TOSHIBA AMERICA MRI

DICOM Conformance Statement

Products: OpArt Store
OpArt Query/Retrieve

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1 Introduction

This document is a DICOM Conformance Statement for Toshiba's OpArt devices. 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 user 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.

  The printed copy of this draft may be obtained from:

  NEMA
  1300 North 17th Street, Suite 1847
  Rosslyn VA 22209
  USA
  (703)841-3200

  Or an electronic copy may be obtained by anonymous ftp to:

  ftp.xray.hmc.psu.edu

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.

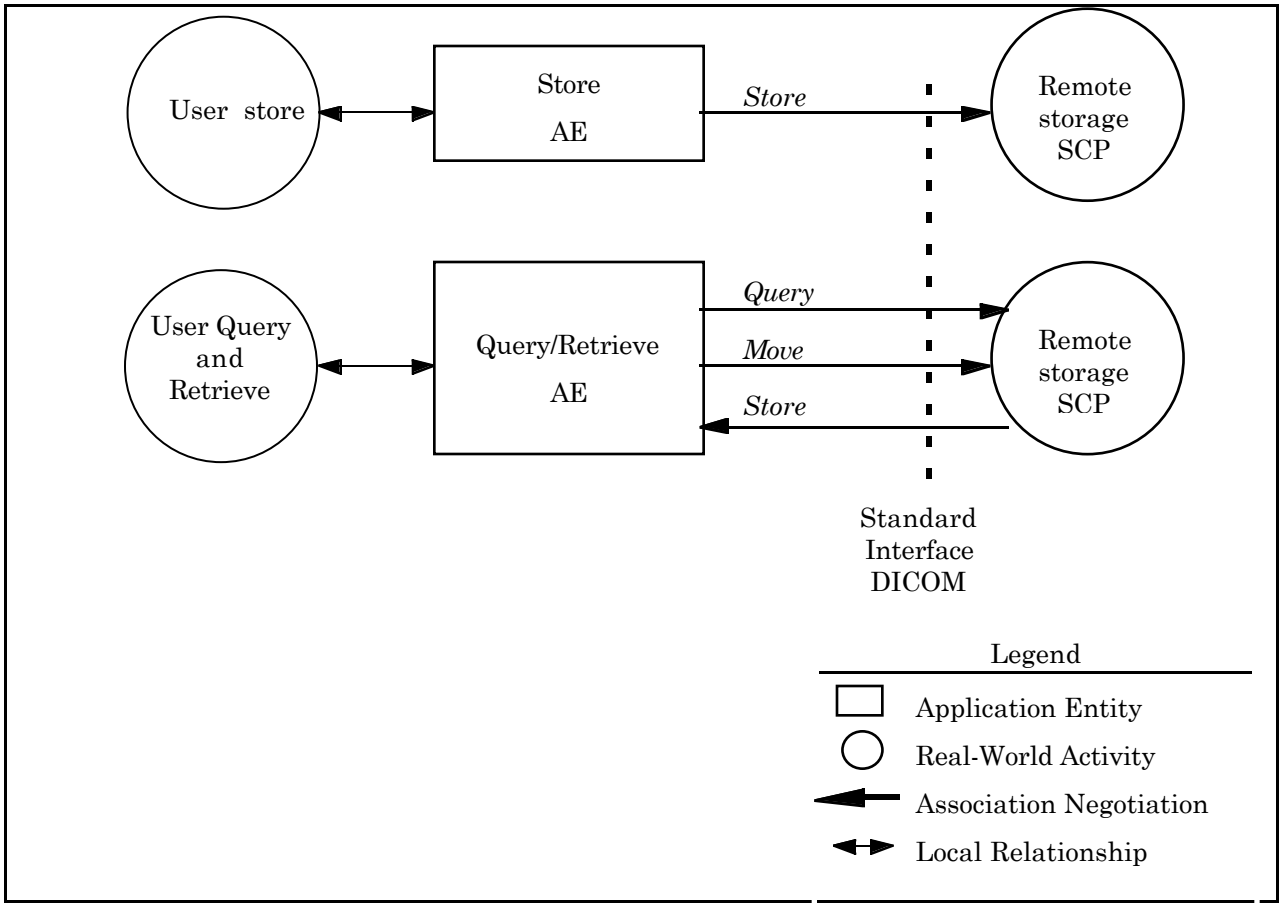
- **Transfer Syntax** - The Transfer Syntax is a set of encoding rules that allow DICOM Application Entities to negotiate the encoding techniques (e.g. data element structure, byte ordering, compression) they are able to support. The Transfer Syntax is negotiated during Association Negotiation.
- **Unique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



2.2 Functional Definition of AE

All communications and image transfer with the remote application is accomplished utilizing the DICOM protocol over TCP/IP protocol stack.

The *Store* AE establishes an association with a user selected remote AE, sends store request and waits for response.

The *Query/Retrieve* AE establishes an association with a user selected remote AE, sends find and/or move requests and waits for responses.

2.3 Sequencing of Real World Activities

Not applicable.

3 Store AE Specifications

3.1 Specification

Store AE provides Standard Conformance to the following DICOM V3.0 SOP Classes as an SCU:

SOP Class UID	SOP Class Name
1.2.840.10008.5.1.4.1.1.4	MR Image Storage

3.1.1 Association Establishment Policies

3.1.1.1 General

The *Store* AE will initiate an association as an SCU of Storage Services when a local operator requests to send images over the network to a remote Storage SCP. The maximum PDU size is 16384.

3.1.1.2 Number of Associations

The *Store* AE only opens 1 association at a time. The user may select that a sequence of images be sent in which case multiple images will be sent sequentially over the association.

3.1.1.3 Asynchronous Nature

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

3.1.1.4 Implementation Identifying Information

Store AE will specify the following Implementation Identifying Information:

- Implementation Class UID 1.2.840.113701.4.1.1095.1
- Implementation Version Name TAMI_MC3_1.0

3.1.2 Association Initiation by Real-World Activity

3.1.2.1 Real-World Activity

The *Store* AE initiates an association when user requests a set of images to be transferred. The association is closed when all images have been sent to the remote DICOM network node. The association may also be aborted if an error occurs.

3.1.2.1.1 Associated Real-World Activity

The *Store* AE initiates an association for MR Image Storage Class and does C-STORE for each image to be transferred. The association is closed when all images have been transferred.

3.1.2.1.2 Proposed Presentation Contexts

Store proposes the Presentation Contexts shown below:

Presentation Context Table					
Abstract Syntax		Transfer Syntax			Extended
Name	UID	Name List	UID List	Role	Negotiation
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Implicit Little Endian	1.2.840.10008.1.2	SCU	None

3.1.2.1.2.1 SOP Specific Conformance for SOP Storage Service Class

Implementation conforms to SOP Class Of the Storage Service Class as SCU:

- successful C_STORE response status is reported to the user
- unsuccessful C_STORE response status is reported to the user
- warning C_STORE response status is reported to the user
- extended negotiations are not supported
- the study may contain optional elements therefore the set of optional elements depends entirely on the contents of the study.

3.1.3 Association Acceptance Policy

Store does not accept any associations generated by remote applications.

4 Query/Retrieve AE Specifications

4.1 Specification

Query/Retrieve AE provides Standard Conformance to the following DICOM V3.0 SOP Classes as an SCU:

SOP Class UID	SOP Class Name
1.2.840.10008.5.1.4.1.2.2.1	Study Root Query Retrieve - FIND
1.2.840.10008.5.1.4.1.2.2.2	Study Root Query Retrieve - MOVE

4.1.1 Association Establishment Policies

4.1.1.1 General

The *Query/Retrieve* AE will initiate an association as an SCU of Query/Retrieve Service Class when a local operator requests to query or retrieve images over the network from a remote Query/Retrieve SCP. The maximum PDU size is 16384.

4.1.1.2 Number of Associations

The *Query/Retrieve* AE only opens 1 and accepts 1 association at a time. The user may select that a sequence of images be queried or retrieved in which case query and retrieve will be done sequentially.

4.1.1.3 Asynchronous Nature

Query/Retrieve allows a single outstanding operation on any association. Therefore, *Query/Retrieve* does not support asynchronous operations, other than the default as specified by the DICOM specification.

4.1.1.4 Implementation Identifying Information

Query/Retrieve AE will specify the following Implementation Identifying Information:

- Implementation Class UID 1.2.840.113701.4.1.1095.1
- Implementation Version Name TAMI_MC3_1.0

4.1.2 Association Initiation by Real-World Activity

The *Query/Retrieve* AE initiates an association when user requests a query or retrieve to be performed. The association is closed when query or retrieval have been completed. The association may also be aborted if an error occurs.

4.1.2.1 Real-World Activity *Query*

The *Query/Retrieve* AE initiates an association when user requests a query to be performed. The association is closed when query has been completed. The association may also be aborted if an error occurs.

4.1.2.1.1 Associated Real-World Activity

The AE initiates an association and does C-FIND request. The association is closed when final response to C-FIND has been received.

4.1.2.1.2 Proposed Presentation Contexts

Query/Retrieve proposes the Presentation Contexts shown below:

Presentation Context Table					
Abstract Syntax		Transfer Syntax			Extended
Name	UID	Name List	UID List	Role	Negotiation
Study Root Query/Retrieve Information Model - Find	1.2.840.10008.5.1.4.1.2.2.1	Implicit Little Endian	1.2.840.10008.1.2	SCU	Relational Query

4.1.2.1.2.1 SOP Specific Conformance for SOP Storage Service Class

Implementation conforms to SOP Class Of Query/Retrieve Service Class as SCU. Implementation requires SCP to provide Relational Query support as requested in extended negotiations.

4.1.2.2 Real-World Activity *Retrieve*

The *Query/Retrieve* AE initiates an association when user requests a retrieve to be performed. The association is closed when retrieval has been completed. The association may also be aborted if an error occurs.

4.1.2.2.1 Associated Real-World Activity

The AE initiates an association and does C-MOVE request. The association from the remote AE responding to C-MOVE is accepted .The associations are closed when final response to C-MOVE has been received.

4.1.2.2.2 Proposed Presentation Contexts

Query/Retrieve proposes the Presentation Contexts shown below:

Presentation Context Table					
Abstract Syntax		Transfer Syntax			Extended
Name	UID	Name List	UID List	Role	Negotiation
Study Root Query/Retrieve Information Model - Move	1.2.840.10008.5.1.4.1.2.2.2	Implicit Little Endian	1.2.840.10008.1.2	SCU	None

4.1.2.2.2.1 SOP Specific Conformance for SOP Storage Service Class

Implementation conforms to SOP Class Of Query/Retrieve Service Class as SCU.

4.1.3 Association Acceptance Policy

Query/Retrieve accepts association generated by remote applications in response to C_MOVE request.

5 Communication Profiles

5.1 Supported Communication Stacks

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

5.2 OSI Stack

Not applicable to this product.

5.3 TCP/IP Stack

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

5.3.1 API

Not applicable to this product.

5.3.2 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.

5.4 Point-to-Point Stack

Not applicable to this product.

6 Extensions/Specializations/Privatizations

Not applicable to this product.

7 Configuration

7.1 AE Title/Presentation Address Mapping

The OpArt AE Title is configured as part of OpArt File Manager application.

The OpArt port is 8001.

The OpArt Host Name and IP address are configured by local system administrator.

Each remote DICOM server is assigned a *Name*. Each Name maps to Host Name, Port Number and AE Title through a database. In turn the Host Name and Port Number are mapped to a Presentation Address in TCP/IP.

Note: the Host Name maps to an IP address as specified by your host table.

7.2 Configurable Parameters

- OpArt system AE Title
- Named sets of Host Name, Port Number and Application titles for remote DICOM servers

8 Support of Extended Character Sets

Store and *Query/Retrieve* are indifferent to Extended Character Sets.