TOSHIBA

DICOM CONFORMANCE STATEMENT
FOR
TOSHIBA DIGITAL RADIOGRAPHY SYSTEM
MODEL ADR-1000A /R2
(MIIXR0003EAE)

TOSHIBA MEDICAL SYSTEMS CORPORATION

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(2) The contents of this manual are subject to change without prior notice and without our legal obligation.

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1. Introduction

This document is a DICOM Conformance Statement for Toshiba's Digital Radiography Systems. It is intended to provide the reader with the knowledge of how to integrate this product within a DICOM compliant hospital network. It details the DICOM Service Classes, Information Objects, and Communication Protocols which are supported by this product.

If the reader is unfamiliar with DICOM, it is recommended that they read the DICOM Specification (referenced below) prior to reading this conformance statement. Also note that this document is formatted according to the DICOM Specification, Part 2: Conformance.

1.1 References

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

1.2 Definitions

● **Association Establishment** - An Association Establishment is the first phase of communication between two DICOM Application Entities. The AEs use the Association Establishment to negotiate how data will be encoded and the type of data to be exchanged.

● **Called Application Entity Title** - The Called AE Title defines the intended receiver of an Association.

● **Calling Application Entity Title** - The Calling AE Title defines the requestor of an Association.

● **DICOM Message Service Element (DIMSE)** - A DIMSE defines the services and protocols utilized by an Application Entity to exchange messages.

● **Information Object Definition (IOD)** - An IOD is a data model which is an abstraction of real-world information. This data model defines the nature and attributes relevant to the class of real-world objects represented.

● **Service Class Provider (SCP)** - A Service Class Provider plays the "server" role to perform operations and invoke notifications during an Association. An example of a Storage Service Class Provider would be an image storage device. In this case, the image storage device is storing the image that was sent by a Service Class User.

● **Service Class User (SCU)** - A Service Class User plays the "client" role to invoke operations and perform notifications during an Association. An example of a Storage Service Class User would be an image acquisition device. In this case, the image acquisition device will create and send a DICOM image by requesting that a Service Class Provider store that image.

● **Service/Object Pair (SOP) Class** - A SOP Class is defined by the union of an Information Object Definition and a set of DIMSE Services. A DICOM Application Entity may support one or more SOP Classes. Each SOP Class is uniquely identified by a SOP Class UID.

● **SOP Instance** - A specific occurrence of a Information Object.

● **Transfer Syntax** - The Transfer Syntax is a set of encoding rules that allow DICOM Application Entities to negotiate the encoding techniques (e.g. data element structure, byte ordering, compression) they are able to support. The Transfer Syntax is negotiated during Association Negotiation.

● **Unique Identifier (UID)** - A Unique Identifier is a globally unique, ISO compliant, ASCII-numeric string. It guarantees uniqueness across multiple countries, sites, vendors and equipment.

1.3 Acronyms, Abbreviations and Symbols

- ACC   American College of Cardiology
- ACR   American College of Radiology
- ASCII   American Standard Code for Information Interchange
- AE   Application Entity
- ANSI   American National Standards Institute
- CEN TC251   Comite Europeen de Normalisation - Technical Committee 251 - Medical Informatics
- DICOM   Digital Imaging and Communications in Medicine
- DIMSE   DICOM Message Service Element
- DIMSE-C   DICOM Message Service Element - Composite
- DIMSE-N   DICOM Message Service Element - Normalized
- HIS   Hospital Information System
- HL7   Health Level 7
- IE   Information Entity
- IOD   Information Object Definition
- ISO   International Standards Organization
- JIRA   Japan Industries Association of Radiological Systems
- MPPS   Modality Performed Procedure Step
- MWM   Modality Worklist Management
- NEMA   National Electrical Manufacturers Association
- OSI   Open Systems Interconnection
- PDU   Protocol Data Unit
- RIS   Radiology Information System
- SCP   Service Class Provider
- SCU   Service Class User
- SOP   Service-Object Pair
- TCP/IP   Transmission Control Protocol/Internet Protocol
- UID   Unique Identifier

2. Implementation Model

2.1 Application Data Flow Diagram
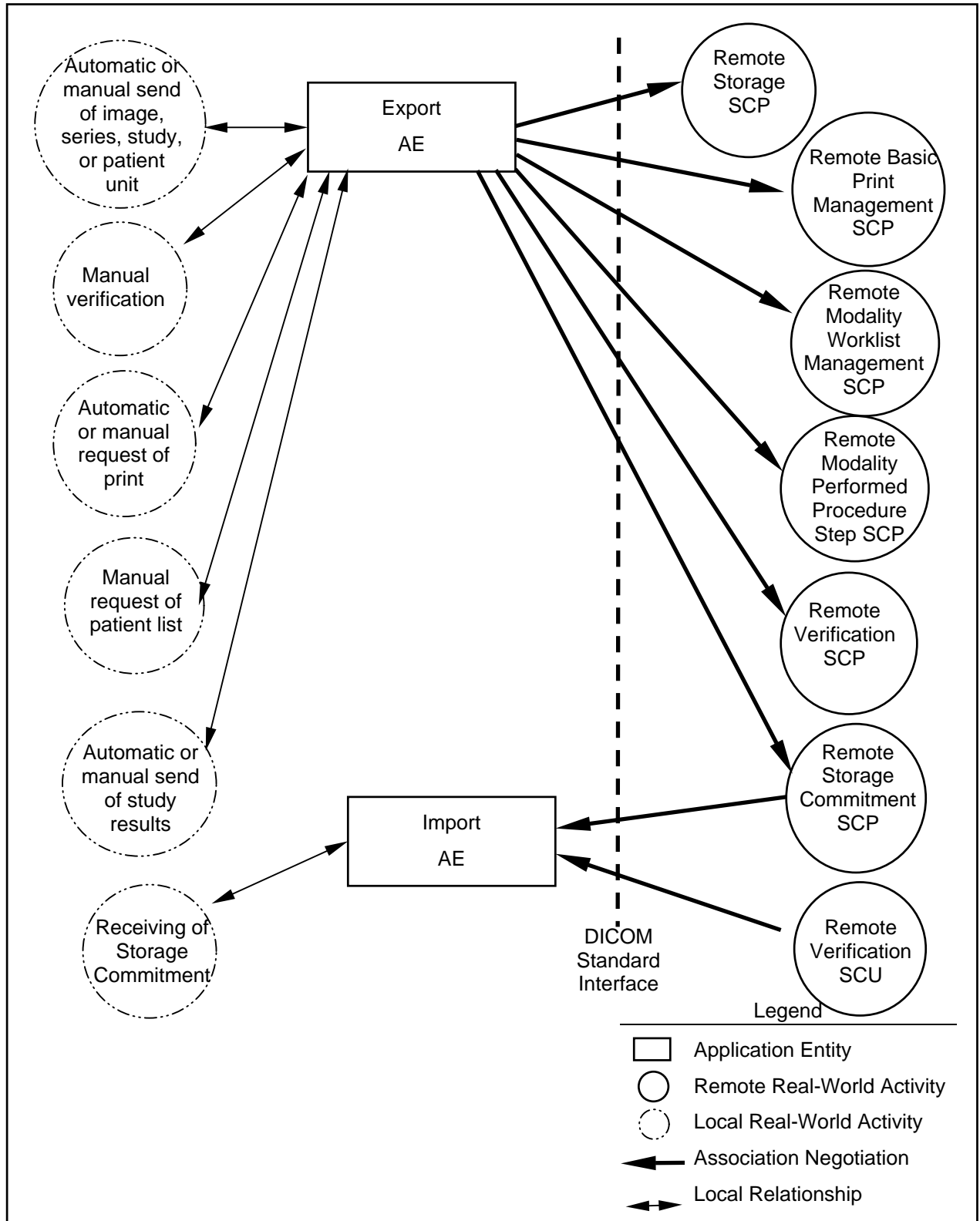
Figure 1

2.2 Functional Definitions of AE's

2.2.1 Export AE

Export AE is used to transmit images and request for Storage Commitment to a remote DICOM device. It therefore performs the following tasks:

- Builds DICOM XA/RF/SC Information Objects
- Establishes DICOM Association with a remote DICOM device
- Performs storage of DICOM XA/RF/SC Information Objects to the remote DICOM device
- Builds DICOM Storage Commitment Information Objects
- Establishes DICOM Association with a remote DICOM device
- Requests DICOM Storage Commitment to the remote DICOM device

Export AE is used to verify that a remote DICOM device is active on the network. It therefore performs the following tasks:

- Establishes DICOM Association with a remote DICOM device
- Performs verification of the remote DICOM device's presence on network

Export AE is used to transmit request for Print images to a remote DICOM device. It therefore performs the following tasks:

- Builds DICOM Basic Grayscale Print Objects
- Establishes DICOM Association with a remote DICOM device
- Performs transmit of DICOM Basic Grayscale Print Objects to the remote DICOM device

Export AE is used to transmit request for patient list to a remote DICOM device and to retrieve patient list with Procedure Step. It therefore performs the following tasks:

- Establishes DICOM Association with a remote DICOM device
- Performs request of DICOM Modality Worklist Objects to the remote DICOM device
- Retrieves patient list with Scheduled Procedure Step Information from the remote DICOM device

Export AE is used to transmit request for a Modality Performed Procedure Step to a remote DICOM device. It therefore performs the following tasks each time of acquisition:

- Builds DICOM Modality Performed Procedure Step Objects
- Establishes DICOM Association with a remote DICOM device
- Performs transmit of DICOM Modality Performed Procedure Step Objects to the remote DICOM device

2.2.2 Import AE

Import AE is used to respond to requests to verify that the Digital Radiography System is present and active on the network.

Import AE is used to receive response of Storage Commitment from a remote DICOM device.

2.3 Sequencing of Real World Activities

2.3.1 Features

2.3.1.1 Automatic or manual send of image, series, study, or patient unit

● The current acquired images are sent automatically or after specified "time-out".

● Operator requests to send images after selecting the transferred images from the patient, study or series list or mini-image screen.

● When the image transfer fails, a request to retry sending is issued automatically or manually.

● The requests are placed on a queue, and are executed in the background.

● Storage Commitment request is automatically sent after sending images.

2.3.1.2 Manual verification

● Toshiba Service Personnel can request verification manually on troubleshooting.

2.3.1.3 Automatic or manual request of print

● The number of frames in the rows and columns on each film can be specified as desired, up to a total maximum of 20 frames per film.

● The current acquired images are sent automatically at the registration of new patient.

● If an error occurs during printing, a request to retry printing is issued manually.

● Operator requests to print out images after selecting the transferred images from the patient, study or series list or mini-image screen.

● Print requests are placed on a queue, and are executed in the background.

2.3.1.4 Manual request of patient list

● The automatic request of Modality Worklist Management is performed periodically.

● Operator requests to transmit requiring patient list and retrieves it with Scheduled Procedure Step Information.

2.3.1.5 Automatic or manual send of study results

● The study results are sent automatically each time of acquisition.

● If an error occurs during sending, a request to retry Modality Performance Procedure Step is issued manually.

● The requests are placed on a queue, and are executed in the background.

2.3.2 Operation

2.3.2.1 Automatic or manual send of image, series, study, or patient unit

● The operation for manual image transferring is described below:
    STEP-1:   Select the images, series, studies or the patient to be transferred.
    STEP-2:   Select the destination of image transfer.
    STEP-3:   Request transfer.
     Regarding automatic send operation it is skipped over STEP-1 and STEP-2.

2.3.2.2 Manual verification

● The operation for manual verification is described below:
    STEP-1:   Select the destination of verification.
    STEP-2:   Request verification.

2.3.2.3 Automatic or manual request of print

● The operation for manual print images is described below:
    STEP-1:   Select the images, series, studies or the patient to be printed.
    STEP-2:   Select the destination of print images and request print out.
     Regarding automatic print operation it is skipped over STEP-1 and STEP-2.

2.3.2.4 Manual request of patient list

● The operation for manual transmitting request for patient list is described below:
    STEP-1:   Select the condition to be found out.
    STEP-2:   Request to transmit request for patient list.
    STEP-3:   Select patients to be registered.
    The patient's name, patient ID, patient's birth date, patient's sex, accession
    number and scheduled performing physicians name are used for the patient
    registration.

2.3.2.5 Automatic or manual send of study results

● The operation for automatic send of study results is described below:
    STEP-1:   Send the study results information each time of acquisition.
    Regarding manual send of study results operation it is executed by pressing "retry"
    button when error is occurred.

2.3.2.6 Receiving of Storage Commitment

● There is no specific operation for Request of Storage Commitment.

3. AE Specifications

3.1 Export Specification

Export AE provides Standard Conformance to the following DICOM SOP Classes as an SCU:

Table 1

SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1
XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1
RF Image Storage	1.2.840.10008.5.1.4.1.1.12.2
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Basic Grayscale Print Management	1.2.840.10008.5.1.1.9
Modality Worklist Information Model-FIND	1.2.840.10008.5.1.4.31
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3
Storage Commitment Push Model	1.2.840.10008.1.20.1

The SOP Classes listed in **Table 2** indicate the SOP Classes regulated by the Basic Grayscale Print Management Meta SOP Class.

Table 2

SOP Class Name	SOP Class UID
Basic Film Session SOP Class	1.2.840.10008.5.1.1.1
Basic Film Box SOP Class	1.2.840.10008.5.1.1.2
Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4
Printer SOP Class	1.2.840.10008.5.1.1.16

3.1.1 Export Association Establishment Policies

3.1.1.1 Export General

Export AE will utilize and understand the following Application Context Name:

Table 3

DICOM V3.0 Application Context	1.2.840.10008.3.1.1.1

Export AE supports a minimum PDU size of 16Kbytes and a maximum PDU size of 16Kbytes. The default value is set to 16Kbytes.

3.1.1.2 Export Number of Associations

Export AE can only establish one association at a time, independent of the number of destinations chosen.

3.1.1.3 Export Asynchronous Nature

Export AE allows a single outstanding operation on any association. Therefore, Export AE does not support asynchronous operations window negotiation, other than the default as specified by the DICOM specification.

3.1.1.4 Export Implementation Identifying Information

Export AE specify the following Implementation Identifying Information

● Implementation class UID   2.16.840.1.113669.632.3.1.1.2.7
● Implementation Version name   ADR_3_0

3.1.2 Export Association Initiation by Real-World Activity

Export AE initiates an association when the following activity is chosen by the operator:

● "Automatic or manual send of image, series, study or patient unit"

   • Storage   - Create and store an XA/RF/SC image to a remote DICOM device

   • Storage Commitment - Request commitment of stored XA/RF/SC images to a remote DICOM device.

● "Manual verification"

   • Verification - Verify that a remote DICOM device is present on the network

    Verification is initiated manually.

● "Automatic or manual request of print"

   • Print   - Request print images to a remote DICOM device

● "Automatic or manual request of patient list"

   • MWM   - Request query and retrieve patient list

● "Automatic or manual send of study results"

   • MPPS   - Create and send MPPS to a remote DICOM device

3.1.2.1 Export Real-World Activity - Storage

3.1.2.1.1 Export Associated Real-World Activity - Storage

Storage is executed by the Digital Radiography System at the manual selection of the image transferred or at the registration of new patient automatically.

3.1.2.1.2 Export Proposed Presentation Contexts - Storage

Export AE proposes the following Presentation Contexts shown below:

Table 4

Presentation Context Table					
Abstract Syntax		Transfer Syntax			Extended
Name	UID	Name List	UID List	Role	Negotiation
XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
RF Image Storage	1.2.840.10008.5.1.4.1.1.12.2	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
RF Image Storage	1.2.840.10008.5.1.4.1.1.12.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
RF Image Storage	1.2.840.10008.5.1.4.1.1.12.2	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None

3.1.2.1.2.1 Export SOP Specific Conformance – XA/RF/SC Image Storage

Export AE operation involves the following sequence of steps for each image transfer.

(1) Association establishment (requestor only)

(2) Data transfer (SCU only)

(3) Association release (requestor only)

Export AE judges that the transfer of one image succeeded when the result of (2) "Data transfer" is "Success" even if the result of (3) "Association release" is "Failure".

XA Information object Definition is described in chapter 8.

XRF Information object Definition is described in chapter 9.

SC Information object Definition is described in chapter 10.

3.1.2.2 Export Real-World Activity – Storage Commitment

3.1.2.2.1 Export Associated Real-World Activity – Storage Commitment

Storage Commitment is executed by the Digital Radiography System after the operator's images transfer requests were finished.

3.1.2.2.2 Export Proposed Presentation Contexts – Storage Commitment

Export AE proposes the following Presentation Contexts shown below:

Table 5

Presentation Context Table

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	**UID**	**Name List**	**UID List**	**Role**	**Negotiation**
Storage Commitment Push Model	1.2.840.10008.1.20.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Storage Commitment Push Model	1.2.840.10008.1.20.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Storage Commitment Push Model	1.2.840.10008.1.20.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None

3.1.2.2.2.1 Export SOP Specific Conformance – Storage Commitment Push Model

- Export AE operation involves the following sequence of steps for each commitment.

    (1) Association establishment (requestor only)

    (2) Committing request (SCU only)

    (3) Association release (requestor only)

Export AE judges that the request storage commitment succeeded when the result of (2) "Committing request" is "Success" even if the result of (3) "Association release" is "Failure".

- DIMSE-Service and Attributes are described in chapter 11.

- Export AE does not receive an N-EVENT-REQPORT on the same Association on whitch the N-ACTION operation was performed. See 3.2.3.2 for receiving the N-EVENT-REQPORT.

3.1.2.3 Export Real-World Activity - Verification

3.1.2.3.1 Export Associated Real-World Activity - Verification

Verification is executed by the Digital Radiography System after the operator selects a destination.

3.1.2.3.2 Export Proposed Presentation Contexts - Verification

Export AE proposes the following Presentation Contexts shown below:

Table 6

Presentation Context Table

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	**UID**	**Name List**	**UID List**	**Role**	
Verification	1.2.840.10008.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Verification	1.2.840.10008.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None

3.1.2.4 Export Real-World Activity - Print

3.1.2.4.1 Export Associated Real-World Activity - Print

Export AE performs request of printing images automatically or manually to destination device.

3.1.2.4.2 Export Proposed Presentation Contexts - Print

Export AE proposes the following Presentation Contexts shown below:

Table 7

Presentation Context Table

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	**UID**	**Name List**	**UID List**	**Role**	
Basic Grayscale Print Management	1.2.840.10008.5.1.1.9	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Basic Grayscale Print Management	1.2.840.10008.5.1.1.9	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Basic Grayscale Print Management	1.2.840.10008.5.1.1.9	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None

3.1.2.4.2.1 Export SOP Specific Conformance - Print

Export AE operation involves the following sequence of steps for each request print image.

> (1)Association establishment (requestor only)

> (2)Request of printing images (SCU only)

> (3)Association release (requestor only)

Export AE judges that the request of printing images succeeded when the result of (2) "Request print images" is "Success" even if the result of (3) "Association release" is "Failure".

SOP Specific Conformance Statement is described in 9 DIMSE-Service and Attributes.

See Chapter 9, DIMSE-Service and Attributes.

3.1.2.5 Export Real-World Activity - MWM

3.1.2.5.1 Export Associated Real-World Activity - MWM

Export AE performs query and retrieve patient list automatically or manually from destination device.

3.1.2.5.2 Export Proposed Presentation Contexts - MWM

Export AE proposes the following Presentation Contexts shown below:

Table 8

Presentation Context Table

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	**UID**	**Name List**	**UID List**	**Role**	**Negotiation**
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None

3.1.2.5.2.1 Export SOP Specific Conformance - MWM

Export AE operation involves the following sequence of steps for each query and retrieve patient list less than 75 matching records. If more than 75 matching records are found in the query, the user will be prompted to limit the search by entering additional search criteria.

> (1)Association establishment (requestor only)

> (2)Query and retrieve patient list (SCU only)

> (3)Association release (requestor only)

Export AE judges that the request of worklist succeeded when the result of (2) "Query and retrieve patient list" is "Success" even if the result of (3) "Association release" is "Failure".

Modality Worklist Information Object Definition is described in chapter 12.

3.1.2.6 Export Real-World Activity - MPPS

3.1.2.6.1 Export Associated Real-World Activity - MPPS

Export AE performs send MPPS automatically or manually to destination device.

3.1.2.6.2 Export Proposed Presentation Contexts - MPPS

Export AE proposes the following Presentation Contexts shown below:

Table 9

Presentation Context Table

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None

3.1.2.6.2.1 Export SOP Specific Conformance - MPPS

Export AE operation involves the following sequence of steps for each request MPPS.

(1)Association establishment (requestor only)

(2)Send MPPS (SCU only)

(3)Association release (requestor only)

Export AE judges that the send of MPPS succeeded when the result of (2) "Send MPPS" is "Success" even if the result of (3) "Association release" is "Failure".

MPPS Information Object Definition is described in chapter 13.

3.1.3 Export Association Acceptance Policy

Export AE does not accept any associations generated by remote applications.

3.2 Import Specification

Import AE provides Standard Conformance to the following DICOM SOP Classes as an SCP:

Table 10

SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1

Import AE provides Standard Conformance to the following DICOM SOP Classes as an SCU:

Table 11

SOP Class Name	SOP Class UID
Storage Commitment Push Model	1.2.840.10008.1.20.1

3.2.1 Import Association Establishment Policies

3.2.1.1 Import General

Import AE will utilize and understand the following Application Context Name:

Table 12

DICOM V3.0 Application Context	1.2.840.10008.3.1.1.1

Import AE supports a minimum PDU size of 16Kbytes and a maximum PDU size of 16Kbytes. The default value is set to 16Kbytes.

3.2.1.2 Import Number of Associations

Import AE can only establish one association at a time, independent of the number of destinations chosen.

3.2.1.3 Import Asynchronous Nature

Import AE allows a single outstanding operation on any association. Therefore, Import AE does not support asynchronous operations window negotiation, other than the default as specified by the DICOM specification.

3.2.1.4 Import Implementation Identifying Information

Import AE specify the following Implementation Identifying Information

● Implementation class UID 2.16.840.1.113669.632.3.1.1.2.7
● Implementation Version name ADR_3_0

3.2.2 Import Association Initiation by Real-World Activity

Import AE never initiate an association.

3.2.3 Import Association Acceptance Policy

When Import AE receives an association request, it will allow the following activities to be performed during that association:

● Verification - Allow a remote DICOM device to verify that the Digital Fluorography System is active on the DICOM network.

● Storage Commitment – Receive a result of commitments from a remote DICOM device

3.2.3.1 Import Real-World Activity - Verification

3.2.3.1.1 Import Associated Real-World Activity - Verification

The Digital Radiography System responds to Verification made by a remote Verification SCU.

3.2.3.1.2 Import Presentation Context Table - Verification

Import AE accepts all of the Presentation Contexts shown:

Table 13

Presentation Context Table

Abstract Syntax		Transfer Syntax			Extended
Name	UID	Name List	UID List	Role	Negotiation
Verification	1.2.840.10008.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Verification	1.2.840.10008.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None

3.2.3.1.2.1 Import SOP Specific Conformance - Verification

Import AE responds with the following status codes in response to a C-ECHO request.

Table 14

Service Status	Further Meaning	Protocol Code	Description
Success	Success	0x0000	Operation performed properly

3.2.3.1.3 Import Presentation Context Acceptance Criterion - Verification

Import AE accepts the Presentation Contexts listed in the Presentation Context Table (Table13).

3.2.3.1.4 Import Transfer Syntax Selection Policies - Verification

Import AE accepts the Transfer Syntaxes listed in the Presentation Context Table (Table13). If offered a choice of Transfer Syntaxes in a Presentation Context, it will select the first one.

3.2.3.2 Import Real-World Activity – Storage Commitment

3.2.3.2.1 Import Associated Real-World Activity – Storage Commitment

When a result commitment is sent by a remote system, an association is accepted.

3.2.3.2.2 Import Presentation Context Table – Storage Commitment

Import AE accepts all of the Presentation Contexts shown below:

Table 15

Presentation Context Table					
Abstract Syntax		Transfer Syntax			Extended
Name	UID	Name List	UID List	Role	Negotiation
Storage Commitment Push Model	1.2.840.10008.1.20.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Storage Commitment Push Model	1.2.840.10008.1.20.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Storage Commitment Push Model	1.2.840.10008.1.20.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None

3.2.3.2.2.1 Import SOP Specific Conformance – Storage Commitment Push Model

- Import AE operation involves the following sequence of steps for each commitments.
    (1) Import AE(acceptor) waits for Storage Commitment N-EVENT-REPORT to confirm commitment of the image storage
    (2) Storage Commitment N-EVENT-REPORT is received by Import AE(acceptor)
    (3) Association is released (acceptor only)
.

- DIMSE-service and Attributes are described in chapter 11.

- Operator is able to delete local SOP Instances copies when a success status is received.

- The Digital Radiography System requires the operator to resend the study when a failure status is received.

- If N-EVENT-REPORT is not received within three days(default) after N-ACTION was sent, the Digital Radiography System asks operator with error. Operator must decide whether to re-send N-ACTION or to delete this failed N-ACTION.

3.2.3.2.3 Import Presentation Context Acceptance Criterion - Storage Commitment Push Model

Import AE accepts the Presentation Contexts listed in the Presentation Context Table (Table15).

3.2.3.2.4 Import Transfer Syntax Selection Policies - Storage Commitment Push Model

Import AE accepts the Transfer Syntaxes listed in the Presentation Context Table (Table15). If offered a choice of Transfer Syntaxes in a Presentation Context, it will select the first one.

4. Communication Profiles

4.1 Supported Communication Stacks

This product provides DICOM TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard.

4.2 OSI Stack

Not applicable to this product.

4.3 TCP/IP Stack

This product inherits its TCP/IP stack from the computer system upon which it executes.

4.3.1 API

Not applicable to this product.

4.3.2 Physical Media Support

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

4.4 Point-to-Point Stack

Not applicable to this product.

5. Extensions/Specializations/Privatizations

Not applicable to this product.

6. Configuration

For the Digital Radiography System, the configuration can be set using the Online Setup interface.

Note: Settings and changes are performed by Toshiba Service Personnel at the time of
      installation of the Digital Radiography System.

6.1 AE Title/Presentation Address Mapping

Mapping from the AE titles to the presentation address is as follows:

- One port number and one AE title can be described for one host name
- Each AE title is mapped to one port number

6.2 Configurable Parameters

6.2.1 Time-out Value, Retry Count, Retry Interval

The time-out value, retry count, and retry interval in each status are shown below:
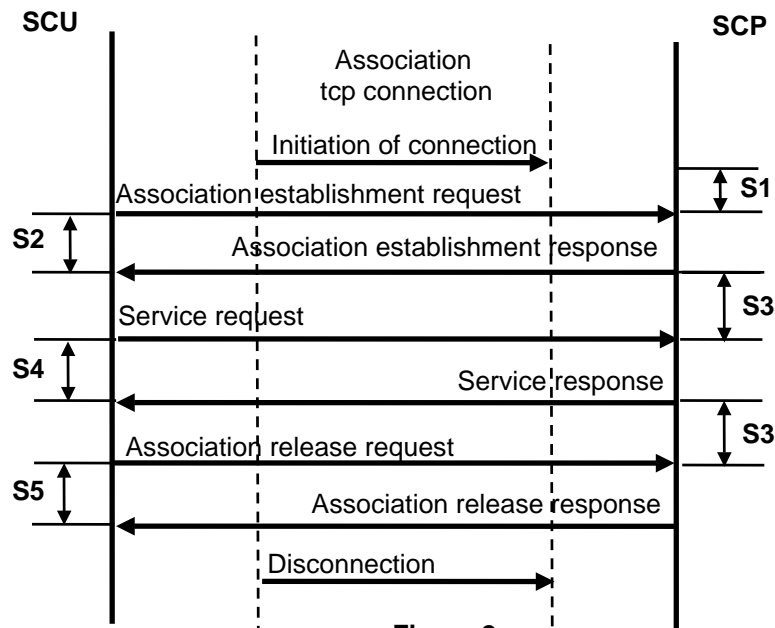
Figure 2

Table 16

Item	Status	Time-out Value	Retry Count	Retry Interval	Remarks
S1	Association establishment request waiting time	Not set	Not set	Not set	Not applicable to this product.
S2	Association establishment response waiting time	default: 15 seconds range: default only	Not set	Not set	Only one parameter can be set in the Digital Radiography System.
S3	Service request waiting time	Not set	Not set	Not set	Not applicable to this product.
S4	Service response waiting time	default: 60 seconds range: 15 to 300	Not set	Not set	Only one parameter can be set in the Digital Radiography System.
S5	Association release waiting time	default: 15 seconds range: default only	Not set	Not set	Only one parameter can be set in the Digital Radiography System.

6.3 Warning Status Criteria

6.3.1 XA/RF/SC Image Storage

6.3.1.1 C-STORE response

If SUCCESS is set, the Digital Radiography System judges that the image transfer succeeded.

If FAIL is set, the Digital Radiography System judges that the image transfer failed.

Table 17

Warning Response Item	Default Value	Parameter setting range
Coercion of Data Set	FAIL	Not Change
Data Set does not match SOP Class	FAIL	Not Change
Element discard	FAIL	Not Change

6.3.2 Basic Grayscale Print Management

6.3.2.1 Basic Film Session SOP Class

6.3.2.1.1 N-CREATE response

If SUCCESS is set, the Digital Radiography System judges that N-CREATE request succeeded.

If FAIL is set, the Digital Radiography System judges that N-CREATE request failed.

Table 18

Warning response	Default Value	Parameter setting range
Memory allocation not supported	FAIL	Not Change

6.3.2.2 Basic Film Box SOP Class

6.3.2.2.1 N-CREATE response

If SUCCESS is set, the Digital Radiography System judges that N-CREATE request succeeded.

If FAIL is set, the Digital Radiography System judges that N-CREATE request failed.

Table 19

Warning response	Default Value	Parameter setting range
Requested Min Density or Max Density outside of printer's operating range. The printer will use its respective minimum or maximum density value instead.	FAIL	Not Change

6.3.2.2.2 N-ACTION response

If SUCCESS is set, the Digital Radiography System judges that N-ACTION request succeeded.

If FAIL is set, the Digital Radiography System judges that N-ACTION request failed.

Table 20

Warning response	Default Value	Parameter setting range
Film Box SOP Instance hierarchy does not contain Image Box SOP Instances(empty page)	FAIL	Not Change
Image size is larger than image box size, the image has been demagnified.	FAIL	Not Change

6.3.2.3 Basic Grayscale Image Box SOP Class

6.3.2.3.1 N-SET response

If SUCCESS is set, the Digital Radiography System judges that N-SET request succeeded.

If FAIL is set, the Digital Radiography System judges that N-SET request failed.

Table 21

Warning response	Default Value	Parameter setting range
Image size is larger than image box size, the image has been demagnified.	FAIL	Not Change
Requested Min Density or Max Density outside of printer's operating range. The printer will use its respective minimum or maximum density value instead.	FAIL	Not Change

6.3.2.4 Printer SOP Class

6.3.2.4.1 N-GET response

If SUCCESS is set, the Digital Radiography System judges that N-GET request succeeded.

If FAIL is set, the Digital Radiography System judges that N-GET request failed.

Table 22

Warning response	Default Value	Parameter setting range
Attribute list error	FAIL	Not Change

6.4 Implementation Information and Maximum Reception PDU Size

The default values for the Digital Radiography System are used for the Implementation Class UID, the Implementation Version name, and the Maximum length received. They cannot be changed.

Table 23

Parameter	Default
Implementation Class UID	2.16.840.1.113669.632.3.1.1.2.7
Implementation Version name	ADR_3_0
Maximum length received(unit: byte)	0x4000

7. Support of Extended Character Sets

This product supports the following character sets and they are set per each of DICOM servers:

Table 24

● ISO-IR 6 (default)	ISO646
● ISO-IR 87(Japanese)	JIS X 0208(Kanji)

8. X-Ray Angiographic Information Object Definition

8.1 Entity Module Definitions

The information modules for the Digital Radiography System are defined below.

8.1.1 XA IOD Modules

Table 25

Information Entity	Module	Reference	Usage[1]
Patient	Patient Module	8.2.1	M
Study	General Study Module	8.2.2	M
Study	Patient Study Module	Not Used	U
Series	General Series Module	8.2.3	M
Equipment	General Equipment Module	8.2.4	M
Image	General Image Module	8.2.5	M
Image	Image Pixel Module	8.2.6	M
Image	Contrast/bolus Module	Not Used	C
Image	Cine Module	Not Used	C
Image	Multi-frame Module	Not Used	C
Image	Frame Pointers Module	Not Used	U
Image	Mask Module	Not Used	C
Image	Display Shutter Module	8.2.7	U
Image	Device Module	Not Used	U
Image	Therapy Module	Not Used	U
Image	X-ray Image Module	8.2.8	M
Image	X-ray Acquisition Module	8.2.9	M
Image	X-ray Collimator Module	8.2.10	U
Image	X-ray Table Module	Not Used	C
Image	XA Positioner Module	8.2.11	M
Image	Overlay Plane Module	Not Used	U
Image	Multi-Frame Overlay Module	Not Used	C
Image	Curve Module	Not Used	U
Image	Modality LUT Module	Not Used	C/U
Image	VOI LUT Module	8.2.12	U
Image	SOP Common Module	8.2.13	M

[1] M=Mandatory, C=Conditional, U=User option

8.2 Information Object Definitions

8.2.1 Patient Module

Table 26

Attribute Name	Tag	Type	Attribute Description
Patient's Name	(0010, 0010)	2	Always set except for urgent patient
Patient ID	(0010, 0020)	2	Always set
Patient's Birth Date	(0010, 0030)	2	Always set
Patient's Birth Time	(0010, 0032)	3	Always set , Length=0
Patient's Sex	(0010, 0040)	2	Always set
Patient Comments	(0010,4000)	3	Not set when no entry is made

8.2.2 General Study Module

Table 27

Attribute Name	Tag	Type	Attribute Description
Study Instance UID	(0020, 000D)	1	Always set
Study Date	(0008, 0020)	2	Always set
Study Time	(0008, 0030)	2	Always set
Referring Physician's Name	(0008, 0090)	2	Length=0 when no entry is made
Study ID	(0020, 0010)	2	Always set
Accession Number	(0008, 0050)	2	Length=0 when no entry is made
Study Description	(0008, 1030)	3	Always set

8.2.3 General Series Module

Table 28

Attribute Name	Tag	Type	Attribute Description
Modality	(0008, 0060)	1	Always set ("XA")
Series Instance UID	(0020, 000E)	1	Always set
Series Number	(0020, 0011)	2	Always set
Series Date	(0008, 0021)	3	Always set
Series Time	(0008, 0031)	3	Always set
Performing Physician's Name	(0008, 1050)	3	Length=0 when no entry is made
Protocol Name	(0018, 1030)	3	Always set
Series Description	(0008,103E)	3	Length=0 when no entry is made
Body Part Examined	(0018,0015)	3	Always set, Length=0
Performed Procedure Step ID	(0040,0253)	3	Always set, Length=0
Performed Procedure Step Start Date	(0040,0244)	3	Always set
Performed Procedure Start Time	(0040,0245)	3	Always set

8.2.4 General Equipment Module

Table 29

Attribute Name	Tag	Type	Attribute Description
Manufacturer	(0008, 0070)	2	Always set
Institution Name	(0008, 0080)	3	Always set
Station Name	(0008, 1010)	3	Always set
Manufacture's Model Name	(0008, 1090)	3	Always set("ADR-1000A")
Device Serial Number	(0018, 1000)	3	Always set

8.2.5 General Image Module

Table 30

Attribute Name	Tag	Type	Attribute Description
Instance Number	(0020, 0013)	2	Always set
Patient Orientation	(0020, 0020)	2C	Always set, Length=0
Image Date	(0008, 0023)	2C	Always set
Image Time	(0008, 0033)	2C	Always set
Image Type	(0008, 0008)	3	Always set ("ORIGINAL\PRIMARY\SINGLE PLANE"/ "DERIVED\SECONDARY\SINGLE PLANE")
Image Comments	(0020, 4000)	3	Length=0 when no entry is made

8.2.6 Image Pixel Module

Table 31

Attribute Name	Tag	Type	Attribute Description
Samples per Pixel	(0028, 0002)	1	Always set (0x0001)
Photometric Interpretation	(0028, 0004)	1	Always set ("MONOCHROME2")
Rows	(0028, 0010)	1	Always set (0x0400)
Columns	(0028, 0011)	1	Always set (0x0400/0x0500)
Bits Allocated	(0028, 0100)	1	Always set (0x0010/0x0008)
Bits Stored	(0028, 0101)	1	Always set (0x000A/0x0008)
High Bit	(0028, 0102)	1	Always set (0x0009/0x0007)
Pixel Representation	(0028, 0103)	1	Always set (0x0000)
Pixel Data	(7FE0, 0010)	1	Always set

8.2.7 Display Shutter Module

Table 32

Attribute Name	Tag	Type	Attribute Description
Shutter shape	(0018, 1600)	1	Always set ("RECTANGULAR") when Columns is "0x0400"
Shutter Left Vertical Edge	(0018, 1602)	1C	Always set when Columns is "0x0400"
Shutter Right Vertical Edge	(0018, 1604)	1C	Always set when Columns is "0x0400"
Shutter Upper Horizontal Edge	(0018, 1606)	1C	Always set when Columns is "0x0400"
Shutter Lower Horizontal Edge	(0018, 1608)	1C	Always set when Columns is "0x0400"
Shutter Presentation Value	(0018, 1622)	3	Always set (0x0000) when Columns is "0x0400"

8.2.8 X-ray Image Module

Table 33

Attribute Name	Tag	Type	Attribute Description
Image Type	(0008, 0008)	1	Always set ("ORIGINAL\PRIMARY\SINGLE PLANE"/ "DERIVED\SECONDARY\SINGLE PLANE")
Pixel Intensity Relationship	(0028, 1040)	1	Always set ("LOG")
Samples per Pixel	(0028, 0002)	1	Always set (0x0001)
Photometric Interpretation	(0028, 0004)	1	Always set ("MONOCHROME2")
Bits Allocated	(0028, 0100)	1	Always set (0x0010/0x0008)
Bits Stored	(0028, 0101)	1	Always set (0x000A/0x0008)
High Bit	(0028, 0102)	1	Always set (0x0009/0x0007)
Pixel Representation	(0028, 0103)	1	Always set (0x0000)

8.2.9 X-ray Acquisition Module

Table 34

Attribute Name	Tag	Type	Attribute Description
KVP	(0018, 0060)	2	Always set [kV]
Radiation Setting	(0018, 1155)	1	Always set
X-ray Tube Current	(0018, 1151)	2C	Always set [mA]
Exposure Time	(0018, 1150)	2C	Always set [msec]
Intensifier Size	(0018, 1162)	3	Always set[mm]
Image Pixel Spacing	(0018,1164)	3	Set when pixel calibration was done

8.2.10 X-ray Collimator Module

Table 35

Attribute Name	Tag	Type	Attribute Description
Collimator Shape	(0018, 1700)	1	Always set ("RECTANGULAR") when Columns is "0x0400"
Collimator Left Vertical Edge	(0018, 1702)	1C	Always set when Columns is "0x0400"
Collimator Right Vertical Edge	(0018, 1704)	1C	Always set when Columns is "0x0400"
Collimator Upper Horizontal Edge	(0018, 1706)	1C	Always set when Columns is "0x0400"
Collimator Lower Horizontal Edge	(0018, 1708)	1C	Always set when Columns is "0x0400"

8.2.11 XA Positioner Module

Table 36

Attribute Name	Tag	Type	Attribute Description
Positioner Primary Angle	(0018, 1510)	2	Always set, Length=0
Positioner Secondary Angle	(0018, 1511)	2	Always set, Length=0

8.2.12 VOI LUT Module

Table 37

Attribute Name	Tag	Type	Attribute Description
Window Center	(0028, 1050)	3	Always set
Window Width	(0028, 1051)	1C	Always set

8.2.13 SOP Common Module

Table 38

Attribute Name	Tag	Type	Attribute Description
Specific Character Set	(0008, 0005)	1C	"\ISO 2022 IR 87"
SOP Class UID	(0008, 0016)	1	Always set ("1.2.840.10008.5.1.4.1.1.12.1")
SOP Instance UID	(0008, 0018)	1	Always set
Instance Number	(0020, 0013)	3	Always set

9. X-Ray Radiofluoroscopic Information Object Definition

9.1 Entity Module Definitions

The information modules for the Digital Radiography System are defined below.

9.1.1 XRF IOD Modules

Table 39

Information Entity	Module	Reference	Usage[1]
Patient	Patient Module	9.2.1	M
Study	General Study Module	9.2.2	M
Study	Patient Study Module	Not Used	U
Series	General Series Module	9.2.3	M
Equipment	General Equipment Module	9.2.4	M
Image	General Image Module	9.2.5	M
Image	Image Pixel Module	9.2.6	M
Image	Contrast/bolus Module	Not Used	C
Image	Cine Module	Not Used	C
Image	Multi-frame Module	Not Used	C
Image	Frame Pointers Module	Not Used	U
Image	Mask Module	Not Used	C
Image	X-ray Image Module	9.2.7	M
Image	X-ray Acquisition Module	9.2.8	M
Image	X-ray Collimator Module	9.2.9	U
Image	Display Shutter Module	9.2.10	U
Image	Therapy Module	Not Used	U
Image	Device Module	Not Used	U
Image	X-ray Table Module	Not Used	U
Image	XRF Positioner Module	Not Used	U
Image	X-Ray Tomo Acquisition Module	Not Used	C
Image	Overlay Plane Module	Not Used	U
Image	Multi-Frame Overlay Module	Not Used	C
Image	Curve Module	Not Used	U
Image	Modality LUT Module	Not Used	C/U
Image	VOI LUT Module	9.2.11	U
Image	SOP Common Module	9.2.12	M

[1] M=Mandatory, C=Conditional, U=User option

9.2 Information Object Definitions

9.2.1 Patient Module

Table 40

Attribute Name	Tag	Type	Attribute Description
Patient's Name	(0010, 0010)	2	Always set except for urgent patient
Patient ID	(0010, 0020)	2	Always set
Patient's Birth Date	(0010, 0030)	2	Always set
Patient's Birth Time	(0010, 0032)	3	Always set , Length=0
Patient's Sex	(0010, 0040)	2	Always set
Patient Comments	(0010,4000)	3	Length=0 when no entry is made

9.2.2 General Study Module

Table 41

Attribute Name	Tag	Type	Attribute Description
Study Instance UID	(0020, 000D)	1	Always set
Study Date	(0008, 0020)	2	Always set
Study Time	(0008, 0030)	2	Always set
Referring Physician's Name	(0008, 0090)	2	Length=0 when no entry is made
Study ID	(0020, 0010)	2	Always set
Accession Number	(0008, 0050)	2	Length=0 when no entry is made
Study Description	(0008, 1030)	3	Always set

9.2.3 General Series Module

Table 42

Attribute Name	Tag	Type	Attribute Description
Modality	(0008, 0060)	1	Always set ("RF")
Series Instance UID	(0020, 000E)	1	Always set
Series Number	(0020, 0011)	2	Always set
Series Date	(0008, 0021)	3	Always set
Series Time	(0008, 0031)	3	Always set
Performing Physician's Name	(0008, 1050)	3	Length=0 when no entry is made
Protocol Name	(0018, 1030)	3	Always set
Series Description	(0008,103E)	3	Length=0 when no entry is made
Body Part Examined	(0018,0015)	3	Always set, Length=0
Performed Procedure Step ID	(0040,0253)	3	Always set, Length=0
Performed Procedure Step Start Date	(0040,0244)	3	Always set
Performed Procedure Start Time	(0040,0245)	3	Always set

9.2.4 General Equipment Module

Table 43

Attribute Name	Tag	Type	Attribute Description
Manufacturer	(0008, 0070)	2	Always set
Institution Name	(0008, 0080)	3	Always set
Station Name	(0008, 1010)	3	Always set
Manufacture's Model Name	(0008, 1090)	3	Always set("ADR-1000A")
Device Serial Number	(0018, 1000)	3	Always set

9.2.5 General Image Module

Table 44

Attribute Name	Tag	Type	Attribute Description
Instance Number	(0020, 0013)	2	Always set
Patient Orientation	(0020, 0020)	2C	Always set, Length=0
Image Date	(0008, 0023)	2C	Always set
Image Time	(0008, 0033)	2C	Always set
Image Type	(0008, 0008)	3	Always set ("ORIGINAL\PRIMARY\SINGLE PLANE"/ "DERIVED\SECONDARY\SINGLE PLANE")
Image Comments	(0020, 4000)	3	Length=0 when no entry is made

9.2.6 Image Pixel Module

Table 45

Attribute Name	Tag	Type	Attribute Description
Samples per Pixel	(0028, 0002)	1	Always set (0x0001)
Photometric Interpretation	(0028, 0004)	1	Always set ("MONOCHROME2")
Rows	(0028, 0010)	1	Always set (0x0400)
Columns	(0028, 0011)	1	Always set (0x0400/0x0500)
Bits Allocated	(0028, 0100)	1	Always set (0x0010/0x0008)
Bits Stored	(0028, 0101)	1	Always set (0x000A/0x0008)
High Bit	(0028, 0102)	1	Always set (0x0009/0x0007)
Pixel Representation	(0028, 0103)	1	Always set (0x0000)
Pixel Data	(7FE0, 0010)	1	Always set

9.2.7 X-ray Image Module

Table 46

Attribute Name	Tag	Type	Attribute Description
Image Type	(0008, 0008)	1	Always set ("ORIGINAL\PRIMARY\SINGLE PLANE"/ "DERIVED\SECONDARY\SINGLE PLANE")
Pixel Intensity Relationship	(0028, 1040)	1	Always set ("LIN")
Samples per Pixel	(0028, 0002)	1	Always set (0x0001)
Photometric Interpretation	(0028, 0004)	1	Always set ("MONOCHROME2")
Bits Allocated	(0028, 0100)	1	Always set (0x0010/0x0008)
Bits Stored	(0028, 0101)	1	Always set (0x000A/0x0008)
High Bit	(0028, 0102)	1	Always set (0x0009/0x0007)
Pixel Representation	(0028, 0103)	1	Always set (0x0000)

9.2.8 X-ray Acquisition Module

Table 47

Attribute Name	Tag	Type	Attribute Description
KVP	(0018, 0060)	2	Always set [kV]
Radiation Setting	(0018, 1155)	1	Always set
X-ray Tube Current	(0018, 1151)	2C	Always set [mA]
Exposure Time	(0018, 1150)	2C	Always set [msec]
Intensifier Size	(0018, 1162)	3	Always set [mm]
Image Pixel Spacing	(0018,1164)	3	Set when pixel calibration was done

9.2.9 X-ray Collimator Module

Table 48

Attribute Name	Tag	Type	Attribute Description
Collimator Shape	(0018, 1700)	1	Always set ("RECTANGULAR") when Columns is "0x0400"
Collimator Left Vertical Edge	(0018, 1702)	1C	Always set when Columns is "0x0400"
Collimator Right Vertical Edge	(0018, 1704)	1C	Always set when Columns is "0x0400"
Collimator Upper Horizontal Edge	(0018, 1706)	1C	Always set when Columns is "0x0400"
Collimator Lower Horizontal Edge	(0018, 1708)	1C	Always set when Columns is "0x0400"

9.2.10 Display Shutter Module

Table 49

Attribute Name	Tag	Type	Attribute Description
Shutter shape	(0018, 1600)	1	Always set ("RECTANGULAR") when Columns is "0x0400"
Shutter Left Vertical Edge	(0018, 1602)	1C	Always set when Columns is "0x0400"
Shutter Right Vertical Edge	(0018, 1604)	1C	Always set when Columns is "0x0400"
Shutter Upper Horizontal Edge	(0018, 1606)	1C	Always set when Columns is "0x0400"
Shutter Lower Horizontal Edge	(0018, 1608)	1C	Always set when Columns is "0x0400"
Shutter Presentation Value	(0018, 1622)	3	Always set (0x0000) when Columns is "0x0400"

9.2.11 VOI LUT Module

Table 50

Attribute Name	Tag	Type	Attribute Description
Window Center	(0028, 1050)	3	Always set
Window Width	(0028, 1051)	1C	Always set

9.2.12 SOP Common Module

Table 51

Attribute Name	Tag	Type	Attribute Description
Specific Character Set	(0008, 0005)	1C	"\ISO 2022 IR 87"
SOP Class UID	(0008, 0016)	1	Always set ("1.2.840.10008.5.1.4.1.1.12.2")
SOP Instance UID	(0008, 0018)	1	Always set
Instance Number	(0020, 0013)	3	Always set

10. SC Information Object Definition

10.1 Entity Module Definitions

The information modules for the Digital Radiography System are defined below.

10.1.1 SC IOD Modules

Table 52

Information Entity	Module	Reference	Usage[1]
Patient	Patient Module	10.2.1	M
Study	General Study Module	10.2.2	M
Study	Patient Study Module	Not Used	U
Series	General Series Module	10.2.3	M
Equipment	General Equipment Module	10.2.4	U
Equipment	SC Equipment Module	10.2.5	M
Image	General Image Module	10.2.6	M
Image	Image Pixel Module	10.2.7	M
Image	SC Image Module	10.2.8	M
Image	Overlay Plane Module	Not Used	U
Image	Modality LUT Module	Not Used	U
Image	VOI LUT Module	10.2.9	U
Image	SOP Common Module	10.2.10	M

[1] M=Mandatory, C=Conditional, U=User option

10.2 Information Object Definitions

10.2.1 Patient Module

Table 53

Attribute Name	Tag	Type	Attribute Description
Patient's Name	(0010, 0010)	2	Always set except for urgent patient
Patient ID	(0010, 0020)	2	Always set
Patient's Birth Date	(0010, 0030)	2	Always set
Patient's Birth Time	(0010, 0032)	3	Always set , Length=0
Patient's Sex	(0010, 0040)	2	Always set
Patient Comments	(0010,4000)	3	Length=0 when no entry is made

10.2.2 General Study Module

Table 54

Attribute Name	Tag	Type	Attribute Description
Study Instance UID	(0020, 000D)	1	Always set
Study Date	(0008, 0020)	2	Always set
Study Time	(0008, 0030)	2	Always set
Referring Physician's Name	(0008, 0090)	2	Length=0 when no entry is made
Study ID	(0020, 0010)	2	Always set
Accession Number	(0008, 0050)	2	Length=0 when no entry is made
Study Description	(0008, 1030)	3	Always set

10.2.3 General Series Module

Table 55

Attribute Name	Tag	Type	Attribute Description
Modality	(0008, 0060)	1	Always set ("XA"/"RF"/"OT")
Series Instance UID	(0020, 000E)	1	Always set
Series Number	(0020, 0011)	2	Always set
Series Date	(0008, 0021)	3	Always set
Series Time	(0008, 0031)	3	Always set
Performing Physician's Name	(0008, 1050)	3	Always set when no entry is made
Series Description	(0008,103E)	3	Length=0 when no entry is made
Body Part Examined	(0018,0015)	3	Always set, Length=0
Performed Procedure Step ID	(0040,0253)	3	Always set, Length=0
Performed Procedure Step Start Date	(0040,0244)	3	Always set
Performed Procedure Start Time	(0040,0245)	3	Always set

10.2.4 General Equipment Module

Table 56

Attribute Name	Tag	Type	Attribute Description
Manufacturer	(0008, 0070)	2	Always set
Institution Name	(0008, 0080)	3	Always set
Station Name	(0008, 1010)	3	Always set
Manufacture's Model Name	(0008, 1090)	3	Always set ("ADR-1000A")
Device Serial Number	(0018, 1000)	3	Always set

10.2.5 SC Equipment Module

Table 57

Attribute Name	Tag	Type	Attribute Description
Conversion Type	(0008, 0064)	1	Always set ("DI")
Modality	(0008, 0060)	3	Always set ("XA"/"RF"/"OT")

10.2.6 General Image Module

Table 58

Attribute Name	Tag	Type	Attribute Description
Instance Number	(0020, 0013)	2	Always set
Patient Orientation	(0020, 0020)	2C	Always set, Length=0
Image Date	(0008, 0023)	2C	Always set
Image Time	(0008, 0033)	2C	Always set
Image Type	(0008, 0008)	3	Always set ("DERIVED\SECONDARY\SINGLE PLANE")
Image Comments	(0020, 4000)	3	Length=0 when no entry is made

10.2.7 Image Pixel Module

Table 59

Attribute Name	Tag	Type	Attribute Description
Samples per Pixel	(0028, 0002)	1	Always set (0x0001)
Photometric Interpretation	(0028, 0004)	1	Always set ("MONOCHROME2")
Rows	(0028, 0010)	1	Always set (0x0400)
Columns	(0028, 0011)	1	Always set (0x0400/0x0500)
Bits Allocated	(0028, 0100)	1	Always set (0x0010/0x0008)
Bits Stored	(0028, 0101)	1	Always set (0x000A/0x0008)
High Bit	(0028, 0102)	1	Always set (0x0009/0x0007)
Pixel Representation	(0028, 0103)	1	Always set (0x0000)
Pixel Data	(7FE0, 0010)	1	Always set

10.2.8 SC Image Module

Table 60

Attribute Name	Tag	Type	Attribute Description
Date of Secondary Capture	(0018, 1012)	1	Always set
Time of Secondary Capture	(0028, 1014)	1	Always set

10.2.9 VOI LUT Module

Table 61

Attribute Name	Tag	Type	Attribute Description
Window Center	(0028, 1050)	3	Always set
Window Width	(0028, 1051)	1C	Always set

10.2.10 SOP Common Module

Table 62

Attribute Name	Tag	Type	Attribute Description
Specific Character Set	(0008, 0005)	1C	"\ISO 2022 IR 87"
SOP Class UID	(0008, 0016)	1	Always set ("1.2.840.10008.5.1.4.1.1.7")
SOP Instance UID	(0008, 0018)	1	Always set
Instance Number	(0020, 0013)	3	Always set

11. DIMSE-Service and Attributes

11.1 DIMSE-Services

Table 63

SOP Class	DIMSE Service Element	Reference	Usage SCU *1
Basic Film Session SOP Class	N-CREATE	11.2.1	M
	N-SET	Not used	U
	N-DELETE	Not used	U
	N-ACTION	Not used	U
Basic Film Box SOP Class	N-CREATE	11.3.1	M
	N-SET	Not used	U
	N-DELETE	Not used	U
	N-ACTION	Used	M
Basic Grayscale Image Box SOP Class	N-SET	11.4.1	M
Printer SOP Class	N-EVENT-REPORT	11.5.1	M
	N-GET	11.5.2	U
Storage Commitment Push Model SOP Class	N-EVENT-REPORT	11.6.1	M
	N-ACTION	11.6.2	M

*1 : M = Mandatory, U = User option

11.2 Basic Film Session SOP Class

11.2.1 N-CREATE Attributes

Table 64

Attribute Name	Tag	Usage	Attribute Description
Number of Copies	(2000,0010)	U	Always set ("1" - "99")
Print Priority	(2000,0020)	U	Always set ("MED")
Media Type	(2000,0030)	U	Always set ("PAPER"/"CLEAR FILM"/ "BLUE FILM")
Film Destination	(2000,0040)	U	Always set ("PROCESSOR")
Film Session Label	(2000,0050)	U	Not set

11.3 Basic Film Box SOP Class

11.3.1 N-CREATE Attributes

Table 65

Attribute Name	Tag	Usage	Attribute Description
Image Display Format	(2010,0010)	M	Always set
Film Orientation	(2010,0040)	U	Always set ("PORTRAIT/LANDSCAPE")
Film Size ID	(2010,0050)	U	Always set
Magnification Type	(2010,0060)	U	Always set
Border Density	(2010,0100)	U	Always set
Empty Image Density	(2010,0110)	U	Always set
Min Density	(2010,0120)	U	Always set
Max Density	(2010,0130)	U	Always set
Trim	(2010,0140)	U	Always set
Referenced Film Session Sequence	(2010,0500)	M	Always set
>Referenced SOP Class UID	(0008,1150)	M	Always set ("1.2.840.10008.5.1.1.1")
>Referenced SOP Instance UID	(0008,1155)	M	Always set

11.4 Basic Grayscale Image Box SOP Class

11.4.1 N-SET Attributes

Table 66

Attribute Name	Tag	Usage	Attribute Description
Image Position	(2020,0010)	M	Always set
Polarity	(2020,0020)	U	Always set
Magnification Type	(2010,0060)	U	Always set
Basic Grayscale Image Sequence	(2020,0110)	M	Always set
>Samples Per Pixel	(0028,0002)	M	Always set (0x0001)
>Photometric Interpretation	(0028,0004)	M	Always set ("MONOCHROME2")
>Rows	(0028,0010)	M	Always set (0x0400)
>Columns	(0028,0011)	M	Always set (0x0500)
>Pixel Aspect Ratio	(0028,0034)	MC	Always set
>Bits Allocated	(0028,0100)	M	Always set (0x0008)
>Bits Stored	(0028,0101)	M	Always set (0x0008)
>High Bit	(0028,0102)	M	Always set (0x0007)
>Pixel Representation	(0028,0103)	M	Always set (0x0000)
>Pixel Data	(7FE0,0010)	M	Always set

11.5 Printer SOP Class

11.5.1 N-EVENT-REPORT

Table 67

Event Type Name	Event Type ID	Attribute	Tag	Usage SCU/SCP
NORMAL	1			
WARNING	2	Printer Name	(2110,0030)	U/U
		Printer Status Information	(2110,0020)	U/M
FAILURE	3	Printer Name	(2110,0030)	U/U
		Printer Status Information	(2110,0020)	U/M

11.5.2 N-GET Attributes

Table 68

Attribute Name	Tag	Usage SCU/SCP
Printer Status	(2110,0010)	U/M
Printer Status Information	(2110,0020)	U/M
Printer Name	(2110,0030)	U/U
Manufacturer	(0008,0070)	U/U
Manufacturer's Model Name	(0008,1090)	U/U
Device Serial Number	(0018,1000)	U/U
Software Version	(0018,1020)	U/U
Date of Last Calibration	(0018,1200)	U/U
Time of Last Calibration	(0018,1201)	U/U

11.6 Storage Commitment Push Model SOP Class

11.6.1 N-ACTION Attributes

Table 69

Action Type Name	Action Type ID	Attribute	Tag	Requirement Type SCU/SCP
Request Storage Commitment	1	Transaction UID	(0008,1195)	1/1
		Referenced SOP Sequence	(0008,1199)	1/1
		>Referenced SOP Class UID	(0008,1150)	1/1
		>Referenced SOP Instance UID	(0008,1155)	1/1
		Referenced Study Component Sequence	(0008,1199)	1C/1
		>Referenced SOP Class UID	(0008,1150)	1/1
		>Referenced SOP Instance UID	(0008,1155)	1/1

11.6.2 N-EVENT-REPORT Attributes

Table 70

Action Type Name	Action Type ID	Attribute	Tag	Requirement Type SCU/SCP
Storage Commitment Request Successful	1	Transaction UID	(0008,1195)	-/1
		Referenced SOP Sequence	(0008,1199)	-/1
		>Referenced SOP Class UID	(0008,1150)	-/1
		>Referenced SOP Instance UID	(0008,1155)	-/1
Storage Commitment Request Complete Failures Exist	2	Transaction UID	(0008,1195)	-/1
		Referenced SOP Sequence	(0008,1199)	-/1C
		>Referenced SOP Class UID	(0008,1150)	-/1
		>Referenced SOP Instance UID	(0008,1155)	-/1
		Failed SOP Sequence	(0008,1198)	-/1
		>Referenced SOP Class UID	(0008,1150)	-/1
		>Referenced SOP Instance UID	(0008,1155)	-/1
		>Failure Reason	(0008,1197)	-/1

12. Modality Worklist Information Object Definition

12.1 Matching Key Attributes

The supported Matching Key Attributes are listed as follows.

12.1.1 Scheduled Procedure Step Module

Table 71

Description/Module	Tag	Matching Key Type	Remark/ Matching Type
Scheduled Procedure Step Sequence	(0040, 0100)	R	
>Scheduled station AE title	(0040, 0001)	R	Single Value Matching
>Scheduled Procedure Step Start Date	(0040, 0002)	R	Single Value Matching or Range Matching
>Scheduled Procedure Step Start Time	(0040, 0003)	R	Single Value Matching or Range Matching
>Modality	(0008, 0060)	R	Single Value Matching ("XA"/"RF") or Universal Matching (as a Return Key)

12.1.2 Imaging Service Request Module

Table 72

Description/Module	Tag	Matching Key Type	Remark/ Matching Type
Accession Number	(0008, 0050)	O	Single Value Matching or Universal Matching (as a Return Key)

12.1.3 Patient Identification Module

Table 73

Description/Module	Tag	Matching Key Type	Remark/ Matching Type
Patient ID	(0010, 0020)	R	Single Value Matching

12.2 Return Key Attributes

The supported Return Key Attributes are listed as follows.

12.2.1 SOP Common Module

Table 74

Description/Module	Tag	Return Key Type	Remark
Specific Character Set	(0008,0005)	1C	Required if an extended or replacement character set is used.

12.2.2 Scheduled Procedure Step Module

Table 75

Description/Module	Tag	Return Key Type	Remark
Scheduled Procedure Step Sequence	(0040, 0100)	1	
>Scheduled station AE title	(0040, 0001)	1	
>Scheduled Procedure Step Start Date	(0040, 0002)	1	
>Scheduled Procedure Step Start Time	(0040, 0003)	1	
>Modality	(0008, 0060)	1	
>Scheduled Performing Physician's Name	(0040,0006)	2	
>Scheduled Procedure Step Description	(0040, 0007)	1C	
>Scheduled Procedure Step Location	(0040, 0011)	2	
>Scheduled Protocol Code Sequence	(0040, 0008)	1C	
>>Code Value	(0008, 0100)	1C	
>>Coding Scheme Designator	(0008, 0102)	1C	
>>Code Meaning	(0008, 0104)	3	
>Scheduled Procedure Step ID	(0040, 0009)	1	

12.2.3 Requested Procedure Module

Table 76

Description/Module	Tag	Return Key Type	Remark
Requested Procedure ID	(0040, 1001)	1	
Requested Procedure Description	(0032, 1060)	1C	
Requested Procedure Code Sequence	(0032, 1064)	1C	
>Code Value	(0008, 0100)	1C	
>Coding Scheme Designator	(0008, 0102)	1C	
>Code Meaning	(0008, 0104)	3	
Study Instance UID	(0020, 000D)	1	
Requested Procedure Comments	(0040, 1400)	3	
Name of Intended Recipients of results	(0040, 1010)	3	

12.2.4 Imaging Service Request Module

Table 77

Description/Module	Tag	Return Key Type	Remark
Accession Number	(0008, 0050)	2	
Requesting Physician	(0032, 1032)	2	
Referring Physician's Name	(0008, 0090)	2	
Imaging Service Request Comments	(0040, 2400)	3	
Requesting Service	(0032, 1033)	3	

12.2.5 Visit Status Module

Table 78

Description/Module	Tag	Return Key Type	Remark
Current Patient Location	(0038, 0300)	2	

12.2.6 Visit Admission Module

Table 79

Description/Module	Tag	Return Key Type	Remark
Referring Physician's Name	(0008, 0090)	3	

12.2.7 Patient Identification Module

Table 80

Description/Module	Tag	Return Key Type	Remark
Patient's Name	(0010,0010)	1	Wild Card Matching
Patient ID	(0010,0020)	1	Single Value Matching

12.2.8 Patient Demographic Module

Table 81

Description/Module	Tag	Return Key Type	Remark
Patient's Birth Date	(0010,0030)	2	
Patient's Sex	(0010,0040)	2	
Patient Comments	(0010,4000)	3	

12.2.9 Patient Medical Module

Table 82

Description/Module	Tag	Return Key Type	Remark
Pregnancy Status	(0010, 21C0)	2	
Medical Alerts	(0010, 2000)	2	
Additional Patient History	(0010, 21B0)	2	

13. Modality Performed Procedure Step Information Object Definition

13.1 N-CREATE Attributes

13.1.1 SOP Common Module

Table 83

Description/Module	Tag	Req. Type N-CREATE	Remark
Specific Character Set	(0008,0005)	1C	Required if an extended or replacement character set is used.

13.1.2 Performed Procedure Step Relationship Module

Table 84

Attribute Name	Tag	Req. Type N-CREATE	Attributes Description
Scheduled Step Attributes Sequence	(0040,0270)	1	Always set
>Study Instance UID	(0020,000D)	1	Always set
>Referenced Study Sequence	(0008,1110)	2	Always set, Length=0
>>Accession Number	(0008,0050)	2	Always set
>>Requested Procedure ID	(0040,1001)	2	Always set, Length=0
>>Requested Procedure Description	(0032,1060)	2	Always set
>>Scheduled Procedure Step ID	(0040,0009)	2	Always set, Length=0
>>Scheduled Procedure Step Description	(0040,0007)	2	Always set, Length=0
>Scheduled Protocol Code Sequence	(0040,0008)	2	Always set, Length=0
Patient's Name	(0010,0010)	2	Always set
Patient ID	(0010,0020)	2	Always set
Patient's Birth Date	(0010,0030)	2	Always set
Patient's Sex	(0010,0040)	2	Always set
Referenced Patient Sequence	(0008,1120)	2	Always set, Length=0

13.1.3 Performed Procedure Step Information Module

Table 85

Attribute Name	Tag	Req. Type N-CREATE	Attributes Description
Performed Procedure Step ID	(0040,0253)	1	Always set
Performed Station AE Title	(0040,0241)	1	Always set
Performed Station Name	(0040,0242)	2	Always set, Length=0
Performed Location	(0040,0243)	2	Always set, Length=0
Performed Procedure Step Start Date	(0040,0244)	1	Always set
Performed Procedure Step Time	(0040,0245)	1	Always set
Performed Procedure Step Status	(0040,0252)	1	Always set ("IN PROGRESS")
Performed Procedure Step Description	(0040,0254)	2	Always set, Length=0
Performed Procedure Type Description	(0040,0255)	2	Always set
Procedure Code Sequence	(0008,1032)	2	Always set, Length=0
Performed Procedure Step End Date	(0040,0250)	2	Always set, Length=0
Performed Procedure Step End Time	(0040,0251)	2	Always set, Length=0

13.1.4 Image Acquisition Results Module

Table 86

Attribute Name	Tag	Req. Type N-CREATE	Attributes Description
Modality	(0008,0060)	1	Always set ("XA"/"RF")
Study ID	(0020,0010)	2	Length=0, when no data is available
Performed ProtocolCode Sequence	(0040,0260)	2	Always set, Length=0
Performed Series Sequence	(0008, 0340)	2	Always set, Length=0

13.2 N-SET Attributes

13.2.1 Performed Procedure Step Information Module

Table 87

Attribute Name	Tag	Req. Type N-SET(*1)	Attributes Description
Performed Procedure Step Status	(0040,0252)	3	Always set ("COMPLETED"/"DISCONTINUED")
Performed Procedure Step Description	(0040,0254)	3	Always set, Length=0
Performed Procedure Type Description	(0040,0255)	3	Always set
Performed Procedure Step End Date	(0040,0250)	3 (1)	Always set
Performed Procedure Step End Time	(0040,0251)	3 (1)	Always set
Procedure Code Sequence	(0008,1032)	3	Always set, Length=0

*1) Requirement Type Final State

13.2.2 Image Acquisition Results Module

Table 88

Attribute Name	Tag	Req. Type N-SET(*1)	Attributes Description
Performed Protocol Code Sequence	(0040,0260)	3	Always set, Length=0
Performed Series Sequence	(0040, 0340)	3 (1)	Always set
>Performing Physician's Name	(0008, 1050)	2C (2)	Length=0, when no entry is made
> Protocol Name	(0018,1030)	1C (1)	Always set
>Operator's Name	(0008, 1070)	2C (2)	Length=0, when no entry is made
>Series Instance UID	(0020, 000E)	1C (1)	Always set
>Series Description	(0008,103E)	2C (2)	Length=0, when no entry is made
>Retrieve AE Title	(0008, 0054)	2C (2)	Always set, Length=0
>Referenced Image Sequence	(0008, 1140)	2C	Length=0, when no data is available
>>Referenced SOP Class UID	(0008, 1150)	1C	Always set, when data is available
>>Referenced SOP Instance UID	(0008, 1155)	1C	Always set, when data is available
>Referenced Non-Image CompositeSOP instance Sequence	(0040, 0220)	2C	Always set, length=0

*1) Requirement Type Final State

E

13.2.3 Radiation Dose Module

Table 89

Description/Module	Tag	Req. Type N-SET	Remark
Total Time of Fluoroscopy	(0040,0300)	3	Length=0, when no data is available
Total Number of Exposures	(0040,0301)	3	Length=0, when no data is available

E