TOSHIBA

No. MIIUS0022EA

DICOM
CONFORMANCE STATEMENT
FOR
DIAGNOSTIC ULTRASOUND SYSTEM

MODEL SSA-770A/700A Aplio V4.00
(DICOM KIT USDI-770A PLUS USDI-772A AND USDI-773A)

TOSHIBA CORPORATION

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1 Introduction

This document is a DICOM Conformance Statement for Toshiba's diagnostic ultrasound system Aplio, model SSA-770A/700A (DICOM KIT: USDI-770A plus USDI-772A and USDI-773A). 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 that are supported by this product as follows:

- Verification Service Class (SCU/SCP)
- Storage Service Class (SCU)
- Query/Retrieve Service Class (SCU)
- Print Management Service Class (SCU)
- Storage Commitment Service Class (SCU)
- MWM (Modality Worklist Management) Service Class (SCU)
- MPPS (Modality Performed Procedure Step) Service Class (SCU)
- MOD and CD-R Medium Storage Service Class (FSC/FSR/FSU)

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

1.1 Reference

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

1.2 Definitions

- **Application Profile -** A Media Storage Application Profile defines a selection of choices at the various layers of the DICOM Media Storage Model which are applicable to a specific need or context in which the media interchange is intended to be performed.
- **Association Establishment** - An Association Establishment is the first phase of communication between two DICOM Application Entities (AEs). 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.
- **DICOMDIR File** - A unique and mandatory DICOM File within a File-set which contains the Media Storage Directory SOP Class. This File is given a single component File ID, DICOMDIR.
- **DICOM File** - A DICOM File is a File with a content formatted according to the requirements of this Part of the DICOM Standard. In particular such files shall contain, the File Meta Information and a properly formatted Data Set.
- **DICOM File Forma**t: The DICOM File Format provides a means to encapsulate in a File the Data Set representing a SOP Instance related to a DICOM Information Object.
- **DICOM File Servic**e - The DICOM File Service specifies a minimum abstract view of files to be provided by the Media Format Layer. Constraining access to the content of files by the Application Entities through such a DICOM File Service boundary ensures Media Format and Physical Media independence.
- **DICOM Message Service Element (DIMSE)** - A DIMSE defines the services and protocols utilized by an Application Entity to exchange messages.
- **File** - A File is an ordered string of zero or more bytes, where the first byte is at the beginning of the file and the last byte at the end of the File. Files are identified by a unique File ID and may by written, read and/or deleted.
- **File ID** - Files are identified by a File ID which is unique within the context of the File-set they belong to. A set of ordered File ID Components (up to a maximum of eight) forms a File ID.
- **File ID Component -** A string of one to eight characters of a defined character set.
- **File Meta Information -** The File Meta Information includes identifying information on the encapsulated Data Set. It is a mandatory header at the beginning of every DICOM File.

- **File-set** - A File-set is a collection of DICOM Files (and possibly non-DICOM Files) that share a common naming space within which File IDs are unique.
- **File-set Creato**r - An Application Entity that creates the DICOMDIR File (see section 8.6) and zero or more DICOM Files.
- **File-set Reade**r - An Application Entity that accesses one or more files in a File-set.
- **File-set Update**r - An Application Entity that accesses Files, creates additional Files, or deletes existing Files in a File-set. A File-set Updater makes the appropriate alterations to the DICOMDIR file reflecting the additions or deletions.
- **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.
- **Media Format -** Data structures and associated policies which organizes the bit streams defined by the Physical Media format into data file structures and associated file directories.
- **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 an 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

The following acronyms and abbreviations are used in this document.

- 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
- FSC — File-Set Creator
- FCR — File-Set Reader
- FSU — File-Set Updater
- HIS — Hospital Information System
- HL7 — Health Level 7
- IE — Information Entity
- IOD — Information Object Definition
- ISO — International Standard Organization
- JIRA — Japan Industries Association of Radiological Systems
- NEMA — National Electrical Manufacturers Association
- 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 Verification

The Verification service class defines an application level class of service which allows the operator to verify the ability of an application on a remote DICOM device to respond to DICOM messages. The DICOM Service Tool application supports the Verification service and acts as the SCU and SCP. The response to Verification requests from remote applications is handled by the Verification SCP application.

2.1.1 Application Data Flow Diagram

The Network AE implementation acts as the SCU and SCP for the Verification service.

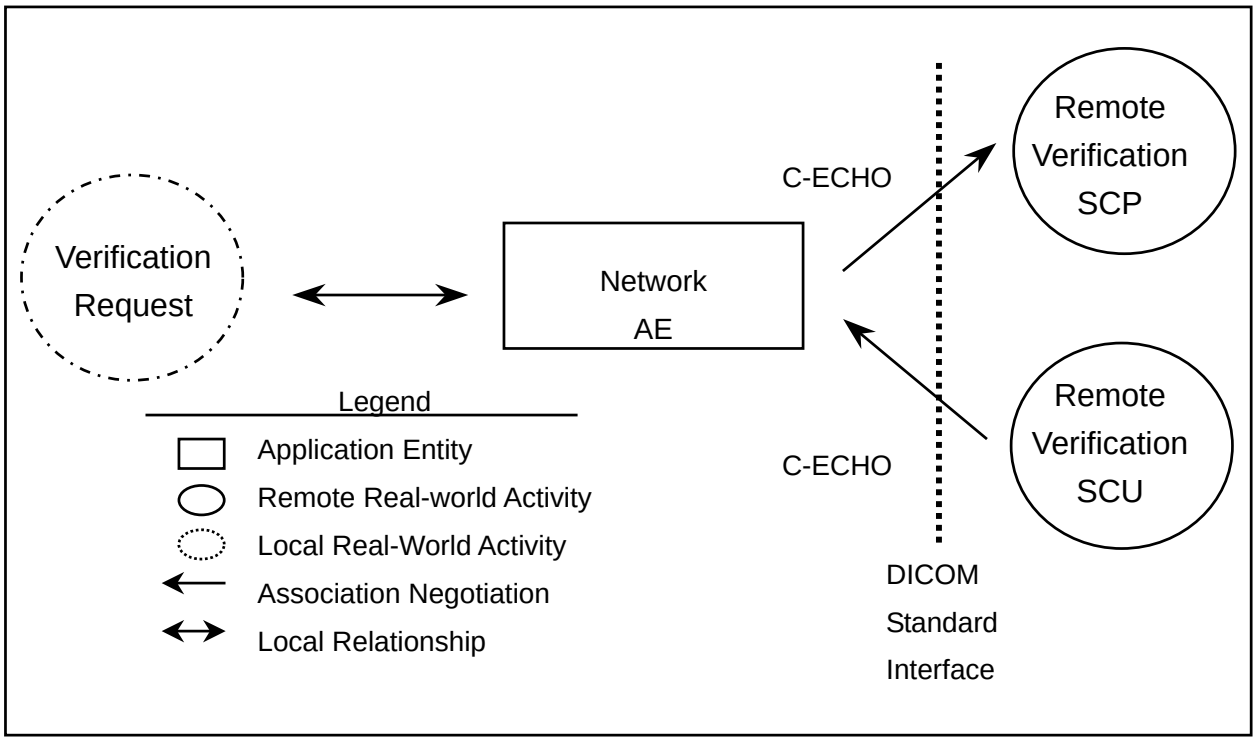

Figure 1

2.1.2 Functional Definitions of Application Entities

Network AE is used to verify that the remote DICOM device is active on the network and allows the remote DICOM device to verify that the Network AE of the

system is active on the network. It therefore performs the following tasks:

- Establishes DICOM association with the remote DICOM device.
- Performs Verification of the presence of the remote DICOM device on the network.
- Accepts establishment of DICOM association from the remote DICOM device.
- Accepts Verification on the network from the remote DICOM device.

2.1.3 Sequence of Real World Activities

2.1.3.1 Features

- Service Engineer requests Verification of activation of the Remote DICOM device.
- Network AE accepts Verification of activation from the Remote DICOM device.
- Network AE is the service class user (SCU) and provider (SCP) for Verification.

2.1.3.2 Operation

Operation 1

Step 1: Select the Remote DICOM device

Step 2: Request verification of activation of the remote DICOM device

Operation 2

Verification SCP is performed automatically when the Remote DICOM device requests the Verification of the presence of Network AEs.

2.2 Storage

Network AE establishes an association for Storage of DICOM Composite Information Objects in the Remote Real World Activity.

2.2.1 Application Data Flow Diagram

Network AE implementation acts as the SCU for the Storage service.

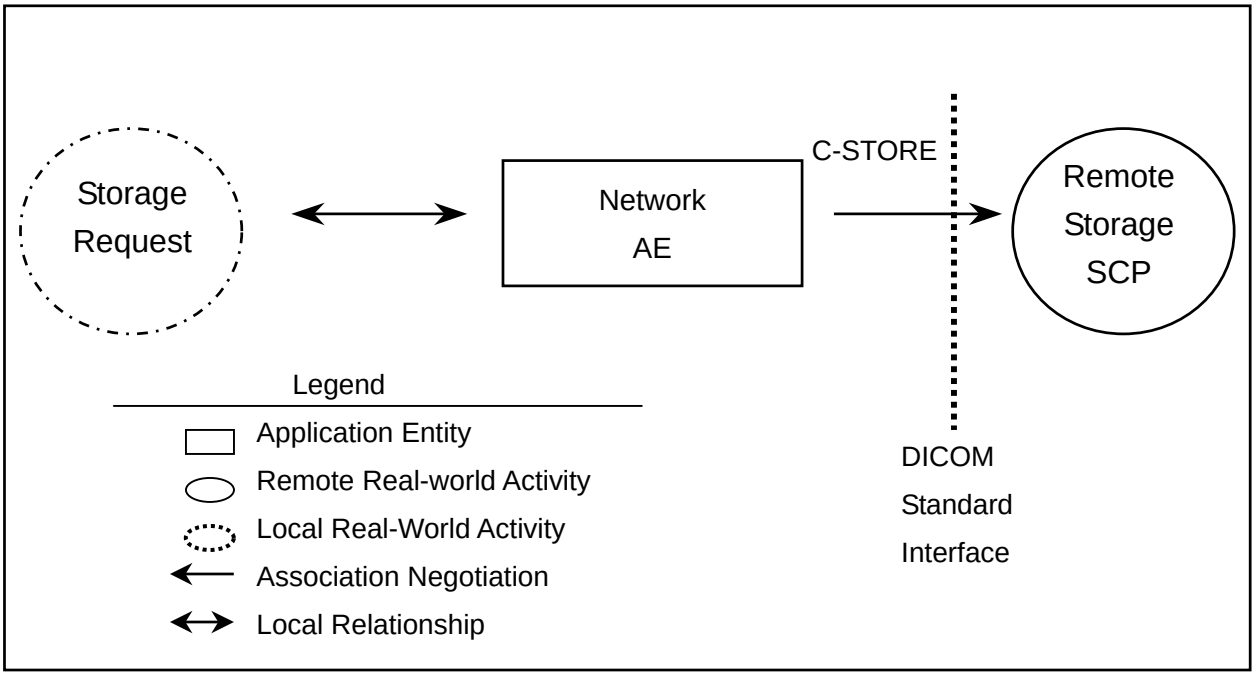

Figure 2

2.2.2 Functional Definitions of Application Entities

Network AE is used to transmit images to a remote DICOM device. It therefore performs the following tasks:

- Builds DICOM SC, US Image, US Multi-frame Image and Toshiba Private Data Information Objects
- Establishes DICOM Association with the remote DICOM device
- Stores DICOM SC, US Image, US Multi-frame Image and Toshiba Private Data Information Objects on the remote DICOM device

2.2.3 Sequence of Real World Activities

2.2.3.1 Features

- The operator requests transfer of study/images to multiple servers after selecting the target studies from the Study/Image List.
- The operator requests immediate and automatic transfer of images after capture to the default server when the feature is set up in advance.
- Storage requests are placed in a queue and are executed in the background.
- When the study or images transfer fails, Aplio attempts to transfer study or images a particular times set in configuration.
- Network AE acts as the SCU for Storage.

2.2.3.2 Operation

The operations for image transfer are described below:

Operation 1

Step 1: Select the image to be transferred.

Step 2: Request transfer.

Operation 2

Step 1: Select the study to be transferred.

Step 2: Request transfer.

Operation 3

An image is transferred to the Remote DICOM device automatically when the feature is set up in advance.

2.3 Query/Retrieve

Network AE establishes an association for Query and Retrieve of DICOM Composite Information Objects to the Remote Real World Activity. Network AE allows establishment of associations for Storage from the Remote Real World activity.

2.3.1 Application Data Flow Diagram

Network AE implementation acts as the SCU for the Query/Retrieve service.

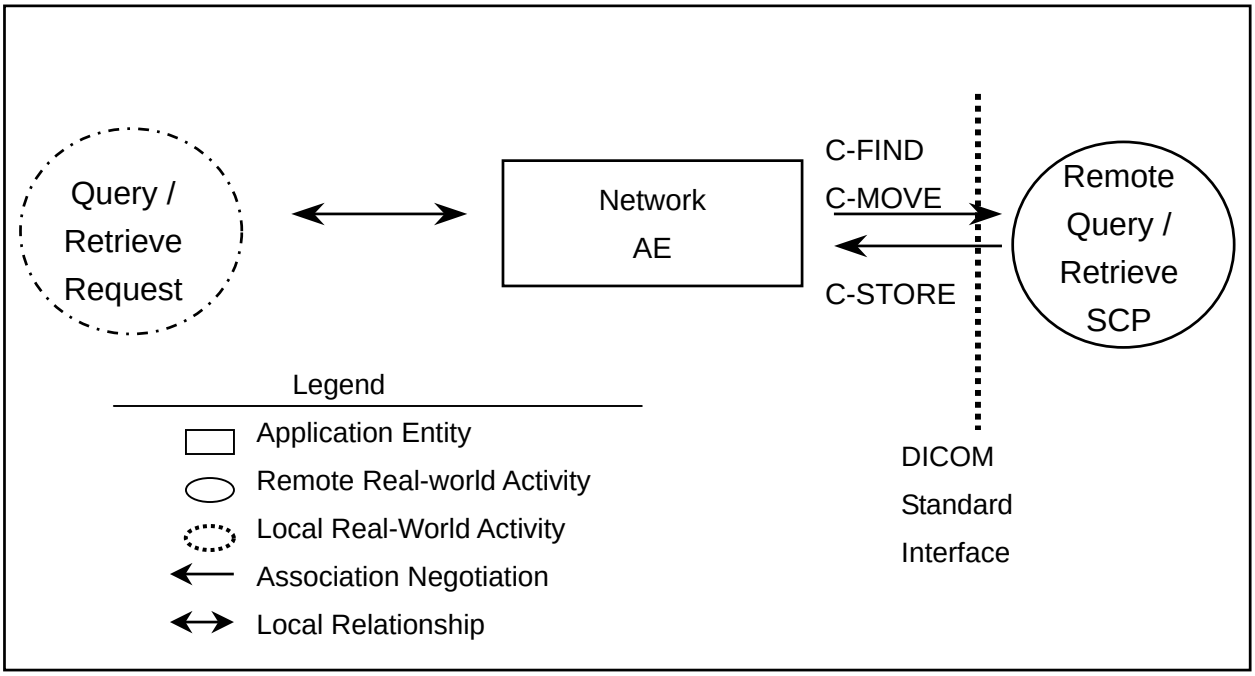

Figure 3

2.3.2 Functional Definitions of Application Entities

Network AE is used to transmit query requests for Patient/Study information and retrieval requests for images from a remote DICOM device. It therefore performs the following tasks:

- Establishes DICOM Association with a remote DICOM device.
- Performs Query of Patient/Study Information Objects from the remote DICOM device.
- Performs Retrieve of DICOM SC, US Image, US Multi-frame Image and Toshiba Private Data Information Objects from the remote DICOM

device.

2.3.3 Sequence of Real World Activities

2.3.3.1 Features

- The operator requests query of studies.
- The operator requests retrieval of the queried studies from the Study List.
- Patient Name, Patient ID, and Accession Number can be set as a filter.
- When the study or image transfer fails, the operator can manually attempt to query/retrieve studies.
- Network AE acts as the SCU for Query and Retrieve.

2.3.3.2 Operation

The operations for query and transfer of studies are as follows:

Step 1: Indicate a data source

Step 2: Set a filter and query

Step 3: Network AE displays a study list which the remote DICOM device has.

Step 4: Choose and Retrieve of studies from the study list.

2.4 Print

The Print Management Service Classes are an application level class of services which facilitate the printing of images on a hardcopy medium. The print management SCU and print management SCP are peer the Remote Real World Activity. The DICOM print application supports the print management DIMSE services and acts as the SCU.

2.4.1 Application Data Flow Diagram

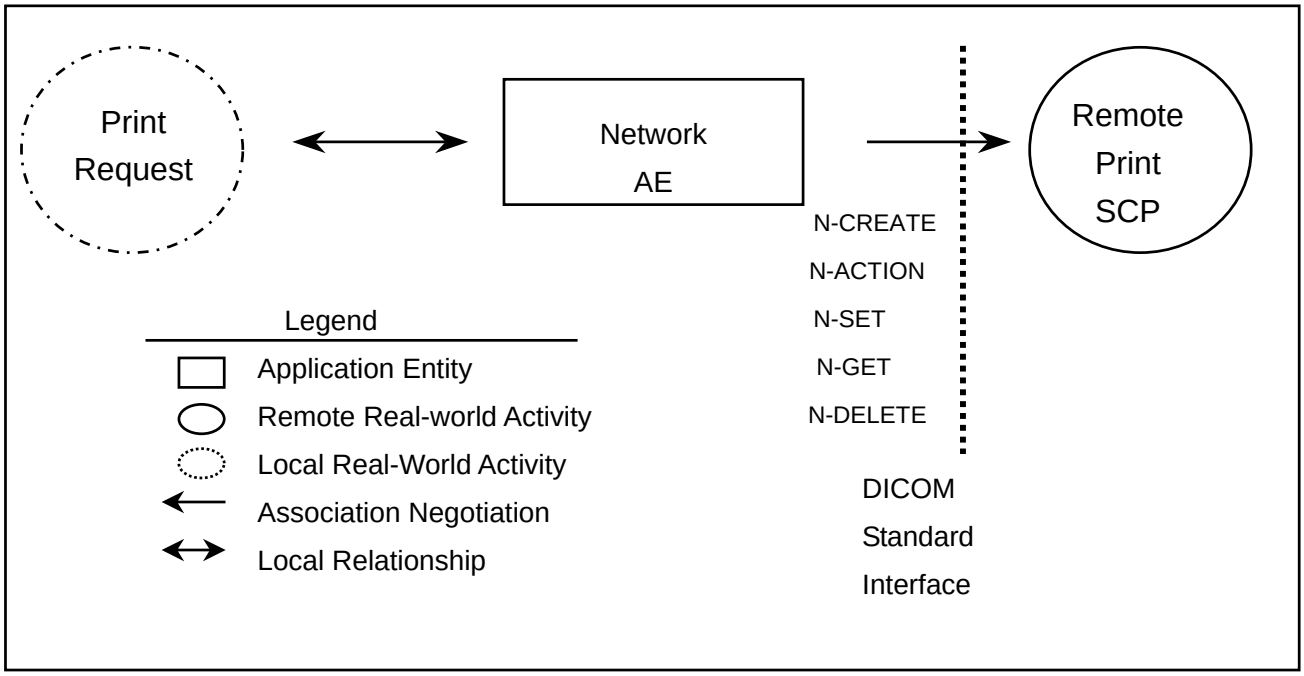

Figure 4

2.4.2 Functional Definitions of Application Entities

Network AE is used to transmit image Print requests to a remote DICOM device. It therefore performs the following tasks:

- Builds DICOM Basic Grayscale and Color Print Objects
- Establishes DICOM Associations with the remote DICOM device
- Transmits DICOM Basic Grayscale and Color Print Objects to the remote DICOM device

2.4.3 Sequence of Real World Activities

2.4.3.1 Features

- The operator requests printing of images after selecting the target

study/images from the study list or the Image List.

- The operator requests printing of image immediate to the default server when the feature is set up in advance.
- The number of rows and columns of frames on each film can be specified as desired.
- Print requests are placed in a queue and are executed in the background.
- When the study or images print fails, Aplio will activate as follows:
  If the error is critical error such as Aplio can not establish an association with the remote DICOM device, it will display print out fails, then the operator can manually attempt.
  If the error is not critical, Aplio attempts to transfer study or images automatically.
- Network AE acts as the SCU for Print.

2.4.3.2 Operation

The operations for printing are described below:

Operation 1

Step 1: Select images or study to be printed.

Step 2: Network AE displays the image to be printed. It can be skipped.

Step 2: Request printing.

Operation 2

An image is transferred to the DICOM printer automatically when the feature is set up in advance.

2.5 Storage Commitment

Network AE establishes an association for Storage Commitment of DICOM Composite Information Objects to the Remote Real World Activity. Network AE allows establishment of associations for commitment from the Remote Real World Activity.

2.5.1 Application Data Flow Diagram

Network AE implementation acts as the SCU for the Storage Commitment service.

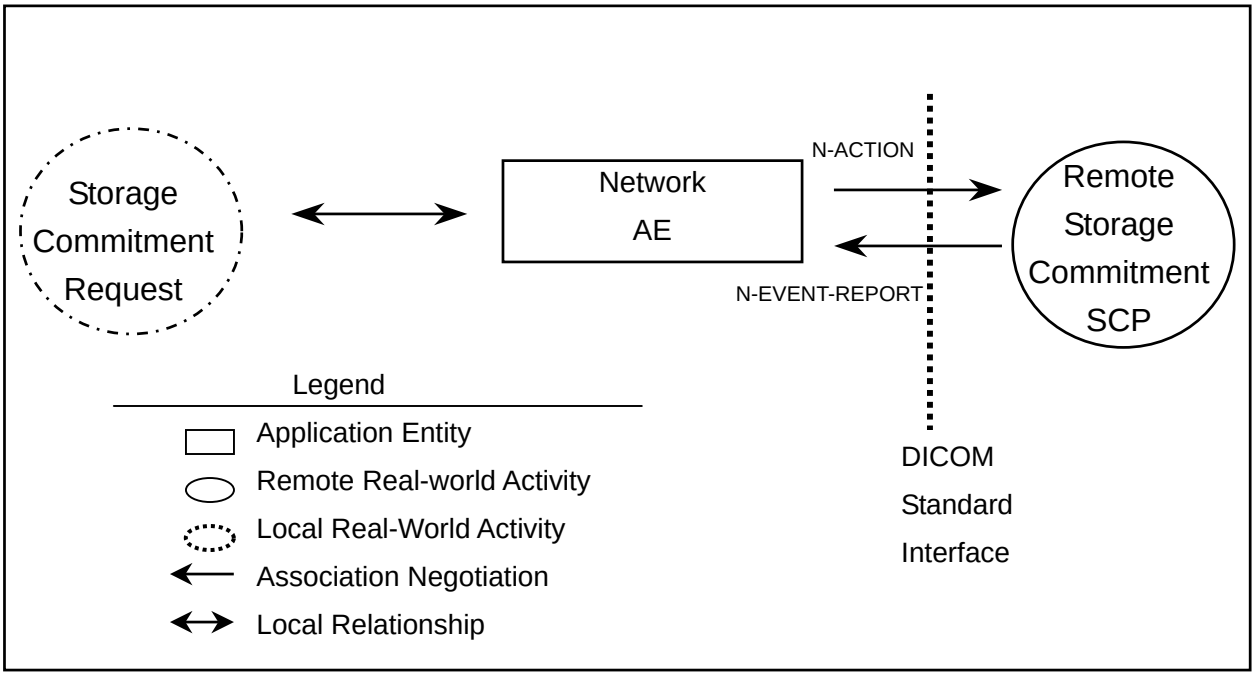

Figure 5

2.5.2 Functional Definitions of Application Entities

Network AE is used to transmit the commitment in a remote DICOM device. It therefore performs the following tasks:

- Establishes DICOM association with the remote DICOM device.
- Sends storage commitment request related to the image.
- Releases the association.
- Establishes DICOM association from the remote DICOM device.
- Waits for storage commitment to confirm commitment of image storage.

- Receives storage commitment.
- Releases the association from the remote DICOM device.

2.5.3 Sequence of Real World Activities

2.5.3.1 Features

- Aplio recognize a procedure fails either a failure of storage or a failure of commitment.
- When the study or image transfer fails, the operator can manually attempt to transfer the study or images.
- Commitment is performed automatically.
- Network AE acts as the SCU for Storage Commitment.

2.5.3.2 Operation

The operations for image transfer are described below:

Operation 1

Step 1: Select the images to be transferred.

Step 2: Request transfer.

Operation 2

Step 1: Select the study to be transferred.

Step 2: Request transfer.

Operation 3

An image is transferred to a remote DICOM device automatically when the feature is set up in advance.

Commitment is performed automatically after the aforementioned operation.

2.6 MWM (Modality Worklist Management)

Network AE establishes an association for MWM of DICOM Composite Information Objects in the Remote Real World Activity.

2.6.1 Application Data Flow Diagram

Network AE implementation acts as the SCU for the MWM service.

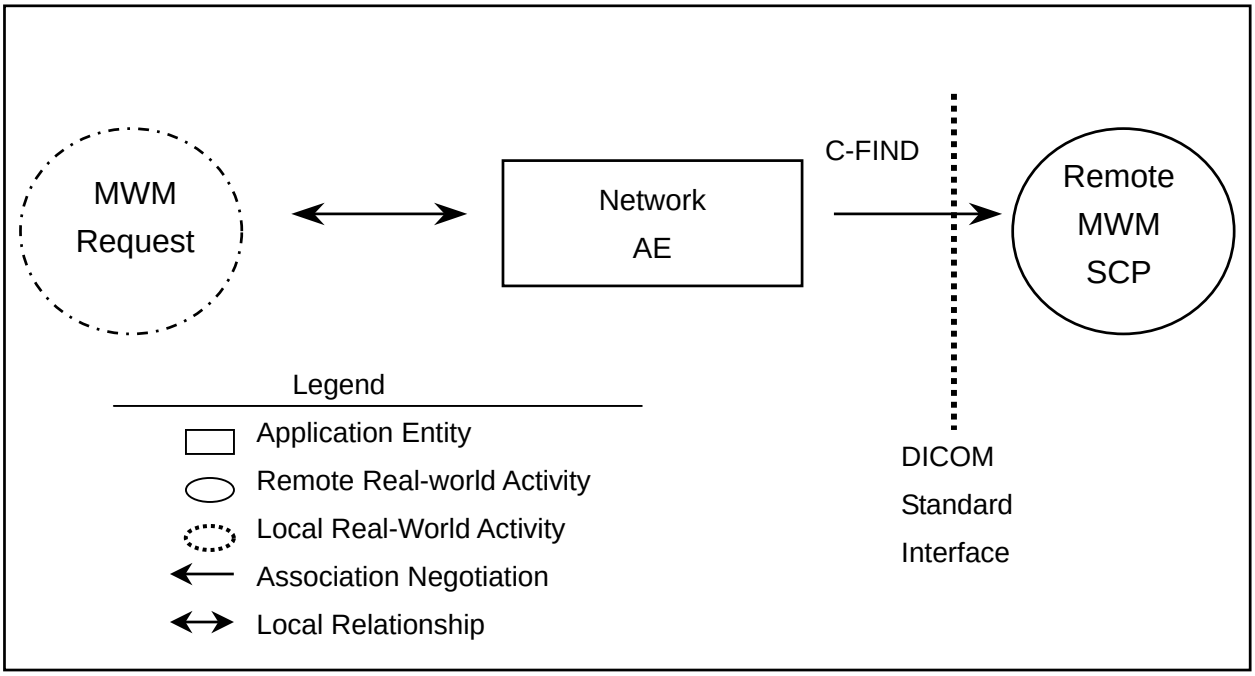

Figure 6

2.6.2 Functional Definitions of Application Entities

Network AE is used to transmit requests for retrieval of MWM information from a remote DICOM device. It therefore performs the following tasks:

- Establishes DICOM association with the remote DICOM device.
- Retrieves DICOM MWM Information from the remote DICOM device.

2.6.3 Sequence of Real World Activities

2.6.3.1 Features

- The operator requests retrieval of MWM information manually.
- When the retrieval fails, the operator can manually attempt to retrieve

MWM information.

- Network AE acts as the SCU for the MWM.

2.6.3.2 Operation

- Query the scheduled study.

2.7 MPPS (Modality Performed Procedure Step)

Network AE establishes an association for MPPS of DICOM Normalized Information Objects in the Remote Real World Activity.

2.7.1 Application Data Flow Diagram

Network AE implementation acts as the SCU for the MPPS service.

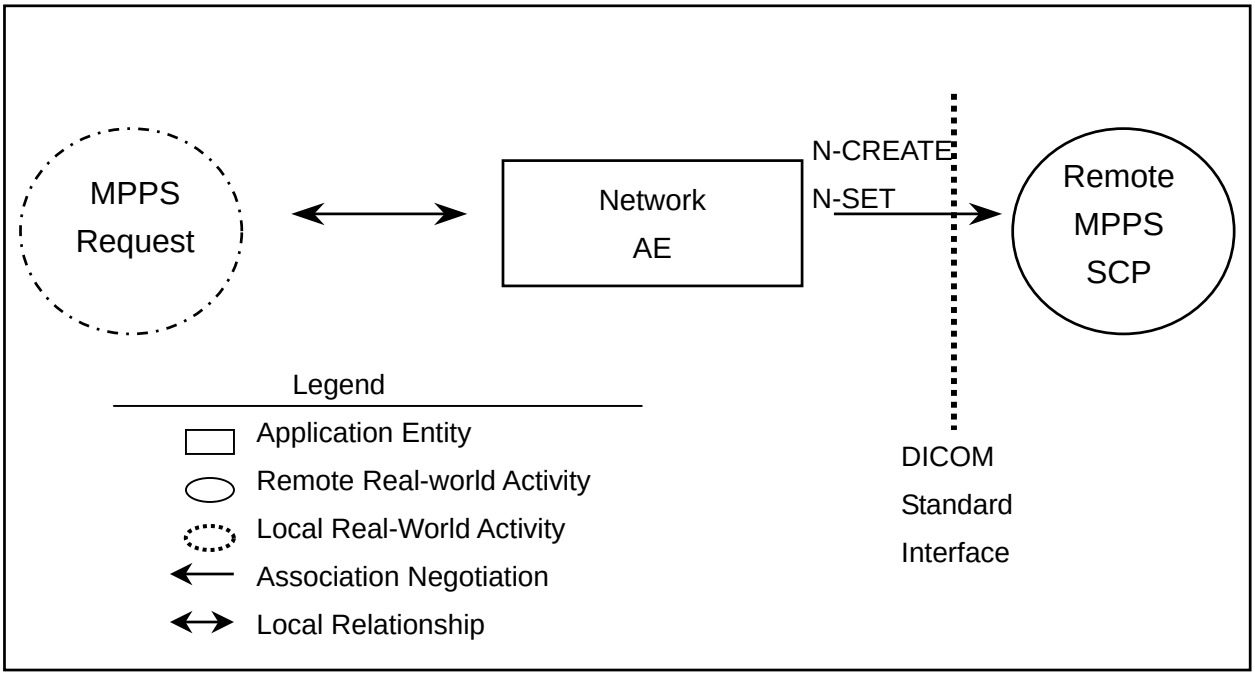

Figure 7

2.7.2 Functional Definitions of Application Entities

Network AE is used to transmit events which are the start and end of a study to a remote DICOM device. It therefore performs the following tasks:

- Establishes DICOM association with the remote DICOM device.
- Informs the remote DICOM device of DICOM MPPS Information.

2.7.3 Sequence of Real World Activities

2.7.3.1 Features

- Network AE transmits events such as the start and end of a study.
- Network AE acts as the SCU for the MPPS.

2.7.3.2 Operation

Network AE performs MPPS functions automatically. The study status is transmitted to a remote DICOM device.

2.8 MOD MEDIUM

The DICOM archive application serves as an interface with the MOD offline medium device. It incorporates the offline media directory into the browser and copies SOP Instances to a medium or retrieves SOP Instances from a medium to local storage. The DICOM Archive application supports Standard MOD media. The FSU role updates new SOP Instances only to media with preexisting File-sets conforming to the Application Profiles supported. The contents of DICOMDIR will be temporarily stored in the Archive Database.

2.8.1 Application data flow diagram

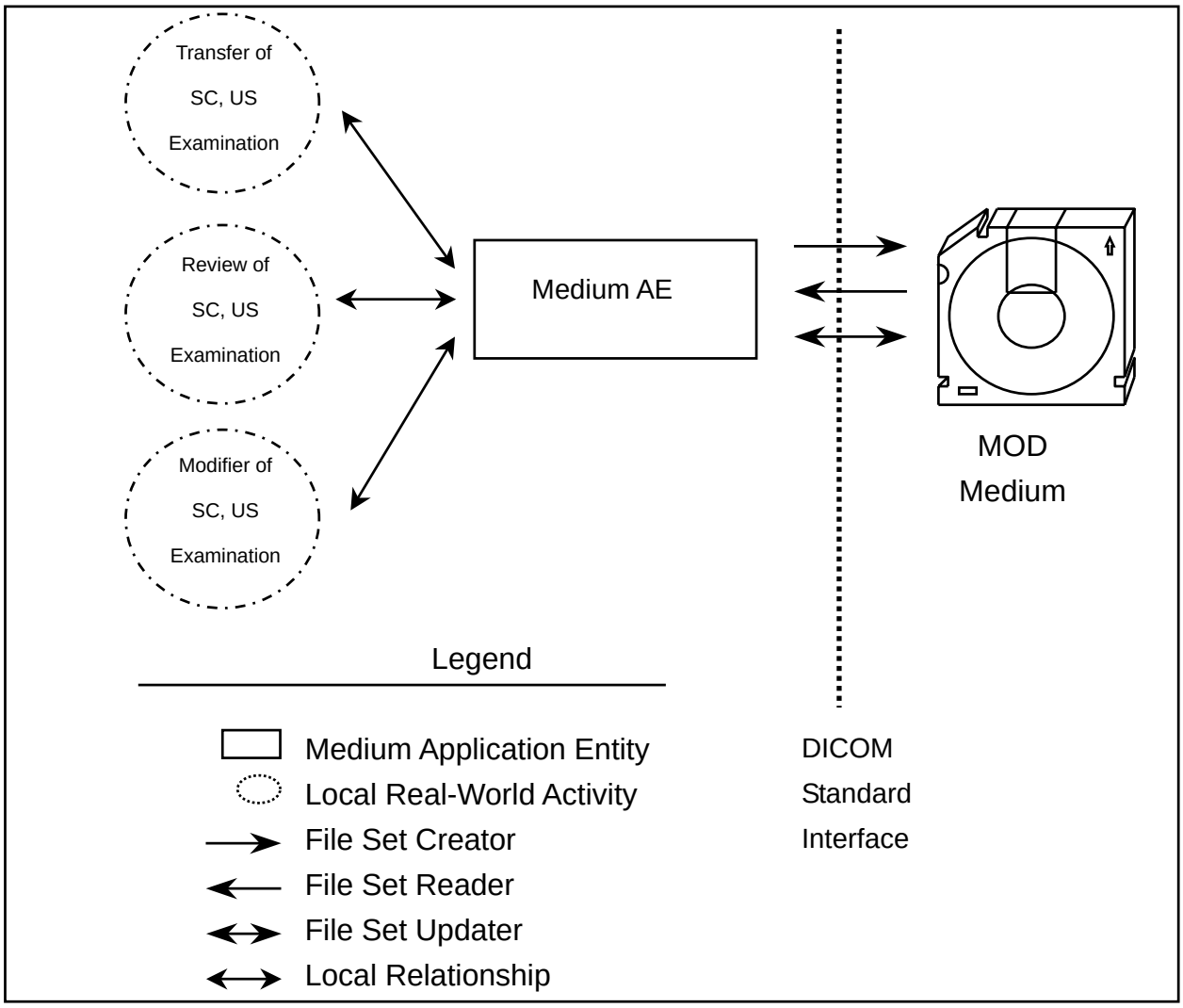

Figure 8

2.8.2 Functional definitions of AE_s

Medium AE is used to create/read/modify studies/images to/from an offline DICOM MOD Medium. It therefore performs the following tasks:

- Builds DICOM SC, US Image, US Multi-frame Image and Toshiba Private Data Information Objects.
- CREATES a DICOMDIR file that represents the contents of the DICOM SC, US Image, US Multi-frame Image and Toshiba Private Data Information Objects to be recorded.
- RECORDS DICOM SC, US Image, US Multi-frame Image and Toshiba Private Data Information Objects from local storage to a MOD medium.
- READS the DICOMDIR file that represents the contents of the data as recorded.
- DISPLAYS the ordered list of studies/images, identifying information, or icon images.
- READS the selected studies/images from a MOD medium and displays them on the monitor of the DICOM Reader.
- READS the File-set of the MOD medium and writes it to the local storage of DICOM Reader.
- MODIFIES the DICOMDIR file and the studies/images.

2.8.2.1 Features

- Operator requests storage of study/images to a MOD medium after selecting studies from the Study List.
- Operator requests immediate and automatic storage of an image after capture.
- Operator requests retrieval of study/images from a MOD medium to the local disk.
- Storage requests are placed in a queue and are executed in the background.

2.8.2.2 Operations

The operations for manual image transfer/modification are described below:

Operation-1

Step-1: Display the image to be transferred/modified.

Step-2: Request transfer/modification.

Operation-2

Step-1: Select the study to be transferred/modified.

Step-2: Request transfer/modification.

2.8.3 File meta information for implementation class UID and version name

Medium File Meta Information will specify the following Implementation Identifying Information

Table 1

System	Implementation Class UID	Implementation Version Name	File Meta Information Version
APLIO SSA-770A	**1.2.392.200036.9116.7.8.10.46.6.1.1**	**TM_APLIO_1.0**	**Version 1**

2.9 CD-R MEDIUM

The DICOM archive application serves as an interface with the CD-R offline medium device. It incorporates the offline media directory into the browser and copies SOP Instances to a medium or retrieves SOP Instances from a medium to local storage. The DICOM Archive application supports Standard CD-R media. The FSU role updates new SOP Instances only to media with preexisting File-sets conforming to the Application Profiles supported. The contents of DICOMDIR will be temporarily stored in the Archive Database.

2.9.1 Application data flow diagram

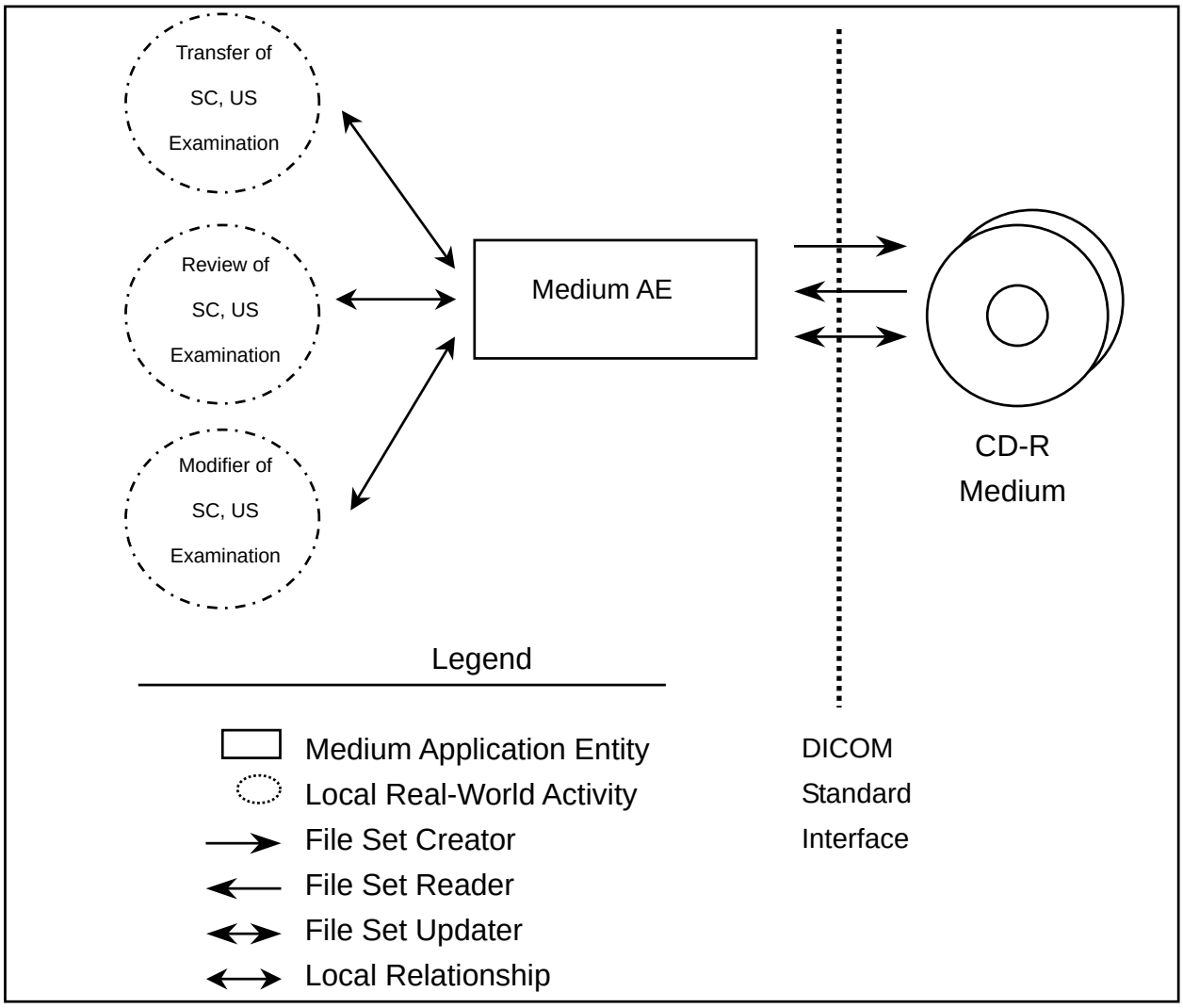

Figure 9

2.9.2 Functional definitions of AE_s

Medium AE is used to create/read/modify studies/images to/from an offline DICOM CD-R Medium. It therefore performs the following tasks:

- Builds DICOM SC, US Image, US Multi-frame Image and Toshiba Private Data Information Objects.
- CREATES a DICOMDIR file that represents the contents of the DICOM SC, US Image, US Multi-frame Image and Toshiba Private Data Information Objects to be recorded.
- RECORDS DICOM SC, US Image, US Multi-frame Image and Toshiba Private Data Information Objects from local storage to a CD-R medium.
- READS the DICOMDIR file that represents the contents of the data as recorded.
- DISPLAYS the ordered list of studies/images, identifying information, or icon images.
- READS the selected studies/images from a CD-R medium and displays them on the monitor of the DICOM Reader.
- READS the File-set of the CD-R medium and writes it to the local storage of DICOM Reader.
- MODIFIES the DICOMDIR file and the studies/images.

2.9.2.1 Features

- Operator requests storage of study/images to a CD-R medium after selecting studies from the Study List.
- Operator requests immediate and automatic storage of an image after capture.
- Operator requests retrieval of study/images from a CD-R medium to the local disk.
- Storage requests are placed in a queue and are executed in the background.

2.9.2.2 Operations

The operations for manual image transfer/modification are described below:

Operation-1

Step-1: Display the image to be transferred/modified.

Step-2: Request transfer/modification.

Operation-2

Step-1: Select the study to be transferred/modified.

Step-2: Request transfer/modification.

2.9.3 File meta information for implementation class UID and version name

Medium File Meta Information will specify the following Implementation Identifying Information

Table 2

System	Implementation Class UID	Implementation Version Name	File Meta Information Version
APLIO SSA-770A	**1.2.392.200036.9116.7.8.10.46.6.1.1**	**TM_APLIO_1.0**	**Version 1**

3 AE Specifications

3.1 Network AE Specifications

Network AE (initiation) provides Standard Conformance to the following DICOM SOP Classes as an SCU:

Table 3

SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2
Basic Grayscale Print Management	1.2.840.10008.5.1.1.9
Basic Color Print Management	1.2.840.10008.5.1.1.18
Storage Commitment Push Model	1.2.840.10008.1.20.1
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
Toshiba Private Data Storage	1.2.392.200036.9116.7.8.1.1.1

Network AE (acceptance) provides Standard Conformance to the following DICOM SOP Classes as an SCP:

Table 4

SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1

3.1.1 Association Establishment Policies

3.1.1.1 General

The configuration of the DICOM application defines the Application Entity Titles, the port numbers, and of course the host name and net address.
The Application Entity will utilize the following Application Context Name:

Table 5

DICOM V3.0 Application Context	1.2.840.10008.3.1.1.1

3.1.1.2 Number of Associations

Network AE (initiation) attempts several associations at a time, one for each transfer request being processed.

Plural simultaneous associations shall not be accepted by Network AE (acceptance).

3.1.1.3 Asynchronous Nature

Network AE (initiation/acceptance) does not support asynchronous communication (multiple outstanding transactions over a single association).

3.1.1.4 Implementation Identifying Information

Network AE will specify the following Implementation Identifying Information

Table 6

System	Implementation Class UID	Implementation Version Name
APLIO SSA-770A	1.2.392.200036.9116.7.8.10.46.6.1.1	TM_APLIO_1.0

3.1.2 Association Initiation by Real World Activity

Network AE initiates an association when any of the following activities is chosen by the operator:

- Verification
  Verify that a remote DICOM device is present on the network
- Storage
  Create and store an SC, US image, US Multi-frame Image and Toshiba Private Data on a remote DICOM device.
- Query/Retrieve
  Query information from a remote DICOM device.
  Retrieve an SC, US image, US Multi-frame Image and Toshiba Private Data from a remote DICOM device.
- Print
  Request printing of an image on a remote DICOM device.
- Storage Commitment
  Create, store, and commit to store an SC, US image, US Multi-frame Image and Toshiba Private Data to a remote DICOM device.

- MWM
  Retrieve MWM information from a remote DICOM device.
- MPPS
  Transmit MPPS information to a remote DICOM device

3.1.2.1 Real World Activity - Verification SCU

3.1.2.1.1 Associated Real World Activity

The Associated Real World Activity is a C-ECHO request initiated by the DICOM Service Tool application. If the process successfully establishes an association with a remote Application Entity, it will send the C-ECHO-Request via the open association to verify that the remote Application Entity is responding to DICOM messages.

3.1.2.1.2 Proposed Presentation Contexts

The DICOM application will propose Presentation Contexts as shown in the following table:

Table 7

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

3.1.2.1.2.1 SOP Specific Conformance Statement

The Application conforms to the definition of a Verification SCU in accordance with the DICOM Standard.

DIMSE and attributes are described in chapter 9 .

3.1.2.2 Real World Activity - Storage SCU

3.1.2.2.1 Associated Real World Activity

The Associated Real World Activity is a C-STORE request initiated by an internal daemon process. If the process successfully establishes an association with a remote Application Entity, it will transfer images one after another via the open association

3.1.2.2.2 Proposed Presentation Contexts

The DICOM application will propose Presentation Contexts as shown in the following table:

Table 8

Presentation Context Table

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	**UID**	**Name List**	**UID List**		
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
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		JPEG Lossy, Baseline Sequential with Huffman Coding (Process1)	1.2.840.10008.1.2.4.50	SCU	None
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

		JPEG Lossy, Baseline Sequential with Huffman Coding (Process1)	1.2.840.10008.1.2.4.50	SCU	None
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.6.1	JPEG Lossy, Baseline Sequential with Huffman Coding (Process1)	1.2.840.10008.1.2.4.50	SCU	None
Toshiba Private Data Storage	1.2.392.200036.9116.7.8.1.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

3.1.2.2.2.1 SOP Specification Conformance Statement

The Application conforms to the definition of a Storage SCU in accordance with the DICOM Standard.

DIMSE and attributes are described in chapter 10 , 11 and 12

3.1.2.3 Real World Activity - Query/Retrieve

3.1.2.3.1 Associated Real World Activity

Network AE will issue a Query request when a user of Network AE wishes to query and retrieve information from a remote DICOM device.

3.1.2.3.2 Proposed Presentation Contexts

Network AE supports the following Presentation Contexts for Query/Retrieve.

Table 9

Presentation Context Table

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	**UID**	**Name List**	**UID List**		
Study Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

Study Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

3.1.2.3.2.1 SOP Specific Conformance Statement

The Application conforms to the definition of a Query/Retrieve SCU in accordance with the DICOM Standard.

DIMSE and attributes are described in chapter 13 .

3.1.2.4 Real World Activity – Print SCU

The print management SCU invokes print management DIMSE services to transfer images from Network AE to the remote DICOM device and to print the images with the defined film format and size on a selected network DICOM hardcopy printer (see DICOM part 4, annex H). It provides Standard Conformance to the DICOM V3.0 Basic Grayscale Print Management Meta SOP Class, the Basic Color Print Management Meta SOP Class, and the optional Print Job SOP Class as an SCU:

Basic Gray Scale Print Management Meta SOP Classes

Table 10

SOP Class Name	SOP Class UID
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9
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
Print Job SOP Class	1.2.840.10008.5.1.1.14

Basic Color Print Management Meta SOP Classes

Table 11

SOP Class Name	SOP Class UID
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18
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 Color Image Box SOP Class	1.2.840.10008.5.1.1.4.1
Printer SOP Class	1.2.840.10008.5.1.1.16
Print Job SOP Class	1.2.840.10008.5.1.1.14

3.1.2.4.1 Associated Real World Activity

The Associated Real World Activity is to print over a network one or more copies of a set of images on a film sheet . The images are converted to “STANDARD\1,1”.

3.1.2.4.2 Proposed Presentation Contexts

Network AE supports the following Presentation Contexts for Print.

Table 12

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Basic Grayscale Print Management Meta SOP	1.2.840.10008.5.1.1.9	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Basic Film Session SOP	1.2.840.10008.5.1.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Basic Film Box SOP	1.2.840.10008.5.1.1.2	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Basic Grayscale Image Box SOP	1.2.840.10008.5.1.1.4	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Printer SOP	1.2.840.10008.5.1.1.16	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Print Job SOP	1.2.840.10008.5.1.1.14	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

Table 13

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Basic Color Print Management Meta SOP	1.2.840.10008.5.1.1.18	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Basic Film Session SOP	1.2.840.10008.5.1.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Basic Film Box SOP	1.2.840.10008.5.1.1.2	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Basic Color Image Box SOP	1.2.840.10008.5.1.1.4.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Printer SOP	1.2.840.10008.5.1.1.16	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Print Job SOP	1.2.840.10008.5.1.1.14	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

3.1.2.4.2.1 SOP Specific Conformance Statement

The PRINT SCU conforms to the DICOM Basic Grayscale Print Management Meta SOP Class and Basic Color Print Management Meta SOP Class.

Printing is suspended only in the case of a failure return status of the SCP.

DIMSE and attributes are described in chapter 14 .

3.1.2.5 Real World Activity - Storage Commitment SCU

3.1.2.5.1 Associated Real World Activity

Network AE will issue a Storage Commitment request when a user of Network AE wishes to commit storage of studies/images to a remote DICOM device.

3.1.2.5.2 Proposed Presentation Contexts

Network AE supports the following Presentation Contexts for Storage Commitment.

Table 14

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

3.1.2.5.2.1 SOP Specific Conformance Statement

Network AE conforms to the definition of a Storage Commitment SCU in accordance with the DICOM Standard.

Network AE accepts to confirm storage commitment N-EVENT-REPORT not only per image, but also per study.

DIMSE and attributes are described in chapter 15 .

3.1.2.6 Real World Activity – MWM SCU

3.1.2.6.1 Associated Real World Activity

Network AE will issue a C-FIND request in order to retrieve information for a remote DICOM device.

3.1.2.6.2 Proposed Presentation Contexts

Network AE supports the following Presentation Contexts for MWM.

Table 15

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Modality Worklist Imformation Model Find	1.2.840.10008.5.1.4.31	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

3.1.2.6.2.1 SOP Specific Conformance Statement

The Application conforms to the definition of an MWM SCU in accordance with the DICOM Standard.

DIMSE and attributes are described in chapter 16 .

3.1.2.7 Real World Activity - MPPS SCU

3.1.2.7.1 Associated Real World Activity

Network AE issues MPPS when the study starts and when the study ends.

3.1.2.7.2 Proposed Presentation Contexts

Network AE supports the following Presentation Contexts for MPPS.

Table 16

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	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

3.1.2.7.2.1 SOP Specific Conformance Statement

The Application conforms to the definition of an MPPS SCU in accordance with the DICOM Standard.

DIMSE and attributes are described in chapter 17 .

3.1.3 Association Acceptance Policy

Network AE accepts passive association at any activation time.

3.1.3.1 Acceptance Real World Activity – Verification SCP

3.1.3.1.1 Associated Real World Activity

The Associated Real World Activity is acceptance to initiate a C-ECHO request from a remote DICOM device.

If the process successfully establishes an association from a remote DICOM device, the C-ECHO response will be sent to it via the open association to verify the Network AE.

3.1.3.1.2 Presentation Context Table

The DICOM application allows establishment of Presentation Contexts as shown in the following table:

Table 17

Presentation Context Table

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	**UID**	**Name List**	**UID List**		
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

3.2 Medium AE Specification

Medium Activity : Medium AE provides Conformance to DICOM Interchange of the Media Storage Service Class. The Application Profiles and roles are listed in the following table.

Table 18

Application Profiles Supported	Real-World Activity	Roles	SC Option
AUG-US-ID-MF-MOD128 (128MB 90mm MOD)	Transfer of SC, US Examination	FSC	Interchange
AUG-US-ID-MF-MOD230 (230MB 90mm MOD)	Modifier of SC, US Examination	FSU	Interchange
AUG-US-ID-MF-MOD540 (540MB 90mm MOD)	Review of SC, US Examination	FSR	Interchange
AUG-US-ID-MF-MOD650 (650MB 90mm MOD)			
AUG-US-ID-MF-MOD12 (1.2GB 90mm MOD)			
AUG-US-ID-MF-CDR			

3.2.1 File meta information for the application entity

The Source Application Entity Title is set by the user in the configuration file.

3.2.2 Real World Activity - Removable Media

A DICOM conformant Magneto-Optical Disk (MOD) or CD-R is created when a non-conformant MOD or CD-R are inserted into Aplio and one or more DICOM Exams are transferred to the MOD or CD-R. When Exams are first transferred, their files are added to the MOD or CD-R in DICOM Part 10 format and a valid DICOMDIR is created and saved to the MOD or CD-R. Aplio can add images to an existing DICOM conformant MOD or CD-R and update its DICOMDIR. Aplio can be a File-set Reader and a File-set Updater.

4 Augmentated and Private application Profiles

4.1 Augmented Application profiles

Augmented Application Profiles cover from Standard Application Profiles in addition to dealing with SC IOD.

Table 19

Augmented Application Profiles	Standard Application Profiles
AUG-US-ID-MF-MOD128	STD-US-ID-MF-MOD128
AUG-US-ID-MF-MOD230	STD-US-ID-MF-MOD230
AUG-US-ID-MF-MOD540	STD-US-ID-MF-MOD540
AUG-US-ID-MF-MOD650 [1]	STD-US-ID-MF-MOD650
AUG-US-ID-MF-MOD12 [1]	STD-US-ID-MF-MOD12
AUG-US-ID-MF-CDR	STD-US-ID-MF-CDR

[1] AUG-US-ID-MF-MOD650 and AUG-US-ID-MF-MOD12 are replaced from 130mm MOD to 90mm MOD

4.2 SOP Class augmentations

Aforementioned Application Profiles support following SOP Class UID and Transfer Syntax.

Table 20

Information Object Definition	SOP Class UID	Transfer Syntax	Transfer Syntax UID
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Explicit VR Little Endian Uncompressed	1.2.840.10008.1.2.1
Toshiba Private Data Storage	1.2.392.200036.9116.7.8.1.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1

4.3 Directory augmentations

Not applicable to this product

4.4 Other augmentations

Not applicable to this product

4.5 Private Application Profiles

Not applicable to this product

5 Communication Profiles

5.1 Supported Communication Stacks

This system provides DICOM V3.0 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 application uses the TCP/IP stack from the computer system on which it is executed.

5.3.1 API

Not applicable to this product.

5.3.2 Physical Media Support

This application is independent of the physical medium over which TCP/IP executes; it inherits this from the computer system on which it is executed.

5.3.3 Point-to-Point Stack

Not applicable to this product.

6 Extensions/Specializations/Privatizations

6.1 Standard Extended/Specialized/Private SOPs

6.1.1 Private Elements for Storage SOP Classes

The following private attributes are defined by COMAPL-based DICOM applications.

6.1.1.1 Registry of DICOM Data Elements

Table 21

Tag	Private Owner Code	Name	VR	VM
(0029, xx08)	TOSHIBA MDW HEADER	Image Header Type	CS	1
(0029, xx09)	TOSHIBA MDW HEADER	Image Header Version	LO	1
(0029, xx10)	TOSHIBA MDW HEADER	Image Header Info	OB	1
(0029, xx18)	TOSHIBA MDW HEADER	Series Header Type	CS	1
(0029, xx19)	TOSHIBA MDW HEADER	Series Header Version	LO	1
(0029, xx20)	TOSHIBA MDW HEADER	Series Header Info	OB	1
(0029, xx08)	TOSHIBA COMAPL HEADER	COMAPL Header Type	CS	1
(0029, xx09)	TOSHIBA COMAPL HEADER	COMAPL Header Version	LO	1
(0029, xx10)	TOSHIBA COMAPL HEADER	COMAPL Header Info	OB	1
(0029, xx20)	TOSHIBA COMAPL HEADER	COMAPL History Information	OB	1
(0029, xx31)	PMTF INFORMATION DATA	PMTF Information 1	LO	1
(0029, xx32)	PMTF INFORMATION DATA	PMTF Information 2	UL	1
(0029, xx33)	PMTF INFORMATION DATA	PMTF Information 3	UL	1
(0029, xx34)	PMTF INFORMATION DATA	PMTF Information 4	CS	1
(0029, xx08)	TOSHIBA COMAPL OOG	COMAPL OOG Type	CS	1
(0029, xx09)	TOSHIBA COMAPL OOG	COMAPL OOG Version	LO	1
(0029, xx10)	TOSHIBA COMAPL OOG	COMAPL OOG Info	OB	1

6.1.1.2 All COMAPL Supported Image SOP Classes

6.1.1.2.1 Extended Image IOD Module Table

Table 22

IE	Module	Reference	Usage[*1]	Notes
Patient	Patient	Part 3 C.7.1.1	M	
Study	General Study	Part 3 C.7.2.1	M	
	Patient Study	Part 3 C.7.2.2	U	
Series	General Series	Part 3 C.7.3.1	M	
Equipment	General Equipment	Part 3 C.7.5.1	U	
Image	General Image	Part 3 C.7.6.1	M	
	Image Pixel	Part 3 C.7.6.3	M	
	IOD Specific Modules	Part 3 C.8.<module>	M/U	Depends on the IOD.
	Image Header	6.1.1.2.2	U	
	Series Header	6.1.1.2.3	U	
	COMAPL Header	6.1.1.2.4	U	Private History information
	COMAPL OOG	6.1.1.2.5	U	If object graphics are attached to images
	SOP Common	Part 3 C.12.1	M	

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

6.1.1.2.2 Image Header Module

The table in this section contains private IOD Attributes that describe the Image Header.

Table 23

Attribute Name	Tag	Private Creator	Type	Notes
Image Header Type	(0029, xx08)	TOSHIBA MDW HEADER	1	Image Header identification characteristics.
Image Header Version	(0029, xx09)	TOSHIBA MDW HEADER	3	Version of Image Header Info (0029, xx10) format.
Image Header Info	(0029, xx10)	TOSHIBA MDW HEADER	3	Product dependent information.

6.1.1.2.3 Series Header Module

The table in this section contains private IOD Attributes that describe the Series Header.

Table 24

Attribute Name	Tag	Private Creator	Type	Notes
Series Header Type	(0029, xx18)	TOSHIBA MDW HEADER	1	Series Header identification characteristics.
Series Header Version	(0029, xx19)	TOSHIBA MDW HEADER	3	Version of Series Header Info (0029, xx20) format.
Series Header Info	(0029, xx20)	TOSHIBA MDW HEADER	3	Product dependent information.

6.1.1.2.4 COMAPL Header Module

The table in this section contains private IOD Attributes that describe the TOSHIBA COMAPL HEADER.

Table 25

Attribute Name	Tag	Private Creator	Type	Notes
COMAPL Header Type	(0029, xx08)	TOSHIBA COMAPL HEADER	1C	COMAPL Header identification characteristics. Defined Terms: COMAPL 1 Required if COMAPL Header Info (0029, xx10) present.
COMAPL Header Version	(0029, xx09)	TOSHIBA COMAPL HEADER	2C	Version of COMAPL Header Info (0029, xx10) format. Required if COMAPL Header Info (0029, xx10) present.
COMAPL Header Info	(0029, xx10)	TOSHIBA COMAPL HEADER	3	Manufacturer model dependent information. The value of the attribute COMAPL Header Info (0029, xx10) can be included in each user defined format.
COMAPL History Information	(0029, xx20)	TOSHIBA COMAPL HEADER	3	COMAPL defined Patient Registration history information. See 6.1.1.2.4.1
PMTF Information 1	(0029, xx31)	PMTF INFORMATION DATA	3	Transformation Information
PMTF Information 2	(0029, xx32)	PMTF INFORMATION DATA	3	Transformation Information
PMTF Information 3	(0029, xx33)	PMTF INFORMATION DATA	3	Transformation Information
PMTF Information 4	(0029, xx34)	PMTF INFORMATION DATA	3	Transformation Information

6.1.1.2.4.1 COMAPL History Information

The value of the attribute COMAPL History Information (0029, xx20) is defined as follows:

Table 26

Part	Name	Type	Bytes	Notes
Header	Identifier	String	32	Always "HISTORY"
	Version	String	32	e.g. "V1.10"
> n items	Class Name	String	64	
	Modification String	String	1024	

6.1.1.2.5 COMAPL OOG Module

The table in this section contains private IOD Attributes that describe COMAPL Object Oriented Graphics (OOG). This module is used when object graphics are drawn on the image. The module stores the properties of the graphics objects (line, circle, rectangle, arrow, and so on). Thus the graphics objects retain their relationships with the image even if the image is transferred via the DICOM C-Store SOP class.

Table 27

Attribute Name	Tag	Private Creator	Type	Notes
COMAPL OOG Type	(0029, xx08)	TOSHIBA COMAPL OOG	1	COMAPL Object Oriented Graphics (OOG) identification characteristics. Defined Terms: COMAPL OOG 1
COMAPL OOG Version	(0029, xx09)	TOSHIBA COMAPL OOG	3	Version of COMAPL OOG Info (0029, xx10) format
COMAPL OOG Info	(0029, xx10)	TOSHIBA COMAPL OOG	3	COMAPL Object Oriented Graphics (OOG) data.

The graphics objects are stored in an Image overlay plane for compatibility with products that do not support the COMAPL OOG module. Any system which does not support this COMAPL OOG module has to remove these private attributes when modifying the image overlay data.

7 Configuration

7.1 Configurable Parameters

The service engineer can set and maintain the following configuration parameters for local and remote DICOM device. The parameters are as follows:

Table 28

Parameter			Default
Local	AE Title		aplio
	Port Number		2000
Remote	AE Title		
	Host Name		
	Port Number		
	IP Address		
	Storage	Proposed Transfer Syntax Implicit VR Little Endian/ Explicit VR Little Endian	
		Retry count	3
	Print	Hold printed film jobs	10
		Pixel Size [1/1000 mm]	Depends on the printer.
		Film Sheet Formats	Depends on the printer.
		Number of Pixels [Rows, Columns]	Depends on the printer.
		Medium Type	Depends on the printer.
		Film Destination	Depends on the printer.
		Magnification Type	Replicate
	Commitment	Effect	OFF
	MWM	Query Waiting Time [sec]	60
		Max Query Match Number	200
		Query Interval [sec]	1440
	Q/R	Query effect	OFF
		Retrieve effect	OFF
	MPPS	Effect	OFF
		Retry count	3

8 Support of Extended Character Sets

ISO-IR 100 (Latin alphabet No.1) Supplementary set of ISO8859

9 DIMSE, Attributes, and Criteria - Verification SCU/SCP

9.1 DIMSE - Verification SCU/SCP

Table 29

SOP Class	DIMSE Service Element	Usage SCU *1	Usage
Verification	C-ECHO	M	Used

*1: M = Mandatory, C = Conditional, U = User option

10 DIMSE and Attributes - Secondary Capture Image Storage SCU

10.1 DIMSE - Secondary Capture Image Storage SCU

Table 30

SOP Class	DIMSE Service Element	Usage SCU *1	Usage
Secondary Capture Image Storage	C-STORE	M	Used

*1: M = Mandatory, C = Conditional, U = User option

10.2 Entity Module Definitions

The information modules for the Ultrasound Workstation are defined below.

Table 31

Information Entity	Module	Reference	Usage[1]
Patient	Patient Module	10.3.1	M
Study	General Study Module	10.3.2	M
	Patient Study Module	10.3.3	U
Series	General Series Module	10.3.4	M
Equipment	General Equipment Module	10.3.5	U
	SC Equipment Module	10.3.6	M
Image	General Image Module	10.3.7	M
	Image Pixel Module	10.3.8	M
	SC Image Module	10.3.9	M
	Overlay Plane Module	Not Used	U
	Modality LUT Module	Not Used	U
	VOI LUT Module	10.3.10	U
	SOP Common Module	10.3.11	M

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

10.3 Attributes - Secondary Capture Image Storage SCU

10.3.1 Patient Module

Table 32

Attribute Name	Tag	Type	Attribute Description
Patient's Name	(0010, 0010)	2	Length = 0 when no entry is made
Patient ID	(0010, 0020)	2	Always set
Patient's Birth Date	(0010, 0030)	2	Length = 0 when no entry is made
Patient's Sex	(0010, 0040)	2	Length = 0 when no entry is made
Patient Comments	(0010, 4000)	3	Length = 0 when no entry is made (“Insurance=” Health Insurance Information <LINE FEED> Additional Patient Information)

10.3.2 General Study Module

Table 33

Attribute Name	Tag	Type	Attribute Description
Study Instance UID	(0020, 000D)	1	Always set
Study Date	(0008, 0020)	2	Length = 0 when no entry is made
Study Time	(0008, 0030)	2	Length = 0 when no entry is made
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
Name of Physician(s) Reading Study	(0008, 1060)	3	Not set when no entry is made

10.3.3 Patient Study Module

Table 34

Attribute Name	Tag	Type	Attribute Description
Admitting Diagnosis Description	(0008, 1080)	3	Always set (Length = 0)
Patient's Age	(0010, 1010)	3	Not set when no entry is made
Patient's Size	(0010, 1020)	3	Not set when no entry is made
Patient's Weight	(0010, 1030)	3	Not set when no entry is made

Additional Patient's History	(0010, 21B0)	3	Not set when no entry is made

10.3.4 General Series Module

Table 35

Attribute Name	Tag	Type	Attribute Description
Modality	(0008, 0060)	1	Always set ("US")
Series Instance UID	(0020, 000E)	1	Always set
Series Number	(0020, 0011)	2	Length = 0 when no entry is made
Series Date	(0008, 0021)	3	Not set when no entry is made
Series Time	(0008, 0031)	3	Not set when no entry is made
Performing Physician's Name	(0008, 1050)	3	Not set when no entry is made
Operator's Name	(0008, 1070)	3	Not set when no entry is made

10.3.5 General Equipment Module

Table 36

Attribute Name	Tag	Type	Attribute Description
Manufacturer	(0008, 0070)	2	Always set ("TOSHIBA_MEC")
Institution Name	(0008, 0080)	3	Always set
Device Serial Number	(0018, 1000)	3	Always set
Manufacture's Model Name	(0008, 1090)	3	Always set ("SSA-770A")
Software Versions	(0018, 1020)	3	Always set ("V3.00")

10.3.6 SC Equipment Module

Table 37

Attribute Name	Tag	Type	Attribute Description
Conversion Type	(0008, 0064)	1	Always set "DV" Digitized Video "DI" Digital Interface "DF" Digitized Film "WSD" Workstation

10.3.7 General Image Module

Table 38

Attribute Name	Tag	Type	Attribute Description
Instance Number	(0020, 0013)	2	Always set
Patient Orientation	(0020, 0020)	2C	Always set (Length = 0)
Content Date	(0008, 0023)	2C	Always set
Content Time	(0008, 0033)	2C	Always set
Image Type	(0008, 0008)	3	Always set: Value 1: Pixel Data Characteristics “ORIGINAL” or “DERIVED” Value 2: Patient Exam Characteristics “PRIMARY” or “SECONDARY” Value 3: System Defined Term: “US IMAGE” “US 3D IMAGE” (Set when the Secondary Capture image is 3D Screen Shot)
Acquisition Date	(0008, 0022)	3	Always set
Acquisition Time	(0008, 0032)	3	Always set
Image Comments	(0020, 4000)	3	Not set when no entry is made
Lossy Image Compression	(0028, 2110)	3	Not set when no entry is made
Lossy Image Compression Ratio	(0028, 2112)	3	Not set when no entry is made

10.3.8 Image Pixel Module

Table 39

Attribute Name	Tag	Type	Attribute Description
Samples per Pixel	(0028, 0002)	1	Always set (3)
Photometric Interpretation	(0028, 0004)	1	Always set (“RGB”)
Rows	(0028, 0010)	1	Always set (600)
Columns	(0028, 0011)	1	Always set (800)
Bits Allocated	(0028, 0100)	1	Always set (8)
Bits Stored	(0028, 0101)	1	Always set (8)
High Bit	(0028, 0102)	1	Always set (7)

Pixel Representation	(0028, 0103)	1	Always set: (0000H: Unsigned integer)
Pixel Data	(7FE0, 0010)	1	Always set
Planar Configuration	(0028, 0006)	1C	Always set (0)

10.3.9 SC Image Module

Table 40

Attribute Name	Tag	Type	Attribute Description
Date of Secondary Capture	(0018, 1012)	3	Not set
Time of Secondary Capture	(0018, 1014)	3	Not set

10.3.10 VOI LUT Module

Table 41

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

10.3.11 SOP Common Module

Table 42

Attribute Name	Tag	Type	Attribute Description
SOP Class UID	(0008, 0016)	1	Always set
SOP Instance UID	(0008, 0018)	1	Always set
Specific Character Set	(0008, 0005)	1C	Always set (“ISO_IR 100”)
Instance Number	(0020, 0013)	3	Not set when no entry is made

11 DIMSE and Attributes - Ultrasound Image Storage SCU

11.1 DIMSE - Ultrasound Image Storage SCU

Table 43

SOP Class	DIMSE Service Element	Usage SCU *1	Usage
Ultrasound Image Storage	C-STORE	M	Used

*1: M = Mandatory

11.2 Entity Module Definitions - Ultrasound Image Storage SCU

The information modules for the Ultrasound Workstation are defined below.

Table 44

Information Entity	Module	Reference	Usage[1]
Patient	Patient Module	11.3.1	M
Study	General Study Module	11.3.2	M
Study	Patient Study Module	11.3.3	U
Series	General Series Module	11.3.4	M
Frame of Reference	Frame of Reference Module	Not Used	U
	US Frame of Reference Module	Not Used	C
Equipment	General Equipment Module	11.3.5	M
Image	General Image Module	11.3.6	M
	Image Pixel Module	11.3.7	M
	Palette Color Lookup Table	Not Used	C
	Contrast/bolus Module	Not Used	C
	US Region Calibration Module	11.3.8	U
	US Image Module	11.3.9	M
	Overlay Plane Module	Not Used	U
	VOI LUT Module	11.3.10	U
	SOP Common Module	11.3.11	M
Curve[2]	Curve Identification Module	Not Used	M
	Curve Module	Not Used	M
	Audio Module	Not Used	U
	SOP Common	Not Used	M

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

[2] The Image and Curve IEs are mutually exclusive

11.3 Attributes - Ultrasound Image Storage SCU

11.3.1 Patient Module

Table 45

Attribute Name	Tag	Type	Attribute Description
Patient's Name	(0010, 0010)	2	Length = 0 when no entry is made
Patient ID	(0010, 0020)	2	Always set
Patient's Birth Date	(0010, 0030)	2	Length = 0 when no entry is made
Patient's Sex	(0010, 0040)	2	Length = 0 when no entry is made
Patient Comments	(0010, 4000)	3	Length = 0 when no entry is made (“Insurance=” Health Insurance Information<LINE FEED> Additional Patient Information)

11.3.2 General Study Module

Table 46

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
Name of Physician(s) Reading Study	(0008,1060)	3	Not set when no entry is made

11.3.3 Patient Study Module

Table 47

Attribute Name	Tag	Type	Attribute Description
Admitting Diagnoses Description	(0008,1080)	3	Always set (Length = 0)
Patient's Age	(0010, 1010)	3	Not set when no entry is made
Patient's Size	(0010, 1020)	3	Not set when no entry is made
Patient's Weight	(0010, 1030)	3	Not set when no entry is made
Additional Patient’s History	(0010, 21B0)	3	Not set when no entry is made

11.3.4 General Series Module

Table 48

Attribute Name	Tag	Type	Attribute Description
Modality	(0008, 0060)	1	Always set (“US”)
Series Instance UID	(0020, 000E)	1	Always set
Series Number	(0020, 0011)	2	Always set
Series Date	(0008, 0021)	3	Not set when no entry is made
Series Time	(0008, 0031)	3	Not set when no entry is made
Performing Physician’s Name	(0008, 1050)	3	Not set when no entry is made
Operator’s Name	(0008, 1070)	3	Not set when no entry is made

11.3.5 General Equipment Module

Table 49

Attribute Name	Tag	Type	Attribute Description
Manufacturer	(0008, 0070)	2	Always set (“TOSHIBA_MEC”)
Institution Name	(0008, 0080)	3	Always set
Device Serial Number	(0018, 1000)	3	Always set
Manufacturer’s Model Name	(0008, 1090)	3	Always set (“SSA-770A”)
Software Versions	(0018, 1020)	3	Always set (“V3.00”)

11.3.6 General Image Module

Table 50

Attribute Name	Tag	Type	Attribute Description
Instance Number	(0020, 0013)	2	Always set
Patient Orientation	(0020,0020)	2C	Always set (Length = 0)
Content Date	(0008, 0023)	2C	Always set
Content Time	(0008, 0033)	2C	Always set
Image Type	(0008, 0008)	3	Always set: Value 1: Pixel Data Characteristics “ORIGINAL” or “DERIVED” Value 2: Patient Exam Characteristics “PRIMARY” or

			“SECONDARY” Value 3: System Defined Term: “US IMAGE” Value 4: Standard Defined Terms: 0001 = 2D Imaging 0002 = M-Mode 0004 = CW Doppler 0008 = PW Doppler 0010 = Color Doppler 0020 = Color M-Mode 0040 = 3D Rendering Aforementioned Values may be combined.
Acquisition Date	(0008, 0022)	3	Always set
Acquisition Time	(0008, 0032)	3	Always set
Image Comments	(0020, 4000)	3	Not set when no entry is made
Lossy Image Compression	(0028, 2110)	3	Not set when no entry is made
Lossy Image Compression Ratio	(0028, 2112)	3	Not set when no entry is made

11.3.7 Image Pixel Module

Table 51

Attribute Name	Tag	Type	Attribute Description
Samples per Pixel	(0028, 0002)	1	Always set (3)
Photometric Interpretation	(0028, 0004)	1	Always set (“RGB”)
Rows	(0028, 0010)	1	Always set (537)
Columns	(0028, 0011)	1	Always set (716)
Bits Allocated	(0028, 0100)	1	Always set (8)
Bits Stored	(0028, 0101)	1	Always set (8)
High Bit	(0028, 0102)	1	Always set (7)
Pixel Representation	(0028, 0103)	1	Always set (0): Unsigned Integer
Pixel Data	(7FE0, 0010)	1	Always set
Planar Configuration	(0028, 0006)	1C	Always set (0)

11.3.8 US Region Calibration Module

11.3.8.1 US Region Calibration Module B-mode

Table 52

Attribute Name	Tag	Type	Attribute Description
Sequence of Ultrasound Regions	(0018, 6011)	1	Always set
>Region Location Min x0	(0018, 6018)	1	Always set
>Region Location Min y0	(0018, 601A)	1	Always set
>Region Location Max x1	(0018, 601C)	1	Always set
>Region Location Max y1	(0018, 601E)	1	Always set
>Physical Units X Direction	(0018, 6024)	1	Always set
>Physical Units Y Direction	(0018, 6026)	1	Always set
>Physical Delta X	(0018, 602C)	1	Always set
>Physical Delta Y	(0018, 602E)	1	Always set
>Region Spatial Format	(0018, 6012)	1	Always set
>Region Data Type	(0018, 6014)	1	Always set
>Region Flags	(0018, 6016)	1	Always set
>Transducer Frequency	(0018, 6030)	3	Always set

11.3.8.2 US Region Calibration Module BC-mode

Table 53

Attribute Name	Tag	Type	Attribute Description
Sequence of Ultrasound Regions	(0018, 6011)	1	Always set
>Region Location Min x0	(0018, 6018)	1	Always set
>Region Location Min y0	(0018, 601A)	1	Always set
>Region Location Max x1	(0018, 601C)	1	Always set
>Region Location Max y1	(0018, 601E)	1	Always set
>Physical Units X Direction	(0018, 6024)	1	Always set
>Physical Units Y Direction	(0018, 6026)	1	Always set

>Physical Delta X	(0018, 602C)	1	Always set
>Physical Delta Y	(0018, 602E)	1	Always set
>Region Spatial Format	(0018, 6012)	1	Always set
>Region Data Type	(0018, 6014)	1	Always set
>Region Flags	(0018, 6016)	1	Always set
>Transducer Frequency	(0018, 6030)	3	Always set
>Pulse Repetition Frequency	(0018, 6032)	3	Always set

11.3.8.3 US Region Calibration Module D-mode

Table 54

Attribute Name	Tag	Type	Attribute Description
Sequence of Ultrasound Regions	(0018, 6011)	1	Always set
>Region Location Min x0	(0018, 6018)	1	Always set
>Region Location Min y0	(0018, 601A)	1	Always set
>Region Location Max x1	(0018, 601C)	1	Always set
>Region Location Max y1	(0018, 601E)	1	Always set
>Physical Units X Direction	(0018, 6024)	1	Always set
>Physical Units Y Direction	(0018, 6026)	1	Always set
>Physical Delta X	(0018, 602C)	1	Always set
>Physical Delta Y	(0018, 602E)	1	Always set
>Region Spatial Format	(0018, 6012)	1	Always set
>Region Data Type	(0018, 6014)	1	Always set
>Region Flags	(0018, 6016)	1	Always set
>Transducer Frequency	(0018, 6030)	3	Always set
>Pulse Repetition Frequency	(0018, 6032)	3	Always set
>Doppler Correction Angle	(0018, 6034)	3	Always set

>Steering Angle	(0018, 6036)	3	Always set

11.3.8.4 US Region Calibration Module M-mode

Table 55

Attribute Name	Tag	Type	Attribute Description
Sequence of Ultrasound Regions	(0018, 6011)	1	Always set
>Region Location Min x0	(0018, 6018)	1	Always set
>Region Location Min y0	(0018, 601A)	1	Always set
>Region Location Max x1	(0018, 601C)	1	Always set
>Region Location Max y1	(0018, 601E)	1	Always set
>Physical Units X Direction	(0018, 6024)	1	Always set
>Physical Units Y Direction	(0018, 6026)	1	Always set
>Physical Delta X	(0018, 602C)	1	Always set
>Physical Delta Y	(0018, 602E)	1	Always set
>Region Spatial Format	(0018, 6012)	1	Always set
>Region Data Type	(0018, 6014)	1	Always set
>Region Flags	(0018, 6016)	1	Always set
>Transducer Frequency	(0018, 6030)	3	Always set

11.3.9 US Image Module

Table 56

Attribute Name	Tag	Type	Attribute Description
Sample Per Pixel	(0028, 0002)	1	Always set (3)
Photometric Interpretation	(0028, 0004)	1	Always set (“RGB”)
Bits Allocated	(0028,0100)	1	Always set (8)
Bits Stored	(0028, 0101)	1	Always set (8)
High Bit	(0028, 0102)	1	Always set (7)
Planar Configuration	(0028, 0006)	1	Always set (0)

Pixel Representation	(0028, 0103)	1	Always set (0)
Image Type	(0008, 0008)	2	Always set: Value 1: Pixel Data Characteristics “ORIGINAL” or “DERIVED” Value 2: Patient Exam Characteristics “PRIMARY” or “SECONDARY” Value 3: System Defined Term: “US IMAGE” Value 4: Standard Defined Terms: 0001 = 2D Imaging 0002 = M-Mode 0004 = CW Doppler 0008 = PW Doppler 0010 = Color Doppler 0020 = Color M-Mode 0040 = 3D Rendering Aforementioned values may be combined.
Lossy Image Compression	(0028, 2110)	1C	Always set
Ultrasound Color Data Present	(0028, 0014)	3	Always set (1)
Heart Rate	(0018, 1088)	3	Not set when no entry is made. Beat per minute.
Transducer Type	(0018, 6031)	3	Always set Defined Terms: “SECTOR_PHASED” “LINEAR” “CURVED LINEAR” “VECTOR_PHASED”

11.3.10 VOI LUT Module

Table 57

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

11.3.11 SOP Common Module

Table 58

Attribute Name	Tag	Type	Attribute Description
SOP Class UID	(0008, 0016)	1	Always set
SOP Instance UID	(0008, 0018)	1	Always set
Specific Character Set	(0008, 0005)	1C	Always set (“ISO_IR 100”)
Instance Number	(0020, 0013)	3	Not set when no entry is made

12 DIMSE and Attributes - Ultrasound Mutl-frame Image Storage SCU

12.1 DIMSE – Ultrasound Multi-frame Image Storage SCU

Table 59

SOP Class	DIMSE Service Element	Usage SCU *1	Usage
Ultrasound Multi-frame Image Storage	C-STORE	M	Used

*1: M = Mandatory

12.2 Entity Module Definitions – Ultrasound Multi-frame Image Storage SCU

The information modules for the Ultrasound Workstation are defined below.

Table 60

Information Entity	Module	Reference	Usage[1]
Patient	Patient Module	12.3.1	M
Study	General Study Module	12.3.2	M
Study	Patient Study Module	12.3.3	U
Series	General Series Module	12.3.4	M
Frame of Reference	Frame of Reference Module	Not Used	U
Frame of Reference	US Frame of Reference Module	Not Used	C
Equipment	General Equipment Module	12.3.5	M
Image	General Image Module	12.3.6	M
	Image Pixel Module	12.3.7	M
	Palette Color Lookup Table	Not Used	C
	Contrast/bolus Module	Not Used	C
	Cine Module	12.3.8	M
	Multi-frame Module	12.3.9	M
	US Region Calibration Module	12.3.10	U
	US Image Module	12.3.11	M
	Overlay Plane Module	Not Used	U
	VOI LUT Module	12.3.12	U
	SOP Common Module	12.3.13	M
Curve[2]	Curve Identification Module	Not Used	M
	Curve Module	Not Used	M

	Audio Module	Not Used	U
	SOP Common	Not Used	M

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

[2] The Image and Curve IEs are mutually exclusive

12.3 Attributes - Ultrasound Multi-frame Image Storage SCU

12.3.1 Patient Module

Table 61

Attribute Name	Tag	Type	Attribute Description
Patient's Name	(0010, 0010)	2	Length = 0 when no entry is made
Patient ID	(0010, 0020)	2	Always set
Patient's Birth Date	(0010, 0030)	2	Length = 0 when no entry is made
Patient's Sex	(0010, 0040)	2	Length = 0 when no entry is made
Patient Comments	(0010, 4000)	3	Length = 0 when no entry is made (“Insurance=” Health Insurance Information<LINE FEED> Additional Patient Information)

12.3.2 General Study Module

Table 62

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
Name of Physician(s) Reading Study	(0008,1060)	3	Not set when no entry is made

12.3.3 Patient Study Module

Table 63

Attribute Name	Tag	Type	Attribute Description
Admitting Diagnoses Description	(0008,1080)	3	Always set (Length = 0)
Patient's Age	(0010, 1010)	3	Not set when no entry is made
Patient's Size	(0010, 1020)	3	Not set when no entry is made
Patient's Weight	(0010, 1030)	3	Not set when no entry is made
Additional Patient’s History	(0010, 21B0)	3	Not set when no entry is made

12.3.4 General Series Module

Table 64

Attribute Name	Tag	Type	Attribute Description
Modality	(0008, 0060)	1	Always set (“US”)
Series Instance UID	(0020, 000E)	1	Always set
Series Number	(0020, 0011)	2	Always set
Series Date	(0008, 0021)	3	Not set when no entry is made
Series Time	(0008, 0031)	3	Not set when no entry is made
Performing Physician’s Name	(0008, 1050)	3	Not set when no entry is made
Operator’s Name	(0008, 1070)	3	Not set when no entry is made

12.3.5 General Equipment Module

Table 65

Attribute Name	Tag	Type	Attribute Description
Manufacturer	(0008, 0070)	2	Always set (“TOSHIBA_MEC”)
Institution Name	(0008, 0080)	3	Always set
Device Serial Number	(0018, 1000)	3	Always set
Manufacturer’s Model Name	(0008, 1090)	3	Always set (“SSA-770A”)
Software Versions	(0018, 1020)	3	Always set (“V3.00”)

12.3.6 General Image Module

Table 66

Attribute Name	Tag	Type	Attribute Description
Instance Number	(0020, 0013)	2	Always set
Patient Orientation	(0020,0020)	2C	Always set (Length = 0)
Content Date	(0008, 0023)	2C	Always set
Content Time	(0008, 0033)	2C	Always set
Image Type	(0008, 0008)	3	Always set: Value 1: Pixel Data Characteristics “ORIGINAL” or “DERIVED” Value 2: Patient Exam Characteristics “PRIMARY” or

			“SECONDARY” Value 3: System Defined Term: “US IMAGE” Value 4: Standard Defined Terms: 0001 = 2D Imaging 0002 = M-Mode 0004 = CW Doppler 0008 = PW Doppler 0010 = Color Doppler 0020 = Color M-Mode 0040 = 3D Rendering Aforementioned Values may be combined.
Acquisition Date	(0008, 0022)	3	Always set
Acquisition Time	(0008, 0032)	3	Always set
Image Comments	(0020, 4000)	3	Not set when no entry is made
Lossy Image Compression	(0028, 2110)	3	Not set when no entry is made
Lossy Image Compression Ratio	(0028, 2112)	3	Not set when no entry is made

12.3.7 Image Pixel Module

Table 67

Attribute Name	Tag	Type	Attribute Description
Samples per Pixel	(0028, 0002)	1	Always set (3)
Photometric Interpretation	(0028, 0004)	1	Always set (“YBR_FULL_422”)
Rows	(0028, 0010)	1	Always set
Columns	(0028, 0011)	1	Always set
Bits Allocated	(0028, 0100)	1	Always set (8)
Bits Stored	(0028, 0101)	1	Always set (8)
High Bit	(0028, 0102)	1	Always set (7)
Pixel Representation	(0028, 0103)	1	Always set (0): Unsigned Integer
Pixel Data	(7FE0, 0010)	1	Always set
Planar Configuration	(0028, 0006)	1C	Always set (0)

12.3.8 Cine Module

Table 68

Attribute Name	Tag	Type	Attribute Description
Frame Time	(0018,1063)	1C	Always set
Start Time	(0008,2142)	3	Not set when no entry is made
Stop Time	(0008,2143)	3	Not set when no entry is made
Recommended Display Frame Rate	(000,2144)	3	Not set when no entry is made
Cine Rate	(0018,0040)	3	Not set when no entry is made
Frame Delay	(0018,1066)	3	Not set when no entry is made
Image Trigger Delay	(0018,1067)	3	Not set when no entry is made
Effective Duration	(0018,0072)	3	Not set when no entry is made
Actual Frame Duration	(0018,1242)	3	Not set when no entry is made

12.3.9 Muti-Frame Module

Table 69

Attribute Name	Tag	Type	Attribute Description
Number of Frame	(0028,0008)	1	Always set
Frame Increment Pointer	(0028,0009)	1	Always set(0x00181063)

12.3.10 US Region Calibration Module

12.3.10.1 US Region Calibration Module B-mode

Table 70

Attribute Name	Tag	Type	Attribute Description
Sequence of Ultrasound Regions	(0018, 6011)	1	Always set
>Region Location Min x0	(0018, 6018)	1	Always set
>Region Location Min y0	(0018, 601A)	1	Always set
>Region Location Max x1	(0018, 601C)	1	Always set
>Region Location Max y1	(0018, 601E)	1	Always set
>Physical Units X Direction	(0018, 6024)	1	Always set
>Physical Units Y Direction	(0018, 6026)	1	Always set
>Physical Delta X	(0018, 602C)	1	Always set
>Physical Delta Y	(0018, 602E)	1	Always set
>Region Spatial Format	(0018, 6012)	1	Always set
>Region Data Type	(0018, 6014)	1	Always set
>Region Flags	(0018, 6016)	1	Always set
>Transducer Frequency	(0018, 6030)	3	Always set

12.3.10.2 US Region Calibration Module BC-mode

Table 71

Attribute Name	Tag	Type	Attribute Description
Sequence of Ultrasound Regions	(0018, 6011)	1	Always set
>Region Location Min x0	(0018, 6018)	1	Always set
>Region Location Min y0	(0018, 601A)	1	Always set
>Region Location Max x1	(0018, 601C)	1	Always set
>Region Location Max y1	(0018, 601E)	1	Always set
>Physical Units X Direction	(0018, 6024)	1	Always set
>Physical Units Y Direction	(0018, 6026)	1	Always set

>Physical Delta X	(0018, 602C)	1	Always set
>Physical Delta Y	(0018, 602E)	1	Always set
>Region Spatial Format	(0018, 6012)	1	Always set
>Region Data Type	(0018, 6014)	1	Always set
>Region Flags	(0018, 6016)	1	Always set
>Transducer Frequency	(0018, 6030)	3	Always set
>Pulse Repetition Frequency	(0018, 6032)	3	Always set

12.3.10.3 US Region Calibration Module D-mode

Table 72

Attribute Name	Tag	Type	Attribute Description
Sequence of Ultrasound Regions	(0018, 6011)	1	Always set
>Region Location Min x0	(0018, 6018)	1	Always set
>Region Location Min y0	(0018, 601A)	1	Always set
>Region Location Max x1	(0018, 601C)	1	Always set
>Region Location Max y1	(0018, 601E)	1	Always set
>Physical Units X Direction	(0018, 6024)	1	Always set
>Physical Units Y Direction	(0018, 6026)	1	Always set
>Physical Delta X	(0018, 602C)	1	Always set
>Physical Delta Y	(0018, 602E)	1	Always set
>Region Spatial Format	(0018, 6012)	1	Always set
>Region Data Type	(0018, 6014)	1	Always set
>Region Flags	(0018, 6016)	1	Always set
>Transducer Frequency	(0018, 6030)	3	Always set
>Pulse Repetition Frequency	(0018, 6032)	3	Always set
>Doppler Correction Angle	(0018, 6034)	3	Always set

>Steering Angle	(0018, 6036)	3	Always set

12.3.10.4 US Region Calibration Module M-mode

Table 73

Attribute Name	Tag	Type	Attribute Description
Sequence of Ultrasound Regions	(0018, 6011)	1	Always set
>Region Location Min x0	(0018, 6018)	1	Always set
>Region Location Min y0	(0018, 601A)	1	Always set
>Region Location Max x1	(0018, 601C)	1	Always set
>Region Location Max y1	(0018, 601E)	1	Always set
>Physical Units X Direction	(0018, 6024)	1	Always set
>Physical Units Y Direction	(0018, 6026)	1	Always set
>Physical Delta X	(0018, 602C)	1	Always set
>Physical Delta Y	(0018, 602E)	1	Always set
>Region Spatial Format	(0018, 6012)	1	Always set
>Region Data Type	(0018, 6014)	1	Always set
>Region Flags	(0018, 6016)	1	Always set
>Transducer Frequency	(0018, 6030)	3	Always set

12.3.11 US Image Module

Table 74

Attribute Name	Tag	Type	Attribute Description
Sample Per Pixel	(0028, 0002)	1	Always set (3)
Photometric Interpretation	(0028, 0004)	1	Always set (“RGB”)
Bits Allocated	(0028,0100)	1	Always set (8)
Bits Stored	(0028, 0101)	1	Always set (8)
High Bit	(0028, 0102)	1	Always set (7)
Planar Configuration	(0028, 0006)	1	Always set (0)

Pixel Representation	(0028, 0103)	1	Always set (0)
Image Type	(0008, 0008)	2	Always set: Value 1: Pixel Data Characteristics “ORIGINAL” or “DERIVED” Value 2: Patient Exam Characteristics “PRIMARY” or “SECONDARY” Value 3: System Defined Term: “US IMAGE” Value 4: Standard Defined Terms: 0001 = 2D Imaging 0002 = M-Mode 0004 = CW Doppler 0008 = PW Doppler 0010 = Color Doppler 0020 = Color M-Mode 0040 = 3D Rendering Aforementioned values may be combined.
Lossy Image Compression	(0028, 2110)	1C	Always set
Ultrasound Color Data Present	(0028, 0014)	3	Always set (1)
Heart Rate	(0018, 1088)	3	Not set when no entry is made. Beat per minute.
Transducer Type	(0018, 6031)	3	Always set Defined Terms: “SECTOR_PHASED” “LINEAR” “CURVED LINEAR” “VECTOR_PHASED”

12.3.12 VOI LUT Module

Table 75

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

12.3.13 SOP Common Module

Table 76

Attribute Name	Tag	Type	Attribute Description
SOP Class UID	(0008, 0016)	1	Always set
SOP Instance UID	(0008, 0018)	1	Always set
Specific Character Set	(0008, 0005)	1C	Always set (“ISO_IR 100”)
Instance Number	(0020, 0013)	3	Not set when no entry is made

13 DIMSE and Attributes - Query/Retrieve SCU

13.1 DIMSE - Query/Retrieve SCU

Table 77

SOP Class	DIMSE Service Element	Usage SCU	Usage
Study Root Query/Retrieve Information Model - FIND SOP Class	C-FIND	M	Used
	C-FIND CANCEL	M	Used
Study Root Query/Retrieve Information Model - MOVE SOP Class	C-MOVE	M	Used
	C-MOVE CANCEL	M	Used

13.2 Study Root Query/Retrieve Information Model - Find

13.2.1 Study Level SCU Request

Table 78

Attribute Name	Tag	Type	User Input	Matching
Study Date	(0008, 0020)	R	Cannot be used as a filter	Universal
Study Time	(0008, 0030)	R	Cannot be used as a filter	Universal
Accession Number	(0008, 0050)	R	Can be used as a filter	Wildcard
Study Description	(0008, 1030)	O	Cannot be used as a filter	Universal
Patient's Name	(0010, 0010)	R	Can be used as a filter	Wildcard
Patient ID	(0010, 0020)	R	Can be used as a filter	Wildcard
Patient's Birth Date	(0010, 0030)	O	Cannot be used as a filter	Universal
Patient's Sex	(0010, 0040)	O	Cannot be used as a filter	Universal
Study ID	(0020, 0010)	R	Cannot be used as a filter	Universal
Study Instance UID	(0020, 000D)	U	Cannot be used as a filter	Universal

13.2.2 Series Level SCU Request

Table 79

Attribute Name	Tag	Type	User Input	Matching
Series Date	(0008, 0021)	O	Cannot be used as a filter	Universal
Series Time	(0008, 0031)	O	Cannot be used as a filter	Universal
Modality	(0008, 0060)	R	Cannot be used as a filter	Universal
Series Description	(0008, 103E)	O	Cannot be used as a filter	Universal
Series Instance UID	(0020, 000E)	U	Cannot be used as a filter	Universal
Series Number	(0020, 0011)	R	Cannot be used as a filter	Universal

13.2.3 Composite Object Instance Level SCU Request

Table 80

Attribute Name	Tag	Type	User Input	Matching
SOP Instance UID	(0008, 0018)	U	Cannot be used as a filter	Universal
Instance Number	(0020, 0013)	R	Cannot be used as a filter	Universal

14 DIMSE and Attributes – Print SCU

14.1 DIMSE - Print SCU

Table 81

SOP Class	DIMSE Service Element	Usage SCU *1	Usage
Basic Film Session SOP Class	N-CREATE	M	14.2.1.1
	N-DELETE	U	Used
Basic Film Box SOP Class	N-CREATE	M	14.2.2.1
	N-ACTION	M	Used
	N-DELETE	U	Used
Basic Grayscale Image Box SOP Class	N-SET	M	14.2.3.1
Basic Color Image Box SOP Class	N-SET	M	14.2.4.1
Printer SOP Class	N-EVENT-REPORT	M	14.2.5.1
	N-GET	U	
Print Job SOP Class	N-EVENT-REPORT	M	14.2.6

*1: M = Mandatory, C = Conditional, U = User option

14.2 Attributes- Print SCU

14.2.1 Attributes - Basic Film Session SOP Class

14.2.1.1 Attributes - N-CREATE

Table 82

Attribute Name	Tag	Usage	Attribute Description
Number of Copies	(2000, 0010)	U	Always set
Medium Type	(2000, 0030)	U	Always set “BLUE FILM”, “CLEAR FILM”, or “PAPER”
Film Destination	(2000, 0040)	U	Always set “MAGAZINE” or “PROCESSOR”

14.2.2 Attributes - Basic Film BOX SOP Class

14.2.2.1 Attributes – N-CREATE

Table 83

Attribute Name	Tag	Usage	Attribute Description
Image Display Format	(2010, 0010)	M	Always set (“STANDARD\1,1”)
Film Orientation	(2010, 0040)	U	Always set (“PORTRAIT”)
Film Size ID	(2010, 0050)	U	Always set (“8INX10IN”, “10INX12IN”, “10INX14IN”, “11INX14IN”, “14INX14IN”, “14INX17IN”, “24CMX24CM”, or “24CMX30CM”)
Magnification Type	(2010, 0060)	U	Always set
Min Density	(2010, 0120)	U	Always set
Max Density	(2010, 0130)	U	Always set
Referenced Film Session Sequence	(2010, 0500)	M	Always set
>Referenced SOP Class UID	(0008, 1150)	M	1.2.840.10008.5.1.1.1
>Referenced SOP Instance UID	(0008, 1155)	M	Always set

14.2.3 Attributes - Basic Grayscale Image Box SOP Class

14.2.3.1 Attributes – N-SET

Table 84

Attribute Name	Tag	Usage	Attribute Description
Image Position	(2020, 0010)	M	Always set (1)
Basic Grayscale Image Sequence	(2020, 0110)	M	Always set
>Samples Per Pixel	(0028, 0002)	M	Always set (1)
>Photometric Interpretation	(0028, 0004)	M	Always set (“MONOCHROME2”)
>Rows	(0028, 0010)	M	Always set
>Columns	(0028, 0011)	M	Always set
>Pixel Aspect Ratio	(0028, 0034)	MC	Always set
>Bits Allocated	(0028, 0100)	M	Always set (8)
>Bits Stored	(0028, 0101)	M	Always set (8)
>High Bit	(0028, 0102)	M	Always set (7)

>Pixel Representation	(0028, 0103)	M	Always set (0)
>Pixel Data	(7FE0, 0010)	M	Always set

14.2.4 Attributes - Basic color Image Box SOP Class

14.2.4.1 Attributes - N-SET

Table 85

Attribute Name	Tag	Usage	Attribute Description
Image Position	(2020, 0010)	M	Always set (1)
Basic Color Image Sequence	(2020, 0111)	M	Always set
>Samples Per Pixel	(0028, 0002)	M	Always set (3)
>Photometric Interpretation	(0028, 0004)	M	Always set (RGB)
>Planar Configuration	(0028, 0006)	M	Always set (0)
>Rows	(0028, 0010)	M	Always set
>Columns	(0028, 0011)	M	Always set
>Pixel Aspect Ratio	(0028, 0034)	MC	Always set
>Bits Allocated	(0028, 0100)	M	Always set (8)
>Bits Stored	(0028, 0101)	M	Always set (8)
>High Bit	(0028, 0102)	M	Always set (7)
>Pixel Representation	(0028, 0103)	M	Always set (0)
>Pixel Data	(7FE0, 0010)	M	Always set

14.2.5 Attributes - Printer SOP Class

Table 86

Event Type Name	Event	Attributes	Tag	Usage
Normal	1	Printer Status Info	(2110, 0020)	U
Warning	2	Printer Status Info	(2110, 0020)	U
Failure	3	Printer Status Info	(2110, 0020)	U

14.2.5.1 Attributes - N-GET/N-EVENT-REPORT

Table 87

Attribute name	Tag	Usage	Attribute Descriptions
Printer Status	(2110, 0010)	M	“NORMAL”, “FAILURE”, or “WARNING”
Printer Status Info	(2110, 0020)	M	“SUPPLY EMPTY *[a]”,

			“SUPPLY LOW”, “RECEIVER FULL”, “NO RECEIVE MAGAZINE”, or “FILM JAM”

*a: Only valid in case of Printer Status WARNING.

14.2.6 Attributes - Print JOB SOP Class

Table 88

Event Type Name	Event	Attribute Name	Tag	Usage
Pending	1	Execution Status Info	(2100, 0030)	U
		Print Job ID	(2100, 0010)	(Print Queue Management SOP Class not supported)
		Film Session Label	(2000, 0050)	U
		Printer Name	(2110, 0030)	U
Printing	2	Execution Status Info	(2100, 0030)	U
		Print Job ID	(2100, 0010)	(Print Queue Management SOP Class not supported)
		Film Session Label	(2000, 0050)	U
		Printer Name	(2110, 0030)	U
Done	3	Execution Status Info	(2100, 0030)	U
		Print Job ID	(2100, 0010)	(Print Queue Management SOP Class not supported)
		Film Session Label	(2000, 0050)	U
		Printer Name	(2110, 0030)	U
Failure	4	Execution Status Info	(2100, 0030)	U
		Print Job ID	(2100, 0010)	(Print Queue Management SOP Class not supported)
		Film Session Label	(2000, 0050)	U
		Printer Name	(2110, 0030)	U

14.3 Return Status Criterion – Print SCU

The time out values for each DIMSE are as follows:

Table 89

DIMSE	Time Out Values
N-CREATE	60 sec
N-DELETE	60 sec
N-ACTION	240 sec
N-SET	240 sec

15 DIMSE and Attributes - Storage Commitment SCU

15.1 DIMSE - Storage Commitment SCU

Table 90

SOP Class	DIMSE Service Element	Reference	Usage SCU
Storage Commitment Push Model SOP Class	N-ACTION	15.2.1	M
	N-EVENT-REPORT	15.2.2	M

15.2 Attributes - Storage Commitment PUSH MODEL SOP CLASS

15.2.1 Attributes - N-ACTION

Table 91

Action type Name	Action Type ID	Attribute Name	Tag	Requirement Type SCU
Request Storage Commitment	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

15.2.2 Attributes - N-EVENT-REPORT

Table 92

Event Type Name	Event Type ID	Attribute Name	Tag	Requirement Type 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 Failure Exist	2	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

16 DIMSE and Attributes – MWM SCU

16.1 DIMSE – MWM SCU

Table 93

SOP Class	DIMSE Service Element	Usage SCU *1	Usage
Modality Worklist Information Model-FIND	C-FIND	M	Used

*1: M = Mandatory

16.2 Attributes -MWM

16.2.1 Matching Key Attributes

16.2.1.1 Scheduled Procedure Step Module

Table 94

Description/Module	Tag	Matching Key Type	Remarks/Matching Type
Scheduled Procedure Step Sequence	(0040, 0100)	R	
>Scheduled Procedure Step Start Date	(0040, 0002)	R	Range matching only
>Scheduled Procedure Step Start Time	(0040, 0003)	R	Range matching only
>Modality	(0008, 0060)	R	Single value matching only

16.2.2 Return Key Attributes

The supported Return Key Attributes are listed below.

16.2.2.1 SOP Common Module

Table 95

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

16.2.2.2 Scheduled Procedure Step Module

Table 96

Description/Module	Tag	Return Key Type	Remarks
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)	1	
>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	
>Comments on the Scheduled Procedure Step	(0040, 0400)	3	
Specific Character Set	(0008, 0005)	1C	

16.2.2.3 Requested Procedure Module

Table 97

Description/Module	Tag	Return key Type	Remarks
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	
>Code Scheme Designator	(0008, 0102)	1C	
>Code Meaning	(0008, 0104)	3	
Requested Procedure ID	(0040, 1001)	1	
Requested Procedure Priority	(0040, 1003)	2	
Patient Transport Arrangements	(0040, 1004)	2	
Reason for the Requested Procedure	(0040, 1002)	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	
Requested Procedure Location	(0040, 1005)	3	

16.2.2.4 Imaging Service Request Module

Table 98

Description/Module	Tag	Return Key Type	Remarks
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	

16.2.2.5 Visit Identification Module

Table 99

Description/Module	Tag	Return Key Type	Remarks
Admission ID	(0038, 0010)	2	

16.2.2.6 Visit Status Module

Table 100

Description/Module	Tag	Return Key Type	Remarks
Current Patient Location	(0038, 0300)	2	
Patient's Institution Residence	(0038, 0400)	3	

16.2.2.7 Visit Relationship Module

Table 101

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

16.2.2.8 Patient Identification Step Module

Table 102

Description/Module	Tag	Return Key Type	Remarks
Patient's Name	(0010, 0010)	1	
Patient ID	(0010, 0020)	1	.

16.2.2.9 Patient Demographic Module

Table 103

Description/Module	Tag	Return Key Type	Remarks
Patients Birth Date	(0010, 0030)	2	
Patient's Sex	(0010, 0040)	2	
Patient's Weight	(0010, 1030)	2	
Confidentiality Constraint on Patient Data	(0040, 3001)	2	

16.2.2.10 Patient Medical Module

Table 104

Description/Module	Tag	Return Key Type	Remarks
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	

17 DIMSE and Attributes – MPPS SCU

17.1 DIMSE – MPPS SCU

Table 105

SOP Class	DIMSE Service Element	Reference	Usage SCU *1	Usage
Modality Performed Procedure Step SOP Class	N-CREATE	17.2.1	M	Used
	N-SET	17.2.2	M	Used

*1: M = Mandatory

17.2 Modality Performed Procedure Step SOP Class

17.2.1 N-CREATE Attributes

17.2.1.1 SOP Common Module

Table 106

Description/Module	Tag	Request Type	Remarks
Specific Character Set	(0008, 0005)	1C	

17.2.1.2 Relationship Module

Table 107

Description/Module	Tag	Request Type	Remarks
Patient's Name	(0010, 0010)	2	
Patient ID	(0010, 0020)	2	
Patient's Birth Date	(0010, 0032)	2	
Patient's Sex	(0010, 0040)	2	
Referenced Patient Sequence	(0008, 1120)	2	
>Referenced SOP Class UID	(0008, 1150)	1C	
>Referenced Instance UID	(0008, 1155)	1C	
Scheduled Step Attribute Sequence	(0040, 0270)	1	
>Study Instance UID	(0020, 000D)	1	
>Referenced Study Sequence	(0008, 1110)	2	
>Accession Number	(0008, 0050)	2	
>Requested Procedure ID	(0040, 1001)	2	
>Requested Procedure Description	(0032, 1060)	2	

>Scheduled Procedure Step ID	(0040, 0009)	2	
>Scheduled Procedure Step Description	(0040, 0007)	2	
>Scheduled Action Item Code Sequence	(0040, 0008)	2	

17.2.1.3 Information Module

Table 108

Description/Module	Tag	Request Type	Remarks
Performed Station AE Title	(0040, 0241)	1	
Performed Station Name	(0040, 0242)	2	
Performed Location	(0040, 0243)	2	
Performed Procedure Step Start Date	(0040, 0244)	1	
Performed Procedure Step Start Time	(0040, 0245)	1	
Performed Procedure Step End Date	(0040, 0250)	2	
Performed Procedure Step End Time	(0040, 0251)	2	
Performed Procedure Step Status	(0040, 0252)	1	
Performed Procedure Step ID	(0040, 0253)	1	
Performed Procedure Step Description	(0040, 0254)	2	
Performed Procedure Type Description	(0040, 0255)	2	
Procedure Code Sequence	(0008, 1032)	2	

17.2.1.4 Image Acquisition results Module

Table 109

Description/Module	Tag	Request Type	Remarks
Modality	(0008, 0060)	1	
Study ID	(0020, 0010)	2	
Performed Action Item Code Sequence	(0040, 0260)	2	
Performed Series Sequence	(0040, 0340)	2	
>Performing Physician’s Name	(0008, 1050)	2C	
>Operator’s Name	(0008, 1070)	2C	
>Protocol Name	(0018, 1030)	1C	
>Series Instance UID	(0020, 000E)	1C	
>Series Description	(0008, 103E)	2C	
>Retrieve AE Title	(0008, 0054)	2C	
>Referenced Image Sequence	(0008, 1140)	2C	
>Referenced Standalone SOP Instance Sequence	(0040, 0220)	2C	

17.2.2 N-SET Attribute

17.2.2.1 Information Module

Table 110

Description/Module	Tag	Request Type	Requirement Type Final Status
Performed Procedure Step End Date	(0040, 0250)	3	1
Performed Procedure Step End Time	(0040, 0251)	3	1
Performed Procedure Step Status	(0040, 0252)	3	
Performed Procedure Step Description	(0040, 0254)	3	
Performed Procedure Type Description	(0040, 0255)	3	
Procedure Code Sequence	(0008, 1032)	3	

17.2.2.2 Image Acquisition results Module

Table 111

Description/Module	Tag	Request Type	Requirement Type Final Status
Performed Action Item Code Sequence	(0040, 0260)	3	
Performed Series Sequence	(0040, 0340)	3	1
>Performing Physician's Name	(0008, 1050)	2C	2
>Operator's Name	(0008, 1070)	2C	2
>Protocol Name	(0018, 1030)	1C	1
>Series Instance UID	(0020, 000E)	1C	1
>Series Description	(0008, 103E)	2C	2
>Retrieve AE Title	(0008, 0054)	2C	2
>Referenced Image Sequence	(0008, 1140)	2C	
>>Referenced SOP Class UID	(0008, 1150)	1C	
>>Referenced Instance UID	(0008, 1155)	1C	
>Referenced Standalone SOP Instance Sequence	(0040, 0220)	2C	

18 Media(MOD or CD-R) storage Information object definition

18.1 Entry module definitions

Table 112

Object	Module/Key	Reference	Usage[1]
DICOM File Meta Information		18.1.1.1 / 18.1.1.2	M
Basic Directory Information Object	File-set Identification Module	18.1.2.1	M
	Directory Information Module	18.1.2.2	U
Definition of Specific Directory Records	PATIENT keys	18.1.3.1	M
	STUDY keys	18.1.3.2	M
	SERIES keys	18.1.3.3	M
	IMAGE keys	18.1.3.4	M

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

18.1.1 DICOM File Meta Information

18.1.1.1 DICOM File Meta Information of Directory IOD

Table 113

Attribute Name	Tag	Type	Attribute Description
File Preamble	No Tag	1	Always set
DICOM Prefix	No Tag	1	Always set (“DICM”)
Group Length	(0002, 0000)	1	Always set
File Meta Information Version	(0002, 0001)	1	Always set (0001H)
Media Storage SOP Class UID	(0002, 0002)	1	Always set (“1.2.840.10008.1.3.10”)
Media Storage SOP Instance UID	(0002, 0003)	1	Always set
Transfer Syntax UID	(0002, 0010)	1	Always set
Implementation Class UID	(0002, 0012)	1	Always set
Implementation Version Name	(0002,0013)	3	Always set (“TM_APLIO_1.0”)

18.1.1.2 DICOM File Meta Information Image IOD

Table 114

Attribute Name	Tag	Type	Attribute Description
File Preamble	No Tag	1	Always set
DICOM Prefix	No Tag	1	Always set (“DICM”)
Group Length	(0002, 0000)	1	Always set
File Meta Information Version	(0002, 0001)	1	Always set (0001H)
Media Storage SOP Class UID	(0002, 0002)	1	Always set
Media Storage SOP Instance UID	(0002, 0003)	1	Always set
Transfer Syntax UID	(0002, 0010)	1	Always set
Implementation Class UID	(0002, 0012)	1	Always set
Implementation Version Name	(0002, 0013)	3	Always set (“TM_APLIO_1.0”)

18.1.2 Basic Directory Information Object

18.1.2.1 File-set identification Module

Table 115

Attribute Name	Tag	Type	Attribute Description
File-set ID	(0004, 1130)	2	Always set

18.1.2.2 Directory Information Module

Table 116

Attribute Name	Tag	Type	Attribute Description
Offset of the First Directory Record of the Root Directory Entity	(0004, 1200)	1	Always set
Offset of the Last Directory Record of the Root Directory Entity	(0004, 1202)	1	Always set
File-set Consistency Flag	(0004, 1212)	1	Always set
Directory Record Sequence	(0004, 1220)	2	Set if present in image or private object.
>Offset of the Next Directory Record	(0004, 1400)	1C	Set if present in image or private object.
>Record In-use Flag	(0004, 1410)	1C	Always set (FFFFH)
>Offset of Referenced Lower-Level Directory Entity	(0004, 1420)	1C	Set if present in image or private object.
>Directory Record Type	(0004, 1430)	1C	Always set “PATIENT”, “STUDY”, “SERIES”, “IMAGE”, or “PRIVATE”
>Referenced File ID	(0004, 1500)	1C	Contains the filename in media for the Directory Records of Type IMAGE and PRIVATE
>Referenced SOP Class UID in File	(0004, 1510)	1C	For the Directory Record Types IMAGE and PRIVATE
>Referenced SOP Instance UID in File	(0004, 1511)	1C	For the Directory Record Types IMAGE and PRIVATE
>Referenced Transfer Syntax UID in File	(0004, 1512)	1C	For the Directory Record Types IMAGE and PRIVATE
> Record Selection Keys	see below		

18.1.3 Definition of Specific Directory Records

18.1.3.1 PATIENT Keys

Table 117

Attribute Name	Tag	Type	Attribute Description
Specific Character Set	(0008,0005)	1C	Always set (“ISO_IR 100”)
Patent’s Name	(0010, 0010)	2	Set if present in image object.
Patient ID	(0010, 0020)	1	Always set
Patient’s Birth Date	(0010,0030)	3	Set if present in image object.

Patient's Sex	(0010,0040)	3	Set if present in image object.
Patient's Age	(0010,1010)	3	Set if present in image object.
Patient's Size	(0010,1020)	3	Set if present in image object.
Patient's Weight	(0010,1030)	3	Set if present in image object.
Patient's Address	(0010,1040)	3	Set if present in image object.
Patient Comment	(0010,4000)	3	Set if present in image object.

18.1.3.2 STUDY keys

Table 118

Attribute Name	Tag	Type	Attribute Description
Specific Character Set	(0008,0005)	1C	Always set ("ISO_IR 100")
Study Date	(0008, 0020)	1	Always set
Study Time	(0008, 0030)	1	Always set
Accession Number	(0008, 0050)	2	Set if present in image object.
Referring Physician's Name	(0008,0090)	3	Set if present in image object.
Study Description	(0008, 1030)	2	Set if present in image object.
Admitting Diagnosis Description	(0008,1080)	3	Set if present in image object.
Study Instance UID	(0020, 000D)	1C	Always set
Study ID	(0020, 0010)	1	Generates automatically, if not present. Value = "-"

18.1.3.3 SERIES keys

Table 119

Attribute Name	Tag	Type	Attribute Description
Specific Character Set	(0008,0005)	1C	Always set (“ISO_IR 100”)
Series Date	(0008,0021)	3	Set if present in image object.
Modality	(0008, 0060)	1	Always set
Institution Name	(00080080)	3	Set if present in image object.
Institution Address	(00080081)	3	Set if present in image object.
Performing Physician’s Name	(0008,1050)	3	Set if present in image object.
Operator’s Name	(0008,1070)	3	Set if present in image object.
Series Instance UID	(0020, 000E)	1	Always set
Series Number	(0020, 0011)	1	Always set

18.1.3.4 IMAGE keys

Table 120

Attribute Name	Tag	Type	Attribute Description
Specific Character Set	(0008,0005)	1C	Always set (“ISO_IR 100”)
Image Type	(0008, 0008)	3	Always set
SOP Class UID	(0008,0016)	3	Always set
SOP Instance UID	(0008,0018)	3	Always set
Image Date	(0008,0023)	3	Set if present in image object.
Image Time	(0008,0033)	3	Set if present in image object.
Instance Number	(0020, 0013)	1	Always set
Rows	(0028, 0010)	3	Always set
Columns	(0028, 0011)	3	Always set
Calibration Image	(0050,0004)	3	Always set
Pixel Spacing	(0028, 0030)	3	Set if present in image object.
Private Creator	(0029, 0010)	1	Always set
Data Type	(0029,1008)	1	Always set
Data Version	(0029,1009)	1	Always set
Icon Image Sequence	(0088,0200)	3	Always set
>Samples per Pixel	(0028,0002)		1
>Photometric Interpretation	(0028,0004)		“MONOCHROME2”
>Rows	(0028,0010)		64
>Columns	(0028,0011)		64
>Bits Allocated	(0028,0100)		8
>Bits Stored	(0028,0101)		8
>High Bit	(0028,0102)		7
>Pixel Representation	(0028,0103)		0 (Unsigned)
>Pixel Data	(7FE0,0010)		Icon Image pixel data

18.1.3.5 PRIVATE keys

Table 121

Attribute Name	Tag	Type	Attribute Description
Private Recorder UID	(0004,1432)	1	“1.2.392.200036.9116.7.8.1.1.1”
Specific Character Set	(0008,0005)	1C	Always set (“ISO_IR 100”)
Image Type	(0008, 0008)	3	Always set
SOP Class UID	(0008,0016)	3	Always set (“1.2.392.200036.9116.7.8.1.1.1”)
SOP Instance UID	(0008,0018)	3	Always set
Acquisition Data	(0008,0022)	3	Set if present in Toshiba Private Data Information object.
Acquisition Time	(0008,0032)	3	Set if present in Toshiba Private Data Information object.
Private Creator	(0029, 0010)	1	Always set
Data Type	(0029,1008)	1	Always set
Data Version	(0029,1009)	1	Always set

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