No. MIICT0030EA

TOSHIBA

DICOM CONFORMANCE STATEMENT
MODALITY WORKLIST MANAGEMENT SCU
FOR
TOSHIBA WHOLE-BODY X-RAY CT SCANNER
AUKLET
(COT-20A)

TOSHIBA CORPORATION

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1 Introduction

This document is a DICOM Conformance Statement for Toshiba CT scanner Auklet. 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
- 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

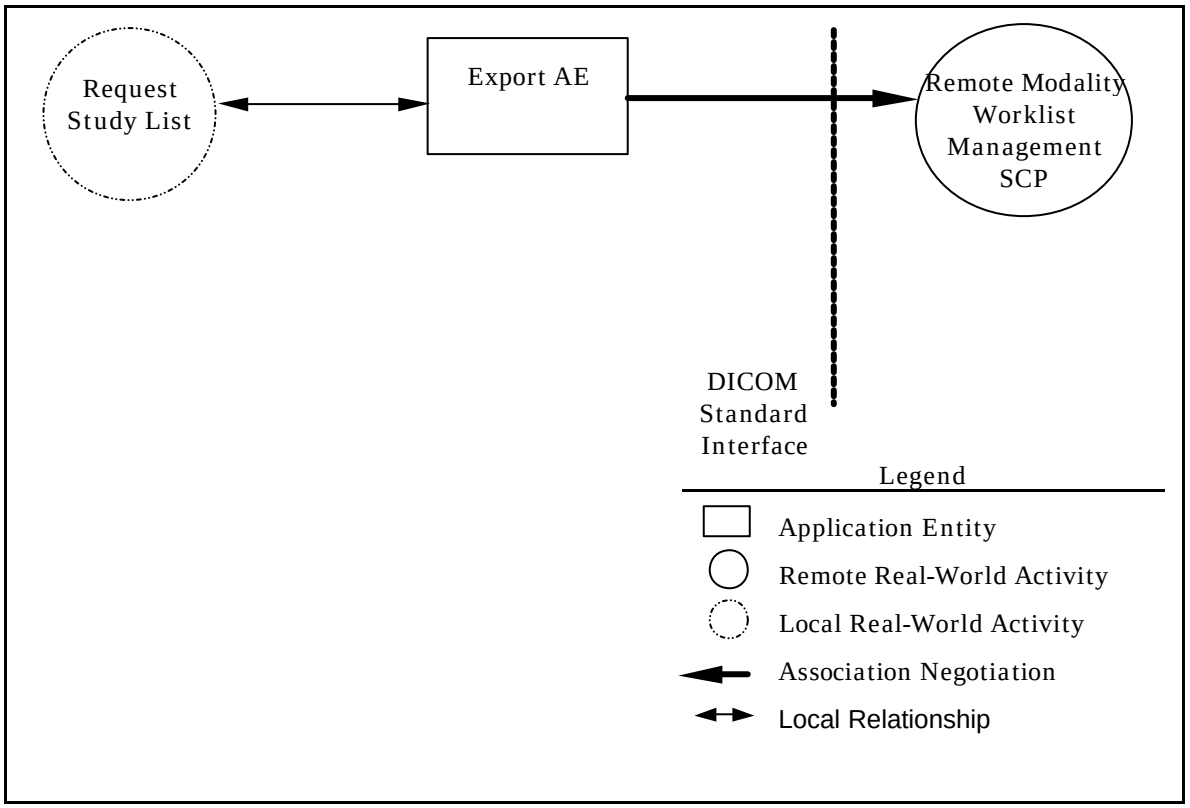

Figure 1

2.2 Functional Definitions of AE's

2.2.1 Export AE

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

- Establishes DICOM Association with remote DICOM device
- Performs request of DICOM Modality Worklist Objects to remote DICOM device
- Retrieves Study List with Procedure Step Information from remote DICOM device

2.3 Sequencing of Real World Activities

2.3.1 Features

- Operator manually requests to transmit requesting Study List and retrieves it with Procedure Step.

2.3.2 Operation

The operation for manual transmitting request for Study List :

Step-1: Specify the Scheduled Procedure Step Start Date, Scheduled Performing Physician's Name, Patient's Name, etc., search the remote SCP for worklist.

Step-2: Select one of the worklist for an examination.

Step-3: The patient's name, patient ID, etc. are used for the patient registration.

◆ Access to Worklist SCP is automatically carried out at the time of key-word change.

In order to access to Worklist SCP compulsorily by the manual, it uses Reload function.

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
Modality Worklist Information Model-FIND	1.2.840.10008.5.1.4.31

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 2

DICOM V3.0 Application Context	1.2.840.10008.3.1.1.1

Export AE supports the PDU size of 16 Kbytes only. The default value is set to 16 Kbytes.

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 will specify the following Implementation Identifying Information:

- Implementation Class UID 1.2.392.200036.9116.2.2.2.100
- Implementation Version Name TM_CT_CMW_V1.00

3.1.2 Export Association Initiation by Real-World Activity

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

- "Request Study List"
  - — Request Worklist - Query and Retrieve Study List

3.1.2.1 Export Real-World Activity - Request Worklist

3.1.2.1.1 Export Associated Real-World Activity - Request Worklist

Export AE performs Query and Retrieve Study List automatically or manually to destination device.

3.1.2.1.2 Export Proposed Presentation Contexts - Request Worklist

Export AE proposes the following Presentation Contexts shown below:

Table 3

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**			**Extended**
Name	**UID**	**Name List**	**UID List**	**Role**	**Negotiation**
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

3.1.2.1.3 Export SOP Specific Conformance - Request Worklist

Export AE operation involves the following sequence of steps for each Query and Retrieve Study List.

(1) Association establishment (requestor only)

(2) Query and Retrieve Study List (SCU only)

(3) Association release (requestor only)

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

Modality worklist Management Information Object Definition is described in chapter 8.

3.1.3 Export Association Acceptance Policy

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

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 Auklet, the configuration can be set through interaction.

Note: Settings and changes are performed by Toshiba Service Personnel at a time of installation of the Auklet .

6.1 AE Title/Presentation Address Mapping

Mapping from the AE titles to the presentation addresses 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.

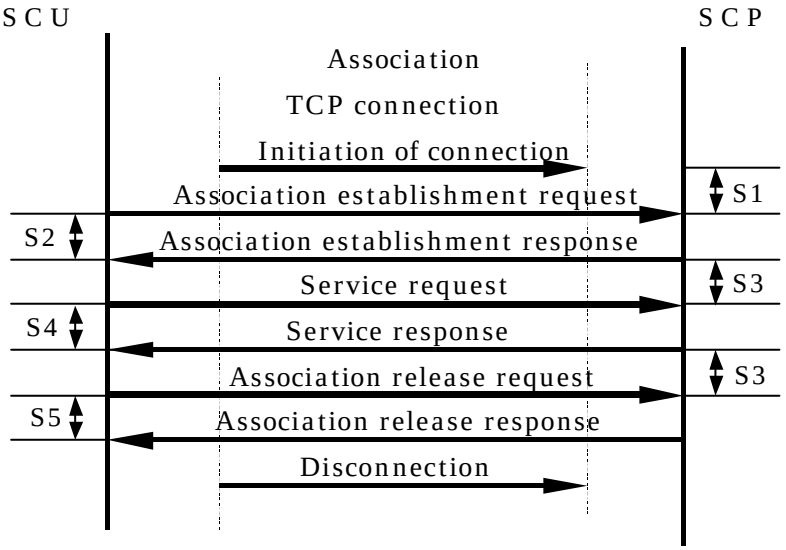

Figure 2

Table 4

Status	Item	Time-out Value	Retry Count	Retry Interval	Remarks
S1	Association establishment request waiting time	Not set	Not set	Not set	Not applicable to the Auklet.
S2	Association establishment response waiting time	<default: 30 seconds range: 1 to 999999	<default: once range: 0 to 999999	<default: 30 seconds range: 0 to 999999	Only one parameter can be set in the Auklet.
S3	Service request waiting time	Not set	Not set	Not set	Not applicable to the Auklet.
S4	Service response waiting time	<default: 180 seconds range: 1 to 999999	Not set	Not set	Only one parameter can be set in the Auklet.
S5	Association release waiting time	<default: 5 seconds range: 1 to 999999	Not set	Not set	Only one parameter can be set in the Auklet.

◆ Performed value may be different from the setting value, because of the condition of the communication line of the burden of the environment of the Auklet.

6.3 Implementation Information and Maximum Reception PDU Size

The default value for Auklet is used for the Implementation Class UID, the Implementation Version name, and the Maximum length received.

Table 5

Parameter	Default
Implementation Class UID	1.2.392.200036.9116.2.2.2.100
Implementation Version name	TM_CT_CMW_V1.00
Maximum length received(unit:byte)	16 Kbytes

6.4 Default Transfer Syntax

In Modality Worklist Information Model - FIND, the Auklet sends only one transfer syntax.

Default = "Implicit VR Little Endian"

7 Support of Extended Character Sets

This product supports the following character sets:

- ISO-IR 6 (default) Basic G0 Set

8 Matching Key Attributes and Return Key Attributes

The attributes listed in the following tables represent a small set of the possible attributes which could be supported by a Modality Worklist SCU.

8.1 Matching Key Attributes

The supported Matching Key Attributes are listed as follows.

8.1.1 Scheduled Procedure Step Module

Table 6

Description / Module	Tag	Matching Key Type	Matching Type
Scheduled Procedure Step Sequence	(0040,0100)	Required	
>Modality	(0008,0060)	Required	Single value matching only.
>Scheduled station AE title	(0040,0001)	Required	Single value matching only.
>Scheduled Procedure Step Start Date	(0040,0002)	Required	Single Value Matching or Range Matching.
>Scheduled Procedure Step Start Time	(0040,0003)	Required	Single Value Matching or Range Matching.
>Scheduled Performing Physician's Name	(0040,0006)	Required	Single Value Matching or Wild Card Matching.

8.1.2 Patient Identification Module

Table 7

Description / Module	Tag	Matching Key Type	Matching Type
Patient's Name	(0010,0010)	Required	Single Value Matching or Wild Card Matching.
Patient ID	(0010,0020)	Required	Single Value Matching only.

8.2 Return Key Attributes

The supported Return Key Attributes are listed as follows.

8.2.1 SOP Common Module

Table 8

Description / Module	Tag	Return Key Type	Note
Specific Character Set	(0008,0005)	1C	

8.2.2 Scheduled Procedure Step Module

Table 9

Description / Module	Tag	Return Key Type	Note
Scheduled Procedure Step Sequence	(0040,0100)	1	
>Modality	(0008,0060)	1	
>Requested Contrast Agent	(0032,1070)	2C	
>Scheduled station AE title	(0040,0001)	1	
>Scheduled Procedure Step Start Date	(0040,0002)	1	
>Scheduled Procedure Step Start Time	(0040,0003)	1	
>Scheduled Procedure Step End Date	(0040,0004)	3	
>Scheduled Procedure Step End Time	(0040,0005)	3	
>Scheduled Performing Physician's Name	(0040,0006)	2	
>Scheduled Procedure Step Description	(0040,0007)	1C	
>Scheduled Action Item 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	
>Scheduled Station Name	(0040,0010)	2	
>Scheduled Procedure Step Location	(0040,0011)	2	
>Pre-Medication	(0040,0012)	2C	
>Scheduled Procedure Step Status	(0040,0020)	3	
>Comments on the Scheduled Procedure Step	(0040,0400)	3	

8.2.3 Requested Procedure Module

Table 10

Description / Module	Tag	Return Key Type	Note
Referenced Study Sequence	(0008,1110)	2	
>Referenced SOP Class UID	(0008,1150)	1C	
>Referenced SOP Instance UID	(0008,1155)	1C	
Study Instance UID	(0020,000D)	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	
Requested Procedure ID	(0040,1001)	1	
Reason for requested Procedure	(0040,1002)	3	
Requested Procedure Priority	(0040,1003)	2	
Patient Transport Arrangements	(0040,1004)	2	
Requested Procedure Location	(0040,1005)	3	
Placer Order Number / Procedure	(0040,1006)	3	
Filler Order Number / Procedure	(0040,1007)	3	
Confidentiality Code	(0040,1008)	3	
Reporting Priority	(0040,1009)	3	
Names of Intended Recipients of results	(0040,1010)	3	
Requested Procedure Comments	(0040,1400)	3	

8.2.4 Imaging Service Request Module

Table 11

Description / Module	Tag	Return Key Type	Note
Accession Number	(0008,0050)	2	
Referring Physician's Name	(0008,0090)	2	
Requesting Physician	(0032,1032)	2	
Requesting Service	(0032,1033)	3	
Reason for the Imaging Service Request	(0040,2001)	3	
Issuing Date of Imaging Service Request	(0040,2004)	3	
Issuing Time of Imaging Service Request	(0040,2005)	3	
Placer Order Number / Imaging Service Request	(0040,2006)	3	
Filler Order Number / Imaging Service Request	(0040,2007)	3	
Order entered by ...	(0040,2008)	3	
Order Enterer's Location	(0040,2009)	3	
Order Callback Phone Number	(0040,2010)	3	
Imaging Service Request Comments	(0040,2400)	3	

8.2.5 Patient Identification Module

Table 12

Description / Module	Tag	Return Key Type	Note
Patient's Name	(0010,0010)	1	
Patient ID	(0010,0020)	1	
Issuer of Patient ID	(0010,0021)	3	
Other Patient IDs	(0010,1000)	3	
Other Patient Names	(0010,1001)	3	
Patient's Birth Name	(0010,1005)	3	
Patient's Mother's Birth Name	(0010,1060)	3	
Medical Record Locator	(0010,1090)	3	

8.2.6 Patient Medical Module

Table 13

Description / Module	Tag	Return Key Type	Note
Medical Alerts	(0010,2000)	2	
Contrast Allergies	(0010,2110)	2	
Pregnancy Status	(0010,21C0)	2	
Special Needs	(0038,0050)	2	
Patient State	(0038,0500)	2	
Smoking Status	(0010,21A0)	3	
Additional Patient History	(0010,21B0)	3	
Last Menstrual Date	(0010,21D0)	3	

8.2.7 Patient Relationship Module

Table 14

Description / Module	Tag	Return Key Type	Note
Referenced Visit Sequence	(0008,1125)	3	
>Referenced SOP Class UID	(0008,1150)	3	
>Referenced SOP Instance UID	(0008,1155)	3	
Referenced Study Sequence	(0008,1110)	3	
>Referenced SOP Class UID	(0008,1150)	3	
>Referenced SOP Instance UID	(0008,1155)	3	
Referenced Patient Alias Sequence	(0038,0004)	3	
>Referenced SOP Class UID	(0008,1150)	3	
>Referenced SOP Instance UID	(0008,1155)	3	

8.2.8 Patient Demographic Module

Table 15

Description / Module	Tag	Return Key Type	Note
Patient's Birth Date	(0010,0030)	2	
Patient's Birth Time	(0010,0032)	3	
Patient's Sex	(0010,0040)	2	
Patient's Insurance Plan Code Sequence	(0010,0050)	3	
>Code Value	(0008,0100)	3	
>Coding Scheme Designator	(0008,0102)	3	
>Code Meaning	(0008,0104)	3	
Patient's Age	(0010,1010)	3	
Patient's Size	(0010,1020)	3	
Patient's Weight	(0010,1030)	2	
Patient's Address	(0010,1040)	3	
Military Rank	(0010,1080)	3	
Branch of Service	(0010,1081)	3	
Country of Residence	(0010,2150)	3	
Region of Residence	(0010,2152)	3	
Patient's Telephone Numbers	(0010,2154)	3	
Ethnic Group	(0010,2160)	3	
Occupation	(0010,2180)	3	
Patient's Religious Preference	(0010,21F0)	3	
Patient Data Confidentiality Constraint Description	(0040,3001)	2	
Patient Comments	(0010,4000)	3	

8.2.9 Visit Relationship Module

Table 16

Description / Module	Tag	Return Key Type	Note
Referenced Study Sequence	(0008,1110)	3	
>Referenced SOP Class UID	(0008,1150)	3	
>Referenced SOP Instance UID	(0008,1155)	3	
Referenced Patient Sequence	(0008,1120)	2	
>Referenced SOP Class UID	(0008,1150)	2	
>Referenced SOP Instance UID	(0008,1155)	2	

8.2.10 Visit Identification Module

Table 17

Description / Module	Tag	Return Key Type	Note
Institution Name	(0008,0080)	3	
Institution Address	(0008,0081)	3	
Institution Code Sequence	(0008,0082)	3	
>Code Value	(0008,0100)	3	
>Code Scheme Designator	(0008,0102)	3	
>Code Meaning	(0008,0104)	3	
Admission ID	(0038,0010)	2	
Issuer of Admission ID	(0038,0011)	3	

8.2.11 Visit Status Module

Table 18

Description / Module	Tag	Return Key Type	Note
Visit Status ID	(0038,0008)	3	
Current Patient Location	(0038,0300)	2	
Patient's Institution Residence	(0038,0400)	3	
Visit Comments	(0038,4000)	3	

8.2.12 Visit Admission Module

Table 19

Description / Module	Tag	Return Key Type	Note
Referring Physician's Name	(0008,0090)	3	
Referring Physician's Address	(0008,0092)	3	
Referring Physician's Phone Numbers	(0008,0094)	3	
Admitting Diagnosis Description	(0008,1080)	3	
Admitting Diagnosis Code Sequence	(0008,1084)	3	
>Code Value	(0008,0100)	3	
>Coding Scheme Designator	(0008,0102)	3	
>Code Meaning	(0008,0104)	3	
Route of Admissions	(0038,0016)	3	
Admitting Date	(0038,0020)	3	
Admitting Time	(0038,0021)	3	