series uses the following IOD modules:

Information Entities	Module
Patient	Patient
Study	General Study
	Patient Study
Series	General Series
	CR Series
Equipment	General Equipment
Image	General Image
	Image Plane(*)
	Image Pixel
	CR Image
	X-Ray Acquisition(*)
	VOI LUT
	SOP Common

VR (Value Representation) is as follows:

VR	Format	Data Length (Byte)
AS (Age String)	nnnY, nnnM, nnnW, nnnD	4
AE (Application Entity)		16 (max.)
CS (Code String)		16 (max.)
DA (Date)	YYYYMMDD	8
DS (Decimal String)	+xxx.xxxx, -xxx.xxxxx, etc	16 (max.)
DT (Date Time)	YYYYMMDDHHMMSS.FFFFFFFF	26 (max.)
FL (Floating Point Single)		4
FD (Floating Point Double)		8
IS (Integer String)		12 (max.)
LO (Long String)		64 (max.)
LT (Long Text)		10,240 (max.)
OB (Other Byte String)		Differs according to the transfer syntax.
OW (Other Word String)		Differs according to the transfer syntax.
PN (Person Name)		64 (max.) / component
SH (Short String)		16 (max.)
ST (Short Text)		1,024 (max.)
TM (Time)	HHMMSS.FFFFFFFF	16 (max.)
UI (Unique Identifier)		64 (max.)
UL (Unsigned Long)		4
US (Unsigned Short)		2

8.2 Library

Each elements in this system for TYPE will be handled as follows:

TYPE	Handling
1	Value is always sent with Tag.
1C	Value is sent with Tag under a certain condition.
2	Value is sent with Tag. However, when Value is unknown, it will be sent as a text string of length 0.
2C	It will be handled in the same way as TYPE2 under a certain condition.
3	Value is sent with Tag. However, when Value is unknown, it will be sent as a text string of length 0, or the element itself will not be sent.

Patient

Attribute Name	Tag	VR	Type	Value
Patient's Name	(0010,0010)	PN	2	Patient's name being entered.
Patient ID	(0010,0020)	LO	2	Patient's ID being entered.
Patient's Birth Date	(0010,0030)	DA	2	Patient's birth date (YYYYMMDD) being entered.
Patient's Sex	(0010,0040)	CS	2	Patient's sex (Male, Female or Unknown) being entered.

General Study

Attribute Name	Tag	VR	Type	Value
Study Instance UID*	(0020,000D)	UI	1	1.2.392.200046.100.2.1.(S/N).(Internal study No.)(Year, month, date and time of study exposure)
Study Date	(0008,0020)	DA	2	Date (YYYYMMDD) when study was performed.
Study Time	(0008,0030)	TM	2	Time (HHMMSS.000000) when study was performed.
Referring Physician's Name	(0008,0090)	PN	2	Physician's name to refer to. (Physician in charge of the patient)
Study ID	(0020,0010)	SH	2	Internal study number.
Accession Number	(0008,0050)	SH	2	A RIS or a HIS generated number which identifies the order for the study.
Study Description	(0008,1030)	LO	2	Institution-generated description or classification of the study performed.
Name of Physician(s) Reading Study	(0008,1060)	PN	3	Name of the physician(s) reading the study.

Patient Study

Attribute Name	Tag	VR	Type	Value
Admitting Diagnoses Description	(0008,1080)	LO	3	Description of the admitting diagnosis.
Patient's Age	(0010,1010)	AS	3	Age of patient.
Patient's Size	(0010,1020)	DS	3	Height of patient, in meters.
Patient's Weight	(0010,1030)	DS	3	Weight of patient, in kilograms.
Occupation	(0010,2180)	SH	3	Occupation of patient.
Additional Patient's History	(0010,21B0)	LT	3	Additional information about the patient's medical history.

General Series

Attribute Name	Tag	VR	Type	Value
Modality	(0008,0060)	CS	1	CR
Series Instance UID	(0020,000E)	UI	1	1.2.392.200046.100.2.1.(S/N).(Internal study No.)(Year, month, date and time of study exposure).(Series No.)
Series Number	(0020,0011)	IS	2	A number that identifies this Series.
Laterality	(0020,0060)	CS	2C	Laterality of (paired) body part examined. Required if the body part examined is a paired structure. Enumerated Values: R=right, L=left
Series Date	(0008,0021)	DA	3	Date the series started.
Series Time	(0008,0031)	TM	3	Time the series started.
Protocol Name	(0018,1030)	LO	3	User-defined description of the conditions under which the series was performed.
Series Description	(0008,103E)	LO	3	User provided description of the series.
Operator's Name	(0008,1070)	PN	3	Technologist(s) supporting the Series.
Body Part Examined	(0018,0015)	CS	3	Text description of the part of the body examined. SKULL, CSPINE, TSPINE, LSPINE, SSPINE, COCCYX, CHEST, CLAVICLE, BREAST, ABDOMEN, PELVIS, HIP, SHOULDER, ELBOW, KNEE, ANKLE, HAND, FOOT, EXTREMITY

CR Series

Attribute Name	Tag	VR	Type	Value
View Position	(0018,5101)	CS	2	One of the following: AP = Anterior / Posterior PA = Posterior / Anterior LL = Left Lateral RL = Right Lateral RLD = Right Lateral Decubitus LLD = Left Lateral Decubitus RLO = Right Lateral Oblique LLO = Left Lateral Oblique
Filter Type	(0018,1160)	SH	3	Label for the Type of the filter inserted into the X-ray beam.
Collimator/grid Name	(0018,1180)	SH	3	Label describing any collimator/grid inserted.
Focal Spot	(0018,1190)	DS	3	Size of focal spot, in mm. For devices with variable focal spot or multiple focal spots, small dimension followed by large dimension.

General Equipment

Attribute Name	Tag	VR	Type	Value
Manufacturer	(0008,0070)	LO	2	Canon Inc.
Institution Name	(0008,0080)	LO	3	Institution where the equipment is located
Station Name	(0008,1010)	SH	3	User defined name identifying the machine that produced the digital images. (Settings of NETWORK HOST NAME)
Institution Department Name	(0008,1040)	LO	3	Department in the institution where the equipment is located that produced the digital images
Manufacturer's Model Name	(0008,1090)	LO	3	CXDI
Device Serial Number	(0018,1000)	LO	3	Serial number
Software Versions	(0018,1020)	LO	3	Vx.x.xx (x indicates version number)
Spatial Resolution	(0018,1050)	DS	3	Minimum resolution, in mm.
Date of Last Calibration	(0018,1200)	DA	3	Date (YYYYMMDD) when the last calibration was performed.
Time of Last Calibration	(0018,1201)	TM	3	Time (HHMMSS.000000) when the last calibration was performed.

General Image

Attribute Name	Tag	VR	Type	Value
Image Number	(0020,0013)	IS	2	A number that identifies the internal image.
Image Comments	(0020,4000)	LT	3	Comments on Images.

Image Plane

Attribute Name	Tag	VR	Type	Value
Pixel Spacing*	(0028,0030)	DS	1C	Pixel pitch of sensor.

Image Pixel

Attribute Name	Tag	VR	Type	Value
Samples per Pixel	(0028,0002)	US	1	1
Photometric Interpretation	(0028,0004)	CS	1	MONOCHROME1
Rows	(0028,0010)	US	1	Number of pixels in rows in the image data.
Columns	(0028,0011)	US	1	Number of pixels in columns in the image data.
Bits Allocated	(0028,0100)	US	1	16
Bits Stored	(0028,0101)	US	1	12
High Bits	(0028,0102)	US	1	11
Pixel Representation	(0028,0103)	US	1	0

Private Module

Attribute Name	Tag	VR	Type	Value
Implementor Information	(0019,0016)	LO	3	Canon Inc.
Canon Internal Data 1 . . . Canon Internal Data 111	(0019,1610) . . . (0019,167F)	OB	3	Canon Internal Data 1 Canon Internal Data 111
Performed number of series	(0019,1060)	US	3	
Performed number of images	(0019,1070)	US	3	

CR Image

Attribute Name	Tag	VR	Type	Value
KVP	(0018,0060)	DS	3	Peak kilo voltage output of the X-ray generator used.
Distance Source to Detector	(0018,1110)	DS	3	Distance in mm from source to detector center.
Distance Source to Patient	(0018,1111)	IS	3	Distance in mm from source to isocenter (center of field of view).
Exposure Time	(0018,1150)	IS	3	Time of X-ray exposure, in msec.
X-ray Tube Current	(0018,1151)	IS	3	X-ray tube current, in mA.
Exposure	(0018,1152)	IS	3	The product of exposure time and X-ray tube current expressed in mAs.
Generator Power	(0018,1170)	IS	3	Power in kW to the X-ray generator.
Acquisition Device Processing Description	(0018,1400)	LO	3	Method of processing the image.
Acquisition Device Processing Code	(0018,1401)	LO	3	Code of image processing.
Sensitivity	(0018,6000)	LO	3	Read out sensitivity.

X-Ray Acquisition

Attribute Name	Tag	VR	Type	Value
Imager Pixel Spacing*	(0018,1164)	DS	3	Pixel pitch of sensor.

VOI LUT

Attribute Name	Tag	VR	Type	Value
Window Center	(0028,1050)	DS	3	Window center for display. 2048
Window Width	(0028,1051)	DS	1C	Window width for display. 4096
VOI LUT Sequence	(0028,3010)	SQ	3	Defines a sequence of VOI LUTs.
>LUT Descriptor	(0028,3002)	US	1C	Specifies the format of the LUT Data.
>LUT Data	(0028,3006)	US	1C	LUT Data.

SOP Common

Attribute Name	Tag	VR	Type	Value
SOP Class UID	(0008,0016)	UI	1	1.2.840.10008.5.1.4.1.1.1
SOP Instance UID(*)	(0008,0018)	UI	1	1.2.392.200046.100.2.1.(S/N).(Internal study No.)(Year, month, day and time of study exposure).(Series No.)(Acquisition No.)(Image No.)
Specific Character Set	(0008,0005)	CS	1C	When escape character is used, the values will be as indicated below. Also, if this tag is used, PN will conform to Part 5.C.6.2.1. Default repertoire: ISO_IR 6 Latin alphabet No. 1: ISO_IR 100 Latin alphabet No. 2: ISO_IR 101 Cyrillic: ISO_IR 144

Modality LUT

Attribute Name	Tag	VR	Type	Value
Rescale Intercept	(0028,1052)	DS	1C	Rescale Intercept. 200
Rescale Slope	(0028,1053)	DS	1C	Rescale Slope. 7.326007E-1
Rescale Type	(0028,1054)	LO	1C	Rescale Type. OD

Basic Film Session

Attribute Name	Tag	VR	Type	Value
Number of Copies	(2000,0010)	IS	3	Number of copies to be printed for each film of the film session.
Print Priority	(2000,0020)	CS	3	Specifies the priority of the print job. (HIGH or LOW)
Medium Type	(2000,0030)	CS	3	Medium Type. (PAPER,CLEAR FILM,BLUE FILM)
Film Destination	(2000,0040)	CS	3	Film Destination. (MAGAZINE or PROCESSOR)
Film Session Label	(2000,0050)	LO	3	Human readable label that identifies the film session.

Basic Film Box

Attribute Name	Tag	VR	Type	Value
Image Display Format	(2010,0010)	ST	1	Format speified by the user.
Film Orientation	(2010,0040)	CS	3	Direction of the film specified by the user. (PORTRAIT or LANDSCAPE)
Film Size ID	(2010,0050)	CS	1	Film size identification. 8IN X 10IN, 10IN X 12IN, 10IN X 14IN, 11IN X 14IN, 14IN X 14IN, 14IN X 17IN, 24CM X 24CM, 24CM X 30CM
Magnification Type	(2010,0060)	CS	3	One of the following interpolation types: REPLICATE BILINEAR CUBIC NONE
Smoothing Type	(2010,0080)	CS	3	Further specifies the type of the interpolation function; values are defined in Conformance Statement; only valid for Magnification Type (2010,0060)=CUBIC
Border Density	(2010,0100)	CS	3	Density of border.
Min Density	(2010,0120)	US	3	Minimum density of the image.
Max Density	(2010,0130)	US	3	Maximum density of the image.
Trim	(2010,0140)	CS	3	Specifies whether a Trim box shall be printed surrounding each image on the film (ON/OFF).
Configuration Information	(2010,0150)	ST	3	Character string that contains either the ID of the printer configuration table that contains a set of values for implementation specific print parameters or one or more configuration data values, encoded as characters.

Basic Image Box

Attribute Name	Tag	VR	Type	Value
Image Position	(2020,0010)	US	1	Position of the image on the film.
Polarity	(2020,0020)	CS	3	Specifies whether minimum pixel values are to be printed black or white.
Requested Image Size	(2020,0030)	DS	3	Width of the image to be printed, in mm.
Preformatted Grayscale Image Sequence	(2020,0110)	SQ	1	Sequence of image.
>Photometric Interpretation	(0028,0004)	US	1	Refer to Image Pixel.
>Samples Per Pixel	(0028,0002)	US	1	Refer to Image Pixel.
>Rows	(0028,0010)	US	1	Refer to Image Pixel.
>Columns	(0028,0011)	US	1	Refer to Image Pixel.
>Bits Allocated	(0028,0100)	US	1	Refer to Image Pixel.
>Bits Stored	(0028,0101)	US	1	Refer to Image Pixel.
>High Bit	(0028,0102)	US	1	Refer to Image Pixel.
>Pixel Representation	(0028,0103)	US	1	Refer to Image Pixel.
>Pixel Data	(7FE0,0010)	OW	1	Image data.

Printer

Attribute Name	Tag	VR	Type	Value
Printer Status	(2110,0010)	LO	3	Printer device status: NORMAL WARNING FAILURE
Printer Status Info	(2110,0020)	CS	3	Information on printer status.
Printer Name	(2110,0030)	LO	3	User defined identifying the printer.
Manufacturer	(0008,0070)	LO	3	Manufacturer of the printer.
Manufacturer Model Name	(0008,1090)	LO	3	Model name of the printer.
Device Serial Number	(0018,1000)	LO	3	Serial number of the printer.
Software Version	(0018,1020)	LO	3	Software version of the printer.
Date of Last Calibration	(0018,1200)	DA	3	Date(YYYYMMDD) when the last calibration was performed.
Time of Last Calibration	(0018,1201)	TI	3	Time(HHMMSS.000000) when the last calibration was performed.

Basic Annotation Box

Attribute Name	Tag	VR	Type	Value
Annotation Position	(2030,0010)	US	1	Position of the annotation box.
Text String	(2030,0020)	LO	3	Text string.